Appendix 14-A

Brucejack Gold Mine Project: Cumulative Aquatic Resources Baseline Report

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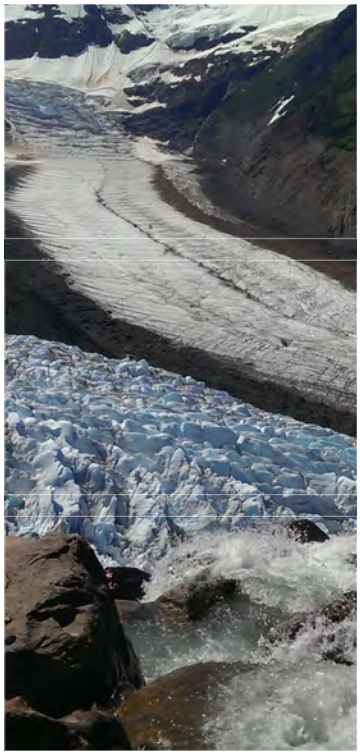

Prepared for:

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BRUCEJACK GOLD MINE PROJECT

Cumulative Aquatic Resources Baseline Report

April 2014

The world's leading sustainability consultancy

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Pretium Resources Inc.

BRUCEJACK GOLD MINE PROJECT
Cumulative Aquatic Resources Baseline Report

April 2014

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EXECUTIVE SUMMARY

INTRODUCTION

Report Purpose

This report describes background aquatic resources conditions relevant to the proposed Brucejack Gold Mine Project (the Project) from 2008-2013 and includes historical data collected in 1988. The purpose of this aquatic resources baseline report is to characterize the spatial and temporal background conditions of aquatic resources in lakes, rivers, and streams that comprise potential aquatic receiving environments for proposed Project facilities. This information has been used as part of the basis for Project planning and design, and for applicable monitoring and management plans and the environmental effects assessment for the Project.

Project Overview

The Brucejack property (56°28'20" N, 130°11'31" W) is located in the Boundary Ranges of the Coast Mountains of northwest British Columbia within the Sulphurets District in the Iskut River region, approximately 950 km northwest of Vancouver, 65 km north-northwest of Stewart, and 21 km south-southeast of the closed Eskay Creek Mine. The mine site itself will be located near Brucejack Lake, at approximately 56°27′59″ N latitude by 130°11′11″ W longitude. The mine access road traverses (from east to west) various subcatchments of the Nass River watershed, including Wildfire Creek (tributary to Bell-Irving River); Todedada Lake and Creek (tributary to Treaty Creek, which is tributary to the Bell-Irving River); Scott Creek (tributary to Bowser River); and Bowser River (tributary to Bell-Irving River) watersheds. The Bell-Irving River is a major tributary of the Nass River. The ~60 km road section from Highway 37 to the toe of the Knipple Glacier is generally situated in mid-elevation valley bottom locations; elevations range from ~500 masl at its lowest point along the Bowser River to ~1,400 masl west of Knipple Glacier within the Brucejack watershed. The Knipple Glacier, on which ~12 km of the access road is routed, also drains to the Bowser River. Additional operations Project infrastructure outside the Mine Site Area (Brucejack watershed) includes the Transmission Line, Knipple Transfer Area, and Bowser Aerodrome.

Mine and Exploration History; Definition of Baseline Aquatic Conditions

Several historic and current human activities have occurred both within, and in proximity to, the proposed Project area. These include mining exploration and production, hydroelectric power generation, forestry, as well as road construction and use. The Brucejack watershed (Mine Site Area) itself is an advanced exploration site with a long history of mineral exploration. There has been exploration for decades, although the most active exploration periods have been from 1986 to 1990 (Newhawk) and from 2009 to present (Silver Standard and Pretivm). In 1999, reclamation of the Newhawk mining activities included the removal of approximately 60,000 m^3 of waste rock located on a pad adjacent Brucejack Creek and subsequent deposition in Brucejack Lake. Activities during the 2011 to present time period have included several large surface exploration programs, as well as underground dewatering, exploration and bulk sample mining. No pre-disturbance baseline aquatic resources data are available for the Brucejack watershed.

BASELINE STUDY AREA

The aquatic resources study area reflects proposed and existing Project infrastructure and considered watersheds over a range of spatial scales from local (i.e., immediately downstream of Brucejack Lake) to regional (i.e., Unuk River at the international border). The aquatic resources study area for the proposed mine site includes the Brucejack Lake and Creek watershed, and the downstream receiving environment of Sulphurets Creek as far as the Unuk River, including Sulphurets Lake. Aquatic resources were also studied within the subcatchments of the Bell-Irving and Nass River watersheds noted above, as a basis for assessing potential effects of proposed ancillary off-site infrastructure. Aquatic resources samples were collected from 30 streams, 10 lakes, one wetland and one effluent site (i.e., existing adit) from 2008 to 2013.

Descriptions of the aquatic resources characterization and monitoring study and corresponding results have been separated according to the watershed groupings; that is, the Brucejack watershed (mine site), Sulphurets watershed and Unuk watershed (near and far-field downstream receiving environments, respectively) and the Bowser/Scott/Todedada/Wildfire watersheds (ancillary Project infrastructure areas).

BRUCEJACK, SULPHURETS, AND UNUK WATERSHEDS (MINE FACILITIES, RECEIVING WATERSHED)

Aquatic resources in the mine site area are generally characterized by high sediment metal concentrations, which are likely due to highly mineralized areas in the Brucejack and Sulphurets watersheds. The relatively low density and richness of primary producers and aquatic invertebrates in the Brucejack watershed is typical for a high elevation, alpine, aquatic ecosystem and the extremely sparse productivity observed in upper Sulphurets Creek and Sulphurets Lake is predictable due to heavy sediment loading from the Sulphurets Glacier.

Water Toxicity

Water toxicity tests were conducted in 2013 and included an acute 48-hour lethality test on the aquatic invertebrate, *Daphnia magna* and a 6-day chronic lethality and reproductive test on the aquatic invertebrate *Ceriodaphnia dubia*. Invertebrates were exposed to test waters of a range of concentrations collected from Brucejack Creek, Camp Creek, the existing adit and upper Sulphurets Creek.

Survival was high in acute and chronic tests for all sites except Camp Creek, where survival was reduced over six days. Aquatic invertebrate reproduction was impaired to varying degrees from upper Brucejack Creek to upper Sulphurets Creek, with lowest impairment in lower Brucejack Creek (BJ2) and highest impairment in upper Sulphurets (SC0).

Sediment Quality

Sediments generally varied between silt- and clay-sized particles in the depositional environment of Brucejack and Sulphurets lakes to sandy sediments in Brucejack Creek and its tributaries. Sediments were generally low in nitrogen, available phosphate, and organic carbon as is typical of high-altitude, low-order waterbodies, and metal contents of sediments reflected the mineralized nature of the geology in the area. Elevated concentrations of aluminum, arsenic, cadmium, copper, iron, lead,

manganese, mercury, selenium, silver, and zinc were observed in the sediments of Brucejack Lake and in Brucejack Creek. Sediment concentrations of chromium and nickel were higher in the downstream Sulphurets and Unuk watersheds than in the Brucejack watershed.

Sediment Quality Guidelines

Sediment concentrations of arsenic, cadmium, copper, iron, lead, manganese, mercury, selenium, silver and zinc were frequently greater than BC Ministry of Environment and CCME (Canadian Council of Ministers of the Environment) guidelines throughout the areas where sampling was conducted. Furthermore, the concentrations of lead in the Brucejack watershed, and nickel in the Sulphurets and Unuk watersheds were often greater than guidelines. Sediment cadmium concentrations were above guidelines in some samples in some sites on Brucejack Creek, Sulphurets Creek and the Unuk River, by a maximum factor of 1.6.

Tissue Residues

Tissue metal concentrations were variable among benthic invertebrates collected from Brucejack Creek, Sulphurets Creek, and the Unuk River. Among the collection sites in these watersheds, tissue metal concentrations were generally greatest in benthic invertebrates collected at site BJ2 in Brucejack Creek. The concentrations of total mercury in tissue were always less than the CCME methylmercury guideline for the protection of wildlife consumers of aquatic biota. Similarly, the tissue concentrations of selenium were always less than the BC guideline. No associations between sediment metal concentrations and tissue metal concentrations were observed except for the relationship between sediment and tissue mercury concentrations, which were positively correlated.

Primary Producers

The Brucejack watershed has a relatively low density and richness of primary producers and aquatic invertebrates, as is typical for a high elevation, alpine, aquatic ecosystem. Extremely sparse productivity was observed in upper Sulpurets Creek and Sulphurets Lake, as is predictable due to heavy sediment loading from the Sulphurets Glacier.

Primary producers were generally in low abundance and biomass in the mine site area and downstream receiving environment. Lakes had consistently low (Brucejack Lake) to very low (Sulphurets Lake) densities of phytoplankton cells. Substantial inter-annual variation was observed in the density of periphyton in streams, which frequently coincided with changes in the composition of the primary producer community. Diatoms were the most frequent periphyton and phytoplankton taxa, with cyanobacteria and chrysophytes contributing substantially in some lake and stream samples.

Aquatic Invertebrates

Sampling results indicate that benthic invertebrate and zooplankton densities are generally low in the mine site area and downstream receiving environment, and are temporally and spatially variable in lakes and streams in the Brucejack, Sulphurets, and Unuk watersheds.

Brucejack and Sulphurets Lake benthic invertebrate communities were both dominated by Chironomidae (non-biting midges; Diptera). Zooplankton communities were primarily Calanoida copepods in Brucejack Lake, and Rotifera in Sulphurets Lake. Chironomidae and Annelida (worms)

were the primary constituents of Brucejack Creek benthic invertebrate communities. In contrast, Sulphurets Creek and the Unuk River had an abundance of Chironomidae, Ephemeroptera (mayflies) and Plecoptera (stoneflies). Stream benthic invertebrate richness was higher in Sulphurets Creek and the Unuk River compared to Brucejack Creek; however, this was not reflected in the diversity values. Lake benthic invertebrate and zooplankton richness and diversity were low in both Brucejack and Sulphurets lakes.

BOWSER/SCOTT/TODEDADA/WILDFIRE WATERSHEDS (ANCILLARY INFRASTRUCTURE AREAS)

Aquatic resources in the ancillary infrastructure area (Bowser, Scott, Todedada and Wildfire watersheds) are also characterized by elevated sediment metal concentrations, with variable primary production and benthic communities often reflecting the differing influence of glaciers on the sampling sites.

Sediment Quality

Lake and stream sediments in the ancillary Project infrastructure areas tended to range from sandy sediments (many streams) to silty-clay (lakes). Sediment nutrient concentrations were variable and ranged from near analytical detection limits at the BR1 site on the Bowser River to relative high total nitrogen and total organic carbon concentrations in Todedada Lake. Metals were generally abundant in sediments in the ancillary Project infrastructure areas. In terms of spatial variability of sediment chemistry, the concentrations of copper, iron, lead, and manganese were generally similar in sediments throughout the Bowser, Scott Creek, Todedada, and Wildfire watersheds. The Todedada watershed tended to have higher concentrations of arsenic, cadmium, mercury, selenium, silver, and zinc.

Sediment Quality Guidelines

Sediment concentrations of arsenic, cadmium, copper, iron, manganese, nickel and zinc were frequently greater than BC Ministry of Environment and CCME (Canadian Council of Ministers of the Environment) guidelines throughout the sampled sites in the Bowser/Scott/Todedada/Wildfire watersheds. Furthermore, sediment concentrations of chromium, mercury, selenium and silver greater than guidelines in at observed at some sites.

Primary Producers

Primary producer density and biomass in the ancillary Project infrastructure areas were variable and tended to reflect the influence of sediment loading from glaciers on the sampling sites.

Periphyton and phytoplankton density and biomass varied substantially among streams and lakes in the ancillary Project infrastructure areas, with highest phytoplankton densities and biomass in Todedada Lake, and very low densities and biomasses in Bowser and Knipple Lakes. Higher-order stream sites along the Bowser River, Scott Creek, and Wildfire Creek tended to have greater densities of periphyton than the other streams. Cyanobacteria were the dominant taxa in streams, with smaller contributions from chrysophytes and diatoms. Phytoplankton abundance was too low in Bowser and Knipple lakes to resolve the phytoplankton communities, but Todedada Lake was generally dominated by cyanobacteria.

Aquatic Invertebrates

Like the mine site area, Chironomidae were the most common benthic invertebrate taxa in the ancillary Project infrastructure area, along with Ephemeroptera and Plecoptera. The zooplankton community in lakes of ancillary Project infrastructure areas were generally composed of rotifers.

Ancillary project infrastructure streams and lakes had variable benthic invertebrate and zooplankton densities, and in general, levels in Todedada Lake were elevated. Stream benthic invertebrate communities were similar to Sulphurets Creek and the Unuk River, with an abundance of Chironomidae, Ephemeroptera and Plecoptera. Chironomidae were also common in Knipple Lake, while Todedada Lake had a more taxa rich community, with Amphipoda, Annelida, Bivalvia and Chironomidae all abundant. Lake zooplankton communities in the Ancillary project infrastructure areas were dominated by Rotifera. Stream benthic invertebrate community richness and diversity was comparable across watersheds. Lake benthic invertebrate and zooplankton communities had low richness and diversity.

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GLOSSARY AND ABBREVIATIONS

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

<	less than
>	larger than
≤	less than or equal to
≥	larger than or equal to
µg	microgram
µm	micrometres
ALS	ALS Environmental Laboratories
BC	British Columbia
BC MOE	British Columbia Ministry of the Environment
Benthos	Benthic Invertebrates
CABIN	Canadian Aquatic Biomonitoring Network
CAEAL	Canadian Association for Environmental Analytical Laboratories
CCME	Canadian Council of Ministers of the Environment
chl *a*	chlorophyll *a* (used as an estimate of algal biomass)
cm^2	centimetres squared
DAIR	Draft Application Information Requirements
EA	Environmental Assessment
EC	Environment Canada
EEM	Metal Mining Environmental Effects Monitoring
ICp	Inhibiting concentration for a specified percent effect (i.e., IC25).
ID	Idaho
ICPMS	Inductively Coupled Argon Plasma Mass Spectrometry
ISQG	Interim Sediment Quality Guideline (CCME sediment quality guideline)
KSM	Kerr-Sulphurets-Mitchell Project
LC_{50}	Lethal concentration estimated to be lethal to 50% of test organisms

LEL	Lowest Effects Level (BC MOE sediment quality guideline)
m^2	metres squared
m^3	metres cubed
masl	metres above sea level
MDL	Method Detection Limit
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
MMER	Metal Mining Effluent Regulations
Newhawk	Newhawk Gold Mines Ltd.
PEL	Probable Effects Level (CCME sediment quality guideline)
p_i	Proportion of the ith taxon at the station. Used to calculate Simpson's Diversity Index
Pretivm	Pretium Resources Inc.
QA/QC	Quality Assurance and Quality Control
Rescan	Rescan Environmental Services Ltd, an ERM company
RPD	Relative Percent Difference
S	Richness
Seabridge	Seabridge Gold Inc.
SEL	Severe Effects Level (BC MOE sediment quality guideline)
The Project	Brucejack Gold Mine Project
TOC	Total Organic Carbon
tpd	Tonnes per day
VOK	Valley of the Kings
wwt	Wet Weight

1. INTRODUCTION

1.1 REPORT OBJECTIVES AND ORGANIZATION

The overall objective of the Brucejack Gold Mine Project (Project) aquatic resources baseline study is to characterize the spatial and temporal background conditions of aquatic components in lakes, rivers, and streams that comprise potential aquatic receiving environments for Project facilities. This information is needed to support:

- relevant aspects of Project design, such that mitigation strategies to minimize potential effects on aquatic resources can be incorporated into Project design where feasible;
- the development of aquatic resources related environmental management plans;
- the assessment of potential changes to aquatic resources as a result of the Project; and
- future identification of changes resulting from proposed Project activities through construction, operations and post-closure monitoring programs.

Aquatic resource data that have been collected must also meet or exceed provincial information requirements to support the environmental assessment process (BC MOE 2012). Baseline data for aquatic resources have been collected in the Project area since 2008 and annual sampling was conducted based on the Project designs as of the time of sampling. Aquatic resources encompass water toxicity, sediment quality, tissue residues, primary producer (phytoplankton and periphyton), and aquatic invertebrates (benthic invertebrates and zooplankton). Baseline water quality data for the Project were also collected in conjunction with and in support of baseline aquatic resource information. These data are presented in a separate, standalone report (ERM Rescan 2014). Specific objectives for the aquatic resource studies included:

1. Identify waterbodies that could be directly or indirectly affected by the Project;
2. Collect water toxicity, sediment quality, tissue residue, primary producer, and aquatic invertebrate data from selected stream/river and lake sites of potentially affected waterbodies; and
3. Compile and present water toxicity, sediment quality, tissue residue, primary producer and aquatic invertebrate data from sampled waterbodies in the study area.

This report documents aquatic resources studies completed for the Project in 2008 through 2013, including data from the neighbouring Kerr-Sulphurets-Mitchell (KSM) Project. The report also presents historical sediment quality data collected by previous property owner (Newhawk) and Environment Canada in 1988 (Newhawk 1989; Godin and Chamberlain 1990). These datasets are used to define baseline conditions.

The report is organized as follows:

- Introductory information related to the Project (Chapters 1 and 2);
- Introductory information related to aquatic resources (Chapter 3);
- The details of the aquatic resources sampling program and the methodologies used (Chapters 4 and 5);
- The results of the aquatic resources program, including water toxicity, sediment quality, tissue residue, primary producers and aquatic invertebrates (Chapter 6);
- Conclusions (Chapter 7); and
- Analytical results presented in Appendices 1 to 6.

1.2 REGULATORY AND POLICY FRAMEWORK

This section provides an overview of the relevant provincial and federal statutory framework, guidance documents, and policies related to potential Project-related effects on aquatic resources (summarized in Tables 1.2-1 and 1.2-2).

At the provincial level, the *Environmental Management Act* (EMA, 1996b) requires authorization of specified discharges to the environment, including the aquatic receiving environment. The legislation provides enforcement options to protect human health and the quality of water, land, and air in BC. Mines require authorization under the EMA to discharge mine affected effluent to receiving waters, and are required to register effluent (or have it included in the mine effluent permit) from sewage treatment facilities. Mines are also required to comply with requirements for the production, storage, treatment, recycling or discharge of prescribed quantities of hazardous waste (Table 1.2-1). Authorizations (permits or approvals) for effluent discharges from mines include monitoring requirements, which may entail water quality, sediment sampling and other aquatic resources monitoring. Applications for effluent discharge authorizations must assess the potential for adverse effects on aquatic resources. Further, the Ministry of Environment (BC MOE) provides specific guidelines for field sampling (BC MOE 2004, 2012) and laboratory analyses (BC MOE 2009). There are surface water quality guidelines for the protection of aquatic life in BC (BC MOE 2006, 2013; Table 1.2-2), including some that are based on presently approved and working Canadian Council of Ministers of the Environment (CCME) guidelines.

Aquatic habitat is subject to several federal legislations and regulations including the *Canada Water Act* (1985a), the *Fisheries Act* (1985b) and its enabled *Metal Mining Effluent Regulations* (MMER; SOR/ 2002-222), and the *Canadian Environmental Protection Act* (1999; Table 1.2-1). Regulations designed to protect aquatic resources are premised on the avoidance of deleterious effects to water quality, quantity, sediment quality, and aquatic organisms. In British Columbia, the Environmental Protection Division of the Ministry of Environment (BC MOE) provides specific guidelines for field sampling and laboratory analyses of aquatic resources (BC MOE 2009, 2012; Clark 2003).

Table 1.2-1. Summary of Applicable Statutes and Regulations for Potential Aquatic Resource Effects, Brucejack Gold Mine Project

Name	Level of Government	Description
Environmental Management Act (EMA)	Provincial (MOE)	The EMA provides the authorization framework to protect human health and the quality of water, land, and air in BC. Mine activities requiring authorization or registration under EMA include discharge of effluent to the aquatic receiving environment and the production, storage, treatment and discharge of prescribed quantities of hazardous waste.
British Columbia Approved & Working Water Quality Guidelines	Provincial (MOE)	Water quality criteria are defined as maximum or minimum physical, chemical or biological characteristics of water, biota or sediment; and are applicable province-wide. They are intended to prevent detrimental effects on water quality or aquatic life, under specified environmental conditions. The guidelines are intended to prevent detrimental effects on water quality or aquatic life, under specified environmental conditions.
Mines Act	Provincial (MEM)	The *BC Mines Act* and its associated Health, Safety and Reclamation Code for Mines in BC require that mines have a program for the environmental protection of land and watercourses throughout mine life, including plans for prediction and prevention of metal leaching and acid rock drainage, and prevention of erosion and sediment release. Watercourses are required to be reclaimed, and the Ministry of Energy and Mines has the authority to require monitoring and/or remediation programs to protect watercourses and water quality.
Canadian Council of Ministers of the Environment (CCME) Sediment Quality Guidelines for the Protection of Aquatic Life	National	Environmental Quality Guidelines (EQGs) are intended to protect, sustain, and enhance the quality of the Canadian environment. Each jurisdiction determines the degree to which it will adopt CCME recommendations and EQGs should not be regarded as blanket values for national environmental quality; users of EQGs consider local conditions and other supporting information (e.g., site-specific background concentrations of naturally occurring substances) during the implementation. Science-based site-specific criteria, guidelines, objectives, or standards may, therefore, differ from the Canadian EQGs.
Metal Mining Effluent Regulations (under the *Fisheries Act*)	National (DFO)	The MMER (SOR/2002-222) regulate the deposition of mine effluent if it is not within a defined pH range, if the concentrations of the MMER deleterious substances in the effluent do not exceed authorized limits, and if the effluent is demonstrated to be non-acutely lethal to rainbow trout. These discharge limits were established to be minimum national standards based on best available technology economically achievable at the time. To assess the adequacy of the effluent regulations for protecting the aquatic environment, the MMER include EEM requirements to evaluate the potential effects of effluent on fish, fish habitat, and the use of fisheries resources.
Other Guidance Documents	Provincial and Federal	• Policy for Metal Leaching and Acid Rock Drainage in British Columbia (BC MEM and BC MELP 1998) • Guidelines for Metal Leaching and Acid Rock Drainage at Mine sites in British Columbia (Price and Errington 1998) • Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (Price 2009) • Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators (Ministry of Environment 2012)

Table 1.2-2. Provincial and Federal Guidelines Applicable to Aquatic Resources

	Units	BC Guideline		CCME Guideline	
		For the Protection of Freshwater Aquatic Life			
Sediment Metals		**LEL[a]**	**SEL[b]**	**ISQG[c]**	**PEL[d]**
Arsenic (As)	mg/kg	5.9	17	5.9	17
Cadmium (Cd)	mg/kg	0.6	3.5	0.6	3.5
Chromium (Cr)	mg/kg	37.3	90	37.3	90
Copper (Cu)	mg/kg	35.7	197	35.7	197
Iron (Fe)	mg/kg	21,200	43,766	-	-
Lead (Pb)	mg/kg	35	91.3	35	91.3
Manganese (Mn)	mg/kg	460	1,100	-	-
Mercury (Hg)	mg/kg	0.170	0.486	0.170	0.486
Nickel (Ni)	mg/kg	16	75	-	-
Selenium (Se)	mg/kg	2	-	-	-
Silver (Ag)	mg/kg	0.5	-	-	-
Zinc (Zn)	mg/kg	123	315	123	315
Periphyton Biomass		**For the Protection of Freshwater Aquatic Life**			
Chlorophyll *a*	mg/m²	100		-	
Tissue Residues		**For the Protection of Wildlife**			
Methyl Mercury (Hg)	mg/kg wwt	0.033		0.033	
Selenium (Se)	mg/kg wwt	1		-	

[a] *BC lowest effect level based on the screening level concentration.*
[b] *BC severe effect level based on the screening level concentration.*
[c] *CCME interim sediment guideline.*
[d] *CCME probable effects level.*

Provincial and/or federal guidelines are provided for individual parameters in sediments, periphyton biomass and tissue residues. Provincial sediment quality guidelines for the protection of aquatic life are often based on approved and working Canadian Council of Ministers for the Environment (CCME) guidelines (BC MOE 2006, 2013; CCME 2000, 2013; Table 1.2-2). These guidelines are a useful tool for sediment quality monitoring. A provincial guideline exists for periphyton biomass (BC MOE 2013), largely used as a tool to evaluate nutrient loading. Both provincial and/or federal guidelines for the protection of wildlife exist for tissue metals that may bioaccumulate (Table 1.2-2).

2. PROJECT DESCRIPTION AND MINE HISTORY

2.1 PROJECT OVERVIEW

Pretivm proposes to develop the Project as a 2,700 tonne per day (tpd) underground gold and silver mine. The proposed Brucejack Gold Mine Project (the Project) is located at 56°28'20" N latitude by 130°11'31" W longitude, which is approximately 950 km northwest of Vancouver, 65 km north-northwest of Stewart, and 21 km south southeast of the Eskay Creek Mine (Figure 2.1-1).

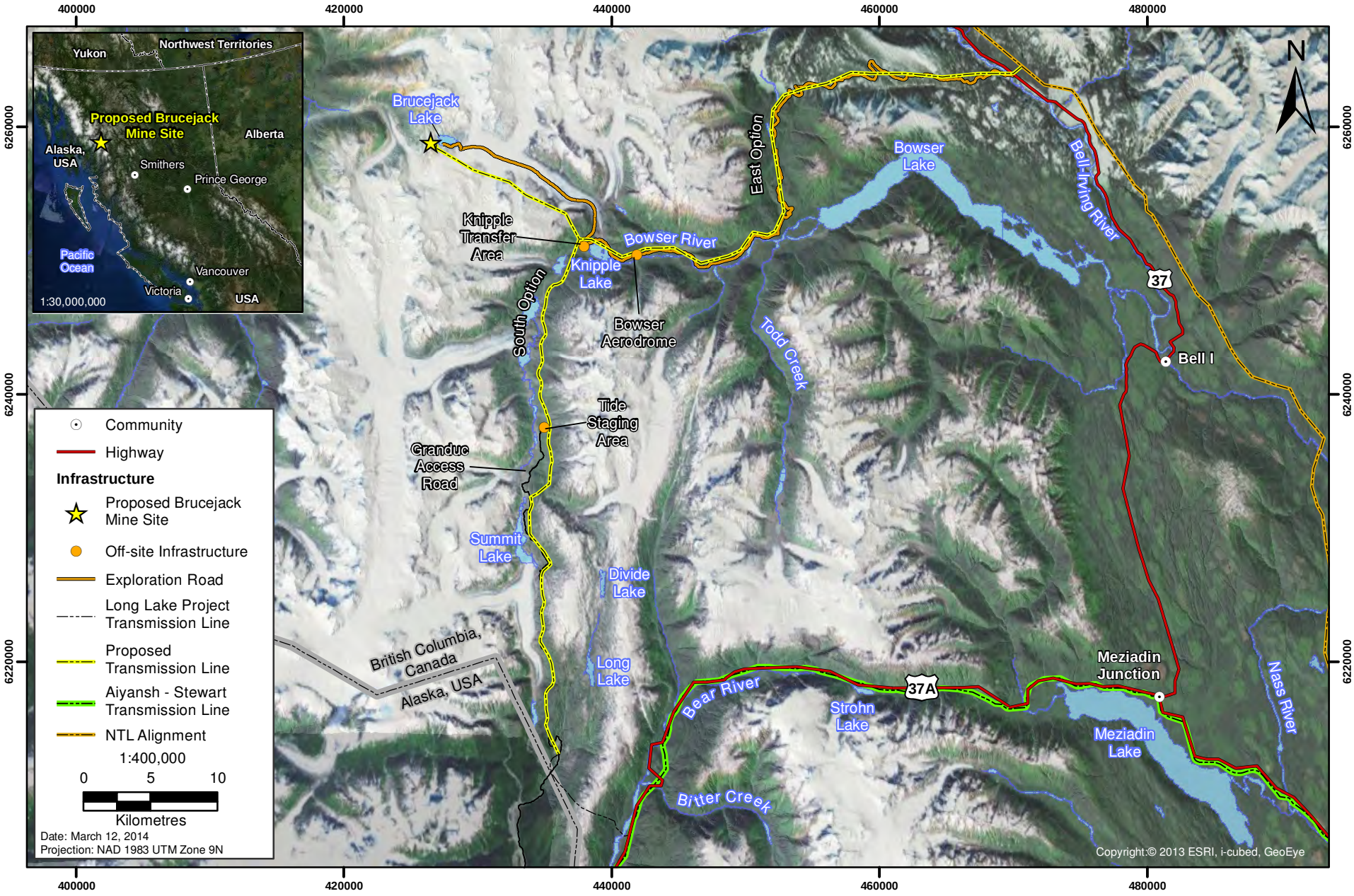
The Project is within the Kitimat-Stikine Regional District. Several First Nations have traditional territory within the general region of the Project, including the Skii km Lax Ha, the Tahltan Nation, the Gitxsan First Nation, and the Gitanyow First Nation. Nisga'a Nation has Treaty Rights in the region as defined by the Nisga'a Final Agreement.

The Brucejack property is within the boundary range of the Coast Mountain Physiographic Belt, along the western margin of the Intermontane Tectonic Belt. The local terrain ranges from generally steep in the western portion of the Project area in the high alpine with substantial glacier cover, to relatively subdued topography in the eastern portion of the Project area towards Wildfire Creek and the Bell-Irving River. Elevations within the project area range from 1,400 metres above sea level (masl) through the Brucejack Lake area to lower level terrain near the Wildfire Creek and Bell-Irving River of 500 masl. Sparse fir, spruce, and alder grow along the valley bottoms, with only scrub alpine spruce, juniper, alpine grass, moss, and heather covering the steep valley walls.

The mine site proper will be located near Brucejack Lake at approximately 56°27′59″ N latitude by 130°11′11″ W longitude (Figure 2.1-1). A transmission line will connect the mine site to the provincial power grid; at the time of baseline data collection two options were being considered, the South Option is now the proposed route (Figure 2.1-1). Vehicle access to the mine site will be via an existing exploration access road from Highway 37; the access road will require some upgrades to facilitate traffic during mine operations. The mine access road traverses (from east to west) the Wildfire Creek watershed (tributary to Bell-Irving River); Todedada Lake and Creek (tributary to Treaty Creek, which is tributary to the Bell-Irving River); Scott Creek (tributary to Bowser River); and the Bowser River (tributary to Bell-Irving River) watersheds (Figure 2.1-1). The ~59 km road section from Highway 37 to the toe of the Knipple Glacier is generally situated in mid-elevation valley bottom locations; elevations range from ~500 masl at its lowest point along the Bowser River to ~1,400 masl west of Knipple Glacier within the Brucejack watershed. The Knipple Glacier, on which ~12 km of the access road is routed, also drains to the Bowser River.

Additional proposed operations Project infrastructure outside the mine site (Brucejack watershed) includes the Knipple Lake Transfer Station and Bowser Aerodrome (Figure 2.1-1).

Figure 2.1-1
Brucejack Gold Mine Project - Regional Setting



2.2 SITE HISTORY

Several types of human activities have previously and/or continue to occur both within and near the proposed Project Area. These include mining exploration and production, hydroelectric power generation, and forestry.

The proposed mine site, located within the Brucejack watershed, is an advanced exploration site with a long history of mineral exploration. Historic exploration activities that may have affected aquatic resources, either short or long-term, are summarized in Table 2.2-1. Further assessment of the possible effects of these activities is provided in Section 5: Methodology.

Table 2.2-1. Summary of Exploration Activities within the Brucejack Watershed, 1935 to 2013

Period	Activity
1935	Discovery of Cu-Mo mineralization on the Sulphurets Property, ~6 km NW of Brucejack Lake; these claims were staked in 1960.
1935-1959	Project area inactive with respect to prospecting.
1960-1979	Granduc exploration, lithogeochemical sampling, trenching and diamond drilling north and northwest of Brucejack Lake.
1980	Esso Minerals Canada Ltd. (Esso) optioned the Property from Granduc; completed an extensive program consisting of mapping, trenching, and geochemical sampling.
1982-1983	Exploration and drilling activities confined to silver and gold bearing vein systems in the Brucejack Lake area at the southern end of the property, including the Near Shore and West zones, located 800 m apart near Brucejack Lake. Drilling commenced on the Shore Zone.
1982-1985	Small-scale mining of the Catear (Goldwedge) area (Unnamed Creek – Trib2, a tributary of Brucejack Lake); included on-land and lake disposal of an unquantified volume of waste rock and approximately 4,000 t of tailings from a small underground mine.
1986-1999	Various operators explored the Sulphurets Property; an underground program was completed on the West Zone of the Brucejack Property by the Newcana JV.; waste rock placed as shallow pad along the southern boundary of Brucejack Creek (~124, 000 tonnes).
1986-1989	Adit excavation and active de-watering of underground water.
1990	Project halted due to economic constraints, underground workings allowed to flood.
1990 - May 2011	Adit passively draining into Brucejack Creek.
July 27 to Aug. 27, 1999	Waste rock and lime deposition in Brucejack Lake (~124,000 t).
May 1, 2011 - present	Current exploration and drilling program (Pretivm).
Nov. 6 to Dec. 5, 2011	Underground dewatering test, discharge to Brucejack Creek.
Sept. 1 to Dec. 31, 2012	Waste rock deposition into Brucejack Lake.
Jan. 2013	Water treatment plant (WTP) commissioning.

Newhawk Gold Mines Ltd.'s Sulphurets Project was an advanced underground exploration project located at the currently proposed Brucejack mine site. The Sulphurets Project was reviewed in 1990 via the Mine Development Assessment Process that preceded the current British Columbia Environmental Assessment Act, and subsequently received a Certificate approving mine development. Underground workings began in the fall of 1986 and continued until late 1990 as part of an advanced exploration and bulk sampling program (Newhawk 1989; Price 2005). Discharge

from the existing adit (Plate 2.2-1) began in the late 1980's following the initial underground development of this program (Price 2005). The waste rock generated from the underground workings during Newhawk operations was used as a shallow pad for the foundation for camp facilities along the southern boundary of Brucejack Creek, just downstream of Brucejack Lake. Two small piles of low-grade ore were placed at the back of the pad and two small streams, Camp and Little Camp Creek, were piped under the pad. Reclamation efforts following the Newhawk advanced exploration work included deposition of waste rock and ore within Brucejack Lake. Roughly 60,000 m^3 of waste rock was removed from the pads along lower Brucejack Creek and deposited in Brucejack Lake during July and August 1999 (Price 2005).

Plate 2.2-1. Passive discharge from the Adit (August 2011).

To support its advanced exploration program, Newhawk completed the construction of a 1,050 m (3,500 ft.) long industrial airstrip in the upper Bowser River Valley approximately 1,500 m northeast of Knipple Lake (Newhawk 1989). An all-weather road was also constructed between Knipple Lake and the west end of Bowser Lake in 1988. The access road in the Bowser Valley was about 22 km long and connected the western most landing on Bowser Lake with Knipple Camp near the toe of the Knipple Glacier (Newhawk 1989).

Pretivm acquired the Brucejack Gold Mine property from Silver Standard Resources Inc. in December 2010 and entered the exploration phase in May 2011. Exploration has included surface and underground drilling programs, a bulk sampling program, construction of an exploration access road from Highway 37 to the west end of Bowser Lake, and the rehabilitation of an existing access road from the west end of Bowser Lake to Brucejack Mine Site (Table 2.2-1).

3. AQUATIC RESOURCE CONTEXT

Aquatic resources include primary producers (organisms that photosynthesize to produce their own energy and provide the basis of the food web) and secondary producers (organisms that feed on primary producers and on each other). Primary producers include periphyton in streams (algae attached to substrates and along bottoms), macrophytes, and phytoplankton (free-floating algae found in lakes). Secondary producers include benthic invertebrates (dwelling in and on sediment of streams and lakes) and zooplankton (invertebrates that live in the open waters of lakes).

Effects to aquatic resources may occur through changes in water quality and sediment quality. Sediment quality includes the physical and chemical properties of sediment in streams and lakes. Sediment quality is an indicator of long-term patterns in water quality because sediment particles adsorb and absorb water constituents. Fluxes of these constituents are always moving between the water and sediment depending on the environmental conditions. Aquatic organisms living on or within sediment (e.g., periphytic algae, macrophytes, benthos, benthivorous, and bottom-dwelling fish) can be adversely affected by poor water and sediment quality. Aquatic organisms living in the water column can be adversely affected by poor water quality; potential effects can be estimated by the experimental results of water toxicity bioassays on representative organisms. Water and sediment quality can influence contaminant transfer through direct toxicity and bioaccumulation and affect upper trophic level structure (e.g., trophic cascade) and function in aquatic ecosystems; bioaccumulation of metals can be estimated by analyzing metals in tissues of resident organisms. Consequently, aquatic resources play a key role in aquatic ecosystem health.

The following components were collected as part of the Project aquatic resources program:

- water toxicity;
- sediment quality;
- tissue residues;
- primary producers; and
- aquatic invertebrates.

3.1 WATER TOXICITY

Once a mine becomes operational, bioassays form part of the requirements for effluent monitoring under the MMER (SOR/2002-222) of the federal *Fisheries Act* (1985b) and may also be required by MOE under the effluent permit. Inclusion of these tests provides a measure of baseline toxicity to aquatic invertebrates; an important food source for higher trophic levels (e.g., fish).

3.2 SEDIMENT QUALITY

The natural physical and chemical composition of sediments in surface waters varies depending on underlying geology, topography, hydrological regimens, and the chemical composition of overlying

water. The chemical compositions of water and sediment co-vary, with factors such as pH and temperature driving the exchange of elements and molecules between sediments and the overlying water column.

The physical and chemical compositions of sediments are interrelated, with strong associations between grain sizes and elemental concentrations. For example, many heavy metals absorb onto fine-grained sediments (e.g., clay and silt). For this reason, higher concentrations of metals tend to be found in depositional areas associated with fine-grained sediments, including the deepest area of lakes and areas of slow-moving water (pools) and back-eddies in streams.

The physical and chemical compositions of sediments are important determinants of the quantity and identity of benthic organisms, which are a primary food source for fish. Changes in sediment size or chemistry can influence benthic community density and structure, and thus, can cascade to affect the highest trophic levels in aquatic systems.

3.3 TISSUE RESIDUES

Biological tissues are important sampling media in mine-related baseline development and impact assessment. Similar to sediments, tissues can absorb metal or organic compounds discharged by operational or post-closure mines. These compounds may be taken up directly from the water column via facilitated diffusion (e.g., organic metals) or, in the case of organic selenium and methyl-mercury, may be taken up via dietary sources, stored in fat and tissues and biomagnified in the food chain. The quantification of baseline tissue compound levels provides reference for future accumulations experienced by aquatic organisms and can form the foundation for the development of food chain or bioaccumulation models. Observation of future changes in tissue compound loads relative to baseline conditions can provide an early warning that compounds may be bioaccumulating in the food chain, allowing mitigation measures to be implemented before concentrations reach levels at which effects may occur. Baseline benthic invertebrate tissue residue was collected for the Project.

3.4 PRIMARY PRODUCERS

Phytoplankton and periphyton are primary producers that live in the water column and on submerged surfaces, respectively, and perform the key biogeochemical process of producing organic matter from inorganic nutrients and carbon by photosynthesis. As primary producers, phytoplankton and periphyton are important food sources for grazers, such as zooplankton and benthic invertebrates, and therefore comprise the base of lake and stream food webs, ultimately driving ecosystem bioenergetics. Phytoplankton are particularly important in lakes, especially deep lakes that lack productive littoral communities and in lakes lacking major terrestrial inputs. Phytoplankton are consumed by zooplankton (which are consumed by fish), flushed out of the lake, or exported to the sediments. Periphyton are particularly important in shallow lakes (where the UV reaches the sediment layer) and in streams. Periphyton are an important food item for many benthic invertebrates, which in turn are a primary food source for fish. Phytoplankton and periphyton also affect water chemistry through their interactions with the carbon, nitrogen, phosphorus, and metal biogeochemical cycles and can be significant sinks and sources of organic carbon and macro- and micronutrients (Wetzel 2001).

Because of their short life cycles, phytoplankton and periphyton are among the first organisms to respond to environmental change, and can exhibit taxon-specific responses to stressors, making them good indicators of current environmental conditions. Periphyton community composition can be used as an indicator of biotic integrity and ecosystem health (Hill et al. 2000).

3.5 AQUATIC INVERTEBRATES

Aquatic invertebrates sampled as part of the Project baseline program include benthic invertebrates in both stream and lake environments and zooplankton from lake environments.

Benthic invertebrates (benthos) are widely used as indicators of environmental conditions and change in streams (Hilsenhoff 1988; Poulton et al. 1995). Benthos have close contact with stream and lake substrates, are abundant and sessile, and have a wide range of environmental tolerances that make them good indicators of local conditions and environmental change (Environment Canada 2012). Benthos are also an important food source for fish and have diets that include algae, bacteria, and detritus making benthos an important link between trophic levels. Benthic invertebrate communities' studies are required under the MMER if mine effluent is discharged (SOR/2002-222).

Zooplankton feed on phytoplankton and are preyed upon by fish. Thus, zooplankton are a critical link between the primary producer and microbial communities and higher trophic levels in aquatic systems (Wetzel 2001). Zooplankton affect phytoplankton community densities, biomass, and composition directly through grazing, but also indirectly through nutrient regeneration (Carpenter et al. 1987). Zooplankton communities are also influenced by a variety of physio-chemical factors including water chemistry, pH, and light attenuation.

4. BASELINE STUDY AREA

The baseline study area follows the assessment boundaries established for the regional study area (RSA) to be considered in the environmental effects assessment for the Project (Figure 4.1-1). The RSA is defined as the spatial area within which direct and indirect effects from the Project are anticipated to occur. For this report, the study area has been divided into two, reflecting Project infrastructure locations within the Unuk River and Nass River watersheds:

1. the mine site and downstream receiving environment, which includes the Brucejack, Sulphurets, and Unuk watersheds; and
2. The ancillary Project infrastructure areas, which includes the Bowser, Scott, Todedada, and Wildfire watersheds (all within the Nass River watershed).

4.1 BRUCEJACK, SULPHURETS AND UNUK WATERSHEDS (MINE SITE AREA AND DOWNSTREAM RECEIVING ENVIRONMENT)

Existing and proposed mine facilities are situated within the Brucejack Creek Watershed (11.7 km^2), a small headwater sub-basin in the Sulphurets watershed (299 km^2). All potential effects of the Mine Site Area on aquatic resources are relevant to this watershed. Sulphurets Creek is a tributary of the Unuk River that flows southwest, eventually discharging into the Pacific Ocean northeast of Ketchikan, Alaska (drainage area 2,577 km^2 at mouth). No fish have been found above a 200 m long cascade in Sulphurets Creek, approximately 300 m upstream of its confluence with the Unuk River; this cascade is approximately 20 km downstream of Brucejack Lake (Rescan 2013b).

Brucejack Lake is on a high plateau above the tree line at an elevation of 1,365 masl and is ice covered for roughly 8 months of the year. The lake is fed by several small tributaries, Brucejack Lake Watershed has an estimated catchment area of 10.1 km^2 (Knight Piesold Ltd, 2011), a maximum depth of approximately 85 m, and a total surface area of 840,965 m^2 (Rescan 2013c). Brucejack Lake also receives sporadic flow from East Lake, which is situated approximately 500 m to the east and adjacent to Knipple Glacier. The outflow of East Lake has been observed to flow into Brucejack Lake on some occasions and underneath Knipple Glacier on others (Newhawk 1989). However, the predominant condition is for East Lake to discharge eastward, below the Knipple Glacier (Newhawk 1989).

The outlet of Brucejack Lake is at the west end of the lake, where the lake discharges to Brucejack Creek. Brucejack Creek flows westward in a braided channel through alluvial deposits from southern and northern tributaries (VOK Creek and un-named creek) for approximately 1 km, moving through a bedrock-confined canyon containing several waterfalls, chutes and rapids before plunging beneath Sulphurets Glacier, joining the sub-glacial drainage channel of Sulphurets Creek for a further 4 km (Newhawk 1989). Sulphurets Creek emerges from the toe of the Sulphurets Glacier, flows into Sulphurets Lake (drainage area 84 km^2), and then extends from the outlet of Sulphurets Lake to the creek's confluence with the Unuk River (drainage area 400 km^2), which crosses the Canada-US border. Along its flow path to its confluence with the Unuk River, Sulphurets Creek flows receives inputs from several tributaries, the largest being Mitchell Creek (Figure 4.1-1).

The Unuk River is an international waterway and flows southwest for approximately 25 km to the boundary between British Columbia and Alaska before eventually draining into the Pacific Ocean at Burroughs Bay in the Alaska Panhandle, 80 km northeast of Ketchikan, Alaska (Newhawk 1989). Glacier coverage in the Unuk River watershed (15%) is much lower than those of Sulphurets Creek (38%), Sulphurets Lake (49%), and Brucejack Lake (42%) watersheds.

4.1.1 Historical Sampling Sites (1988)

Historical mineral development and water quality monitoring activities within the Brucejack watershed and downstream watercourses have been discussed in a Natural Resources Canada Mine Environment Neutral Drainage (Price 2005) report, in a Stage I Impact Assessment for the Sulphurets Property (Newhawk 1989), the Brucejack Project Feasibility Study (Tetra Tech 2013) and a survey performed by Environment Canada in 1988 (Godin and Chamberlain 1990).

Site-specific historical monitoring sediment data incorporated into this report are as follows (Newhawk 1989, Godin and Chamberlain 1990; Table 4.1-1):

- Brucejack Lake (BJ), from depths of 30 and 88 m, beginning in 1988;
- Brucejack Creek above (BJ U/S) and below (BJ OF and BJ2) the historical waste rock pad and discharge from the Adit, 1988; and
- lower Sulphurets Creek (SC3) and upper Unuk River (UR1A and UR1), 1988.

Data from the entire period of aquatic resource monitoring (1988, and 2008-2013) are included in this report. The historical dataset, including a concordance table of historical and present site names is presented in Appendix 3.

4.1.2 Current Sampling Sites (2008-2013)

Rationale for sampling site selection within the Brucejack, Sulphurets, and Unuk watersheds is summarized in Table 4.1-1. Locations of sampling sites are shown on Figure 4.1-1; photos of key lake and stream sampling locations are provided in Plate 4.1-1; Appendix 1 contains representative photos for all sampling locations.

The sampling program has evolved in response to changes in Project design and to ensure that sampling efforts are sufficient to meet the objectives outlined in Section 1.1, including the assessment of potential Project effects on surface water quality and, by extension, aquatic resources. Current aquatic resources study area boundaries (Figure 4.1-1) reflect proposed and existing Project infrastructure and considered watersheds over a range of spatial scales from local (i.e., immediately downstream of Brucejack Lake) to regional (i.e., Unuk River at the international border). Within the study area, sampling sites for the current baseline program (2008 through 2013) were selected to cover areas that could potentially be affected by existing and proposed Project facilities and activities and also to align with historical sampling efforts (Figure 4.1-1).

Figure 4.1-1
Aquatic Sampling Sites, Brucejack Gold Mine Project Study Area, 1988-2013

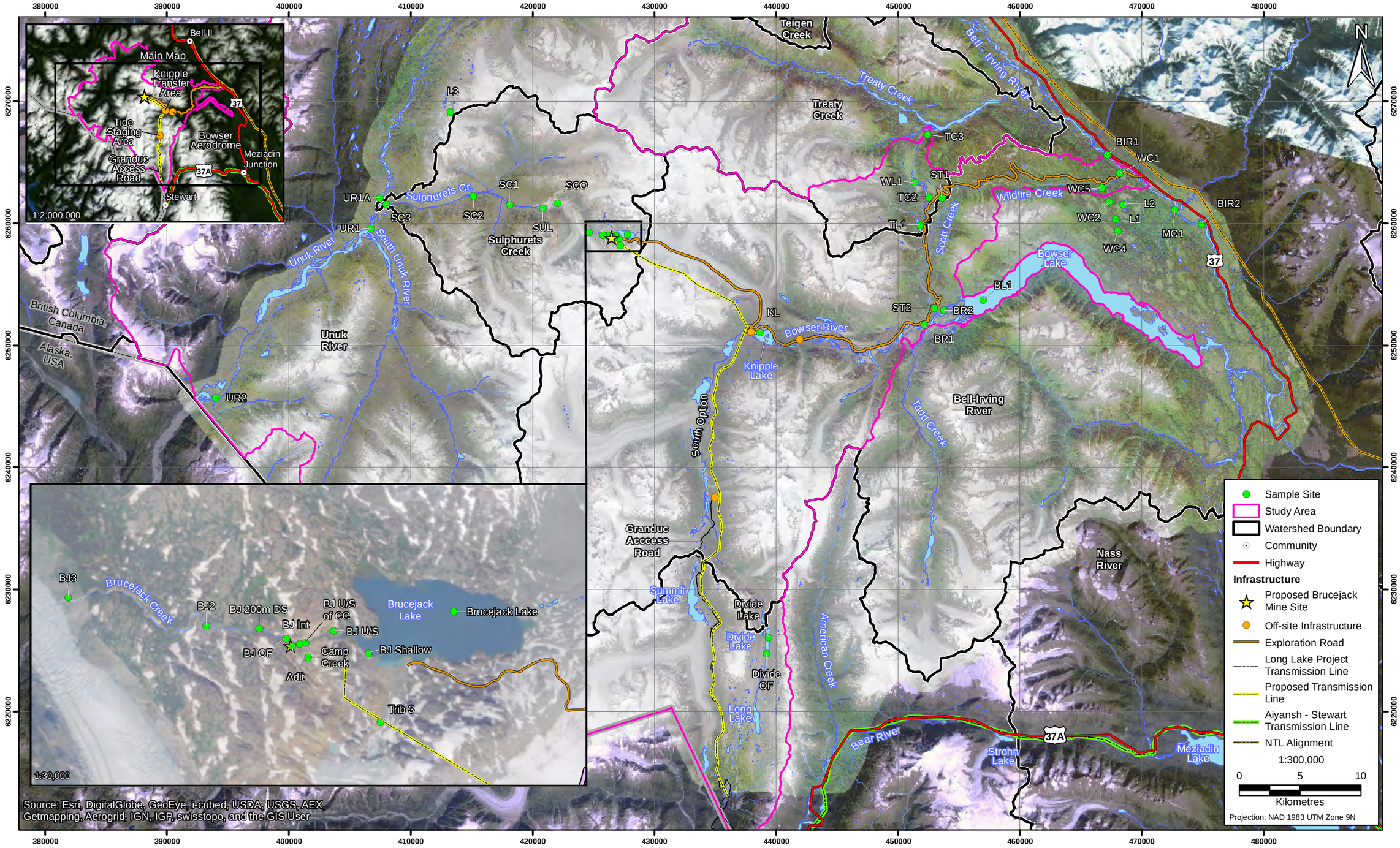


Table 4.1-1. Mine Site Area and Downstream Receiving Environment Aquatic Resource Baseline Sampling Site Description and Rationale

Watershed	Site Name	Abbreviated Site Name	Easting	Northing	Site Description	Rationale
Brucejack	Unnamed Creek	Trib2[c]	427207	6258233	Northern tributary to Brucejack Lake, receives inputs from Catear adit	Characterize inputs into Brucejack Lake and possible loadings from historical Catear adit, used to inform and substaintiate predictive water quality models
	Brucejack Lake[a]	BJ	427804	6259140	Centre of Brucejack Lake near the deepest point of the lake	Site of waste rock and tailings disposal; historical SQ site
	Brucejack Lake, Shallow	BJ S	427108	6258796	Shallow Portion of Brucejack Lake, proximal to SW outflow	Proximal to waste rock disposal; proximal to south-west outflow of lake
	Brucejack Creek Upstream[a]	BJ U/S	426820	6258983	Brucejack Creek, first sampling site below Brucejack Lake outlet	Upstream of exploration adit discharge and Camp Creek confluence; historic Newhawk Site 2 "Upper Footbridge"
	Brucejack Creek Upstream of Camp Creek	BJ U/S of CC	426587	6258883	Brucejack Creek downstream of BJ U/S, 200m upstream of Camp Creek	Upstream of exploration adit and Camp Creek confluence
	Camp Creek	Camp Creek	426608	6258764	Flows through camp area into Brucejack Creek upstream of the adit, and downstream of BJ U/S of CC	Characterize inputs of Camp Creek into Brucejack Creek
	Brucejack Intermediate	BJ Inter	426538	6258877	Brucejack Creek upstream of adit, downstream of Camp Creek	Characterize Brucejack Creek immediately upstream of exploration adit input
	Adit	Adit	426480	6258857	Drainage from the adit; flows into Brucejack Creek	Characterize Adit discharge into Brucejack Creek
	Brucejack Outflow[a]	BJ OF	426426	6258919	Brucejack Creek immediately downstream of the adit and upstream of the cascades	Characterize Brucejack Creek immediately downstream of exploration adit input; historic Newhawk Site "60 m Below Portal"
	Brucejack 200m Downstream	BJ 200m D/S	426208	6259004	Brucejack Creek 200m downstream of the adit, just below the cascades	Characterize Brucejack Creek downstream of the exploration adit input, below the initial dilution zone (complete mixing)
	Brucejack Creek 2[a]	BJ2	425773	6259026	Brucejack Creek downstream of the adit	Characterize Brucejack Creek below all mine related inputs, including VOK Creek; historic Newhawk Site "Downstream Gage"; Environment Canada Site 4
	Brucejack Creek 3	BJ3	424642	6259256	Brucejack Creek, upstream of Sulphurets Glacier, mid-field	Characterize Brucejack Creek prior to passing under Sulphurets glacier
Sulphurets	Sulphurets Creek 0	SC0	422038	6261659	Sulphurets Creek, downstream of Sulphurets Glacier, inflow to Sulphurets Lake; mid-field	Characterize Sulphurets Creek below the Brucejack Creek confluence and upstream of Sulphurets Lake
	Sulphurets Lake	SUL	420840	6261283	Sulphurets Lake; far-field	Characterize Sulphurets Lake, downstream of mine related discharges
	Sulphurets Creek 1	SC1	418143	6261557	Upper Sulphurets Creek; far-field	Characterize outflow of Sulphurets Lake
	Sulphurets Creek 2	SC2	415127	6262273	Mid Sulphurets Creek, downstream of Mitchell Creek; far-field	Characterize Sulphurets Creek after contributions of Mitchell Creek
	Sulphurets Creek 3[a]	SC3	408001	6261574	Lower Sulphurets Creek; far-field	Characterize Sulphurets Creek prior to mixing with the Unuk River; historic Environment Canada Site 3
Unuk	Unuk River 1A[a]	UR1A	407466	6262103	Unuk River, upstream of Sulphurets confluence; far-field	Upstream of Sulphurets-Unuk confluence and proposed discharge flow path; historic Environment Canada Site 1
	Unuk River 1[a]	UR1	406723	6259606	Unuk River, downstream of Sulphurets confluence; far-field	Characterize Unuk River after confluence with Sulphurets Creek; historic Environment Canada Site 2
	Unuk River 2	UR2	393969	6245694	Unuk River, approximately 18 km downstream of the Sulphurets confluence, upstream of international boundary; far-field	Characterize Unuk River before the American border
Potential Reference[b]	Divide Lake	Divide	439369	6226082	Divide lake, South of Project	Potential reference lake, outside of all proposed and exsisting Project infrastructure and activites and in a topographic and geological environment similar to water courses potentially exposed to Project activities
	Divide Lake, South Outflow	Divide OF	439182	6224736	Divide Lake outflow stream	Potential Reference Stream. Characterize outflow of Divide Lake
	Lake 3	L3	413260	6269123	Potential Reference Lake	Potential Reference Lake

Note: Data collection may have varied slightly from co-ordinates provided.

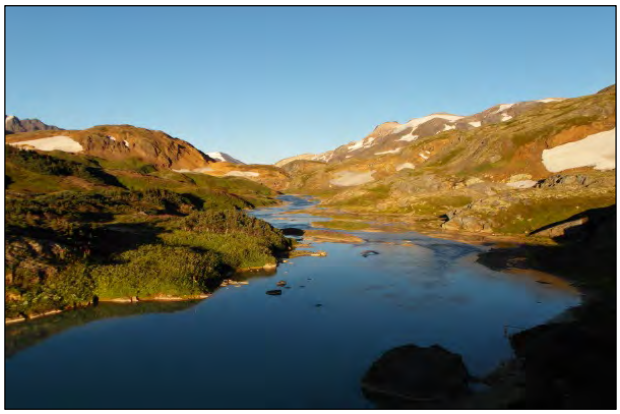
[a] *Historical monitoring site (Newhawk 1989; Godin and Chamberlan 1990) (see text)*

[b] *Reference sites for the Project are currently under evaluation, data is presented separately within Appendices 3 to 6.*

a) Brucejack Lake (BJ)

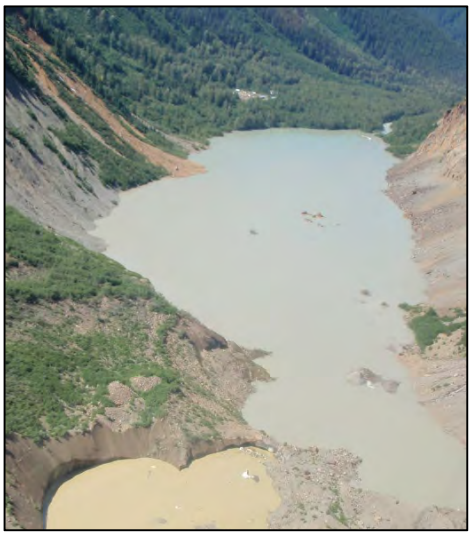
b) Brucejack Creek (BJ U/S of CC)

c) Camp Creek



d) Lower Brucejack Creek (BJ 2)

e) Sulphurets Creek (SC0)



f) Sulphurets Lake (SUL)

(continued)

Plate 4.1-1. Streams and Lakes, from upstream to downstream, within the Brucejack/Sulphurets/Unuk Area sampled as part of the 2008-2013 aquatic resources baseline study for the Brucejack Gold Mine Project.

8) Sulphurets Creek (SC2)

h) Unuk River (UR2)

Plate 4.1-1. Streams and Lakes, from upstream to downstream, within the Brucejack/Sulphurets/Unuk Area sampled as part of the 2008-2013 aquatic resources baseline study for the Brucejack Gold Mine Project (completed).

4.2 BOWSER RIVER, SCOTT CREEK, TODEDADA AND WILDFIRE CREEK WATERSHEDS (ANCILLARY PROJECT INFRASTRUCTURE AREAS)

The proposed Bowser Aerodrome and Knipple Transfer Area (including camp) locations are both within the Bowser River watershed, with the transfer station near to the terminus of the Knipple Glacier (Figure 4.1-1). Knipple Glacier flows in a southeastern direction from the Brucejack Lake area and terminates at Knipple Lake, which feeds the Bowser River. The Bowser River originates southwest of Knipple Lake at Berendon Glacier Lake and Betty Creek, and flows through several lake sections, including the glacier terminus lake for the Frank Mackie Glacier, before reaching Knipple Lake. Downstream of Knipple Lake, the Bowser River flows east to Bowser Lake; the Bowser River confluence with the southerly flowing Scott Creek is just west of Bowser Lake. Bowser Lake has a length of 23 km and a surface area of 36,100,000 m^2 (36.1 km^2; Coombs 1988). Downstream of Bowser Lake the Bowser River eventually flows into the Bell-Irving River.

The existing exploration access road between Highway 37 and the mine site traverses the Wildfire Creek (tributary of Bell-Irving River), Todedada Creek (tributary of Treaty Creek), Scott Creek (tributary of Bowser River), and Bowser River watersheds (Figure 4.1-1). Wildfire Creek, Bowser River, and Treaty Creek drain into the Bell-Irving River (drainage area 5,330 km^2), which eventually flows into the Nass River (21,483 km^2 at mouth) and the Pacific Ocean near the southern tip of the Alaskan panhandle.

4.2.1 Historical Sampling Sites

Little historical aquatic resource data are available for the Bowser River, Scott Creek, Todedada Creek and Wildfire Creek watersheds. There is aquatic invertebrate data for zooplankton collected from Bowser Lake in 1977 (Newhawk 1989), but the methodology is unclear so these data were not incorporated into this report.

4.2.2 Current Sampling Sites (2008-2013)

Rationale for current sampling site selection within off-site and ancillary Project infrastructure areas is summarized in Table 4.2-1. Locations of sampling sites are shown in Figure 4.1-1; photos of key lake and stream sampling locations are provided in Plate 4.2-1; Appendix 1 contains representative photos for all sampling locations.

a) Knipple Lake (KL)

b) Bowser River (BR1)

c) Scott Creek (ST2)

d) Todedada Lake (TL1)

e) Todedada Creek (TC2)

f) Wildfire Creek (WC1)

Plate 4.2-1. Streams and lakes, from upstream to downstream, within the Bowser, Scott Creek, Todedada Creek and Wildfire Creek areas, sampled as part of the 2008-2013 aquatic resources baseline study for the Brucejack Gold Mine Project.

Table 4.2-1. Ancillary Project Infrastructure and Far-Field Aquatic Resources Baseline Sampling Site Description and Rationale

Watershed	Site Name	Abbreviated Site Name	Easting	Northing	Site Description	Rationale
Bowser	Knipple Lake	KL	438656	6251080	Knipple Lake	Characterize Knipple Lake, Transfer Area
	Bowser River 1	BR1	452132	6251635	Bowser River; upstream of Scott Creek	Characterize Bowser River downstream of Knipple lake before confluence with Scott Creek, along access corridor
	Bowser River 2	BR2	453751	6252882	Bowser River; downstream of Scott Creek	Characterize Bowser River downstream of Knipple lake after confluence with Scott Creek, along access corridor
	Bowser Lake	BL1	456976	6253734	Western end of Bowser Lake, downstream of Bowser River	Downstream of access road, Knipple Transfer Station and Bowser Aerodrome
Scott, Todedada and Todd	Scott Creek 1	ST1	453592	6262084	Upstream on Scott Creek	Along access road corridor
	Scott Creek 2	ST2	452955	6253069	Downstream on Scott Creek	Along access road corridor
	Todedada Lake	TL1	451777	6259869	Todedada Lake	Downstream of access road corridor
	Todedada Creek 2	TC2	452499	6262125	Downstream on Todedada Creek	Downstream of access road corridor
	Wetland 1[a]	WL1	451357	6263357	Wetland along Todedada Creek	Proximal to previously considered Project infastructure
	Todedada Creek 3	TC3	452419	6267253	Downstream on Todedada Creek	Downstream of access road corridor
	Todd Creek 1[a]	TD1	452143	6250973	Todd Creek	Reference for Scott Creek
Wildfire and Bell Irving	Wildfire Creek 4[a]	WC4	468025	6259429	Wildfire Creek upstream of Lake 1	Upstream of previously considered Project infastructure
	Wildfire Creek 2[a]	WC2	467314	6261775	Wildfire Creek downstream of Lake 1 (L1)	Downstream of previously considered Project infastructure
	Wildfire Creek 5	WC5	466690	6262885	Wildfire Creek downstream of Lake 1 (L1)	Characterize aquatic resources proximal to road; upstream of Wildfire bridge
	Wildfire Creek 1	WC1	468159	6264118	Wildfire Creek near the mouth	Characterize aquatic resources proximal to road; downstream of Wildfire bridge
	Lake 1[a]	L1	468497	6261553	Lake between WC4 and WC2	Proximal to previously considered Project infastructure
	Lake 2[a]	L2	467834	6260358	Lake east of WC2	Proximal to previously considered Project infastructure
	Bell Irving River 1[a]	BIR1	467158	6265602	Bell-Irving River upstream of the Wildfire Creek confluence	Receiving environment of previously considered Project infastructure
	Bell Irving River 2[a]	BIR2	474921	6259981	Bell-Irving River downstream of the Wildfire Creek confluence	Receiving environment of previously considered Project infastructure
	McInnes Creek[a]	MC1	472712	6261108	McInnes Creek near the mouth	Proximal to previously considered Project infastructure

Note: Data collection may have varied slightly from co-ordinates provided.

[a] *Monitoring sites have varied over the 2008-2013 baseline program to reflect updates to the proposed Project design. These sites are outside the current RSA boundary and are not considered in detail within this report; corresponding aquatic resource data for these sites are reported within Appendices 3 to 6.*

The sampling program in the off-site, ancillary Project areas has evolved with changes in Project design and to ensure that sampling efforts are sufficient to meet the objectives outlined in Section 1.1, including to the assessment of potential Project effects on surface water quality and, by extension, aquatic resources. Monitoring conducted at select sites within the Wildfire Creek, Bell-Irving, and Todd Creek (2008-2010) watersheds reflected previously considered Project infrastructure and are no longer pertinent to the environmental assessment (Figure 4.1-1, Table 4.2-1). Current baseline study area boundaries and sampling efforts within these areas reflect updated Project design and cover areas that could potentially be affected by existing and proposed Project facilities and activities. Although data from the entire period of aquatic resource monitoring (2008-2013) are included in this report, only those sites pertinent to the EA (Table 4.2-1) have been included as a basis for describing baseline or background conditions within the main report. The entire baseline dataset, including results for those sites outside the current study area boundary, are presented in Appendices 1 to 6.

5. METHODOLOGY

5.1 DATA SOURCES

This report describes background aquatic resources condition relevant to the Brucejack Gold Mine Project (the Project) based on both historic information collected by previous property owners Newhawk Gold Mines Ltd. (1989) and recent Project-specific aquatic resource data collected from 2008 to 2013.

Historical data (1988) was accessed from *The Environmental and Socioeconomic Impact Assessment for the Sulphurets Property* (Newhawk 1989) and the baseline monitoring conducted by Environment Canada and reported in *Baseline Monitoring; Sulphurets Project; August 9 1988, Regional data report DR90-02* (Godin and Chamberlain 1990). Studies focused on the downstream pathway flowing west from Brucejack Lake into Brucejack Creek, Sulphurets Creek, and eventually into the Unuk River. Historical aquatic resource data was not available for the Bowser River, Scott Creek, Todedada Creek, and the Wildfire Creek watersheds.

Pretivm has a data sharing agreement with Seabridge Gold Inc. (Seabridge) for their neighbouring Kerr-Sulphurets-Mitchell (KSM) project; this report includes shared aquatic resource data for sites along Sulphurets Creek and the Unuk River.

5.2 HISTORICAL SAMPLING PROGRAM (1988)

5.2.1 Overview

Historical monitoring programs focused on sediments collected from Brucejack Lake and along the Brucejack-Sulphurets-Unuk downstream pathway; site-specific historical monitoring data incorporated into this report are presented in Table 5.2-1.

Limited historical sampling was performed for both toxicity and aquatic invertebrates (Newhawk 1989; Tripp 1987). A 96-hour acute lethality assay was conducted on juvenile rainbow trout (*Oncorhynchus mykiss*) exposed to waters collected from the historical Adit in September 1987. No mortality was observed over the experimental time frame (Newhawk 1989). Aquatic invertebrate data for benthic invertebrates was collected in 1987 from the Brucejack watershed (Tripp 1987) and zooplankton data collected from Bowser Lake are available from 1977 (Newhawk 1989); however, historical methodology is unclear so data were not incorporated into this report.

5.2.2 Sediment Quality

5.2.2.1 Sampling

Historical monitoring in 1988 included collecting samples from two depths in Brucejack Lake (33 and 80 m) and sampling seven sites along the discharge pathway (Table 5.2-1). Overall, sediment quality data for 16 samples are included in this report from historical monitoring programs (Newhawk 1989; Godin and Chamberlain 1990).

5.2.2.2 Analysis

The analytical treatment of historical sediment samples differed from contemporary methods. Only metals were measured. Although metal analysis was performed using inductively coupled argon plasma mass spectrometry (ICPMS) for all samples, historical metal analysis of sediments was conducted on the 150 or 117 µm size fraction rather than the 63 µm size fraction, as recommended by current BC MOE sampling protocols (Clark 2003). Additionally, historical detection limits were occasionally higher than those of the current sampling program. Historical parameter lists and respective detection limits are reported in Section 5.3.3.

5.2.2.3 Quality Assurance and Quality Control (QA/QC)

Duplicate or quintuplet sediment samples were collected at each stream and lake site (Appendix 3). One historical sampling site along Brucejack Creek could not be reconciled with contemporary sampling locations ("Below Camp Waterfall"; Newhawk 1989), so it is not included in figures and analysis, but is available in Appendix 3.

5.3 CURRENT SAMPLING PROGRAM (2008-2013)

5.3.1 Overview

As described in Chapter 4 and Tables 5.2-1 and 5.3-1, the 2008 through 2013 sampling program has evolved with changes in Project design and to ensure that efforts meet program objectives and environmental assessment and permitting-related information requirements. In general terms, sampling effort was comprehensive and included all study watersheds until 2012, after which the sampling effort became focused on the Brucejack, Sulphurets, and Unuk waterbodies (proposed mine site and downstream receiving environment; Tables 5.2-1 and 5.3-1). Overall, baseline information exists for 11 lake/wetland sampling sites, 30 stream sampling sites, and the existing (Newhawk) adit. A minimum of one year of aquatic resource sampling has been completed for all receiving waterbodies potentially affected by Project infrastructure, and there are three or more years of data for some sites, particularly in the mine site area and downstream receiving environment.

Data collected for KSM in 2008 and 2009 included sites in Sulphurets Lake, Sulphurets Creek, and the Unuk River (Table 5.2-1). Aquatic resource sampling was initiated by Pretivm during 2010 in Scott Creek, Bowser River, Todedada Creek, and Todd Creek due to potential infrastructure siting for the Project in these watersheds (Table 5.3-1). Sampling of the Bell-Irving River and Wildfire Creek commenced in 2011 due to potential for Project infrastructure. In addition, the 2011 program included sampling of the Adit discharge and the site Brucejack Creek 2 (BJ2). The 2012 and 2013 sampling programs had an increased focus on the Brucejack watershed; aquatic resources were also collected from Sulphurets Creek and the Unuk River for KSM in 2013 (Tables 5.2-1 and 5.3-1).

Baseline water quality and physical limnology data were collected in conjunction with and in support of baseline aquatic resource characterization for the Project. Water quality and physical limnology data are presented in a separate, standalone report (ERM Rescan 2014).

Table 5.2-1. Mine Site Area and Downstream Receiving Environment, Aquatic Resource Sampling Schedule , 1988 to 2013

Watershed	Site Name	Abbreviated Site Name	Toxicity	Sediment Quality	Tissue Residues	Primary Producers Periphyton / Phytoplankton	Aquatic Invertebrates	
							Benthos	Zooplankton
Effluent	Effluent	Adit[b]	2012, 2013	2011	-	2011	2011	-
Brucejack	Tributary 2	Trib 2	-	2013	-	-	-	-
	Brucejack Lake	BJ	-	1988, 2012, 2013	-	2012, 2013	2012, 2013	2012, 2013
	Brucejack Lake (Shallow)	BJ (Shallow)	-	2012, 2013	-	2012 (Chl *a* only), 2013	2012, 2013	-
	Brucejack Creek Upstream	BJ U/S	2013	2012, 2013	2013	2013	2013*	-
	Brucejack Creek Upstream of Camp Creek	BJ U/S of CC	2012	2012	-	2012	2012	-
	Camp Creek	Camp Creek	2012, 2013	-	-	-	-	-
	Brucejack Creek Intermediate	BJ Inter	-	2012	-	2012	2012	-
	Brucejack Creek Outflow	BJ OF	-	1988	-	-	-	-
	Brucejack Creek 200m D/S	BJ 200m D/S	-	2012, 2013	-	-	-	-
	Brucejack Creek 2	BJ2	2012, 2013	1988, 2011, 2012, 2013	2013	2011, 2012, 2013	2011, 2012, 2013*	-
	Brucejack Creek 3	BJ3	-	2013		2013	2013*	-
Sulphurets	Sulphurets Creek 0	SC0	2013	2013	-	2013	2013*	-
	Sulphurets Lake	SUL	-	2008, 2009, 2013	-	2008, 2009, 2013	2008, 2009, 2013	2008, 2009, 2013
	Sulphurets Creek 1	SC1	-	2008, 2009, 2012	2013	2008, 2009	2008, 2009	-
	Sulphurets Creek 2	SC2	-	2008, 2009, 2012, 2013	2013	2008, 2009, 2013	2008, 2009, 2013**	-
	Sulphurets Creek 3	SC3	-	1988, 2008, 2009, 2012, 2013	2013	2008, 2009, 2013	2008, 2009, 2013**	-
Unuk	Unuk River 1A	UR1A	-	1988, 2008, 2009, 2012, 2013	-	2008, 2009, 2013	2008, 2009, 2013**	-
	Unuk River 1	UR1	-	1988, 2008, 2009, 2012, 2013	2013	2008, 2009, 2013	2008, 2009, 2013**	-
	Unuk River 2	UR2	-	2009, 2012, 2013	2013	2009, 2013	2009, 2013**	-
Potential Reference	Divide Lake[a]	Divide	-	2013	-	2013	2013	2013
	Divide South Outflow[a]	Divide OF	-	2013	2013	2013	2013	-
	Lake 3[a]	L3	-	2013	-	-	-	-

** 2013: Benthos sampled using both CABIN and Hess methodology*

*** 2013: Benthos sampled using CABIN methodology only*

[a] *Reference sites for the Project are currently under evaluation, data is presented within Appendices 1 to 6*

[b] *Sediment quality, primary producer and benthic invertebrate data is presented with in Appendices 3, 5 and 6*

Table 5.3-1. Ancillary Project Infrastructure Areas and Far-field Sites, Aquatic Resource Sampling Schedule, 2008 to 2013

Watershed	Site Name	Abbreviated Site Name	Sediment Quality	Primary Producers	Aquatic Invertebrates	
				Periphyton / Phytoplankton	Benthos	Zooplankton
Bowser	Knipple Lake	KL	2013	2013	2013	2013
	Bowser River 1	BR1	2010	2010	2010	-
	Bowser River 2	BR2	2010	2010	2010	-
	Bowser Lake	BL1	2010	2010	-	2010
Scott, Todedada, and Todd	Scott Creek 1	ST1	2010	2010	2010	-
	Scott Creek 2	ST2	2010	2010	2010	-
	Todedada Lake	TL1	2010	2009, 2010	2009, 2010	2009, 2010
	Todedada Creek 2	TC2	2010	2010	2010	-
	Wetland 1	WL1	2010	2010	2010	-
	Todedada Creek 3	TC3	2010	2010	2010	-
	Todd Creek 1[a]	TD1	2010	2010	2010	-
Wildfire and Bell Irving	Wildfire Creek 4[a]	WC4	2011	-	-	-
	Wildfire Creek 2[a]	WC2	2011	2011	2011	-
	Wildfire Creek 5	WC5	2011	2011	2011	-
	Wildfire Creek 1	WC1	2011	2011	2011	-
	Lake 1[a]	L1	2011	2011	2011	2011
	Lake 2[a]	L2	2011	2011	2011	2011
	Bell-Irving River 1[a]	BIR1	2011	2011	2011	-
	Bell-Irving River 2[a]	BIR2	2011	2011	2011	-
	McInnes Creek 1[a]	MC1	2011	2011	2011	-

[a] *Monitoring sites have varied over the 2008-2013 baseline program to reflect updates to the proposed Project design. These sites are outside the current RSA boundary and are not considered in detail within this report; corresponding aquatic resource data for these sites are reported within Appendices 1 to 6.*

5.3.2 Water Toxicity

5.3.2.1 Sampling

Water for bioassays was collected from five stream sites and one effluent site (Table 5.2-1). To provide context to the bioassay results, toxicity samples were collected in conjunction with water quality samples. Stream samples were collected with the scientist wading into mid-channel (when safe) while facing upstream to avoid potential contamination from sediment disturbance. Water was collected wearing nitrile gloves from within the stream. Samples were collected by submerging bottles approximately 30 cm into the water beneath the surface layer to avoid collecting debris travelling on the surface. All toxicity samples were kept cool and in the dark during storage and were shipped to the fully accredited[1] Nautilus Environmental Laboratory (Burnaby, BC) where they were received within 36 hours.

5.3.2.2 Analysis

In 2012, toxicity tests included a chronic 6-day static renewal *Ceriodaphnia dubia* (freshwater micro-crustacean) partial life cycle test, a 72-h *Pseudokirchneriella subcapitata* (algae) growth inhibition test and a 48-h acute lethality *Daphnia magna* (freshwater micro-crustacean) survival test. In 2013, the toxicity tests repeated both the chronic test using *C. dubia* and the acute lethality test using *D. magna*. Experimental methods followed Environment Canada protocols specific to each bioassay. The method is described in the report generated by Nautilus Environmental (Appendix 2) and is fully detailed by Environment Canada (EC 2000, 2007).

Water quality samples were analyzed using industry-standard techniques at ALS Environmental Laboratories (ALS) in Burnaby, BC, which is an accredited environmental laboratory. Sampling procedures and data analysis followed the principles and procedures outlined in the *British Columbia Field Sampling Manual* (Clark 2003). Water quality samples were analyzed for physicochemical parameters (dissolved oxygen, pH, hardness, turbidity), major anions, nutrients, cyanides (total and weak acid dissociable), total organic carbon (TOC), and total and dissolved metals at the lowest feasible method detection limit (MDL) by ALS. Water quality results are available in Appendix 2.

5.3.2.3 Quality Assurance and Quality Control (QA/QC)

Chain of custody forms were used for water samples as part of the toxicity QA/QC program. Standard protocols were followed with respect to sample handling and storage, holding times, stock culturing, lab acclimation of test water and organisms, test validity, and QA/QC controls (EC 2000, 2007). Negative and positive controls were used to ensure that appropriate testing performance criteria were met, ensuring that dilution water was not detrimental and that test organisms were of good health. Detailed QA/QC results are provided in Appendix 2.

[1] Nautilus Environmental is accredited by the Canadian Association for Environmental Analytical Laboratories (CAEAL) to ISO 17025 standards and is accredited by CAEAL to conduct a number of acute and chronic tests.

5.3.3 Sediment Quality

5.3.3.1 Sampling

Three to five replicate sediment quality samples were collected from 30 streams and one effluent site (the Adit) from 2008 to 2013 (Tables 5.2-1 and 5.3-1). Replicates were collected from distinct areas of each stream (e.g., different braids or different stretches of the main channel) covering 50 to 100 m depending on stream size and site access. For each replicate, sediment was spooned from the top 3 to 5 cm in depositional zones (areas of slow moving water). The subsamples were pooled until sufficient sample was obtained for a complete replicate (Plate 5.3-1). Excess water was drained and the sample was manually homogenized for one minute and then placed in pre-labelled Whirl-Pack bags. Samples were then sealed (no air bubbles) and kept cool in the dark until analyzed by ALS.

Plate 5.3-1. Stream sediment collected from depositional zones (BJ2, September 2012).

Sediment samples were collected from 10 lake and one wetland site between 2008 and 2013 using an Ekman grab sampler (surface area = 0.023 m^2). Sediment was collected from two to three distinct zones, generally around the deepest point in each lake. At each zone, multiple separate grabs were collected a minimum of 5 m apart. The top 2 to 3 cm of each grab were spooned off the surface of the sample into a clean bowl, homogenized, and placed into a pre-labelled Whirl-Pak bag as described above for shipment to ALS (Plate 5.3-2).

Plate 5.3-2. Lake sediment collected using an Ekman sampler (Brucejack Lake, August 2013).

5.3.3.2 Analysis

Whole sediment samples in streams, lakes, and the wetland site were analyzed for pH, particle size, nutrients, and TOC using the lowest possible detection limit (Table 5.3-2). Metal analyses were generally conducted on the < 63 µm fraction of the sample because this fraction is more bioavailable to benthic organisms and tends to contain greater concentrations of metals and other contaminants than the coarse sediment fraction (BC MOE 2012).

Data were delimitated by major Project components (mine site area and downstream receiving environment, and ancillary Project infrastructure areas) and summarized by site and watershed. Sites falling outside of the current Project study area were dropped from analysis.

Sediments collected from relevant sites were compared to current BC MOE working sediment quality criteria (Nagpal et al. 2006) and CCME Interim Sediment Quality Guidelines (CCME 2013). BC sediment quality criteria include the Lower Effects Level (LEL) and the Severe Effects Level (SEL) that provide a flexible interpretive tool for evaluating the toxicological significance of sediment chemistry data, as well as for prioritizing actions and management decisions (CCME 2002). Sediment chemical concentrations below the LEL are not expected to adversely affect biotic communities; however, concentrations above the SEL are expected to be frequently associated with adverse effects on biotic communities. These screening criteria provide practical means to characterize sites as of minimal, potential, or significant toxicological concern. Similarly, the CCME guidelines include the Interim Sediment Quality Guidelines (ISQG) and the Probable Effect Levels (PEL), analogous to the LEL and SEL.

Table 5.3-2. Sediment Quality Parameters and Realized Detection Limits, 1988 to 2013

		Realized Detection Limit						
Parameter	Units	1988	2008	2009	2010	2011	2012	2013
Physical Tests								
Particle Size	%	-	1	1	0.1	0.1	0.1	0.1
Moisture	%	-	0.1	0.1	0.1	0.25	0.25	0.25
pH	%	-	0.1	0.1	0.1	0.1	0.1	0.1
Nutrients								
Available Phosphate	mg/kg	-	1	2	2	2-8	2	2
Total Nitrogen	%	-	0.02	0.02	0.02	-	0.02	0.02
Total Available Nitrogen	mg/kg	-	-	-	-	2.2-31	-	-
Available Ammonium	mg/kg	-	-	-	-	1-6.4	1	1 - 2.4
Available Nitrate	mg/kg	-	-	-	-	4	1-4	1-6
Nitrite	mg/kg					0.4-6		
Available Sulphate	mg/kg	-	-	-	2	3	-	-
Organics								
Total Carbon	%	-	-	0.1	-	-	0.1	0.1
Inorganic Carbon	%	-	-	0.09-0.1	-	-	0.1	0.1
Total Organic Carbon	%	-	0.1	0.1-0.7	0.1	0.1	0.1	0.1
Cyanides								
Total Cyanide	mg/kg	-	3	3	3	3	0.05	0.05
Total Metals								
Aluminum	mg/kg	6,000-24,000	50	50	100	50-100	50	50
Antimony	mg/kg	5	10	10	0.1	0.1	0.1	0.1
Arsenic	mg/kg	n/a	5	5	0.2	0.05-0.2	0.05	0.05
Barium	mg/kg	n/a	1	1	1	0.5-1	0.5	0.5
Beryllium	mg/kg	0.5	0.5	0.5	0.1	0.1	0.1	0.1
Bismuth	mg/kg	2-24	20	20	0.1	0.1	0.1	0.1
Boron	mg/kg	-	-	-	-	-	5	5
Cadmium	mg/kg	0.5	0.5	0.5	0.05	0.05	0.05	0.05
Calcium	mg/kg	n/a	50	50	100	50-100	50	50
Chromium	mg/kg	1	2	2	1	0.5-1	0.5	0.5
Cobalt	mg/kg	10	2	2	0.3	0.1-0.3	0.1	0.1
Copper	mg/kg	n/a	1	1	0.5	0.5	0.5	0.5
Iron	mg/kg	n/a	50	50	100	50-100	50	50
Lead	mg/kg	n/a	30	30	0.1	0.1	0.1	0.1
Lithium	mg/kg	-	2	2	1	-	5	5
Magnesium	mg/kg	n/a	50	50	10	10	10	10
Manganese	mg/kg	n/a	1	1	0.2	0.2	0.2	0.2
Mercury	mg/kg	1	0.005	0.005 - 0.01	0.005	0.005	0.005-0.015	0.005 - 0.015
Molybdenum	mg/kg	1	4	4	0.1	0.1	0.1	0.1
Nickel	mg/kg	1	5	5	0.8	0.8	0.5	0.5
Phosphorus	mg/kg	n/a	50	50	10	10	20	20
Potassium	mg/kg	n/a	200	200	100	100	100	100
Selenium	mg/kg	10	2-10	0.5-11	0.1	0.1	0.1	0.1
Silver	mg/kg	2	2	2	0.05	0.05	0.05	0.05
Sodium	mg/kg	0.1	200	200	100	100	100	100
Strontium	mg/kg	n/a	0.5	0.5	0.1	0.1	0.1	0.1
Sulphur	mg/kg	-	-	0.1-100	-	-	500	500
Thallium	mg/kg	10	1	1	0.1	0.05-0.1	0.05	0.05
Tin	mg/kg	8	5	5	0.2	0.2	0.2	0.2
Titanium	mg/kg	100	1	1	1	1	1	1
Tungsten	mg/kg	5	-	-	-	-	-	-
Uranium	mg/kg	10	-	0.1	0.05	0.05	0.05	0.05
Vanadium	mg/kg	n/a	2	2	2	0.2-2	0.2	0.2
Zinc	mg/kg	n/a	1	1	2	1-2	1	1

Note: Metal analysis was performed on 63 µm size fraction, except for samples collected in 1988 (117 and 150 µm) and 2008 (2000 µm)

The percentage of stream sediment samples with concentrations greater than BC and CCME guidelines and the average factor by which concentrations were greater than guidelines, were calculated for each site for samples from all years. The average factor and percentage of lake sediment concentrations greater than BC MOE and CCME guidelines were presented together because many provincial and federal guidelines overlap.

Cumulative data for sediment quality parameters and existing sediment quality guidelines were presented graphically along with parameters that showed interesting trends in sediment quality (see Figures 6.1-1 to 6.1-18 and 6.2-1 to 6.2-17). Sediment quality data are presented in Appendix 3.

5.3.3.3 Quality Assurance and Quality Control (QA/QC)

Triplicate or quintuplicate sediment samples were collected at each stream site and duplicate or triplicate samples were collected from each lake. At 10% of the sites in 2010, 2012 and 2013, one sediment sample was split and labeled as a duplicate to ensure that sample homogenization was thorough. The relative percent different (RPD) between sediment splits were calculated as below for every parameter greater than 5× the analytical detection limits, where A and B represent the concentration of the parameter in each duplicate (Clark 2003).

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

Quality assurance and quality control results are presented in Appendix 3.

5.3.4 Tissue Residues

5.3.4.1 Sampling

Tissue residues were collected from benthic invertebrate communities at eight stream sites within the mine site area and downstream receiving environment during August or September 2013 (Table 5.2-1), and corresponded with water quality and sediment sampling locations (as recommended by BC MOE 2012). A 400 µm kick net was used to collect benthic invertebrates until the sample size was > 0.5 g in weight. Samples were placed in pre-labelled Whirl-Pack bags, sealed (no air bubbles) and frozen until analyzed by ALS.

5.3.4.2 Analysis

Analysis of tissue moisture and metals was performed using the lowest possible detection limit (Table 5.3-3). Tissue residues were compared to current BC MOE and CCME guidelines for the protection of wildlife.

Tissue residues with existing BC MOE and CCME guidelines (selenium and mercury; Table 1.2-2) were compared to respective sediment quality concentrations and presented graphically (Section 6.1.3, Figure 6.1-19). Tissue residue data are presented in Appendix 4.

Table 5.3-3. Benthic Invertebrate Tissue Residue Parameters and Realized Detection Limits, 2013

	Units	Realized Detection Limit		Units	Realized Detection Limit
Physical Tests			**Metals *(cont'd)***		
% Moisture	%	0.10	Manganese (Mn)	mg/kg wwt	0.0040
Metals			Mercury (Hg)	mg/kg wwt	0.0010
Aluminum (Al)	mg/kg wwt	0.40	Molybdenum (Mo)	mg/kg wwt	0.0040
Antimony (Sb)	mg/kg wwt	0.0020	Nickel (Ni)	mg/kg wwt	0.010
Arsenic (As)	mg/kg wwt	0.0040	Phosphorus (P)	mg/kg wwt	100
Barium (Ba)	mg/kg wwt	0.010	Potassium (K)	mg/kg wwt	400
Beryllium (Be)	mg/kg wwt	0.0020	Rhenium (Re)	mg/kg wwt	0.0020
Bismuth (Bi)	mg/kg wwt	0.0020	Rubidium (Rb)	mg/kg wwt	0.010
Boron (B)	mg/kg wwt	0.20	Selenium (Se)	mg/kg wwt	0.020
Cadmium (Cd)	mg/kg wwt	0.0020	Sodium (Na)	mg/kg wwt	400
Calcium (Ca)	mg/kg wwt	10	Strontium (Sr)	mg/kg wwt	0.010
Cesium (Cs)	mg/kg wwt	0.0010	Tellurium (Te)	mg/kg wwt	0.0040
Chromium (Cr)	mg/kg wwt	0.010	Thallium (Tl)	mg/kg wwt	0.00040
Cobalt (Co)	mg/kg wwt	0.0040	Thorium (Th)	mg/kg wwt	0.0020
Copper (Cu)	mg/kg wwt	0.010	Tin (Sn)	mg/kg wwt	0.020
Gallium (Ga)	mg/kg wwt	0.0040	Uranium (U)	mg/kg wwt	0.00040
Iron (Fe)	mg/kg wwt	0.20	Vanadium (V)	mg/kg wwt	0.020
Lead (Pb)	mg/kg wwt	0.0040	Yttrium (Y)	mg/kg wwt	0.0020
Lithium (Li)	mg/kg wwt	0.020	Zinc (Zn)	mg/kg wwt	0.10
Magnesium (Mg)	mg/kg wwt	20			

wwt = wet weight of sample

5.3.4.3 Quality Assurance and Quality Control (QA/QC)

Due to insufficient sample weight, no field replicates or field splits were collected for tissue residues.

5.3.5 Primary Producers

5.3.5.1 Sampling

Streams

Periphyton samples were collected from rocks *in situ* at 27 stream sites and the Adit effluent from 2008 to 2013 (Tables 5.3-1 and 5.3-2). Three replicates were obtained from randomly collected rocks at each site. Each replicate consisted of three composite subsamples from an individual rock, which were obtained by removing periphyton using a template of known surface area, a modified toothbrush, syringe, and rinse bottle (Plate 5.3-3). For detailed methodology refer to Table 5.3-4.

Plate 5.3-3. Periphyton collection using a circular template, September 2013 (SC2).

Lakes

Phytoplankton samples were collected from eight lakes and one wetland during August or September from 2008 to 2013 (Tables 5.3-2 and 5.3-3). Samples were collected from a depth of 1 m using a GO-FLO sampling bottle (Plate 5.3-4) and transferred into 1 L plastic bottles that were kept cool and dark and transported back to camp. Phytoplankton taxonomy and biomass samples were handled in the same manner as periphyton samples. For detailed methodology refer to Table 5.3-4.

Taxonomic samples were stored in 250 mL plastic bottles and preserved in Lugol's solution. Taxonomic identification and enumeration was conducted by G3 Consulting Ltd. (Surrey, BC; 2008 and 2009 data), Fraser Environmental Services (Surrey, BC; 2010 and 2011 data) and EcoAnalysts, Inc. (Moscow, Idaho, USA; 2012 and 2013 data; Table 5.3-4). For each sample, mean genera richness and diversity (as Simpson's diversity index) were calculated for each site, with variability estimated as standard error (see Section 5.3.5.2). Periphyton and phytoplankton biomass samples were prepared by gently filtering samples through a 0.45 µm filter using a hand pump and filter apparatus. Filters were folded in half, wrapped in aluminum foil, and kept frozen until they were analyzed by ALS.

5.3.5.2 Analysis

Chlorophyll *a* (chl *a*) concentration was used as an estimate of periphyton (µg chl *a*/cm^2) and phytoplankton (µg chl *a*/mL) biomass. Periphyton density was calculated by dividing the total number of cells counted by the area sampled. Phytoplankton density was calculated by dividing the total number of cells counted by the volume sampled. Taxa not identified to division (e.g. unidentified colonial algae) and taxa from diversity scans were completely excluded from all analyses. Taxa not identified to family were included in density estimations, but removed from community composition, richness, and Simpson's diversity calculations.

Table 5.3-4. Primary Producer Sampling Methodology Summary, Brucejack Gold Mine Project Area, 2008 to 2013

	Year					
	2008	2009	2010	2011	2012	2013
Stream Sites	**SC1, SC2, SC3, UR1A, and UR1**	**SC1, SC2, SC3, UR1A, UR1, and UR2**	**BR1, BR2, ST1, ST2, TC2, TC3, and REF1**	**Adit, BJ2, BIR1, BIR2, WC2, WC5, WC1, and MC1**	**BJ U/S of CC, BJ Inter and BJ2**	**BJ U/S, BJ2, BJ3, SC0, SC2, SC3, UR1A, UR1, UR2, Divide OF**
Periphyton						
Number of samples/site	3	3	3	3	3	3
Number of grabs per composite sample	Multiple discs	3	3	3	3	3
Chlorophyll *a* filter size	0.45 µm	0.45 µm	0.45 µm	0.45 µm	0.45 µm	0.45 µm
Taxonomic Analysis	G3 Consulting Ltd.	G3 Consulting Ltd.	Fraser Environmental Services	Fraser Environmental Services	EcoAnalysts, Inc.	EcoAnalysts, Inc.
Chlorophyll *a* Analysis	ALS Environmental Services Ltd.	ALS Environmental Services Ltd.	ALS Environmental Services Ltd.	ALS Environmental Services Ltd.	ALS Environmental Services Ltd.	ALS Environmental Services Ltd.
Lake Sites	**SUL**	**SUL**	**BL1, TL1 and WL1**	**L1 and L2**	**BJ Shallow (Chl *a* only) and BJ**	**BJ Shallow (Chl a only), BJ, SUL, Divide and KL**
Phytoplankton						
Number of samples/site	1 per depth zone (shallow, mid, deep)	2 per depth zone (shallow, mid, deep)	3	1	3	3
Chlorophyll *a* filter size	0.45 µm	0.45 µm	0.45 µm	0.45 µm	0.45 µm	0.45 µm
Taxonomic Analysis	G3 Consulting Ltd.	G3 Consulting Ltd.	Fraser Environmental Services	Fraser Environmental Services	EcoAnalysts, Inc.	EcoAnalysts, Inc.
Chlorophyll *a* Analysis	ALS Environmental Services Ltd.	ALS Environmental Services Ltd.	ALS Environmental Services Ltd.	ALS Environmental Services Ltd.	ALS Environmental Services Ltd.	ALS Environmental Services Ltd.

Plate 5.3-4. Setting up a GO-FLO sampling device to collect phytoplankton, August 2013.

Periphyton and phytoplankton were grouped into genera for richness and Simpson's diversity calculations. Richness and diversity were calculated in accordance with the 2012 Metal Mining Environmental Effects Monitoring Technical Guidance Document (Environment Canada 2012):

$$D = 1 - \sum_{i=1}^{S} (p_i)^2$$

where S is the number of taxa in the replicate and p_i is the proportion of the i^{th} taxon in the replicate. Simpson's diversity can range from 0 (lowest diversity) to 1 (maximum diversity). The use of Simpson's diversity index accounts for both the number of taxa present and the relative density of organisms from each taxa (evenness).

Cumulative biomass, density, and community composition data are presented graphically in Section 6.1 (Figures 6.1-20 to 6.1-24 and 6.2-18 to 6.2-22). Periphyton and phytoplankton biomass and taxonomic data from 2008 to 2013 are presented in Appendix 5. Reference photographs are presented in Appendix 5.

5.3.5.3 Quality Assurance and Quality Control (QA/QC)

Triplicate periphyton and phytoplankton samples were collected at each stream or lake site from 2008 to 2013, with some exceptions (refer to Table 5.3-4 for annual methodology). QA/QC procedures at EcoAnalysts Inc., Fraser Environmental Services and G3 Consulting Ltd. included consistent sample concentration and sub-sampling techniques. Precision was monitored by duplication, where the same taxonomist analyzed a sample in duplicate for 10% of samples. Accuracy was monitored by having a second taxonomist analyze 10% of the sample (Appendix 5). To ensure consistency of higher phylogenetic classification across taxonomists, primary producer data from all years (2009-2013) were merged by taxonomists at EcoAnalysts.

5.3.6 Aquatic Invertebrates

5.3.6.1 Sampling

Benthic Invertebrates

Benthic invertebrates were collected from 25 stream sites, the site of the Adit drainage (when passively draining) and 8 lake sites during August or September from 2008 to 2013 (Tables 5.3-1 and 5.3-2).

Streams

Streams were sampled using a 250 µm Hess sampler (Plate 5.3-5). Hess sampling is advantageous in that the area sampled is known, and many stream microhabitats are sampled through the subsamples and replicates. Three to five replicates were collected at each site, with each replicate comprised of three subsamples collected 5 to 10 m apart or in separate braids of the stream (refer to Table 5.3-5 for annual sampling details).

Plate 5.3-5. Collection of stream benthic invertebrates with a Hess sampler at Scott Creek 1, August 2010.

Table 5.3-5. Secondary Producer Sampling Methodology Summary, Brucejack Gold Mine Project Area, 2008 to 2013

	Year						
	2008	2009	2010	2011	2012	2013	
Stream Sites	**SC1, SC2, SC3, UR1A, and UR1**	**SC1, SC2, SC3, UR1A, UR1, and UR2**	**BR1, BR2, ST1, ST2, TC2, TC3, and REF1**	**Adit, BJ2, BIR1, BIR2, WC2, WC5, WC1, and MC1**	**BJ U/S of CC, BJ Inter and BJ2**	**BJ U/S, BJ2, BJ3, SC0, Divide OF**	**BJ U/S, BJ2, BJ3, SC0, SC2, SC3, UR1A, UR2, Divide OF**
Benthic Invertebrates							
Method	Hess sampler (250 µm; surface area 0.096 m^2)	Hess sampler (250 µm; surface area 0.096 m^2)	Hess sampler (250 µm; surface area 0.096 m^2)	Hess sampler (250 µm; surface area 0.096 m^2)	Hess sampler (250 µm; surface area 0.096 m^2)	Hess sampler (250 µm; surface area 0.096 m^2)	CABIN (400 µm; 3 min kick net)
Number of samples/site	5	5 (3 at UR2)	5	5	3	5	1
Number of grabs per composite sample	3	3	3	3	3	3	0
Taxonomic Analysis	Environmental Research & Consulting	Environmental Research & Consulting	Environmental Research & Consulting	Environmental Research & Consulting	EcoAnalysts, Inc.	EcoAnalysts, Inc.	EcoAnalysts, Inc.
Lake Sites	**SUL**	**SUL**	**BL1[a], TL1 and WL1**	**L1 and L2**	**BJ Shallow (Benthos only) and BJ**	**BJ Shallow (Benthos only), BJ, SUL, Divide, KL**	
Benthic Invertebrates							
Method	Ekman grab sieved through 250 µm mesh	Ekman grab sieved through 250 µm mesh	Ekman grab sieved though 500 µm mesh	Ekman grab sieved though 500 µm mesh	Ekman grab sieved through 250 µm mesh	Ekman grab sieved through 250 µm mesh	
Number of samples/site	1 per depth zone (mid/deep)	2 per depth zone (shallow/mid/deep)	3	3	3	5	
Number of grabs per composite sample	3	1	3	3	3[b]	3	
Taxonomic Analysis	Environmental Research & Consulting	Environmental Research & Consulting	Environmental Research & Consulting	Environmental Research & Consulting	EcoAnalysts, Inc.	EcoAnalysts, Inc.	
Zooplankton							
Method	Vertical haul (118 µm)	Vertical haul (118 µm)	Vertical haul (0.3 m diameter; 120 µm mesh)	Vertical haul (0.3 m diameter; 120 µm mesh)	Vertical haul (0.3 m diameter; 64 µm mesh)	Vertical haul (0.3 m diameter; 64 µm mesh)	
Number of samples/site	1	2	3	3	3	3	
Number of grabs per composite sample	2-3 (dependent on density)	2	3	3	1	1	
Taxonomic Analysis	G3 Consulting Ltd.	G3 Consulting Ltd.	Applied Technical Services	Applied Technical Services	EcoAnalysts, Inc.	EcoAnalysts, Inc.	

[a] *BL1 2010: A horizontal zooplankton haul was required for one replicate since depths were 1 to 2 m and multiple sandbars extended a considerable distance from the shore. No benthic invertebrates were collected from this site.*

[b] *BJ 2012: Rep 3 only has one grab.*

For each stream subsample, the Hess sampler was driven 10 cm into the substrate of an undisturbed riffle zone while the technician was facing upstream, with the cod-end trailing downstream. Larger gravel and rocks inside the sampler were carefully cleaned within the Hess cylinder and then removed from sampler. The sediment was then stirred, scrubbed, lifted and dropped inside the Hess sampler for approximately one minute, allowing the stream current to wash the benthos into the cod-end. The sampler mesh was then carefully rinsed into the cod-end to capture all benthos contained in the sampler area. The contents of the cod-end from each sub-sample were carefully transferred into and combined in a clean, pre-labelled 500 mL plastic jar and preserved with 10% buffered formalin.

Kick-net sampling was conducted at six sites in 2013 according to the Canadian Aquatic Biomonitoring Network (CABIN) protocol by CABIN-certified field personnel (Environment Canada 2010a; Tables 5.3-1 and 5.3-5). A standard CABIN kick-net (400 µm mesh) was used to collect one sample at each site. Samples were collected by placing the kick net downstream of the collector with the flat bottom of the net resting on the substrate and having the sampler walk backward in an upstream direction dragging the net along the bottom of the stream, disturbing the substrate to a depth of 5-10 cm using a kicking motion. The sampler zigzagged continuously over the stream bottom in an upstream direction for a period of three minutes. Contents of the kick-net sample were transferred to a white tray and sample debris was washed from the net into the tray using a squirt bottle. Large rocks were scrubbed, rinsed, and removed from the sample. The contents of the white tray were transferred into clean 500 mL, pre-labelled plastic jars and preserved to a final concentration of 10% buffered formalin.

Lakes

Replicate benthos samples were collected from up to three depth zones from eight lakes sites and one wetland using a standard Ekman grab during August or September from 2008 to 2013 (Tables 5.3-2 and 5.3-3). Each replicate consisted of one to three Ekman grabs pooled together to form a composite sample. At the surface, the contents of the grab samples were released into a 250 µm or 500 µm mesh sieve bucket that was gently sieved and then rinsed into a clean, pre-labelled 500 mL jar (refer to Table 5.3-5 for details). Procedures for sample handling, preservation, transport, and analysis were identical to those described for the stream benthos samples.

Zooplankton

One to three zooplankton replicates were collected from six lakes and one wetland during August or September from 2008 to 2013, with each replicate composed of one to three subsamples (Tables 5.3-1 and 5.3-2). In general, zooplankton samples were collected by lowering a 0.3 m diameter 118-120 µm mesh zooplankton net to a depth of 1 m above the sediments and bringing the net to the surface, vertically, at a speed of 0.5 m/s (refer to Table 5.3-5 for annual details). The contents of the cod-end were then transferred into the same pre-labelled, clean, plastic jar and preserved with 10% buffered formalin. Samples were kept cool and dark and shipped to G3 Consulting Ltd. (Surrey, BC; 2008 and 2009 data), Applied Technical Services (Victoria BC; 2010 and 2011 data), or EcoAnalysts Inc. (Moscow, ID; 2012 and 2013 data) for analysis.

5.3.6.2 Analysis

Benthic Invertebrates

Taxonomic analyses were conducted by Environmental Research and Consulting (Summerland, BC; 2008 to 2011) and EcoAnalysts Inc. (2012 and 2013). Invertebrates were sorted and identified to the lowest possible taxonomic level (usually genus).

The number of organisms in each replicate was converted to density by dividing each sample by the area or volume sampled. Ostracoda, Cladocera, Nematoda, Copepoda, Porifera, Platyhelminthes and terrestrial organisms were excluded from all analysis following Environment Canada (2010b) CABIN protocols. Immature, damaged, or specimens not identified to the family level were included in density estimations, but excluded from all other analyses. Benthos density, genus richness, and Simpson's diversity indices were calculated for each sample at a family level (Section 5.3.5).

Cumulative data showing density and community composition are presented graphically in Section 6.1 (Figures 6.1-25 to 6.1-28 and 6.2-23 to 6.2-26). Benthic invertebrate data for 2008 to 2013 are presented in Appendix 6.

Zooplankton

The number of organisms in each replicate was converted to density (organisms/m^3) by dividing each sample by the volume sampled. Zooplankton densities were normalized to number of organisms/m^3 by calculating the volume of water the zooplankton net filtered using the depth of the haul and the diameter of the net opening:

$$V = \pi r^2 d$$

where V = volume of water filtered through sampler; π = 3.1416; r = radius of net mouth; and d = depth of net sampler at start of vertical haul (total length of course through water).

The mean and standard error was calculated for each site and presented graphically. For zooplankton, nauplii were excluded from all analyses; copepodites were included in density estimations but excluded from all other analyses. Richness and diversity were estimated as described in Section 5.3.5.

Cumulative data showing density and community composition are presented graphically in Section 6.1 (Figures 6.1-25 to 6.1-28 and 6.2-23 to 6.2-26). Zooplankton data for 2008 to 2013 are presented in Appendix 6.

5.3.6.3 Quality Assurance and Quality Control (QA/QC)

Benthic Invertebrates

Benthic Invertebrates Sorting efficiency and reproducibility were assessed by having an independent taxonomist re-analyze 10% (Environmental Research and Consulting) or 20% (EcoAnalysts) of samples to ensure that more than 90% of the total number of organisms found in both the initial and QA sort were recovered during the initial sort (as required by Environment Canada for invertebrate community surveys; Environment Canada 2010b; Appendix 6). Samples not meeting the QA sort

target of 90% recovery were re-sorted. Organisms that were retrieved during the re-sorting process were added to the count of the original sort for all samples analyzed by EcoAnalysts, even if the QA target of 90% recovery was met. In contrast, organisms retrieved during the re-sorting process were not included by Environmental Research and Consulting whenever the sorting efficiency was greater than 90%. Sorting efficiency was calculated by Environmental Research and Consulting according to the following equation:

$$\%\ sorting\ efficiency = \left[1 - \frac{\#\text{ in QA/QC re-sort}}{(\#\text{ sorted originally} + \#\text{ in QA/QC re-sort})}\right] \times 100\%$$

In contrast, sorting efficiency was calculated by EcoAnalysts Inc. calculated as follows:

$$\%\ sorting\ efficiency = \left[\frac{\text{Original Count}}{\text{Original Count} + \left(\frac{\text{QACount} * \text{QASquares}}{\text{QTSquares}}\right)}\right] \times 100\%$$

where Original Count is the number of organisms retrieved by the first sorter; QACount is the number of organisms found in the Quality Assurance sort; QASquares is the number of grids sorted during the QA process; QTSquares is the total number of grids in the QA Caton sampling tray.

Zooplankton

Data quality was assessed on 10% of samples by randomly selecting samples for re-sorting or re-identification by a second taxonomist (Appendix 6). If less than 90% sorting efficiency was found, either all samples were rechecked (Applied Technical), an additional 10% was re-analyzed (G3 Consulting Ltd.), or a discussion between taxonomists and a possible recount occurred (EcoAnalysts Inc.). Percent similarity was calculated by EcoAnalysts Inc. as follows:

$$PSC = 1 - 0.5\sum_{i=1}^{K}|a - b|$$

where a and b = for a given species, the relative proportions of the total samples A and B, respectively, which that species represents.

5.4 DESCRIPTION OF BRUCEJACK REPRESENTATIVE BASELINE DATA PERIODS

Pre-disturbance sediment quality data are not available for watercourses in the Brucejack watershed. Sediment quality monitoring was first conducted in 1988 to support a Stage 1 Impact Assessment for the Sulphurets Project proposed by Newhawk. This occurred after the deposition of roughly 4000 t of tailings into Brucejack Lake by the Catear Mine between 1982 and 1985 and the underground development that took place at the Brucejack (Sulphurets) site in the autumn of 1986. Subsequent to 1986, Brucejack Creek has been affected by passive drainage from the adit and various water bodies within the Brucejack watershed have periodically received drainage from areas disturbed through surface activities, active (dewatering), and reclamation activities (Newhawk 1989; Price 2005).

For analyses, aquatic resource data were excluded if recent Project-related activities affecting water quality (ERM Rescan 2014) were considered to have direct or cumulative effects on aquatic resources (detailed below in Section 5.5).

5.5 INCLUDED DATA

Most available aquatic resource data are included in the Results and Interpretation section of this report (Chapter 6). Data were excluded if they: 1) are now located outside of the EAC Application study area based on proposed Project infrastructure (Figure 4.1-1); 2) came from a potential reference site (Table 4.1-1); or 3) were clearly affected by exploration activities (Table 2.2-1) such that their inclusion would result in unrepresentative baseline characterization (i.e., skew the data). Exclusion of data in the third category provides a conservative approach to characterizing background aquatic resource conditions – i.e., to the extent feasible given the lack of pre-disturbance information. All excluded aquatic resource data are available in relevant appendices (Appendices 1 to 6).

The limited historical data available for water toxicity and zooplankton (discussed in Section 5.2) was also excluded from present analyses due to uncertainty in methodology. These data are available in *The Environmental and Socioeconomic Impact Assessment for the Sulphurets Property* (Newhawk 1989).

1. The following sites and associated aquatic resource data were excluded as they fell outside of study area boundaries (Figure 4.1-1):
   - Wildfire Creek 4 (WC4)
   - Wildfire Creek 2 (WC2)
   - Lake 1 (L1)
   - Lake 2 (L2)
   - Bell Irving River 1 (BIR1)
   - Bell Irving River 2 (BIR2)
   - McInnes Creek (MC1).

   Although western Bowser Lake (BL1) falls outside of the study area, it is included in this report because of its potential importance to fish and fish habitat.
2. The requirement for a reference site for Brucejack Lake and Brucejack Creek is under consideration. In 2013, three potential reference sites were visited. The need for and appropriateness of these sites is still being evaluated, therefore the following sites and associated aquatic resource data were excluded from the analysis (but still presented in the Appendices):
   - Divide Lake (Divide)
   - Divide South Outflow (Divide OF)
   - Lake 3 (L3).
3. The following data were excluded from analysis as they are considered to have likely been influenced by site exploration activities and not appropriate to be considered as baseline conditions:
   - 2012: Water toxicity and all data from BJ Intermediate
   - 2013: Periphyton taxonomy and biomass from BJ U/S, BJ2, BJ3.

6. RESULTS AND INTERPRETATION

Results of the aquatic resource characterization and monitoring study have been separated according to the watershed groupings described in Chapter 4 due to both the differing aquatic environment characteristics and the potential effects of Project facilities; that is, the Brucejack watershed (mine site area), the Sulphurets watershed (mid-field receiving environment), the Unuk watershed (far-field receiving environment; Section 4.1) and the Bowser, Scott, Todedada, and Wildfire watersheds (ancillary Project infrastructure areas; Section 4.2).

6.1 MINE SITE AREA AND DOWNSTREAM RECEIVING ENVIRONMENT

6.1.1 Water Toxicity

Toxicology testing in 2013 was performed on the invertebrates *Daphnia magna* and *Ceriodaphnia dubia* exposed to waters collected from BJ U/S, Camp Creek, Adit, BJ2 and SC0. Tests included an acute (48-hour) and chronic (6-day) survival assay in addition to a chronic reproductive assay. Several metrics were derived from exposing the organisms to test waters diluted to a range of concentrations. Survival was measured by the LC_{50} that represents the concentration of test water where 50% mortality is observed. The effect of site water upon reproduction was measured by the inhibiting concentration that was defined at 25% and 50%. The inhibiting concentration was the estimated test water concentration that depressed reproduction by 25 or 50% (IC_{25} or IC_{50}), usually due to smaller brood sizes and/or extended time period between broods.

Toxicology reports and the accompanying water quality data are available in Appendix 2.

6.1.1.1 Survival (Lethal Concentration)

Survival of test organisms was high across all test sites (BJ U/S, Camp Creek, Adit, BJ2 and SC0), test water concentrations (0, 5, 10, 20, 40, 60, 90, 100%), and exposure times (48-hour and 6-day). The lethal concentration (LC_{50}) exceeded 100% at most sites in both the acute lethality test on *D. magna* and the chronic survival and reproduction test on *C. dubia* (i.e., LC_{50} values were greater than the highest concentration tested). All *D. magna* individuals survived 48 hours of exposure to waters of full strength collected from BJ U/S, Camp Creek, Adit, BJ2 and SC0 resulting in an LC_{50} of > 100% for all sites (Table 6.1-1). The LC_{50} for *C. dubia* exposed to site water for six days was > 100% for most sites, except Camp Creek, where the LC_{50} estimated that 50% of test organisms would die when exposed to diluted Camp Creek water at a concentration of 77% (LC_{50} = 77%; Table 6.1-2).

6.1.1.2 Reproduction (Inhibition Concentration)

The upper Sulphurets Creek (SC0) is relatively more toxic and impaired invertebrate reproduction to a greater degree compared to Brucejack Creek and Adit waters. Reproduction was not affected in test waters collected from BJ2, as IC_{25} and IC_{50} values were greater than the highest concentration (> 100%). Site waters collected from other sites affected the reproductive capabilities of *C. dubia* (BJ U/S, Camp Creek, Adit and SC0), with reproduction being uniquely low in waters collected from SC0, the outflow of Sulphurets Glacier, (IC_{25} = 9.7%), and somewhat depressed in Camp Creek (IC_{25} = 63.4%) and the adit

waters (IC_{25} = 77.6%). *C. dubia* responded to exposure to waters collected from BJ U/S with slightly reduced reproduction (IC_{25} = 80.9%). Patterns in the IC_{50} followed similar patterns; the value for SC0 was the lowest (IC_{50} = 28.5%), indicating that reproduction would be halved in site waters at a concentration of 28.5%. The IC_{50} for BJ U/S and Camp Creek were 80.8% and 75.2%, respectively. The IC_{50} for the Adit waters was greater than 100%, indicating that exposure did not greatly affect reproduction.

Table 6.1-1. Toxicity Test Results for the 48-hour *Daphnia magna* LC_{50} Tests

Site Water Concentration (%)	BJ U/S	Camp Creek	Adit	BJ2	SC0
0%	100	100	100	100	100
6.25%	100	100	100	100	100
12.5%	100	100	100	100	100
25%	100	100	100	100	100
50%	100	100	100	100	100
100%	100	100	100	100	100
Test endpoint (%)					
LC_{50}	> 100	> 100	> 100	> 100	> 100

Notes: Values represent % survival
LC = Lethal Concentration

6.1.2 Sediment Quality

The baseline sampling program collected sediment quality data in the Brucejack watershed (mine site area) and the Sulphurets and Unuk watersheds (downstream receiving environment). Data from the baseline sampling program (1988–2013) are included as outlined in the Methodology chapter (see Chapter 5), and the complete baseline sediment quality data are presented in Appendix 3. The sediment quality data are divided into the sections describing the particle size composition, nutrient content, and metal content of sediments, with the data aggregated by sampling year to present inter-annual variability.

6.1.2.1 Particle Size

Brucejack Watershed

Brucejack Lake sediment samples were characteristic of a depositional environment and were dominated by silt and clay particles (≥ 90%; Figure 6.1-1). Little inter-annual variability was observed in Brucejack Lake sediments. In contrast, the sediments in Brucejack Creek downstream of Brucejack Lake showed greater inter-annual variation (Figure 6.1-1). The dynamic hydrology of Brucejack Creek, with low winter flows, a large freshet, and storm events in the fall, was the probable source of the inter-annual variability. Larger particles (sand and gravel, > 63 µm) were frequently the majority of sediment particles, which is typical of streams with periods of high flows.

Table 6.1-2. Toxicity Test Results for *Ceriodaphnia dubia* Survival and Reproduction Tests

Site	BJ U/S		Camp Creek		Adit		BJ2		SC0	
Site Water Concentration (%)	Survival (%)	Reproduction* (Mean ± SD)	Survival (%)	Reproduction (Mean ± SD)	Survival (%)	Reproduction (Mean ± SD)	Survival (%)	Reproduction (Mean ± SD)	Survival (%)	Reproduction (Mean ± SD)
0	100	15.0 ± 3.5	100	14.5 ± 5.1	100	16.9 ± 2.7	80	15.4 ± 8.7	100	24.1 ± 3.8
5	100	14.9 ± 3.6	100	15.3 ± 4.3	100	17.4 ± 5.2	100	20.8 ± 2.7	100	20.7 ± 1.8
10	100	15.8 ± 3.5	100	19.3 ± 5	100	19.1 ± 3.8	90	17.3 ± 6.6	100	17.1 ± 2.4
20	100	15.0 ± 2.8	100	18.5 ± 6.2	100	16.8 ± 2.6	100	19.3 ± 3.7	90	14.7 ± 4.1
40	100	14.7 ± 4.1	90	20.6 ± 7.8	100	17.1 ± 4.6	90	19.8 ± 2.7	100	10.7 ± 3.2
60	100	14.4 ± 3.4	80	11.7 ± 8.6	100	16.0 ± 5.4	80	18.8 ± 7.7	90	5.4 ± 4.2
80	90	11.5 ± 5.6	40	5.9 ± 7.9	90	12.3 ± 5.8	100	19.0 ± 3.7	90	4.5 ± 3.3
100	80	6.6 ± 4.9	20	4.1 ± 8.8	80	9.9 ± 5.8	80	12.8 ± 7.9	90	4.2 ± 4.2
Test endpoint (%)										
LC_{50}	>100	-	77 (62.8–90.4)	-	>100	-	>100	-	>100	-
IC_{25} (95% CL)	-	80.8 (69.1-89.5)	-	63.4 (55.7–72.9)	-	77.6 (63.3–89.9)	-	>100	-	9.7 (7.0–12.8)
IC_{50} (95% CL)	-	96.1 (87.8->100)	-	75.2 (65.6–89.8)	-	>100	-	>100	-	28.5 (24.1–33.4)

Notes:

LC = Lethal Concentration

IC = Inhibition Concentration

SD = Standard Deviation

CL = Confidence Limits

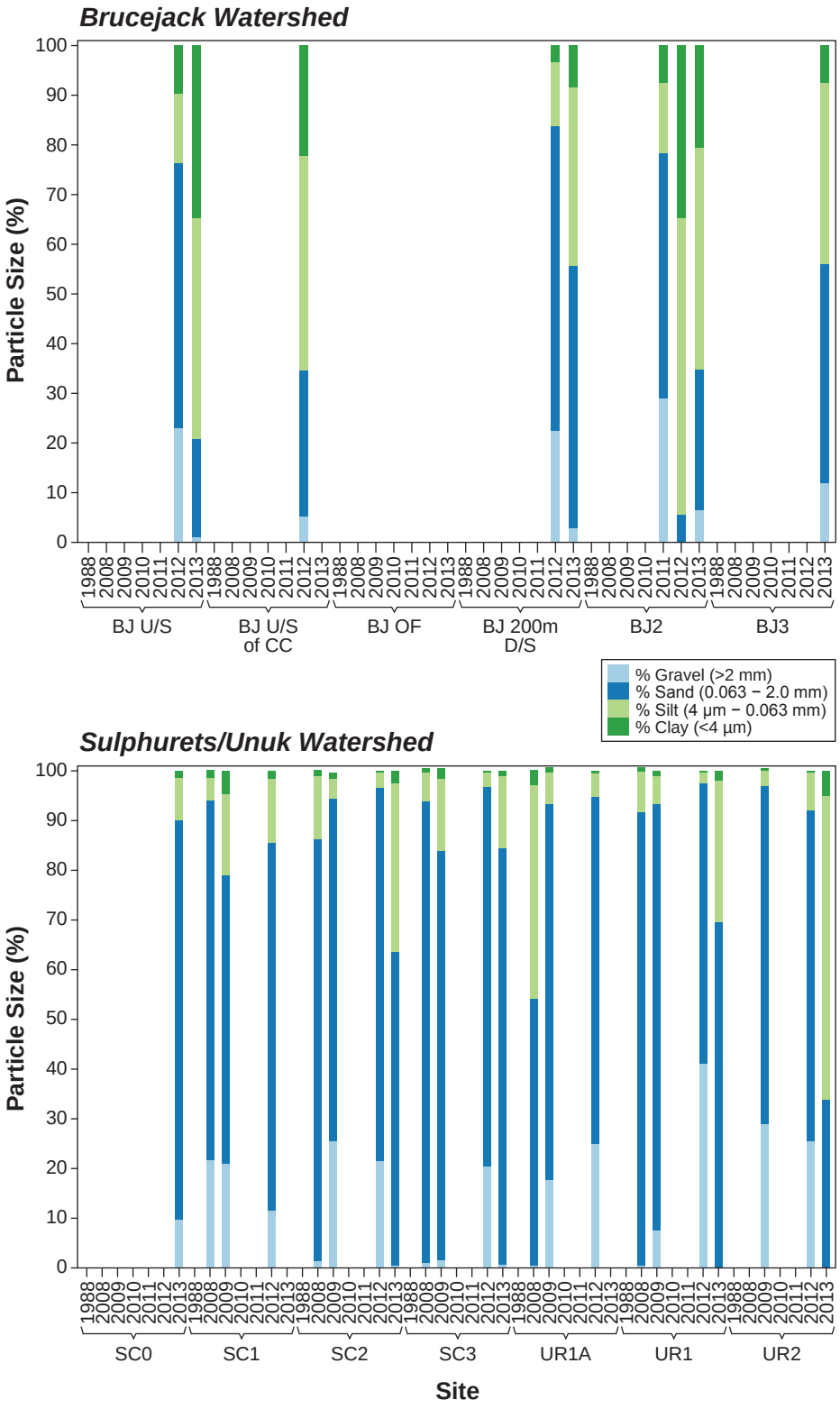
LC_{50} *= Lethal concentration estimated to be lethal to 50% of test organisms*

IC*p* *= Inhibiting concentration for a specified percent effect (i.e., IC* $_{25}$ *)*

** Reproduction represents the number of live neonates produced by each first-generation daphnid during its first three broods only.*

Figure 6.1-1

Sediment Particle Size Composition in Mine Site Area and Downstream Receiving Environment Streams, Brucejack Gold Mine Project, 1988 to 2013



Note: Stacked bars represent particle size means.

Sulphurets and Unuk Watersheds

Downstream of the Sulphurets Glacier, sediments from site SC0 in Sulphurets Creek were dominated by sand-sized particles (Figure 6.1-1). Sulphurets Lake sediments were generally composed of smaller silt- and clay-sized particles (Figure 6.1-2), although some inter-annual variation was observed. Sulphurets Creek below Sulphurets Lake (SC1, SC2, and SC3) and Unuk River (UR1A, UR1, and UR2) sites had typical stream sediments composed of ≥ 50% sand-sized particles, with generally small proportions of silt- and clay-sized particles (Figure 6.1-1).

6.1.2.2 Nutrients

Brucejack Watershed

Sediment nutrients, analyzed as sediment total nitrogen, available phosphate, and total organic carbon, were low in lake and stream sediments in the Brucejack watershed (Figures 6.1-3 to 6.1-5). Total nitrogen and total organic carbon content of Brucejack Lake sediments did not vary much between sampling years and were generally ~0.05% and ~0.4%, respectively. Similarly, the total nitrogen and total organic carbon contents of Brucejack Creek sediments were low. Higher total nitrogen and total organic carbon concentrations were observed in 2012 at the BJ U/S of CC and BJ2 sites which were associated with higher proportions of silt- and clay-sized particles in the sampled sediments (Figure 6.1-1).

Available phosphate was near or below the analytical detection limits for sediments from Brucejack Lake. Downstream, Brucejack Creek sediment had higher available phosphate concentrations, although the concentration of available phosphate decreased along Brucejack Creek towards BJ3 (Figure 6.1-5).

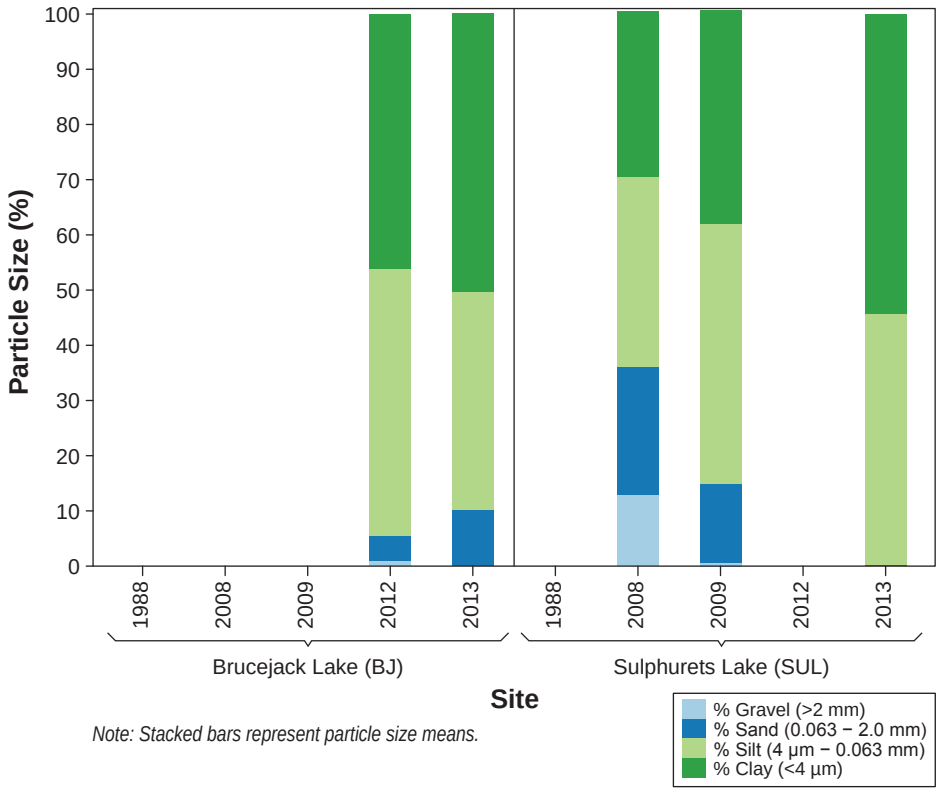
Sulphurets and Unuk Watersheds

Sediment total nitrogen and total organic carbon concentrations in lake and stream sites in the Sulphurets and Unuk watersheds were low and similar to those in the Brucejack watershed (Figures 6.1-3 and 6.1-4). Concentrations of total nitrogen ranged from less than the analytical detection limits to 0.09%, with no substantial differences between Sulphurets Lake, Sulphurets Creek, and Unuk River sites, although some inter-annual variation was observed in Sulphurets Lake and Unuk River sediments (Figure 6.1-3). Total organic carbon concentrations were generally ~0.3%, with no observed inter-annual or spatial trends (Figure 6.1-4).

Available phosphate concentrations also varied between less than analytical detection limits to ~3.5 mg/kg in Sulphurets Lake and downstream stream sites (Figure 6.1-5). Although the frequency of samples greater than the analytical detection limits for available phosphate was greater in 2012 and 2013, the trend was likely insignificant due to the relative magnitude of the observations to the detection limits.

Figure 6.1-2

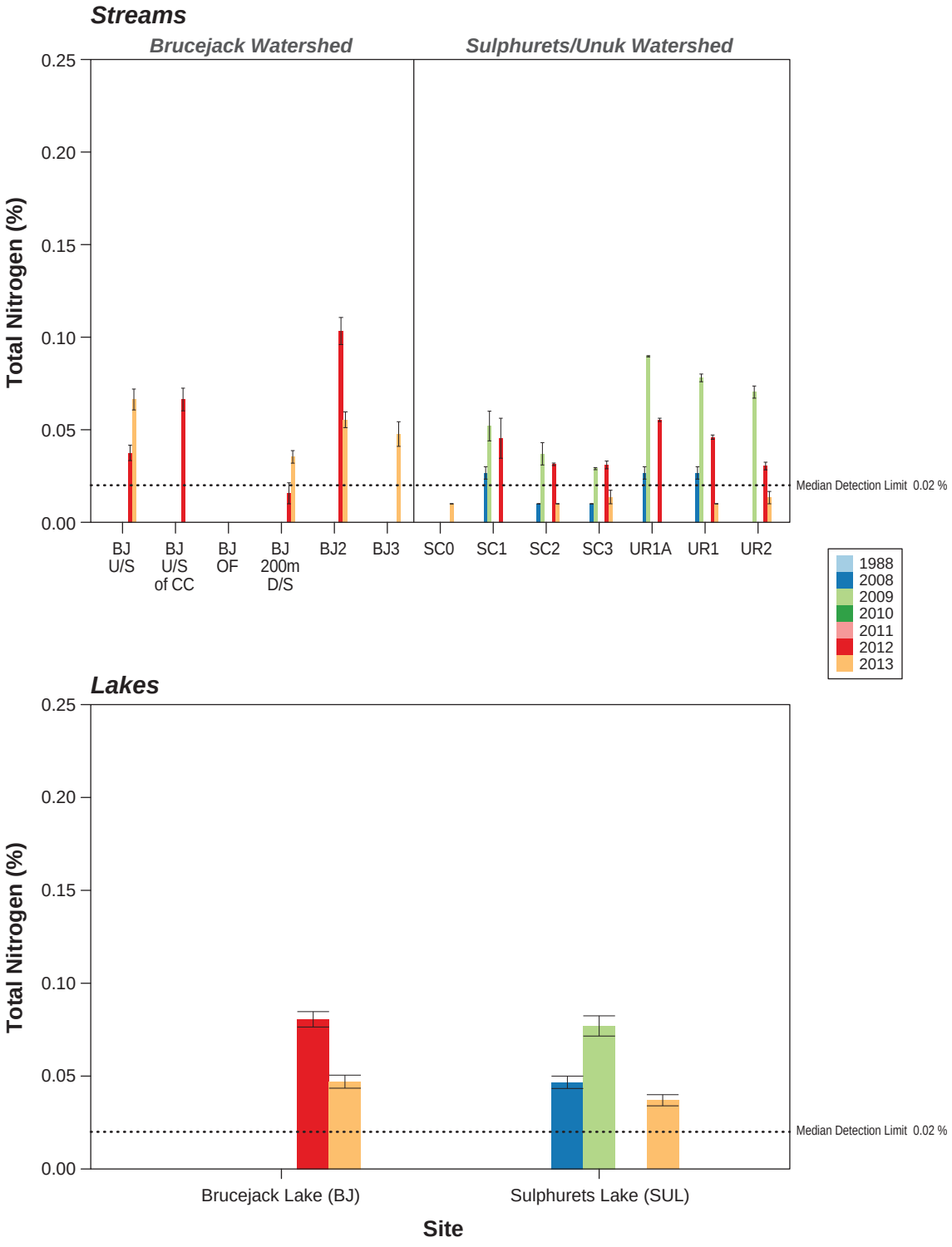
Sediment Particle Size Composition in Mine Site Area and Downstream Receiving Environment Lakes, Brucejack Gold Mine Project, 1988 to 2013



Note: Stacked bars represent particle size means.

Figure 6.1-3

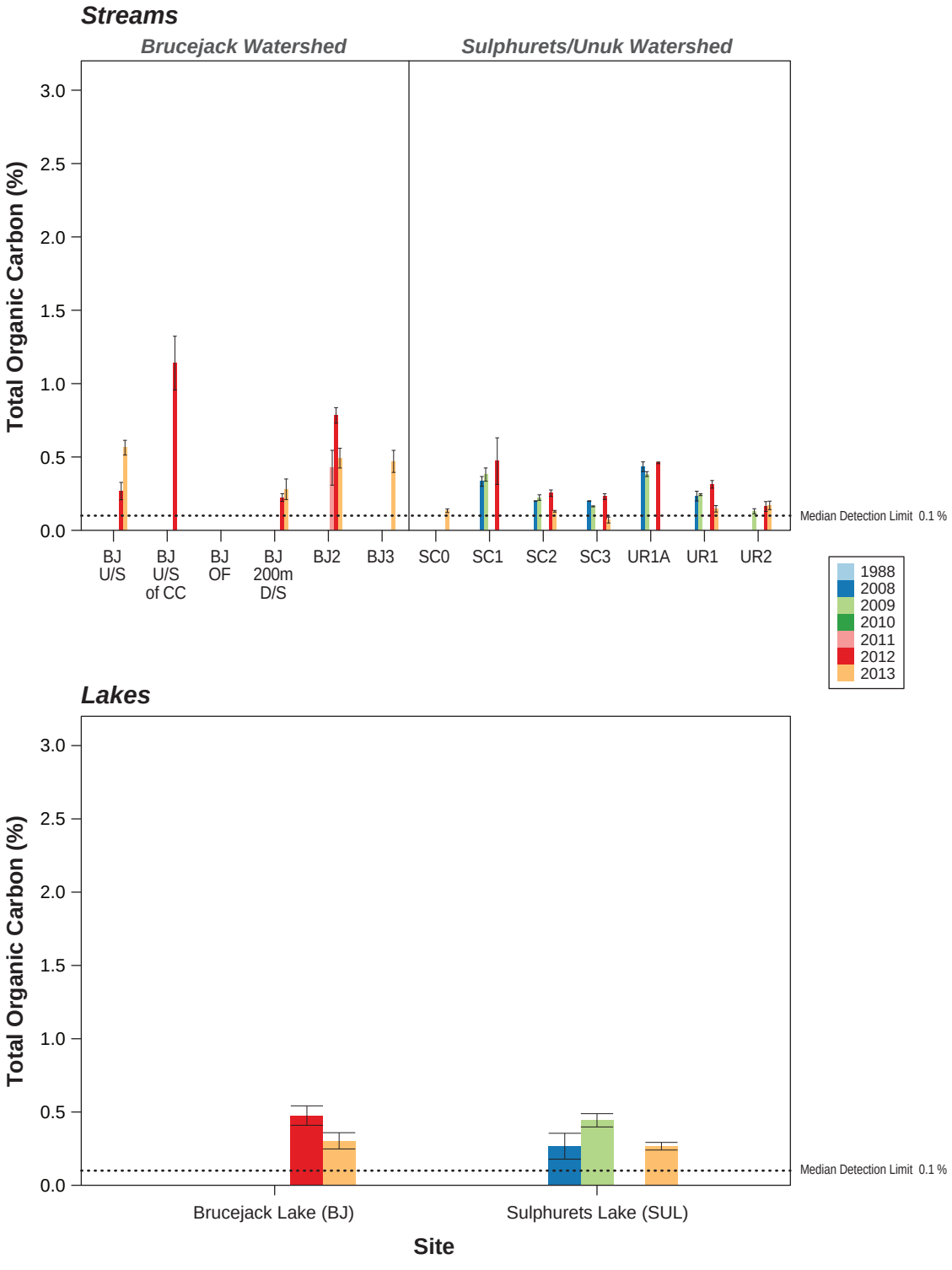
Sediment Total Nitrogen Concentrations in Mine Site Area and Downstream Receiving Environment Streams and Lakes, Brucejack Gold Mine Project, 1988 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
Stream sites listed upstream (left) to downstream (right) on x-axis.

Figure 6.1-4

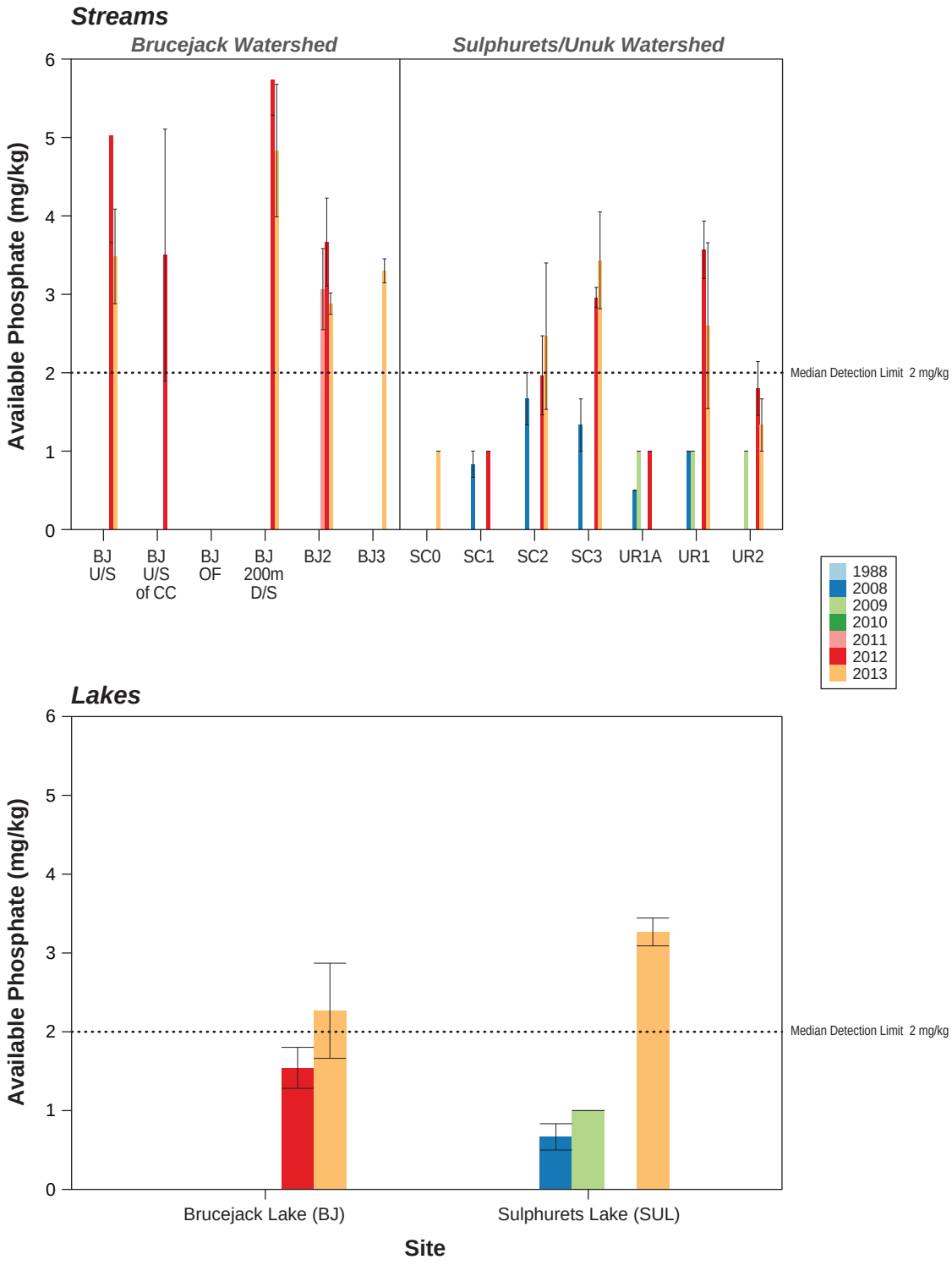
Sediment Total Organic Carbon Concentrations in Mine Site Area and Downstream Receiving Environment Streams and Lakes, Brucejack Gold Mine Project, 1988 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
Stream sites listed upstream (left) to downstream (right) on x-axis.

Figure 6.1-5

Sediment Total Phosphate Concentrations in Mine Site Area and Downstream Receiving Environment Streams and Lakes, Brucejack Gold Mine Project, 1988 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
Stream sites listed upstream (left) to downstream (right) on x-axis.

6.1.2.3 Cyanides

Sediment cyanide concentrations were below analytical detection limits in samples taken from the mine site area and downstream receiving environment lakes and streams, except for two replicates collected from site BJ U/S in 2013 that were 0.052 mg/kg (0.02 mg/kg above the analytical detection limit; Appendix 3).

6.1.2.4 Metals

Brucejack Watershed

Sediments in Brucejack Lake had elevated concentrations of metals, which was likely due to the erosion of highly mineralized outcropping mineral deposits (Figures 6.1-6 to 6.1-18). Elevated concentrations of aluminum, arsenic, cadmium, iron, lead, manganese, mercury, selenium, silver, and zinc were observed in Brucejack Lake sediments. Analytical detection limits were not available for Brucejack Lake sediment samples collected in 1988 for the concentrations aluminum, arsenic, chromium, copper, iron, lead, manganese, and zinc. However, the concentrations of aluminum, arsenic, chromium, copper, iron, and manganese were generally similar between the 1988, 2012, and 2013 sediment samples. Sediment concentrations of lead and zinc showed temporal variation between the 1988, 2012, and 2013 samples; however, these differences may be due to differences in analytical technology and may not represent actual variation in the baseline sediment quality conditions.

Sediment metal concentrations in Brucejack Creek tended to be similar in magnitude to those in Brucejack Lake, and were greater than analytical detection limits (Figures 6.1-6 to 6.1-18). The concentrations of arsenic, cadmium, copper, and zinc tended to be greater at sites further downstream from the Brucejack Lake outflow (BJ 200m D/S, BJ2, and BJ3), which may be due to erosion of outcropping mineral deposits in the watershed including the Valley of the Kings (VOK) Creek and other un-named tributaries of Brucejack Creek.

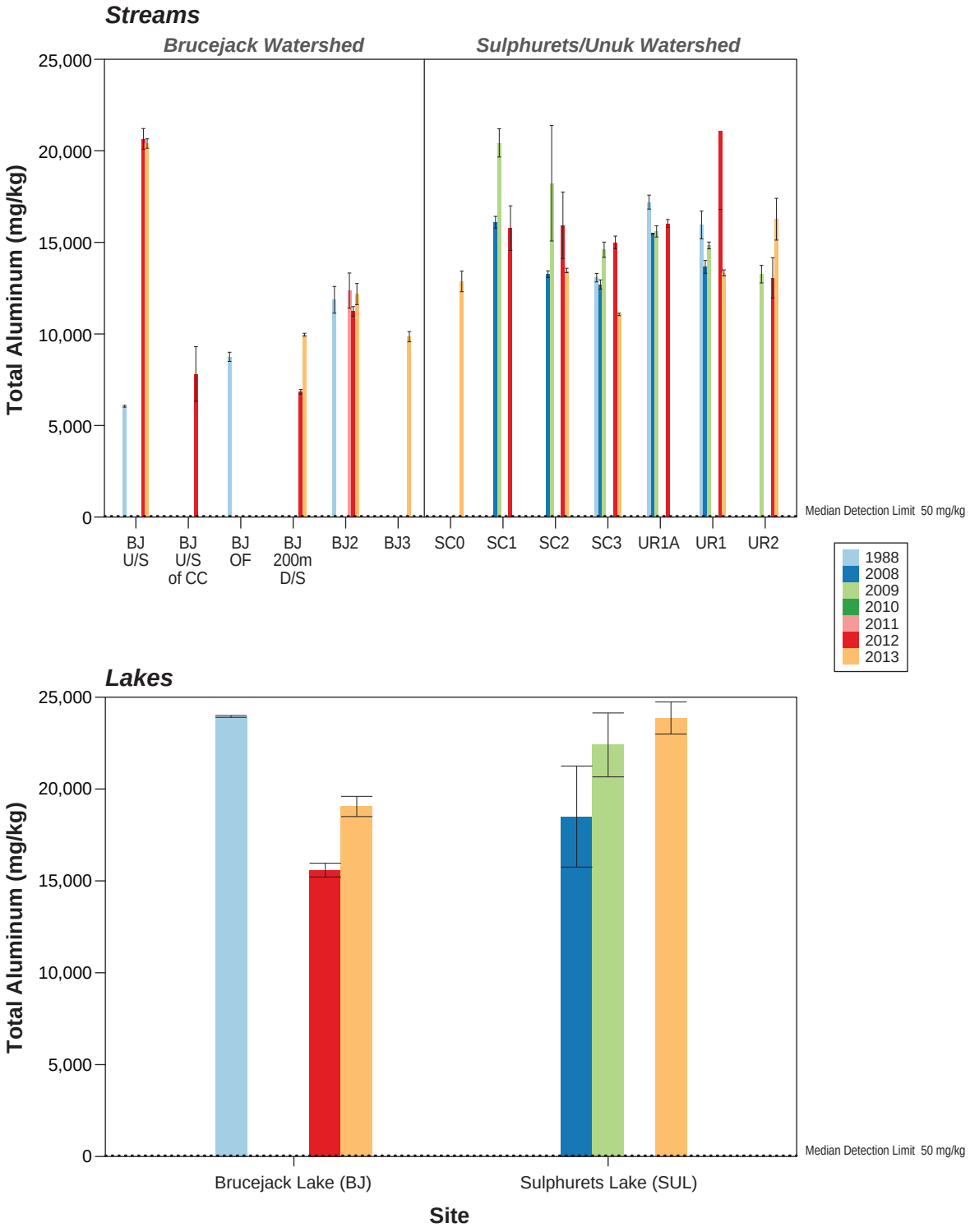
Sulphurets and Unuk Watersheds

The baseline concentrations of aluminum, cadmium, chromium, copper, nickel, and selenium in sediments from Sulphurets Lake, Sulphurets Creek, and the Unuk River tended to be greater than the concentrations in Brucejack Lake and Brucejack Creek sediments (Figures 6.1-6, 6.1-8, 6.1-9, 6.1-10, 6.1-15, and 6.1-16). In contrast, the concentrations of arsenic, lead, mercury, and silver were generally lower in Sulphurets and Unuk watershed sediments than in Brucejack watershed sediments (Figures 6.1-7, 6.1-12, 6.1-14, and 6.1-17). For example, silver concentrations in sediments from Brucejack Lake and Creek ranged from 2.5 mg/kg (BJ U/S) to 57 mg/kg (BJ 200m D/S), but ranged from 0.4 mg/kg (UR2) to 2.4 mg/kg (SC2) downstream of the Brucejack watershed.

These spatial differences likely resulted from changes in the composition of surficial geology in the respective catchments. For example, arsenic sediment concentrations in the Brucejack watershed and in sediments from the SC0 and SC1 stream sites were higher than the downstream sites in Sulphurets Creek (SC2 and SC3) and in the Unuk River (UR1 and UR2; Figure 6.1-7). Source influences on the concentration of mercury in sediments was also observed. Sediment mercury concentrations were generally high in the Brucejack watershed, but decreased at downstream sites in the Sulphurets watershed. However, sediment mercury concentrations were greater in the Unuk River upstream of the confluence with Sulphurets Creek (UR1A), which suggested the presence of mercury sources in the Unuk River watershed (Figure 6.1-14).

Figure 6.1-6

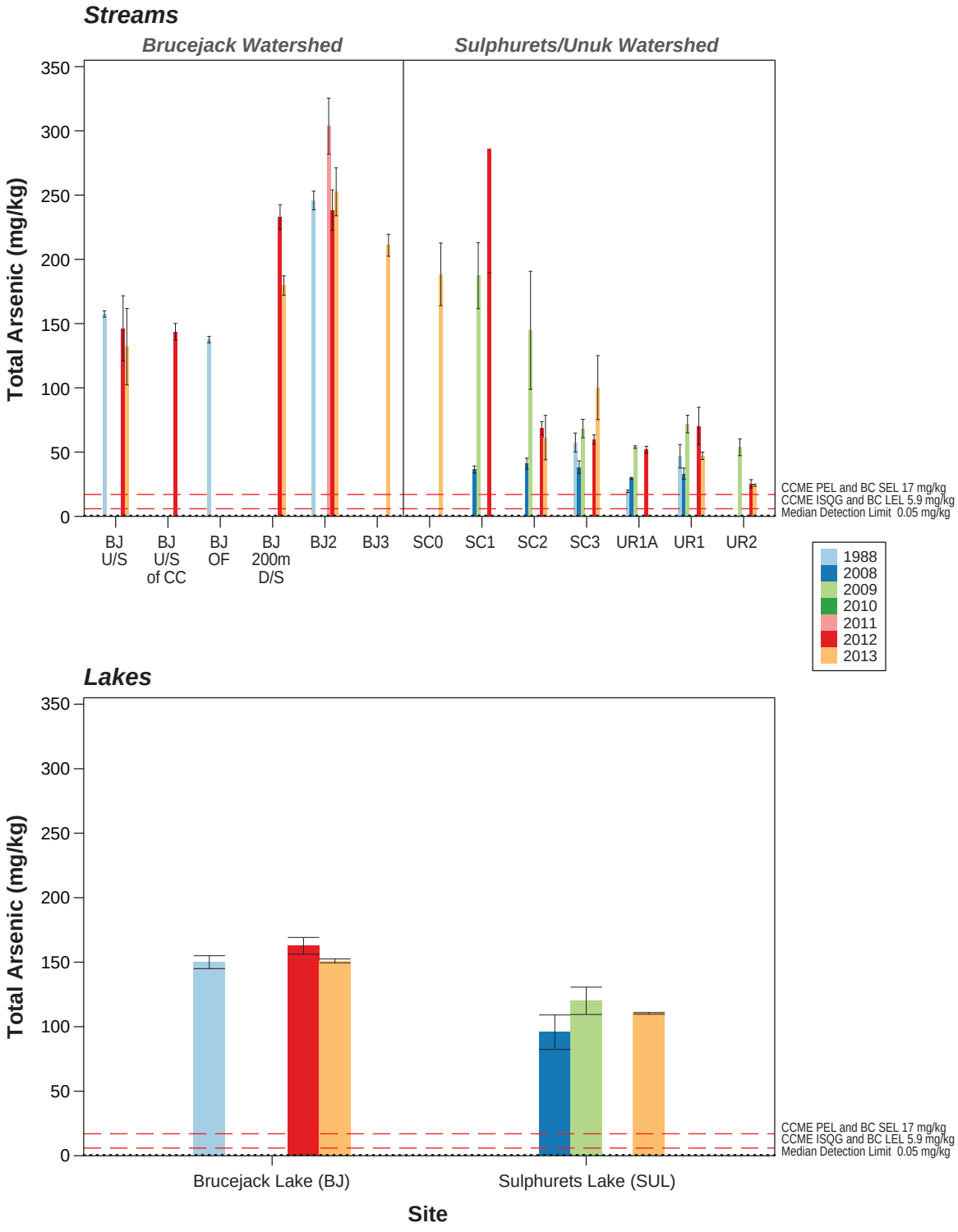
Sediment Total Aluminum Concentrations in Mine Site Area and Downstream Receiving Environment Streams and Lakes, Brucejack Gold Mine Project, 1988 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
Stream sites listed upstream (left) to downstream (right) on x-axis.

Figure 6.1-7

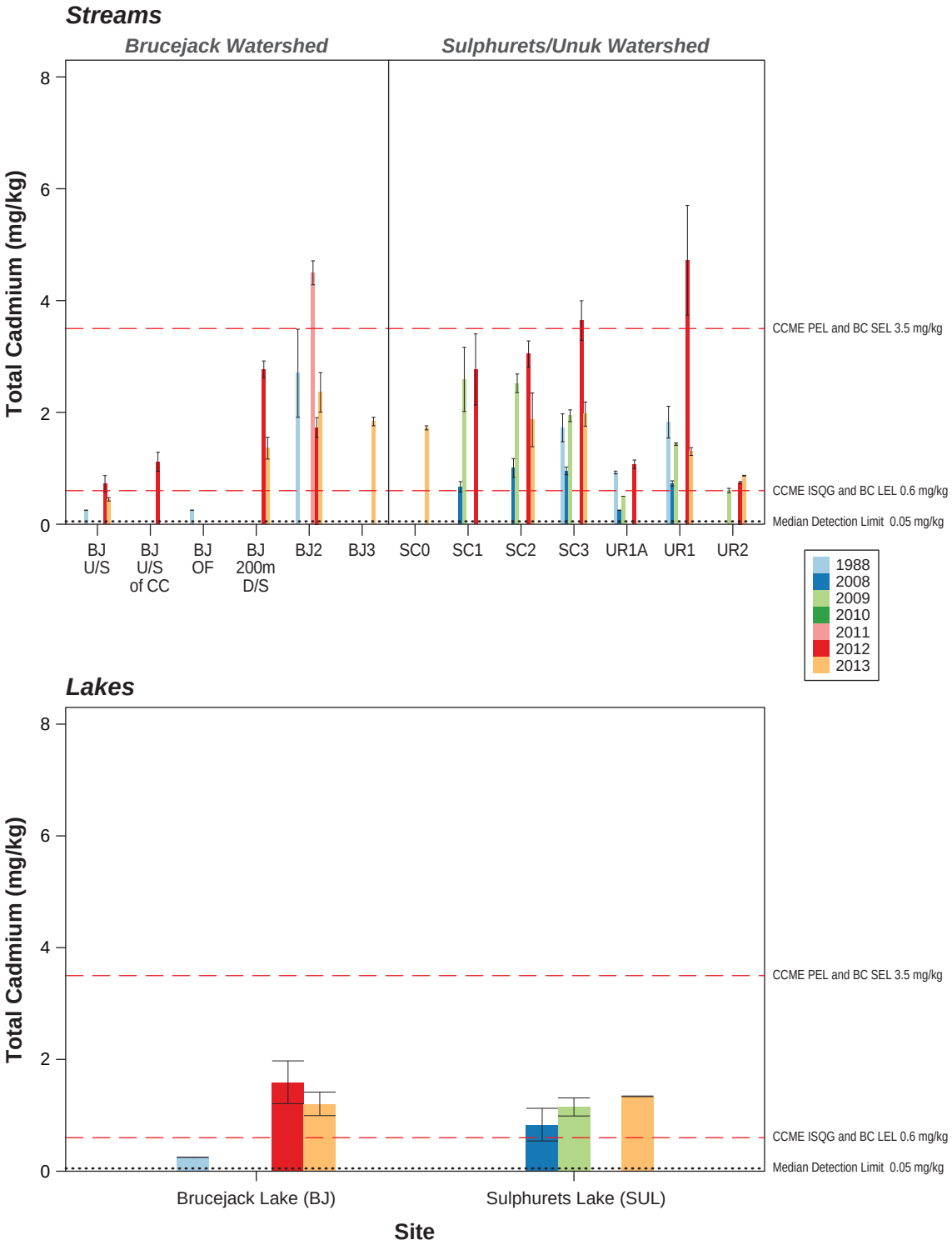
Sediment Total Arsenic Concentrations in Mine Site Area and Downstream Receiving Environment Streams and Lakes, Brucejack Gold Mine Project, 1988 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
CCME sediment quality guideline: PEL = probable effect level; ISQG = interim sediment quality guideline.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.
Stream sites listed upstream (left) to downstream (right) on x-axis.

Figure 6.1-8

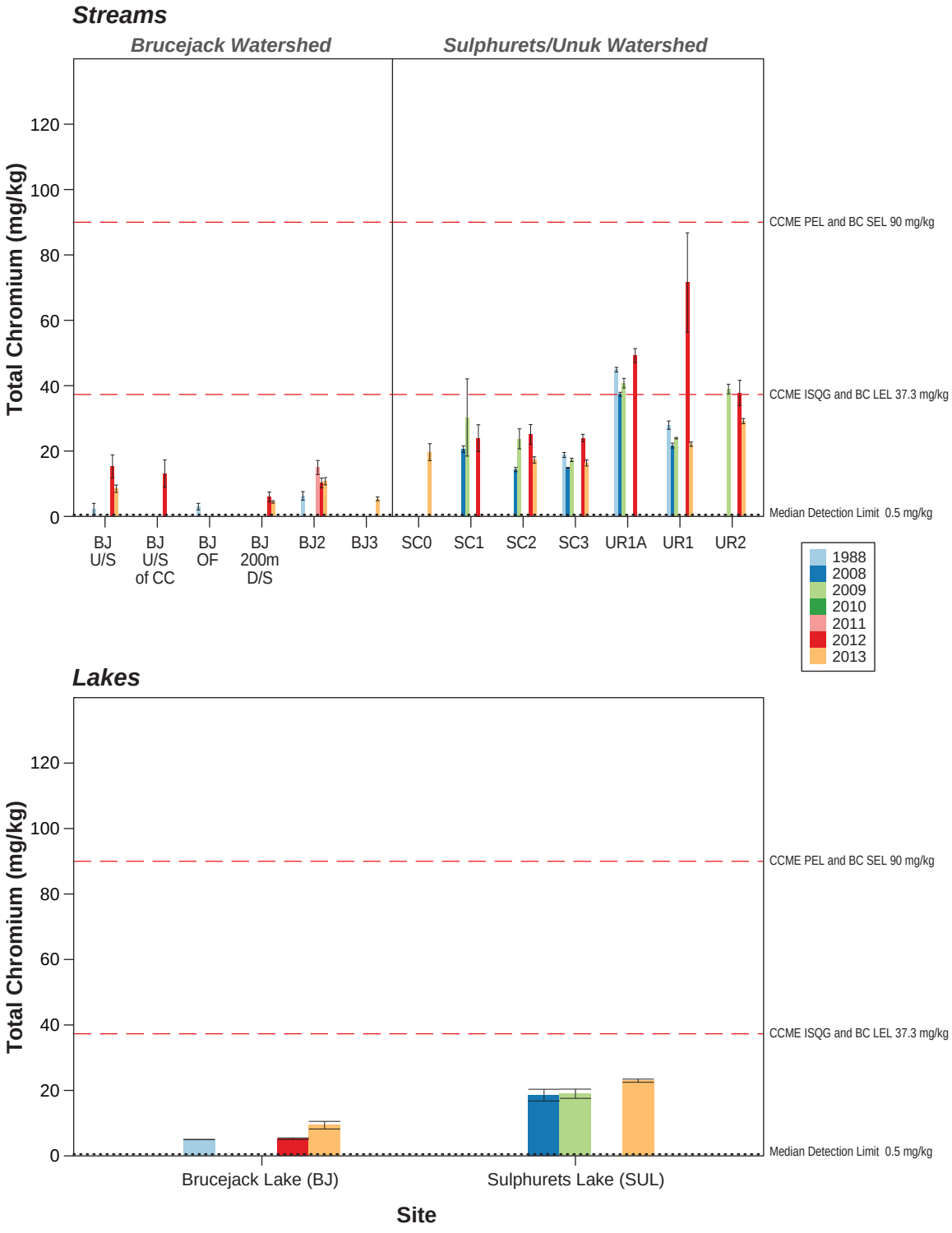
Sediment Total Cadmium Concentrations in Mine Site Area and Downstream Receiving Environment Streams and Lakes, Brucejack Gold Mine Project, 1988 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
CCME sediment quality guideline: PEL = probable effect level; ISQG = interim sediment quality guideline.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.
Stream sites listed upstream (left) to downstream (right) on x-axis.

Figure 6.1-9

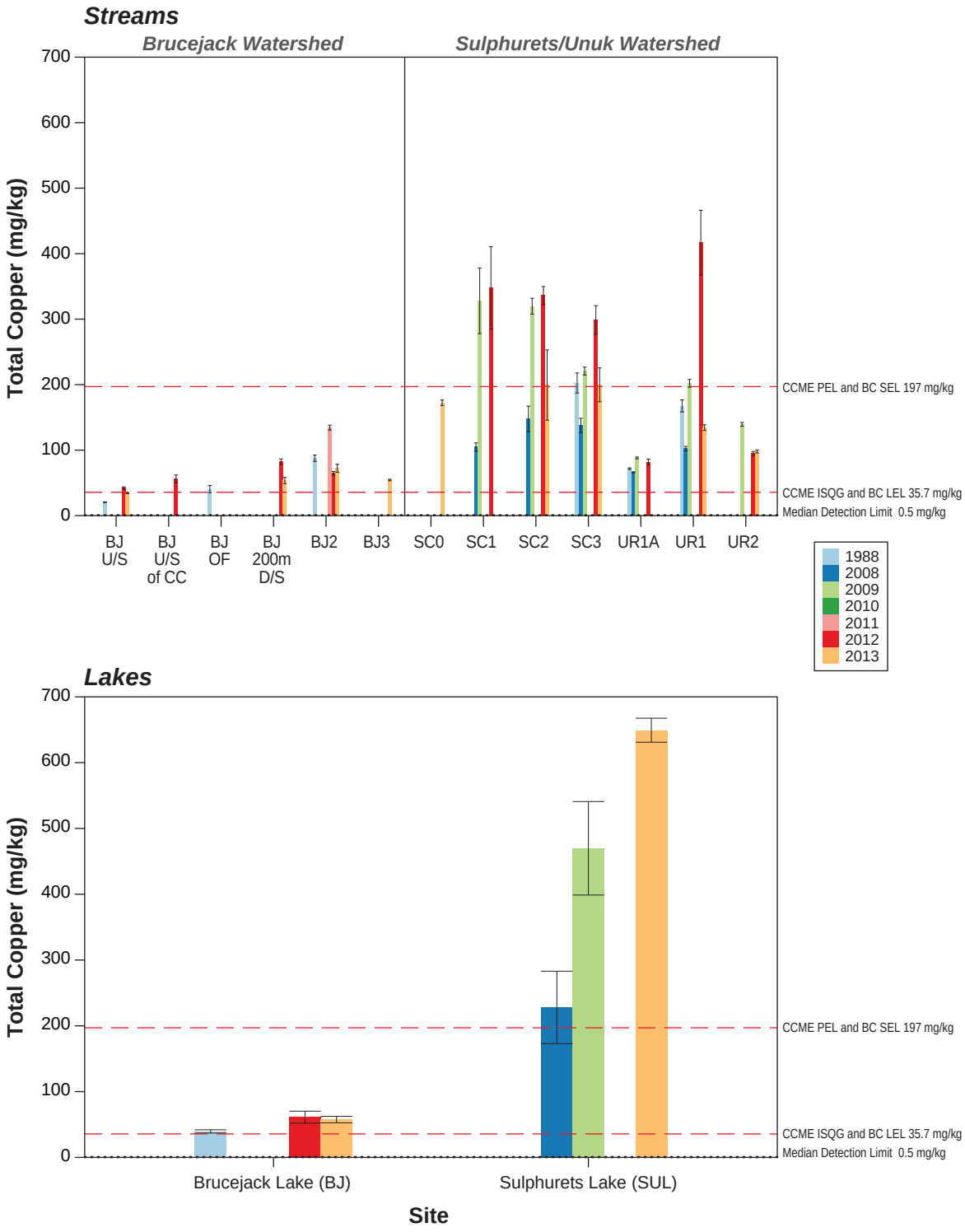
Sediment Total Chromium Concentrations in Mine Site Area and Downstream Receiving Environment Streams and Lakes, Brucejack Gold Mine Project, 1988 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
CCME sediment quality guideline: PEL = probable effect level; ISQG = interim sediment quality guideline.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.
Stream sites listed upstream (left) to downstream (right) on x-axis.

Figure 6.1-10

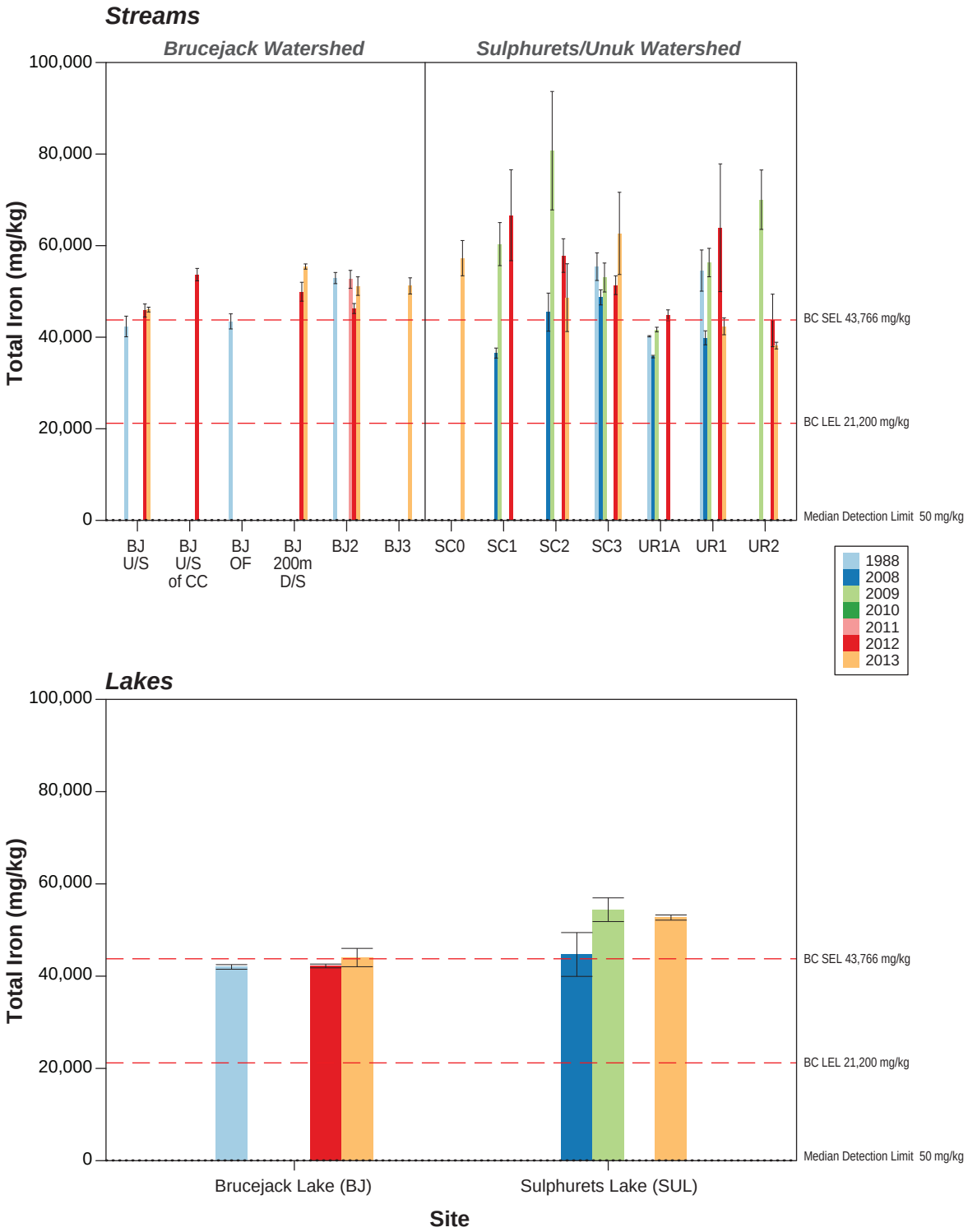
Sediment Total Copper Concentrations in Mine Site Area and Downstream Receiving Environment Streams and Lakes, Brucejack Gold Mine Project, 1988 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
CCME sediment quality guideline: PEL = probable effect level; ISQG = interim sediment quality guideline.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.
Stream sites listed upstream (left) to downstream (right) on x-axis.

Figure 6.1-11

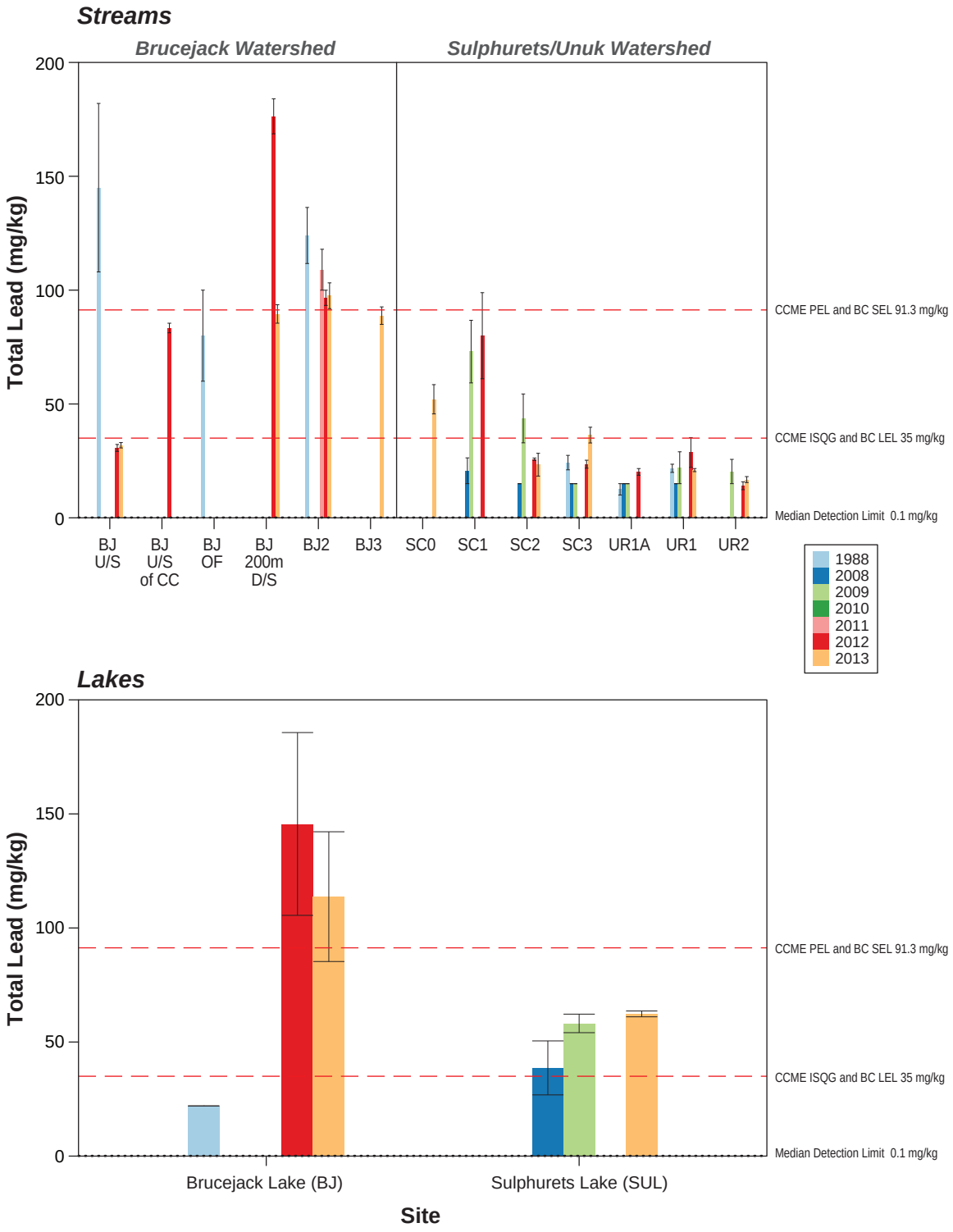
Sediment Total Iron Concentrations in Mine Site Area and Downstream Receiving Environment Streams and Lakes, Brucejack Gold Mine Project, 1988 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.
Stream sites listed upstream (left) to downstream (right) on x-axis.

Figure 6.1-12

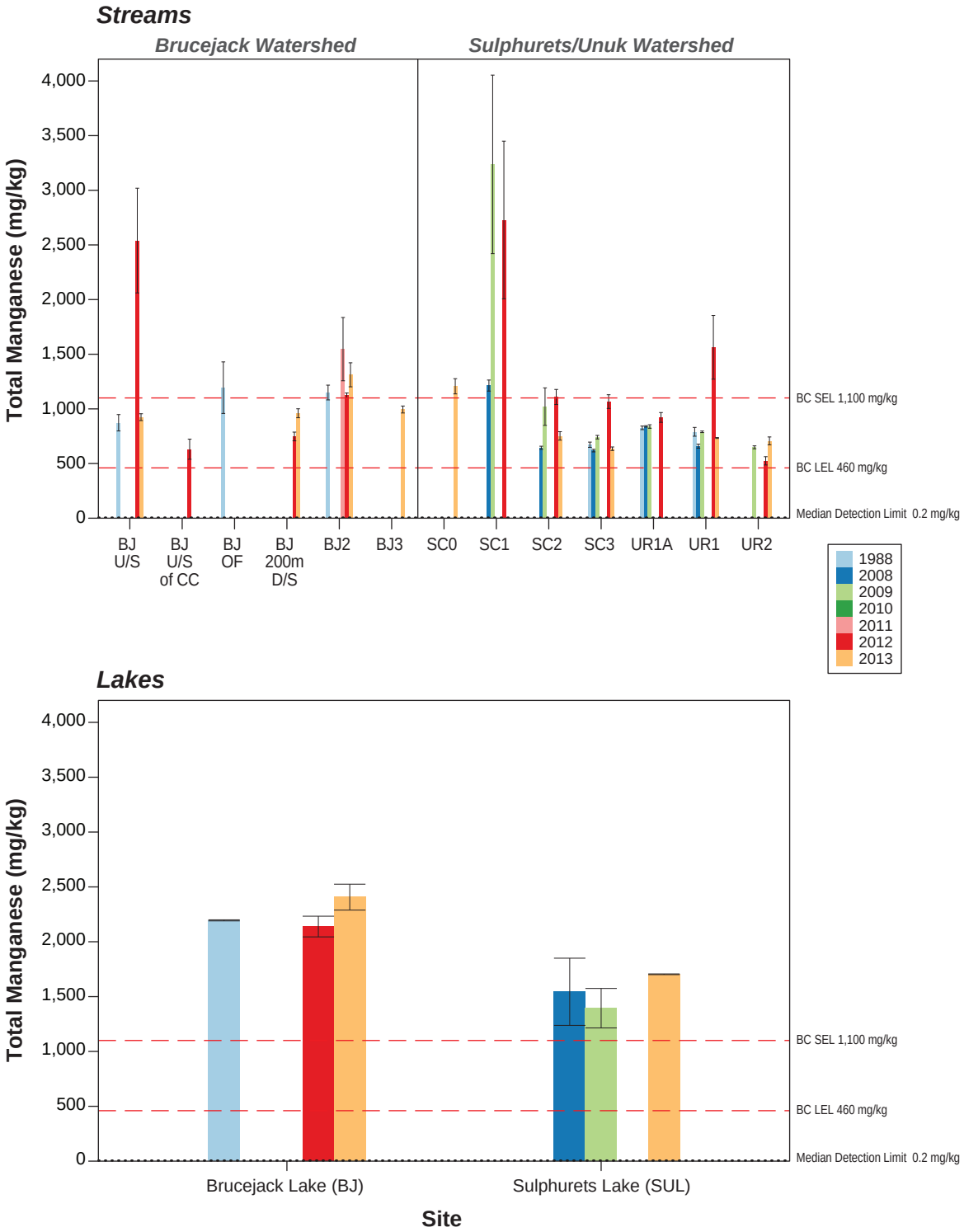
Sediment Total Lead Concentrations in Mine Site Area and Downstream Receiving Environment Streams and Lakes, Brucejack Gold Mine Project, 1988 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
CCME sediment quality guideline: PEL = probable effect level; ISQG = interim sediment quality guideline.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.
Stream sites listed upstream (left) to downstream (right) on x-axis.

Figure 6.1-13

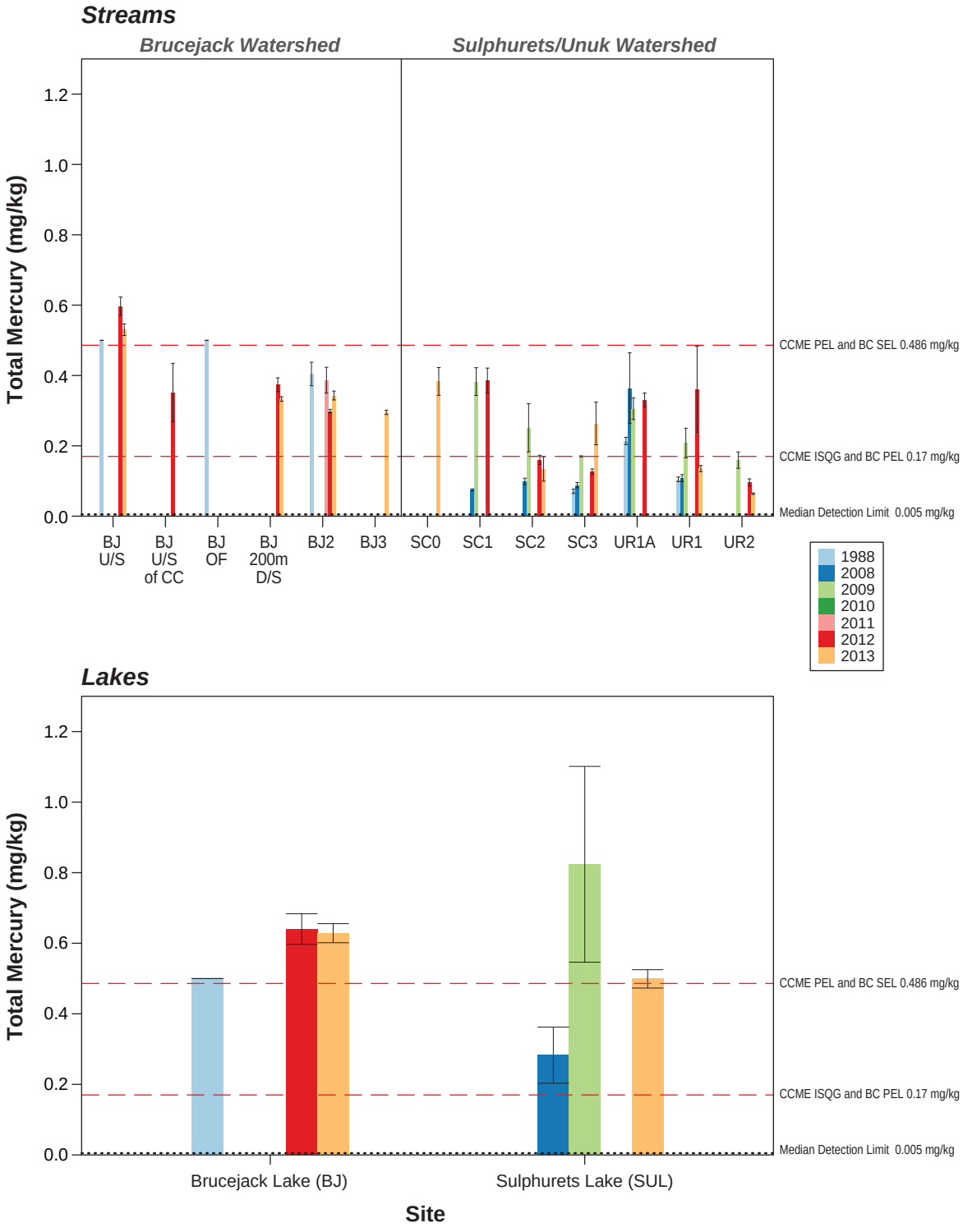
Sediment Total Manganese Concentrations in Mine Site Area and Downstream Receiving Environment Streams and Lakes, Brucejack Gold Mine Project, 1988 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.
Stream sites listed upstream (left) to downstream (right) on x-axis.

Figure 6.1-14

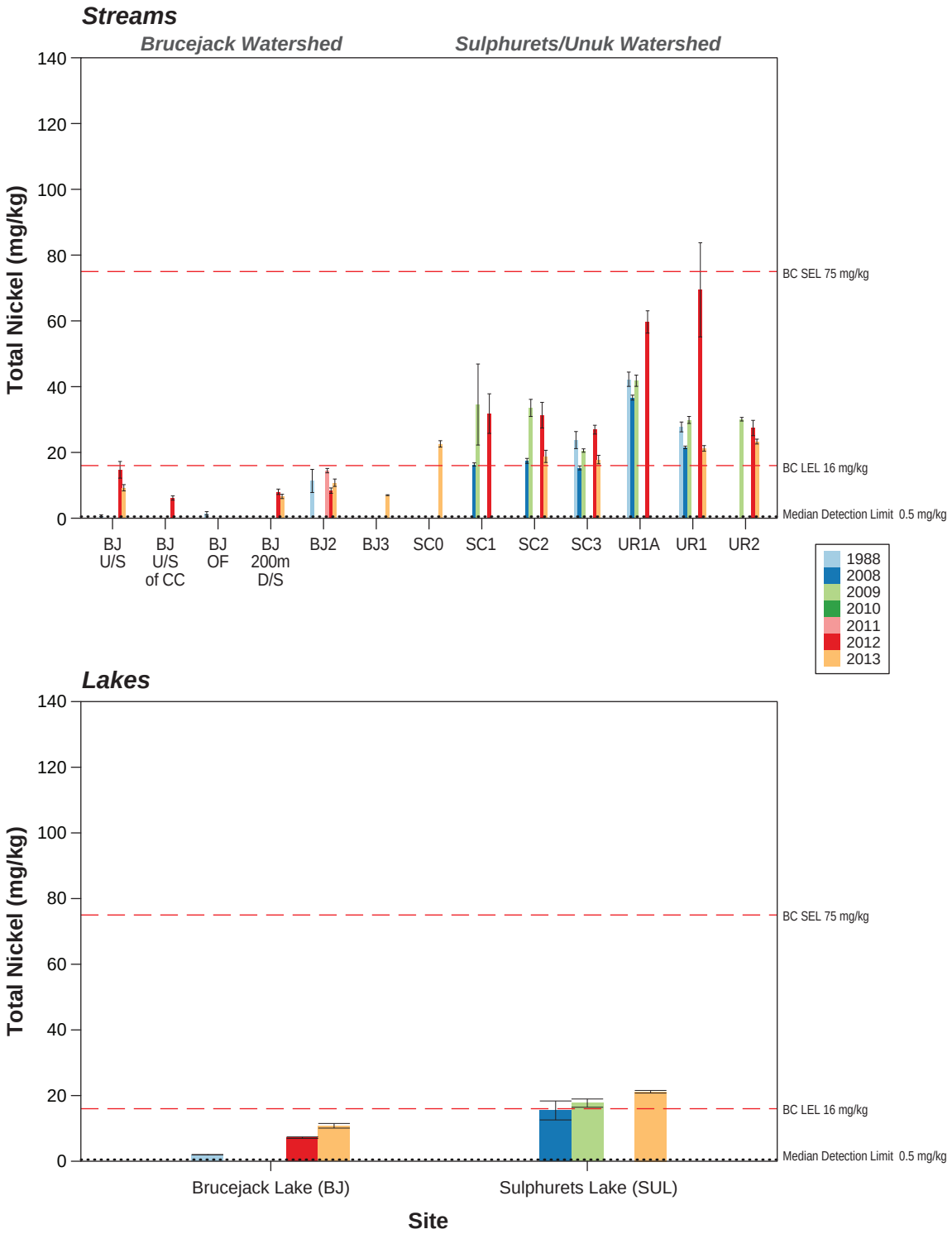
Sediment Total Mercury Concentrations in Mine Site Area and Downstream Receiving Environment Streams and Lakes, Brucejack Gold Mine Project, 1988 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
CCME sediment quality guideline: PEL = probable effect level; ISQG = interim sediment quality guideline.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.
Stream sites listed upstream (left) to downstream (right) on x-axis.

Figure 6.1-15

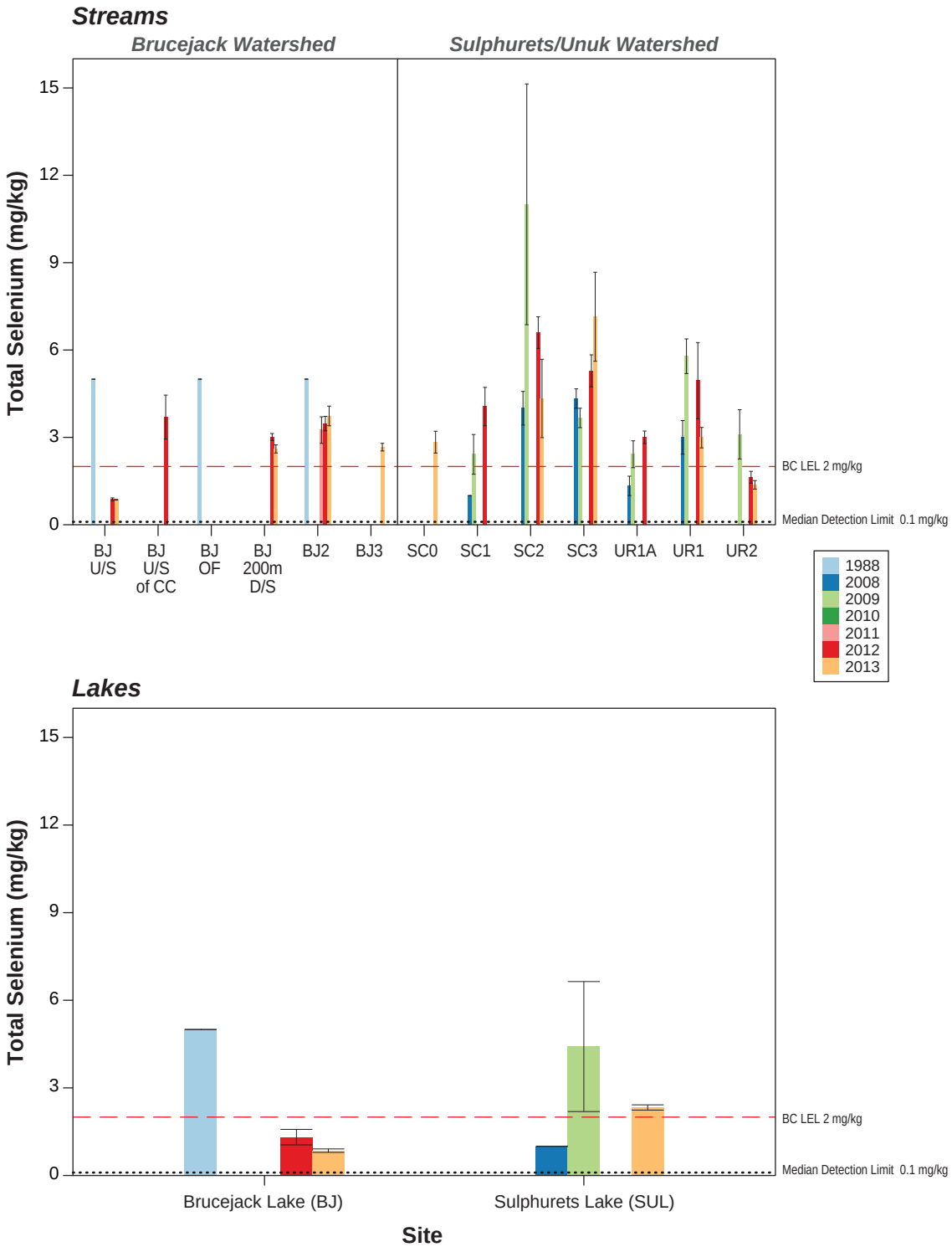
Sediment Total Nickel Concentrations in Mine Site Area and Downstream Receiving Environment Streams and Lakes, Brucejack Gold Mine Project, 1988 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.
Stream sites listed upstream (left) to downstream (right) on x-axis.

Figure 6.1-16

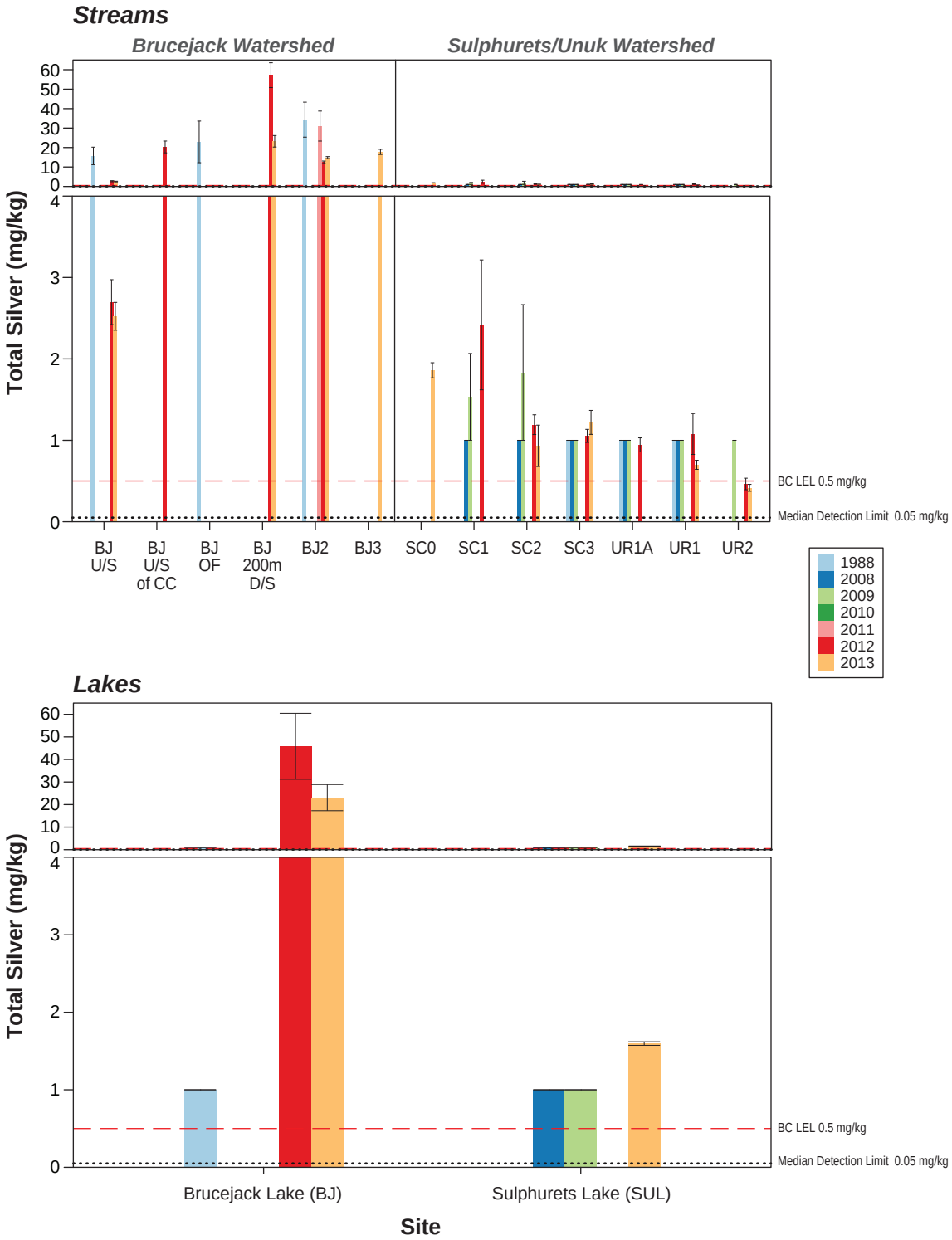
Sediment Total Selenium Concentrations in Mine Site Area and Downstream Receiving Environment Streams and Lakes, Brucejack Gold Mine Project, 1988 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.
Stream sites listed upstream (left) to downstream (right) on x-axis.

Figure 6.1-17

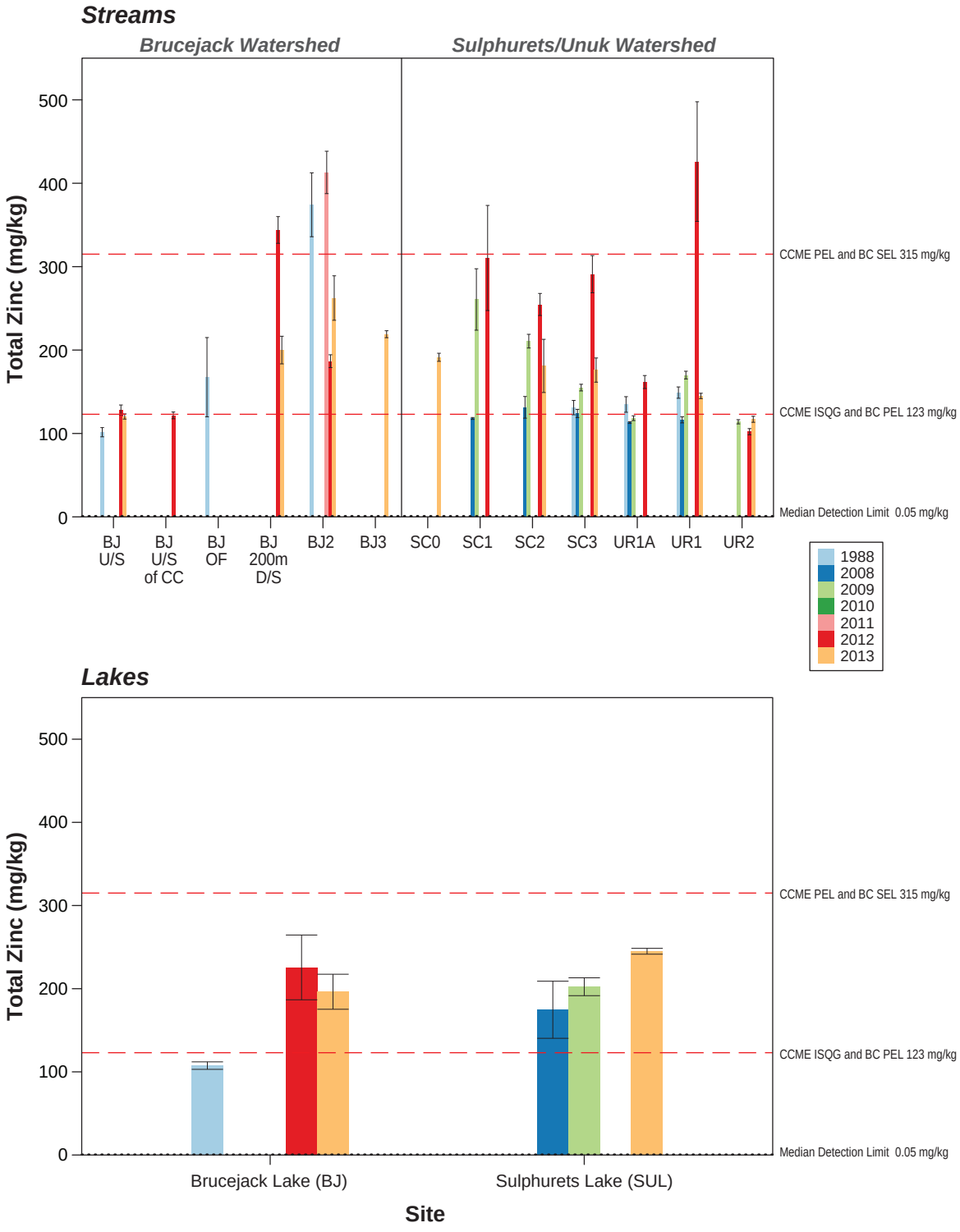
Sediment Total Silver Concentrations in Mine Site Area and Downstream Receiving Environment Streams and Lakes, Brucejack Gold Mine Project, 1988 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.
Stream sites listed upstream (left) to downstream (right) on x-axis.

Figure 6.1-18

Sediment Total Zinc Concentrations in Mine Site Area and Downstream Receiving Environment Streams and Lakes, Brucejack Gold Mine Project, 1988 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
CCME sediment quality guideline: PEL = probable effect level; ISQG = interim sediment quality guideline.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.
Stream sites listed upstream (left) to downstream (right) on x-axis.

Sediment concentrations of iron and manganese tended to be similar in the Sulphurets and Unuk watersheds to the concentrations in the Brucejack watershed (Figures 6.1-11 and 6.1-13). Iron concentrations, for example, ranged from 35,800 mg/kg (UR1A) to 80,733 mg/kg (SC2) in sediments.

6.1.2.5 Comparison to Sediment Quality Guidelines

Sediment metal concentrations collected during the baseline program were compared to the BC MOE and CCME sediment quality guidelines for the protection of aquatic life. The CCME sediment quality guidelines for arsenic, cadmium, chromium, copper, lead, mercury, and zinc are identical to the BC sediment quality guidelines. For each site, the average factor and mean frequency of exceedance were calculated for each sediment metal concentration.

Samples with no reported detection limits and with analytical detection limits greater than guidelines were excluded from the analysis. Baseline program observations collected in 1988 had no reported detection limits for the concentrations of aluminum, arsenic, chromium, copper, iron, lead, manganese, and zinc. In addition, sediment selenium and silver concentrations from the 1988 sampling campaign had analytical detection limits that were greater than the sediment quality guidelines, and were also excluded from this analysis.

Brucejack Watershed

Lake and stream sediments in the Brucejack watershed had naturally high concentrations of metals. As a result, the concentrations of arsenic, iron, manganese, mercury and silver were always greater than BC sediment quality guidelines in baseline samples from Brucejack Lake and Brucejack Creek (Table 6.1-3). In addition, the sediment concentrations of cadmium, copper, lead, selenium, and zinc were frequently greater than the BC sediment quality guidelines.

Arsenic concentrations in Brucejack Lake and Brucejack Creek were always greater than the BC LEL guideline of 5.9 mg/kg and were greater than the BC SEL guideline of 17 mg/kg by factors that ranged from 8.1 to 15.1. Cadmium concentrations greater than the BC LEL guideline (0.6 mg/kg) were observed at most sites in the Brucejack watershed (except for BJ OF), and samples from the BJ2 site also had cadmium concentrations greater than the BC SEL guideline (3.5 mg/kg). Sediment chromium concentrations in the Brucejack watershed were always less than the BC sediment quality guidelines.

Like many of the other metals, copper, iron, lead, manganese, mercury, silver and zinc concentrations in sediments were greater than the BC LEL guidelines in samples from Brucejack Lake and all downstream Brucejack Creek sites. The factor of exceedance for manganese and mercury sediment concentrations tended to be higher in samples from Brucejack Lake and lower in the downstream Brucejack Creek sites.

Sediment nickel concentrations were higher than the BC LEL guideline (16 mg/kg) at BJ U/S and BJ2. Sediment selenium concentrations were greater than the BC LEL guideline (2 mg/kg) in all sites in the Brucejack watershed, except at BJ U/S and BJ OF (for which baseline data was not available).

Table 6.1-3. Percentage of BC and CCME Guideline Exceedances and Average Factor of Exceedances in Sediment Quality Samples, Mine Site Area and Downstream Receiving Environment Lakes and Streams, Brucejack Gold Mine Project, 1988 to 2013

Parameter		Arsenic				Cadmium				Chromium				Copper				Iron				Lead			
Guideline		BC = CCME				BC = CCME				BC = CCME				BC = CCME				BC				BC = CCME			
		ISQG = LEL 5.9		PEL = SEL 17		ISQG = LEL 0.6		PEL = SEL 3.5		ISQG = LEL 37.3		PEL = SEL 90		ISQG = LEL 35.7		PEL = SEL 197		LEL 21,200		SEL 46,766		ISQG = LEL 35		PEL = SEL 91.3	
Site	Samples	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent
BJ	15	26.5	100%	9.2	100%	2.8	67%	–	0%	–	0%	–	0%	1.7	87%	–	0%	2.0	100%	1.1	20%	4.3	73.3%	2.3	47%
BJ U/S	12	23.9	100%	8.3	100%	1.9	8%	-	0%	-	0%	-	0%	1.1	42%	-	0%	2.1	100%	1.1	75%	3.1	25.0%	1.6	17%
BJ U/S of CC	3	24.4	100%	8.5	100%	1.9	100%	–	0%	–	0%	–	0%	1.6	100%	–	0%	2.5	100%	1.2	100%	2.4	100.0%	–	0%
BJ OF	2	23.3	100%	8.1	100%	n/a	n/a	n/a	n/a	-	0%	-	0%	1.3	50%	-	0%	2.0	100%	1.0	50%	2.3	100.0%	1.1	50%
BJ 200m D/S	6	35.0	100%	12.1	100%	3.4	100%	–	0%	–	0%	–	0%	1.9	100%	–	0%	2.5	100%	1.2	100%	3.8	100.0%	1.6	83%
BJ2	17	43.5	100%	15.1	100%	5.1	88%	1.2	35%	-	0%	-	0%	2.4	100%	-	0%	2.4	100%	1.2	100%	3.1	100.0%	1.2	82%
BJ3	3	35.8	100%	12.4	100%	3.1	100%	–	0%	–	0%	–	0%	1.5	100%	–	0%	2.4	100%	1.2	100%	2.5	100.0%	1.1	33%
SC0	3	31.9	100%	11.1	100%	2.9	100%	–	0%	–	0%	–	0%	4.8	100%	–	0%	2.7	100%	1.3	100%	1.5	100.0%	–	0%
SUL	12	18.9	100%	6.6	100%	2.1	83%	–	0%	–	0%	–	0%	12.7	100%	2.5	92%	2.4	100%	1.2	92%	1.7	91.7%	–	0%
SC1	11	32.4	100%	11.2	100%	3.8	91%	1.2	18%	1.2	18%	–	0%	7.7	100%	1.7	73%	2.7	100%	1.5	73%	2.4	63.6%	1.4	18%
SC2	12	13.4	100%	4.6	100%	3.5	100%	–	0%	–	0%	–	0%	7.0	100%	1.6	58%	2.7	100%	1.5	75%	1.9	8.3%	–	0%
SC3	18	10.8	100%	3.8	100%	3.7	100%	1.1	22%	-	0%	-	0%	6.2	100%	1.3	61%	2.5	100%	1.2	100%	1.2	5.6%	-	0%
UR1A	13	6.3	100%	2.2	100%	1.6	54%	-	0%	1.2	92%	-	0%	2.1	100%	-	0%	1.9	100%	1.0	15%	-	0.0%	-	0%
UR1	16	9.0	100%	3.1	100%	3.3	100%	1.6	13%	1.9	19%	1.0	6%	5.7	100%	1.9	25%	2.4	100%	1.3	75%	1.1	12.5%	-	0%
UR2	11	5.6	100%	2.0	91%	1.3	91%	–	0%	1.1	55%	–	0%	3.0	100%	–	0%	2.3	100%	1.4	55%	–	0.0%	–	0%

Parameter		Manganese				Mercury				Nickel				Selenium		Silver		Zinc			
Guideline		BC				BC = CCME				BC				BC		BC		BC = CCME			
		LEL 460		SEL 1,100		ISQG = LEL 35		PEL = SEL 91.3		LEL 16		SEL 75		LEL 2		LEL 2		ISQG = LEL 123		PEL = SEL 315	
Site	Samples	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent
BJ	15	4.9	100%	2.0	100%	3.7	100%	1.3	100%	–	0%	–	0%	1.0	8%	61.5	100%	2.0	67%	1.0	7%
BJ U/S	12	3.2	100%	2.3	33%	3.3	100%	1.2	90%	1.2	17%	-	0%	-	0%	9.6	100%	1.1	33%	-	0%
BJ U/S of CC	3	1.4	100%	–	0%	2.1	100%	–	0%	–	0%	–	0%	1.8	100%	40.6	100%	1.0	33%	–	0%
BJ OF	2	2.6	100%	1.3	50%	n/a	n/a	n/a	n/a	-	0%	-	0%	n/a	n/a	45.8	100%	1.7	50%	-	0%
BJ 200m D/S	6	1.9	100%	–	0%	2.1	100%	–	0%	–	0%	–	0%	1.4	100%	80.4	100%	2.2	100%	1.1	33%
BJ2	17	2.7	100%	1.2	82%	2.1	100%	1.0	12%	1.2	18%	-	0%	1.9	100%	48.3	100%	2.6	100%	1.3	47%
BJ3	3	2.2	100%	–	0%	1.7	100%	–	0%	–	0%	–	0%	1.3	100%	35.5	100%	1.8	100%	–	0%
SC0	3	2.6	100%	1.2	67%	2.3	100%	–	0%	1.4	100%	–	0%	1.4	100%	3.7	100%	1.6	100%	–	0%
SUL	12	3.3	100%	1.6	75%	3.8	92%	2.7	25%	1.2	75%	–	0%	2.8	100%	3.2	100%	1.7	92%	–	0%
SC1	11	5.3	100%	2.2	100%	2.3	73%	1.1	9%	1.9	91%	–	0%	2.0	100%	4.9	100%	2.4	73%	1.3	27%
SC2	12	1.9	100%	1.1	25%	1.3	42%	–	0%	1.6	100%	–	0%	3.8	100%	2.8	100%	1.7	83%	–	0%
SC3	18	1.7	100%	1.0	17%	1.4	22%	-	0%	1.4	89%	-	0%	3.0	100%	2.2	100%	1.7	78%	1.0	11%
UR1A	13	1.9	100%	-	0%	1.7	100%	1.1	8%	2.8	100%	-	0%	1.5	100%	1.9	100%	1.2	54%	-	0%
UR1	16	2.0	100%	1.4	19%	2.0	25%	1.2	6%	2.1	100%	1.2	6%	2.3	100%	1.8	100%	1.8	81%	1.5	13%
UR2	11	1.4	91%	–	0%	1.1	18%	–	0%	1.7	100%	–	0%	1.7	30%	1.3	13%	–	0%	–	0%

Notes:

All units in mg/kg.

British Columbia working sediment quality guidelines for the protection of freshwater aquatic life; LEL = Lowest Effect Level and SEL = Severe Effect Level (accessed March 2013)

Canadian Council of Ministers of Environment sediment quality guidelines for the protection of aquatic life; ISQG = Interim Sediment Quality Guideline and PEL = Probable Effects Level (accessed March 2013)

Half the detection limit was substituted for values below the detection limit.

Samples below the detection limit but above the guideline concentration were excluded from all calculations.

Factor represents the average factor by which sample concentrations were greater than guideline concentrations.

Percent represents the percentage of samples collected at each site that were greater than guidelines.

n/a indicates no information available for that parameter.

Sulphurets and Unuk Watersheds

Sediment metal concentrations in Sulphurets Lake, Sulphurets Creek, and the Unuk River were naturally high. Samples from all sites in the Sulphurets and Unuk watersheds had sediment arsenic, cadmium, copper, iron, manganese, mercury, nickel, and selenium concentrations greater than the BC sediment quality guidelines (Table 6.1-3).

Sediment arsenic concentrations were always greater than the BC LEL and SEL guidelines, but exceeded guidelines to a lesser degree with distance from the highly mineralized Brucejack and Sulphurets watersheds. In contrast, the concentration of cadmium, iron, manganese, mercury and nickel were naturally higher than BC sediment quality guidelines throughout the downstream receiving environment with no observed spatial trends. Selenium levels in the Sulphurets/Unuk watershed sites were above the BC guideline of 2 mg/kg by a greater factor (mean range: 1.4-3.8) than Brucejack watershed sites (mean range: 1.0-1.9). Silver concentrations in sediments in the Sulphurets/Unuk watershed sites all exceeded the BC LEL guideline of 0.5 mg/kg, with exceedances on average an order of magnitude lower than observed in the Brucejack watershed sites. (mean range: 1.3-4.9 compared to 9.6-80.4 at Brucejack watershed sites). Sediment zinc concentrations were generally greater than the BC LEL guidelines in the Sulphurets and Unuk watersheds, except for the far-field downstream UR2 site on the Unuk River.

Chromium concentrations in sediments were observed to be naturally greater than the BC LEL guideline (37.3 mg/kg) in Sulphurets Creek (site SC1) and the Unuk River (sites UR1A, UR1, and UR2).

6.1.2.6 Quality Assurance and Quality Control (QA/QC)

Eight sediment quality duplicate split samples were collected in 2010, 2012, and 2013 (Appendix 3). Of these, an RPD was calculated for 67% (250/373) of the duplicate concentrations that had concentrations at least five times greater than the detection limit (BC MOE 2004). Of these, RPD was between 20% and 50% for 6% of duplicate concentrations and greater than 50% for 8% of duplicate concentrations. These high RPD values were primarily associated with one set of duplicates (collected from TL1 on August 25, 2010), where RPDs were between 20 and 50% for four parameters and greater than 50% for 20 parameters. The large discrepancy between duplicate samples for this replicate may have resulted from insufficient homogenization. As such, sediment quality results from TL1 in 2010 should be interpreted with caution.

6.1.3 Tissue Residues

Benthic invertebrate tissues were analyzed for metal concentrations from sites BJ U/S, BJ2, SC2, SC3, UR1, and UR2 in the mine site area and downstream receiving environment in 2013, and the complete results are presented in Appendix 4. Substantial variability was observed in the tissue concentrations of most metals among surveyed sites. Benthic invertebrates collected at BJ2 in Brucejack Creek had substantially higher tissue overall metal concentrations than organisms collected from sites upstream and downstream (Appendix 4).

Tissue metal concentrations were compared to sediment metal concentrations (Figure 6.1-19). Tissue mercury concentrations were correlated with sediment mercury concentrations, with the highest tissue mercury concentration observed in benthic invertebrate tissue from site BJ U/S on Brucejack Creek (R^2 = 0.84, p = 0.010, n = 6). However, all mercury tissue concentrations were less than the CCME methylmercury guideline for the protection of wildlife consumers of aquatic biota (0.033 mg/kg methylmercury, which can comprise up to 100% of the total mercury in tissues, CCME 2000).

In contrast to mercury, tissue selenium concentrations were not well-correlated to sediment selenium concentrations (Figure 6.1-19). The sites with the highest selenium tissue concentrations, BJ2 in Brucejack Creek and SC2 in Sulphurets Creek, had relatively moderate concentrations of selenium (3 to 5 mg/kg). All selenium tissue concentrations were less than the BC MOE guideline (1 mg/kg).

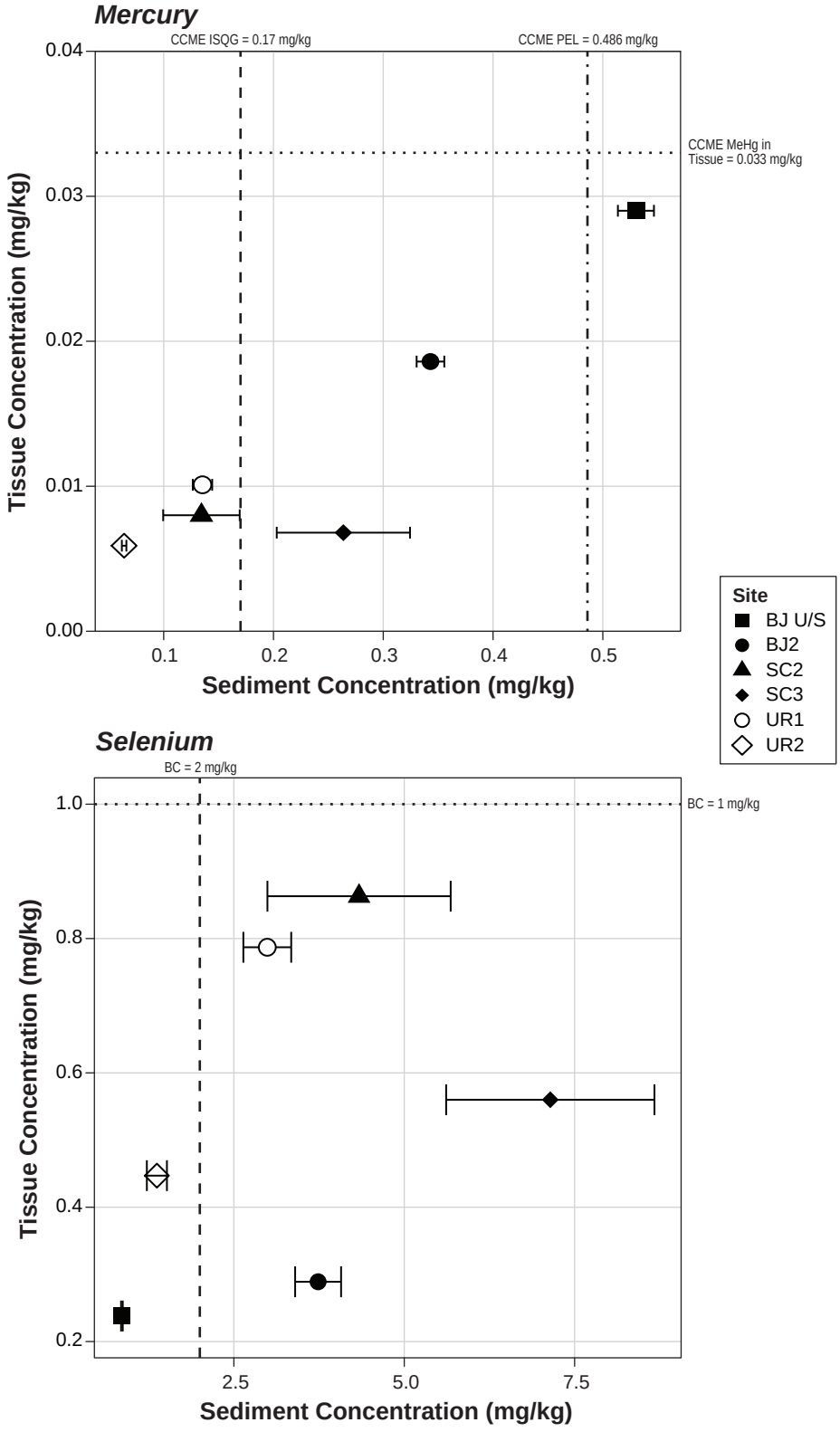
6.1.4 Primary Producers

The baseline sampling program collected data on the density, biomass, and community composition of phytoplankton and periphyton in Brucejack Lake, Brucejack Creek, Sulphurets Creek, Sulphurets Lake, and the Unuk River. The data are summarized in Figures 6.1-20 to 6.1-24 and Tables 6.1-4 and 6.1-5. The complete results are presented in Appendix 5. The density of primary producers in streams and lakes in the Mine Site Area and downstream receiving environment was often very low (one cell per mL or cm^2), which would suggest the *in situ* primary production may be very low in these environments.

6.1.4.1 Brucejack Watershed

Inter-annual variation was observed in the density and biomass of phytoplankton in Brucejack Lake (Figures 6.1-20 and 6.1-21). The density of phytoplankton varied between 660 cells/mL in 2012 to 66 cells/mL in 2013, whereas the biomass varied between 0.08 µg chl *a*/L in 2012 and 0.07 µg chl *a*/L in 2013. Brucejack Lake had low water nutrient levels and was classified as ultra-oligotrophic, with concentrations of several nutrients being below detection limits (ERM Rescan 2014). The composition of the phytoplankton community also varied substantially between years; diatom (primarily genus *Synedra*) cells were 77% of the community in 2012, but 2013 community was comprised equally of diatom (43%, primarily genus *Synedra*) and heterotrophic dinoflagellates (43%, genus *Gymnodinium*; Table 6.1-5 and Figure 6.1-22). The number of taxa in Brucejack Lake was generally around seven taxa per sample (Figure 6.1-23). However, the diversity metric (Simpson's D) indicated an increase in diversity between 2012 and 2013 (0.45 to 0.68), but this trend was likely confounded by the 10-fold decrease in density (Figure 6.1-24).

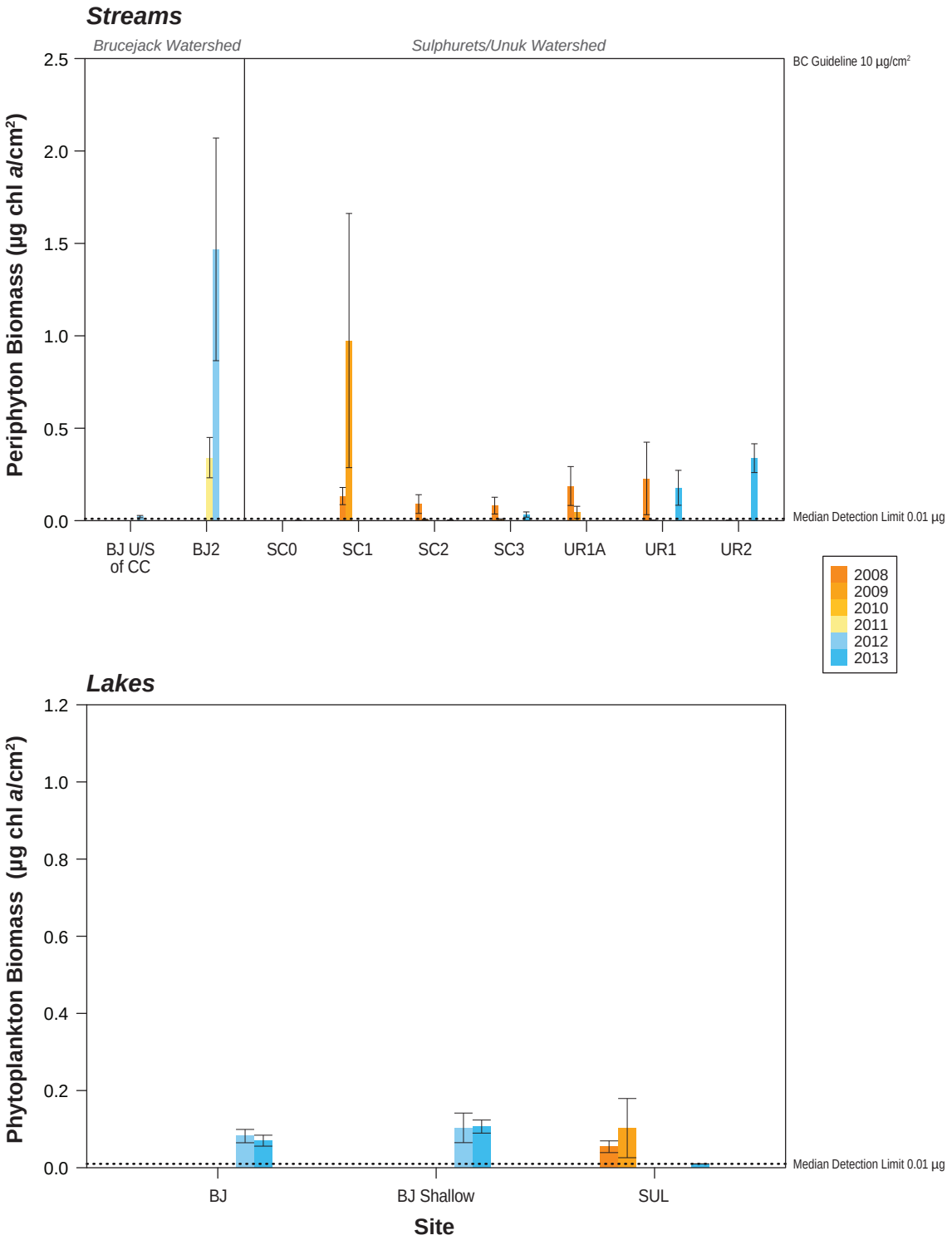
Little spatial variability was observed in the density, community composition, and diversity of the phytoplankton community in Brucejack Lake (sites BJ and BJ Shallow; Figures 6.1-20 to 6.1-24). However, *Leptolyngbya* sp. (a filamentous cyanobacteria) were a minor component (11%) of the phytoplankton community at the BJ Shallow site in 2013 (Figure 6.1-22).



Notes: All observations were greater than the analytical detection limits for tissue and sediment metal concentrations.
The CCME Sediment Quality Guidelines for Protection of Aquatic Life and Tissue Residue Quality Guidelines for the Aquatic Biota are shown for mercury.
The BC interim Sediment Quality Guidelines for sediment and tissue are shown for selenium.

Figure 6.1-20

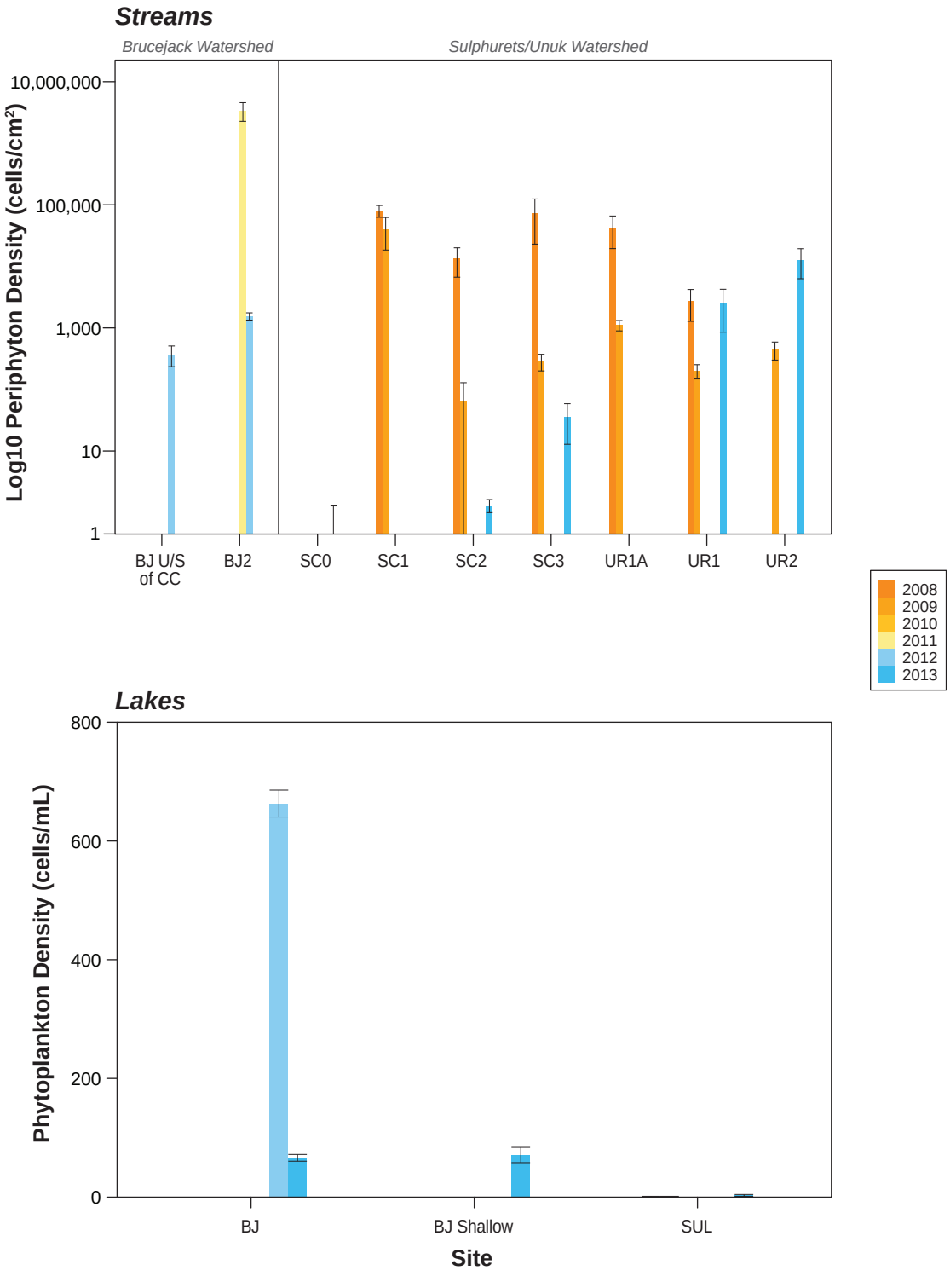
Periphyton and Phytoplankton Biomass in Mine Site Area and Downstream Receiving Environment, Brucejack Gold Mine Project, 2008 to 2013



Note: Error bars represent the standard error of the mean.

Figure 6.1-21

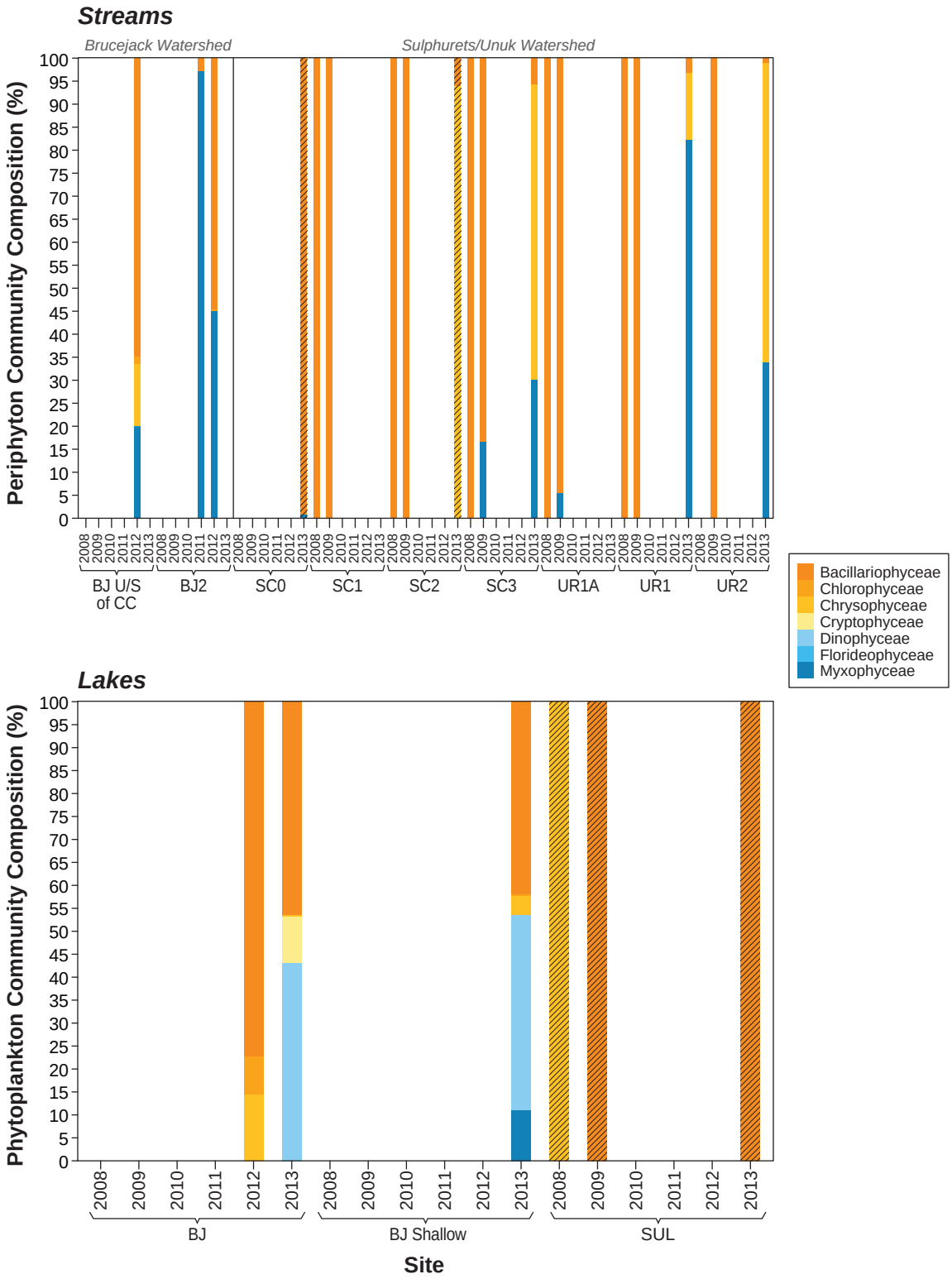
Periphyton and Phytoplankton Density in Mine Site Area and Downstream Receiving Environment, Brucejack Gold Mine Project, 2008 to 2013



Note: Error bars represent the standard error of the mean.

Figure 6.1-22

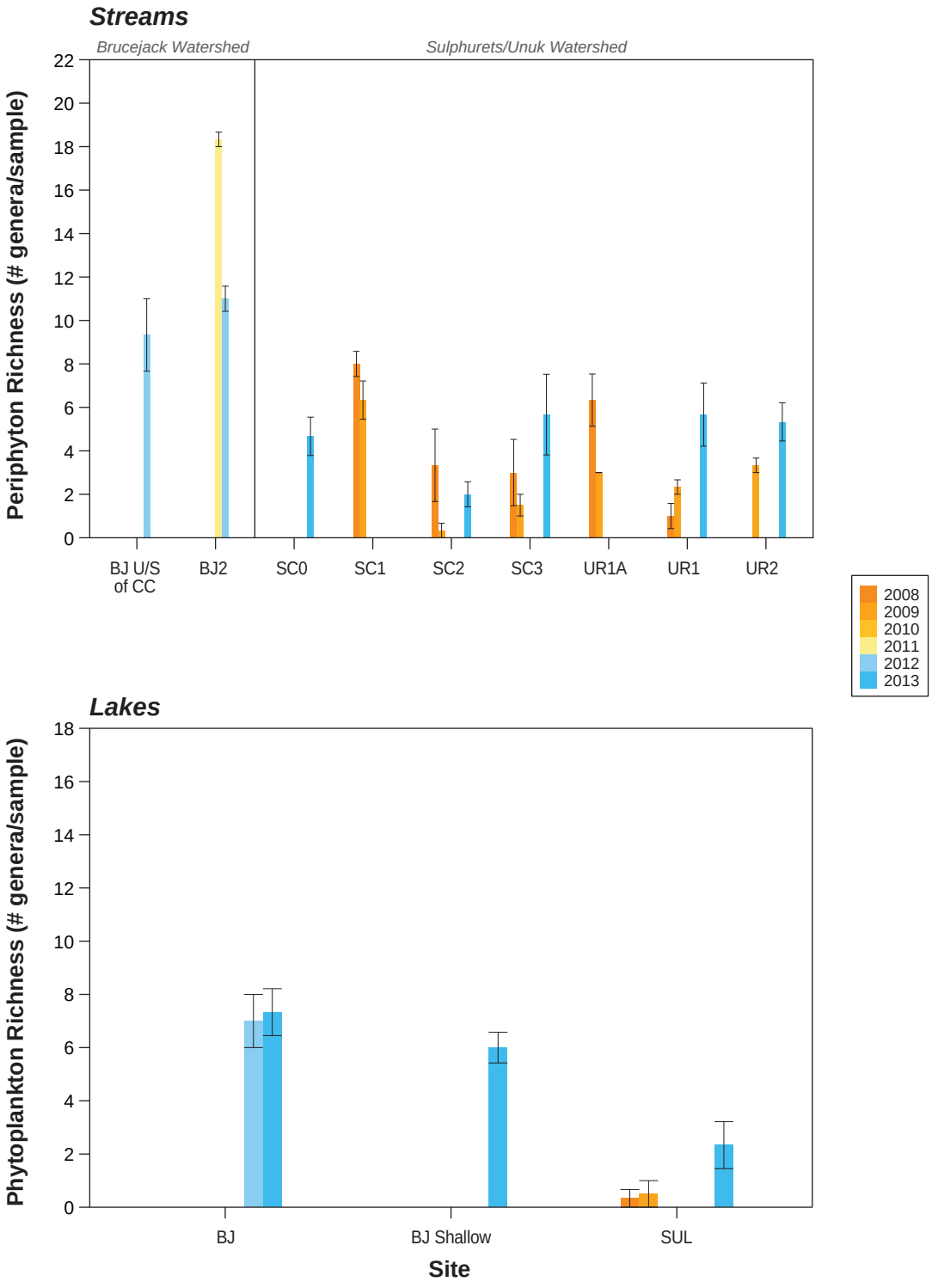
Periphyton and Phytoplankton Community Composition in Mine Site Area and Downstream Receiving Environment, Brucejack Gold Mine Project, 2008 to 2013



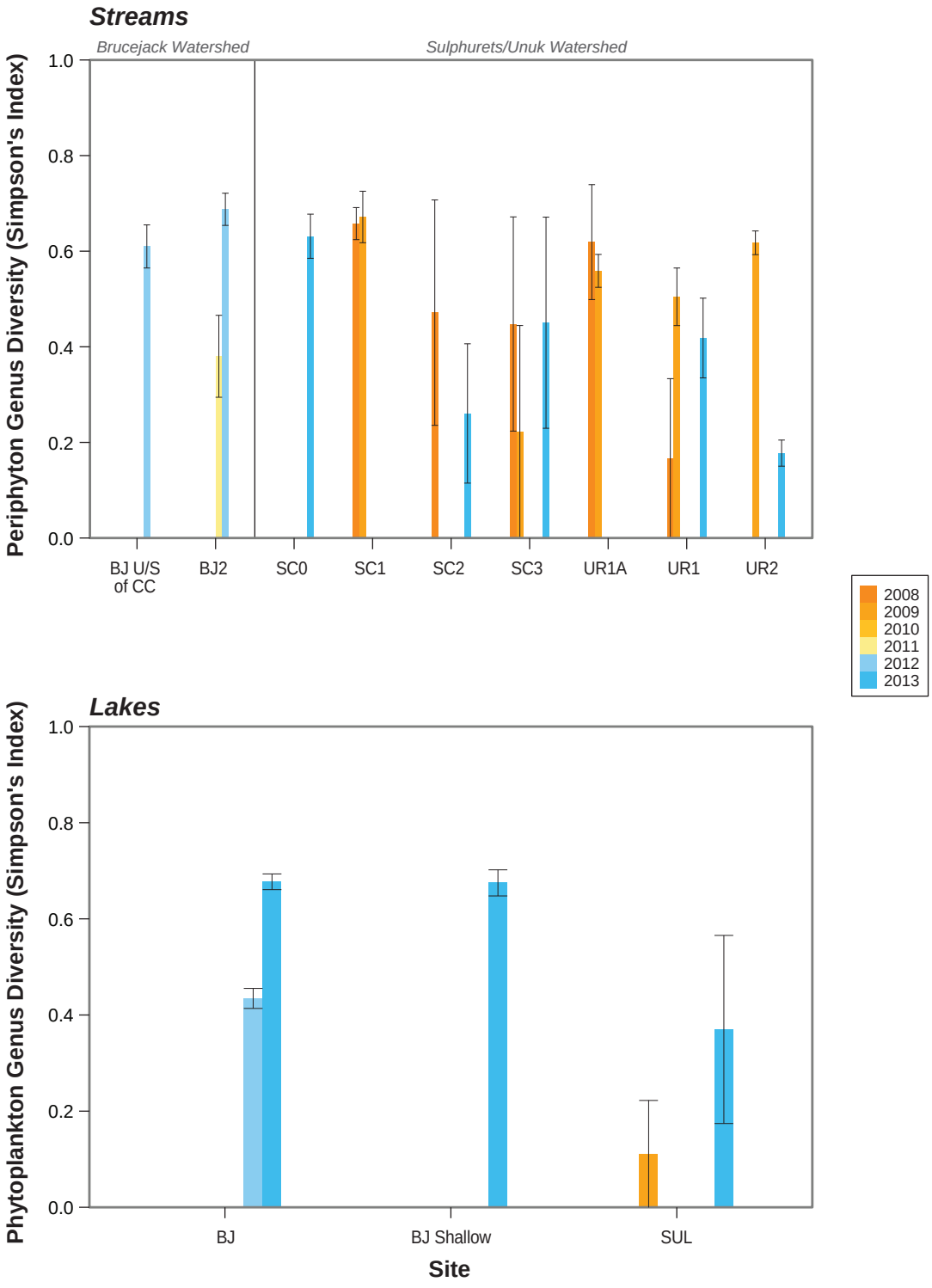
Notes: Error bars represent the standard error of the mean.
Immature, damaged and unidentified individuals were excluded from all analyses except density calculations.
Hatched bars indicate sites where the mean density was less than 15 cells/cm^2 or 15 cells/mL.

Figure 6.1-23

Periphyton and Phytoplankton Richness in Mine Site Area and Downstream Receiving Environment, Brucejack Gold Mine Project, 2008 to 2013



Note: Error bars represent the standard error of the mean.
Immature, damaged and unidentified individuals were excluded from all analyses except density calculations.



Note: Error bars represent the standard error of the mean.
Immature, damaged and unidentified individuals were excluded from all analyses except density calculations.

Table 6.1-4. Stream Periphyton Dominant Taxa in Mine Site Area and Downstream Receiving Environment, Brucejack Gold Mine Project, 2008 to 2013

Watershed	Site	Year	Class	Order	Genus	Percent
Brucejack	BJ Inter	2012	Chrysophyceae	Chromulinales	*Chrysocapsella*	94%
			Bacillariophyceae	Pennales	*Tabellaria*	2%
			Bacillariophyceae	Pennales	*Gomphonema*	2%
	BJ U/S of CC	2012	Bacillariophyceae	Pennales	*Synedra*	56%
			Myxophyceae	Nostocales	*Anabaena*	20%
			Chrysophyceae	Chrysomonadales	*Dinobryon*	13%
	BJ2	2011	Myxophyceae	Oscillatoriales	*Schizothrix*	77%
			Myxophyceae	Oscillatoriales	*Phormidium*	15%
			Myxophyceae	Oscillatoriales	*Pseudanabaena*	4%
		2012	Myxophyceae	Oscillatoriales	*Oscillatoria*	41%
			Bacillariophyceae	Pennales	*Hannaea*	30%
			Bacillariophyceae	Pennales	*Synedra*	13%
Sulphurets/Unuk	SC0	2013	Bacillariophyceae	Pennales	*Hannaea*	35%
			Bacillariophyceae	Pennales	*Navicula*	30%
			Bacillariophyceae	Pennales	*Nitzschia*	26%
	SC1	2008	Bacillariophyceae	Pennales	*Cymbella*	52%
			Bacillariophyceae	Pennales	*Gomphonema*	16%
			Bacillariophyceae	Pennales	*Fragilaria*	14%
		2009	Bacillariophyceae	Pennales	*Cymbella*	35%
			Bacillariophyceae	Pennales	*Gomphonema*	28%
			Bacillariophyceae	Pennales	*Navicula*	13%
	SC2	2008	Bacillariophyceae	Pennales	*Cymbella*	26%
			Bacillariophyceae	Pennales	*Navicula*	23%
			Bacillariophyceae	Pennales	*Gomphonema*	23%
		2009	Bacillariophyceae	Pennales	*Gomphonema*	100%
		2013	Chrysophyceae	Chromulinales	*Hydrurus*	80%
			Chrysophyceae	Chromulinales	*Chrysosphaera*	14%
			Bacillariophyceae	Pennales	*Hannaea*	6%
	SC3	2008	Bacillariophyceae	Pennales	*Cymbella*	44%
			Bacillariophyceae	Pennales	*Nitzschia*	19%
			Bacillariophyceae	Pennales	*Navicula*	17%
		2009	Bacillariophyceae	Pennales	*Gomphonema*	83%
			Myxophyceae	Oscillatoriales	*Oscillatoria*	17%
		2013	Chrysophyceae	Chromulinales	*Hydrurus*	53%
			Myxophyceae	Oscillatoriales	*Phormidium*	17%
			Myxophyceae	Oscillatoriales	*Homoeothrix*	13%
	UR1A	2008	Bacillariophyceae	Pennales	*Gomphonema*	35%
			Bacillariophyceae	Pennales	*Meridion*	15%
			Bacillariophyceae	Pennales	*Navicula*	14%
		2009	Bacillariophyceae	Pennales	*Gomphonema*	38%
			Bacillariophyceae	Pennales	*Cymbella*	26%
			Bacillariophyceae	Pennales	*Hannaea*	19%
	UR1	2008	Bacillariophyceae	Pennales	*Nitzschia*	75%
			Bacillariophyceae	Pennales	*Gomphonema*	25%
		2009	Bacillariophyceae	Pennales	*Gomphonema*	31%
			Bacillariophyceae	Pennales	*Navicula*	22%
			Bacillariophyceae	Pennales	*Fragilaria*	22%
		2013	Myxophyceae	Oscillatoriales	*Leptolyngbya*	47%
			Myxophyceae	Oscillatoriales	*Phormidium*	33%
			Chrysophyceae	Chromulinales	*Hydrurus*	14%
	UR2	2009	Bacillariophyceae	Pennales	*Gomphonema*	44%
			Bacillariophyceae	Pennales	*Cymbella*	26%
			Bacillariophyceae	Pennales	*Fragilaria*	21%
		2013	Chrysophyceae	Chromulinales	*Hydrurus*	65%
			Myxophyceae	Oscillatoriales	*Leptolyngbya*	34%
			Bacillariophyceae	Pennales	*Gomphonema*	1%

Notes: Values represent the percentage of the total community.
Immature, damaged and unidentified individuals below the family level were excluded.

Table 6.1-5. Lake Phytoplankton Dominant Taxa in Mine Site Area and Downstream Receiving Environment, Brucejack Gold Mine Project, 2008 to 2013

Watershed	Site	Year	Class	Order	Genus	Percent
Brucejack	BJ	2012	Bacillariophyceae	Pennales	*Synedra*	73%
			Chrysophyceae	Chrysomonadales	*Dinobryon*	14%
			Chlorophyceae	Chlorococcales	*Monoraphidium*	8%
		2013	Dinophyceae	Gymnodiniales	*Gymnodinium*	43%
			Bacillariophyceae	Pennales	*Synedra*	34%
			Cryptophyceae	Cryptomonadales	*Chroomonas*	10%
	BJ Shallow	2013	Dinophyceae	Gymnodiniales	*Gymnodinium*	43%
			Bacillariophyceae	Pennales	*Hannaea*	33%
			Myxophyceae	Oscillatoriales	*Leptolyngbya*	11%
Sulphurets/Unuk	SUL	2008	Chrysophyceae	Chromulinales	*Kephyrion*	100%
		2009	Bacillariophyceae	Pennales	*Cymbella*	33%
			Bacillariophyceae	Pennales	*Fragilaria*	33%
			Bacillariophyceae	Pennales	*Surirella*	33%
		2013	Bacillariophyceae	Pennales	*Synedra*	72%
			Bacillariophyceae	Pennales	*Nitzschia*	18%
			Bacillariophyceae	Pennales	*Navicula*	7%

Notes: Values represent the percentage of the total community.
Immature, damaged and unidentified individuals below the family level were excluded.

The Brucejack Creek site BJ U/S of CC had low periphyton densities (370 cells/mL) and biomass (0.02 µg chl *a*/cm^2; Figures 6.1-20 and 6.1-21). As with Brucejack Lake, BJ U/S of CC had low water nutrient levels (ERM Rescan 2014). Substantial inter-annual variation may be a natural feature of the periphyton community. Periphyton density and biomass varied 2,000-fold and 4-fold, respectively, between 2011 and 2012 at site BJ2 on Brucejack Creek (Figures 6.1-20 and 6.1-21, note the logarithmic scale for periphyton cell density). The inter-annual variation coincided with a change in community composition from filamentous cyanobacteria in 2011 (97% of cells, primarily genus *Schizothrix*) to the larger, but less abundant diatoms (55% of cells, genera *Hannaea* and *Synedra*) in 2012 (Table 6.1-4 and Figure 6.1-22). Interestingly, the largest number of periphyton taxa in the baseline sampling program was observed at BJ2 when the site was dominated by cyanobacteria in 2011. The substantial changes in cell density likely also confounded the diversity metrics for the periphyton community in Brucejack Creek, as was observed for Brucejack Lake (discussed above; Figure 6.1-24).

6.1.4.2 Sulphurets and Unuk Watersheds

The Sulphurets Creek site SC0, downstream from the Sulphurets Glacier, and Sulphurets Lake were both characterized by naturally low primary producer density and biomass. Both SC0 and SUL sites had cell densities and biomass lower than upstream sites (e.g., BJ2 and BJ; Figures 6.1-20 and 6.1-21). The low numbers of cells in samples for taxonomic analysis reduced the resolution of taxonomic analyses of the periphyton and phytoplankton communities in the upper reaches of Sulphurets

Creek and Sulphurets Lake (Figure 6.1-22), although the only primary producers observed were diatoms and chrysophytes (Tables 6.1-4 and 6.1-5).

Downstream of Sulphurets Lake, sites SC2 and SC3 had relatively higher periphyton cell densities and biomass, but inter-annual variability was observed (Figures 6.1-20 and 6.1-21). For example, periphyton densities ranged from 13,000 cells/cm^2 in 2008 to ~1 cell/cm^2 in 2013. The periphyton community in Sulphurets Creek was generally dominated by diatoms (≥ 80% of cells, *Cymbella* and *Gomphonema* genera), but chrysophytes were a noteworthy component of the community during periods of low periphyton density in 2013 (Table 6.1-4 and Figure 6.1-22).

Sites in the Unuk River, both upstream (site UR1A) and downstream (sites UR1 and UR2) of the confluence with Sulphurets Creek, had periphyton communities generally similar in density, biomass, and community composition to the lower stretches of Sulphurets Creek (Figures 6.1-20 to 6.1-22). Inter-annual variation was observed in density, biomass, and community composition. For example, the density and biomass of periphyton cells at UR1 varied 10-fold and 140-fold, respectively, between 2009 and 2008/2013. The richness of the Unuk River sites was generally low (< 6 taxa per sample; Figure 6.1-23), and the community varied from diatoms to cyanobacteria (site UR1) or diatoms to chrysophytes (site UR2; Table 6.1-4 and Figure 6.1-22).

6.1.5 Aquatic Invertebrates

The baseline sampling program collected data on the density, biomass, and community composition of aquatic invertebrates in Brucejack Lake, Brucejack Creek, Sulphurets Creek, Sulphurets Lake, and the Unuk River. The data are summarized in Figures 6.1-25 to 6.1-28 and Tables 6.1-6 to 6.1-9. The complete results are presented in Appendix 6.

6.1.5.1 Density

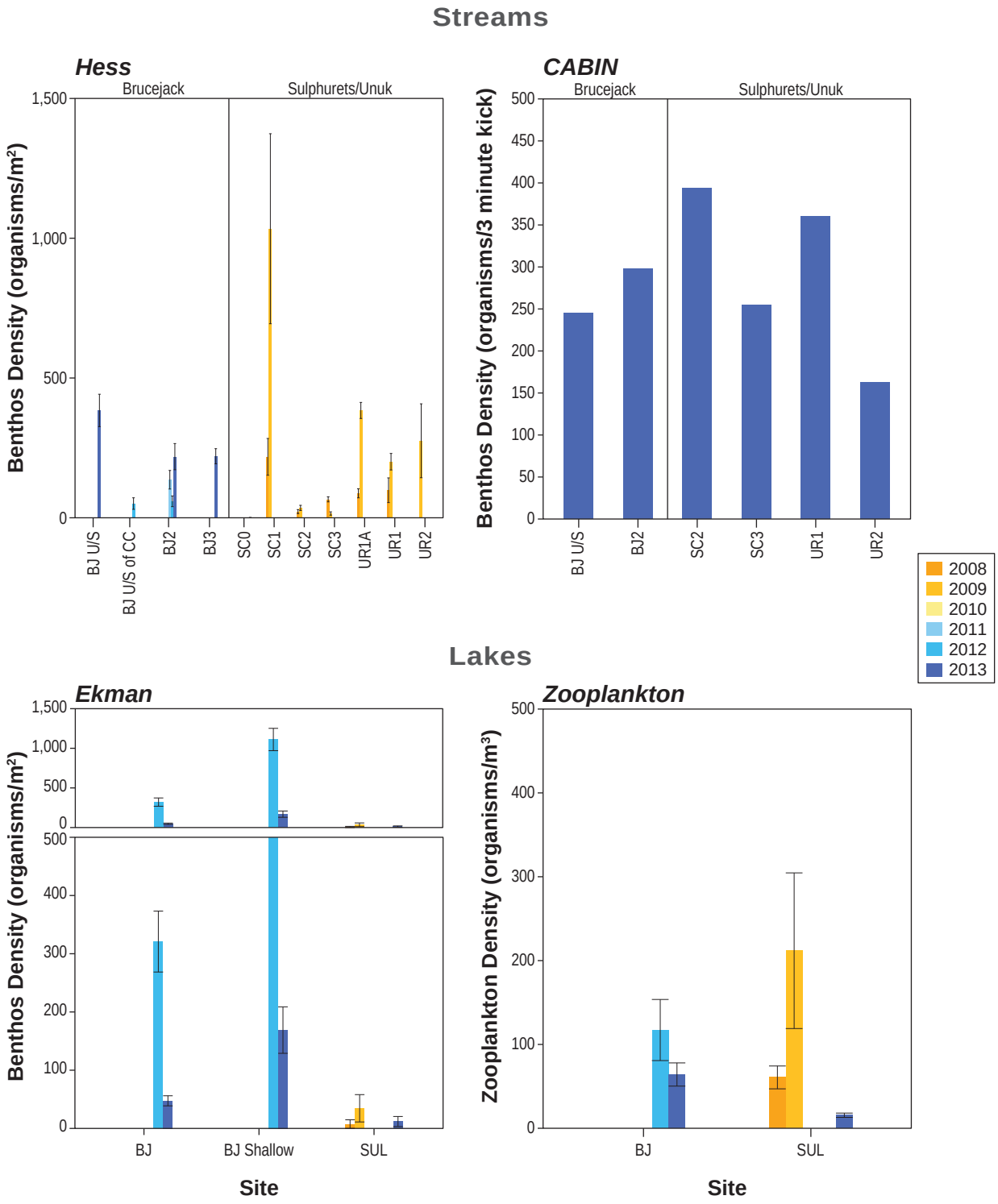
Brucejack Lake benthic invertebrate densities were variable temporally and spatially (Figure 6.1-25). Benthic invertebrate densities were higher at BJ Shallow at ~10 m depth (mean range: 170 to 1,100 organisms/m^2) compared to BJ collected from ~78 m depth (mean range: 47 to 320 organisms/m^2). Densities in Brucejack Lake (BJ and BJ Shallow) were six times higher in 2012 compared to 2013.

Brucejack Lake flows into Brucejack Creek, which was sampled with a Hess sampler and a CABIN kick-net. Brucejack Creek mean benthic invertebrate densities collected with the Hess sampler varied between sites and ranged from 51 organisms/m^2 at BJ U/S of CC (2012) to 380 organisms/m^2 at BJ U/S (2013; Figure 6.1-25). Hess densities were generally constant between years. For example, benthos densities at BJ2 were 140 organisms/m^2 in 2011, 59 organisms/m^2 in 2012, and 22 organisms/m^2 in 2013. Benthic invertebrate densities collected in 2013 with a CABIN kick net were very similar between BJ U/S (245 organisms/3 minute kick) and BJ2 (298 organisms/3 minute kick; Figure 6.1-25).

Brucejack Creek flows under the Sulphurets Glacier where it joins Sulphurets Creek. Sulphurets Creek 0 (SC0) is located at the toe of the glacier, just upstream of Sulphurets Lake. Benthic invertebrates were sampled from SC0 with a Hess sampler; however, four of the five replicates did not contain any organisms and only one Nemouridae (Plecoptera) was found in one replicate.

Figure 6.1-25

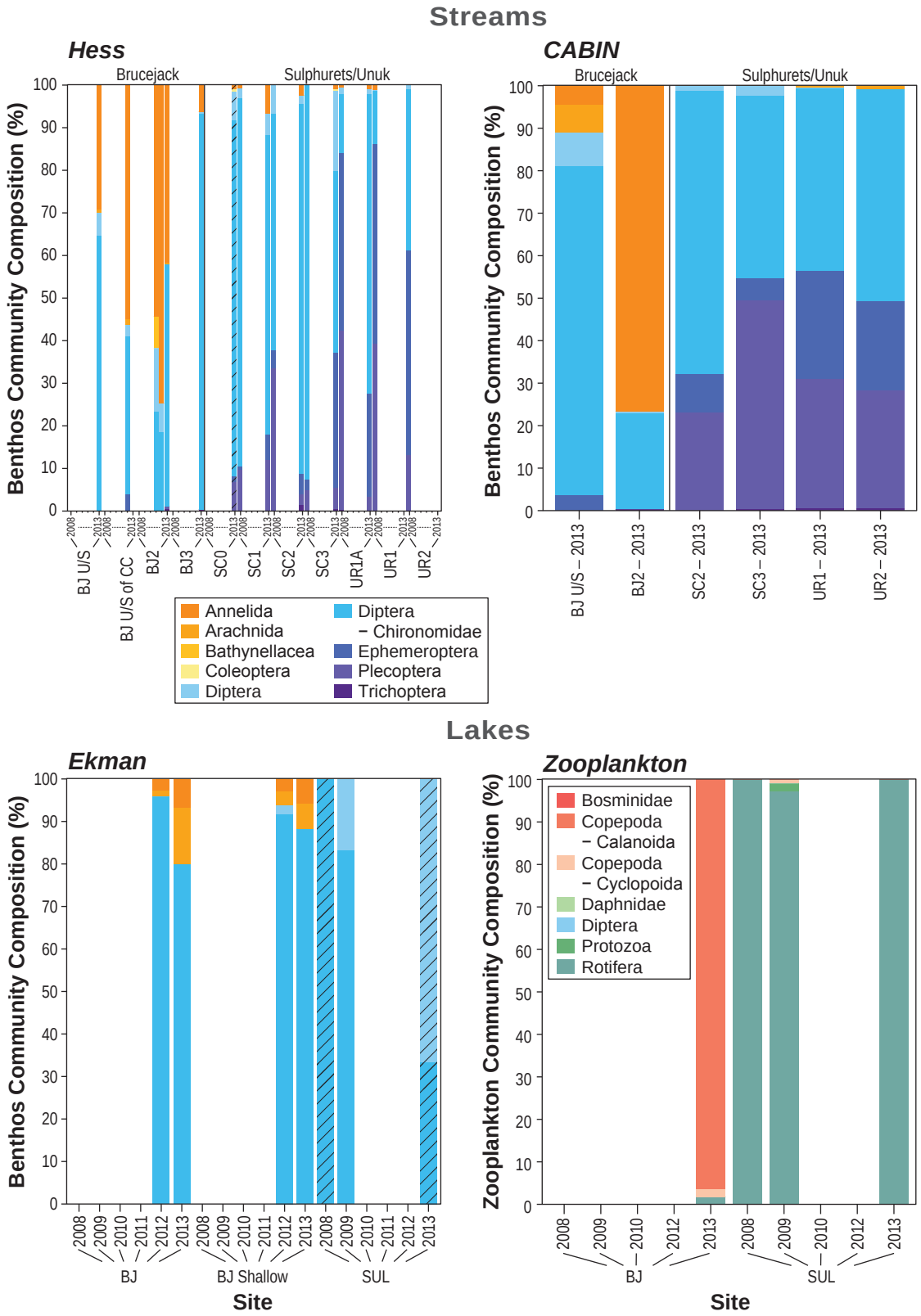
Benthic Invertebrate and Zooplankton Density in Mine Site Area and Downstream Receiving Environment, Brucejack Gold Mine Project, 2008 to 2013



Note: Error bars represent the standard error of the mean.
Ostracoda, Cladocera, Copepoda, Porifera, Nematoda, Platyhelminthes, fish and terrestrial invertebrates were excluded from all benthic invertebrate calculations.

Figure 6.1-26

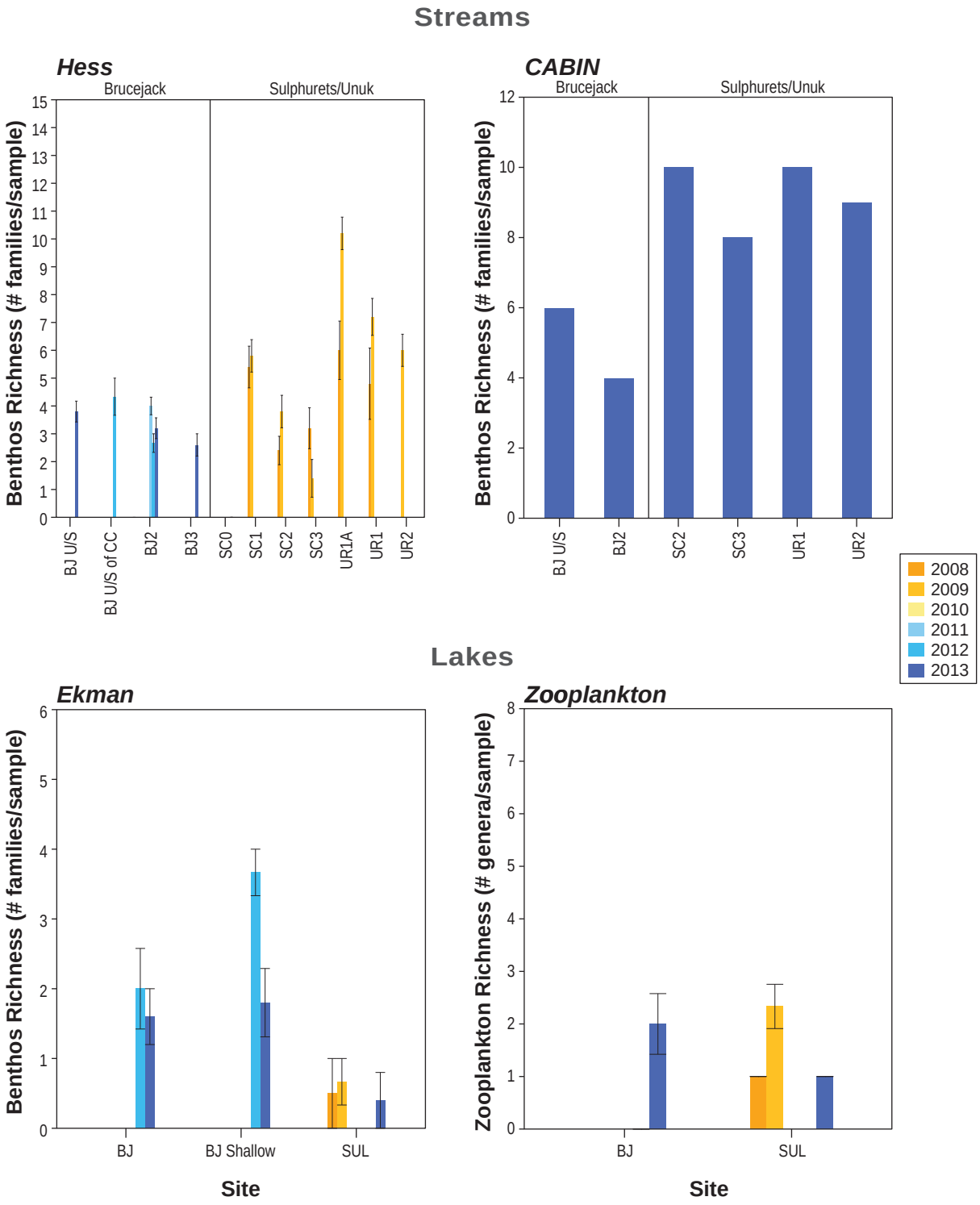
Benthic Invertebrate and Zooplankton Community Composition in Mine Site Area and Downstream Receiving Environment, Brucejack Gold Mine Project, 2008 to 2013



Notes: Community composition values represent the mean of replicates.
Immature, damaged and unidentified individuals were excluded from all benthic invertebrate analyses except density calculations.
Ostracoda, Cladocera, Copepoda, Porifera, Nematoda, Platyhelminthes, fish and terrestrial invertebrates were excluded from all benthic invertebrate calculations.
Stream benthic invertebrate data: only Nemouridae were found in one replicate from SC0.
Lake zooplankton data: only immature specimens were found at BJ (2012) that could not be reliably identified below Copepoda; only one genus was identified at SUL (2008).
Nauplii were excluded from all zooplankton analyses and copepodites were only included in density calculations.
Hatched bars indicate sites where the mean density was less than 15 organisms/m² or 15 organisms/m³.

Figure 6.1-27

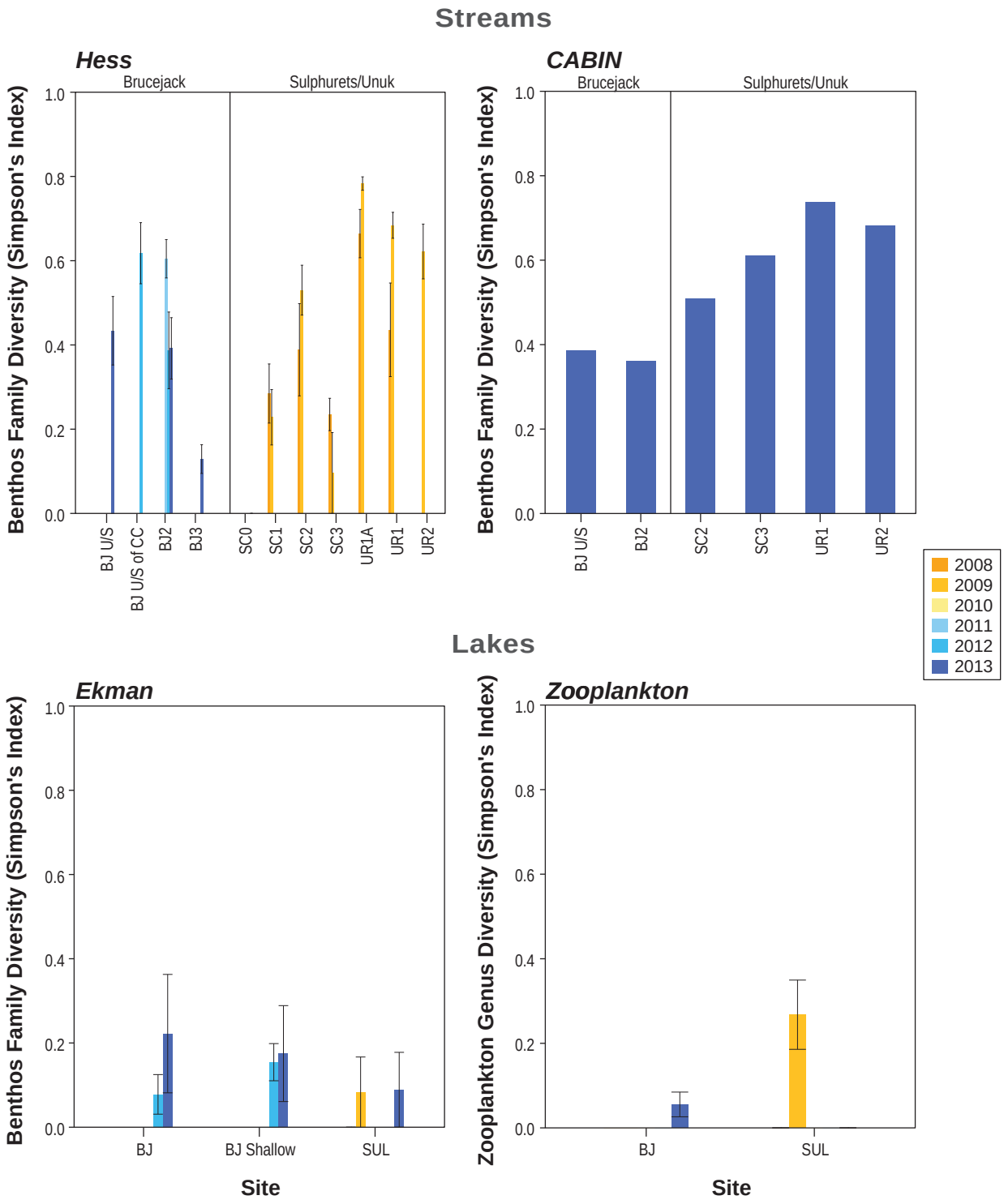
Benthic Invertebrate and Zooplankton Richness in Mine Site Area and Downstream Receiving Environment, Brucejack Gold Mine Project, 2008 to 2013



Notes: Error bars represent the standard error of the mean.
Immature, damaged and unidentified individuals were excluded from all benthic invertebrate analyses except density calculations.
Ostracoda, Cladocera, Copepoda, Porifera, Nematoda, Platyhelminthes, fish and terrestrial invertebrates were excluded from all benthic invertebrate calculations.
Stream benthic invertebrate data: only Nemouridae were found in one replicate from SC0.
Note lake zooplankton data: only immature specimens were found at BJ (2012) that could not be reliably identified below Copepoda; only one genus was identified at SUL (2008).

Figure 6.1-28

Benthic Invertebrate and Zooplankton Diversity in Mine Site Area and Downstream Receiving Environment, Brucejack Gold Mine Project, 2008 to 2013



Notes: Error bars represent the standard error of the mean.
Immature, damaged and unidentified individuals were excluded from all benthic invertebrate analyses except density calculations.
Ostracoda, Cladocera, Copepoda, Porifera, Nematoda, Platyhelminthes, fish and terrestrial invertebrates were excluded from all benthic invertebrate calculations.
Stream benthic invertebrate data: only Nemouridae were found in one replicate from SC0.
Nauplii were excluded from all zooplankton analyses and copepodites were only included in density calculations.
Lake zooplankton data: only immature specimens were found at BJ (2012) that could not be reliably identified below Copepoda; only one genus was identified at SUL (2008).

Table 6.1-6. Stream Benthic Invertebrate Dominant Taxa (Hess) in Mine Site Area and Downstream Receiving Environment, Brucejack Gold Mine Project, 2008 to 2013

Watershed	Site	Year	Major Taxon	Family	Genus	Percent
Brucejack	BJ U/S	2013	Diptera	Chironomidae	*Orthocladius*	42%
			Diptera	Chironomidae	*Diamesa*	11%
			Diptera	Chironomidae	*Diplocladius*	11%
	BJ U/S of CC	2012	Diptera	Chironomidae	*Diplocladius*	29%
			Annelida	Naididae	*Nais*	19%
			Diptera	Chironomidae	*Orthocladius*	6%
	BJ Inter	2012	Diptera	Chironomidae	*Diamesa*	50%
			Diptera	Chironomidae	*Orthocladius*	50%
	BJ2	2011	Diptera	Tipulidae	*Gonomyodes*	15%
			Diptera	Chironomidae	*Diplocladius*	13%
			Diptera	Chironomidae	*Cricotopus/Orthocladius*	9%
		2012	Diptera	Chironomidae	*Orthocladius*	13%
			Diptera	Tipulidae	*Gonomyodes*	7%
			Diptera	Chironomidae	*Diplocladius*	4%
		2013	Diptera	Chironomidae	*Diamesa*	39%
			Diptera	Chironomidae	*Orthocladius*	15%
			Annelida	Naididae	*Nais*	1%
	BJ3	2013	Diptera	Chironomidae	*Diamesa*	90%
			Diptera	Chironomidae	*Orthocladius*	3%
			Annelida	Naididae	*Nais*	0.4%
Sulphurets/Unuk	SC1	2008	Diptera	Chironomidae	*Diamesa*	64%
			Diptera	Chironomidae	*Platysmittia*	12%
			Diptera	Chironomidae	*Cricotopus/Orthocladius*	7%
		2009	Diptera	Chironomidae	*Diamesa*	41%
			Diptera	Chironomidae	*Cricotopus/Orthocladius*	29%
			Plecoptera	Taeniopterygidae	*Taenionema*	8%
	SC2	2008	Diptera	Chironomidae	*Diamesa*	35%
			Diptera	Chironomidae	*Eukiefferiella*	12%
			Diptera	Chironomidae	*Cricotopus/Orthocladius*	10%
		2009	Diptera	Chironomidae	*Diamesa*	26%
			Plecoptera	Taeniopterygidae	*Taenionema*	24%
			Diptera	Chironomidae	*Cricotopus/Orthocladius*	15%
	SC3	2008	Diptera	Chironomidae	*Diamesa*	60%
			Diptera	Chironomidae	*Cricotopus/Orthocladius*	12%
			Diptera	Chironomidae	*Platysmittia*	6%
		2009	Diptera	Chironomidae	*Diamesa*	47%
			Diptera	Chironomidae	*Cricotopus/Orthocladius*	22%
			Diptera	Chironomidae	*Eukiefferiella*	19%
	UR1A	2008	Ephemeroptera	Baetidae	*Baetis*	19%
			Diptera	Tipulidae	*Rhabdomastix*	16%
			Diptera	Chironomidae	*Cricotopus/Orthocladius*	14%
		2009	Plecoptera	Taeniopterygidae	*Taenionema*	30%
			Ephemeroptera	Heptageniidae	*Rhithrogena*	20%
			Ephemeroptera	Baetidae	*Baetis*	13%
	UR1	2008	Diptera	Chironomidae	*Diamesa*	29%
			Diptera	Chironomidae	*Diplocladius*	21%
			Ephemeroptera	Baetidae	*Baetis*	14%
		2009	Ephemeroptera	Baetidae	*Baetis*	37%
			Plecoptera	Taeniopterygidae	*Taenionema*	28%
			Ephemeroptera	Heptageniidae	*Rhithrogena*	6%
	UR2	2009	Ephemeroptera	Heptageniidae	*Rhithrogena*	34%
			Diptera	Chironomidae	*Platysmittia*	30%
			Ephemeroptera	Baetidae	*Baetis*	13%

Notes: Values represent the percentage of the total community.

Immature, damaged and unidentified individuals below the family level were excluded.

Ostracoda, Cladocera, Copepoda, Porifera, Nematoda, Platyhelminthes, fish and terrestrial invertebrates were excluded.

Table 6.1-7. Stream Benthic Invertebrate Dominant Taxa (CABIN Kick-Net) in and Downstream Receiving Environment, Brucejack Gold Mine Project, 2013

Watershed	Site	Major Taxon	Family	Genus	Percent
Brucejack	BJ U/S	Diptera	Chironomidae	*Orthocladius*	50%
		Diptera	Chironomidae	*Diamesa*	26%
		Diptera	Tipulidae	*Dicranota*	8%
	BJ2	Diptera	Chironomidae	*Diamesa*	14%
		Diptera	Chironomidae	*Orthocladius*	7%
		Diptera	Chironomidae	*Cricotopus*	1%
Sulphurets/Unuk	SC2	Diptera	Chironomidae	*Diamesa*	64%
		Plecoptera	Nemouridae	*Zapada*	20%
		Ephemeroptera	Baetidae	*Baetis*	7%
	SC3	Diptera	Chironomidae	*Diamesa*	40%
		Plecoptera	Perlodidae	*Megarcys*	4%
		Ephemeroptera	Baetidae	*Baetis*	2%
	UR1	Diptera	Chironomidae	*Diamesa*	41%
		Plecoptera	Perlodidae	*Megarcys*	12%
		Ephemeroptera	Baetidae	*Baetis*	11%
	UR2	Diptera	Chironomidae	*Diamesa*	37%
		Ephemeroptera	Heptageniidae	*Rhithrogena*	16%
		Diptera	Chironomidae	*Chaetocladius*	10%

Notes: Values represent the percentage of the total community.
Immature, damaged and unidentified individuals below the family level were excluded.
Ostracoda, Cladocera, Copepoda, Porifera, Nematoda, Platyhelminthes, fish and terrestrial invertebrates were excluded.

Benthic invertebrate densities were low in Sulphurets Lake, which had a maximum yearly mean of 35 organisms/m^2 in 2009. Sulphurets Lake had low light penetration in the water column (Secchi depth at 10 cm; ERM Rescan 2014) due to high total suspended solids and turbidity.

Water flows from Sulphurets Lake into Sulphurets Creek, which in turn enters the Unuk River. SC1 had high benthic invertebrate densities in 2009 collected with the Hess sampler, with 1,030 organisms/m^2. Benthic invertebrate Hess densities were more than double in SC1 compared to further downstream in Sulphurets Creek at SC2 and SC3, where densities were less than 70 organisms/m^2. Benthic invertebrates densities collected with a Hess sampler were comparable along the Unuk upstream (UR1A) and downstream (UR1 and UR2) of the confluence with Sulphurets Creek. CABIN benthic invertebrate densities in Sulphurets/Unuk ranged from 163 organisms/3 minute kick at UR2 to 394 organisms/3 minute kick at SC2. CABIN samples were not collected at SC1.

Zooplankton densities were generally comparable between Brucejack and Sulphurets lakes (Figure 6.1-25). Sulphurets Lake had variable zooplankton densities, with a minimum of 16 organisms/m^3 in 2013 and a maximum of 210 organisms/m^3 in 2009.

Table 6.1-8. Lake Benthic Invertebrate Dominant Taxa in Mine Site Area and Downstream Receiving Environment, Brucejack Gold Mine Project, 2008 to 2013

Watershed	Site	Year	Major Taxon	Family	Genus	Percent
Brucejack	BJ	2012	Diptera	Chironomidae	*Heterotrissocladius*	88%
			Arachnida	Lebertiidae	*Lebertia*	1%
			Diptera	Chironomidae	*Micropsectra*	1%
		2013	Diptera	Chironomidae	*Heterotrissocladius*	55%
			Diptera	Chironomidae	*Paracladius*	25%
			Arachnida	Lebertiidae	*Lebertia*	13%
	BJ Shallow	2012	Diptera	Chironomidae	*Heterotrissocladius*	30%
			Diptera	Chironomidae	*Orthocladius*	13%
			Diptera	Chironomidae	*Paracladius*	11%
		2013	Diptera	Chironomidae	*Heterotrissocladius*	50%
			Diptera	Chironomidae	*Paracladius*	33%
			Arachnida	Lebertiidae	*Lebertia*	6%
Sulphurets/Unuk	SUL	2008	Diptera	Chironomidae	*Pseudodiamesa*	100%
		2009	Diptera	Chironomidae	*Gymnometriocnemus*	30%
			Diptera	Chironomidae	*Brillia*	17%
			Diptera	Chironomidae	*Eukiefferiella*	17%
		2013	Diptera	Chironomidae	*Chaetocladius*	33%
			Diptera	Tipulidae	*Ormosia*	33%

Notes: Values represent the percentage of the total community.
Immature, damaged and unidentified individuals below the family level were excluded.
Ostracoda, Cladocera, Copepoda, Porifera, Nematoda, Platyhelminthes, fish and terrestrial invertebrates were excluded.

Table 6.1-9. Lake Zooplankton Dominant Taxa in Mine Site Area and Downstream Receiving Environment, Brucejack Gold Mine Project, 2008 to 2013

Watershed	Site	Year	Major Taxon	Family	Genus	Percent
Brucejack	BJ	2013	Copepoda - Calanoida	Diaptomidae	*Hesperodiaptomus*	96%
			Copepoda - Cyclopoida	Cyclopidae	*Acanthocyclops*	1%
			Rotifera	Brachionidae	*Keratella*	1%
Sulphurets/Unuk	SUL	2008	Rotifera	Brachionidae	*Kellicottia*	100%
		2009	Rotifera	Brachionidae	*Kellicottia*	80%
			Rotifera	Conochilidae	*Conochilus*	13%
			Rotifera	Brachionidae	*Keratella*	4%
		2013	Rotifera	Brachionidae	*Notholca*	87%

6.1.5.2 Community Composition

Brucejack Lake was dominated by non-biting midges (Diptera - Chironomidae), which comprised 80 to 96% of lake benthic invertebrate communities (Figure 6.1-26). *Heterotrissocladius* was a particularly abundant Chironomidae genus, and comprised 30 to 88% of Brucejack Lake communities (Table 6.1-8). Brucejack Lake also had low proportions of Annelida (worms and leeches; 3 to 7% of the community), Arachnida (mites; 1 to 13% of the community) and other Diptera families (0 to 2% of the community).

Brucejack Creek benthic invertebrate communities sampled with a Hess sampler were primarily composed of Chironomidae (19 to 100% of the community) and Annelida (0 to 75% of the community; Figure 6.1-26). Arachnida, Bathynellacea (crustacean), other Diptera families, and Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies; EPTs) were also present in Brucejack Creek communities in low proportions (< 15% of the community). BJ2 had comparable communities from 2011 to 2013. The CABIN kick-net yielded very similar results and communities were dominated by Chironomidae and Annelida (Figure 6.1-26). *Diamesa* and *Cricotopus/Orthocladius* were common genera in Brucejack Creek from both Hess sampling (Table 6.1-6) and CABIN kick-net sampling (Table 6.1-7).

Sulphurets Lake was dominated by Chironomidae, which comprised 33% to 100% of lake benthic invertebrate communities. Benthic invertebrate densities were very low in Sulphurets Lake in 2008 and 2013, and community composition results should be interpreted with caution. For example, only one individual organism was found in the 2008 Sulphurets Lake sample, which belonged to the Chironomidae genus *Pseudodiamesa* (Table 6.1-8).

Chironomidae (12 to 93% of the Hess community), Ephemeroptera (1 to 48% of the Hess community) and Plecoptera (3 to 42% of the Hess community) dominated the Sulphurets Creek and the Unuk River benthic invertebrate communities, and *Baetis* (Ephemeroptera), *Rhithrogena* (Ephemeroptera) and *Taenionema* (Plecoptera) were the dominant genera. As with Brucejack Creek, *Diamesa* and *Cricotopus/Orthocladius* were common chironomids. Sulphurets Creek and the Unuk River also had small proportions of Annelida, Coleoptera (beetles), Trichoptera and other Diptera families. Benthic invertebrate communities were comparable among years and between Hess and CABIN kick-net sampling. Benthic invertebrate densities were very low in SC0 in 2013 (mean: 0.69 organisms/m^2), and community composition results should be interpreted with caution.

Brucejack Lake zooplankton communities in 2013 were almost entirely composed of Calanoida copepods from the genus *Hesperodiaptomus* (96% of the community; Table 6.1-9), while Sulphurets Lake was dominated by Rotifera (97 to 100% of the community; Figure 6.1-26). Abundant rotifer genera from Sulphurets Lake included *Kellicottia* and *Notholca* (Table 6.1-9). Cyclopoida copepods and Protozoa were also found in Brucejack and Sulphurets Lake in low proportions. Brucejack Lake was sampled in 2012; however, only immature specimens were found and could not be reliably identified below Copepoda.

6.1.5.3 Richness

Brucejack Lake had low benthic invertebrate richness (yearly means < 4 families/sample) and was generally consistent between years (Figure 6.1-27).

Brucejack Creek also had low benthic invertebrate richness, which ranged from a mean of 2.6 families/sample at BJ3 (2013) to 4.3 families/sample at BJ U/S of CC (2012) in the Hess samples (Figure 6.1-27). BJ2 had similar family richness values between years (mean range: 2.7 to 4 families/sample). Family richness was also low in Brucejack Creek from CABIN kick-net sampling, with 6 families found at BJ U/S and 4 families at BJ2.

Sulphurets Lake had particularly low benthic invertebrate family richness, and the yearly means were all below 1 family/sample. Generally, only Chironomidae were collected from the Sulphurets Lake benthic communities.

Sulphurets Creek benthic invertebrate Hess family richness (mean range: 0 to 5.8 families/sample) were lower than those observed in the Unuk River (mean range: 4.8 to 10 families/sample). Benthic invertebrate family richness from the CABIN kick-net sampling was similar among all Sulphurets Creek and Unuk River sites (range: 8 to 10 families/sample), which were higher than those observed in Brucejack Creek (range: 4 to 6 families/sample). Benthic invertebrate richness values were similar in streams between years.

Lake zooplankton richness was also low, with Brucejack and Sulphurets Lake means all below 3 genera/sample (Figure 6.1-27).

6.1.5.4 Diversity

Brucejack Lake family diversity values as indicated by Simpson's diversity index were low, with means less than 0.25 (Figure 6.1-28).

Brucejack Creek benthic invertebrate communities collected with the Hess net were variable spatially and temporally, and mean Simpson's index ranged from 0.13 at BJ3 (2013) to 0.62 at BJ U/S of CC (2012; Figure 6.1-28). Brucejack Creek family diversity in the CABIN kick-net samples were comparable to the Hess samples, with 0.39 Simpson's index at BJ U/S and 0.36 at BJ2.

Sulphurets Lake had low mean Simpson's diversity indices that were always less than 0.09.

As observed for family richness, Sulphurets Creek had slightly lower family diversity (mean range: 0.10 to 0.53 Simpson's index) than the Unuk River (mean range: 0.44 to 0.78 Simpson's index). Sulphurets Creek and Unuk River family diversity in the CABIN kick-net samples ranged from 0.51 at SC2 to 0.74 at UR1 and were slightly higher than Brucejack Creek diversities (< 0.4 Simpson's index).

Zooplankton genus diversity was low (mean < 0.4 Simpson's index) and many samples had no identifiable organisms or only one genus (Figure 6.1-28).

6.2 BOWSER, SCOTT CREEK, TODEDADA, AND WILDFIRE CREEK WATERSHEDS (ANCILLARY PROJECT INFRASTRUCTURE AREAS)

6.2.1 Sediment Quality

The baseline sampling program collected sediment quality data in the ancillary Project infrastructure areas in the Bowser, Scott, Todedada, and Wildfire watersheds. Data from the baseline sampling program (2009 to 2013) are included as outlined in the Methodology chapter (see Chapter 4), and the complete baseline sediment quality data are presented in Appendix 3. The sediment quality data are divided into the sections describing the particle composition, nutrient content, and metal content of sediments. Data is presented by sampling year for consistency with the baseline sampling program for the mine site area.

6.2.1.1 Particle Size

Sediment samples from Knipple Lake and Todedada Lake were composed primarily of silt- and clay-sized particles (90% and 70%, respectively), and was similar to the sediment compositions observed in Brucejack and Sulphurets lakes (Figures 6.1-1, 6.1-2, and 6.2-1). The west end of Bowser Lake, which is downstream of Knipple Lake, the Bowser River and Scott Creek, had coarser sediments that were 50% sand- and gravel-sized particles.

Streams in the ancillary Project infrastructure areas tended to have coarser sediments, which was characteristic of streams with dynamic flow regimes like the many of the streams in the Brucejack and Sulphurets watersheds (Figure 6.2-1). However, two sites (BR2 on the Bowser River and ST1 on Scott Creek) had sediments composed of 50% silt-sized particles, which suggested these sites were in depositional environments.

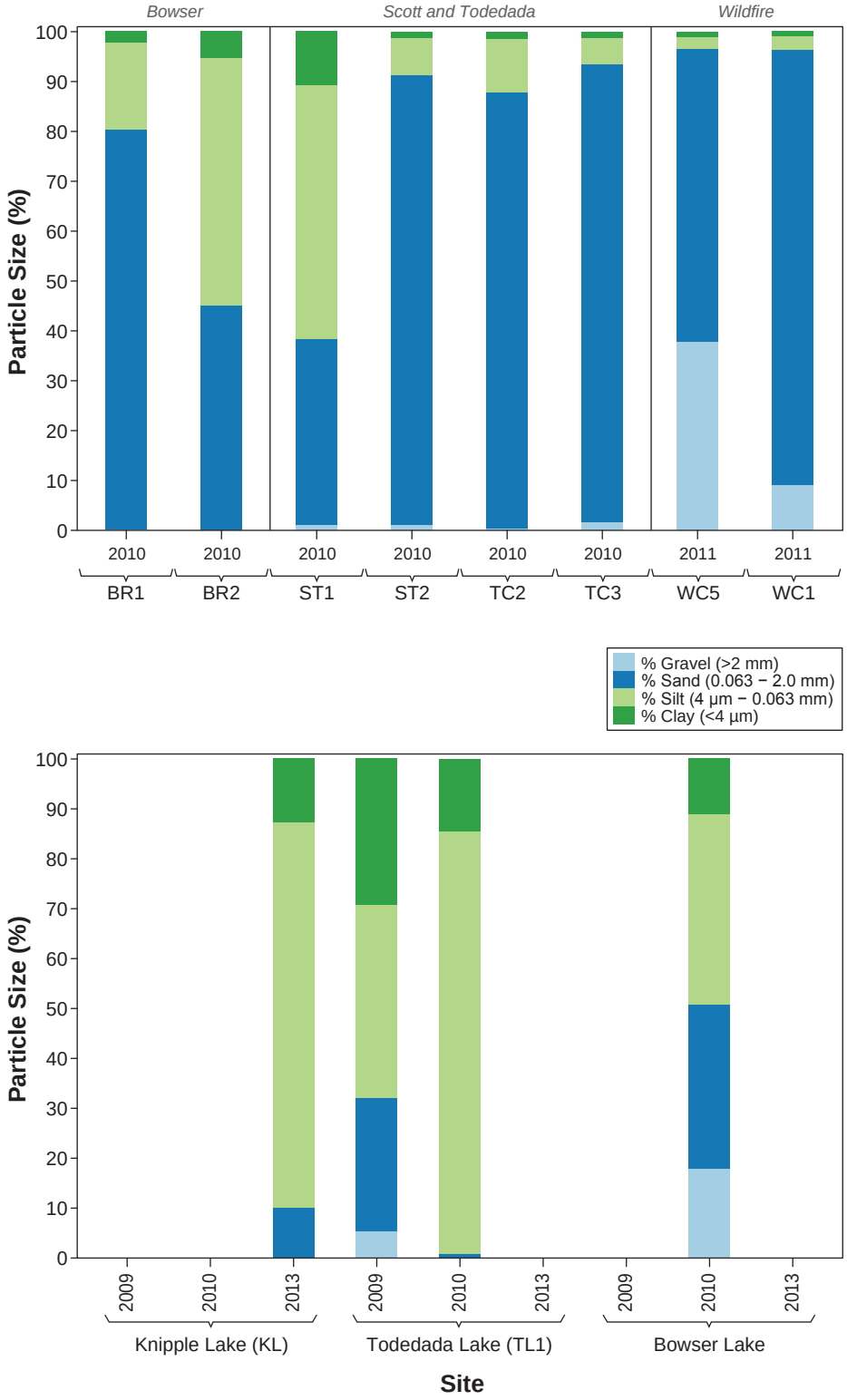
6.2.1.2 Nutrients

Sediment total nitrogen concentrations varied among streams and lakes in the ancillary Project infrastructure areas, and ranged from near the analytical detection limits (0.02%) at the BR1 site on the Bowser River to 1.6% in Todedada Lake and 2.2% at the WC5 Wildfire Creek site (Figure 6.2-2). Both Knipple and Bowser lakes had relatively low concentrations of total nitrogen and total organic carbon, similar to the total organic carbon concentrations in Brucejack and Sulphurets lakes (Figure 6.2-3). In contrast, Todedada Lake sediments had total organic carbon concentrations of 9.8% in 2009 and 18% in 2010. The BR1 site on the Bowser River also had low total organic carbon concentrations (near the analytical detection limit of 0.1%).

Available phosphate concentrations in lake and stream sediments were generally near or less than analytical detection limits (Figure 6.2-4). The phosphate concentrations of Todedada Lake sediments were 19 mg/kg in 2009 and 34 mg/kg in 2010, which were coincident with high total nitrogen and total organic carbon concentrations. Higher catchment and in-lake productivity were likely causes of the higher sediment concentrations of nutrients in Todedada Lake.

Figure 6.2-1

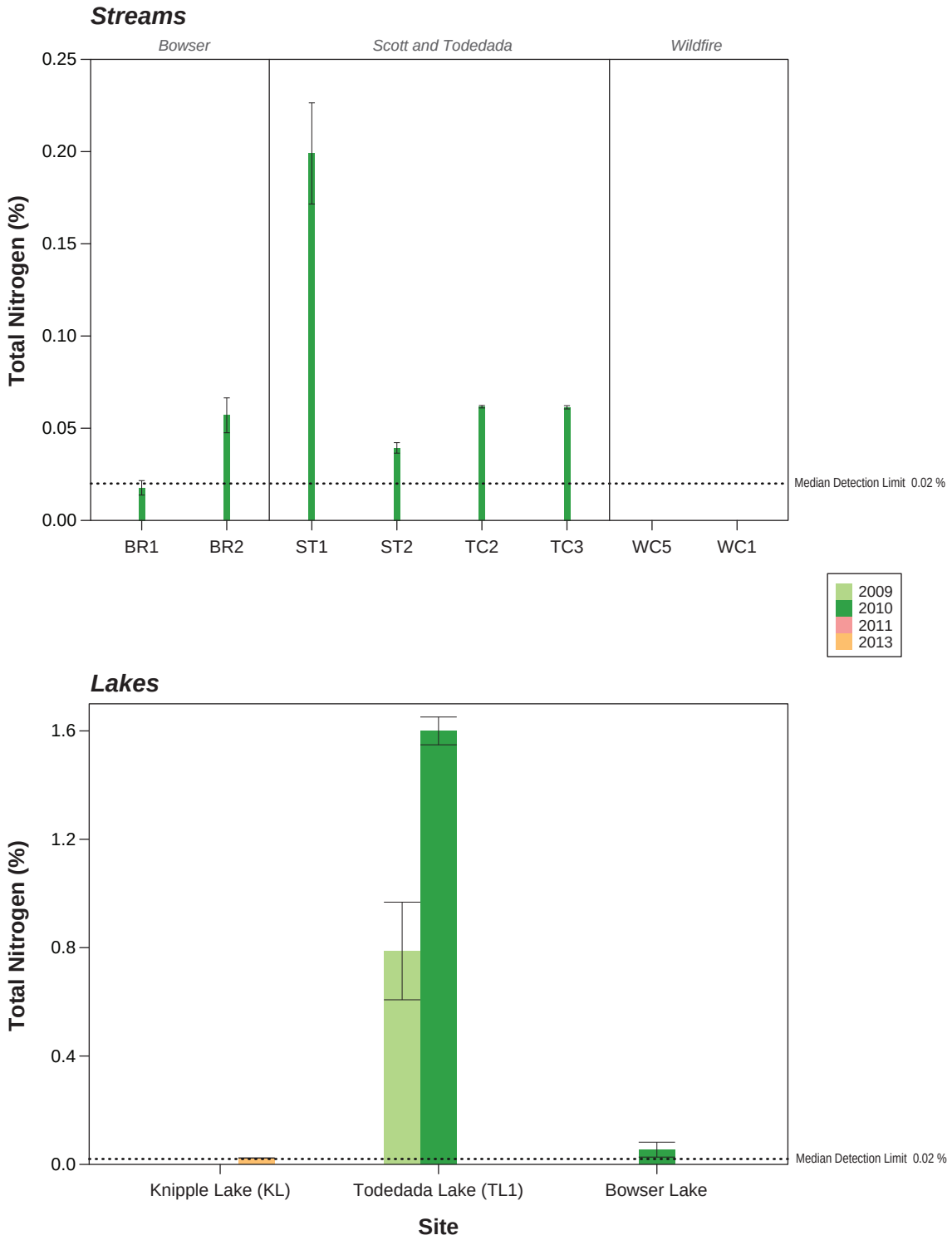
Sediment Particle Size Composition in Streams and Lakes of Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2009 to 2013



Note: Stacked bars represent particle size means.

Figure 6.2-2

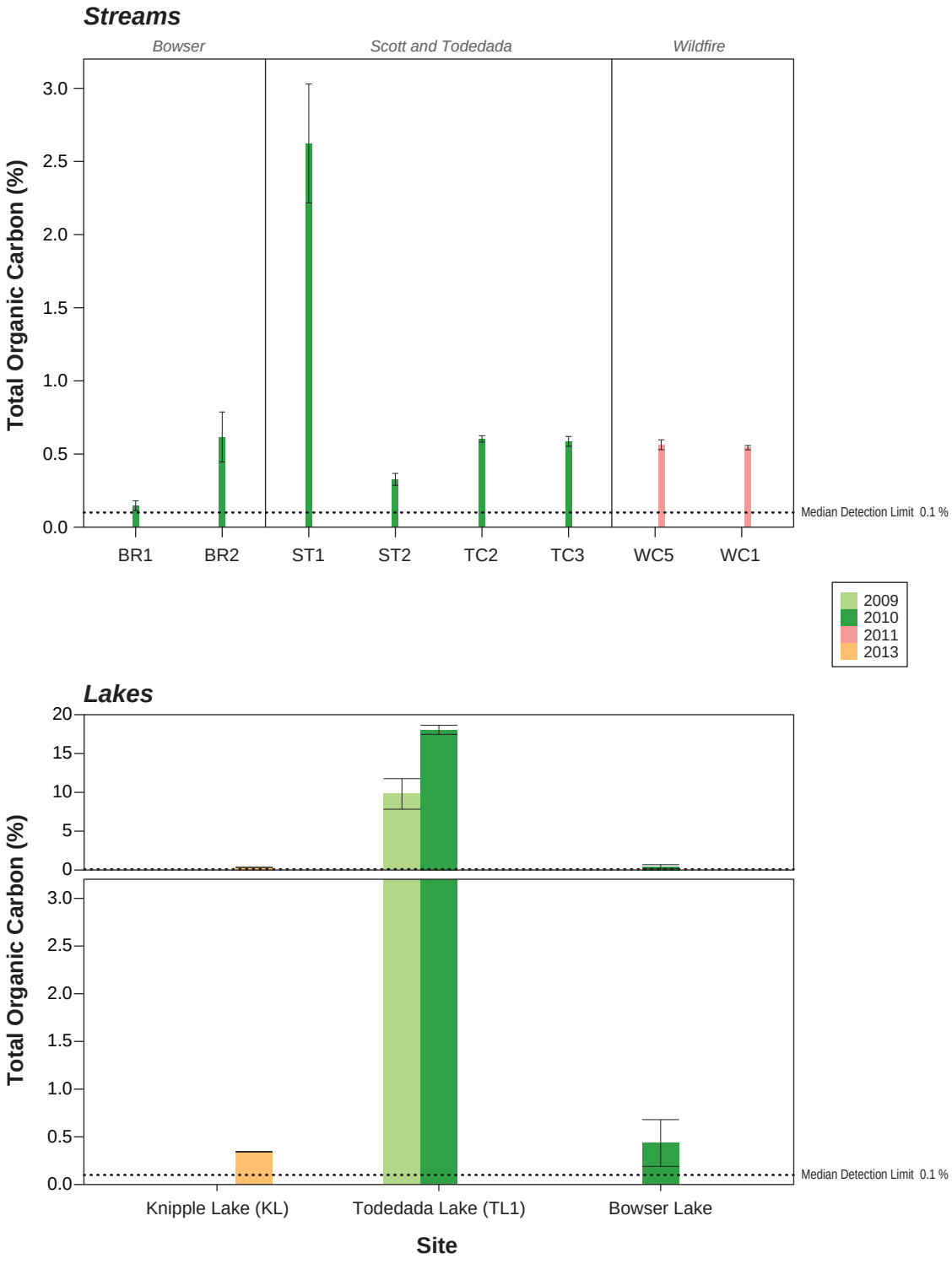
Sediment Total Nitrogen Concentrations in Streams and Lakes of Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2009 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.

Figure 6.2-3

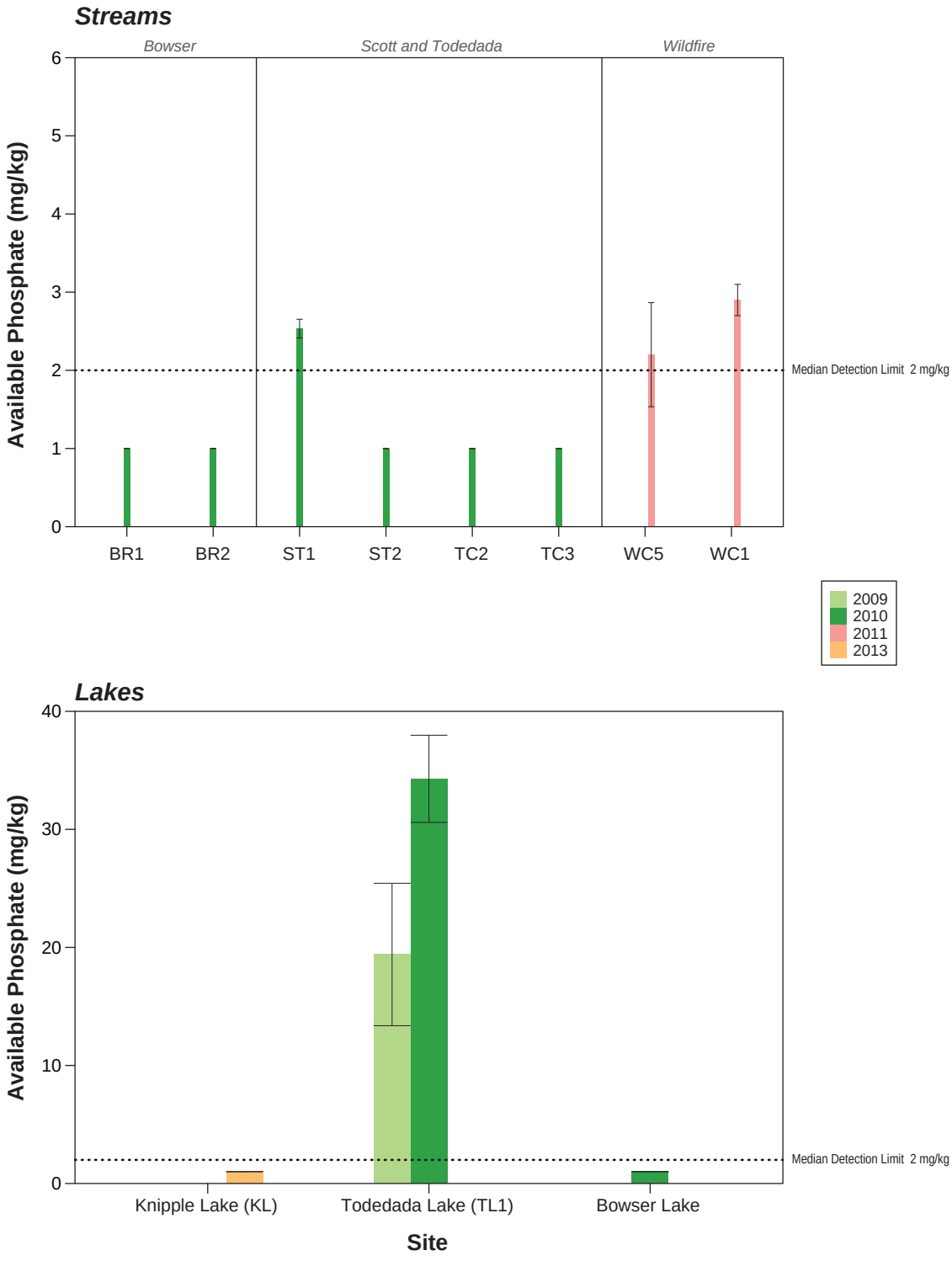
Sediment Total Organic Carbon Concentrations in Streams and Lakes of Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2009 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.

Figure 6.2-4

Sediment Available Phosphate Concentrations in Streams and Lakes of Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2009 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.

6.2.1.3 Cyanides

Sediment cyanide concentrations were below analytical detection limits in sediment samples from the lakes and streams in ancillary Project infrastructure areas and is not discussed further. The complete analytical results for cyanide are presented in Appendix 3.

6.2.1.4 Metals

Metals were generally abundant in lake and stream sediments in the ancillary Project infrastructure areas, which was consistent with the mineralogy of the region. The concentrations of selected metals with potential effects on aquatic life are presented for both stream and lake sites on Figures 6.2-5 to 6.2-17, with the complete metal analyses presented in Appendix 3.

Sediment aluminum concentrations varied substantially among streams, with aluminum concentrations being highest in sediments from the ST1 site on Scott Creek and the WC5 and WC1 sites on Wildfire Creek (22,000, 21,000, and 20,000 mg/kg, respectively; Figure 6.2-5). No substantial differences in sediment aluminum concentrations were observed among the lakes in the ancillary Project infrastructure areas.

Todedada Creek sites TC2 and TC3 had greater sediment concentrations of arsenic, cadmium, mercury, selenium, and zinc than other streams in the ancillary Project infrastructure areas (Figures 6.2-6, 6.2-7, 6.2-13, 6.2-15, and 6.2-17). Todedada Lake also had greater sediment concentrations of cadmium, selenium, and zinc, relative to Bowser and Knipple lakes (Figures 6.2-7, 6.2-15, and 6.2-17).

Sediment chromium concentrations varied substantially among lakes and streams in the Bowser, Scott Creek, Todedada, and Wildfire watersheds (Figure 6.2-8). Chromium concentrations were lowest, around 20 mg/kg in Bowser River, Knipple Lake, and Todedada Creek sediments, and highest in Scott Creek, Wildfire Creek, and Bowser Lake sediments (ranging between 73 and 90 mg/kg).

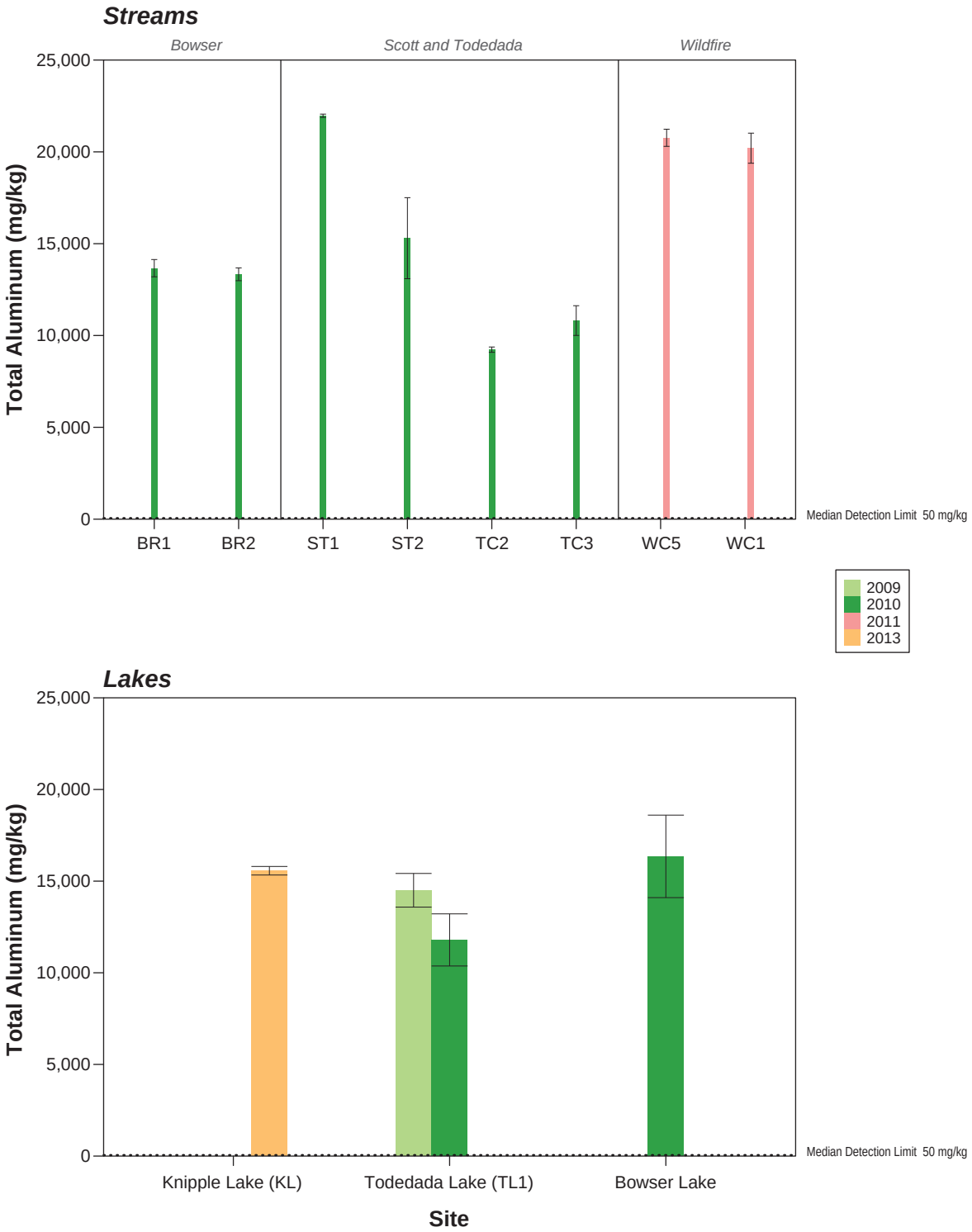
The sediment concentrations of copper, iron, lead, and manganese were generally similar among lakes and streams in the Bowser, Scott, Todedada, and Wildfire watersheds (Figures 6.2-9, 6.2-10, 6.2-11, and 6.2-12).

Sediment nickel concentrations, like the chromium concentrations, varied substantially among lakes and streams, and high nickel concentrations often coincided with high chromium concentrations (Figures 6.2-8 and 6.2-14). Scott Creek site ST1, sites WC5 and WC1 on Wildfire Creek, Todedada Lake, and Bowser Lake had nickel concentrations ranging from 65 mg/kg (BL1) to 121 mg/kg (WC5).

Silver concentrations were highest in Bowser River, Todedada Creek, and Todedada Lake sediments (0.8 mg/kg), and were generally near 0.5 mg/kg in other stream and lake sediments in the Bowser, Scott, and Wildfire watersheds (Figure 6.2-16).

Figure 6.2-5

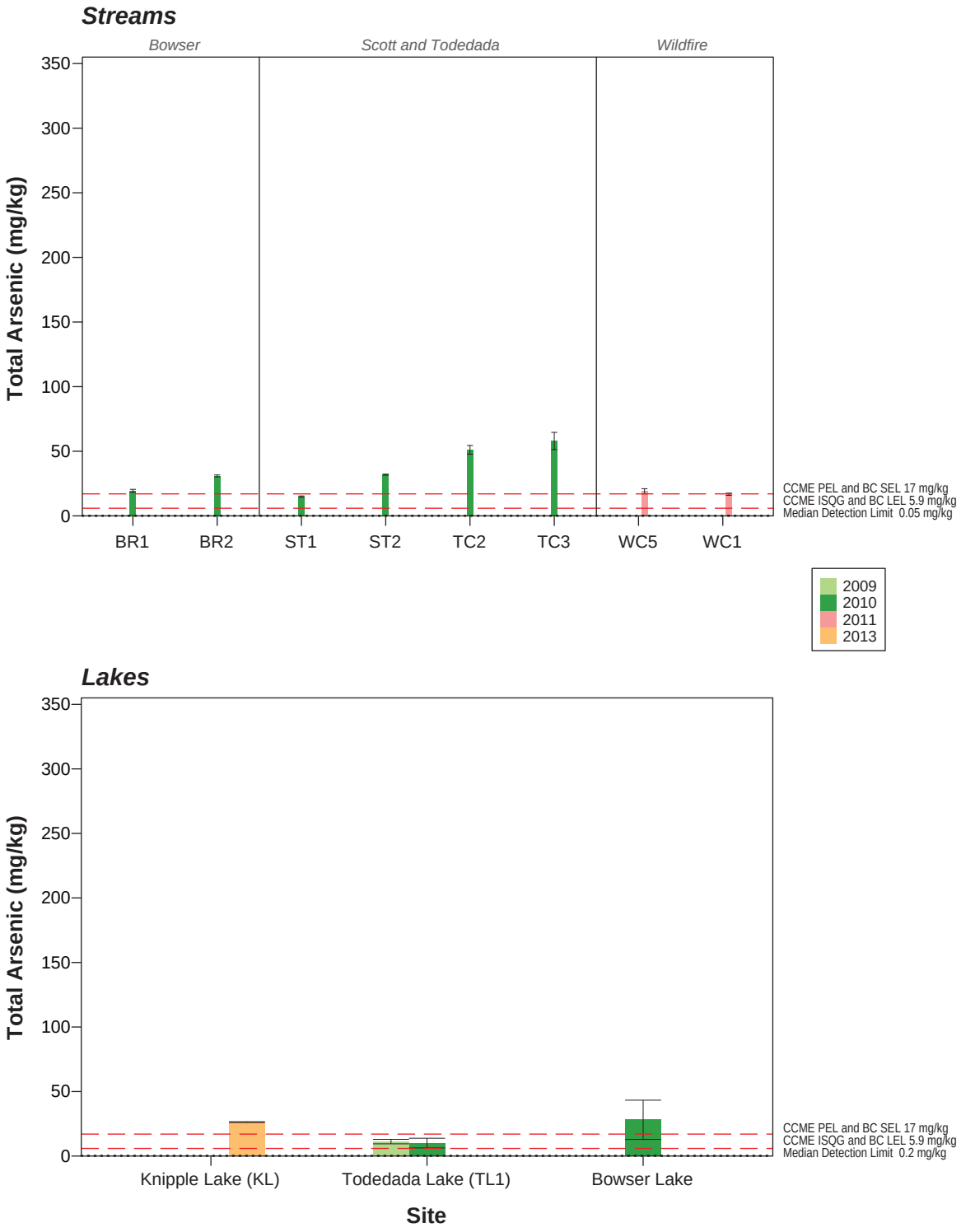
Sediment Total Aluminum Concentrations in Streams and Lakes of Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2009 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.

Figure 6.2-6

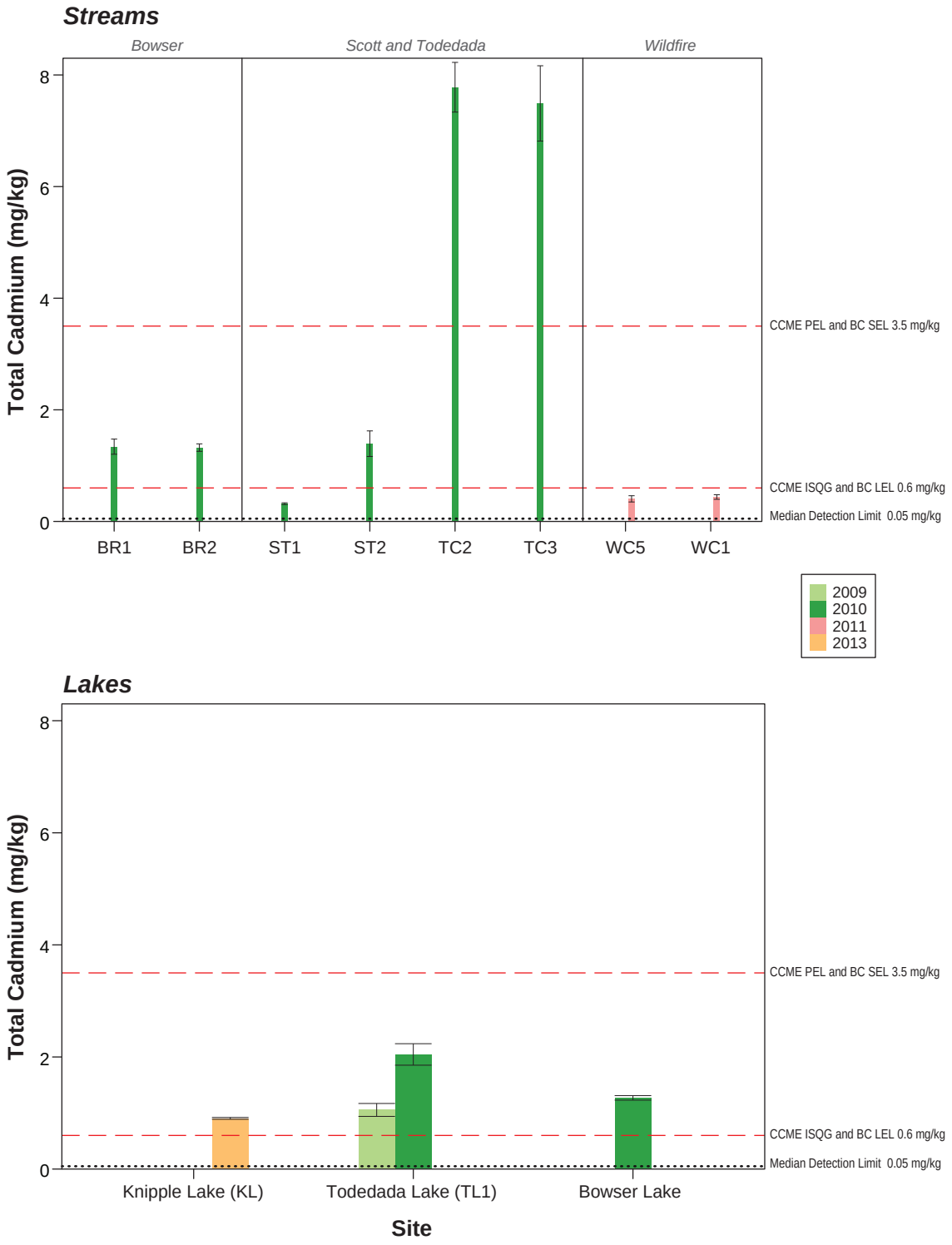
Sediment Total Arsenic Concentrations in Streams and Lakes of Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2009 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
CCME sediment quality guideline: PEL = probable effect level; ISQG = interim sediment quality guideline.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.

Figure 6.2-7

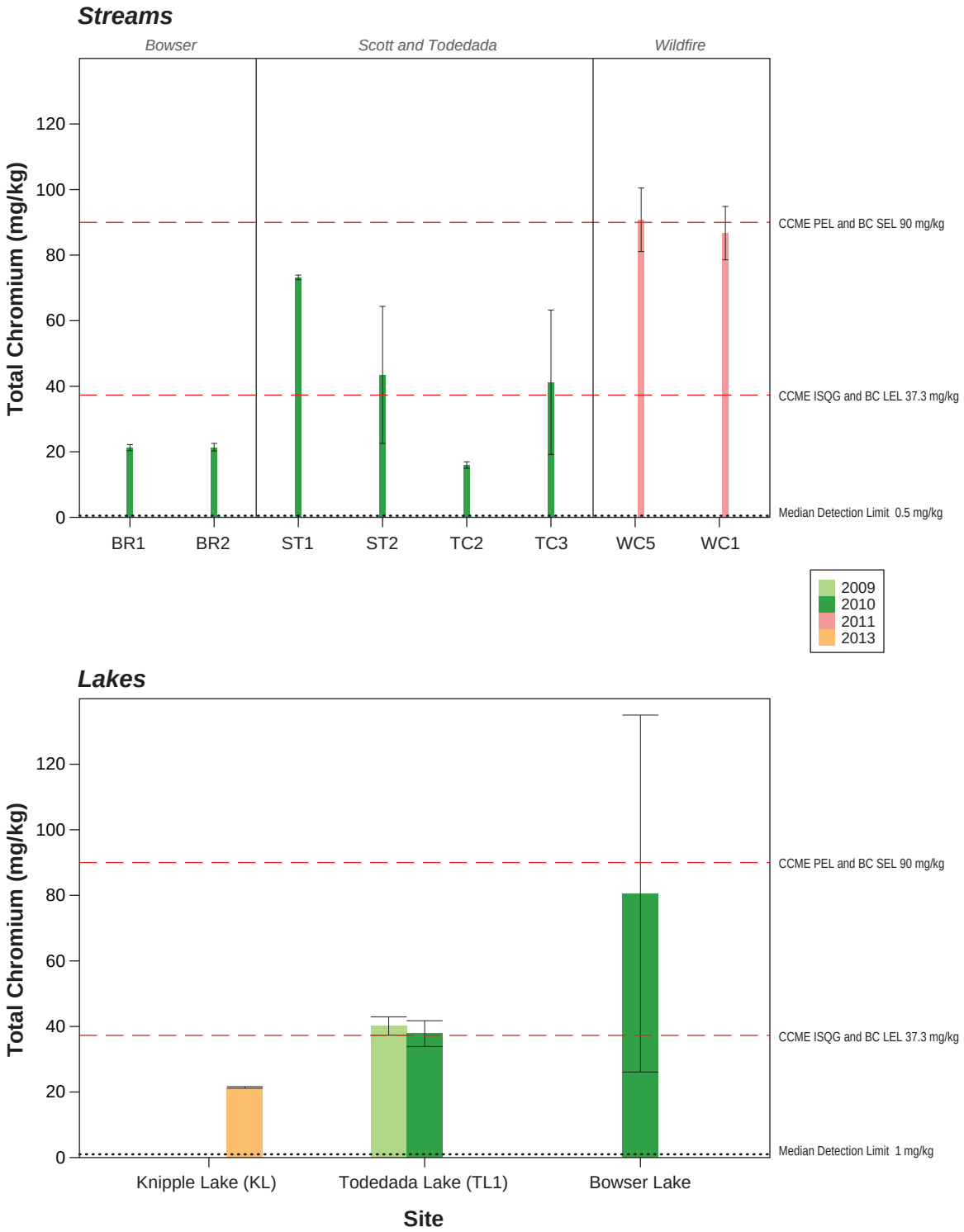
Sediment Total Cadmium Concentrations in Streams and Lakes of Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2009 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
CCME sediment quality guideline: PEL = probable effect level; ISQG = interim sediment quality guideline.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.

Figure 6.2-8

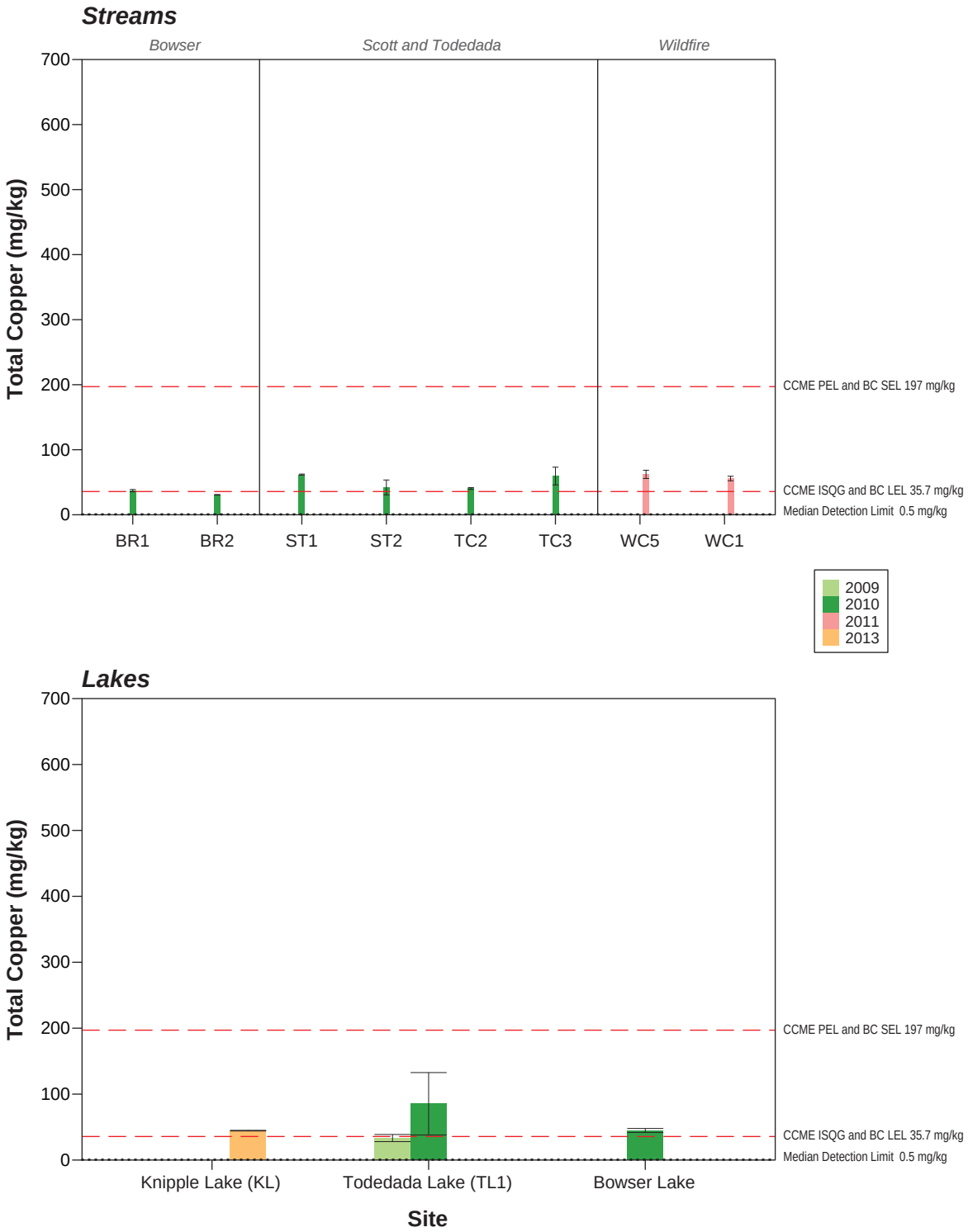
Sediment Total Chromium Concentrations in Streams and Lakes of Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2009 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
CCME sediment quality guideline: PEL = probable effect level; ISQG = interim sediment quality guideline.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.

Figure 6.2-9

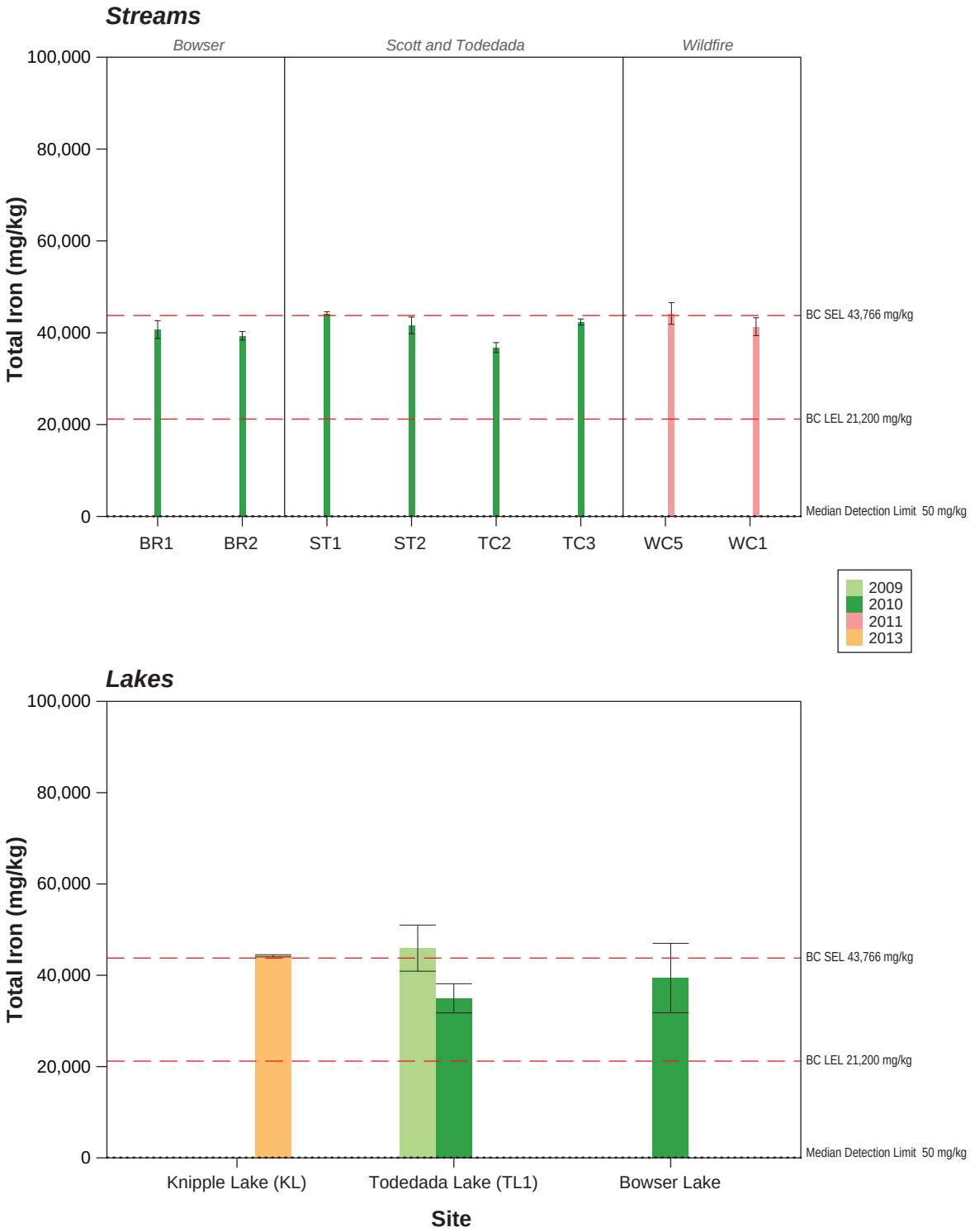
Sediment Total Copper Concentrations in Streams and Lakes of Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2009 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
CCME sediment quality guideline: PEL = probable effect level; ISQG = interim sediment quality guideline.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.

Figure 6.2-10

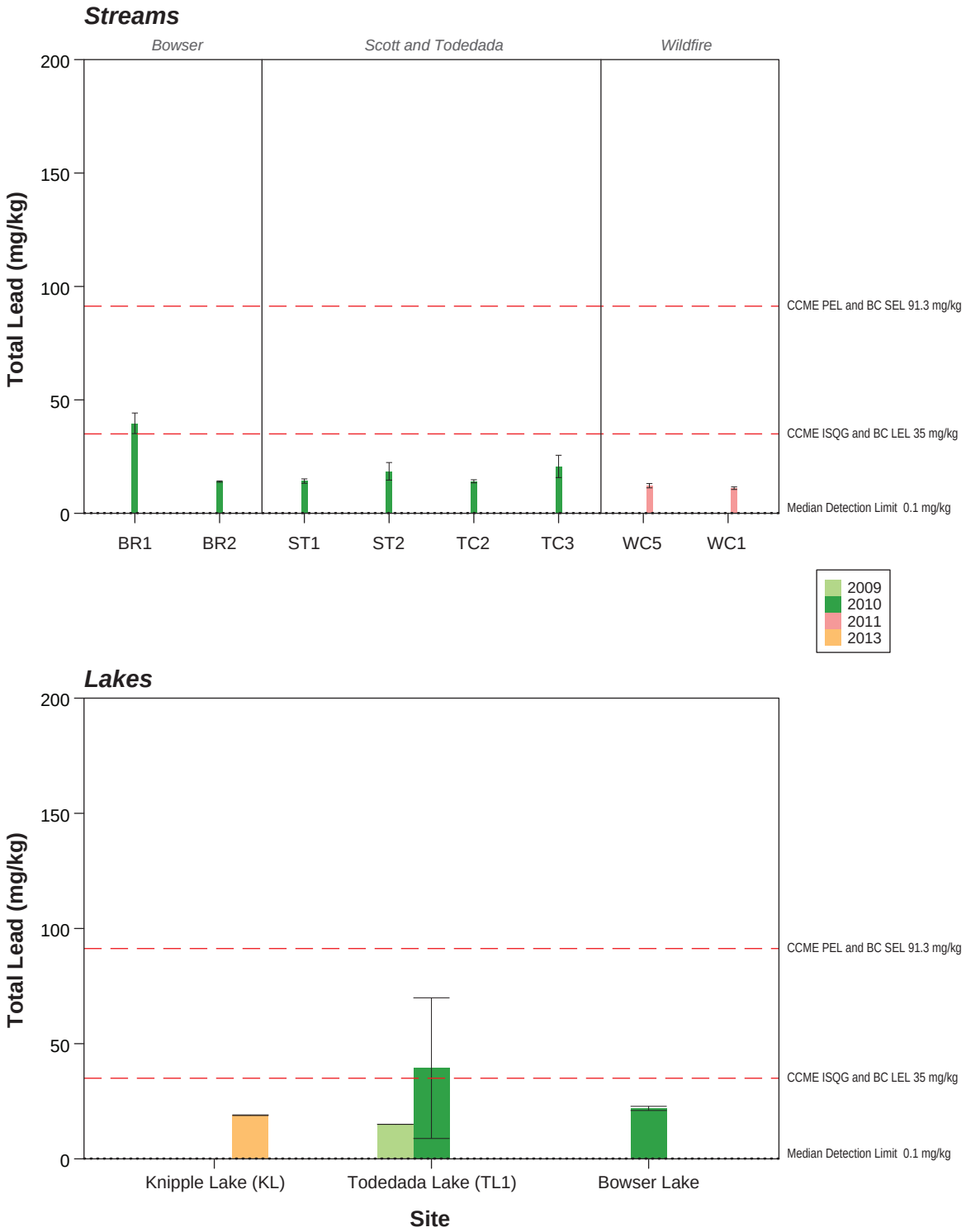
Sediment Total Iron Concentrations in Streams and Lakes of Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2009 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.

Figure 6.2-11

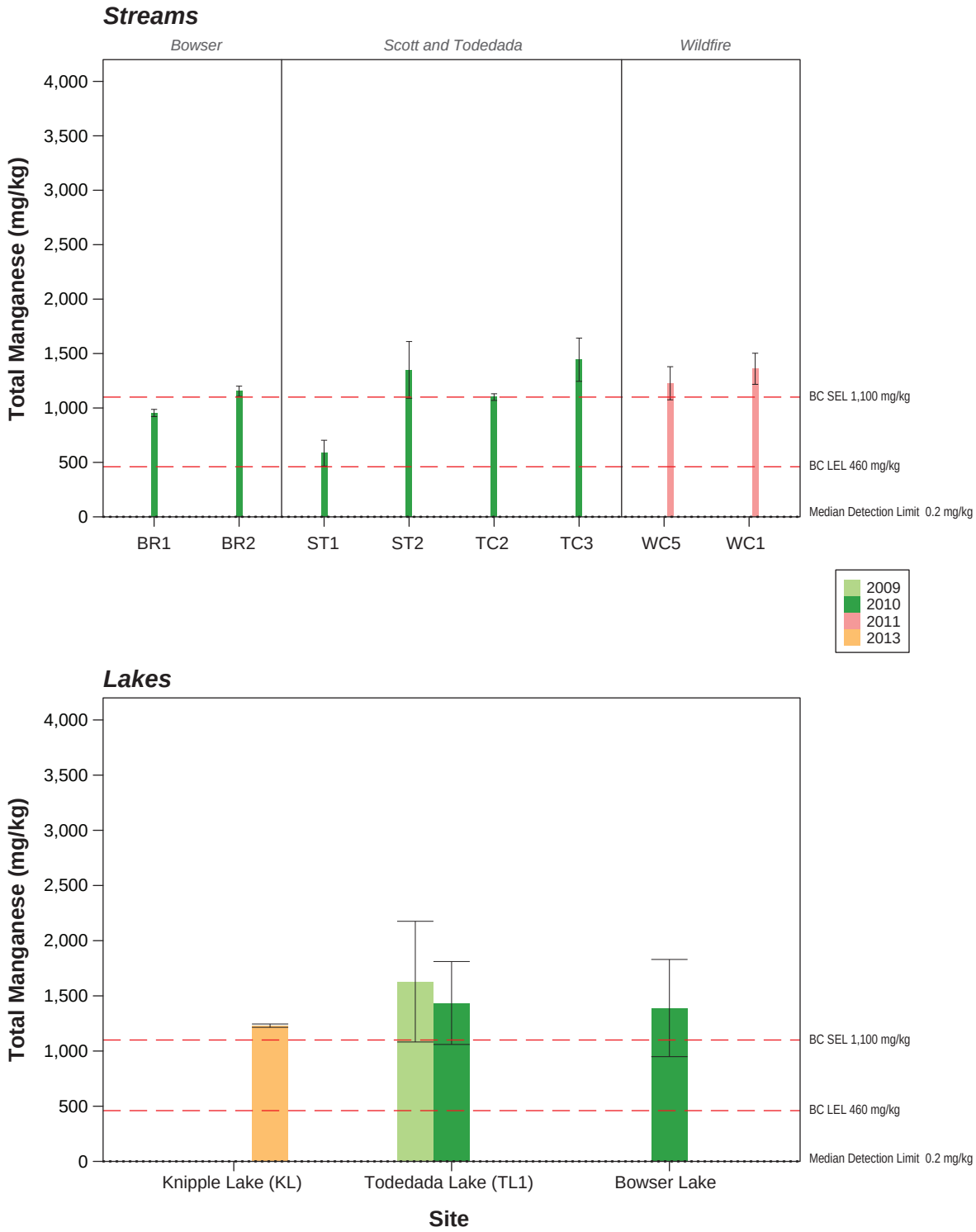
Sediment Total Lead Concentrations in Streams and Lakes of Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2009 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
CCME sediment quality guideline: PEL = probable effect level; ISQG = interim sediment quality guideline.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.

Figure 6.2-12

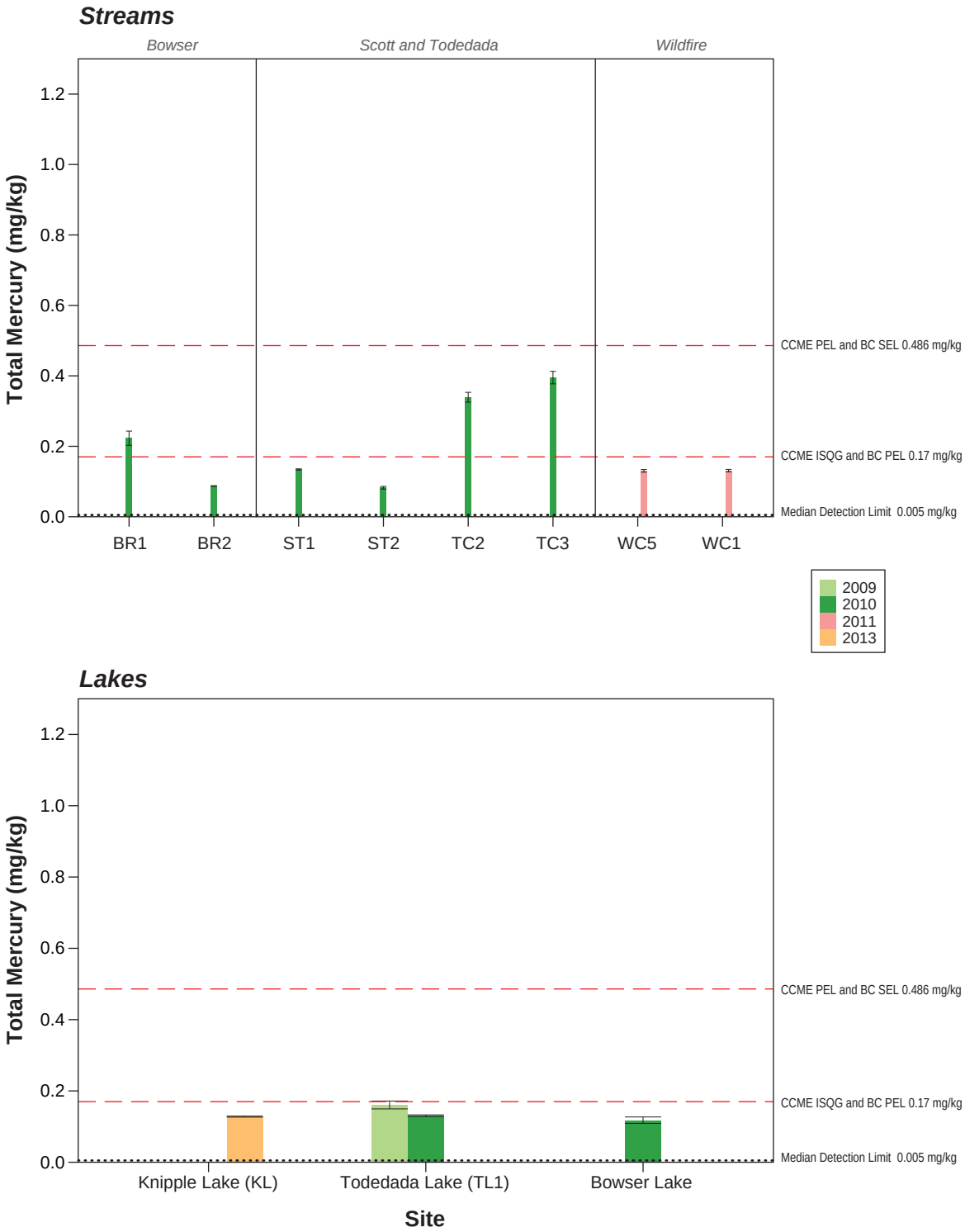
Sediment Total Manganese Concentrations in Streams and Lakes of Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2009 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.

Figure 6.2-13

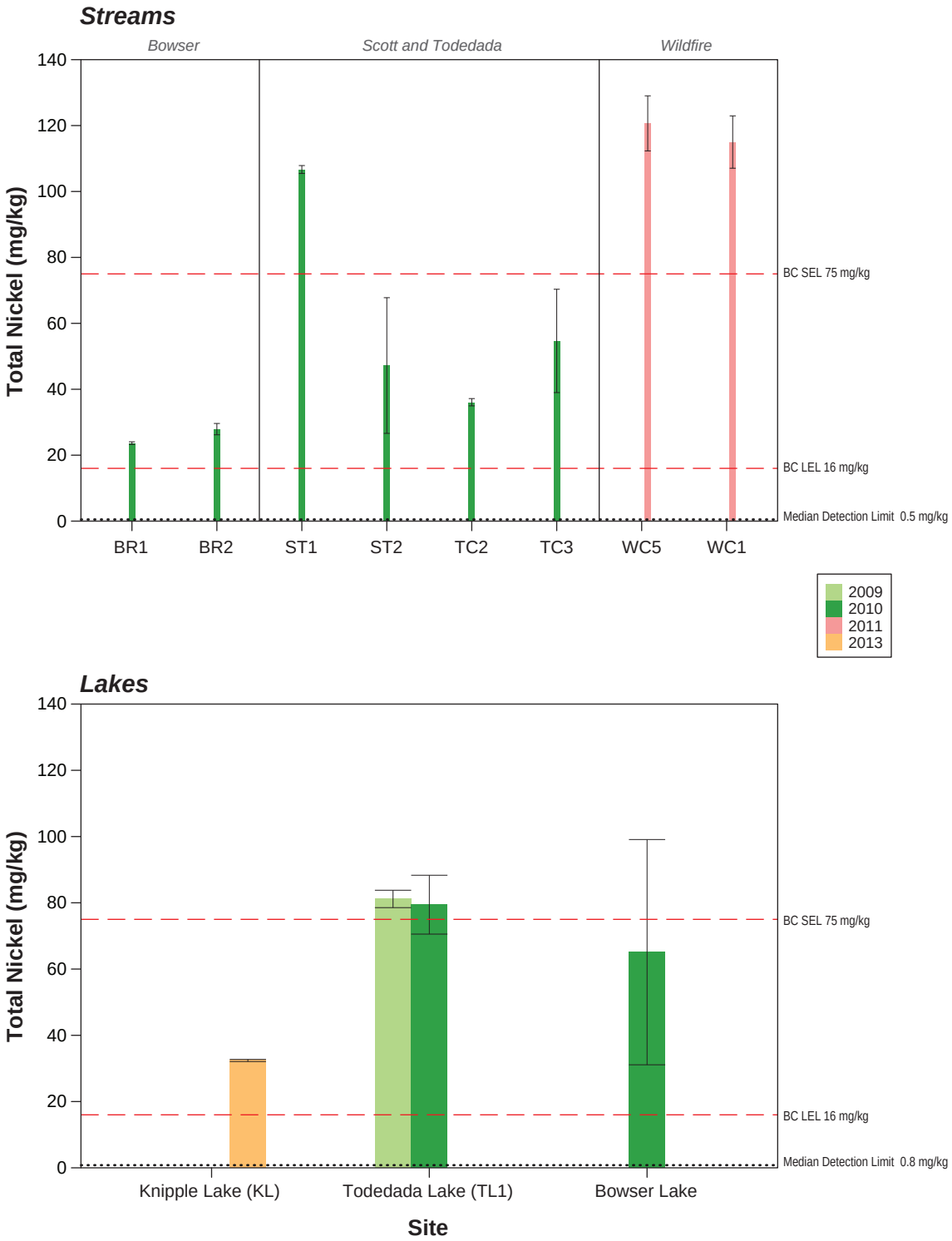
Sediment Total Mercury Concentrations in Streams and Lakes of Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2009 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
CCME sediment quality guideline: PEL = probable effect level; ISQG = interim sediment quality guideline.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.

Figure 6.2-14

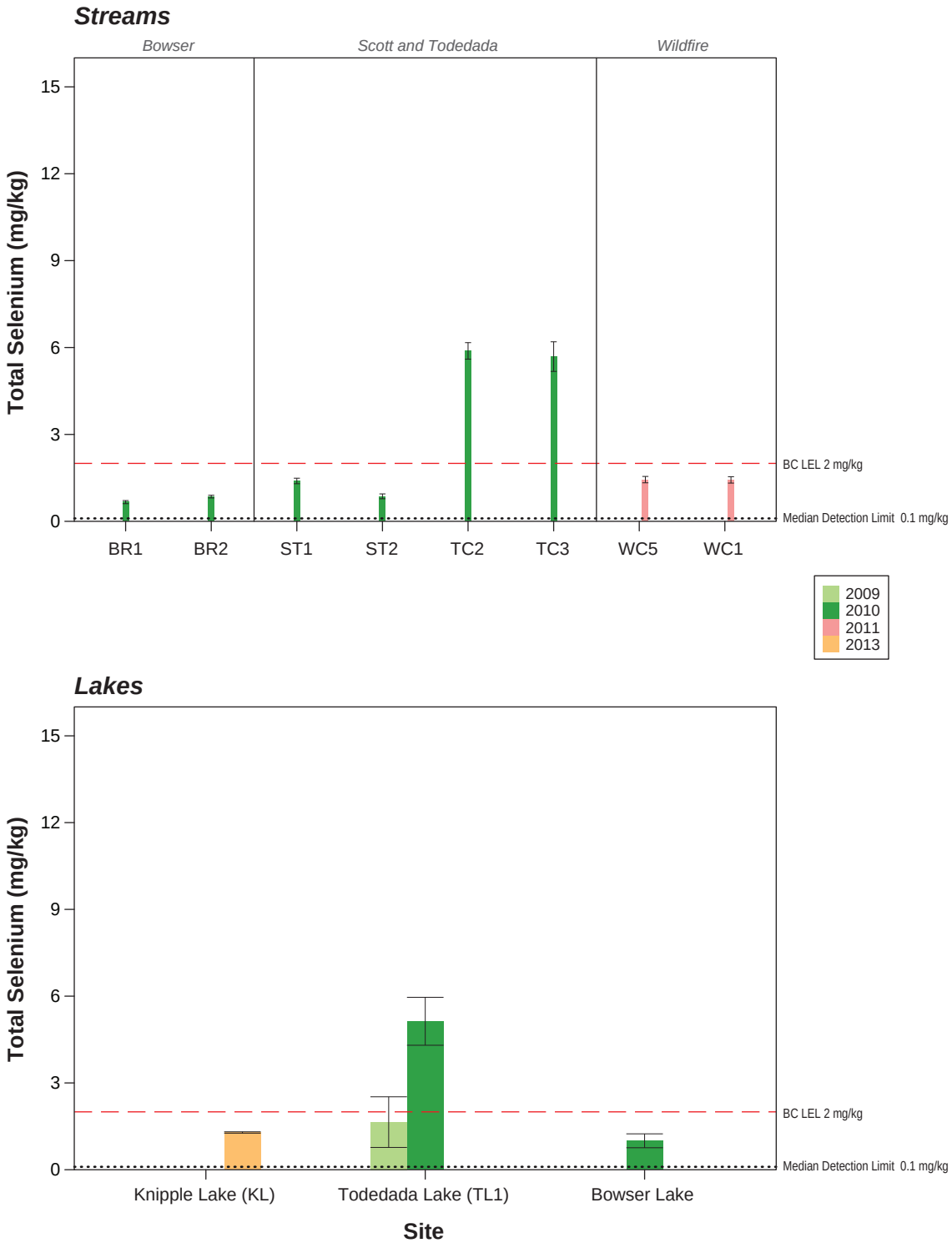
Sediment Total Nickel Concentrations in Streams and Lakes of Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2009 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.

Figure 6.2-15

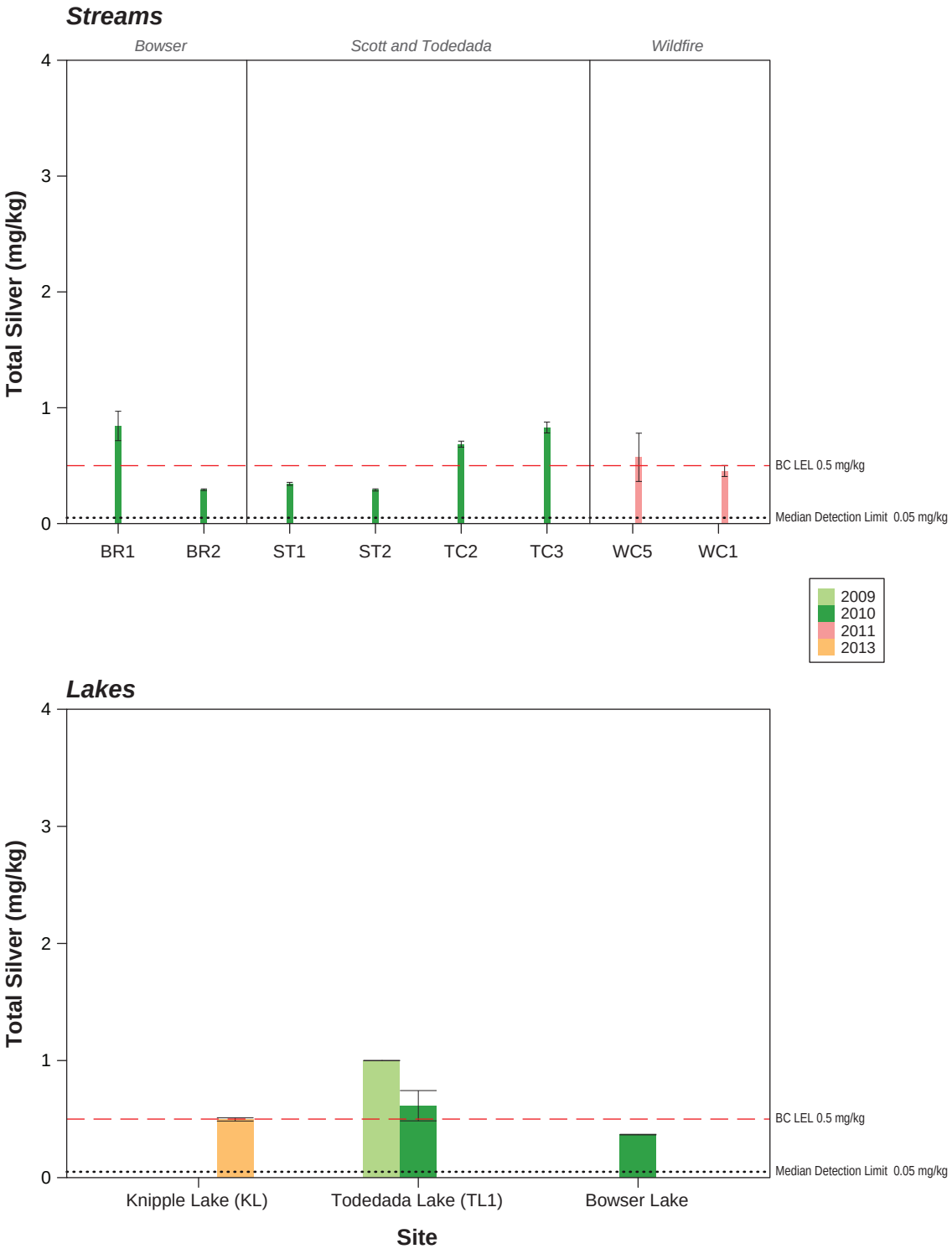
Sediment Total Selenium Concentrations in Streams and Lakes of Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2009 to 2013



Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.

Figure 6.2-16

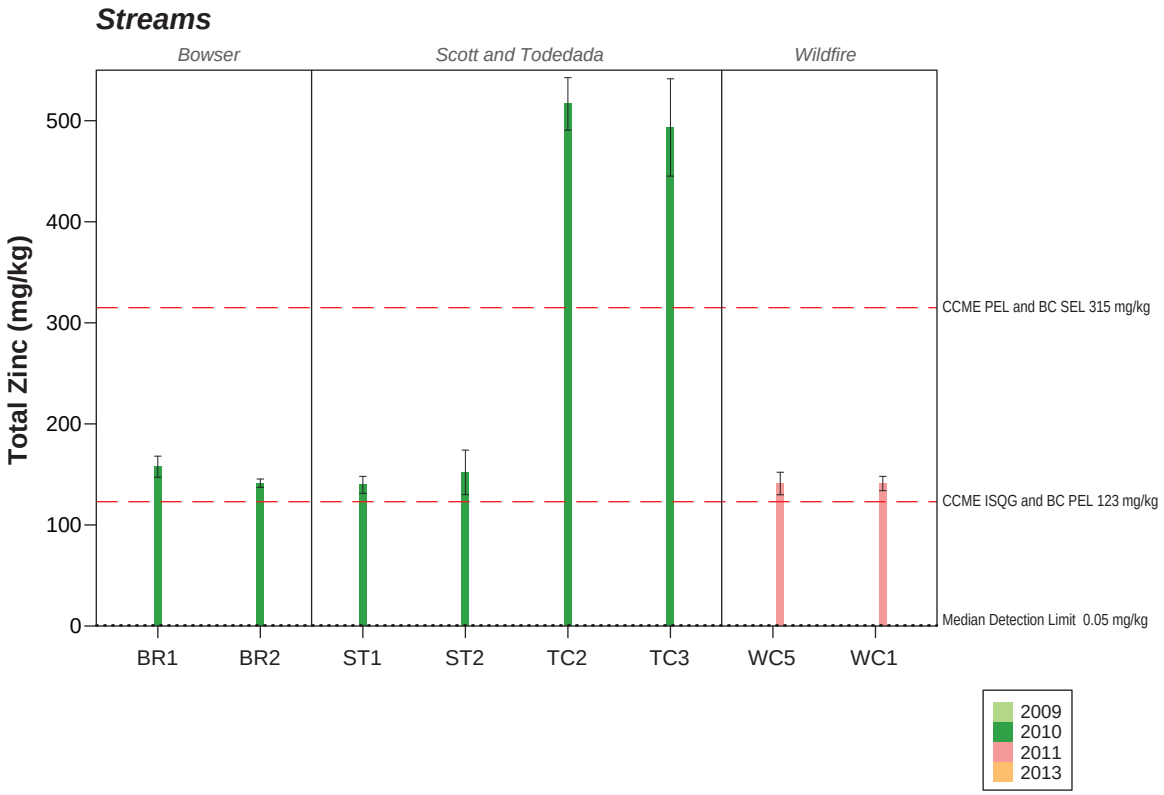
Sediment Total Silver Concentrations in Streams and Lakes of Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2009 to 2013

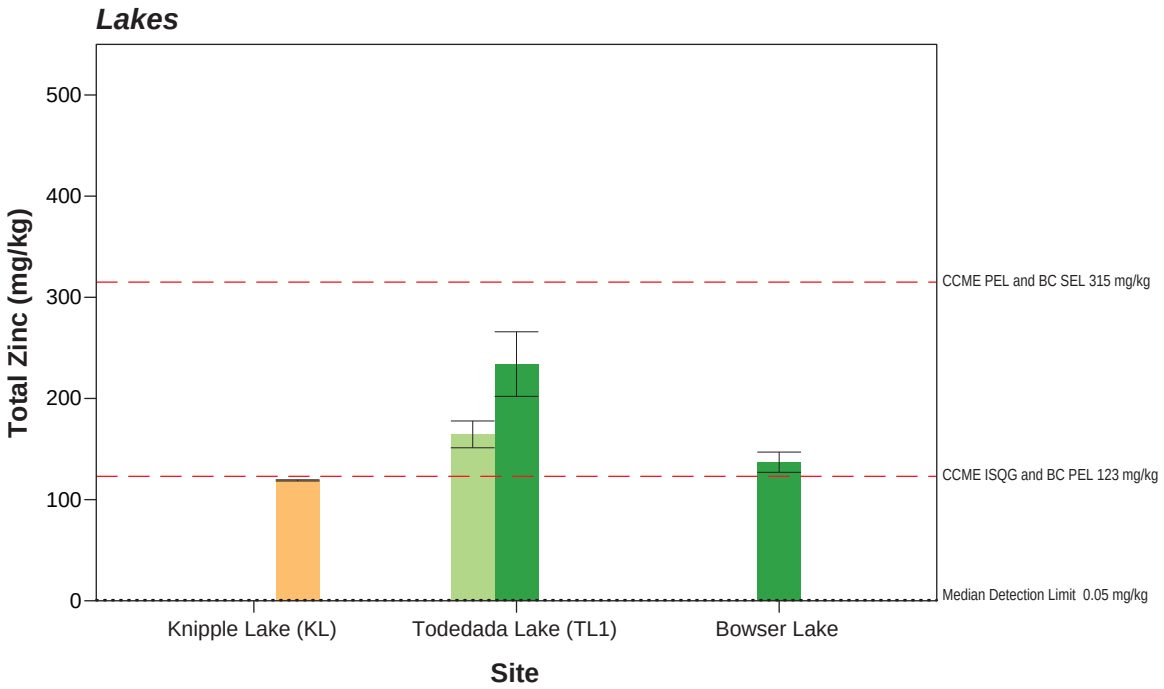


Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.

Figure 6.2-17

Sediment Total Zinc Concentrations in Streams and Lakes of Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2009 to 2013





Notes: Error bars represent the standard error of the mean.
Dotted line represents the median analytical detection limit; values below the detection limit were plotted as half the detection limit.
CCME sediment quality guideline: PEL = probable effect level; ISQG = interim sediment quality guideline.
BC sediment quality guideline: SEL = severe effect level; LEL = lower effect level.

6.2.1.5 Comparison to Sediment Quality Guidelines

Sediment metal concentrations from the ancillary Project infrastructure areas were compared to the BC MOE and CCME sediment quality guidelines for the protection of aquatic life. The CCME sediment quality guidelines for arsenic, cadmium, chromium, copper, lead, mercury, and zinc are identical to the BC sediment quality guidelines. For each site, the average factor and mean frequency of exceedance were calculated for each sediment metal concentration parameter.

Samples with no reported detection limits and with analytical detection limits greater than guidelines were excluded from the analysis. Todedada Lake sediment silver and selenium measurements from 2009 were excluded because the analytical detection limits were greater than guideline values.

Sediment concentrations of arsenic, copper, iron, manganese, nickel, and zinc in at least one sample for all or almost all sites in the ancillary Project infrastructure areas were above BC guidelines (Table 6.2-1). The largest factor of exceedances relative to BC LEL guidelines were observed for arsenic (9.8 in Todedada Creek site TC3), nickel (7.5 in Wildfire Creek site WC5), and zinc (4.2 in Todedada Creek site TC2). Sediment metal concentrations greater than the BC SEL guidelines were also observed in the majority of sites for arsenic (91% of sites), iron (64% of sites), manganese (82% of sites), and nickel (64% of sites).

The concentration of cadmium in stream and lake sediments in the Bowser, Scott, and Todedada watersheds were greater than BC LEL guideline (0.6 mg/kg), and above the BC SEL guideline (3.5 mg/kg) in all samples from Todedada Creek.

Sediment chromium concentrations from Bowser Lake, Scott Creek, Todedada Lake, Todedada Creek, and Wildfire Creek were frequently or always greater than BC LEL guidelines (37.3 mg/kg) and greater than BC SEL guidelines (90 mg/kg) in Bowser Lake and Wildfire Creek.

The concentrations of lead and mercury were greater than BC LEL guidelines in samples from Bowser River (site BR1), Todedada Lake, and Todedada Creek (mercury only). Like many of the other metals, Todedada Lake and Creek also had sediment selenium concentrations greater than the BC LEL guideline (2 mg/kg). Silver concentrations in sediments were greater than BC LEL guidelines at most sites, by a maximum mean factor of 2.5. Todedada Creek and Todedada Lake were above most sediment quality guidelines.

6.2.1.6 Quality Assurance and Quality Control (QA/QC)

Results of quality assurance and quality control are as described above, in Section 6.1.2.6 and Appendix 3.

6.2.2 Primary Producers

The density, biomass, and community composition of primary producers in lakes and streams in the ancillary Project infrastructure areas are presented in Figures 6.2-18 to 6.2-22 and Tables 6.2-2 and 6.2-3. The complete results are presented in Appendix 5. Substantial natural variation in cell density and biomass were observed in phytoplankton and periphyton from sites throughout the Bowser, Scott Creek, and Todedada watersheds (Figures 6.2-18 and 6.2-19), as was observed in the Brucejack, Sulphurets, and Unuk River watersheds.

Table 6.2-1. Percentage of BC and CCME Guideline Exceedances and Average Factor of Exceedances in Sediment Quality Samples, Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2009 to 2013

Parameter Guideline		Arsenic BC = CCME				Cadmium BC = CCME				Chromium BC = CCME				Copper BC = CCME				Iron BC				Lead BC = CCME			
		ISQG = LEL 5.9		PEL = SEL 17		ISQG = LEL 0.6		PEL = SEL 3.5		ISQG = LEL 37.3		PEL = SEL 90		ISQG = LEL 35.7		PEL = SEL 197		LEL 21,200		SEL 46,766		ISQG = LEL 35		PEL = SEL 91.3	
Site	Samples	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent
KL	3	4.5	100%	1.5	100%	1.5	100%	–	0%	–	0%	–	0%	1.2	100%	–	0%	2.1	100%	1.0	100%	–	0%	–	0%
BR1	3	3.3	100%	1.1	100%	2.2	100%	–	0%	–	0%	–	0%	1.1	67%	–	0%	1.9	100%	–	0%	1.2	67%	–	0%
BR2	3	5.2	100%	1.8	100%	2.2	100%	–	0%	–	0%	–	0%	–	0%	–	0%	1.9	100%	–	0%	–	0%	–	0%
BL1	2	4.8	100%	2.5	50%	2.1	100%	–	0%	3.6	50%	1.5	50%	1.3	100%	–	0%	1.9	100%	1.1	50%	–	0%	–	0%
ST1	3	2.5	100%	–	0%	–	0%	–	0%	2.0	100%	–	0%	1.7	100%	–	0%	2.1	100%	1.0	67%	–	0%	–	0%
ST2	3	5.4	100%	1.9	100%	2.3	100%	–	0%	2.3	33%	–	0%	1.8	33%	–	0%	2.0	100%	1.0	33%	–	0%	–	0%
TL1	12	2.0	83%	1.4	17%	2.6	100%	–	0%	1.2	58%	–	0%	2.1	67%	1.6	8%	1.9	100%	1.3	25%	5.5	8%	2.1	8%
TC2	3	8.7	100%	3.0	100%	13.0	100%	2.2	100%	–	0%	–	0%	1.1	100%	–	0%	1.7	100%	–	0%	–	0%	–	0%
TC3	3	9.8	100%	3.4	100%	12.5	100%	2.1	100%	2.3	33%	–	0%	1.7	100%	–	0%	2.0	100%	–	0%	–	0%	–	0%
WC5	3	3.2	100%	1.2	67%	–	0%	–	0%	2.4	100%	1.2	33%	1.7	100%	–	0%	2.1	100%	1.1	67%	–	0%	–	0%
WC1	3	2.8	100%	1.1	33%	–	0%	–	0%	2.3	100%	1.1	33%	1.6	100%	–	0%	1.9	100%	1.0	33%	–	0%	–	0%

Parameter Guideline		Manganese BC				Mercury BC = CCME				Nickel BC				Selenium BC		Silver BC		Zinc BC = CCME			
		LEL 460		SEL 1,100		ISQG = LEL 35		PEL = SEL 91.3		LEL 16		SEL 75		LEL 2		LEL 2		ISQG = LEL 123		PEL = SEL 315	
Site	Samples	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent	Factor	Percent
KL	3	2.7	100%	1.1	100%	–	0%	–	0%	2.0	100%	–	0%	–	0%	1.0	33%	–	0%	–	0%
BR1	3	2.1	100%	–	0%	1.3	100%	–	0%	1.5	100%	–	0%	–	0%	1.7	100%	1.3	100%	–	0%
BR2	3	2.5	100%	1.1	67%	–	0%	–	0%	1.7	100%	–	0%	–	0%	NA	0%	1.1	100%	–	0%
BL1	2	3.0	100%	1.7	50%	–	0%	–	0%	4.1	100%	1.3	50%	–	0%	NA	0%	1.1	100%	–	0%
ST1	3	1.5	67%	–	0%	–	0%	–	0%	6.7	100%	1.4	100%	–	0%	NA	0%	1.1	100%	–	0%
ST2	3	2.9	100%	1.4	67%	–	0%	–	0%	3.0	100%	1.2	33%	–	0%	NA	0%	1.2	100%	–	0%
TL1	12	3.6	92%	2.4	42%	1.1	17%	–	0%	5.0	100%	1.1	83%	2.7	64%	2.5	17%	1.6	100%	1.2	8%
TC2	3	2.4	100%	1.1	33%	2.0	100%	–	0%	2.3	100%	–	0%	2.9	100%	1.4	100%	4.2	100%	1.6	100%
TC3	3	3.1	100%	1.3	100%	2.3	100%	–	0%	3.4	100%	1.1	33%	2.8	100%	1.7	100%	4.0	100%	1.6	100%
WC5	3	2.7	100%	1.2	67%	–	0%	–	0%	7.5	100%	1.6	100%	–	0%	2.0	33%	1.2	67%	–	0%
WC1	3	3.0	100%	1.4	67%	–	0%	–	0%	7.2	100%	1.5	100%	–	0%	1.1	33%	1.1	100%	–	0%

Notes:

All units in mg/kg.

British Columbia working sediment quality guidelines for the protection of freshwater aquatic life; LEL = Lowest Effect Level and SEL = Severe Effect Level. (accessed March 2013)

Canadian Council of Ministers of Environment sediment quality guidelines for the protection of aquatic life; ISQG = Interim Sediment Quality Guideline and PEL = Probable Effects Level. (accessed March 2013)

Half the detection limit was substituted for values below the detection limit.

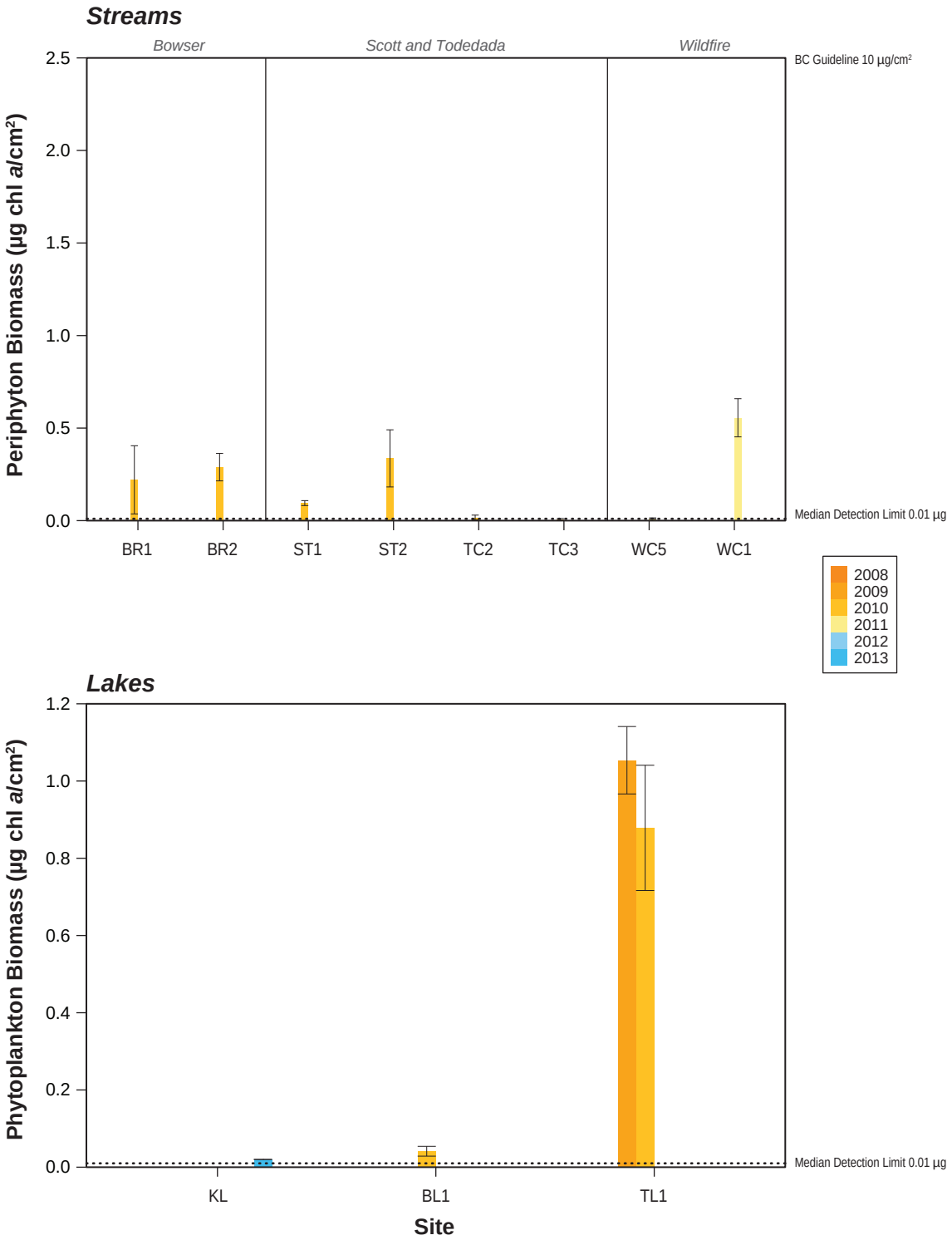
Samples below the detection limit but above the guideline concentration were excluded from all calculations.

Factor represents the average factor by which sample concentrations were greater than guideline concentrations.

Percent represents the percentage of samples collected at each site that were greater than guidelines.

Figure 6.2-18

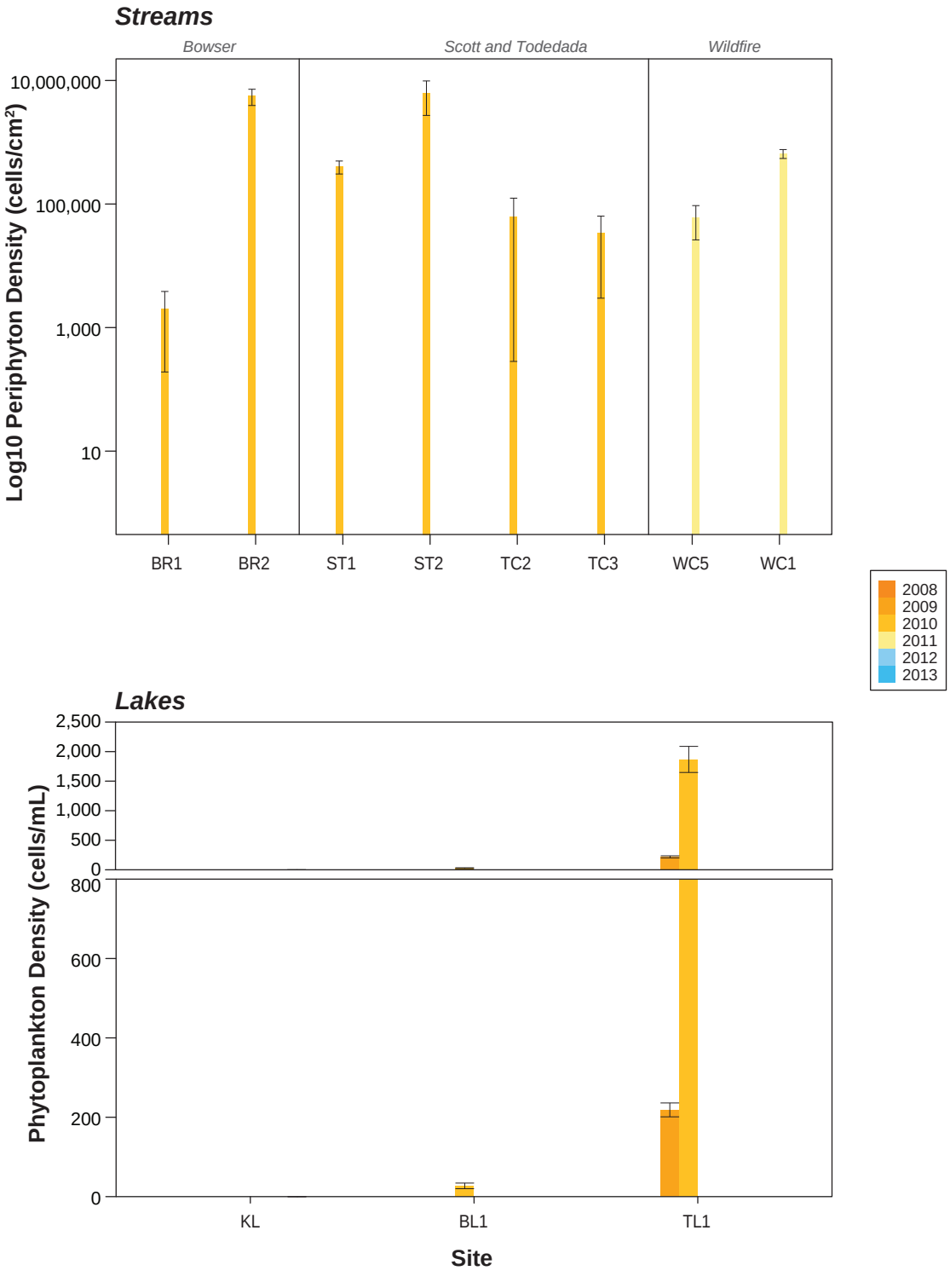
Periphyton and Phytoplankton Biomass in Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2008 to 2013



Note: Error bars represent the standard error of the mean.

Figure 6.2-19

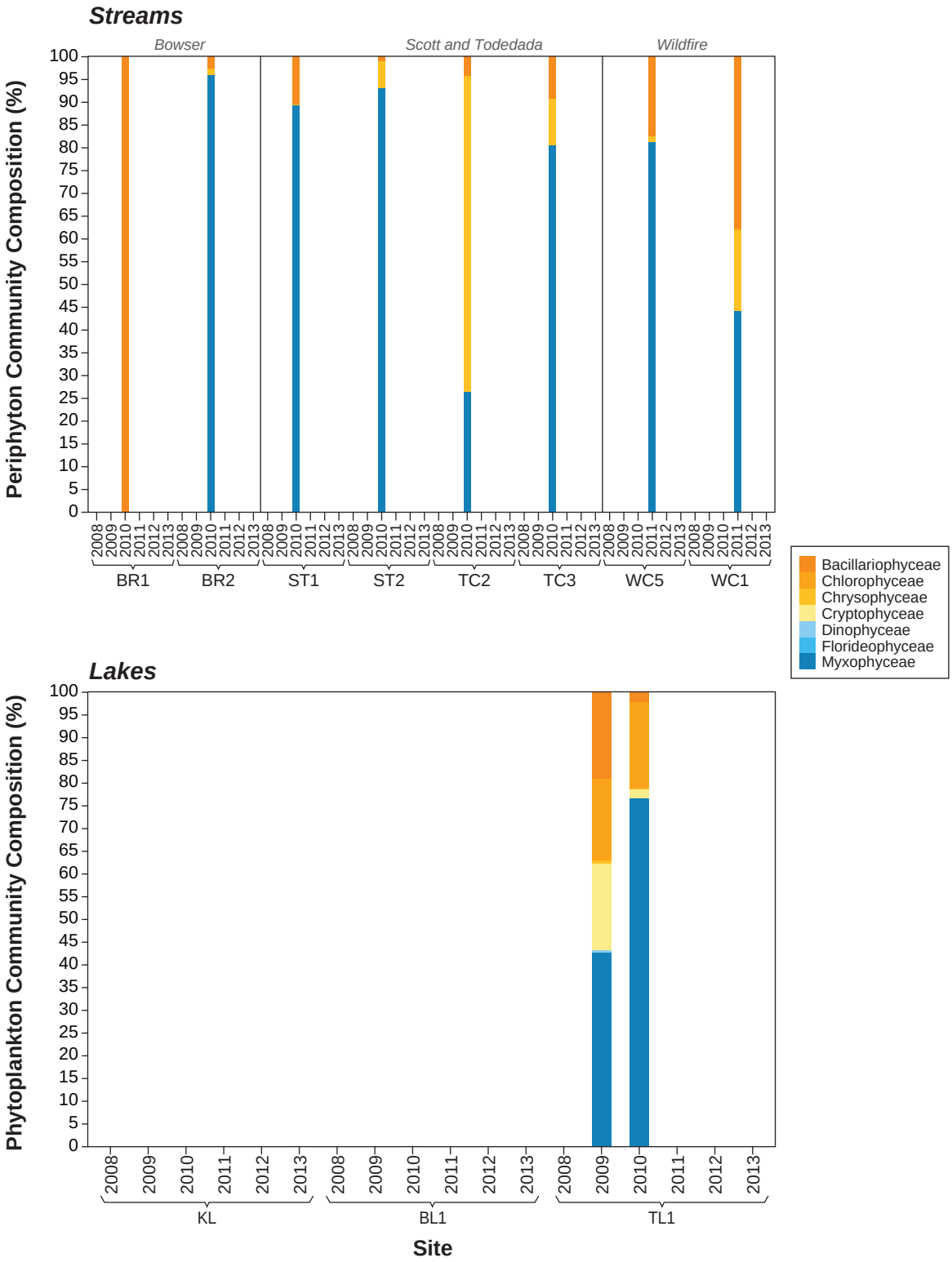
Periphyton and Phytoplankton Density in Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2008 to 2013



Note: Error bars represent the standard error of the mean.

Figure 6.2-20

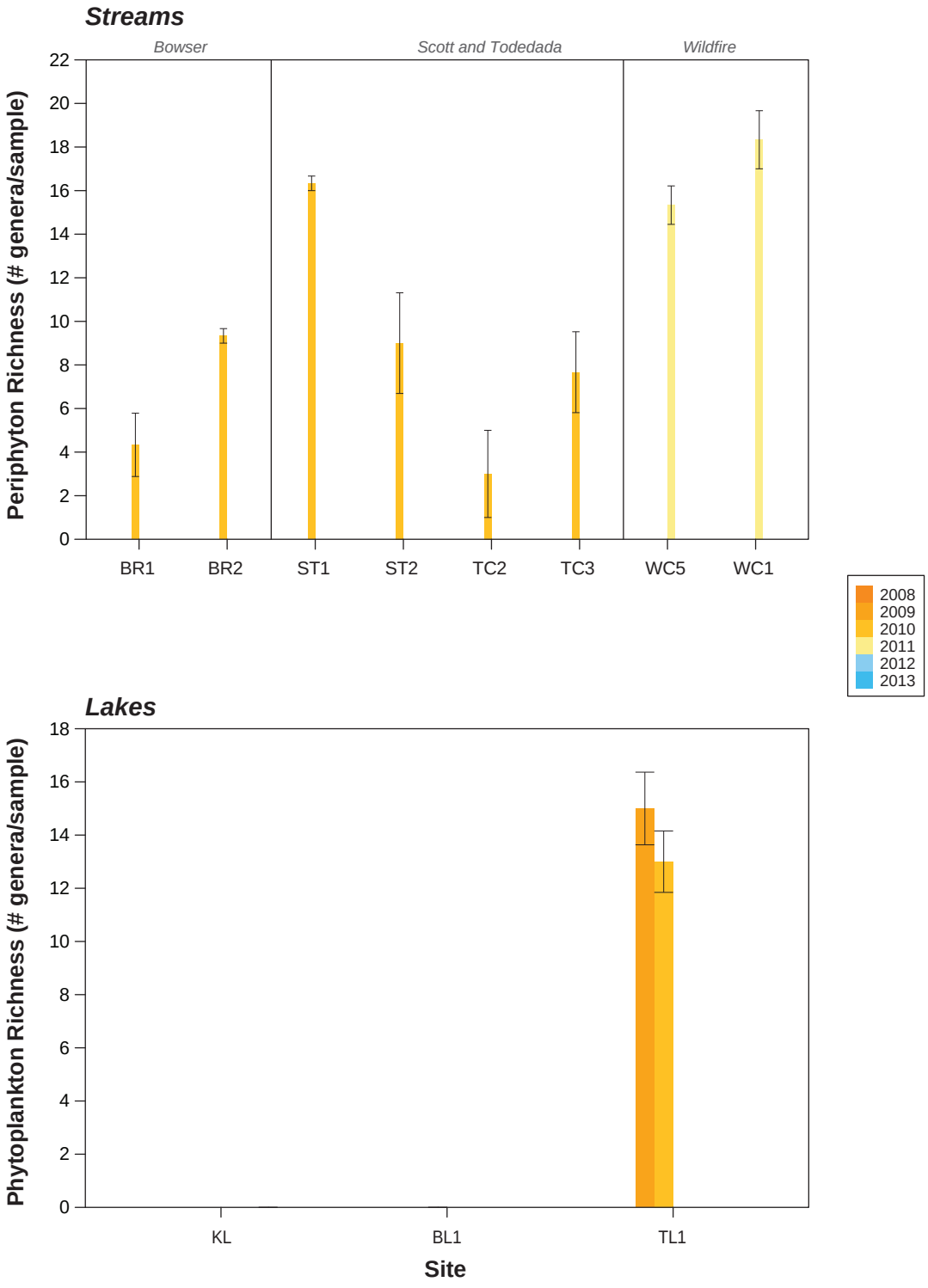
Periphyton and Phytoplankton Community Composition in Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2008 to 2013



Notes: Error bars represent the standard error of the mean.
Immature, damaged and unidentified individuals were excluded from all analyses except density calculations.

Figure 6.2-21

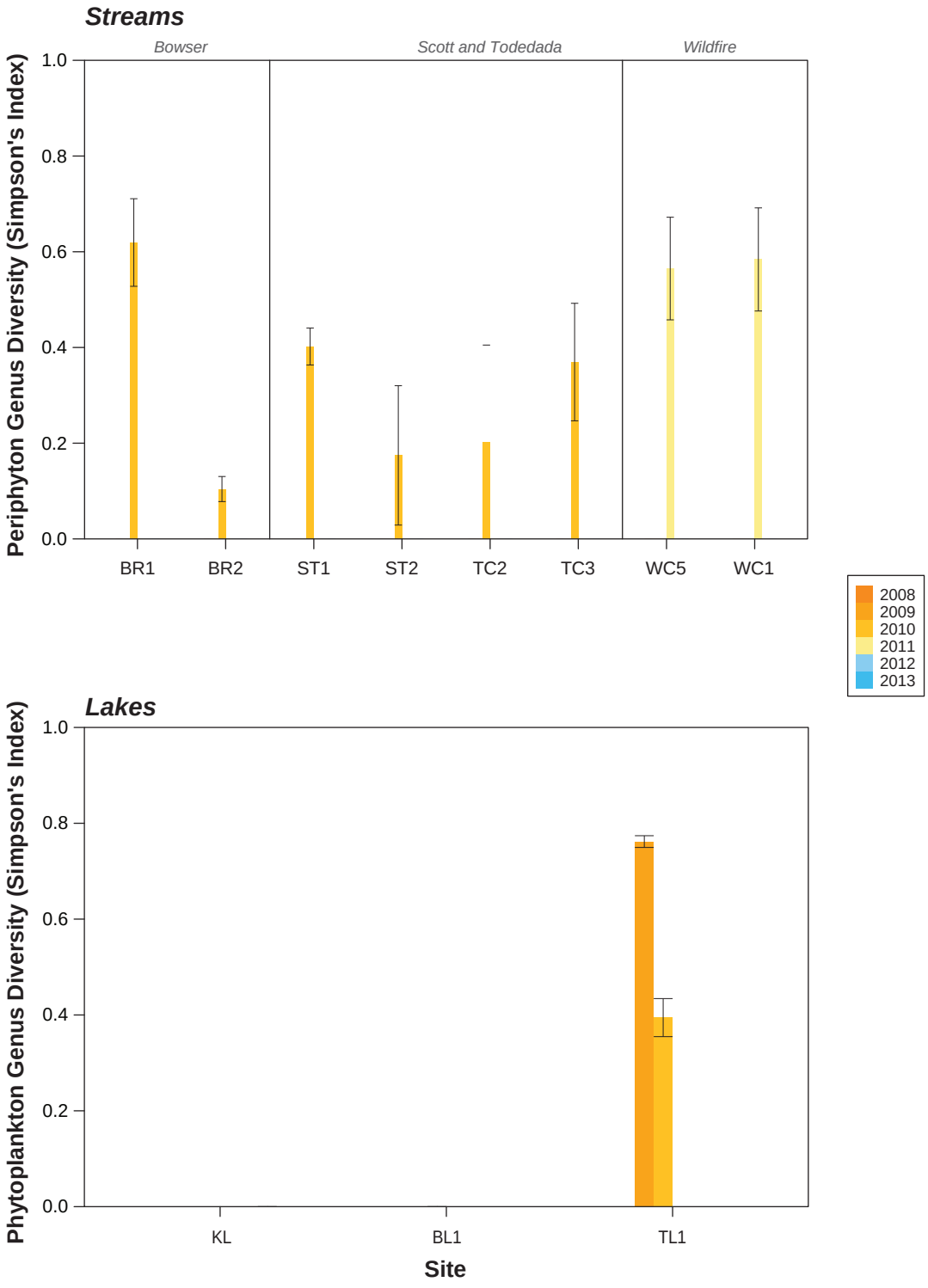
Periphyton and Phytoplankton Richness in Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2008 to 2013



Notes: Error bars represent the standard error of the mean.
Immature, damaged and unidentified individuals were excluded from all analyses except density calculations.

Figure 6.2-22

Periphyton and Phytoplankton Diversity in Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2008 to 2013



Notes: Error bars represent the standard error of the mean.
Immature, damaged and unidentified individuals were excluded from all analyses except density calculations.

Table 6.2-2. Stream Periphyton Dominant Taxa in Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2008 to 2013

Watershed	Site	Year	Class	Order	Genus	Percent
Bowser	BR1	2010	Bacillariophyceae	Pennales	*Fragilaria*	46%
			Bacillariophyceae	Pennales	*Cymbella*	30%
			Bacillariophyceae	Pennales	*Nitzschia*	9%
	BR2	2010	Myxophyceae	Oscillatoriales	*Homoeothrix*	95%
			Bacillariophyceae	Pennales	*Cymbella*	2%
			Chrysophyceae	Chromulinales	*Hydrurus*	1%
Scott and Todedada	ST1	2010	Myxophyceae	Oscillatoriales	*Homoeothrix*	75%
			Myxophyceae	Chroococcales	*Chamaesiphon*	14%
			Bacillariophyceae	Pennales	*Achnanthes*	8%
	ST2	2010	Myxophyceae	Oscillatoriales	*Homoeothrix*	89%
			Chrysophyceae	Chromulinales	*Hydrurus*	6%
			Myxophyceae	Chroococcales	*Chamaesiphon*	4%
	TC2	2010	Chrysophyceae	Chromulinales	*Hydrurus*	69%
			Myxophyceae	Oscillatoriales	*Homoeothrix*	19%
			Myxophyceae	Chroococcales	*Chamaesiphon*	7%
	TC3	2010	Myxophyceae	Oscillatoriales	*Homoeothrix*	58%
			Myxophyceae	Oscillatoriales	*Pseudanabaena*	22%
			Chrysophyceae	Chromulinales	*Hydrurus*	10%
Wildfire	WC5	2011	Myxophyceae	Chroococcales	*Chamaesiphon*	47%
			Myxophyceae	Oscillatoriales	*Homoeothrix*	32%
			Bacillariophyceae	Pennales	*Hannaea*	11%
	WC1	2011	Myxophyceae	Oscillatoriales	*Homoeothrix*	39%
			Bacillariophyceae	Pennales	*Hannaea*	28%
			Chrysophyceae	Chromulinales	*Hydrurus/Chromulina*	13%

Notes: Values represent the percentage of the total community.
Immature, damaged and unidentified individuals below the family level were excluded.

Knipple Lake and Bowser Lake had naturally low abundances of phytoplankton (no observed cells in Knipple Lake in 2013 and 27 cells/mL in Bowser Lake in 2010; Figure 6.2-19). Light penetration was very shallow in Knipple lake in 2013 (Secchi depth 5 cm) which resulted in a shallow euphotic zone (euphotic depth = 14 cm; ERM Rescan 2014), creating challenging conditions for phytoplankton growth. Bowser River site BR1, downstream of Knipple Lake, also had the lowest stream periphyton cell density (2,000 cells/cm^2) observed in the ancillary Project infrastructure areas (Figure 6.2-19). The community at BR1 was comprised of diatoms (genus *Fragilaria*), which was similar to observations from Sulphurets Creek and the Unuk River but dissimilar from other sites on the Bowser River and other streams in the Scott Creek, Todedada, and Wildfire watersheds (Tables 6.1-4 and 6.2-2; Figures 6.1-22 and 6.2-20).

Table 6.2-3. Lake Phytoplankton Dominant Taxa in Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2008 to 2013

Watershed	Site	Year	Class	Order	Genus	Percent
Scott and Todedada	TL1	2009	Myxophyceae	Chroococcales	*Chroococcus*	43%
			Bacillariophyceae	Centrales	*Cyclotella*	15%
			Cryptophyceae	Pyrenomonadales	*Rhodomonas*	13%
		2010	Myxophyceae	Chroococcales	*Anacystis*	77%
			Chlorophyceae	Chlorococcales	*Crucigenia*	10%
			Chlorophyceae	Chlorococcales	*Botryococcus*	3%

Notes: Values represent the percentage of the total community.
Immature, damaged and unidentified individuals below the family level were excluded.
No identifiable taxa were found in KL (2013) or BL1 (2010).

Sites on Todedada Creek (TC2 and TC3), and Wildfire Creek (WC5) were all broadly similar in terms of their periphyton communities. Biomass was very low with an average of 0.01 µg chl *a*/cm² and cell densities ranged from 33,000 cells/cm² (TC3) to 62,000 cells/cm² (TC2; Figures 6.2-18 and 6.2-19). Cyanobacteria were the dominant taxa in these streams, and composed between 25% (TC2) and 80% of the cells (WC5; Figure 6.2-20). The dominant cyanobacteria were the filamentous genera *Homoeothrix* and *Chamesiphon*. Taxonomic richness and diversity were variable between these streams, with no notable spatial patterns or associations with periphyton biomass or cell density (Figures 6.2-21 and 6.2-22).

Todedada Lake had relatively large densities and biomass of phytoplankton cells, although substantial inter-annual variability was observed (Figures 6.2-18 and 6.2-19). Cyanobacteria were the dominant taxa in Todedada Lake (genera *Chroococcus* and *Anacystis*; Table 6.2-3 and Figure 6.2-20), but the community was relatively rich (~14 taxa per sample, Figure 6.2-21).

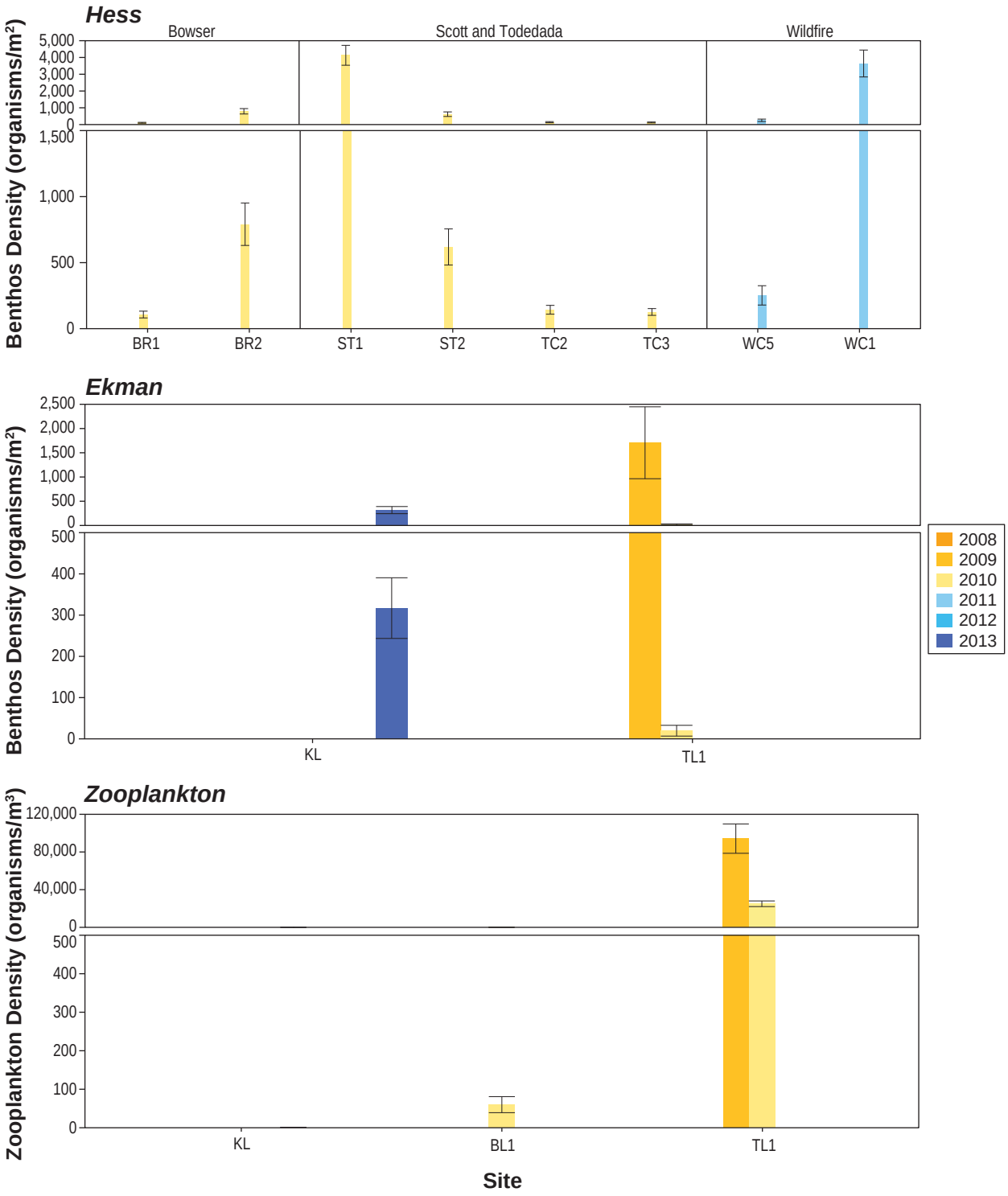
The highest periphyton cell densities and biomass were observed on the Bowser River (site BR2), Scott Creek (site ST2), and Wildfire Creek (site WC1; Figures 6.2-18 and 6.2-19). These sites were from higher-order streams sites: ST2 is located just before the confluence of Scott Creek and the Bowser River; BR2 is located on the Bowser River downstream from the confluence of Todedada Creek and Todd Creek; and WC1 is the most downstream site on Wildfire Creek before the Bell-Irving River. Periphyton cell densities, for example, ranged from 650,000 cells/cm² (WC1) to 6,300,000 cells/cm² (ST2). Both the Bowser River BR2 and Scott Creek ST2 sites were dominated by the cyanobacteria genus *Homoeothrix;* the filamentous *Homoeothrix* were 45% of the cells at the Wildfire Creek WC1 site (Figure 6.2-20). The periphyton communities at sites WC5 and ST1 were generally rich (~16 taxa per sample) and moderately diverse (Simpson's diversity index 0.4 to 0.6), however taxonomic richness (10 genera/sample) and diversity (0.10) were lower at the Bowser River site BR1, likely due to the dominance of cyanobacteria at that site (Figures 6.2-21 and 6.2-22).

6.2.3 Aquatic Invertebrates

The density and community composition of aquatic invertebrates in lakes and streams in the ancillary Project infrastructure areas are presented in Figures 6.2-23 to 6.2-26 and Tables 6.2-4 to 6.2-6. The complete results are resented in Appendix 6.

Figure 6.2-23

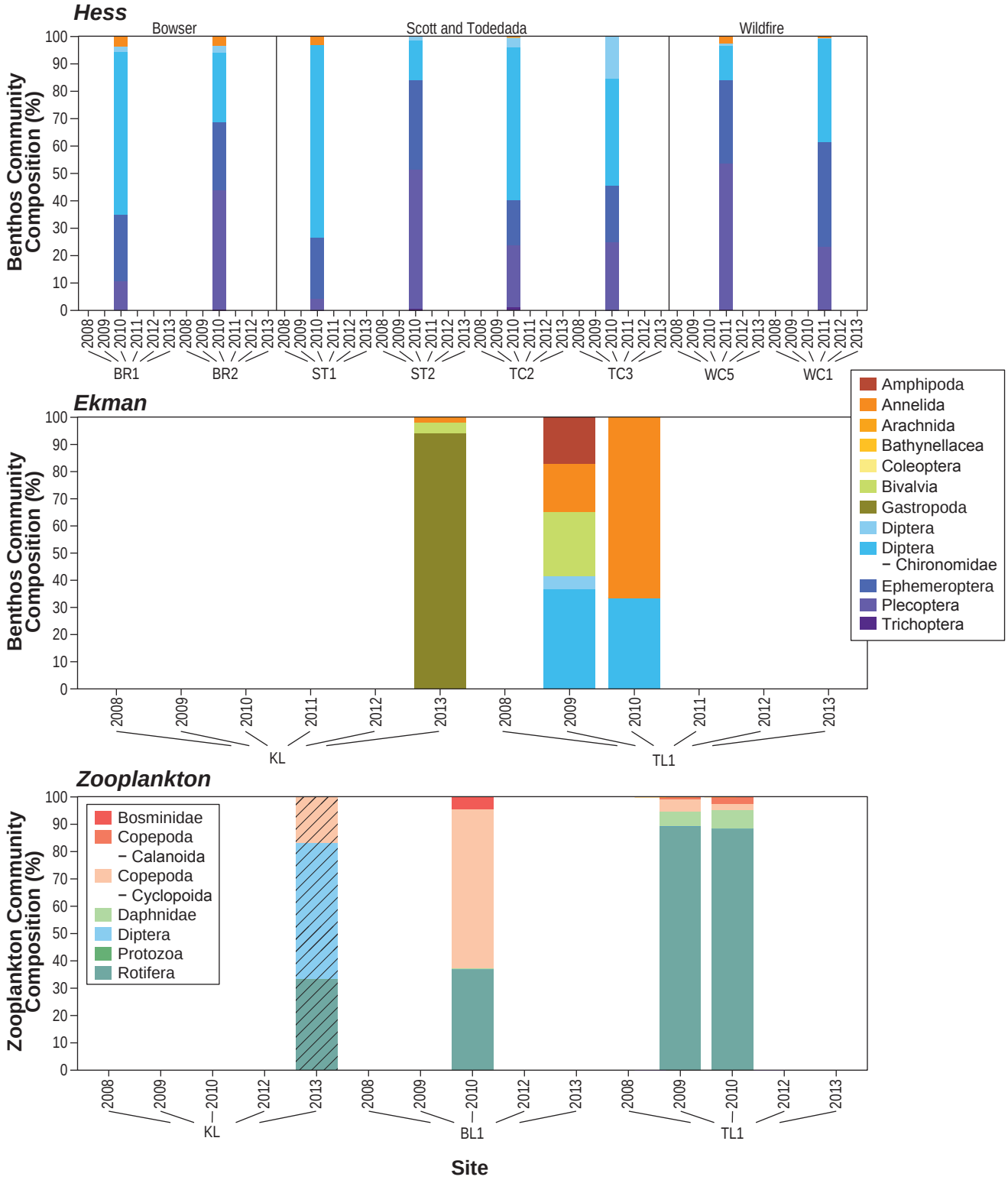
Benthic Invertebrate and Zooplankton Density in Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project 2008 to 2013



Notes: Error bars represent the standard error of the mean.
Ostracoda, Cladocera, Copepoda, Porifera, Nematoda, Platyhelminthes, fish and terrestrial invertebrates were excluded from all benthic invertebrate calculations.
Nauplii were excluded from all zooplankton analyses and copepodites were only included in density calculations.

Figure 6.2-24

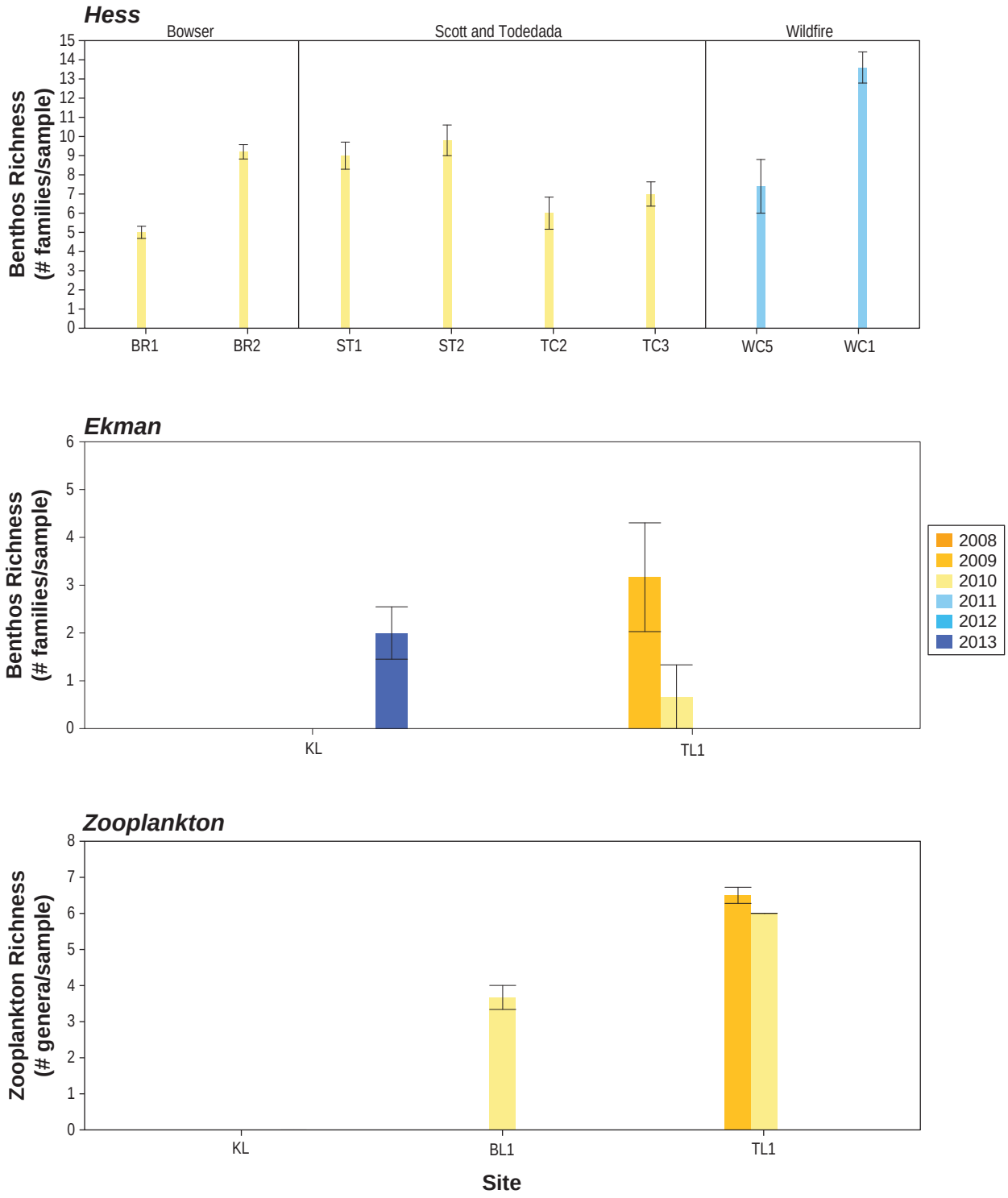
Benthic Invertebrate and Zooplankton Community Composition in Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2008 to 2013



Notes: Community composition values represent the mean of replicates.
Immature, damaged and unidentified individuals were excluded from all benthic invertebrate analyses except density calculations.
Ostracoda, Cladocera, Copepoda, Porifera, Nematoda, Platyhelminthes, fish and terrestrial invertebrates
Nauplii were excluded from all zooplankton analyses and copepodites were only included in density calculations.

Figure 6.2-25

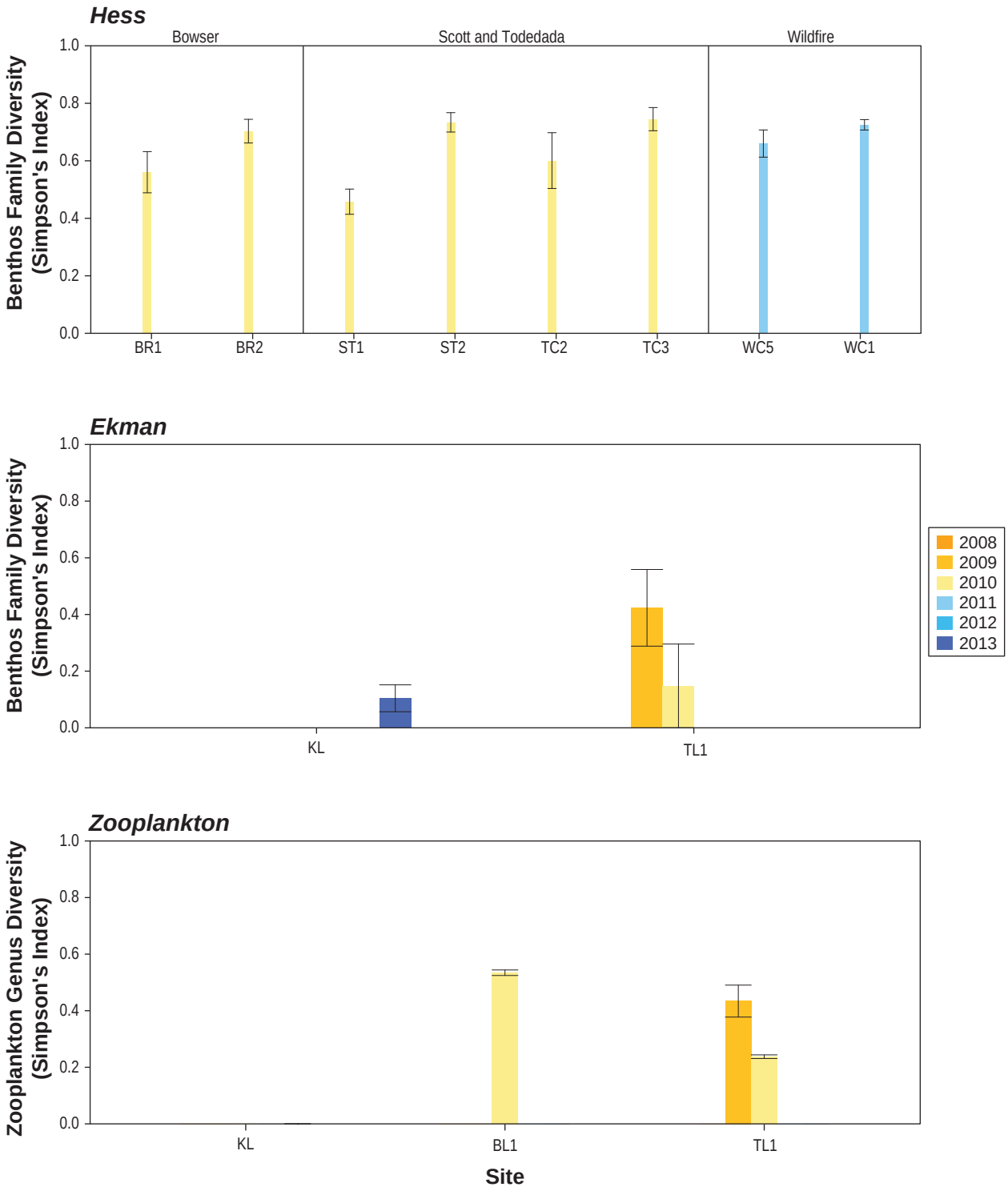
Benthic Invertebrate and Zooplankton Richness in Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2008 to 2013



Notes: Error bars represent the standard error of the mean.
Immature, damaged and unidentified individuals were excluded from all benthic invertebrate analyses except density calculations.
Ostracoda, Cladocera, Copepoda, Porifera, Nematoda, Platyhelminthes, fish and terrestrial invertebrates were excluded from all benthic invertebrate calculations.
Nauplii were excluded from all zooplankton analyses and copepodites were only included in density calculations.
Lake zooplankton data: taxa could not be identified below family at KL (2013).

Figure 6.2-26

Benthic Invertebrate and Zooplankton Diversity in Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2008 to 2013



Notes: Error bars represent the standard error of the mean.
Immature, damaged and unidentified individuals were excluded from all benthic invertebrate analyses except density calculations.
Ostracoda, Cladocera, Copepoda, Porifera, Nematoda, Platyhelminthes, fish and terrestrial invertebrates were excluded from all benthic invertebrate calculations.
Nauplii were excluded from all zooplankton analyses and copepodites were only included in density calculations.
Lake zooplankton data: taxa could not be identified below family at KL (2013).

Table 6.2-4. Stream Benthic Invertebrate Dominant Taxa (Hess) in Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2008 to 2013

Watershed	Site	Year	Major Taxon	Family	Genus	Percent
Bowser	BR1	2010	Diptera	Chironomidae	*Diamesa*	21%
			Ephemeroptera	Heptageniidae	*Rhithrogena*	18%
			Diptera	Chironomidae	*Platysmittia*	11%
	BR2	2010	Plecoptera	Taeniopterygidae	*Taenionema*	38%
			Ephemeroptera	Ephemerellidae	*Drunella*	12%
			Diptera	Chironomidae	*Diamesa*	6%
Scott and Todedada	ST1	2010	Diptera	Chironomidae	*Micropsectra*	64%
			Ephemeroptera	Baetidae	*Baetis*	18%
			Ephemeroptera	Ameletidae	*Ameletus*	4%
	ST2	2010	Plecoptera	Taeniopterygidae	*Taenionema*	37%
			Plecoptera	Nemouridae	*Zapada*	10%
			Ephemeroptera	Heptageniidae	*Rhithrogena*	10%
	TC2	2010	Diptera	Chironomidae	*Diamesa*	36%
			Ephemeroptera	Baetidae	*Baetis*	9%
			Diptera	Chironomidae	*Platysmittia*	8%
	TC3	2010	Diptera	Chironomidae	*Platysmittia*	26%
			Diptera	Tipulidae	*Dicranota*	14%
			Ephemeroptera	Baetidae	*Baetis*	11%
Wildfire	WC5	2011	Plecoptera	Taeniopterygidae	*Taenionema*	47%
			Ephemeroptera	Heptageniidae	*Rhithrogena*	20%
			Ephemeroptera	Heptageniidae	*Epeorus*	7%
	WC1	2011	Ephemeroptera	Heptageniidae	*Rhithrogena*	23%
			Diptera	Chironomidae	*Cricotopus/Orthocladius*	11%
			Diptera	Chironomidae	*Tvetenia*	10%

Notes: Values represent the percentage of the total community.
Immature, damaged and unidentified individuals below the family level were excluded.
Ostracoda, Cladocera, Copepoda, Porifera, Nematoda, Platyhelminthes, fish and terrestrial invertebrates were excluded.

6.2.3.1 Density

Stream benthic invertebrate densities varied in the ancillary Project infrastructure areas, and means ranged from 107 organisms/m^2 at BR1 to 4,130 organisms/m^2 at ST1 (Figure 6.2-23). Stream benthic invertebrate densities were comparable across watersheds (including the mine site area); however, were variable within watersheds. Lakes in the ancillary Project infrastructure areas also had variable benthic invertebrate densities spatially and temporally (Figure 6.2-23). For example, Todedada Lake mean benthic invertebrate density in 2009 was 1,700 organisms/m^2 and in 2010 was 20 organisms/m^2. Zooplankton densities in the ancillary Project infrastructure areas were also highly variable (Figure 6.2-23). Knipple Lake sampled in 2013 had particularly low zooplankton

densities of 1.1 organisms/m^3. Todedada Lake had very high zooplankton densities, and densities were three times higher in 2009 (mean: 94,175 organisms/m^3) than those observed in 2010 (mean: 25,024 organisms/m^3).

Table 6.2-5. Lake Benthic Invertebrate Dominant Taxa in Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2008 to 2013

Watershed	Site	Year	Major Taxon	Family	Genus	Percent
Bowser	KL	2013	Diptera	Chironomidae	*Diamesa*	38%
			Diptera	Chironomidae	*Heterotrissocladius*	13%
			Diptera	Chironomidae	*Pseudodiamesa*	6%
Scott and Todedada	TL1	2009	Diptera	Chironomidae	*Heterotrissocladius*	20%
			Amphipoda	Gammaridae	*Gammarus*	17%
			Bivalvia	Pisidiidae	*Pisidium/Sphaerium*	13%
		2010	Diptera	Chironomidae	*Chironomus*	33%

Notes: Values represent the percentage of the total community.
Immature, damaged and unidentified individuals below the family level were excluded.
Ostracoda, Cladocera, Copepoda, Porifera, Nematoda, Platyhelminthes, fish and terrestrial invertebrates were excluded.

Table 6.2-6. Lake Zooplankton Dominant Taxa in Ancillary Project Infrastructure Areas, Brucejack Gold Mine Project, 2008 to 2013

Watershed	Site	Year	Major Taxon	Family	Genus	Percent
Bowser	BL1	2010	Copepoda - Cyclopoida	Cyclopidae	*Cyclops*	58%
			Rotifera	Brachionidae	*Keratella*	30%
			Rotifera	Brachionidae	*Kellicottia*	6%
Scott and Todedada	TL1	2009	Rotifera	Brachionidae	*Kellicottia*	71%
			Rotifera	Conochilidae	*Conochilus*	17%
			Crustacea	Daphnidae	*Daphnia*	5%
		2010	Rotifera	Brachionidae	*Kellicottia*	87%
			Crustacea	Daphnidae	*Daphnia*	7%
			Copepoda - Cyclopoida	Cyclopidae	*Cyclops*	2%

Notes: Values represent the percentage of the total community.
Nauplii and copepodites were excluded from calculations.
Taxa could not be identified below family at KL (2013).

6.2.3.2 Community Composition

Stream benthic invertebrate communities in the ancillary Project infrastructure areas were primarily composed of Chironomidae (13 to 70% of the community), Ephemeroptera (16 to 38% of the community) and Plecoptera (4 to 53% of the community; Figure 6.2-24). Common genera included *Baetis* (Ephemeroptera), *Rhithrogena* (Ephemeroptera) and *Taenionema* (Plecoptera), which were also abundant in Sulphurets Creek and the Unuk River (Table 6.2-4). Diptera, Annelida and Trichoptera

were also present in lower proportions (≤ 15% of the community). Streams in the ancillary Project infrastructure areas had very similar communities as Sulphurets Creek and the Unuk River.

As with Brucejack and Sulphurets lakes, Chironomidae were abundant in Knipple Lake (94% of the community) and Todedada Lake (33 to 37% of the community; Figure 6.2-24). Annelida were also common in Todedada Lake in 2010, which could only be identified to the family Tubificidae (67%). Todedada Lake in 2009 had a slightly different benthic invertebrate community compared to other lakes sampled from the Project area, with an abundance of Bivalvia (clams; 23% of the community) and *Gammarus* (Amphipoda; 17% of the community; Table 6.2-5).

Cyclopoida copepods and Rotifera were common in Bowser Lake zooplankton communities (Figure 6.2-24). Todedada Lake was dominated by Rotifera (88 to 89% of the community), which were primarily from the genus *Kellicottia* (71 to 87% of the community; Table 6.2-6). Zooplankton densities were very low in Knipple Lake in 2013, and community composition results should be interpreted with caution.

6.2.3.3 Richness

Stream benthic invertebrate family richness was comparable across the Bowser River, Scott, Todedada and Wildfire creeks (Figure 6.2-25); however richness at individual sites varied. For example, in Wildfire Creek in 2011, mean richness was 7.4 families/sample at WC5 and 13.6 families/sample at WC1.

Benthic invertebrate family richness was low in lakes in the ancillary Project infrastructure areas (<4 families/sample; Figure 6.2-25).

Lake zooplankton genus richness was higher at Todedada Lake (mean range: 6.0 to 6.5 genera/sample) compared to Bowser Lake (mean: 3.7 genera/sample; Figure 6.2-25). Zooplankton collected from Knipple Lake in 2013 could not be identified below the family level, and so the resulting genus richness was 0.

6.2.3.4 Diversity

Stream benthic invertebrate family diversity in the ancillary Project infrastructure areas ranged from 0.46 Simpson's Index at ST1 to 0.75 Simpson's Index at TC3 (Figure 6.2-26). Stream benthic invertebrate diversity values were generally comparable between watersheds.

Lake benthic invertebrate family diversity in ancillary Project infrastructure areas was low (< 0.5 Simpson's Index; Figure 6.2-26).

Lake zooplankton communities also had low genus diversity, and reached a maximum mean of 0.54 Simpson's Index at BL1 (2010; Figure 6.2-26).

7. CONCLUSIONS

The overall objective of the Brucejack Gold Mine Project (Project) aquatic resources baseline study is to characterize the spatial and temporal background conditions of aquatic resources in lakes, rivers, and streams that comprise the potential aquatic receiving environments for Project facilities. The baseline aquatic resources studies were conducted 2008 through 2013 and were designed to allow for the assessment of potential effects of proposed Project activities on aquatic resources. Aquatic resources encompass water toxicity, sediment quality, tissue residues, primary producer (phytoplankton and periphyton), and aquatic invertebrates (benthic invertebrates and zooplankton). This report synthesizes aquatic resources studies completed for the Project in 2008 through 2013, including data from the neighbouring Kerr-Sulphurets-Mitchell (KSM) Project (Seabridge). The report also presents historical sediment quality data collected by previous property owner Newhawk, and Environment Canada in 1988 (Newhawk 1989; Godin and Chamberlain 1990).

Mine Site Area and Downstream Receiving Environment

The study area for the proposed mine site includes the Brucejack Lake and Creek watershed, and the downstream receiving environment of Sulphurets Creek as far as the Unuk River, including Sulphurets Lake. Aquatic resources in the mine site area are generally characterized by high sediment metal concentrations, which are likely due to highly mineralized areas in the Brucejack and Sulphurets watersheds. The relatively low density and richness of primary producers and aquatic invertebrates in the Brucejack watershed is typical for a high elevation, alpine, aquatic ecosystem and the extremely sparse productivity observed in upper Sulphurets Creek and Sulphurets Lake is predictable due to heavy sediment loading from the Sulphurets Glacier.

Sediment concentrations of arsenic, cadmium, copper, iron, lead, manganese, mercury, selenium, silver and zinc in the Brucejack, Sulphurets, and Unuk watersheds were frequently or always greater than the BC MOE guidelines for the protection of aquatic life. However, benthic invertebrate tissue metal concentrations were lower than BC MOE and CCME guidelines for selenium and mercury (respectively).

Benthic invertebrates were variable temporally and spatially in lakes and streams in the Brucejack, Sulphurets, and Unuk watersheds. Chironomidae (midges) were dominant taxa in lakes and streams throughout the mine site area, although Ephemeroptera (mayflies) and Plecoptera (stoneflies) were observed in invertebrate communities from higher-order, lower elevation stream sites in the Sulphurets and Unuk watersheds. The density of aquatic invertebrates tended to increase at lower elevations, in lower Sulphurets Creek and in the Unuk watershed, especially when sampled with CABIN protocol, which covers a wide range of microhabitats. Copepods were the dominant zooplankton taxa in Brucejack Lake, in contrast with the sparse rotifer-dominated community observed in Sulphurets Lake. Substantial inter-annual variation in primary producers was observed in some stream sampling sites. Bacillariophyceae (diatoms) and Myxophyceae **(**cyanobacteria) were important taxa in primary producer communities.

Ancillary Project Infrastructure Areas

Metals were also abundant in the sediments of streams and lakes in the Bowser, Scott Creek and Todedada, and Wildfire watersheds. The concentrations of arsenic, cadmium, copper, iron, manganese, mercury, nickel, selenium, silver and zinc were frequently greater than BC MOE and CCME sediment quality guidelines.

Primary producer density and biomass in the ancillary Project infrastructure areas was variable and ranged from very low in lower-order streams, Bowser Lake, and Knipple Lake, to high in higher order streams and Todedada Lake. Sparse populations in Knipple Lake are likely due to heavy sediment loading from the Knipple Glacier and similarly low productivity in western Bowser Lake can be contributed to high sediment contributions from the Bowser River which is predominantly glacial-fed. Myxophyceae **(**cyanobacteria) were generally the dominant taxa, although Bacillariophyceae (diatoms) and chrysophytes (golden algae) were usually observed. The abundance and taxonomic composition of the benthic invertebrate community varied among streams and lakes in ancillary Project infrastructure areas. The productive, wetland-headed, Todedada Lake had the highest density of primary producers and aquatic invertebrates. Like the mine site area, Chironomidae were the most common benthic invertebrate taxa, along with Ephemeroptera and Plecoptera. However, the more-productive Todedada Lake also had abundant Amphipoda, Annelida, and Bivalvia. The zooplankton community in lakes of ancillary Project infrastructure areas were generally composed of rotifers.

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Appendix 1

Photographs of Aquatic Resource Sampling Sites

Appendix 1.1-1. Baseline Monitoring Locations, from Upstream to Downstream, within the Brucejack Watershed (Mine Site Area) and Sulphurets and Unuk Watersheds (Mid- and Far-field Receiving Environments)

Appendix 1.1-2. Baseline Monitoring Locations in Ancillary Project Infrastructure and Off-site Areas, from Upstream to Downstream, Bowser/Scott/Todedada/Wildfire Watersheds

Appendix 1.1-1. Baseline Monitoring Locations, from Upstream to Downstream, within the Brucejack Watershed (Mine Site Area) and Sulphurets and Unuk Watersheds (Mid- and Far-field Receiving Environments)

Northern tributary to Brucejack Lake (Trib2 aka Catear Creek).

Brucejack Lake (BJ).

Brucejack Creek, Upstream (BJ U/S).

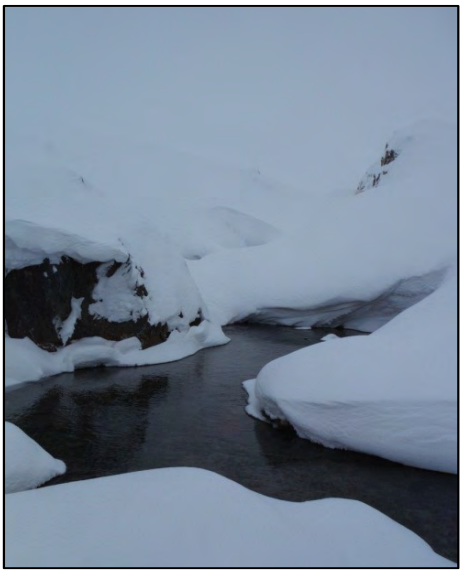
Brucejack Creek, upstream of Camp Creek (BJ U/S of CC).

Camp Creek (CC)

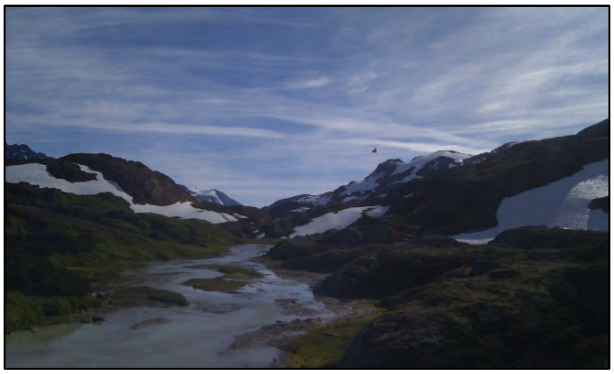
Brucejack Creek Intermediate (BJ Inter)

The Adit (Adit)

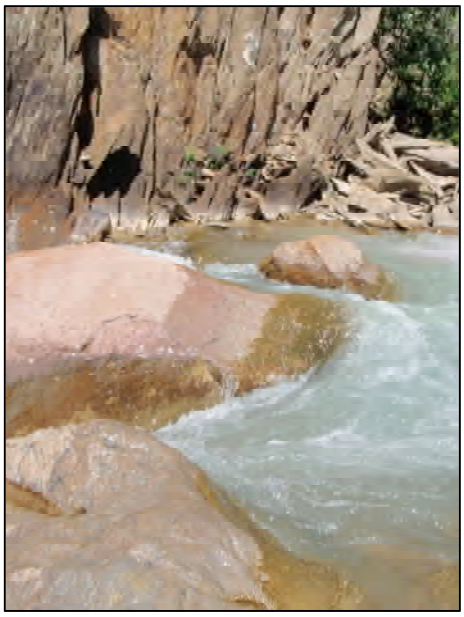
Brucejack Outflow (BJ OF)



Brucejack 200m Downstream (BJ 200m D/S)



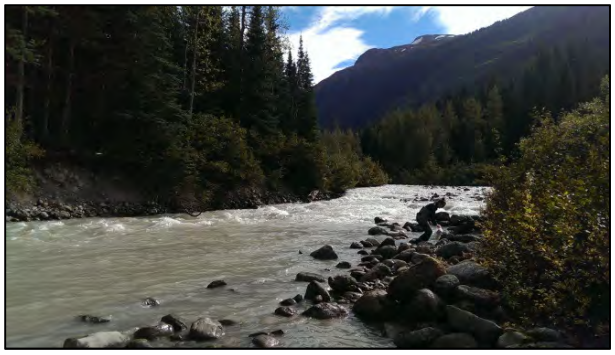
Brucejack Creek 2 (BJ2)



Brucejack Creek, upstream of Sulphurets Glacier (BJ3).

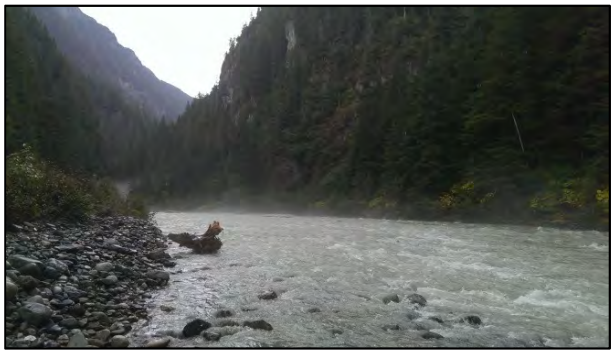
Sulphurets Creek, downstream of Sulphurets Glacier (SC0).

Sulphurets Lake (SUL).



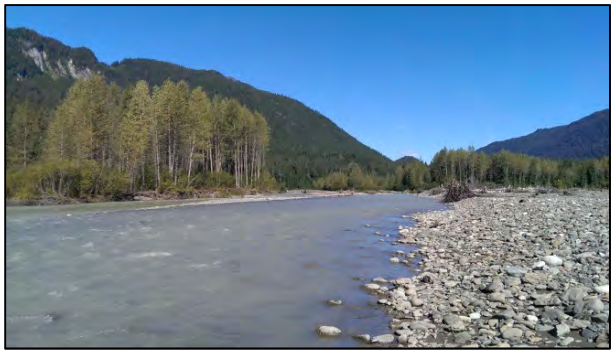
Sulphurets Creek, downstream of Sulphurets Lake (SC1).

Sulphurets Creek, downstream of Mitchell Creek (SC2).



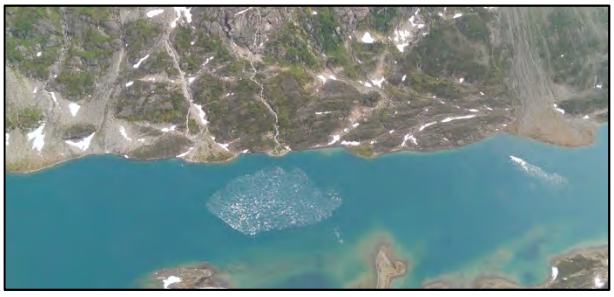
Sulphurets Creek, upstream of the Unuk River (SC3).

Unuk River, upstream of Sulphurets Creek confluence (UR1A).



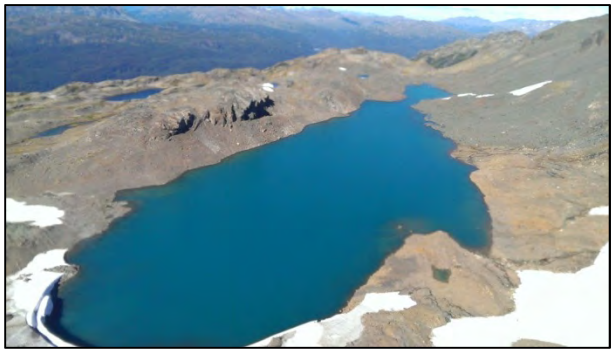
Unuk River, downstream of Sulphurets Creek confluence (UR1).

Unuk River, upstream of Canada-USA international border (UR2).



Divide Lake, potential reference site (Divide).

South outflow of Divide Lake, potential reference site (Divide OF).



Lake 3, potential reference site (L3).

Appendix 1.1-2. Baseline Monitoring Locations in Ancillary Project Infrastructure and Off-site Areas, from Upstream to Downstream, Bowser/Scott/Todedada/Wildfire Watersheds

Knipple Lake, Bowser River Watershed (KL).

Bowser River (BR1).

Bowser River (BR2).

Western end of Bowser Lake (BL1).

Upstream on Scott Creek (ST1).

Downstream on Scott Creek (ST2).

Todedada Lake (TL1).

Downstream on Todedada Creek (TC2, TC3).

Wetland 1 (WL1).

Todd Creek (TD1).

Wildfire Creek, upstream of Lake 1 (WC4).

Wildfire Creek, downstream of Lake 1 (WC2).

Wildfire Creek, downstream of Lake 1 (WC5).

Wildfire Creek, downstream site (WC1).

Lake 1, Wildfire Creek Watershed (L1).

Lake 2, Wildfire Creek Watershed (L2).

Bell Irving River, upstream of confluence with Wildfire Creek (BIR1).

Bell Irving River, downstream of confluence with Wildfire Creek (BIR2).

McInnes Creek (MC1).

Appendix 2

Water Toxicity

Appendix 2.1-1. Toxicity Report for Adit, BJ2, Camp Creek and BJ U/S of CC, 2012

Appendix 2.1-2. Analytical Results for Water Quality used in Toxicity Assays, 2012

Appendix 2.2-1. Toxicity Report for BJ U/S, Camp Creek, Adit, BJ2, and BJ4, 2013

Appendix 2.2-2. Analytical Results for Water Quality Used in Toxicity Assays, 2013

Nautilus Environmental

Toxicity Testing of Adit, BJ2, Camp and BJ u/s of Camp

December 2012

Final Toxicity Test Report

Report date: December 4, 2012

Submitted to:

Rescan Environmental
Vancouver, BC

Burnaby Laboratory
8664 Commerce Court
Burnaby, BC
V5A 4N7

Nautilus Environmental

WO#: 12425-12427

Ms. Allegra Cairns
Rescan Environmental Services Ltd.
1111 W. Hastings Street, 6th floor
Vancouver, BC V6E 2J3

December 4, 2012

Ms. Cairns:

Re: Toxicity Testing on water samples collected on September 9, 2012

Nautilus Environmental is pleased to provide you with the results of the toxicity tests conducted on samples Adit, BJ2, Camp and BJ u/s of Camp, received on September 11, 2012. Testing was conducted following Environment Canada methods. All test acceptability criteria specified by Environment Canada were met. A summary of the test methods and results are provided in the following report.

Please feel free to contact the undersigned at 604-420-8773 should you have any questions or require any additional information.

Yours truly,

Nautilus Environmental

A. Tang

Armando Tang, B.Sc., R.P.Bio.
Laboratory Manager

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APPENDIX B – *Pseudokirchneriella subcapitata* Toxicity Test Data

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APPENDIX D - Chain-of-Custody Form

1.0 INTRODUCTION

Nautilus Environmental conducted toxicity tests for Rescan Environmental Services Ltd. Four samples identified as Adit, BJ2, Camp and BJ u/s of Camp were collected by Rescan on September 9, 2012 and delivered to the Nautilus Environmental Laboratory in Burnaby, BC on September 11, 2012. Each sample was transported in seven 1-L plastic bottle in coolers containing ice packs and stored in the dark at 4 ± 2°C prior to testing. The following toxicity tests were performed on the samples:

- *Ceriodaphnia dubia* survival and reproduction
- 72-h *Pseudokirchneriella subcapitata* growth inhibition
- 48-h *Daphnia magna* survival

This report describes the results of these toxicity tests. Results of these tests only relate to the samples tested. Copies of raw laboratory data sheets and statistical analysis for each test species are provided in Appendices A to C. The chain-of-custody form is provided in Appendix D.

2.0 METHODS

Methods for the toxicity tests are summarized in Tables 1 to 3. The *C. dubia, P. subcapitata* and *D. magna* tests were conducted according to Environment Canada methods (2007a, 2007b and 2000, respectively).

Statistical analyses for all the tests were performed using the software, CETIS (Tidepool Scientific Software, 2012).

2.1 Quality Assurance/Quality Control (QA/QC)

Nautilus follows a comprehensive QA/QC program to ensure that the data generated are of high quality and scientifically defensible. Our QA program is designed to ensure that all tests are performed in accordance with well-established and approved methods (e.g., Environment Canada, US EPA).

To meet these objectives, Nautilus has implemented a number of quality control procedures that include the following:

- Negative controls to ensure that test performance criteria are met;
- Positive controls to assess the health and sensitivity of the test organisms;
- Use of appropriate species and life stage and test methods to meet the study objectives;
- Appropriate number of replicates to allow proper statistical analyses;
- Calibration and proper maintenance of instruments to ensure accurate measurements;
- Proper documentation and record-keeping to allow traceability of performance and document deviations and corrective actions;
- Supervision and training of staff to ensure that methods are followed;
- Proper handling and storage of samples to ensure sample integrity; and
- Review of data and reports by a Registered Professional Biologist to ensure data quality objectives are met.

Table 1. Summary of test conditions for *Ceriodaphnia dubia* survival and reproduction test.

Test type	Static renewal
Endpoints	Survival and reproduction
Organism source	In-house culture
Organism age	<24 hr old neonates produced within 12 hr
Feeding	*Pseudokirchneriella subcapitata* and dYCT
Test chamber	20 mL test tube
Test volume	15 mL
Test temperature	25 ± 1°C
Control water	20% Perrier water
Number of organisms/replicate	1
Number of replicates	10
Photoperiod	16 hours light/8 hours dark
Aeration	None
Statistical software	CETIS
Test protocol	Environment Canada (2007a), EPS 1/RM/21
Test acceptability criterion for controls	≥80% survival; ≥15 young per surviving control female; 60% of controls producing three or more broods
Reference Toxicant	Sodium chloride

Table 2. Summary of test conditions for the *Pseudokirchneriella subcapitata* growth inhibition test.

Test organism	*Pseudokirchneriella subcapitata*
Test organism source	In-house culture
Test organism age	4- to 7-day old culture in logarithmic growth phase
Test type	Static
Test duration	72 hours
Test chamber	Microplate
Test solution volume	220 µL
Test concentrations (% sample)	Seven concentrations, plus laboratory control
Number of replicates	Four for treatments; eight for control
Control/Dilution water	Deionized or distilled water
Test solution renewal	None
Test temperature	24 ± 2°C
Number of organisms/chamber	10,000 cells/mL
Light intensity	3600 to 4400 lux
Photoperiod	Continuous
Aeration	None
Test protocol	Environment Canada (2007b), EPS 1/RM/25
Test endpoint	Algal cell growth inhibition
Test acceptability criteria for controls	≥ 16-fold increase in number of algal cells; control must not exhibit a positive or negative trend with Mann-Kendall test; and the coefficient of variation of the control replicates must not exceed 20%.
Reference toxicant	Zinc

Table 3. Summary of test conditions for the 48-h *D. magna* LC50 test.

Test organism	*Daphnia magna*
Test organism source	In-house culture
Test organism age	< 24 h
Test type	Static
Test duration	48 hours
Test chamber	250-mL glass beakers
Test solution volume	200 mL
Test concentrations (% sample)	Five concentrations, plus laboratory control
Number of replicates	One
Control/Dilution water	Moderately-hard reconstituted water (hardness 80-100 mg/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Number of organisms/chamber	Ten
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada (2000), EPS 1/RM/14
Test endpoint	48-h LC50
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride

3.0 RESULTS

Results of the *C. dubia* toxicity tests are shown in Table 4. Significant effects to survival and reproduction were observed in all four samples tested, with Adit and Camp exhibiting the greatest effects. There was complete mortality in most test concentrations and there was no reproduction in these two samples. The LC50, IC25 and IC50 were all <5% in Adit and Camp. Survival in BJ2 and BJ u/s of Camp ranged from 10 to 100% and the LC50 were 61.8 and 52.8%, respectively. The IC25 was <5% in these two samples, and the IC50 were 9.2 and 13.6% in BJ2 and BJ u/s of Camp, respectively.

Results of the 72-h *P. subcapitata* test are provided in Table 5. Stimulatory effects were observed on algal growth in all four samples. The cell density IC25 and IC50 values were all >95.2%. Percent stimulation in the samples ranged from 3 to 215%.

Results of the 48-h *D. magna* test are provided in Table 6. Effects to survival were observed in Adit from 12.5 to 100% test concentrations; survival in these concentrations ranged from 0 to 30% and the LC50 was 12.0%. No effects were observed in BJ2, Camp or BJ u/s of Camp with survival ranging from 80 to 100%. The LC50 was >100% in all three samples.

3.1 Quality Assurance/Quality Control

All the tests reported herein met the acceptability criteria for test validity specified in their respective protocols. Water quality parameters measured during the toxicity tests were within acceptable ranges and results of the reference toxicant tests conducted during the testing program were all within the in-house historical mean and range. The reference toxicant test results are summarized in Table 7.

Table 4. Toxicity test results for the *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	Adit		BJ2		Camp		BJ u/s of Camp	
	Survival (%)	Reproduction (mean ± SD)	Survival (%)	Reproduction (mean ± SD)	Survival (%)	Reproduction (mean ± SD)	Survival (%)	Reproduction (mean ± SD)
Control	100	16.6 ± 3.6	100	20.3 ± 5.0	100	17.5 ± 2.8	100	19.0 ± 2.5
5	0	0	100	14.4 ± 5.9	0	0	100	11.6 ± 2.8
10	0	0	100	9.5 ± 3.5	0	0	100	11.2 ± 2.0
20	0	0	60	4.7 ± 5.2	0	0	100	7.3 ± 2.5
40	0	0	80	4.2 ± 3.5	0	0	50	3.1 ± 4.1
60	0	0	70	4.2 ± 3.2	0	0	40	4.0 ± 4.7
80	10	0	30	1.3 ± 3.0	0	0	40	1.9 ± 2.9
100	0	0	30	1.0 ± 1.9	0	0	10	0.3 ± 0.9
Test endpoint (% v/v)								
LC50(95% CL)	<5	--	61.8 (41.3 - 100)	--	<5	--	52.8 (41.8 – 67.2)	--
IC25	--	<5	--	<5	--	<5	--	<5
IC50 (95% CL)	--	<5	--	9.2 (6.5 – 12.2)	--	<5	--	13.6 (10.6 – 16.4)

IC = Inhibition Concentration; SD = Standard Deviation; CL = Confidence Limits.

Table 5. Toxicity test results for the *Pseudokirchneriella subcapitata* growth inhibition test.

Concentration (% v/v)	Adit		BJ2		Camp		BJ u/s of Camp	
	Cell Density (x 10^4 cells/mL) (mean ± SD)	Stimulation (%)	Cell Density (x 10^4 cells/mL) (mean ± SD)	Stimulation (%)	Cell Density (x 10^4 cells/mL) (mean ± SD)	Stimulation (%)	Cell Density (x 10^4 cells/mL) (mean ± SD)	Stimulation (%)
Control	93.8 ± 5.9	0.0	59.8 ± 6.1	0.0	63.0 ± 4.8	0.0	89.2 ± 4.1	0.0
1.5	146.5 ± 18.5	56.3	71.5 ± 4.8	19.7	72.0 ± 5.4	14.3	85.5 ± 4.5	-4.2
3.0	170.0 ± 13.0	81.3	75.5 ± 5.1	26.4	88.5 ± 2.4	40.5	92.0 ± 3.9	3.1
5.9	198.0 ± 15.1	111.2	92.8 ± 8.8	55.2	95.2 ± 4.2	51.2	97.2 ± 5.5	9.0
11.9	238.3 ± 12.7	154.1	101.5 ± 5.4	69.9	118.8 ± 2.5	88.5	134.3 ± 4.9	50.4
23.8	295.3 ± 23.9	214.9	133.3 ± 5.7	123.0	123.0 ± 6.5	95.2	155.0 ± 6.8	73.7
47.6	292.8 ± 18.8	212.3	136.5 ± 8.6	128.5	130.3 ± 4.2	106.7	183.5 ± 4.9	105.6
95.2	259.8 ± 24.4	177.1	185.3 ± 8.5	210.1	144.8 ± 8.7	129.8	179.8 ± 3.5	101.4
Test endpoint (% v/v)								
IC25	>95.2	-	>95.2	-	>95.2	-	>95.2	-
IC50	>95.2	-	>95.2	-	>95.2	-	>95.2	-

IC = Inhibition Concentration; SD = Standard Deviation.

Table 6. Toxicity test results for the 48-h *Daphnia magna* LC50 test.

Concentration (% v/v)	%Survival			
	Adit	BJ2	Camp	BJ u/s of Camp
Control	100	100	100	100
6.25	90	100	90	90
12.5	30	90	100	100
25	20	100	100	100
50	0	90	80	90
100	0	80	80	100
Test endpoint (% v/v)				
LC50 (95% CL)	12.0 (8.0-17.6)	>100	>100	>100

LC = Lethal Concentration; CL = Confidence Limits.

Table 7. Reference toxicant test results.

Test Species	Endpoint	Historical Range Mean (2SD Range)	CV(%)	Date Setup
C.dubia	Survival (LC50): 2.0 g/L NaCl	1.9 (1.5 – 2.3)	11	September 6, 2012
	Reproduction (IC50): 1.7 g/L NaCl	1.3 (0.9 – 1.8)	20	
P. subcapitata	Growth (IC50): 24.3 µg/Zn	22.7 (12.4 – 41.4)	35	September 4, 2012
D. magna	Survival (LC50): 4.2 g/L NaCl	4.0 (3.6 – 4.4)	5	September 21, 2012

4.0 REFERENCES

Environment Canada. 2000. Biological test method: reference method for determining acute lethality of effluents to *Daphnia magna.* Environmental Protection Series. Report EPS 1/RM/14, Second Edition, December 2000. Environment Canada, Method Development and Application Section, Environmental Technology Centre, Ottawa, ON. 21 pp.

Environment Canada. 2007a. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. Report EPS 1/RM/21, Second Edition, February 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 74 pp.

Environment Canada. 2007b. Biological test method: growth inhibition test using the freshwater alga. Environmental Protection Series, Report EPS 1/RM/25. Second Edition, March 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 53 pp.

Tidepool Scientific Software. 2012. CETIS comprehensive environmental toxicity information system, version 1.8.4.29 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A – *Ceriodaphnia dubia* Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: Rescan
Work Order No.: 12426

Start Date/Time: September 12/12@ 1040h
Set up by: KLB

Test Validity Criteria:
1) Mean survival of first generation controls is ≥80 %
2) At least 60% of controls have produced three broods within 8 days
3) An average of ≥15 live young produced per surviving female in the control solutions during the first three broods.
4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:
T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Sample Information:

Sample ID: Adit
Sample Date: September 9/12
Date Received: September 11/12
Sample Volume: 7 X 1L

Test Organism Information:

Broodstock No.: 082912
Age of young (Day 0): <24-h (within 12-h)
Avg No. young in first 3 broods of previous 7 d: 29
Mortality (%) in previous 7 d: 12.5
Individual female # used ≥8 young on test day: 5,16,20,27,29,30,36,39

NaCl Reference Toxicant Results:

Reference Toxicant ID: Cd85
Stock Solution ID: 12Na01
Date Initiated: ~~####~~ US Sept 6/12

7-d LC50 (95% CL): 2.0 (1.7-2.4) g/L NaCL
7-d IC50 (95% CL): 1.7 (1.3-2.0) g/L NaCL

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9 (1.5-2.3) g/L NaCL CV (%): 11
7-d IC50 Reference Toxicant Mean and Historical Range: 1.3 (0.9-1.8) g/L NaCL CV (%): 20

Test Results:

	Survival	Reproduction
LC50 %(v/v) (95% CL)	<5	
IC25 %(v/v) (95% CL)		<5
IC50 %(v/v) (95% CL)		<5

Reviewed by: A. Tang
Date reviewed: November 22, 2012

Chronic Freshwater Toxicity Test
Initial and Final Water Quality Measurements

Client: Rescan
Sample ID: Adit
Work Order #: ~~12425~~ 12426 KLB

Start Date & Time: September 12 @ 1040h
Stop Date & Time: September 18 @ 1430h
Test Species: *Ceriodaphnia dubia*

Concentration control %(v/v)	Days 0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	
DO (mg/L)	8.0	7.9	8.0	7.5	8.0	7.2	7.8	7.3	7.7	6.7	7.8	6.5	8.0	
pH	8.3	7.9	8.2	7.6	8.1	7.7	8.0	7.7	7.9	7.4	7.9	7.4	8.0 KLB	
Cond. (µS/cm)	214	209		201		182		182		182		184		
Initials	EMM	EMM		EMM		^		~		EMM		EMM		

Concentration 5%	Days 0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.5	~~25.0~~								
DO (mg/L)	8.0	7.9	7.8	7.5	7.8									
pH	8.1	7.9	8.1	7.7	7.9									
Cond. (µS/cm)	229	226		217										
Initials	EMM	EMM		EMM										

Concentration 40%	Days 0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.5	25.0	25.0									
DO (mg/L)	7.9	7.8	7.7	7.5	7.9									
pH	8.0	7.9	8.1	7.8	7.9									
Cond. (µS/cm)	351	352		341										
Initials	EMM	EMM		EMM										

Concentration 100%	Days 0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	25.0	25.0	24.5	25.0	25.0	25.0	24.6	25.0	24.6	25.0	23.0	25.0	24.5	
DO (mg/L)	7.9	7.6	7.7	7.2	7.8	7.3	7.7	7.2	7.8	7.4	7.9	7.1	7.9	
pH	7.8	7.8	7.8	7.7	7.8	7.8	7.9	7.9	7.7	7.7	7.9	7.8	7.9 KLB	
Cond. (µS/cm)	541	539		540		526		530		549		542		
Initials	EMM	EMM		EMM		^		~		EMM		EMM		

	Control	100% (v/v)		
Hardness*	100	220		
Alkalinity*	88	106		

Analysts: EMM, KLB, AWD
Reviewed by: ART
Date reviewed: 22/12

* mg/L as CaCO3
WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L) ; pH = 6 to 8.5
Sample Description: light grey brown, turbid, fine ppt

Comments: **Broodboard Used:** 082912

Chronic Freshwater Toxicity Test
C. dubia Reproduction Data

Client: Rescan
Sample ID: Adit
Work Order: ~~12425~~ KLB 12426

Start Date & Time: September 12/13 @ 1040h
Stop Date & Time: September ~~14~~ EMM 18/12 @ 1430h
Set up by: KLB

Concentration: control

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KLB
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~
4	3	✓	3	3	✓	✓	4	3	3	3	~
5	6	7	6	8	4	4	9	7	6	6	EMM
6	8	10	9	9	7	8	✓	12	8	10	EMM
7											
8											
Total	17	17	18	20	11	12	13	22	17	19	EMM

Concentration: 5%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	X	X	X	X	X	X	X	X	KLB
3	X	X									~
4											
5											
6											
7											
8											
Total	0✓	0✓	0✓	0✓	0✓	0✓	0✓	0✓	0✓	0✓	KLB

Concentration: 10%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	X →										KLB KLB
3											
4											
5											
6											
7											
8											
Total	0✓	0✓	0✓	0✓	0✓	0✓	0✓	0✓	0✓	0✓	KLB

Concentration: 20%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	X →										KLB
3											
4											
5											
6											
7											
8											
Total	0✓	0✓	0✓	0✓	0✓	0✓	0✓	0✓	0✓	0✓	KLB

Concentration: 40%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	X →										KLB
3											
4											
5											
6											
7											
8											
Total	0✓	0✓	0✓	0✓	0✓	0✓	0✓	0✓	0✓	0✓	KLB

Concentration: 60%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	X →										KLB
3											
4											
5											
6											
7											
8											
Total	0✓	0✓	0✓	0✓	0✓	0✓	0✓	0✓	0✓	0✓	KLB

Concentration: 80%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	X	X	X	X	✓	X	✓	✓	X	X	KLB
3					✓		X	✓			~
4					X			✓			~
5								✓			EMM
6								✓			
7											
8											
Total	0✓	0✓	0✓	0✓	0✓	0✓	0✓	0	0✓	0✓	KLB

Concentration: 100%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	X	✓	X	X	X	X	X	X	X	KLB
3	✓		✓								~
4	✓		X								~
5	X										EMM
6											
7											
8											
Total	0✓	0✓	0✓	0✓	0✓	0✓	0✓	0✓	0✓	0✓	KLB

Concentration:

Days	A	B	C	D	E	F	G	H	I	J	Init
1											
2											
3											
4											
5											
6											
7											
8											
Total											

Notes: X = mortality.

Sample Description: light grey brown, turbid, fine ppt
Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: A. Tong

Date reviewed: November 22, 2012

Ceriodaphnia 7-d Survival and Reproduction Test — Nautilus Environmental

Analysis ID:	15-4023-1745	Endpoint:	6d Survival Rate	CETIS Version:	CETISv1.8.4
Analyzed:	25 Sep-12 16:14	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes
Batch ID:	02-4350-7444	Test Type:	Reproduction-Survival (7d)	Analyst:	Krysta Banack
Start Date:	12 Sep-12 10:40	Protocol:	EC/EPS 1/RM/21	Diluent:	20% Perrier Water
Ending Date:	18 Sep-12 14:30	Species:	Ceriodaphnia dubia	Brine:	
Duration:	6d 4h	Source:	In-House Culture	Age:	<24h
Sample ID:	14-9345-5590	Code:	590452E6	Client:	Rescan
Sample Date:	09 Sep-12	Material:	Water Sample	Project:	
Receive Date:	11 Sep-12	Source:	Rescan		
Sample Age:	~~83h~~ AT	Station:	Adit		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	960667	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	0.09539	0.09372	0.09889	1048	1011	1067
EC10	0.1999	0.1962	0.2076	500.3	481.8	509.6
EC15	0.3143	0.3083	0.327	318.1	305.8	324.3
EC20	0.4397	0.431	0.4582	227.4	218.2	232
EC25	0.577	0.5651	0.6024	173.3	166	177
EC40	1.073	1.048	1.126	93.22	88.78	95.45
EC50	1.487	1.449	1.568	67.25	63.79	68.99

<5% (UIV)

6d Survival Rate Summary — Calculated Variate(A/B)

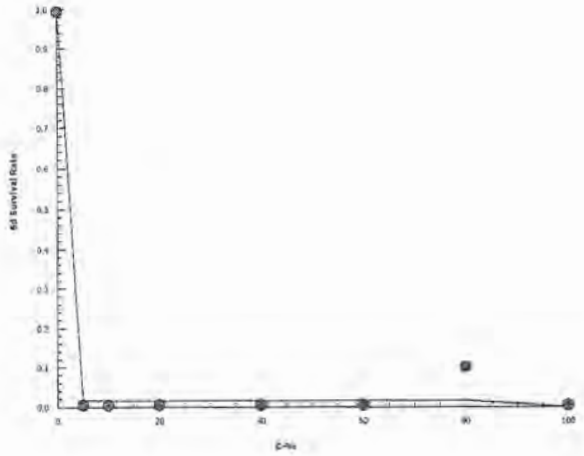
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
5		10	0	0	0	0	0		100.0%	0	10
10		10	0	0	0	0	0		100.0%	0	10
20		10	0	0	0	0	0		100.0%	0	10
40		10	0	0	0	0	0		100.0%	0	10
60		10	0	0	0	0	0		100.0%	0	10
80		10	0.1	0	1	0.1	0.3162	316.2%	90.0%	1	10
100		10	0	0	0	0	0		100.0%	0	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
5		0	0	0	0	0	0	0	0	0	0
10		0	0	0	0	0	0	0	0	0	0
20		0	0	0	0	0	0	0	0	0	0
40		0	0	0	0	0	0	0	0	0	0
60		0	0	0	0	0	0	0	0	0	0
80		0	0	0	0	0	0	0	1	0	0
100		0	0	0	0	0	0	0	0	0	0

Analysis ID:	15-4023-1745	**Endpoint:**	6d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	25 Sep-12 16:14	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Analytical Report

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

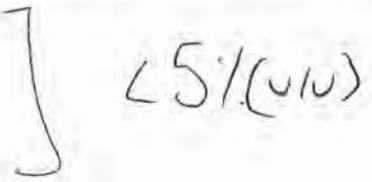
Analysis ID:	13-2362-7188	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.4
Analyzed:	25 Sep-12 16:14	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	02-4350-7444	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Krysta Banack
Start Date:	12 Sep-12 10:40	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	18 Sep-12 14:30	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	6d 4h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	14-9345-5590	**Code:**	590452E6	**Client:**	Rescan
Sample Date:	09 Sep-12	**Material:**	Water Sample	**Project:**	
Receive Date:	11 Sep-12	**Source:**	Rescan		
Sample Age:	~~83h~~ 84	**Station:**	Adit		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	691969	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.09372	0.09372	0.09372	1067	1067	1067
IC10	0.1962	0.1962	0.1962	509.6	509.6	509.6
IC15	0.3083	0.3083	0.3083	324.3	324.3	324.3
IC20	0.431	0.431	0.431	232	232	232
IC25	0.5651	0.5651	0.5651	177	177	177
IC40	1.048	1.048	1.048	95.45	95.45	95.45
IC50	1.449	1.449	1.449	68.99	68.99	68.99



Reproduction Summary — **Calculated Variate**

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	16.6	11	22	1.127	3.565	21.48%	0.0%
5		10	0	0	0	0	0		100.0%
10		10	0	0	0	0	0		100.0%
20		10	0	0	0	0	0		100.0%
40		10	0	0	0	0	0		100.0%
60		10	0	0	0	0	0		100.0%
80		10	0	0	0	0	0		100.0%
100		10	0	0	0	0	0		100.0%

Reproduction Detail

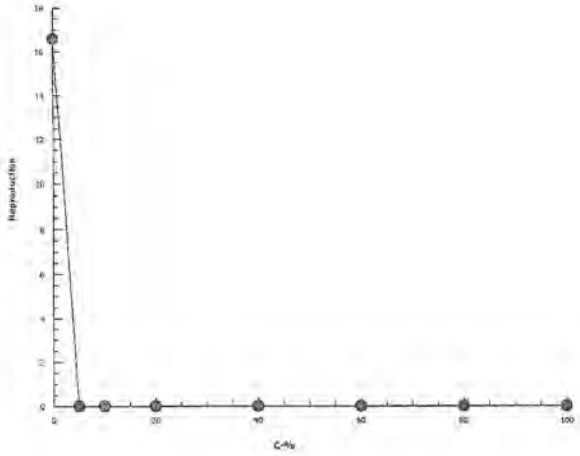
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	17	17	18	20	11	12	13	22	17	19
5		0	0	0	0	0	0	0	0	0	0
10		0	0	0	0	0	0	0	0	0	0
20		0	0	0	0	0	0	0	0	0	0
40		0	0	0	0	0	0	0	0	0	0
60		0	0	0	0	0	0	0	0	0	0
80		0	0	0	0	0	0	0	0	0	0
100		0	0	0	0	0	0	0	0	0	0

Analyst: _____ QA: KRT Nov 22/12

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	13-2362-7188	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.4
Analyzed:	25 Sep-12 16:14	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Ceriodaphnia dubia Summary Sheet

Client: Rescan
Work Order No.: 12426

Start Date/Time: September 12/12@ 1120h
Set up by: KLB

Test Validity Criteria:
1) Mean survival of first generation controls is ≥80 %
2) At least 60% of controls have produced three broods within 8 days
3) An average of ≥15 live young produced per surviving female in the control solutions during the first three broods.
4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:
T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Sample Information:

Sample ID: BJ2
Sample Date: September 9/12
Date Received: September 11/12
Sample Volume: 7 X 1L

Test Organism Information:

Broodstock No.: 082912
Age of young (Day 0): <24-h (within 12-h)
Avg No. young in first 3 broods of previous 7 d: 28
Mortality (%) in previous 7 d: 12.5
Individual female # used ≥8 young on test day: 2,4,15,17,24,34

NaCl Reference Toxicant Results:

Reference Toxicant ID: Cd85
Stock Solution ID: 12Na01
Date Initiated: ~~#### Sept 6/12~~

7-d LC50 (95% CL): 2.0 (1.7-2.4) g/L NaCl
7-d IC50 (95% CL): 1.7 (1.3-2.0) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9(1.5-2.3) g/L NaCl CV (%): 11
7-d IC50 Reference Toxicant Mean and Historical Range: 1.3(0.9-1.8) g/L NaCl CV (%): 20

Test Results:

	Survival	Reproduction
LC50 %(v/v) (95% CL)	61.8(41.3-100)	
IC25 %(v/v) (95% CL)		~~3.7(1.7-6.0)~~ <25
IC50 %(v/v) (95% CL)		9.2(6.5-12.2)

Reviewed by: A. Tang
Date reviewed: November 22, 2012

Chronic Freshwater Toxicity Test
Initial and Final Water Quality Measurements

Client: Rescan
Sample ID: BJ2
Work Order #: ~~12425~~ 12426 BUS

Start Date & Time: September 12 @ 1120h
Stop Date & Time: September 19 @ 1545h
Test Species: *Ceriodaphnia dubia*

Concentration	Days													
	0	1		2		3		4		5		6		7
control %(V/V)	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.5	24.0	25.0	24.0	25.0
DO (mg/L)	8.0	7.8	8.0	7.5	8.0	7.2	7.8	7.2	7.7	6.9	7.8	6.8	8.0	6.4
pH	8.3	7.8	8.2	7.6	8.1	7.7	8.0	7.6	7.9	7.4	7.9	7.3	8.0	7.4
Cond. (µS/cm)	214	Emm 205	209	201		182		182		182		184		192
Initials	Emm	Emm		Emm		~		~		Emm		Emm		Emm

Concentration	Days													
	0	1		2		3		4		5		6		7
5%	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	25.0	25.0	24.0	25.0	24.0	25.5	24.5	25.0	24.0	25.0
DO (mg/L)	7.9	7.8	7.8	7.5	8.0	7.2	7.8	7.3	7.8	6.5	7.8	6.8	7.9	6.7
pH	8.1	7.9	8.2	7.6	8.0	7.6	7.8	7.6	7.8	7.4	7.8	7.4	7.9	7.5
Cond. (µS/cm)	208	203		198		190		188		178		179		176
Initials	Emm	Emm		Emm		~		~		Emm		Emm		Emm

Concentration	Days													
	0	1		2		3		4		5		6		7
40%	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	25.0	25.0	25.0	25.0	25.0	25.0	24.5	25.0	24.5	25.5	24.5	25.0	24.5	25.0
DO (mg/L)	8.1	7.8	7.9	7.5	7.9	7.3	7.7	7.2	7.6	6.8	7.9	7.0	7.9	6.7
pH	8.0	7.8	8.1	7.6	7.9	7.5	7.6	7.6	7.7	7.2	7.7	7.4	7.7	7.4
Cond. (µS/cm)	162	158		155		150		146		144		144		142
Initials	Emm	Emm		Emm		~		~		Emm		Emm		Emm

Concentration	Days													
	0	1		2		3		4		5		6		7
100%	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	25.0	25.0	25.0	25.0	25.5	25.0	24.5	25.0	24.5	25.5	24.5	25.0	25.0	25.0
DO (mg/L)	8.0	7.9	7.8	7.5	7.7	7.3	7.6	7.3	7.5	6.2	8.2	7.0	8.1	6.4
pH	7.5	7.5	7.5	7.6	7.5	7.4	7.6	7.5	7.6	7.0	7.2	7.0	7.4	7.1
Cond. (µS/cm)	79	79		79		88		90		79		81		87
Initials	Emm	Emm		Emm		~		~		Emm		Emm		Emm

	Control	100% (v/v)		
Hardness*	100	30		
Alkalinity*	88	16		

Analysts: KLB, EMM, AWD
Reviewed by: AET
Date reviewed: NOV 22/12

* mg/L as CaCO3
WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L) ; pH = 6 to 8.5
Sample Description: slightly turbid, light brown ppt

Comments: Broodboard Used: 082912

Chronic Freshwater Toxicity Test
C. dubia Reproduction Data

Client: Rescan
Sample ID: BJ2
Work Order: ~~12425~~ 12426 KB

Start Date & Time: September 12th @ 1120h
Stop Date & Time: September 19/12 @ 1545h
Set up by: KB

Days	Concentration: control										
	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KB
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KB
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~
4	✓	✓	3	3	✓	✓	✓	✓	✓	✓	~
5	4	4	7	6	5	5	4	5	4	✓	KB
6	9	✓	✓	~~10~~	10	10	8	✓	8	5	Emm
7	12	10	11	13	12	10	9	8	9	9	Emm
8				22 KB							
Total	25	14	21	~~32~~ 22	27	25	21	13	21	14	Emm

Days	Concentration: 5%										
	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KB
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KB
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~
4	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	~
5	3	3	3	4	2	4	2	4	2		KB
6	7	6	8	✓	✓	6	8	6	7	8	Emm
7	✓	11	✓	6	6	10	12	✓	✓	12	Emm
8											
Total	10	20	11	10	10	18	24	8	11	22	Emm

Days	Concentration: 10%										
	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KB
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KB
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~
5	✓	Emm 3	2	2	2	2	✓	3	2	2	KB
6	4	5	✓	✓	✓	4	3	7	7	7	Emm
7	8	5	6	6	4	✓	8	8	✓	✓	Emm
8											
Total	12	8	8	8	6	6	11	18	9	9	Emm

Days	Concentration: 20%										
	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KB
2	X	✓	✓	✓	✓	✓	✓	X	✓	✓	KB
3											~
4		✓	X				X		✓	✓	~
5		✓		2	✓	✓			✓	✓	KB
6		2		✓	2	2			4	✓	Emm
7		8		6	6	6			9	✓	Emm
8											
Total	0X	10	0X	8	8	8	0X	0X	13	0	Emm

Days	Concentration: 40%										
	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KB
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KB
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~
4	✓	✓	✓	✓	✓	✓	✓	✓	X	X	~
5	✓	✓	✓	✓	✓	✓	✓	✓			KB
6	✓	✓	2	✓	2	2	✓	2			Emm
7	3	4	7	4	7	4	✓	5			Emm
8											
Total	3	4	9	4	9	6	0	7	0X	0X	Emm

Days	Concentration: 60%										
	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KB
2		✓	✓	X	✓	✓	✓	✓	✓	✓	KB
3											~
4		✓	X								~
5		✓			✓	✓	✓	✓		✓	KB
6		✓			2	2	✓	2		✓	Emm
7		4			4	7	4	4		5	Emm
8											
Total	4	0X	0X	6	9	4	6	0X	6	7	Emm

Days	Concentration: 80%										
	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	KB
2	✓	✓	✓	✓	✓	X	✓	X		X	KB
3		✓	✓	✓	✓		✓				~
4	✓	X	✓	X	✓		X				~
5	✓		✓		✓						KB
6	✓		✓		3						Emm
7	4		✓		6						
8											
Total	4	0X	0	0X	9	0X	0X	0X	0X	0X	Emm

Days	Concentration: 100%										
	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KB
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	KB
3	✓	✓	✓	✓	✓	✓	X	X	✓		~
4	✓	✓	X	X	X	✓			X		~
5	✓	✓				✓					KB
6	✓	2				✓					Emm
7	2	4				2					
8											
Total	2	6	0X	0X	0X	2	0X	0X	0X	0X	Emm

Days	Concentration:										
	A	B	C	D	E	F	G	H	I	J	Init
1											
2											
3											
4											
5											
6											
7											
8											
Total											

Notes: X = mortality.

Sample Description: slightly turbid, light brown ppt
Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: A. Tang

Date reviewed: November 22, 2012

Ceriodaphnia 7-d Survival and Reproduction Test — Nautilus Environmental

Analysis ID:	04-6235-8413	Endpoint:	7d Survival Rate	CETIS Version:	CETISv1.8.4
Analyzed:	25 Sep-12 16:41	Analysis:	Linear Regression (MLE)	Official Results:	Yes
Batch ID:	12-0212-5002	Test Type:	Reproduction-Survival (7d)	Analyst:	Krysta Banack
Start Date:	12 Sep-12 11:20	Protocol:	EC/EPS 1/RM/21	Diluent:	20% Perrier Water
Ending Date:	19 Sep-12 15:45	Species:	Ceriodaphnia dubia	Brine:	
Duration:	7d 4h	Source:	In-House Culture	Age:	<24h
Sample ID:	16-0293-4069	Code:	5F8AD535	Client:	Rescan
Sample Date:	09 Sep-12	Material:	Water Sample	Project:	
Receive Date:	11 Sep-12	Source:	Rescan		
Sample Age:	~~83h~~ 47	Station:	BJ2		

Linear Regression Options

Model Function	Threshold Option	Threshold	Optimized	Pooled	Het Corr	Weighted
Log-Angle [Asin(P^0.5)=A+B*log(X)]	Control Threshold	1E-07	No	Yes	No	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
12	-33.68	73.76	71.52	0.7047		0.7125				Lack of Fit Not Tested

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	10.39	2.426	18.19	9.626	5.498	41.23
EC10	14.11	4.354	22.96	7.086	4.356	22.97
EC15	17.97	6.834	27.89	5.563	3.586	14.63
EC20	22.17	9.975	33.46	4.51	2.988	10.03
EC25	26.84	13.84	40.16	3.726	2.49	7.228
EC40	44.83	29.13	75	2.231	1.333	3.433
EC50	61.78	41.27	124.6	1.619	0.8028	2.423

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Slope	0.7231	0.1847	0.3611	1.085	3.915	0.0078	Significant Parameter
Intercept	-0.5095	0.302	-1.101	0.08236	-1.687	0.1425	Non-Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	22.39548	22.39548	1	18.35	0.0052	Significant
Residual	7.322287	1.220381	6			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	7.322	12.59	0.2921	Non-Significant Heterogenity
	Likelihood Ratio GOF	7.238	12.59	0.2994	Non-Significant Heterogenity
Distribution	Shapiro-Wilk W Normality	0.9444	0.6805	0.6547	Normal Distribution
	Anderson-Darling A2 Normality	0.2627	2.492	0.7291	Normal Distribution

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
5		10	1	1	1	0	0	0.0%	0.0%	10	10
10		10	1	1	1	0	0	0.0%	0.0%	10	10
20		10	0.6	0	1	0.1633	0.5164	86.07%	40.0%	6	10
40		10	0.8	0	1	0.1333	0.4216	52.7%	20.0%	8	10
60		10	0.7	0	1	0.1528	0.483	69.01%	30.0%	7	10
80		10	0.3	0	1	0.1528	0.483	161.0%	70.0%	3	10
100		10	0.3	0	1	0.1528	0.483	161.0%	70.0%	3	10

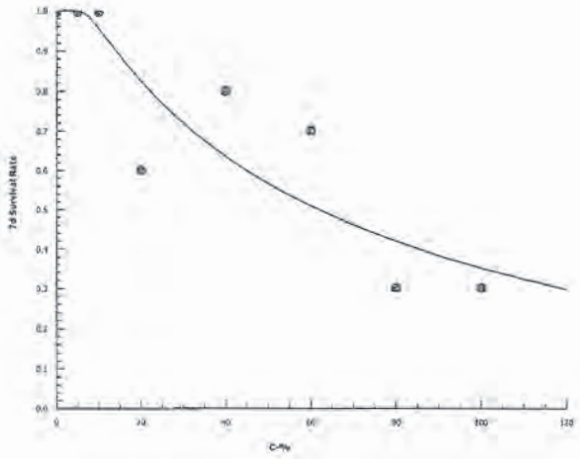
Ceriodaphnia 7-d Survival and Reproduction Test — Nautilus Environmental

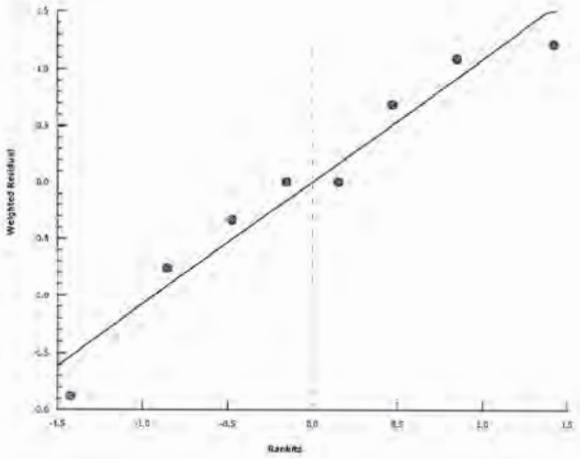
Analysis ID:	04-6235-8413	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	25 Sep-12 16:41	**Analysis:**	Linear Regression (MLE)	**Official Results:**	Yes

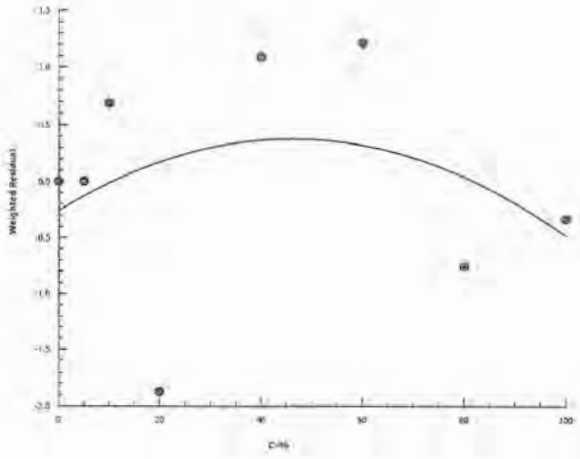
7d Survival Rate Detail

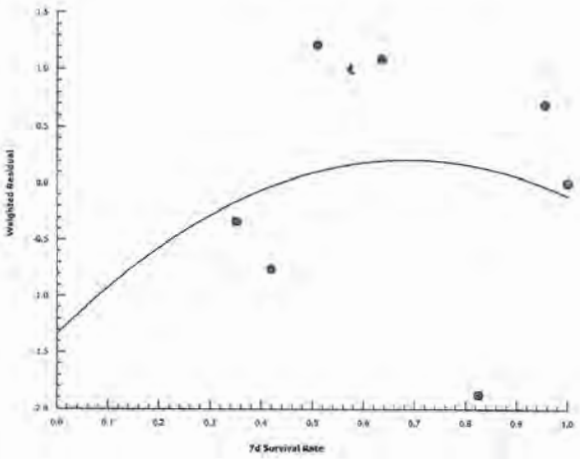
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
5		1	1	1	1	1	1	1	1	1	1
10		1	1	1	1	1	1	1	1	1	1
20		0	1	0	1	1	1	0	0	1	1
40		1	1	1	1	1	1	1	1	0	0
60		1	0	0	1	1	1	1	0	1	1
80		1	0	1	0	1	0	0	0	0	0
100		1	1	0	0	0	1	0	0	0	0

Graphics Log-Angle [Asin(P^0.5)=A+B*log(X)]









CETIS Analytical Report

Ceriodaphnia 7-d Survival and Reproduction Test — Nautilus Environmental

Analysis ID:	17-0916-7543	Endpoint:	Reproduction	CETIS Version:	CETISv1.8.4
Analyzed:	25 Sep-12 16:41	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes
Batch ID:	12-0212-5002	Test Type:	Reproduction-Survival (7d)	Analyst:	Krysta Banack
Start Date:	12 Sep-12 11:20	Protocol:	EC/EPS 1/RM/21	Diluent:	20% Perrier Water
Ending Date:	19 Sep-12 15:45	Species:	Ceriodaphnia dubia	Brine:	
Duration:	7d 4h	Source:	In-House Culture	Age:	<24h
Sample ID:	16-0293-4069	Code:	5F8AD535	Client:	Rescan
Sample Date:	09 Sep-12	Material:	Water Sample	Project:	
Receive Date:	11 Sep-12	Source:	Rescan		
Sample Age:	~~83h~~ 4r	Station:	BJ2		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	907714	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.361	0.2204	2.144	277	46.65	453.7
IC10	0.8524	0.4894	5.237	117.3	19.09	204.3
IC15	1.521	0.8176	5.794	65.74	17.26	122.3
IC20	2.431	1.218	6.396	41.13	15.63	82.08
IC25	3.67	1.707	6.985	27.25	14.32	58.58
IC40	6.896	3.921	9.455	14.5	10.58	25.51
IC50	9.15	6.512	12.18	10.93	8.21	15.36

Reproduction Summary — Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	20.3	13	27	1.585	5.012	24.69%	0.0%
5		10	14.4	8	24	1.875	5.929	41.18%	29.06%
10		10	9.5	6	18	1.118	3.536	37.22%	53.2%
20		10	4.7	0	13	1.633	5.165	109.9%	76.85%
40		10	4.2	0	9	1.114	3.521	83.84%	79.31%
60		10	4.2	0	9	1.02	3.225	76.78%	79.31%
80		10	1.3	0	9	0.9434	2.983	229.5%	93.6%
100		10	1	0	6	0.6146	1.944	194.4%	95.07%

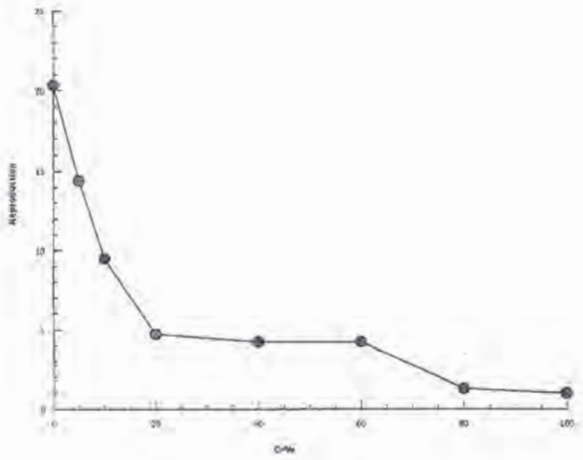
Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	25	14	21	22	27	25	21	13	21	14
5		10	20	11	10	10	18	24	8	11	22
10		12	8	8	8	6	6	11	18	9	9
20		0	10	0	8	8	8	0	0	13	0
40		3	4	9	4	9	6	0	7	0	0
60		4	0	0	6	9	4	6	0	6	7
80		4	0	0	0	9	0	0	0	0	0
100		2	6	0	0	0	2	0	0	0	0

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	17-0916-7543	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.4
Analyzed:	25 Sep-12 16:41	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Ceriodaphnia dubia Summary Sheet

Client: Rescan
Work Order No.: 12426

Start Date/Time: September 12/12@ 11:00h
Set up by: KLB

Test Validity Criteria:
1) Mean survival of first generation controls is ≥80 %
2) At least 60% of controls have produced three broods within 8 days
3) An average of ≥15 live young produced per surviving female in the control solutions during the first three broods.
4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:
T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Sample Information:

Sample ID: Camp
Sample Date: September 9/12
Date Received: September 11/12
Sample Volume: 7 X 1L

Test Organism Information:

Broodstock No.: 090412
Age of young (Day 0): <24-h (within 12-h)
Avg No. young in first 3 broods of previous 7 d: 16
Mortality (%) in previous 7 d: 5
Individual female # used ≥8 young on test day: 3, 4, 5, 6, 8, 11, 12, 14

NaCl Reference Toxicant Results:

Reference Toxicant ID: Cd85
Stock Solution ID: 12Na01
Date Initiated: ~~#####~~ 13Sept6112

7-d LC50 (95% CL): 2.0 (1.7-2.4) g/L NaCL
7-d IC50 (95% CL): 1.7 (1.3-2.0) g/L NaCL

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9 (1.5-2.3) g/L NaCL CV (%): 11
7-d IC50 Reference Toxicant Mean and Historical Range: 1.3 (0.9-1.8) g/L NaCL CV (%): 20

Test Results:

	Survival	Reproduction
LC50 %(v/v) (95% CL)	<5	
IC25 %(v/v) (95% CL)		<5
IC50 %(v/v) (95% CL)		<5

Reviewed by: A. Tang
Date reviewed: November 22, 2012

Chronic Freshwater Toxicity Test
Initial and Final Water Quality Measurements

Client: Rescan
Sample ID: Camp
Work Order #: ~~12425~~ 12426 PP

Start Date & Time: September 12@1100h
Stop Date & Time: September 19 @ 1600h
Test Species: *Ceriodaphnia dubia*

Concentration control %(v/v)	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	24.5	24.0	25.0	24.0	25.5	24.0	25.0	24.0 EMM	25.0
DO (mg/L)	8.0	7.8	8.0	7.5	8.0	7.2	7.8	7.2	7.7	6.5	7.8	EMM 6.5	8.0	6.7
pH	8.3	7.8	8.2	7.6	8.1	7.6	7.0	7.7	7.9	7.5	7.9	7.4	8.0	7.5
Cond. (µS/cm)	214	209		201		182		182		182		184		216
Initials	EMM	EMM		EMM		~		~		EMM		EMM		EMM

Concentration 5%	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	25.0									
DO (mg/L)	7.9	7.9	7.8	7.6	7.9									
pH	8.1	7.9	8.2	7.6	8.0									
Cond. (µS/cm)	208	205		197										
Initials	EMM	EMM		EMM		~		~						

Concentration 40%	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	25.0	25.0	25.0									
DO (mg/L)	8.0	7.8	7.8	7.2	7.9									
pH	8.0	7.7	8.0	7.5	7.8									
Cond. (µS/cm)	173	172		168										
Initials	EMM	EMM		EMM		~		~						

Concentration 100%	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	25.0	25.0	25.0	25.0	25.5									
DO (mg/L)	8.0	7.6	7.8	7.2	7.8									
pH	7.3	7.2	7.3	7.0	7.3									
Cond. (µS/cm)	111	113		113										
Initials	EMM	EMM		EMM		~		~						

	Control	100% (v/v)		
Hardness*	100	42		
Alkalinity*	88	7		

Analysts: EMM, KEB, AWD
Reviewed by: ART
Date reviewed: NOV 22/12

* mg/L as CaCO3
WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L) ; pH = 6 to 8.5
Sample Description: orange-brown, turbid, ppt present

Comments: **Broodboard Used:** 090412

Chronic Freshwater Toxicity Test
C. dubia Reproduction Data

Client: Rescan
Sample ID: Camp
Work Order: ~~12425~~ KB 12426

Start Date & Time: September 12/12 KB @1100h
Stop Date & Time: September 19/12 @ 1600h
Set up by: KB

Concentration: control

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KB
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~
4	3	3	✓	✓	3	✓	3	4	3	3	~
5	5	6	3	3	5	5	7	5	✓	6	KB
6	6	✓	5	5	EMM 11	6	✓	6	8	✓	EMM
7	✓	8	7	9	✓	7	11	✓	12	7	EMM
8											
Total	14	17	15	17	19	18	21	15	23	16	EMM

Concentration: 5%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	X	X	X	X	✓	EMM
3	X	X	+	+	+					+	~
4											~
5											
6											
7											
8											
Total	0	0	0	0	0	0	0	0	0	0	KB

Concentration: 10%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	X	✓	X	✓	X	✓	✓	X	X	✓	EMM
3		✓		✓		✓	✓			✓	~
4											~
5											
6											
7											
8											
Total	0	0	0	0	0	0	0	0	0	0	KB

Concentration: 20%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	X	X	X	X	X	X	✓	✓	✓	✓	EMM
3							X	+	+	+	~
4											~
5											
6											
7											
8											
Total	0	0	0	0	0	0	0	0	0	0	KB

Concentration: 40%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	X	X	✓	X	X	X	X	X	EMM
3	X	✓			X						~
4											~
5											
6											
7											
8											
Total	0	0	0	0	0	0	0	0	0	0	KB

Concentration: 60%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	X	✓	✓	✓	X	X	✓	X	EMM
3	X	X		X	X	X			X		~
4											~
5											
6											
7											
8											
Total	0	0	0	0	0	0	0	0	0	0	KB

Concentration: 80%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	X	✓	X	EMM
2	X	X	✓	X	X	✓	X		✓		EMM
3			+			+			+		~
4											
5											
6											
7											
8											
Total	0	0	0	0	0	0	0	0	0	0	KB

Concentration: 100%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	X	✓	X	✓	X	✓	X	X	X	KB
3	+		+		R		+				~
4											
5											
6											
7											
8											
Total	0	0	0	0	0	0	0	0	0	0	KB

Concentration:

Days	A	B	C	D	E	F	G	H	I	J	Init
1											
2											
3											
4											
5											
6											
7											
8											
Total											

Notes: X = mortality.

Sample Description: orange-brown, turbid, ppt present
Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: A. Tong
Date reviewed: November 22, 2012

Version 2.1 Issued July 29, 2009

Nautilus Environmental

CETIS Analytical Report

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	00-5195-8754	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	25 Sep-12 16:46	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	07-3482-4633	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Krysta Banack
Start Date:	12 Sep-12 11:00	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	19 Sep-12 16:00	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	7d 5h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	11-1820-5542	**Code:**	42A67666	**Client:**	Rescan
Sample Date:	09 Sep-12	**Material:**	Water Sample	**Project:**	
Receive Date:	11 Sep-12	**Source:**	Rescan		
Sample Age:	~~88h~~ 4r	**Station:**	Camp		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1268996	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	0.09372	0.09372	0.09372	1067	1067	1067
EC10	0.1962	0.1962	0.1962	509.6	509.6	509.6
EC15	0.3083	0.3083	0.3083	324.3	324.3	324.3
EC20	0.431	0.431	0.431	232	232	232
EC25	0.5651	0.5651	0.5651	177	177	177
EC40	1.048	1.048	1.048	95.45	95.45	95.45
EC50	1.449	1.449	1.449	68.99	68.99	68.99

LS1 (UIU)

7d Survival Rate Summary — **Calculated Variate(A/B)**

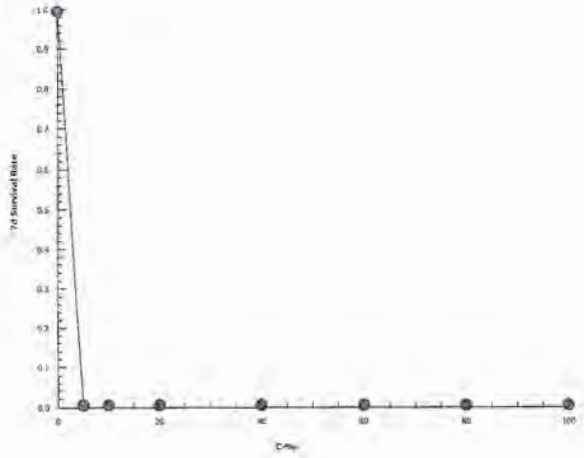
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
5		10	0	0	0	0	0		100.0%	0	10
10		10	0	0	0	0	0		100.0%	0	10
20		10	0	0	0	0	0		100.0%	0	10
40		10	0	0	0	0	0		100.0%	0	10
60		10	0	0	0	0	0		100.0%	0	10
80		10	0	0	0	0	0		100.0%	0	10
100		10	0	0	0	0	0		100.0%	0	10

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
5		0	0	0	0	0	0	0	0	0	0
10		0	0	0	0	0	0	0	0	0	0
20		0	0	0	0	0	0	0	0	0	0
40		0	0	0	0	0	0	0	0	0	0
60		0	0	0	0	0	0	0	0	0	0
80		0	0	0	0	0	0	0	0	0	0
100		0	0	0	0	0	0	0	0	0	0

Analysis ID:	00-5195-8754	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	25 Sep-12 16:46	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Analytical Report

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

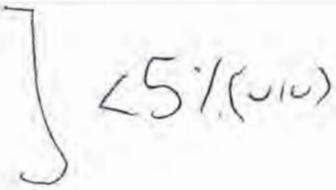
Analysis ID:	15-2912-0932	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.4
Analyzed:	25 Sep-12 16:46	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	07-3482-4633	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Krysta Banack
Start Date:	12 Sep-12 11:00	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	19 Sep-12 16:00	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	7d 5h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	11-1820-5542	**Code:**	42A67666	**Client:**	Rescan
Sample Date:	09 Sep-12	**Material:**	Water Sample	**Project:**	
Receive Date:	11 Sep-12	**Source:**	Rescan		
Sample Age:	~~83h~~ LT	**Station:**	Camp		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	751360	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.09372	0.09372	0.09372	1067	1067	1067
IC10	0.1962	0.1962	0.1962	509.6	509.6	509.6
IC15	0.3083	0.3083	0.3083	324.3	324.3	324.3
IC20	0.431	0.431	0.431	232	232	232
IC25	0.5651	0.5651	0.5651	177	177	177
IC40	1.048	1.048	1.048	95.45	95.45	95.45
IC50	1.449	1.449	1.449	68.99	68.99	68.99



Reproduction Summary — **Calculated Variate**

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	17.5	14	23	0.8975	2.838	16.22%	0.0%
5		10	0	0	0	0	0		100.0%
10		10	0	0	0	0	0		100.0%
20		10	0	0	0	0	0		100.0%
40		10	0	0	0	0	0		100.0%
60		10	0	0	0	0	0		100.0%
80		10	0	0	0	0	0		100.0%
100		10	0	0	0	0	0		100.0%

Reproduction Detail

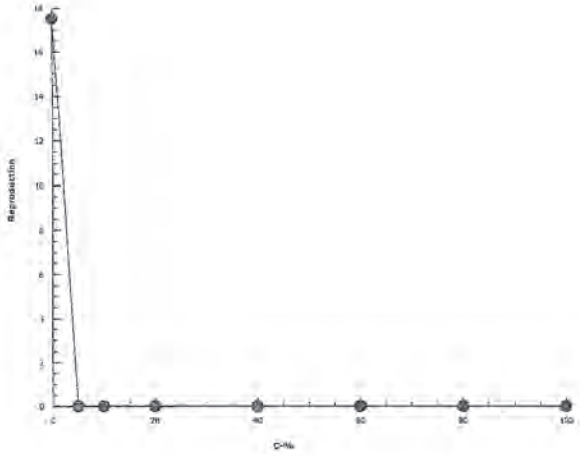
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	14	17	15	17	19	18	21	15	23	16
5		0	0	0	0	0	0	0	0	0	0
10		0	0	0	0	0	0	0	0	0	0
20		0	0	0	0	0	0	0	0	0	0
40		0	0	0	0	0	0	0	0	0	0
60		0	0	0	0	0	0	0	0	0	0
80		0	0	0	0	0	0	0	0	0	0
100		0	0	0	0	0	0	0	0	0	0

Analyst:_____ QA: LRT Nov 27/12

Ceriodaphnia 7-d Survival and Reproduction Test **Nautilus Environmental**

Analysis ID:	15-2912-0932	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.4
Analyzed:	25 Sep-12 16:46	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Ceriodaphnia dubia Summary Sheet

Client: Rescan
Work Order No.: 12426

Start Date/Time: September 12/12@ 1015h
Set up by: KLB

Test Validity Criteria:
1) Mean survival of first generation controls is ≥80 %
2) At least 60% of controls have produced three broods within 8 days
3) An average of ≥15 live young produced per surviving female in the control solutions during the first three broods.
4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:
T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Sample Information:

Sample ID: BJ u/s of camp
Sample Date: September 9/12
Date Received: September 11/12
Sample Volume: 7 X 1L

Test Organism Information:

Broodstock No.: 082912
Age of young (Day 0): <24-h (within 12-h)
Avg No. young in first 3 broods of previous 7 d: 27
Mortality (%) in previous 7 d: 12.5
Individual female # used ≥8 young on test day: 3, 6, 9, 10, 21, 25, 26

NaCl Reference Toxicant Results:

Reference Toxicant ID: Cd85
Stock Solution ID: 12Na01
Date Initiated: ~~#####~~ KLB Sept 6/12

7-d LC50 (95% CL): 2.0 (1.7-2.4) g/L NaCL
7-d IC50 (95% CL): 1.7 (1.3-2.0) g/L NaCL

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9 (1.5-2.3) g/L NaCL CV (%): 11
7-d IC50 Reference Toxicant Mean and Historical Range: 1.3 (0.9-1.8) g/L NaCL CV (%): 20

Test Results:

	Survival	Reproduction
LC50 %(v/v) (95% CL)	52.8 (41.8-67.2)	
IC25 %(v/v) (95% CL)		<5
IC50 %(v/v) (95% CL)		13.6 (10.6-16.4)

Reviewed by: A. Tang
Date reviewed: November 22, 2012

Chronic Freshwater Toxicity Test
Initial and Final Water Quality Measurements

Client: Rescan
Sample ID: BJ u/s of camp
Work Order #: ~~12425~~ 12426 pw

Start Date & Time: September 12@ 1015h
Stop Date & Time: September 18 @ 1510h
Test Species: *Ceriodaphnia dubia*

Concentration control % (v/v)	Days 0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.2	25.2	24.2	25.0	24.0	25.0	24.0	
DO (mg/L)	8.0	7.9	8.0	7.7	8.0	7.2	7.8	7.2	7.7	7.1	7.8	6.5	8.0	
pH	8.3	8.0	8.2	7.7	8.1	7.7	8.2	7.6	7.9	7.4	7.9	7.3	8.0	
Cond. (µS/cm)	214	209		209		182		182		182		184		
Initials	Emm	Emm		Emm		~		~		Emm		Emm		

Concentration 5%	Days 0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	25.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	
DO (mg/L)	7.9	7.9	7.9	7.7	8.0	7.8	7.6	7.2	7.7	6.8	7.9	6.5	7.9	
pH	8.1	8.0	8.0	7.7	7.9	7.7	7.7	7.7	7.6	7.4	7.8	7.4	7.9	
Cond. (µS/cm)	207	203		194		175		166		176		179		
Initials	Emm	Emm		Emm		~		~		Emm		Emm		

Concentration 40%	Days 0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	25.0	25.0	24.5	25.0	25.0	25.0	24.5	25.0	24.0	25.0	24.0	25.0	24.5	
DO (mg/L)	~~15~~ 8.0 Emm	7.8	7.9	7.7	8.0	7.9	7.7	7.1	7.7	6.9	8.0	6.5	7.9	
pH	8.0	7.9	8.1	7.6	7.9	7.7	7.6	7.7	7.5	7.4	7.7	7.4	7.8	
Cond. (µS/cm)	153	150		144		128		130		132		139		
Initials	Emm	Emm		Emm		~		~		Emm		Emm		

Concentration 100%	Days 0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	25.0	25.0	24.5	25.0	25.0	25.0	24.5	25.0	24.5	25.0	24.5	25.0	24.5	
DO (mg/L)	8.0	7.9	8.0	7.7	8.0	7.3	7.7	7.2	7.6	7.6	8.2	7.1	8.0	
pH	7.3	7.5	7.4	7.3	7.4	7.5	7.5	7.6	7.4	7.2	7.3	7.3	7.3	
Cond. (µS/cm)	54	52		52		53		52		53		53		
Initials	Emm	Emm		Emm		~		~		Emm		Emm		

	Control	100% (v/v)		
Hardness*	100	24		
Alkalinity*	88	14		

* mg/L as CaCO3

Analysts: EMM, RLB, AWD
Reviewed by: AET
Date reviewed: NOV 22/12

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L) ; pH = 6 to 8.5

Sample Description: clear

Comments: **Broodboard Used:** 082912

Chronic Freshwater Toxicity Test
C. dubia Reproduction Data

Client: Rescan
Sample ID: BJ u/s of camp
Work Order: ~~12425~~ 12426

Start Date & Time: September 12/12 1015h
Stop Date & Time: September 18/12 1510h
Set up by: KLB

Concentration: control

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~
4	3	3	3	3	4	2	3	3	3	3	^
5	7	6	9	6	10	6	7	7	7	8	EMM
6	9	11	11	11	✓	8	9	8	11	9	EMM
7											
8											
Total	19	20	23	20	14	16	19	18	21	20	EMM

Concentration: 5%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	^
4	3	3	✓	3	4	✓	4	3	3	✓	^
5	✓	EMM 18	4	9	EMM 258	EMM 23	5	4	8	2	EMM
6	6	✓	8	✓	✓	6	8	8	✓	6	EMM
7											
8											
Total	9	11	12	12	12	9	17	15	11	8	EMM

Concentration: 10%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	^
4	✓	3	3	✓	4	✓	✓	3	✓	✓	^
5	3	3	✓	4	EMM 17	4	4	4	4	3	EMM
6	7	7	5	5	✓	8	8	8	8	7	EMM
7											
8											
Total	10	13	8	9	11	12/8	12	15	12	10	EMM

Concentration: 20%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~
4	✓	✓	✓	2	✓	4	✓	✓	✓	✓	~
5	3	3	EMM 3	3	3	7	2	2	3	3	EMM
6	6	7	6	4	5	✓	3	3	✓	4	EMM
7											
8											
Total	9	10	9	6	8	11	5	5	3	7	EMM

Concentration: 40%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	EMM
2	–	✓	✓	|	✓	✓	✓	✓	✓	✓	EMM
3	✓	✓	✓	|	✓	✓	✓	✓	✓	✓	~
4	X	✓	3	|	✓	✓	✓	X	X	X	~
5	|	✓	✓	|	2	3	3	|	|	|	
6	|	✓	5	|	4	6	5	|	|	|	
7											
8											
Total	3X	0	8	0X	6	9	8	0X	0X	0X	EMM

Concentration: 60%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	X	✓	X	✓	✓	✓	✓	✓	✓	X	EMM
3	|	✓	|	X	✓	✓	✓	✓	✓	|	~
4	|	EMM	|	|	✓	✓	✓	X	3X	|	~
5	|	5	|	|	3	2	3	|	|	|	EMM
6	|	6	|	|	6	5	7	|	|	|	
7											
8											
Total	0X	11	0X	0X	9	7	10	0X	3X	0X	EMM

Concentration: 80%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	X	✓	✓	✓	✓	X	✓	✓	X	X	EMM
3	|	✓	✓	✓	✓	|	✓	✓	EMM	EMM	~
4	|	3	✓	✓	✓	|	X	X	|	|	~
5	|	~~EMM~~ 2	✓	✓	|	|	|	|	|	|	
6	|	4	5	2	3	|	|	|	|	|	
7											
8											
Total	0X	7	7	2	3	0X	0X	0X	0X	0X	EMM

Concentration: 100%

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	X	X	✓	X	✓	✓	✓	✓	✓	EMM
3	X	|	|	✓	|	X	✓	X	X	✓	~
4	|	|	|	X	|	|	✓	|	|	X	^
5	|	|	|	|	|	|	EMM	|	|	|	EMM
6	|	|	|	|	|	|	3	|	|	|	EMM
7											
8											
Total	0X	0X	0X	0X	0X	0X	3	0X	0X	0X	EMM

Concentration:

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2											
3											
4											
5											
6											
7											
8											
Total											

Notes: X = mortality.

Sample Description: Clear
Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: A. Tong
Date reviewed: November 22, 2012

Ceriodaphnia 7-d Survival and Reproduction Test — Nautilus Environmental

Analysis ID:	14-1943-4147	Endpoint:	6d Survival Rate	CETIS Version:	CETISv1.8.4
Analyzed:	25 Sep-12 16:54	Analysis:	Linear Regression (MLE)	Official Results:	Yes
Batch ID:	10-1383-7876	Test Type:	Reproduction-Survival (7d)	Analyst:	Krysta Banack
Start Date:	12 Sep-12 10:15	Protocol:	EC/EPS 1/RM/21	Diluent:	20% Perrier Water
Ending Date:	18 Sep-12 15:10	Species:	Ceriodaphnia dubia	Brine:	
Duration:	6d 5h	Source:	In-House Culture	Age:	<24h
Sample ID:	21-2539-4090	Code:	7EAEF0AA	Client:	Rescan
Sample Date:	09 Sep-12	Material:	Water Sample	Project:	
Receive Date:	11 Sep-12	Source:	Rescan		
Sample Age:	~~82h~~ 4T	Station:	BJ u/s of Camp		

Linear Regression Options

Model Function	Threshold Option	Threshold	Optimized	Pooled	Het Corr	Weighted
Log-Angle [Asin(P^0.5)=A+B*log(X)]	Control Threshold	1E-07	No	Yes	No	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
15	-25.19	56.78	54.54	1.183		0.918				Lack of Fit Not Tested

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	21.77	11.78	29.66	4.593	3.372	8.491
EC10	25.36	14.92	33.48	3.944	2.986	6.701
EC15	28.6	17.94	36.96	3.497	2.706	5.575
EC20	31.75	20.98	40.38	3.15	2.477	4.766
EC25	34.91	24.12	43.9	2.865	2.278	4.145
EC40	45.05	34.31	56.21	2.22	1.779	2.915
EC50	52.83	41.75	67.19	1.893	1.488	2.395

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Slope	1.454	0.2864	0.893	2.016	5.078	0.0023	Significant Parameter
Intercept	-1.72	0.4968	-2.694	-0.7466	-3.463	0.0134	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	39.62571	39.62571	1	79.37	0.0001	Significant
Residual	2.99537	0.499228	6			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	2.995	12.59	0.8094	Non-Significant Heterogenity
	Likelihood Ratio GOF	3.098	12.59	0.7964	Non-Significant Heterogenity
Distribution	Shapiro-Wilk W Normality	0.937	0.6805	0.5814	Normal Distribution
	Anderson-Darling A2 Normality	0.4372	2.492	0.3006	Normal Distribution

6d Survival Rate Summary

Calculated Variate(A/B)

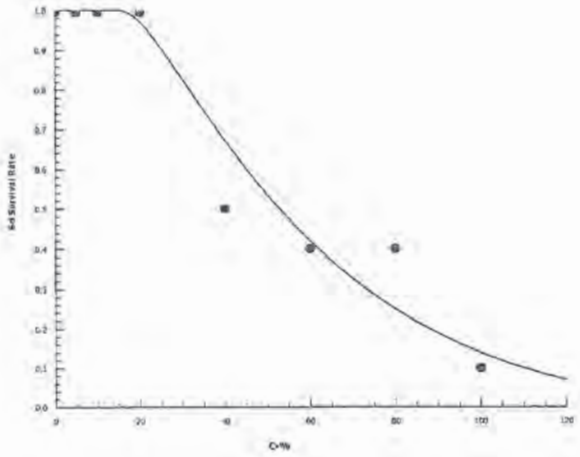
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
5		10	1	1	1	0	0	0.0%	0.0%	10	10
10		10	1	1	1	0	0	0.0%	0.0%	10	10
20		10	1	1	1	0	0	0.0%	0.0%	10	10
40		10	0.5	0	1	0.1667	0.527	105.4%	50.0%	5	10
60		10	0.4	0	1	0.1633	0.5164	129.1%	60.0%	4	10
80		10	0.4	0	1	0.1633	0.5164	129.1%	60.0%	4	10
100		10	0.1	0	1	0.1	0.3162	316.2%	90.0%	1	10

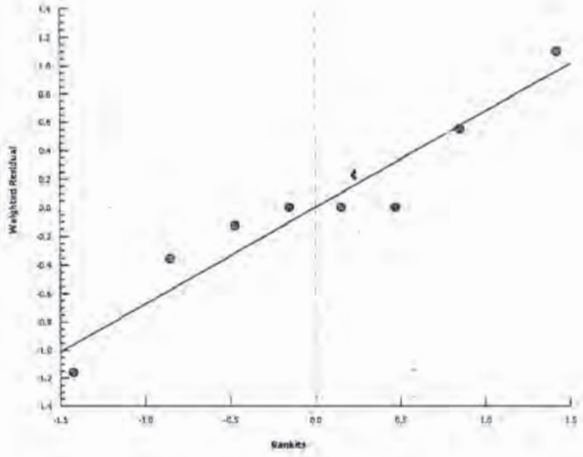
Analysis ID:	14-1943-4147	**Endpoint:**	6d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	25 Sep-12 16:54	**Analysis:**	Linear Regression (MLE)	**Official Results:**	Yes

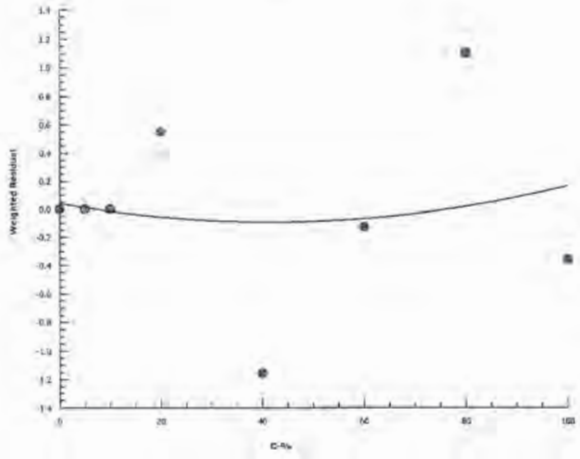
6d Survival Rate Detail

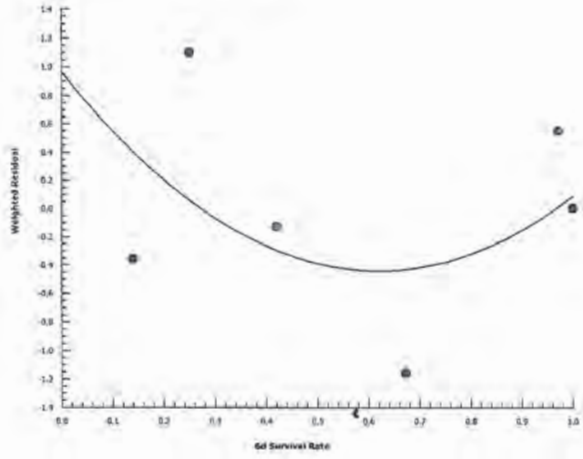
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
5		1	1	1	1	1	1	1	1	1	1
10		1	1	1	1	1	1	1	1	1	1
20		1	1	1	1	1	1	1	1	1	1
40		0	1	1	0	1	1	1	0	0	0
60		0	1	0	0	1	1	1	0	0	0
80		0	1	1	1	1	0	0	0	0	0
100		0	0	0	0	0	0	1	0	0	0

Graphics Log-Angle [Asin(P^0.5)=A+B*log(X)]









Ceriodaphnia 7-d Survival and Reproduction Test — Nautilus Environmental

Analysis ID:	17-7835-6994	Endpoint:	Reproduction	CETIS Version:	CETISv1.8.4
Analyzed:	25 Sep-12 16:54	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes
Batch ID:	10-1383-7876	Test Type:	Reproduction-Survival (7d)	Analyst:	Krysta Banack
Start Date:	12 Sep-12 10:15	Protocol:	EC/EPS 1/RM/21	Diluent:	20% Perrier Water
Ending Date:	18 Sep-12 15:10	Species:	Ceriodaphnia dubia	Brine:	
Duration:	6d 5h	Source:	In-House Culture	Age:	<24h
Sample ID:	21-2539-4090	Code:	7EAEF0AA	Client:	Rescan
Sample Date:	09 Sep-12	Material:	Water Sample	Project:	
Receive Date:	11 Sep-12	Source:	Rescan		
Sample Age:	~~82h~~	Station:	BJ u/s of Camp		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1928177	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.2586	0.2121	0.3986	386.7	250.9	471.4
IC10	0.5841	0.4693	0.9561	171.2	104.6	213.1
IC15	0.9939	0.7809	1.736	100.6	57.61	128.1
IC20	1.51	1.159	2.826	66.25	35.38	86.3
IC25	2.159	1.617	4.352	46.33	22.98	61.86
IC40	7.124	3.66	11.62	14.04	8.605	27.32
IC50	13.58	10.63	16.35	7.363	6.117	9.41

Reproduction Summary — Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	19	14	23	0.8028	2.539	13.36%	0.0%
5		10	11.6	8	17	0.8718	2.757	23.77%	38.95%
10		10	11.2	8	15	0.6464	2.044	18.25%	41.05%
20		10	7.3	3	11	0.8035	2.541	34.81%	61.58%
40		10	3.1	0	9	1.286	4.067	131.2%	83.68%
60		10	4	0	11	1.491	4.714	117.9%	78.95%
80		10	1.9	0	7	0.9123	2.885	151.8%	90.0%
100		10	0.3	0	3	0.3	0.9487	316.2%	98.42%

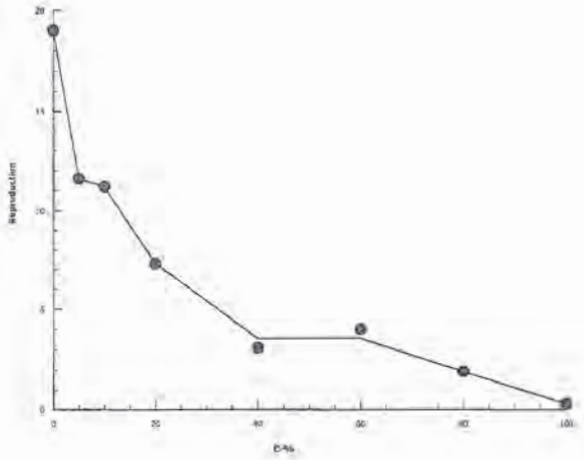
Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	19	20	23	20	14	16	19	18	21	20
5		9	11	12	12	12	9	17	15	11	8
10		10	13	8	9	11	12	12	15	12	10
20		9	10	9	6	8	11	5	5	3	7
40		0	0	8	0	6	9	8	0	0	0
60		0	11	0	0	9	7	10	0	3	0
80		0	7	7	2	3	0	0	0	0	0
100		0	0	0	0	0	0	3	0	0	0

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	17-7835-6994	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.4
Analyzed:	25 Sep-12 16:54	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Client: Rescan

W.O.#: 12427/12426

Hardness and Alkalinity Datasheet

	Alkalinity						Hardness			
Sample ID	Sample Date	Sample Volume (mL)	(mL) 0.02N HCL/H_2SO_4 used to pH 4.5	(mL) of 0.02N HCL/H_2SO_4 used to pH 4.2	Total Alkalinity ($mg/LCaCO_3$)		Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness ($mg/L\ CaCO_3$)	Technician
BJ u/s of camp	Sept 13/12	50	0.8	0.9	14		50	1.2	24	JW
Hardness Adjusted BJ u/s of camp	↓	50	1.3	1.4	24		100	3.0	30	KLB
camp	↓	JW / 100	0.9	1.1	7		50 10① JW	2.1	42	JW
BJ 2	↓	JW / 50	0.9	1.0	16		50	1.5	30	JW
Adit	↓	↓	5.5	5.7	106		10①	2.2	220	JW
MHW	↓	↓	3.5	3.6	68		50	5.0	100	JW
20% Perrier	Sept 12/12	50	4.5	4.6	88		50	5.0	100	KLB

Notes: ① Diluted to 100 mL w/ DI H_2O.

Reviewed by: A. Tong

Date Reviewed: November 22, 2012

APPENDIX B - *Pseudokirchneriella subcapitata* Toxicity Test Data

Pseudokirchneriella subcapitata Summary Sheet

Client: Rescan
Work Order No.: 12424

Start Date: Sept. 11, 2012
Set up by: ECC

Sample Information:

Sample ID: **Adit**
Sample Date: September 9, 2012
Date Received: September 11, 2012
Sample Volume: 7 L

Test Organism Information:

Culture Date: September 7, 2012
Age of culture (Day 0): ~~5~~ 4 d

Zinc Reference Toxicant Results:

Reference Toxicant ID: SC88
Stock Solution ID: 12Zn01
Date Initiated: Sept. 4, 2012

72-h IC50 (95% CL): 24.3 (22.6 - 26.2) µg/L Zn

72-h IC50 Reference Toxicant Mean and Range: 22.7, 12.4 - 41.4 µg/L Zn CV (%): 35%

Test Results:

	Algal Growth
IC25 %(v/v) (95% CL)	>95.2
IC50 %(v/v) (95% CL)	>95.2

Reviewed by: A. Tang

Date reviewed: November 22, 2012

72-h Algal Growth Inhibition Toxicity Test
Water Quality Measurements

Client: RESCAN ENVIRONMENTAL Setup by: EEC JGh

Sample ID: Adit Test Date/Time: Sep. 11/12 @ 1500h

Work Order No.: 12424 Test Species: *Pseudokirchneriella subcapitata*

Culture Date: Sep. 7, 2012 Age of Culture: 4d Culture Health: Good

Culture Count: 1 118 2 123 Average: 120.5 Culture Cell Density (c1): 120.5×10^4

$$v1 = \frac{220{,}000 \text{ cells/ml} \times 50 \text{ ml}}{(c1)\ 120.5 \times 10^4 \text{ cells/ml}} = 9.13 \text{ mL}$$

Time Zero Counts: 1 22 2 22 Average: 22×10^4

No. of Cells/mL: 22×10^4 Initial Density: # cells/mL ÷ 220 µL x 10 µL = 10,000 Cells/mL

Concentration	Water Quality Measurements					Microplates rotated 2X per day?			
	pH	Temp (°C)							
% (v/v)	0 h	0 h	24 h	48 h	72 h	0 h	24 h	48 h	72 h
Lab Control	6-8	25.0	24.5	25.0	25.0	✓	✓	✓	✓
1.5	6-8	25.0	24.5		25.0	✓	✓	✓	✓
3.0	6-8	25.0	24.5		25.0	✓	✓	✓	✓
5.9	7-0	25.0	24.5		25.0	✓	✓	✓	✓
11.9	7.2 10%	25.0	24.5		25.0	✓	✓	✓	✓
23.8	7.52 10%	25.0	24.5		25.0	✓	✓	✓	✓
47.6	7.5	25.0	24.5		25.0	✓	✓	✓	✓
95.2	7.8	25.0	24.5		25.0	✓	✓	✓	✓
Initials	JGh	JGh			JGh	JGh			JGh

Initial control pH: Well 1: 6.8 Well 2: 6.8

Final control pH: Well 1: 6.5 Well 2: 6.5

Light intensity (lux): 3640 Date measured: Sep. 11, 2012

Sample Description: turbid sample

Comments:

Reviewed: A. Tang Date reviewed: November 22, 2012

Pseudokirchneriella subcapitata Toxicity Test Data Sheet
72-h Algal Cell Counts

Client: Rescan Environm. Start Date/Time: Sept. 11, 2012 / 1500 h
Work Order #: 12424 Termination Date: Sept. 14, 2012 / 1500 h
Sample ID: Adit Test set up by: ~~ECC~~ JGL
%(v/v)

Concentration	Rep	Count 1	Count 2	Count 3	Count 4	Comments	Initials
Lab Control	A	95					
	B	93					
	C	85	82				
	D	96					
	E	99					
	F	92					
	G	103					
	H	97					
1.5	A	121	126				
	B	146					
	C	167					
	D	154					
3.0	A	178					
	B	165					
	C	185					
	D	156					
5.9	A	198					
	B	176	183				
	C	215					
	D	209					
11.9	A	226					
	B	248					
	C	231					
	D	252					
23.8	A	296					
	B	258	271				
	C	301					
	D	323					
47.6	A	315					
	B	304					
	C	280					
	D	276					
95.2	A	243					
	B	236					
	C	274					
	D	288					

Comments:

Reviewed by: A. Tang Date Reviewed: November 22, 2012

Pseudokirchneriella subcapitata Algal Counts

Client:	Rescan Environmental	Start Date/Time:	11-Sep-12 @ 15:00 h		
WO#:	12424	Termination Date:	14-Sep-12 @ 15:00 h		
Sample ID:	Adit				
		Initial Cell Density:	10000 cell/mL		220000
					0.22
					0.01

Concentration % v/v	Rep	Count 1 (x 10^4)	Count 2 (x 10^4)	Count 3 (x 10^4)	Count 4 (x 10^4)	Mean (x 10^4)	Cell Yield (x 10^4) cell/mL		10000
Control	A	95				95	94.0	mean	93.8
	B	93				93	92.0	SD	5.731726
	C	85	82			83.5	82.5	CV	6.109767
	D	96				96	95.0		
	E	99				99	98.0		
	F	92				92	91.0		
	G	103				103	102.0		
	H	97				97	96.0		
1.48	A	121	126			123.5	122.5		
	B	146				146	145.0		
	C	167				167	166.0		
	D	154				154	153.0		
2.95	A	178				178	177.0		
	B	165				165	164.0		
	C	185				185	184.0		
	D	156				156	155.0		
5.9	A	198				198	197.0		
	B	176	183			179.5	178.5		
	C	215				215	214.0		
	D	204				204	203.0		
11.9	A	226				226	225.0		
	B	248				248	247.0		
	C	231				231	230.0		
	D	252				252	251.0		
23.8	A	296				296	295.0		
	B	258	271			264.5	263.5		
	C	301				301	300.0		
	D	323				323	322.0		
47.6	A	315				315	314.0		
	B	304				304	303.0		
	C	280				280	279.0		
	D	276				276	275.0		
95.2	A	245				245	244.0		
	B	236				236	235.0		
	C	274				274	273.0		
	D	288				288	287.0		

ART
NOV 22/12

EC Alga Growth Inhibition Test — **Nautilus Environmental**

Analysis ID:	07-3318-9816	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:17	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	20-0628-1923	**Test Type:**	Cell Growth	**Analyst:**	
Start Date:	11 Sep-12	**Protocol:**	EC/EPS 1/RM/25	**Diluent:**	Deionized Water
Ending Date:	14 Sep-12	**Species:**	Pseudokirchneriella subcapitata	**Brine:**	
Duration:	72h	**Source:**	In-House Culture	**Age:**	
Sample ID:	14-9345-5590	**Code:**	Adit	**Client:**	Rescan
Sample Date:	09 Sep-12	**Material:**	~~Pulp Mill Effluent~~ AT	**Project:**	
Receive Date:	11 Sep-12	**Source:**	Rescan		
Sample Age:	48h	**Station:**			

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	0	C < T	Not Run	<1.49	1.49	N/A	>67.11	27.0%

Dunnett's Multiple Comparison Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Negative Control		1.49*	5.266	2.526	10	25.3	<0.0001	Significant Effect
		2.98*	7.612	2.526	10	25.3	<0.0001	Significant Effect
		5.95*	10.41	2.526	10	25.3	<0.0001	Significant Effect
		11.9*	14.43	2.526	10	25.3	<0.0001	Significant Effect
		23.8*	20.12	2.526	10	25.3	<0.0001	Significant Effect
		47.6*	19.87	2.526	10	25.3	<0.0001	Significant Effect
		95.2*	16.57	2.526	10	25.3	<0.0001	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value		2.136	2.991	1.0000	No Outliers Detected
Control Trend		10		0.2751	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	196146.5	28020.93	7	104.7	<0.0001	Significant Effect
Error	7491.5	267.5536	28			
Total	203638	28288.48	35			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	10.3	18.48	0.1720	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9828	0.9166	0.8355	Normal Distribution

Cell Yield Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	8	93.75	91.52	95.98	82	102	2.077	5.874	6.27%	0.0%
1.49		4	146.5	139.5	153.5	122	166	9.242	18.48	12.62%	-56.27%
2.98		4	170	165.1	174.9	155	184	6.494	12.99	7.64%	-81.33%
5.95		4	198	192.3	203.7	178	214	7.539	15.08	7.62%	-111.2%
11.9		4	238.3	233.4	243.1	225	251	6.343	12.69	5.32%	-154.1%
23.8		4	295.3	286.2	304.3	264	322	11.95	23.91	8.1%	-214.9%
47.6		4	292.8	285.6	299.9	275	314	9.402	18.8	6.42%	-212.3%
95.2		4	259.8	250.5	269	235	287	12.17	24.35	9.37%	-177.1%

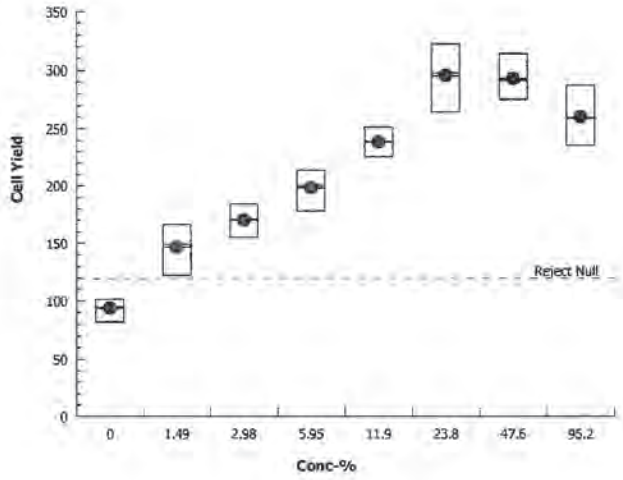
EC Alga Growth Inhibition Test — **Nautilus Environmental**

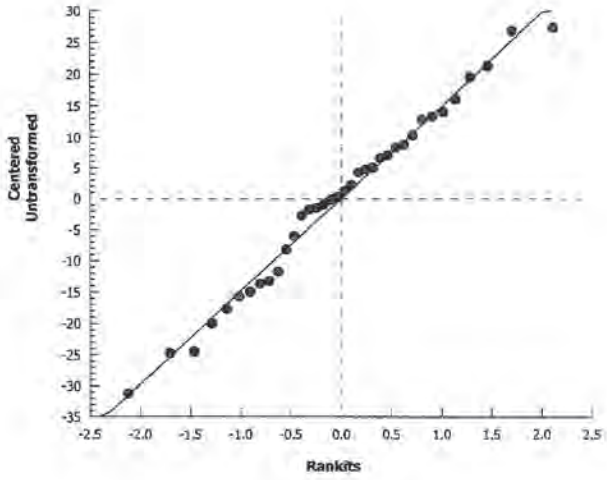
Analysis ID:	07-3318-9816	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:17	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Cell Yield Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	94	92	82	95	98	91	102	96
1.49		122	145	166	153				
2.98		177	164	184	155				
5.95		197	178	214	203				
11.9		225	247	230	251				
23.8		295	264	300	322				
47.6		314	303	279	275				
95.2		244	235	273	287				

Graphics





EC Alga Growth Inhibition Test — **Nautilus Environmental**

Analysis ID:	04-0618-2920	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:17	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	20-0628-1923	**Test Type:**	Cell Growth	**Analyst:**	
Start Date:	11 Sep-12	**Protocol:**	EC/EPS 1/RM/25	**Diluent:**	Deionized Water
Ending Date:	14 Sep-12	**Species:**	Pseudokirchneriella subcapitata	**Brine:**	
Duration:	72h	**Source:**	In-House Culture	**Age:**	
Sample ID:	14-9345-5590	**Code:**	Adit	**Client:**	Rescan
Sample Date:	09 Sep-12	**Material:**	~~Pulp Mill Effluent~~	**Project:**	
Receive Date:	11 Sep-12	**Source:**	Rescan		
Sample Age:	48h	**Station:**			

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	0	C > T	Not Run	95.2	>95.2	N/A	1.05	27.0%

Dunnett's Multiple Comparison Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Negative Control		1.49	-5.266	2.526	10	25.3	1.0000	Non-Significant Effect
		2.98	-7.612	2.526	10	25.3	1.0000	Non-Significant Effect
		5.95	-10.41	2.526	10	25.3	1.0000	Non-Significant Effect
		11.9	-14.43	2.526	10	25.3	1.0000	Non-Significant Effect
		23.8	-20.12	2.526	10	25.3	1.0000	Non-Significant Effect
		47.6	-19.87	2.526	10	25.3	1.0000	Non-Significant Effect
		95.2	-16.57	2.526	10	25.3	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value		2.136	2.991	1.0000	No Outliers Detected
Control Trend		10		0.2751	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	196146.5	28020.93	7	104.7	<0.0001	Significant Effect
Error	7491.5	267.5536	28			
Total	203638	28288.48	35			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	10.3	18.48	0.1720	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9828	0.9166	0.8355	Normal Distribution

Cell Yield Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	8	93.75	91.52	95.98	82	102	2.077	5.874	6.27%	0.0%
1.49		4	146.5	139.5	153.5	122	166	9.242	18.48	12.62%	-56.27%
2.98		4	170	165.1	174.9	155	184	6.494	12.99	7.64%	-81.33%
5.95		4	198	192.3	203.7	178	214	7.539	15.08	7.62%	-111.2%
11.9		4	238.3	233.4	243.1	225	251	6.343	12.69	5.32%	-154.1%
23.8		4	295.3	286.2	304.3	264	322	11.95	23.91	8.1%	-214.9%
47.6		4	292.8	285.6	299.9	275	314	9.402	18.8	6.42%	-212.3%
95.2		4	259.8	250.5	269	235	287	12.17	24.35	9.37%	-177.1%

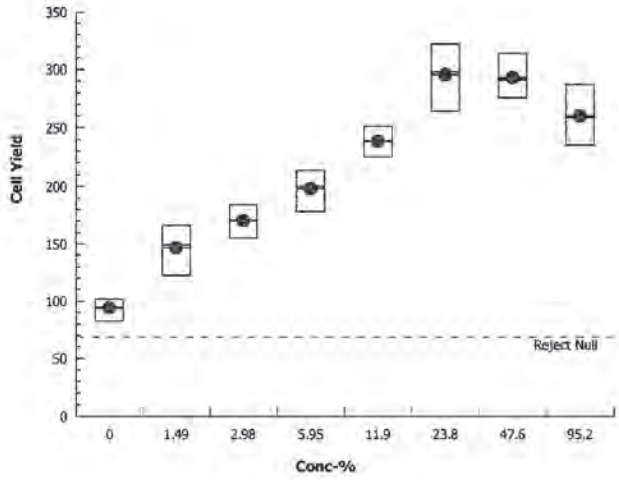
Analyst:_____ ART 22 QA: NOV 12/12 AT

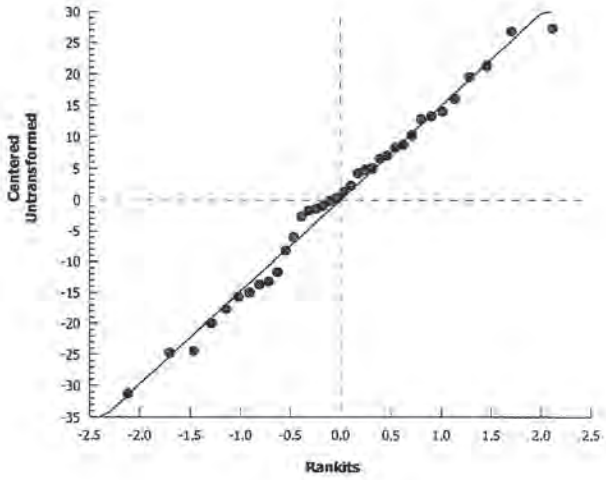
Analysis ID: 04-0618-2920 **Endpoint:** Cell Yield **CETIS Version:** CETISv1.8.0
Analyzed: 19 Sep-12 15:17 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Cell Yield Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	94	92	82	95	98	91	102	96
1.49		122	145	166	153				
2.98		177	164	184	155				
5.95		197	178	214	203				
11.9		225	247	230	251				
23.8		295	264	300	322				
47.6		314	303	279	275				
95.2		244	235	273	287				

Graphics





EC Alga Growth Inhibition Test — Nautilus Environmental

Analysis ID:	02-8953-0837	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:18	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	20-0628-1923	**Test Type:**	Cell Growth	**Analyst:**	
Start Date:	11 Sep-12	**Protocol:**	EC/EPS 1/RM/25	**Diluent:**	Deionized Water
Ending Date:	14 Sep-12	**Species:**	Pseudokirchneriella subcapitata	**Brine:**	
Duration:	72h	**Source:**	In-House Culture	**Age:**	
Sample ID:	14-9345-5590	**Code:**	Adit	**Client:**	Rescan
Sample Date:	09 Sep-12	**Material:**	~~Pulp Mill Effluent~~	**Project:**	
Receive Date:	11 Sep-12	**Source:**	Rescan		
Sample Age:	48h	**Station:**			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	814716281	200	Yes	Two-Point Interpolation

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.136	2.991	1.0000	No Outliers Detected
Control Trend	Mann-Kendall Trend	10		0.2751	Non-significant Trend in Controls

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>95.2	N/A	N/A	<1.05	N/A	N/A
IC10	>95.2	N/A	N/A	<1.05	N/A	N/A
IC15	>95.2	N/A	N/A	<1.05	N/A	N/A
IC20	>95.2	N/A	N/A	<1.05	N/A	N/A
IC25	>95.2	N/A	N/A	<1.05	N/A	N/A
IC40	>95.2	N/A	N/A	<1.05	N/A	N/A
IC50	>95.2	N/A	N/A	<1.05	N/A	N/A

Cell Yield Summary

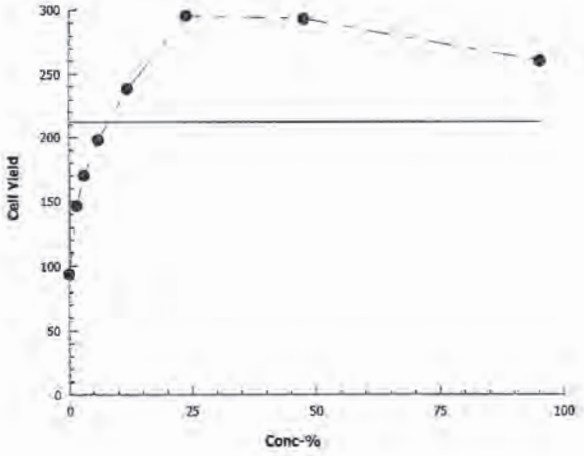
			Calculated Variate						
Conc-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	8	93.75	82	102	2.077	5.874	6.27%	0.0%
1.49		4	146.5	122	166	9.242	18.48	12.62%	-56.27%
2.98		4	170	155	184	6.494	12.99	7.64%	-81.33%
5.95		4	198	178	214	7.539	15.08	7.62%	-111.2%
11.9		4	238.3	225	251	6.343	12.69	5.32%	-154.1%
23.8		4	295.3	264	322	11.95	23.91	8.1%	-214.9%
47.6		4	292.8	275	314	9.402	18.8	6.42%	-212.3%
95.2		4	259.8	235	287	12.17	24.35	9.37%	-177.1%

Cell Yield Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	94	92	82	95	98	91	102	96
1.49		122	145	166	153				
2.98		177	164	184	155				
5.95		197	178	214	203				
11.9		225	247	230	251				
23.8		295	264	300	322				
47.6		314	303	279	275				
95.2		244	235	273	287				

Analysis ID:	02-8953-0837	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:18	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Pseudokirchneriella subcapitata Summary Sheet

Client: Rescan
Work Order No.: 12424
Start Date: Sept. 12, 2012
Set up by: ECC

Sample Information:

Sample ID: **BJ2**
Sample Date: September 9, 2012
Date Received: September 11, 2012
Sample Volume: 7 L

Test Organism Information:

Culture Date: September 7, 2012
Age of culture (Day 0): 5 d

Zinc Reference Toxicant Results:

Reference Toxicant ID: SC88
Stock Solution ID: 12Zn01
Date Initiated: Sept. 4, 2012

72-h IC50 (95% CL): 24.3 (22.6 - 26.2) µg/L Zn

72-h IC50 Reference Toxicant Mean and Range: 22.7, 12.4 - 41.4 µg/L Zn CV (%): 35%

Test Results:

	Algal Growth
IC25 %(v/v) (95% CL)	>95.2
IC50 %(v/v) (95% CL)	>95.2

Reviewed by: A. Tang
Date reviewed: November 22, 2012

72-h Algal Growth Inhibition Toxicity Test
Water Quality Measurements

Client: RESCAN | Setup by: ECC

Sample ID: BJ2 | Test Date/Time: Sept. 12, 2012 / 1100 h

Work Order No.: 12424 | Test Species: *Pseudokirchneriella subcapitata*

Culture Date: Sept. 7, 2012 | Age of Culture: 5 d | Culture Health: Good

Culture Count: 1 270 2 255 | Average: ~~255~~ 262.5 | Culture Cell Density (c1): 262.5 x 10^4

$$v1 = \frac{220{,}000 \text{ cells/ml} \times 50 \text{ ml}}{(c1)\ 262.5 \times 10^4 \text{ cells/ml}} = 4.19 \text{ mL}$$

Time Zero Counts: 1 22 2 23 | Average: 22.5 x 10^4

No. of Cells/mL: 22.5 x 10^4 | Initial Density: # cells/mL ÷ 220 µL x 10 µL = 10,227 Cells/mL

Concentration	Water Quality Measurements					Microplates rotated 2X per day?			
	pH	Temp (°C)							
% (v/v)	0 h	0 h	24 h	48 h	72 h	0 h	24 h	48 h	72 h
Lab Control	6.9	24.5	25.0	25.0	26.0	✓	✓	✓	✓
1.5	6.9	24.5		25.0		✓	✓	✓	✓
3.0	6.9	24.5		25.0		✓	✓	✓	✓
5.9	7.0	24.5		25.0		✓	✓	✓	✓
11.9	7.1	24.5		25.0		✓	✓	✓	✓
23.8	7.2	23.5		25.0		✓	✓	✓	✓
47.6	7.3	23.5		25.0		✓	✓	✓	✓
95.2	7.3	23.5	↓	25.0	↓	✓	✓	✓	✓
Initials				JOH				JOH	

Initial control pH: Well 1: 6.8 | Well 2: 6.8

Final control pH: Well 1: 6.5 | Well 2: 6.5

Light intensity (lux): 3670 | Date measured: Sept. 12, 2012

Sample Description: Clear Sample

Comments:

Reviewed: A. Tang | Date reviewed: November 22, 2012

Pseudokirchneriella subcapitata Toxicity Test Data Sheet
72-h Algal Cell Counts

Client: PESCAN
Start Date/Time: Sept. 12, 2012 / 1100 h
Work Order #: BJ2
Termination Date: Sept. 15, 2012 / 1100 h
Sample ID: 12424
Test set up by: ECC

%(v/v)

Concentration	Rep	Count 1	Count 2	Count 3	Count 4	Comments	Initials
Lab Control	A	60					JGL
	B	57					
	C	59					
	D	55					
	E	57					
	F	78	70				
	G	59					
	H	65					
1.5	A	75					
	B	72					
	C	66					
	D	77					
3.0	A	69					
	B	79					
	C	78					
	D	80					
5.9	A	96					
	B	101					
	C	97					
	D	80	82				
11.9	A	103					
	B	95					
	C	104					
	D	108					
23.8	A	135					
	B	142					
	C	129					
	D	131					
47.6	A	128					
	B	133					
	C	147					
	D	142					
95.2	A	183					
	B	182					
	C	199					
	D	181					

Comments:

Reviewed by: A. Tong
Date Reviewed: November 22, 2012

Pseudokirchneriella subcapitata Algal Counts

Client: Rescan
WO#: 12424
Sample ID: BJ2

Start Date/Time: 12-Sep-12 @ 11:00 h
Termination Date: 15-Sep-12 @ 11:00 h

Initial Cell Density: 10227 cell/mL

									225000
									0.22
									0.01
Concentration % v/v	Rep	Count 1 (x 10^4)	Count 2 (x 10^4)	Count 3 (x 10^4)	Count 4 (x 10^4)	Mean (x 10^4)	Cell Yield (x 10^4) cell/mL		10227.27
Control	A	60				60	59.0	mean	59.7
	B	57				57	56.0	SD	6.112049
	C	59				59	58.0	CV	10.23326
	D	55				55	54.0		
	E	57				57	56.0		
	F	78	70			74	73.0		
	G	59				59	58.0		
	H	65				65	64.0		
1.48	A	75				75	74.0		
	B	72				72	71.0		
	C	66				66	65.0		
	D	77				77	76.0		
2.95	A	69				69	68.0		
	B	79				79	78.0		
	C	78				78	77.0		
	D	80				80	79.0		
5.9	A	96				96	95.0		
	B	101				101	100.0		
	C	97				97	96.0		
	D	80	82			81	80.0		
11.9	A	103				103	102.0		
	B	95				95	94.0		
	C	104				104	103.0		
	D	108				108	107.0		
23.8	A	135				135	134.0		
	B	142				142	141.0		
	C	129				129	128.0		
	D	131				131	130.0		
47.6	A	128				128	127.0		
	B	133				133	132.0		
	C	147				147	146.0		
	D	142				142	141.0		
95.2	A	183				183	182.0		
	B	182				182	181.0		
	C	199				199	198.0		
	D	181				181	180.0		

ART
NOV 22/12

EC Alga Growth Inhibition Test — **Nautilus Environmental**

Analysis ID:	09-3097-4105	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:24	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	18-7973-1070	**Test Type:**	Cell Growth	**Analyst:**	
Start Date:	12 Sep-12	**Protocol:**	EC/EPS 1/RM/25	**Diluent:**	Deionized Water
Ending Date:	15 Sep-12	**Species:**	Pseudokirchneriella subcapitata	**Brine:**	
Duration:	72h	**Source:**	In-House Culture	**Age:**	
Sample ID:	16-0293-4069	**Code:**	BJ2	**Client:**	Rescan
Sample Date:	09 Sep-12	**Material:**	~~Pulp Mill Effluent~~ AT	**Project:**	
Receive Date:	11 Sep-12	**Source:**	Rescan		
Sample Age:	72h	**Station:**			

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	0	C < T	Not Run	<1.49	1.49	N/A	>67.11	17.4%

Dunnett's Multiple Comparison Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Negative Control		1.49*	2.854	2.526	10	10.4	0.0242	Significant Effect
		2.98*	3.825	2.526	10	10.4	0.0022	Significant Effect
		5.95*	8.015	2.526	10	10.4	<0.0001	Significant Effect
		11.9*	10.14	2.526	10	10.4	<0.0001	Significant Effect
		23.8*	17.85	2.526	10	10.4	<0.0001	Significant Effect
		47.6*	18.64	2.526	10	10.4	<0.0001	Significant Effect
		95.2*	30.48	2.526	10	10.4	<0.0001	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value		2.203	2.991	0.8330	No Outliers Detected
Control Trend		8		0.4055	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	57541	8220.143	7	181.8	<0.0001	Significant Effect
Error	1265.75	45.20536	28			
Total	58806.75	8265.348	35			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	2.492	18.48	0.9277	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9857	0.9166	0.9133	Normal Distribution

Cell Yield Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	8	59.75	57.43	62.07	54	73	2.161	6.112	10.23%	0.0%
1.49		4	71.5	69.68	73.32	65	76	2.398	4.796	6.71%	-19.67%
2.98		4	75.5	73.57	77.43	68	79	2.533	5.066	6.71%	-26.36%
5.95		4	92.75	89.41	96.09	80	100	4.385	8.77	9.46%	-55.23%
11.9		4	101.5	99.43	103.6	94	107	2.723	5.447	5.37%	-69.87%
23.8		4	133.3	131.1	135.4	128	141	2.869	5.737	4.31%	-123.0%
47.6		4	136.5	133.2	139.8	127	146	4.291	8.583	6.29%	-128.5%
95.2		4	185.3	182	188.5	180	198	4.27	8.539	4.61%	-210.0%

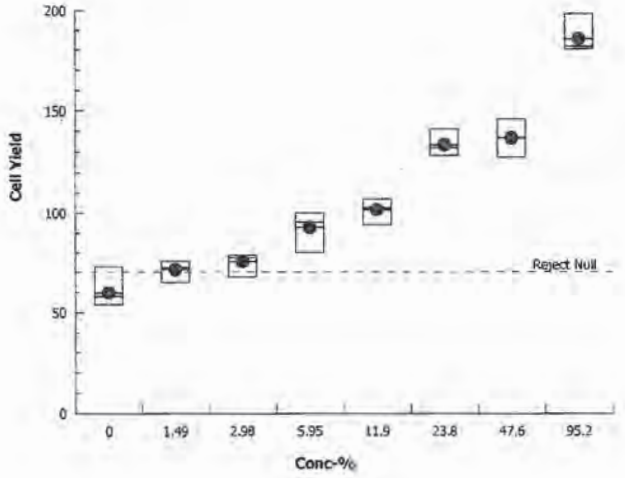
EC Alga Growth Inhibition Test — **Nautilus Environmental**

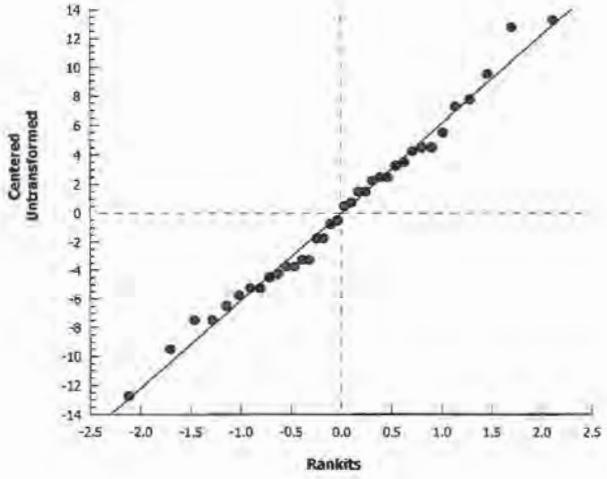
Analysis ID:	09-3097-4105	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:24	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Cell Yield Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	59	56	58	54	56	73	58	64
1.49		74	71	65	76				
2.98		68	78	77	79				
5.95		95	100	96	80				
11.9		102	94	103	107				
23.8		134	141	128	130				
47.6		127	132	146	141				
95.2		182	181	198	180				

Graphics





EC Alga Growth Inhibition Test — **Nautilus Environmental**

Analysis ID:	20-3467-3324	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:24	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	18-7973-1070	**Test Type:**	Cell Growth	**Analyst:**	
Start Date:	12 Sep-12	**Protocol:**	EC/EPS 1/RM/25	**Diluent:**	Deionized Water
Ending Date:	15 Sep-12	**Species:**	Pseudokirchneriella subcapitata	**Brine:**	
Duration:	72h	**Source:**	In-House Culture	**Age:**	
Sample ID:	16-0293-4069	**Code:**	BJ2	**Client:**	Rescan
Sample Date:	09 Sep-12	**Material:**	~~Pulp Mill Effluent~~ LRT	**Project:**	
Receive Date:	11 Sep-12	**Source:**	Rescan		
Sample Age:	72h	**Station:**			

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	0	C > T	Not Run	95.2	>95.2	N/A	1.05	17.4%

Dunnett's Multiple Comparison Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Negative Control		1.49	-2.854	2.526	10	10.4	1.0000	Non-Significant Effect
		2.98	-3.825	2.526	10	10.4	1.0000	Non-Significant Effect
		5.95	-8.015	2.526	10	10.4	1.0000	Non-Significant Effect
		11.9	-10.14	2.526	10	10.4	1.0000	Non-Significant Effect
		23.8	-17.85	2.526	10	10.4	1.0000	Non-Significant Effect
		47.6	-18.64	2.526	10	10.4	1.0000	Non-Significant Effect
		95.2	-30.48	2.526	10	10.4	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value		2.203	2.991	0.8330	No Outliers Detected
Control Trend		8		0.4055	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	57541	8220.143	7	181.8	<0.0001	Significant Effect
Error	1265.75	45.20536	28			
Total	58806.75	8265.348	35			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	2.492	18.48	0.9277	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9857	0.9166	0.9133	Normal Distribution

Cell Yield Summary

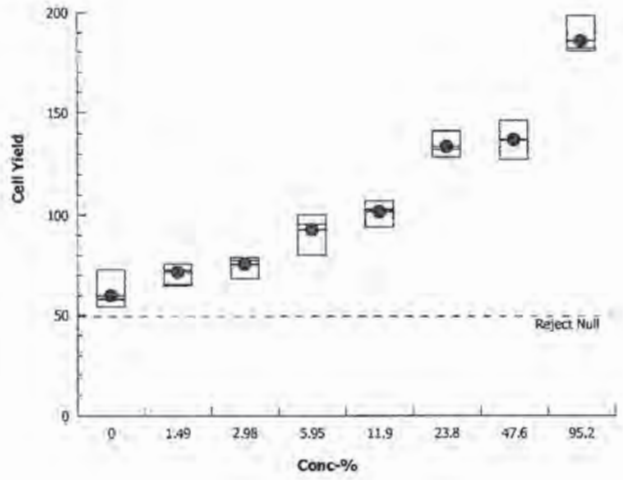
Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	8	59.75	57.43	62.07	54	73	2.161	6.112	10.23%	0.0%
1.49		4	71.5	69.68	73.32	65	76	2.398	4.796	6.71%	-19.67%
2.98		4	75.5	73.57	77.43	68	79	2.533	5.066	6.71%	-26.36%
5.95		4	92.75	89.41	96.09	80	100	4.385	8.77	9.46%	-55.23%
11.9		4	101.5	99.43	103.6	94	107	2.723	5.447	5.37%	-69.87%
23.8		4	133.3	131.1	135.4	128	141	2.869	5.737	4.31%	-123.0%
47.6		4	136.5	133.2	139.8	127	146	4.291	8.583	6.29%	-128.5%
95.2		4	185.3	182	188.5	180	198	4.27	8.539	4.61%	-210.0%

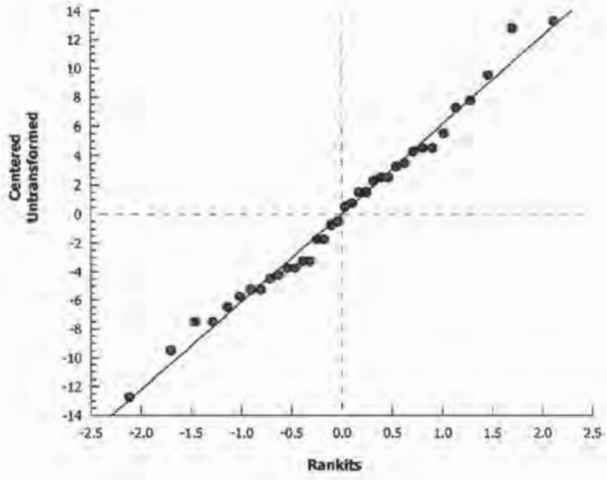
Analysis ID: 20-3467-3324 **Endpoint:** Cell Yield **CETIS Version:** CETISv1.8.0
Analyzed: 19 Sep-12 15:24 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Cell Yield Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	59	56	58	54	56	73	58	64
1.49		74	71	65	76				
2.98		68	78	77	79				
5.95		95	100	96	80				
11.9		102	94	103	107				
23.8		134	141	128	130				
47.6		127	132	146	141				
95.2		182	181	198	180				

Graphics





CETIS Analytical Report

EC Alga Growth Inhibition Test — **Nautilus Environmental**

Analysis ID:	08-2987-0059	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:24	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	18-7973-1070	**Test Type:**	Cell Growth	**Analyst:**	
Start Date:	12 Sep-12	**Protocol:**	EC/EPS 1/RM/25	**Diluent:**	Deionized Water
Ending Date:	15 Sep-12	**Species:**	Pseudokirchneriella subcapitata	**Brine:**	
Duration:	72h	**Source:**	In-House Culture	**Age:**	
Sample ID:	16-0293-4069	**Code:**	BJ2	**Client:**	Rescan
Sample Date:	09 Sep-12	**Material:**	~~Pulp Mill Effluent~~	**Project:**	
Receive Date:	11 Sep-12	**Source:**	Rescan		
Sample Age:	72h	**Station:**			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1.205E+09	200	Yes	Two-Point Interpolation

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.203	2.991	0.8330	No Outliers Detected
Control Trend	Mann-Kendall Trend	8		0.4055	Non-significant Trend in Controls

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>95.2	N/A	N/A	<1.05	N/A	N/A
IC10	>95.2	N/A	N/A	<1.05	N/A	N/A
IC15	>95.2	N/A	N/A	<1.05	N/A	N/A
IC20	>95.2	N/A	N/A	<1.05	N/A	N/A
IC25	>95.2	N/A	N/A	<1.05	N/A	N/A
IC40	>95.2	N/A	N/A	<1.05	N/A	N/A
IC50	>95.2	N/A	N/A	<1.05	N/A	N/A

Cell Yield Summary

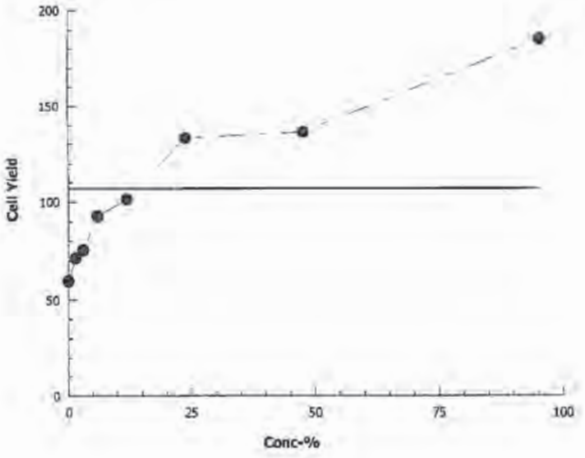
			Calculated Variate						
Conc-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	8	59.75	54	73	2.161	6.112	10.23%	0.0%
1.49		4	71.5	65	76	2.398	4.796	6.71%	-19.67%
2.98		4	75.5	68	79	2.533	5.066	6.71%	-26.36%
5.95		4	92.75	80	100	4.385	8.77	9.46%	-55.23%
11.9		4	101.5	94	107	2.723	5.447	5.37%	-69.87%
23.8		4	133.3	128	141	2.869	5.737	4.31%	-123.0%
47.6		4	136.5	127	146	4.291	8.583	6.29%	-128.5%
95.2		4	185.3	180	198	4.27	8.539	4.61%	-210.0%

Cell Yield Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	59	56	58	54	56	73	58	64
1.49		74	71	65	76				
2.98		68	78	77	79				
5.95		95	100	96	80				
11.9		102	94	103	107				
23.8		134	141	128	130				
47.6		127	132	146	141				
95.2		182	181	198	180				

Analysis ID:	08-2987-0059	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:24	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Pseudokirchneriella subcapitata Summary Sheet

Client: Rescan
Work Order No.: 12424
Start Date: Sept. 12, 2012
Set up by: ECC

Sample Information:

Sample ID: **Camp**
Sample Date: September 9, 2012
Date Received: September 11, 2012
Sample Volume: 7 L

Test Organism Information:

Culture Date: September 7, 2012
Age of culture (Day 0): 5 d

Zinc Reference Toxicant Results:

Reference Toxicant ID: SC88
Stock Solution ID: 12Zn01
Date Initiated: Sept. 4, 2012

72-h IC50 (95% CL): 24.3 (22.6 - 26.2) µg/L Zn

72-h IC50 Reference Toxicant Mean and Range: 22.7, 12.4 - 41.4 µg/L Zn CV (%): 35%

Test Results:

	Algal Growth
IC25 %(v/v) (95% CL)	>95.2
IC50 %(v/v) (95% CL)	>95.2

Reviewed by: A. Tong
Date reviewed: November 22, 2012

72-h Algal Growth Inhibition Toxicity Test
Water Quality Measurements

Client: RESCAN | Setup by: ECC

Sample ID: Camp | Test Date/Time: Sept. 12, 2012 / 1100h

Work Order No.: 12424 | Test Species: *Pseudokirchneriella subcapitata*

Culture Date: Sept. 7, 2012 | Age of Culture: 5 d | Culture Health: Good

Culture Count: 1 270 2 255 | Average: 262.5 | Culture Cell Density (c1): 262.5 x 10^4

v1 = 220,000 cells/ml x 50 ml / (c1) 262.5 x 10^4 cells/ml = 4.19 mL

Time Zero Counts: 1 22 2 23 | Average: 22.5 x10^4

No. of Cells/mL: 22.5 x10^4 | Initial Density: # cells/mL ÷ 220 µL x 10 µL = 10,227 cells/mL

Concentration	Water Quality Measurements					Microplates rotated 2X per day?			
	pH	Temp (°C)							
% (v/v)	0 h	0 h	24 h	48 h	72 h	0 h	24 h	48 h	72 h
Lab Control	6.9	24.5	25.0	25.0	26.0	✓	✓	✓	✓
1.5	6.9	24.5	↓	25.0	↓	✓	✓	✓	✓
3.0	6.9	24.5	↓	25.0	↓	✓	✓	✓	✓
5.9	7.0	24.5	↓	25.0	↓	✓	✓	✓	✓
11.9	7.0	24.5	↓	25.0	↓	✓	✓	✓	✓
23.8	7.0	24.5	↓	25.0	↓	✓	✓	✓	✓
47.6	7.1	23.5	↓	25.0	↓	✓	✓	✓	✓
95.2	7.2	23.5	↓	25.0	↓	✓	✓	✓	✓
Initials	[illegible]	[illegible]	[illegible]	JOH	[illegible]	[illegible]	[illegible]	JOH	[illegible]

Initial control pH: Well 1: 6.8 | Well 2: 6.8

Final control pH: Well 1: 6.5 | Well 2: 6.5

Light intensity (lux): 3650 | Date measured: Sept. 12, 2012

Sample Description: clear sample

Comments:

Reviewed: A. Tong | Date reviewed: November 22, 2012

Pseudokirchneriella subcapitata Toxicity Test Data Sheet
72-h Algal Cell Counts

Client: RESCAN
Work Order #: T2424
Sample ID: Camp
%(v/v)

Start Date/Time: Sept. 12, 2012 / 1100 h
Termination Date: Sept. 15, 2012 / 1100 h
Test set up by: ECC

Concentration	Rep	Count 1	Count 2	Count 3	Count 4	Comments	Initials
Lab Control	A	62					JW
	B	60					
	C	67					
	D	62					
	E	73					
	F	59	60				
	G	61					
	H	68					
1.5	A	65	68				
	B	73					
	C	72					
	D	80					
3.0	A	91					
	B	87					
	C	88					
	D	92					
5.9	A	99					
	B	98					
	C	98					
	D	90					
11.9	A	119					
	B	123					
	C	117					
	D	120					
23.8	A	120					
	B	117					
	C	129					
	D	130					
47.6	A	131					
	B	127					
	C	130					
	D	137					
95.2	A	144					
	B	156					
	C	148					
	D	135					

Comments:

Reviewed by: A. Tang Date Reviewed: November 22, 2012

Pseudokirchneriella subcapitata Algal Counts

Client: Rescan
WO#: 12424
Sample ID: Camp

Start Date/Time: 12-Sep-12 @ 11:00 h
Termination Date: 15-Sep-12 @ 11:00 h

Initial Cell Density: 10227 cell/mL

									225000
									0.22
									0.01
Concentration % v/v	Rep	Count 1 (x 10^4)	Count 2 (x 10^4)	Count 3 (x 10^4)	Count 4 (x 10^4)	Mean (x 10^4)	Cell Yield (x 10^4) cell/mL		10227.27
Control	A	62				62	61.0	mean	63.0
	B	60				60	59.0	SD	4.769228
	C	67				67	66.0	CV	7.565427
	D	62				62	61.0		
	E	73				73	72.0		
	F	59	60			59.5	58.5		
	G	61				61	60.0		
	H	68				68	67.0		
1.48	A	65	68			66.5	65.5		
	B	73				73	72.0		
	C	72				72	71.0		
	D	80				80	79.0		
2.95	A	91				91	90.0		
	B	87				87	86.0		
	C	88				88	87.0		
	D	92				92	91.0		
5.9	A	99				99	98.0		
	B	98				98	97.0		
	C	98				98	97.0		
	D	90				90	89.0		
11.9	A	119				119	118.0		
	B	123				123	122.0		
	C	117				117	116.0		
	D	120				120	119.0		
23.8	A	120				120	119.0		
	B	117				117	116.0		
	C	129				129	128.0		
	D	130				130	129.0		
47.6	A	131				131	130.0		
	B	127				127	126.0		
	C	130				130	129.0		
	D	137				137	136.0		
95.2	A	144				144	143.0		
	B	156				156	155.0		
	C	148				148	147.0		
	D	135				135	134.0		

ART
NOV 22/12

EC Alga Growth Inhibition Test — **Nautilus Environmental**

Analysis ID:	00-6658-8417	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:30	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	08-4594-8952	**Test Type:**	Cell Growth	**Analyst:**	
Start Date:	12 Sep-12	**Protocol:**	EC/EPS 1/RM/25	**Diluent:**	Deionized Water
Ending Date:	15 Sep-12	**Species:**	Pseudokirchneriella subcapitata	**Brine:**	
Duration:	72h	**Source:**	In-House Culture	**Age:**	
Sample ID:	11-1820-5542	**Code:**	Camp	**Client:**	Rescan
Sample Date:	09 Sep-12	**Material:**	~~Pulp Mill Effluent~~ AT	**Project:**	
Receive Date:	11 Sep-12	**Source:**	Rescan		
Sample Age:	72h	**Station:**			

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	0	C < T	Not Run	<1.49	1.49	N/A	>67.11	12.7%

Dunnett's Multiple Comparison Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Negative Control		1.49*	2.847	2.526	10	7.985	0.0245	Significant Effect
		2.98*	8.067	2.526	10	7.985	<0.0001	Significant Effect
		5.95*	10.2	2.526	10	7.985	<0.0001	Significant Effect
		11.9*	17.64	2.526	10	7.985	<0.0001	Significant Effect
		23.8*	18.98	2.526	10	7.985	<0.0001	Significant Effect
		47.6*	21.28	2.526	10	7.985	<0.0001	Significant Effect
		95.2*	25.86	2.526	10	7.985	<0.0001	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value		2.328	2.991	0.5716	No Outliers Detected
Control Trend		4		0.7196	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	29899	4271.286	7	160.3	<0.0001	Significant Effect
Error	746	26.64286	28			
Total	30645	4297.929	35			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	6.851	18.48	0.4445	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9923	0.9166	0.9961	Normal Distribution

Cell Yield Summary

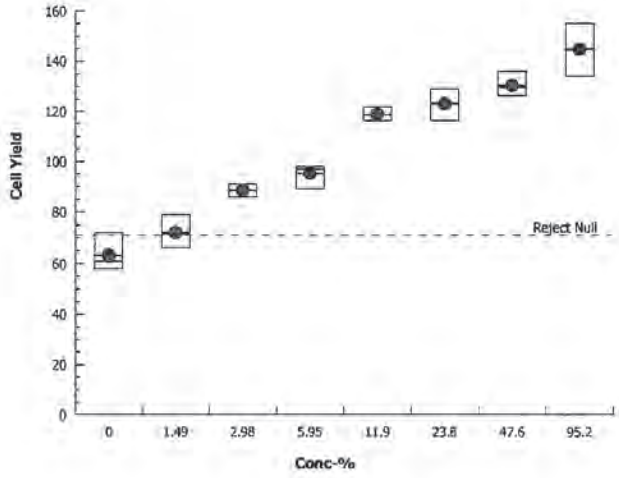
Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	8	63	61.16	64.84	58	72	1.711	4.84	7.68%	0.0%
1.49		4	72	69.96	74.04	66	79	2.677	5.354	7.44%	-14.29%
2.98		4	88.5	87.59	89.41	86	91	1.19	2.38	2.69%	-40.48%
5.95		4	95.25	93.65	96.85	89	98	2.097	4.193	4.4%	-51.19%
11.9		4	118.8	117.8	119.7	116	122	1.25	2.5	2.11%	-88.49%
23.8		4	123	120.5	125.5	116	129	3.24	6.481	5.27%	-95.24%
47.6		4	130.3	128.7	131.8	126	136	2.097	4.193	3.22%	-106.7%
95.2		4	144.8	141.4	148.1	134	155	4.366	8.732	6.03%	-129.8%

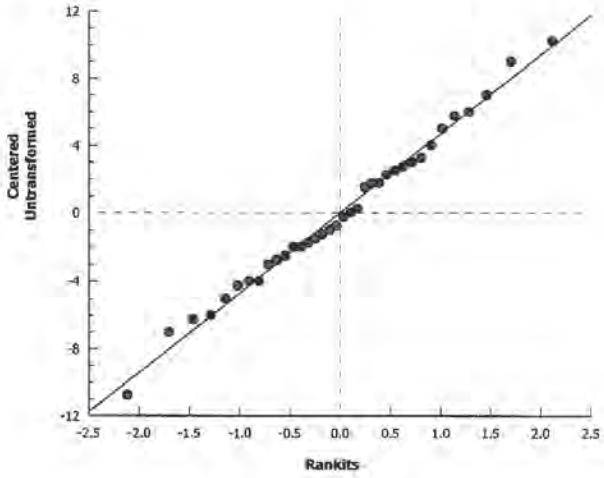
Analysis ID: 00-6658-8417 **Endpoint:** Cell Yield **CETIS Version:** CETISv1.8.0
Analyzed: 19 Sep-12 15:30 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Cell Yield Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	61	59	66	61	72	58	60	67
1.49		66	72	71	79				
2.98		90	86	87	91				
5.95		98	97	97	89				
11.9		118	122	116	119				
23.8		119	116	128	129				
47.6		130	126	129	136				
95.2		143	155	147	134				

Graphics





EC Alga Growth Inhibition Test — Nautilus Environmental

Analysis ID:	15-5547-6839	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:30	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	08-4594-8952	**Test Type:**	Cell Growth	**Analyst:**	
Start Date:	12 Sep-12	**Protocol:**	EC/EPS 1/RM/25	**Diluent:**	Deionized Water
Ending Date:	15 Sep-12	**Species:**	Pseudokirchneriella subcapitata	**Brine:**	
Duration:	72h	**Source:**	In-House Culture	**Age:**	
Sample ID:	11-1820-5542	**Code:**	Camp	**Client:**	Rescan
Sample Date:	09 Sep-12	**Material:**	~~Pulp Mill Effluent~~	**Project:**	
Receive Date:	11 Sep-12	**Source:**	Rescan		
Sample Age:	72h	**Station:**			

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	0	C > T	Not Run	95.2	>95.2	N/A	1.05	12.7%

Dunnett's Multiple Comparison Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Negative Control		1.49	-2.847	2.526	10	7.985	1.0000	Non-Significant Effect
		2.98	-8.067	2.526	10	7.985	1.0000	Non-Significant Effect
		5.95	-10.2	2.526	10	7.985	1.0000	Non-Significant Effect
		11.9	-17.64	2.526	10	7.985	1.0000	Non-Significant Effect
		23.8	-18.98	2.526	10	7.985	1.0000	Non-Significant Effect
		47.6	-21.28	2.526	10	7.985	1.0000	Non-Significant Effect
		95.2	-25.86	2.526	10	7.985	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value		2.328	2.991	0.5716	No Outliers Detected
Control Trend		4		0.7196	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	29899	4271.286	7	160.3	<0.0001	Significant Effect
Error	746	26.64286	28			
Total	30645	4297.929	35			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	6.851	18.48	0.4445	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9923	0.9166	0.9961	Normal Distribution

Cell Yield Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	8	63	61.16	64.84	58	72	1.711	4.84	7.68%	0.0%
1.49		4	72	69.96	74.04	66	79	2.677	5.354	7.44%	-14.29%
2.98		4	88.5	87.59	89.41	86	91	1.19	2.38	2.69%	-40.48%
5.95		4	95.25	93.65	96.85	89	98	2.097	4.193	4.4%	-51.19%
11.9		4	118.8	117.8	119.7	116	122	1.25	2.5	2.11%	-88.49%
23.8		4	123	120.5	125.5	116	129	3.24	6.481	5.27%	-95.24%
47.6		4	130.3	128.7	131.8	126	136	2.097	4.193	3.22%	-106.7%
95.2		4	144.8	141.4	148.1	134	155	4.366	8.732	6.03%	-129.8%

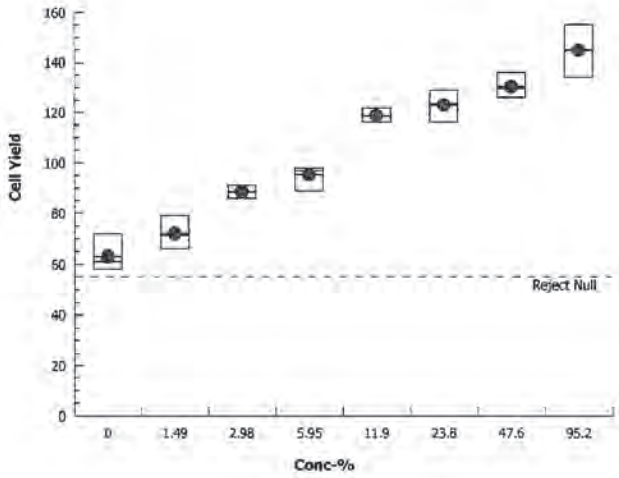
EC Alga Growth Inhibition Test — **Nautilus Environmental**

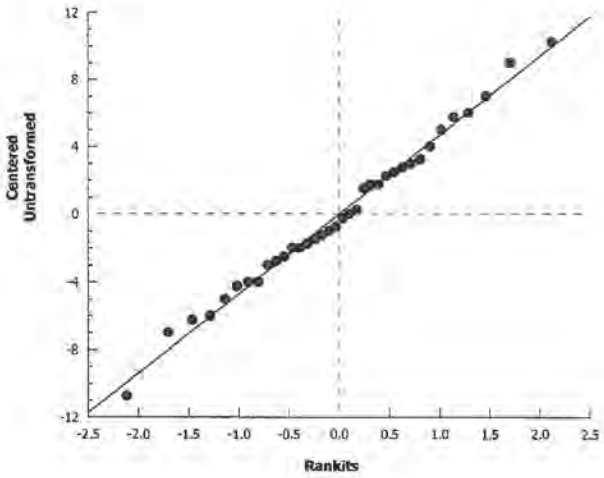
Analysis ID:	15-5547-6839	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:30	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Cell Yield Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	61	59	66	61	72	58	60	67
1.49		66	72	71	79				
2.98		90	86	87	91				
5.95		98	97	97	89				
11.9		118	122	116	119				
23.8		119	116	128	129				
47.6		130	126	129	136				
95.2		143	155	147	134				

Graphics





EC Alga Growth Inhibition Test

Nautilus Environmental

Analysis ID:	20-5035-1512	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:30	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	08-4594-8952	**Test Type:**	Cell Growth	**Analyst:**	
Start Date:	12 Sep-12	**Protocol:**	EC/EPS 1/RM/25	**Diluent:**	Deionized Water
Ending Date:	15 Sep-12	**Species:**	Pseudokirchneriella subcapitata	**Brine:**	
Duration:	72h	**Source:**	In-House Culture	**Age:**	
Sample ID:	11-1820-5542	**Code:**	Camp	**Client:**	Rescan
Sample Date:	09 Sep-12	**Material:**	~~Pulp Mill Effluent~~	**Project:**	
Receive Date:	11 Sep-12	**Source:**	Rescan		
Sample Age:	72h	**Station:**			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1.239E+09	200	Yes	Two-Point Interpolation

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.328	2.991	0.5716	No Outliers Detected
Control Trend	Mann-Kendall Trend	4		0.7196	Non-significant Trend in Controls

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>95.2	N/A	N/A	<1.05	N/A	N/A
IC10	>95.2	N/A	N/A	<1.05	N/A	N/A
IC15	>95.2	N/A	N/A	<1.05	N/A	N/A
IC20	>95.2	N/A	N/A	<1.05	N/A	N/A
IC25	>95.2	N/A	N/A	<1.05	N/A	N/A
IC40	>95.2	N/A	N/A	<1.05	N/A	N/A
IC50	>95.2	N/A	N/A	<1.05	N/A	N/A

Cell Yield Summary

			Calculated Variate						
Conc-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	8	63	58	72	1.711	4.84	7.68%	0.0%
1.49		4	72	66	79	2.677	5.354	7.44%	-14.29%
2.98		4	88.5	86	91	1.19	2.38	2.69%	-40.48%
5.95		4	95.25	89	98	2.097	4.193	4.4%	-51.19%
11.9		4	118.8	116	122	1.25	2.5	2.11%	-88.49%
23.8		4	123	116	129	3.24	6.481	5.27%	-95.24%
47.6		4	130.3	126	136	2.097	4.193	3.22%	-106.7%
95.2		4	144.8	134	155	4.366	8.732	6.03%	-129.8%

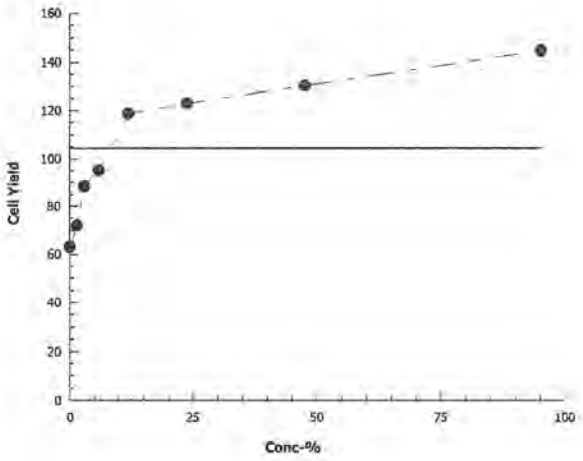
Cell Yield Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	61	59	66	61	72	58	60	67
1.49		66	72	71	79				
2.98		90	86	87	91				
5.95		98	97	97	89				
11.9		118	122	116	119				
23.8		119	116	128	129				
47.6		130	126	129	136				
95.2		143	155	147	134				

EC Alga Growth Inhibition Test **Nautilus Environmental**

Analysis ID:	20-5035-1512	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:30	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Analyst:_____ QA: ART NOV 22/12

Pseudokirchneriella subcapitata Summary Sheet

Client: Rescan
Work Order No.: 12424
Start Date: Sept. 11, 2012
Set up by: ECC

Sample Information:

Sample ID: **BJ u/s of Camp**
Sample Date: September 9, 2012
Date Received: September 11, 2012
Sample Volume: 7 L

Test Organism Information:

Culture Date: September 7, 2012
Age of culture (Day 0): 4 5/d

Zinc Reference Toxicant Results:

Reference Toxicant ID: SC88
Stock Solution ID: 12Zn01
Date Initiated: Sept. 4, 2012

72-h IC50 (95% CL): 24.3 (22.6 - 26.2) µg/L Zn

72-h IC50 Reference Toxicant Mean and Range: 22.7, 12.4 - 41.4 µg/L Zn CV (%): 35%

Test Results:

	Algal Growth
IC25 %(v/v) (95% CL)	>95.2
IC50 %(v/v) (95% CL)	>95.2

Reviewed by: A. Tang
Date reviewed: November 22, 2012

72-h Algal Growth Inhibition Toxicity Test
Water Quality Measurements

Client: Rescan Environm. Setup by: ~~EEC~~ JGh

Sample ID: BJ u/s of Camp Test Date/Time: Sep. 11, 2012 / 1500 h

Work Order No.: 12424 Test Species: *Pseudokirchneriella subcapitata*

Culture Date: Sept. 7, 2012 Age of Culture: 4d Culture Health: Good

Culture Count: 1 118 2 123 Average: 120.5 Culture Cell Density (c1): 120.5×10^4

$$v1 = \frac{220{,}000 \text{ cells/ml} \times 20 \text{ ml}}{(c1)\ 120.5 \times 10^4 \text{ cells/ml}} = 9.13 \text{ mL}$$

Time Zero Counts: 1 22 2 22 Average: 22×10^4

No. of Cells/mL: 22×10^4 Initial Density: # cells/mL ÷ 220 µL x 10 µL = 10,000 cells/mL

Concentration	Water Quality Measurements					Microplates rotated 2X per day?			
	pH	Temp (°C)							
% (v/v)	0 h	0 h	24 h	48 h	72 h	0 h	24 h	48 h	72 h
Lab Control	256.8	25.0	24.5	25.0	25.0	✓	✓	✓	✓
1.5	6.8	25.0	24.5		25.0	✓	✓	✓	✓
3.0	6.7	25.0	24.5		25.0	✓	✓	✓	✓
5.9	6.7	25.0	24.5		25.0	✓	✓	✓	✓
11.9	6.7	25.0	24.5		25.0	✓	✓	✓	✓
23.8	6.7	25.0	24.5		25.0	✓	✓	✓	✓
47.6	6.8	25.0	24.5		25.0	✓	✓	✓	✓
95.2	7.0	25.0	24.5	↓	25.0	✓	✓	✓	✓
Initials	JGh	JGh	[illegible]	[illegible]	JGh	JGh	[illegible]	[illegible]	JGh

Initial control pH: Well 1: 6.8 Well 2: 6.8

Final control pH: Well 1: 6.5 Well 2: 6.5

Light intensity (lux): 3640 Date measured: Sep. 11, 2012

Sample Description: Clear sample

Comments:

Reviewed: A. Tang Date reviewed: November 22, 2012

Pseudokirchneriella subcapitata Toxicity Test Data Sheet
72-h Algal Cell Counts

Client: Rescan Environmental Start Date/Time: Sept. 11, 2012 / 1500 h
Work Order #: 12424 Termination Date: Sept. 14, 2012 / 1500 h
Sample ID: BJ u/s of Camp Test set up by: ECC JGL
%(v/v)

Concentration	Rep	Count 1	Count 2	Count 3	Count 4	Comments	Initials
Lab Control	A	85					JGL
	B	97					
	C	89					
	D	88					
	E	94					
	F	92					
	G	86					
	H	91					
1.5	A	83					
	B	97	90				
	C	86					
	D	84					
3.0	A	98					
	B	91					
	C	94					
	D	89					
5.9	A	97					
	B	106					
	C	97					
	D	93					
11.9	A	135					
	B	129					
	C	141					
	D	136					
23.8	A	159					
	B	147					
	C	155					
	D	163					
47.6	A	184					
	B	179					
	C	191					
	D	184					
95.2	A	179					
	B	185					
	C	177					
	D	182					↓

Comments:

Reviewed by: A. Tang Date Reviewed: November 22, 2012

Pseudokirchneriella subcapitata Algal Counts

Client:	Rescan Environmental	Start Date/Time:	11-Sep-12 @ 15:00 h
WO#:	12424	Termination Date:	14-Sep-12 @ 15:00 h
Sample ID:	BJ u/s of Camp		
		Initial Cell Density:	10000 cell/mL

									220000
									0.22
									0.01
Concentration % v/v	Rep	Count 1 (x 10^4)	Count 2 (x 10^4)	Count 3 (x 10^4)	Count 4 (x 10^4)	Mean (x 10^4)	Cell Yield (x 10^4) cell/mL		10000
Control	A	85				85	84.0	mean	89.3
	B	97				97	96.0	SD	4.062019
	C	89				89	88.0	CV	4.551282
	D	88				88	87.0		
	E	94				94	93.0		
	F	92				92	91.0		
	G	86				86	85.0		
	H	91				91	90.0		
1.48	A	83				83	82.0		
	B	97	90			93.5	92.5		
	C	86				86	85.0		
	D	84				84	83.0		
2.95	A	98				98	97.0		
	B	91				91	90.0		
	C	94				94	93.0		
	D	89				89	88.0		
5.9	A	97				97	96.0		
	B	106				106	105.0		
	C	97				97	96.0		
	D	93				93	92.0		
11.9	A	135				135	134.0		
	B	129				129	128.0		
	C	141				141	140.0		
	D	136				136	135.0		
23.8	A	159				159	158.0		
	B	147				147	146.0		
	C	155				155	154.0		
	D	163				163	162.0		
47.6	A	184				184	183.0		
	B	179				179	178.0		
	C	191				191	190.0		
	D	184				184	183.0		
95.2	A	179				179	178.0		
	B	185				185	184.0		
	C	177				177	176.0		
	D	182				182	181.0		

ART
NOV 22/12

EC Alga Growth Inhibition Test — **Nautilus Environmental**

Analysis ID:	00-8275-8120	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:10	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	11-9573-8819	**Test Type:**	Cell Growth	**Analyst:**	
Start Date:	11 Sep-12	**Protocol:**	EC/EPS 1/RM/25	**Diluent:**	Deionized Water
Ending Date:	14 Sep-12	**Species:**	Pseudokirchneriella subcapitata	**Brine:**	
Duration:	72h	**Source:**	In-House Culture	**Age:**	
Sample ID:	21-2539-4090	**Code:**	BJ u/s of Camp	**Client:**	Rescan
Sample Date:	09 Sep-12	**Material:**	~~Pulp Mill Effluent~~	**Project:**	
Receive Date:	11 Sep-12	**Source:**	Rescan		
Sample Age:	48h	**Station:**			

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	0	C < T	Not Run	2.98	5.95	4.211	33.56	8.26%

Dunnett's Multiple Comparison Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Negative Control		1.49	-1.285	2.526	10	7.371	0.9991	Non-Significant Effect
		2.98	0.9424	2.526	10	7.371	0.5804	Non-Significant Effect
		5.95*	2.742	2.526	10	7.371	0.0312	Significant Effect
		11.9*	15.42	2.526	10	7.371	<0.0001	Significant Effect
		23.8*	22.53	2.526	10	7.371	<0.0001	Significant Effect
		47.6*	32.3	2.526	10	7.371	<0.0001	Significant Effect
		95.2*	31.01	2.526	10	7.371	<0.0001	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value		2.112	2.991	1.0000	No Outliers Detected
Control Trend		0		1.0000	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	53358.55	7622.651	7	335.7	<0.0001	Significant Effect
Error	635.75	22.70536	28			
Total	53994.3	7645.356	35			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.942	18.48	0.9630	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9665	0.9166	0.3368	Normal Distribution

Cell Yield Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	8	89.25	87.7	90.8	84	96	1.436	4.062	4.55%	0.0%
1.49		4	85.5	83.78	87.22	82	92	2.255	4.509	5.27%	4.2%
2.98		4	92	90.51	93.49	88	97	1.958	3.916	4.26%	-3.08%
5.95		4	97.25	95.16	99.34	92	105	2.75	5.5	5.66%	-8.96%
11.9		4	134.3	132.4	136.1	128	140	2.462	4.924	3.67%	-50.42%
23.8		4	155	152.4	157.6	146	162	3.416	6.831	4.41%	-73.67%
47.6		4	183.5	181.6	185.4	178	190	2.466	4.933	2.69%	-105.6%
95.2		4	179.8	178.4	181.1	176	184	1.75	3.5	1.95%	-101.4%

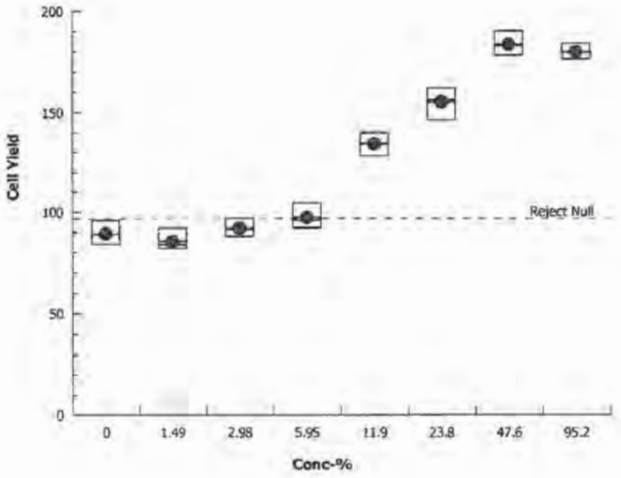
EC Alga Growth Inhibition Test — **Nautilus Environmental**

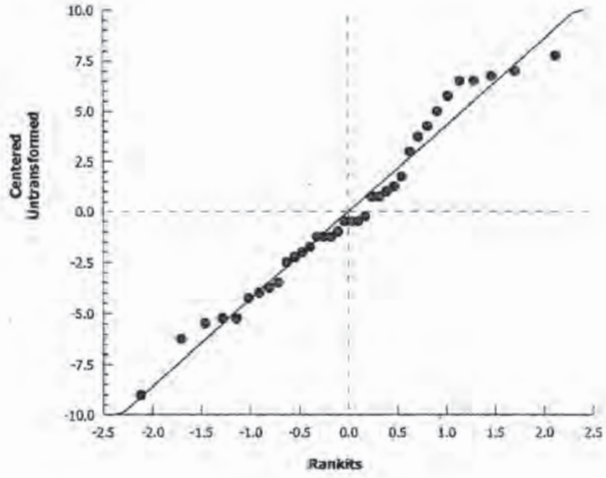
Analysis ID:	00-8275-8120	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:10	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Cell Yield Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	84	96	88	87	93	91	85	90
1.49		82	92	85	83				
2.98		97	90	93	88				
5.95		96	105	96	92				
11.9		134	128	140	135				
23.8		158	146	154	162				
47.6		183	178	190	183				
95.2		178	184	176	181				

Graphics





EC Alga Growth Inhibition Test — **Nautilus Environmental**

Analysis ID:	18-4738-7984	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:10	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	11-9573-8819	**Test Type:**	Cell Growth	**Analyst:**	
Start Date:	11 Sep-12	**Protocol:**	EC/EPS 1/RM/25	**Diluent:**	Deionized Water
Ending Date:	14 Sep-12	**Species:**	Pseudokirchneriella subcapitata	**Brine:**	
Duration:	72h	**Source:**	In-House Culture	**Age:**	
Sample ID:	21-2539-4090	**Code:**	BJ u/s of Camp	**Client:**	Rescan
Sample Date:	09 Sep-12	**Material:**	~~Pulp Mill Effluent~~	**Project:**	
Receive Date:	11 Sep-12	**Source:**	Rescan		
Sample Age:	48h	**Station:**			

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	0	C > T	Not Run	95.2	>95.2	N/A	1.05	8.26%

Dunnett's Multiple Comparison Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Negative Control		1.49	1.285	2.526	10	7.371	0.4088	Non-Significant Effect
		2.98	-0.9424	2.526	10	7.371	0.9965	Non-Significant Effect
		5.95	-2.742	2.526	10	7.371	1.0000	Non-Significant Effect
		11.9	-15.42	2.526	10	7.371	1.0000	Non-Significant Effect
		23.8	-22.53	2.526	10	7.371	1.0000	Non-Significant Effect
		47.6	-32.3	2.526	10	7.371	1.0000	Non-Significant Effect
		95.2	-31.01	2.526	10	7.371	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value		2.112	2.991	1.0000	No Outliers Detected
Control Trend		0		1.0000	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	53358.55	7622.651	7	335.7	<0.0001	Significant Effect
Error	635.75	22.70536	28			
Total	53994.3	7645.356	35			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.942	18.48	0.9630	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9665	0.9166	0.3368	Normal Distribution

Cell Yield Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	8	89.25	87.7	90.8	84	96	1.436	4.062	4.55%	0.0%
1.49		4	85.5	83.78	87.22	82	92	2.255	4.509	5.27%	4.2%
2.98		4	92	90.51	93.49	88	97	1.958	3.916	4.26%	-3.08%
5.95		4	97.25	95.16	99.34	92	105	2.75	5.5	5.66%	-8.96%
11.9		4	134.3	132.4	136.1	128	140	2.462	4.924	3.67%	-50.42%
23.8		4	155	152.4	157.6	146	162	3.416	6.831	4.41%	-73.67%
47.6		4	183.5	181.6	185.4	178	190	2.466	4.933	2.69%	-105.6%
95.2		4	179.8	178.4	181.1	176	184	1.75	3.5	1.95%	-101.4%

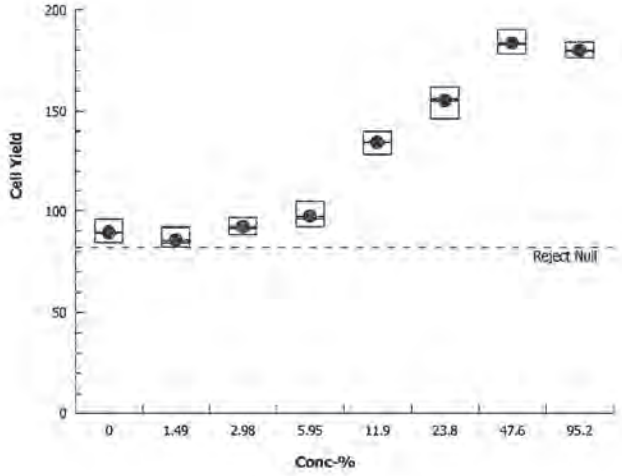
EC Alga Growth Inhibition Test — **Nautilus Environmental**

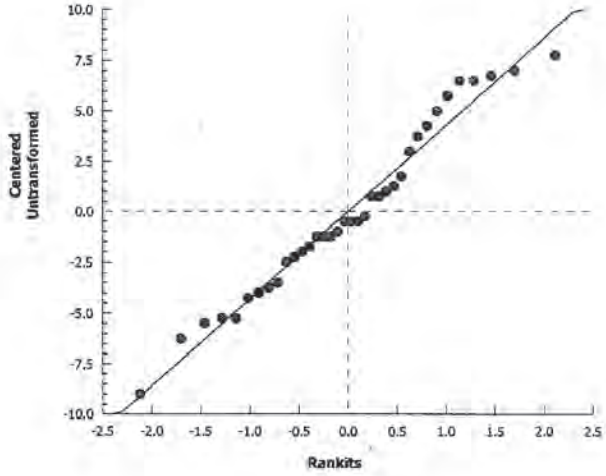
Analysis ID:	18-4738-7984	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:10	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Cell Yield Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	84	96	88	87	93	91	85	90
1.49		82	92	85	83				
2.98		97	90	93	88				
5.95		96	105	96	92				
11.9		134	128	140	135				
23.8		158	146	154	162				
47.6		183	178	190	183				
95.2		178	184	176	181				

Graphics





CETIS Analytical Report

EC Alga Growth Inhibition Test — **Nautilus Environmental**

Analysis ID:	02-5521-7754	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:10	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	11-9573-8819	**Test Type:**	Cell Growth	**Analyst:**	
Start Date:	11 Sep-12	**Protocol:**	EC/EPS 1/RM/25	**Diluent:**	Deionized Water
Ending Date:	14 Sep-12	**Species:**	Pseudokirchneriella subcapitata	**Brine:**	
Duration:	72h	**Source:**	In-House Culture	**Age:**	
Sample ID:	21-2539-4090	**Code:**	BJ u/s of Camp	**Client:**	Rescan
Sample Date:	09 Sep-12	**Material:**	~~Pulp Mill Effluent~~	**Project:**	
Receive Date:	11 Sep-12	**Source:**	Rescan		
Sample Age:	48h	**Station:**			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	836641492	200	Yes	Two-Point Interpolation

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.112	2.991	1.0000	No Outliers Detected
Control Trend	Mann-Kendall Trend	0		1.0000	Non-significant Trend in Controls

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>95.2	N/A	N/A	<1.05	N/A	N/A
IC10	>95.2	N/A	N/A	<1.05	N/A	N/A
IC15	>95.2	N/A	N/A	<1.05	N/A	N/A
IC20	>95.2	N/A	N/A	<1.05	N/A	N/A
IC25	>95.2	N/A	N/A	<1.05	N/A	N/A
IC40	>95.2	N/A	N/A	<1.05	N/A	N/A
IC50	>95.2	N/A	N/A	<1.05	N/A	N/A

Cell Yield Summary

			Calculated Variate						
Conc-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	8	89.25	84	96	1.436	4.062	4.55%	0.0%
1.49		4	85.5	82	92	2.255	4.509	5.27%	4.2%
2.98		4	92	88	97	1.958	3.916	4.26%	-3.08%
5.95		4	97.25	92	105	2.75	5.5	5.66%	-8.96%
11.9		4	134.3	128	140	2.462	4.924	3.67%	-50.42%
23.8		4	155	146	162	3.416	6.831	4.41%	-73.67%
47.6		4	183.5	178	190	2.466	4.933	2.69%	-105.6%
95.2		4	179.8	176	184	1.75	3.5	1.95%	-101.4%

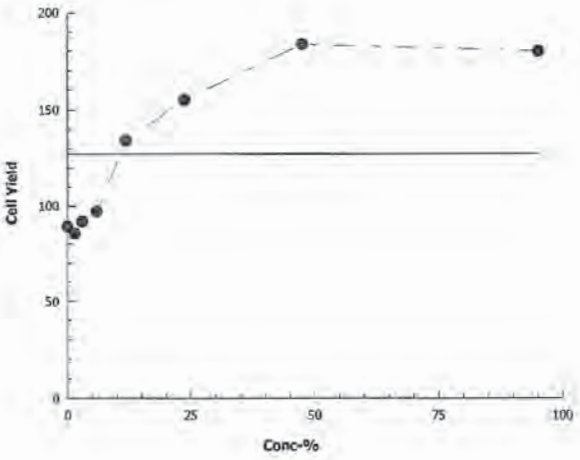
Cell Yield Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	84	96	88	87	93	91	85	90
1.49		82	92	85	83				
2.98		97	90	93	88				
5.95		96	105	96	92				
11.9		134	128	140	135				
23.8		158	146	154	162				
47.6		183	178	190	183				
95.2		178	184	176	181				

EC Alga Growth Inhibition Test — **Nautilus Environmental**

Analysis ID:	02-5521-7754	**Endpoint:**	Cell Yield	**CETIS Version:**	CETISv1.8.0
Analyzed:	19 Sep-12 15:10	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Analyst:_____ QA: 1T KJART KJOV 22/12

APPENDIX C – *Daphnia magna* Toxicity Test Data

Daphnia magna Summary Sheet

Client: Rescan
Work Order No.: 12427

Start Date/Time: Sept 12/12 @ 1650h
Test Species: *Daphnia magna*
Set up by: JW

Sample Information:

Sample ID: Adit
Sample Date: Sept 9/12
Date Received: Sept 11/12
Sample Volume: 7L

Test Validity Criteria:
≥ 90% mean control survival (no more than 2 mortalities in any control replicate)

WQ Ranges:
T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

Test Organism Information:

Broodstock No.: 082912 A+B
Age of young (Day 0): < 24 hours
Avg No. young per brood in previous 7 d: 22
Mortality (%) in previous 7 d: 0
Days to first brood: 8

NaCl Reference Toxicant Results:

Reference Toxicant ID: Dm88
Stock Solution ID: 12NaCl
Date Initiated: Sept 21/12
48-h LC50 (95% CL): 4.2 (3.7-4.8) g/L NaCl

Reference Toxicant Mean and Historical Range: 4.0 (3.6 - 4.4) g/L NaCl
Reference Toxicant CV (%): 5

Test Results: The 48-h LC50 is estimated at 12.0 % (v/v) with 95% confidence limits at 8.0 and 17.6 % (v/v).

Reviewed by: A. Tang

Date reviewed: November 22, 2012

Freshwater Acute
48 Hour Toxicity Test Data Sheet

Client: Rescan
Sample ID: Adit
Work Order No.: 12427

Start Date/Time: Sept 12/12 @ 1650h
No. Organisms/volume: 10/200mL
Test Organism: *D.magna*
Set up by: JW

DO meter: DO-1 pH meter: pH-1 Conductivity meter: C-1

Concentration % (v/v)	Rep	Number of Live Organisms		No. Immobilized	Temperature (°C)			Dissolved oxygen (mg/L)			pH			Conductivity (µS/cm)	
		24	48	48	0	24	48	0	24	48	0	24	48	0	48
Control	A	10	10	0	21.0	19.5	20.0	8.4		8.8	8.0		7.9	374	354
	B														
	C														
	D														
6.25	A	10	9	0	21.0	19.5	20.0	8.2		8.8	8.0		7.8	339371	365
	B														
	C														
	D														
12.5	A	10	10 3	0	21.0	19.5	20.0	8.3		8.8	8.0		7.9	384	377
	B		JW												
	C														
	D														
25	A	10	10 2	0	21.0	19.5	20.0	8.4		8.8	8.0		8.0	409	402
	B		JW												
	C														
	D														
50	A	10	9 0	0	21.0	19.5	20.0	8.4		8.8	8.0		8.0	459	450
	B		JW												
	C														
	D														
100	A	10	10 0	0	21.0	19.5	20.0	8.5		8.8	7.7		8.0	565	551
	B		JW												
	C														
	D														
Technician Initials		KUB	JW	JW	JW	KUB	JW	JW		JW	JW		JW	JW	JW

WQ Ranges: T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

	Hardness*	Alkalinity*
Conc.	*(mg/L as CaCo3)	
Control (MHW)	100	68
Highest conc.	220	106

	Initial WQ	Adjustment	Adjusted WQ
Temp (°C)	21.0		21.0
DO (mg/L)	9.0	2 min aeration	8.5
pH	7.7		7.7
Cond (µS/cm)	565		565

Sample Description: cloudy w/ ppt

Comments: Batch#: 082912 A+B 7-d previous # young/brood: 22 Day of 1st Brood: 8 Previous 7-d % Mortality: 0

Reviewed by: A. Tang Date reviewed: November 22, 2012

Daphnia magna 48-h Acute Survival Test — Nautilus Environmental

Analysis ID:	07-4659-6684	Endpoint:	48h Survival Rate	CETIS Version:	CETISv1.8.4
Analyzed:	19 Sep-12 14:51	Analysis:	Linear Regression (MLE)	Official Results:	Yes
Batch ID:	17-5060-7881	Test Type:	Survival (48h)	Analyst:	Jeslin Wijaya
Start Date:	12 Sep-12 16:50	Protocol:	EPA/821/R-02-012 (2002)	Diluent:	Mod-Hard Synthetic Water
Ending Date:	14 Sep-12 17:00	Species:	Daphnia magna	Brine:	
Duration:	48h	Source:	In-House Culture	Age:	<24h
Sample ID:	16-9875-3673	Code:	6540EC89	Client:	Rescan
Sample Date:	09 Sep-12	Material:	Water Sample	Project:	
Receive Date:	11 Sep-12 12:30	Source:	Rescan		
Sample Age:	89h	Station:	Adit		

Linear Regression Options

Model Function	Threshold Option	Threshold	Optimized	Pooled	Het Corr	Weighted
Log-Angle [Asin(P^0.5)=A+B*log(X)]	Control Threshold	1E-07	Yes	No	No	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
7	-15.36	48.72	36.1	0.4662		0.9208				Lack of Fit Not Tested

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	4.393	1.012	6.979	22.76	14.33	98.86
EC10	5.225	1.492	7.91	19.14	12.64	67.04
EC15	5.992	2.019	8.767	16.69	11.41	49.53
EC20	6.748	2.615	9.626	14.82	10.39	38.25
EC25	7.518	3.292	10.53	13.3	9.496	30.38
EC40	10.05	5.868	13.96	9.949	7.163	17.04
EC50	12.05	7.988	17.55	8.298	5.697	12.52

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	8.87E-08	9.42E-05	-0.00018	0.000185	0.000942	0.9993	Non-Significant Parameter
Slope	1.277	0.3714	0.5495	2.005	3.44	0.0412	Significant Parameter
Intercept	-0.5956	0.4175	-1.414	0.2227	-1.427	0.2490	Non-Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	38.89208	38.89208	1	60.1	0.0045	Significant
Residual	1.941252	0.647084	3			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	1.941	7.815	0.5847	Non-Significant Heterogenity
	Likelihood Ratio GOF	1.996	7.815	0.5733	Non-Significant Heterogenity
Distribution	Shapiro-Wilk W Normality	0.8144	0.5128	0.0788	Normal Distribution

48h Survival Rate Summary — Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	1	1	1	1	0	0	0.0%	0.0%	10	10
6.25		1	0.9	0.9	0.9	0	0	0.0%	10.0%	9	10
12.5		1	0.3	0.3	0.3	0	0	0.0%	70.0%	3	10
25		1	0.2	0.2	0.2	0	0	0.0%	80.0%	2	10
50		1	0	0	0	0	0		100.0%	0	10
100		1	0	0	0	0	0		100.0%	0	10

Analyst:_____ QA: ART Nov 22/12

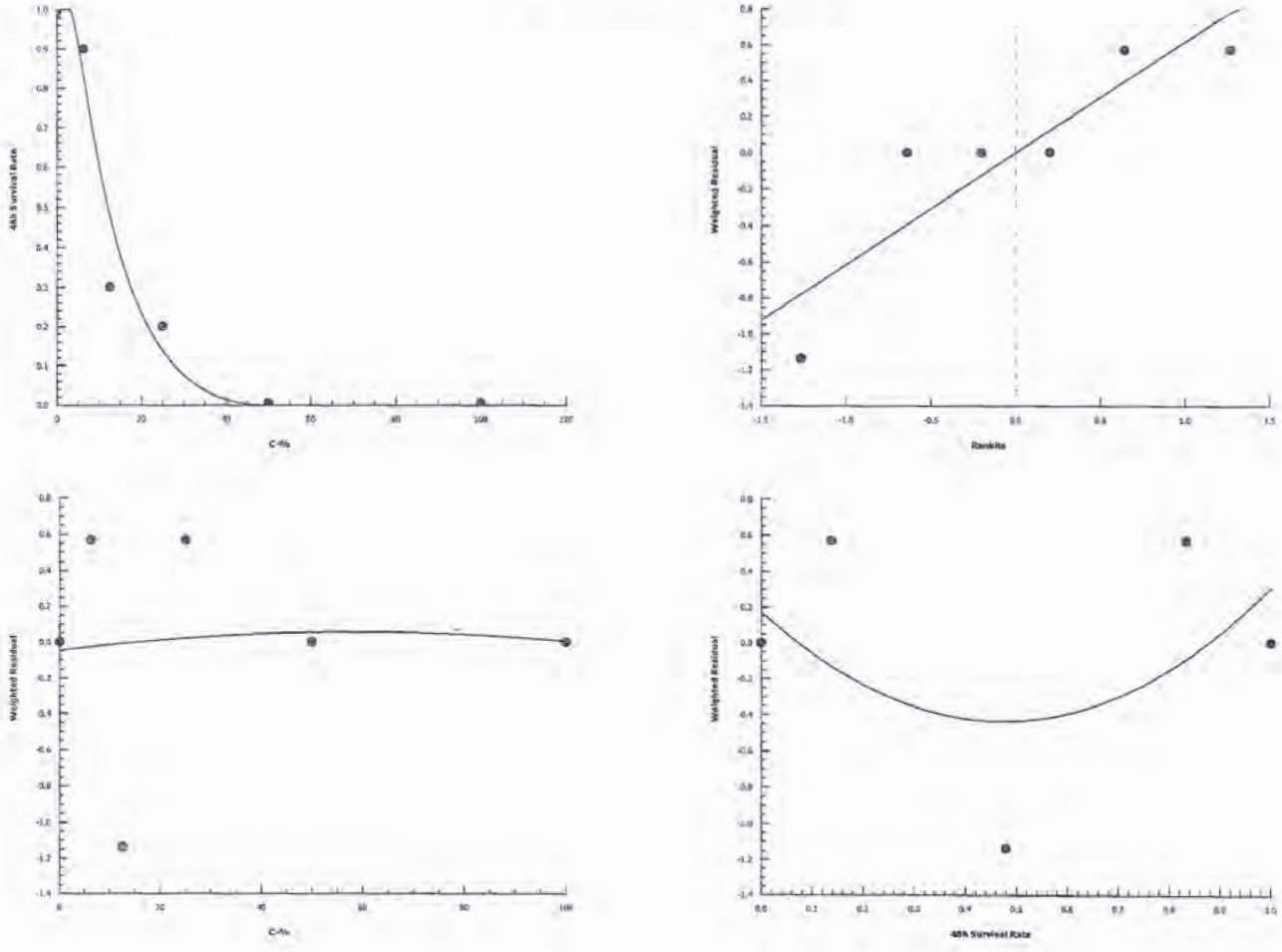
Daphnia magna 48-h Acute Survival Test — **Nautilus Environmental**

Analysis ID:	07-4659-6684	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	19 Sep-12 14:51	**Analysis:**	Linear Regression (MLE)	**Official Results:**	Yes

48h Survival Rate Detail

C-%	Control Type	Rep 1
0	Negative Control	1
6.25		0.9
12.5		0.3
25		0.2
50		0
100		0

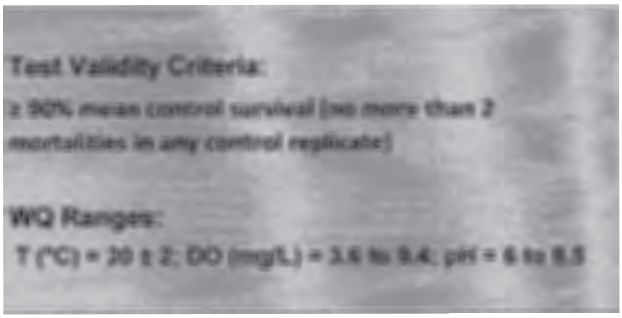
Graphics Log-Angle [Asin(P^0.5)=A+B*log(X)]



Daphnia magna Summary Sheet

Client: Rescan
Work Order No.: 12427

Start Date/Time: Sept 12/12 @ 1645h
Test Species: *Daphnia magna*
Set up by: JW



Sample Information:

Sample ID: BJ2
Sample Date: Sept 9/12
Date Received: Sept 11/12
Sample Volume: 7L

Test Organism Information:

Broodstock No.: 082912 A+B
Age of young (Day 0): < 24 hours
Avg No. young per brood in previous 7 d: 22
Mortality (%) in previous 7 d: 0
Days to first brood: 8

NaCl Reference Toxicant Results:

Reference Toxicant ID: Dm88
Stock Solution ID: 12NaCl
Date Initiated: Sept 21/12
48-h LC50 (95% CL): 4.2 (3.7-4.8) g/LNaCL

Reference Toxicant Mean and Historical Range: 4.0 (3.6-4.4) g/L NaCL
Reference Toxicant CV (%): 5

Test Results: The 48h LC50 is >100% (v/v)

Reviewed by: A. Tang

Date reviewed: November 22, 2012

Freshwater Acute
48 Hour Toxicity Test Data Sheet

Client: Rescan
Sample ID: BJ2
Work Order No.: 12427

Start Date/Time: Sept 12/12 @ 1645h
No. Organisms/volume: 10/200mL
Test Organism: *D.magna*
Set up by: JW

DO meter: DO-1 pH meter: pH-1 Conductivity meter: C-1

Concentration % (v/v)	Rep	Number of Live Organisms		No. Immobilized	Temperature (°C)			Dissolved oxygen (mg/L)			pH			Conductivity (µS/cm)	
		24	48	48	0	24	48	0	24	48	0	24	48	0	48
Control	A	10	10	10	21.0	19.5	20.0	8.4		8.8	8.0		7.9	374	353
	B														
	C														
	D														
6.25	A	10	10	0	21.0	19.5	20.0	8.3		8.7	8.0		7.9	339	336
	B														
	C														
	D														
12.5	A	10	9	0	21.0	19.5	20.0	8.3		8.7	8.1		7.9	324	323
	B														
	C														
	D														
25	A	10	10	0	21.0	19.5	20.0	8.3		8.9	8.0		7.9	291	287
	B														
	C														
	D														
50	A	10	9	0	21.0	19.5	20.0	8.4		8.8	7.9		7.9	224	222
	B														
	C														
	D														
100	A	10	8	0	21.5	19.5	20.0	8.7		8.9	7.5		7.7	84	87
	B														
	C														
	D														
Technician Initials		KLB	JW	JW	JW	KLB	JW	JW		JW	JW		JW	JW	JW

WQ Ranges: T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

	Hardness*	Alkalinity*
Conc.	*(mg/L as CaCo3)	
Control (MHW)	100	68
Highest conc.	30	16

	Initial WQ	Adjustment	Adjusted WQ
Temp (°C)	21.5		21.5
DO (mg/L)	10.1	5 min aeration	8.7
pH	7.5		7.5
Cond (µS/cm)	84		JW ~~84~~ 84

Sample Description: clear w/ ppt

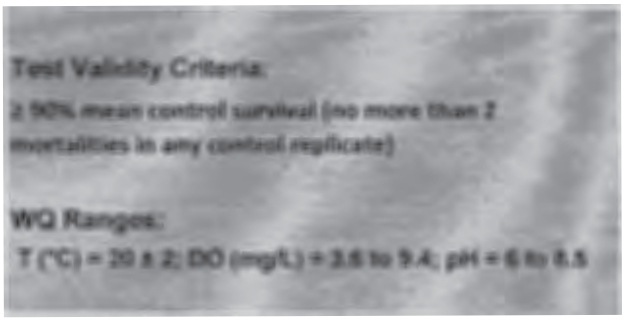
Comments: Batch#: 082912 A+B 7-d previous # young/brood: 22 Day of 1st Brood: 8 Previous 7-d % Mortality: 0

Reviewed by: A. Tang Date reviewed: 19 November 22, 2012

Daphnia magna Summary Sheet

Client: Rescan
Work Order No.: 12427

Start Date/Time: Sept 12/12 @ 1640h
Test Species: *Daphnia magna*
Set up by: JW



Sample Information:

Sample ID: Camp
Sample Date: Sept 9/12
Date Received: Sept 11/12
Sample Volume: 7L

Test Organism Information:

Broodstock No.: 082912 A+B
Age of young (Day 0): < 24 hours
Avg No. young per brood in previous 7 d: 22
Mortality (%) in previous 7 d: 0
Days to first brood: 8

NaCl Reference Toxicant Results:

Reference Toxicant ID: Dm88
Stock Solution ID: 12Na01
Date Initiated: Sept 21/12
48-h LC50 (95% CL): 4.2 (3.7-4.8) g/LNaCL

Reference Toxicant Mean and Historical Range: 4.0 (3.6-4.4) g/L NaCL
Reference Toxicant CV (%): 5

Test Results: The 48h LC50 is >100% (v/v)

Reviewed by: A. Tang

Date reviewed: November 22, 2012

Freshwater Acute
48 Hour Toxicity Test Data Sheet

Client: Rescan
Sample ID: camp
Work Order No.: 12427

Start Date/Time: Sept 12/12 @ 1640h
No. Organisms/volume: 10/200mL
Test Organism: *D.magna*
Set up by: JW

DO meter: DO-1 pH meter: pH-1 Conductivity meter: C-1

Concentration % (v/v)	Rep	Number of Live Organisms		No. Immobilized	Temperature (°C)			Dissolved oxygen (mg/L)			pH			Conductivity (µS/cm)	
		24	48	48	0	24	48	0	24	48	0	24	48	0	48
Control	A	10	10	0	21.0	19.5	20.0	8.4		8.8	8.0		7.9	374	353
	B														
	C														
	D														
6.25	A	10	9	0	21.0	19.5	20.0	8.3		8.7	8.0		8.0	343	344
	B														
	C														
	D														
12.5	A	10	10	0	21.0	19.5	20.0	8.3		8.8	8.0		8.0	329	325
	B														
	C														
	D														
25	A	10	10	0	21.0	19.5	20.0	8.4		8.8	8.0		7.9	298	295
	B														
	C														
	D														
50	A	10	8	0	21.0	19.5	20.0	8.4		8.8	7.9		7.9	239	237
	B														
	C														
	D														
100	A	10	8	0	21.5	19.5	20.0	8.8		8.9	6.7		7.6	128	128
	B														
	C														
	D														
Technician Initials		KLB	JW	JW	JW	KLB	JW	JW		JW	JW		JW	JW	JW

WQ Ranges: T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

	Hardness*	Alkalinity*
Conc.	*(mg/L as CaCo3)	
Control (MHW)	100	68
Highest conc.	42	7

	Initial WQ	Adjustment	Adjusted WQ
Temp (°C)	21.5		21.5
DO (mg/L)	9.9	3 min aeration	8.8
pH	6.7		6.7
Cond (µS/cm)	128		128

Sample Description: light yellow, turbid

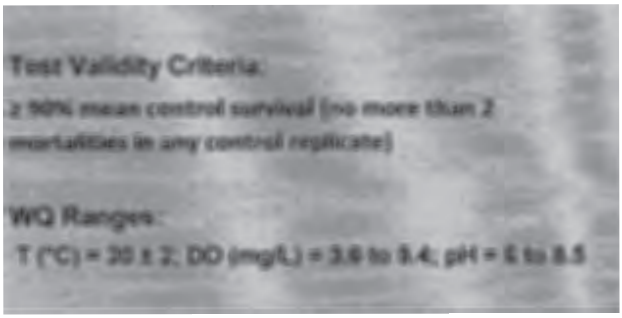
Comments: Batch#: 082912 A+B 7-d previous # young/brood: 22 Day of 1st Brood: 8 Previous 7-d % Mortality: 0

Reviewed by: A. Tang Date reviewed: November 22, 2012

Daphnia magna Summary Sheet

Client: Rescan
Work Order No.: 12427

Start Date/Time: Sept 12/12 @ 1655h
Test Species: *Daphnia magna*
Set up by: JW



Sample Information:

Sample ID: BJ2 u/s of camp
Sample Date: Sept 9/12
Date Received: Sept 11/12
Sample Volume: 7L

Test Organism Information:

Broodstock No.: 082912 A+B
Age of young (Day 0): < 24 hours
Avg No. young per brood in previous 7 d: 22
Mortality (%) in previous 7 d: 0
Days to first brood: 8

NaCl Reference Toxicant Results:

Reference Toxicant ID: Dm88
Stock Solution ID: ~~Sub~~ 12NaCl
Date Initiated: Sept 21/12
48-h LC50 (95% CL): 4.2 (3.7-4.8) g/LNaCL

Reference Toxicant Mean and Historical Range: 4.0 (3.6-4.4) g/L NaCL
Reference Toxicant CV (%): 5

Test Results: The 48h LC50 is >100% (v/v)

Reviewed by: A. Tang

Date reviewed: November 22, 2012

Freshwater Acute
48 Hour Toxicity Test Data Sheet

Client: Rescan
Sample ID: BJ u/s of camp
Work Order No.: 12427

Start Date/Time: Sept 12/12 @ 1655h
No. Organisms/volume: 10/200mL
Test Organism: *D.magna*
Set up by: JW

DO meter: DO-1 pH meter: pH-1 Conductivity meter: C-1

Concentration % (v/v)	Rep	Number of Live Organisms		No. Immobilized	Temperature (°C)			Dissolved oxygen (mg/L)			pH			Conductivity (µS/cm)	
		24	48	48	0	24	48	0	24	48	0	24	48	0	48
Control	A	10	10	0	21.0	19.5	20.0	8.4		8.8	8.0		7.9	374	354
	B														
	C														
	D														
6.25	A	10	9	0	21.0	19.5	20.0	8.2		8.7	8.0		8.0	342	339
	B														
	C														
	D														
12.5	A	10	10	0	21.0	19.5	20.0	8.3		8.7	8.1		8.0	329	326
	B														
	C														
	D														
25	A	10	10	0	21.5	19.5	20.0	8.3		8.8	8.1		7.9	300	296
	B														
	C														
	D														
50	A	10	9	0	22.0	19.5	20.0	8.3		8.8	8.0		7.9	242	240
	B														
	C														
	D														
100	A	10	10	0	22.0	19.5	20.0	8.0		8.9	7.6		7.8	121	119
	B														
	C														
	D														
Technician Initials		KB	JW	JW	JW	KB	JW	JW		JW	JW		JW	JW	JW

WQ Ranges: T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

	Hardness*	Alkalinity*
Conc.	*(mg/L as CaCo3)	
Control (MHW)	100	68
Highest conc. (100%)	24	14
Hardness adj. (100%)	30	24

	Initial WQ	Adjustment	Adjusted WQ
Temp (°C)	21.0		22.0
DO (mg/L)	10.1		8.0
pH	7.3		7.6
Cond (µS/cm)	55	Hardness adj.	121

Sample Description: clear.

Comments: Batch#: 082912A+B 7-d previous # young/brood: 22 Day of 1st Brood: 8 Previous 7-d % Mortality: 0

Reviewed by: L. Tang Date reviewed: November 22, 2012

APPENDIX D - Chain–of-Custody Form

Nautilus Environmental

BRITISH COLUMBIA
8664 Commerce Court
Burnaby British Columbia Canada V5A 4N7
Phone 604.420.8773
Fax 604.357.1361

Chain of Custody

0647

Date 09-Sept-2012 Page 1 of 1

Sample Collection by: Allegra Cairns (Rescan)

Report to:
Company Rescan Environmental
Address 1111 W. Hastings
City Vancouver Prov. BC PC
Contact Allegra Cairns.
Phone No. acairns@rescan.com

Invoice to:
Company same as report
Address
City Prov. PC
Contact
Phone No.

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NUMBER OF CONTAINERS	COMMENTS	ANALYSIS REQUIRED: Selenastrum	Ceriodaphnia 7-d	Acute D.magna	RECEIPT TEMPERATURE (°C)
Adit	09 Sept 2012					7L of water	WO: 124424	124425	124427	3.7
BJ 2	09 Sept 2012							124426		3.6
Camp	09 Sept 2012							124425		3.5
BJ u/s of camp	09 Sept 2012							124426		4.3

PROJECT INFORMATION	SAMPLE RECEIPT
CLIENT	TOTAL NO. OF CONTAINERS
P.O. NO.	REC'D GOOD CONDITION
SHIPPED VIA:	

SPECIAL INSTRUCTIONS/COMMENTS:
Project # 1042.008.08 (Bruejack)

RELINQUISHED BY (CLIENT)	RELINQUISHED BY (COURIER)
(Signature) Sept 10th	(Signature) (Time)
(Printed Name) Allegra Cairns 2012 (Time)	(Printed Name) (Date)
(Company) Rescan Environmental. 7:30 am	(Company)

RECEIVED BY (COURIER)	RECEIVED BY (LABORATORY)
(Signature) (Time)	(Signature) Jacob (Time)
(Printed Name) (Date)	(Printed Name) Nautilus Sept 11/12 @1230 (Date)
(Company)	

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Appendix 2.1-2. Analytical Results for Water Quality Used in Toxicity Assays, 2012

Sample ID			BJ U/S of CC Stream	Camp Creek Stream	Adit Effluent	BJ2 Stream
Date Sampled		Detection	9-Sep-2012	9-Sep-2012	9-Sep-2012	9-Sep-2012
ALS Sample ID	Units	Limit	L1207295-3	L1207295-2	L1207295-1	L1207295-5
Physical Tests						
Colour, True	CU	5.0	<5.0	<5.0	<5.0	<5.0
Conductivity	µS/cm	2.0	53.9	113	548	78.9
Hardness (as $CaCO_3$)	mg/L	0.50	23.2	43.4	147	29.3
pH	pH	0.10	7.72	7.55	8.09	7.66
Total Suspended Solids	mg/L	1.0	<3.0	608	302	65.4
Total Dissolved Solids	mg/L	10	30	70	352	38
Turbidity	NTU	0.10	4.18	487	291	50.9
Anions and Nutrients						
Acidity (as $CaCO_3$)	mg/L	1.0	2	2.1	2.7	2.2
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	2.0	13.3	7.5	103	16.8
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as $CaCO_3$)	mg/L	2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as $CaCO_3$)	mg/L	2.0	13.3	7.5	103	16.8
Ammonia, Total (as N)	mg/L	0.0050	<0.0050	0.0384	1.41	0.021
Bromide (Br)	mg/L	0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	0.50	<0.50	<0.50	1.52	<0.50
Fluoride (F)	mg/L	0.020	<0.020	0.047	0.343	0.032
Nitrate (as N)	mg/L	0.0050	<0.0050	0.0242	3.34	0.104
Nitrite (as N)	mg/L	0.0010	<0.0010	<0.0010	0.0677	0.0014
Total Kjeldahl Nitrogen	mg/L	0.050	<0.050	0.316	1.4	0.155
Total Nitrogen	mg/L	0.050	<0.050	0.34	3.85	0.26
Orthophosphate-Dissolved (as P)	mg/L	0.0010	<0.0010	0.0012	0.0026	0.0011
Phosphorus (P)-Total	mg/L	0.0020	0.0041	0.716	0.465	0.0975
Sulphate (SO_4)	mg/L	0.50	10.6	41	160	19.6
Cyanides						
Cyanide, Total	mg/L	0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cyanide, Weak Acid Diss	mg/L	0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic / Inorganic Carbon						
Total Organic Carbon	mg/L	0.50	<0.50	2.5	1.44	1.36
Total Metals						
Aluminum (Al)	mg/L	0.0030	0.122	7.91	3.13	1.26
Antimony (Sb)	mg/L	0.00010	0.00024	0.00337	0.00864	0.00096
Arsenic (As)	mg/L	0.00010	0.00098	0.0858	0.0383	0.0115
Barium (Ba)	mg/L	0.000050	0.0349	0.343	0.226	0.0627
Beryllium (Be)	mg/L	0.00010	<0.00010	0.00031	0.00021	<0.00010
Bismuth (Bi)	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	0.010	<0.010	<0.010	0.112	<0.010
Cadmium (Cd)	mg/L	0.000010	0.00002	0.00036	0.00038	0.00012
Calcium (Ca)	mg/L	0.020	9.19	17.6	54.8	10.7
Chromium (Cr)	mg/L	0.00010	0.0001	0.00185	0.00329	0.0007
Cobalt (Co)	mg/L	0.00010	0.00014	0.00728	0.00312	0.0009
Copper (Cu)	mg/L	0.00050	<0.00050	0.0193	0.0116	0.0039
Iron (Fe)	mg/L	0.030	0.125	25.2	6.97	2.58
Lead (Pb)	mg/L	0.000050	0.000332	0.0332	0.0445	0.00549
Lithium (Li)	mg/L	0.00050	<0.00050	0.0118	0.184	0.00857
Magnesium (Mg)	mg/L	0.0050	0.31	3.05	5.01	0.764
Manganese (Mn)	mg/L	0.000050	0.047	0.979	0.643	0.133
Mercury (Hg)	mg/L	0.000010	<0.000010	0.000288	0.000037	0.000024
Molybdenum (Mo)	mg/L	0.000050	0.000313	0.00157	0.00416	0.000613
Nickel (Ni)	mg/L	0.00050	<0.00050	0.00229	0.00433	0.00059
Phosphorus (P)	mg/L	0.30	<0.30	0.89	0.44	<0.30

Appendix 2.1-2. Analytical Results for Water Quality Used in Toxicity Assays, 2012

Sample ID			BJ U/S of CC Stream	Camp Creek Stream	Adit Effluent	BJ2 Stream
Date Sampled		Detection	9-Sep-2012	9-Sep-2012	9-Sep-2012	9-Sep-2012
ALS Sample ID	Units	Limit	L1207295-3	L1207295-2	L1207295-1	L1207295-5
Total Metals *(cont'd)*						
Potassium (K)	mg/L	0.050	0.132	2.2	4.68	0.705
Selenium (Se)	mg/L	0.00010	0.0001	0.00096	0.00046	0.00021
Silicon (Si)	mg/L	0.050	0.74	9.59	8.24	2.84
Silver (Ag)	mg/L	0.000010	0.000027	0.00358	0.00591	0.000879
Sodium (Na)	mg/L	2.0	<2.0	<2.0	55.2	3
Strontium (Sr)	mg/L	0.00020	0.0557	0.0989	1.29	0.102
Thallium (Tl)	mg/L	0.000010	<0.000010	0.00025	0.000185	0.000052
Tin (Sn)	mg/L	0.00010	<0.00010	0.00017	<0.00010	<0.00010
Titanium (Ti)	mg/L	0.010	<0.010	0.073	0.065	0.025
Uranium (U)	mg/L	0.000010	0.000024	0.000432	0.000672	0.000125
Vanadium (V)	mg/L	0.0010	<0.0010	0.0122	0.0083	0.0022
Zinc (Zn)	mg/L	0.0030	<0.0030	0.0603	0.0576	0.0128
Dissolved Metals						
Dissolved Metals Filtration Location	-	-	LAB	LAB	LAB	LAB
Aluminum (Al)	mg/L	0.0030	0.0169	0.0126	0.0661	0.261
Antimony (Sb)	mg/L	0.00010	0.0002	0.00022	0.0032	0.00042
Arsenic (As)	mg/L	0.00010	0.00031	0.00021	0.00404	0.00265
Barium (Ba)	mg/L	0.000050	0.0313	0.0295	0.0236	0.0371
Beryllium (Be)	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	0.010	<0.010	<0.010	0.108	<0.010
Cadmium (Cd)	mg/L	0.000010	0.000068	0.000049	<0.000010	0.000052
Calcium (Ca)	mg/L	0.020	8.82	16.2	51.3	10.8
Chromium (Cr)	mg/L	0.00010	<0.00010	<0.00010	0.00011	0.00018
Cobalt (Co)	mg/L	0.00010	0.00021	0.0005	0.00067	0.0003
Copper (Cu)	mg/L	0.00050	<0.00050	<0.00050	<0.00050	0.00068
Iron (Fe)	mg/L	0.030	<0.030	<0.030	<0.030	0.555
Lead (Pb)	mg/L	0.000050	<0.000050	<0.000050	0.000092	0.00117
Lithium (Li)	mg/L	0.00050	<0.00050	0.0021	0.187	0.00805
Magnesium (Mg)	mg/L	0.0050	0.292	0.738	4.55	0.536
Manganese (Mn)	mg/L	0.000050	0.0428	0.257	0.437	0.0846
Mercury (Hg)	mg/L	0.000010	<0.000010	<0.000010	<0.000010	0.00001
Molybdenum (Mo)	mg/L	0.000050	0.000304	0.000185	0.00264	0.000417
Nickel (Ni)	mg/L	0.00050	<0.00050	<0.00050	0.00078	<0.00050
Phosphorus (P)	mg/L	0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)	mg/L	0.050	0.087	0.419	3.58	0.355
Selenium (Se)	mg/L	0.00010	<0.00010	<0.00010	0.00011	0.00011
Silicon (Si)	mg/L	0.050	0.52	0.747	2.9	1.19
Silver (Ag)	mg/L	0.000010	<0.000010	<0.000010	<0.000010	0.000109
Sodium (Na)	mg/L	2.0	<2.0	<2.0	55.5	2.9
Strontium (Sr)	mg/L	0.00020	0.0535	0.0853	1.27	0.101
Thallium (Tl)	mg/L	0.000010	<0.000010	0.000015	0.000056	0.000015
Tin (Sn)	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)	mg/L	0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)	mg/L	0.000010	0.000021	<0.000010	0.000581	0.000052
Vanadium (V)	mg/L	0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)	mg/L	0.0030	0.0046	<0.0030	<0.0030	0.0033

Nautilus Environmental

Toxicity testing on samples identified as BJ u/s, Camp Creek (CC), Adit, BJ2, and BJ4

Samples collected August 13, 2013

Final Report

Report date:
October 10, 2013

Submitted to:

Rescan Environmental Services Ltd.
Vancouver, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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APPENDIX C – Chain of Custody Form

SIGNATURE PAGE

Jeslin Wijaya, B.Sc.
Laboratory Biologist

James Elphick, R.P.Bio.
Senior Reviewer

This report has been prepared based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental conducted sub-lethal and acute toxicity tests for Rescan Environmental Services Ltd. on five samples identified as BJ u/s, Camp Creek (CC), Adit, BJ2, and BJ4. All five samples were collected on August 13, 2013 and delivered to the laboratory in Burnaby, BC on August 15, 2013. Samples BJ u/s, Adit, BJ2, and BJ4 were transported in two 20-L plastic containers, and Camp Creek (CC) was transported in forty 1-L bottles. Samples were received at a temperature of 11.2°C and were stored in the dark at 4 ± 2°C prior to testing. The following toxicity tests were conducted on the samples:

- *Ceriodaphnia dubia* survival and reproduction
- 48-h *Daphnia magna* LC50

This report describes the results of these toxicity tests. Copies of laboratory data sheets and printouts of statistical analyses for each test are provided in Appendices A and B. The chain-of-custody form is provided in Appendix C.

2.0 METHODS

Methods for the toxicity tests are summarized in Tables 1 and 2. Testing was conducted according to procedures described by Environment Canada (2000 and 2007). Statistical analyses for all tests were performed using CETIS (Tidepool Scientific Software, 2012).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	*Ceriodaphnia dubia*
Test organism source	In-house culture
Test organism age	<24 h old neonates produced within 12 h
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20 mL test tube
Test volume	15 mL
Test replicates	10 test replicates per treatment
Number of organisms	1 per replicate
Control water	20% Perrier water
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	*Pseudokirchneriella subcapitata* and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada (2007a), EPS 1/RM/21
Statistical software	CETIS (2012)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods
Reference toxicant	Sodium chloride

Table 2. Summary of test conditions: 48-h *Daphnia magna* LC50 test.

Test organism	*Daphnia magna*
Test organism source	In-house culture
Test organism age	<24 h
Test type	Static
Test duration	48 h
Test vessel	250 mL glass beakers
Test volume	200 mL
Test replicates	1 per treatment
No. of organisms	10 per replicate
Control water	Moderately hard reconstituted water
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada (2000b), EPS 1/RM/14
Statistical software	CETIS (2012)
Test endpoint	48-h LC50
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride

3.0 RESULTS

The results of toxicity tests conducted using C. dubia are provided in Tables 3 through 7. The LC50 for survival of *C. dubia* in samples BJ u/s, Adit, BJ2, and BJ4, was >100%; however, reduced survival observed in the sample identified as Camp Creek (CC) resulted in an LC50 of 77.0% in this sample. For the reproduction endpoint, Sample BJ2 produced an IC25 value of greater than the highest concentration in this sample (i.e., >100). Sample BJ4 exhibited the largest adverse effect, producing an IC25 of 9.7% sample. BJ u/s, Camp Creek (CC) and Adit were relatively similar in toxicity, producing IC25 values ranging from 63.4 to 80.8% sample.

There were no adverse effects observed on survival of *D. magna* in any of the samples, resulting in LC50 values of greater than the highest concentration tested (i.e., >100%) (Table 8).

Table 3. Toxicity test results: *Ceriodaphnia dubia* test with sample BJ u/s.

Concentration (% v/v)	Survival (%)	Reproduction (Mean ± SD)
Control	100	15.0 ± 3.5
5	100	14.9 ± 3.6
10	100	15.8 ± 3.5
20	100	15.0 ± 2.8
40	100	14.7 ± 4.1
60	100	14.4 ± 3.4
80	90	11.5 ± 5.6
100	80	6.6 ± 4.9
Test endpoint (%)		
LC50	>100	--
IC25 (95% CL)	--	80.8 (69.1 - 89.5)
IC50 (95% CL)	--	96.1 (87.8 - >100)

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits

Table 4. Toxicity test results: *Ceriodaphnia dubia* test with sample Camp Creek (CC).

Concentration (% v/v)	Survival (%)	Reproduction (Mean ± SD)
Control	100	14.5 ± 5.1
5	100	15.3 ± 4.3
10	100	19.3 ± 5.0
20	100	18.5 ± 6.2
40	90	20.6 ± 7.8
60	80	11.7 ± 8.6
80	40	5.9 ± 7.9
100	20	4.1 ± 8.8
Test endpoint (%)		
LC50 (95% CL)	77.0 (62.8 – 90.4)	--
IC25 (95% CL)	--	63.4 (55.7 – 72.9)
IC50 (95% CL)	--	75.2 (65.6 – 89.8)

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits

Table 5. Toxicity test results: *Ceriodaphnia dubia* test with sample Adit.

Concentration (% v/v)	Survival (%)	Reproduction (Mean ± SD)
Control	100	16.9 ± 2.7
5	100	17.4 ± 5.2
10	100	19.1 ± 3.8
20	100	16.8 ± 2.6
40	100	17.1 ± 4.6
60	100	16.0 ± 5.4
80	90	12.3 ± 5.8
100	80	9.9 ± 5.8
Test endpoint (%)		
LC50	>100	--
IC25 (95% CL)	--	77.6 (63.3 – 89.9)
IC50	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits

Table 6. Toxicity test results: *Ceriodaphnia dubia* test with sample BJ2.

Concentration (% v/v)	Survival (%)	Reproduction (Mean ± SD)
Control	80	15.4 ± 8.7
5	100	20.8 ± 2.7
10	90	17.3 ± 6.6
20	100	19.3 ± 3.7
40	90	19.8 ± 2.7
60	80	18.8 ± 7.7
80	100	19.0 ± 3.7
100	80	12.8 ± 7.9
Test endpoint (%)		
LC50	>100	--
IC25	--	>100
IC50	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL= Confidence Limits

Table 7. Toxicity test results: *Ceriodaphnia dubia* test with sample BJ4.

Concentration (% v/v)	Survival (%)	Reproduction (Mean ± SD)
Control	100	24.1 ± 3.8
5	100	20.7 ± 1.8
10	100	17.1 ± 2.4
20	90	14.7 ± 4.1
40	100	10.7 ± 3.2
60	90	5.4 ± 4.2
80	90	4.5 ± 3.3
100	90	4.2 ± 4.2
Test endpoint (%)		
LC50	>100	--
IC25 (95% CL)	--	9.7 (7.0 – 12.8)
IC50 (95% CL)	--	28.5 (24.1 – 33.4)

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL= Confidence Limits

Table 8. Toxicity test results: *Daphnia magna* LC50 test.

Concentration	Survival (%)				
(%v/v)	BJ u/s	Camp Creek (CC)	Adit	BJ2	BJ4
Control	100	100	100	100	100
6.25	100	100	100	100	100
12.5	100	100	100	100	100
25	100	100	100	100	100
50	100	100	100	100	100
100	100	100	100	100	100
Test endpoint (%)					
LC50	>100	>100	>100	>100	>100

LC = Lethal Concentration

4.0 QA/QC

The health history of the test organisms used in the exposures was acceptable and met the requirements of the Environment Canada protocols. The tests met all control acceptability criteria and water quality parameters remained within acceptable ranges specified in the protocols throughout the tests. There were no deviations from the test methodologies. Uncertainty associated with these tests is best described by the confidence intervals around the IC25 and IC50 estimates.

Results of the reference toxicant tests conducted during the testing program are summarized in Table 9. Results for these tests fell within the acceptable range for organisms performance of mean and two standard deviation range, based on historical results obtained by the laboratory with these tests. Thus, the sensivity of the organisms used in these tests was appropriate.

Table 9. Reference toxicant test results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
C. dubia	Survival (IC50): 2.0 g/L NaCl	1.7 (1.1 – 2.5)	23	August 21, 2013
	Reproduction (IC50): 1.5 g/L NaCl	1.2 (0.8 – 1.7)	21	
D. magna	Survival (LC50): 4.2 g/L NaCl	4.0 (3.7 – 4.3)	4	August 8, 2013

IC = Inhibition Concentration, LC = Lethal Concentration, SD = Standard Deviation, CV = Coefficient of Variation.

5.0 REFERENCES

Environment Canada. 2000b. Biological test method: reference method for determining acute lethality of effluents to *Daphnia magna.* Environmental Protection Series. Report EPS 1/RM/14, Second Edition, December 2000. Environment Canada, Method Development and Application Section, Environmental Technology Centre, Ottawa, ON. 21 pp.

Environment Canada. 2007a. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. Report EPS 1/RM/21, Second Edition, February 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 74 pp.

Tidepool Scientific Software. 2012. CETIS comprehensive environmental toxicity information system, version 1.8.4.29 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: Rescan / Ertn
Work Order No.: 13417

Start Date/Time: August 16, 2013 @ 1245h
Set up by: KLP

Sample Information:

Sample ID: BJ U/S
Sample Date: August 13 / 13
Date Received: August 15 / 13
Sample Volume: 2 x 20L

Test Validity Criteria:

1) Mean survival of first generation controls is ≥80 %
2) At least 60% of controls have produced three broods within 8 days
3) An average of ≥15 live young produced per surviving female in the control solutions during the first three broods.
4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 080713
Age of young (Day 0): <24-h (within 12-h)
Avg No. young in first 3 broods of previous 7 d: 17
Mortality (%) in previous 7 d: 2.5
Individual female # used ≥8 young on test day: 1, 3, 5, 6, 9, 21, 26, 30, 31, 40

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd 101
Stock Solution ID: 13 NaCl 02
Date Initiated: August 21 / 13

7-d LC50 (95% CL): 2.0 (1.7 - 2.3) g/L NaCL
7-d IC50 (95% CL): 1.5 (1.2 - 1.8) g/L NaCL

7-d LC50 Reference Toxicant Mean and Historical Range: 1.7 (1.1 - 2.5) g/L NaCL CV (%): 23
7-d IC50 Reference Toxicant Mean and Historical Range: 1.2 (0.8 - 1.7) g/L NaCL CV (%): 21

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	> 100	
IC25 % (v/v) (95% CL)		80.8 (69.1 - 89.5)
IC50 % (v/v) (95% CL)		96.1 (87.8 - > 100)

JW

Reviewed by: JCh
Date reviewed: Sep. 24/13

Chronic Freshwater Toxicity Test
Initial and Final Water Quality Measurements

Client: Rescan
Sample ID: BJ U/S
Work Order #: 13417

Start Date & Time: August 16/13 @ 1245
Stop Date & Time: August 23/13 @ 1300h
Test Species: *Ceriodaphnia dubia*

%(v/v) Concentration control	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.5	24.0	24.5	24.0	24.5
DO (mg/L)	8.2	6.7	8.2	7.3	8.1	6.8	8.3	7.4	8.0	6.9	8.3	7.8	8.2	6.9
pH	7.8	7.7	8.0	7.7	8.2	7.9	8.1	7.7	8.1	7.7	8.2	7.8	8.1	7.6
Cond. (µS/cm)	205	207		206		207		207		210		212		206
Initials	KLP	AW		AW		EMM		EMM		EMM		EMM		KLP

Concentration 5	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.5	24.0	24.5	24.0	24.5
DO (mg/L)	8.2	6.8	8.2	7.0	8.2	6.4	8.1	7.4	7.7	6.9	8.1	7.5	8.2	6.9
pH	7.9	7.8	8.1	7.8	8.0	7.8	8.2	7.7	8.2	7.7	8.0	7.8	8.0	7.5
Cond. (µS/cm)	199	197		200		200		205		201		202		199
Initials	KLP	AW		AW		EMM		EMM		EMM		EMM		KLP

Concentration 40	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.5	24.0	24.5	24.0	24.5
DO (mg/L)	8.2	6.9	8.3	6.8	8.2	6.2	8.0	7.4	7.7	6.6	8.1	7.3	8.2	7.0
pH	8.0	7.8	8.1	7.8	8.1	7.7	8.1	7.6	8.2	7.6	7.9	7.7	8.0	7.5
Cond. (µS/cm)	149	148		146		149		150		150		153		157
Initials	KLP	AW		AW		EMM		EMM		EMM		EMM		KLP

Concentration 100	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.5	24.5	24.5	24.0	24.5
DO (mg/L)	8.2	6.9	8.3	6.7	8.3	6.8	8.0	7.4	7.8	6.9	8.0	7.4	8.2	7.1
pH	8.1	7.8	8.2	7.9	8.2	7.4	7.9	7.4	7.7	7.4	7.3	7.3	7.9	7.6
Cond. (µS/cm)	57	53		54		54		54		55		55		59
Initials	KLP	AW		AW		EMM		EMM		EMM		EMM		KLP

	Control	100%(v/v)		
Hardness*	98	26		
Alkalinity*	86	16		

* mg/L as CaCO3

Analysts: KLP, EMM, AWD.
Reviewed by: JGH
Date reviewed: Sept. 24/13

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L) ; pH = 6 to 8.5

Sample Description: clear

Comments: Broodboard Used: 080713

Chronic Freshwater Toxicity Test
C. dubia Reproduction Data

Client: Rescan
Sample ID: BJ 415
Work Order: 13417

Start Date & Time: August 16/13 @ 1245
Stop Date & Time: August 23/13 @ 1300h
Set up by: KLP/EMM

% (v/v)

Concentration: Control

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AM
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	✓	3	✓	✓	✓	3	4	2	4	3	KLP
5	4	✓	4	4 JW	4	✓	✓	5	✓	✓	KLP
6	7	6	8	~~86~~	6	7	8	✓	6	6	YYL
7	6	6	✓	✓	✓	7	9	8	7	7	KLP
8											
Total	17	15	12	10	10	17	21	15	17	16	KLP

Concentration: 5

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AM
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KLP
5	4	5	6	4	5	5	6	6	4	4	KLP
6	7	9	7 JW	✓	8	✓	8	10	✓	✓	YYL
7	10	✓	✓	9	8	10	✓	✓	8	6	KLP
8											
Total	21	14	13	13	21	15	14	16	12	10	KLP

Concentration: 10

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AM
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	3	✓	✓	✓	2	✓	✓	✓	4	✓	KLP
5	✓	4	4	5	7	6	3	6	✓	5	KLP
6	5	7	8	10	✓	9	10	✓	7	7	YYL
7	8	✓	10	✓	11	✓	✓	10	7	✓	KLP
8						15 JW				12 JW	
Total	16	11	22	15	20	~~14~~	13	16	18	~~14~~	KLP

Concentration: 20

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AM
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	✓	✓	✓	✓	3	✓	✓	✓	✓	✓	KLP
5	4	5	3	4	✓	5	4	6	6	6	KLP
6	7	7	10	✓	7	9	✓	8	✓	9	YYL
7	~~11~~ JW	7	✓	9	10	✓	10	✓	11	✓	KLP
8											
Total	11	19	13	13	20	14	14	14	17	15	KLP

Concentration: 40

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AM
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	✓	✓	✓	✓	✓	✓	1	✓	✓	✓	KLP
5	✓	4	6	4	4	4	✓	6	6	4	KLP
6	6	✓	9	✓	8	10	6	10	9	7	YYL
7	10	7	✓	7	✓	✓	11	8	✓	✓	KLP
8								24			
Total	16	11	15	11	12	14	18	~~25~~ JW	15	11	KLP

Concentration: 60

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AM
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KLP
5	4	6	5	4	6	6	5	6	3	4	KLP
6	✓	✓	6	7	✓	7	✓	✓	8	6	YYL
7	6	11	✓	✓	9	✓	9	8	8	10	KLP
8											
Total	10	17	11	11	15	13	14	14	19	20	KLP

Concentration: 80

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AM
3	✓	✓	✓	✓	✓	✓	✓	|	✓	✓	EMM
4	✓	✓	✓	✓	✓	✓	✓	|	✓	✓	KLP
5	4	4	4	4	4	4	4	|	4	5	KLP
6	✓	6	✓	✓	✓	7	5	|	✓	9	YYL
7	8	✓	8	8	7	12	✓	|	8	✓	KLP
8								|			
Total	12	10	12	12	11	23	9	~~05~~	12	14	KLP

Concentration: 100

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AM
2	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	AM
3	X	✓	✓	✓	✓	✓	|	✓	✓	✓	EMM
4	|	✓	✓	✓	✓	✓	|	✓	✓	✓	KLP
5	|	4	3	✓	✓	✓	|	4	4	4	KLP
6	|	✓	✓	✓	5	4	|	✓	✓	✓	YYL
7	|	6	6	✓	6	5	|	6	8	1	KLP
8	|						|				
Total	~~05~~	10	9	0	11	9	~~05~~	10	12	5	KLP

Concentration:

Days	A	B	C	D	E	F	G	H	I	J	Init
1											
2											
3											
4											
5											
6											
7											
8											
Total											

Notes: X = mortality.

Sample Description: clear

Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JGh

Date reviewed: Sep. 17/13

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	10-0812-0029	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	26 Aug-13 9:41	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	05-4821-7786	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Jeslin Wijaya
Start Date:	16 Aug-13 12:45	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	23 Aug-13 13:00	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	7d 0h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	01-3124-0736	**Code:**	7D29320	**Client:**	Rescan
Sample Date:	13 Aug-13 16:50	**Material:**	Water Sample	**Project:**	
Receive Date:	15 Aug-13 12:30	**Source:**	Rescan		
Sample Age:	68h (11.2 °C)	**Station:**	BJ u/s		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1303814	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	69.29	63.56	N/A	1.443	NA	1.573
EC10	80	67.33	N/A	1.25	NA	1.485
EC15	89.45	71.31	N/A	1.118	NA	1.402
EC20	100	75.53	N/A	1	NA	1.324
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary — Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
5		10	1	1	1	0	0	0.0%	0.0%	10	10
10		10	1	1	1	0	0	0.0%	0.0%	10	10
20		10	1	1	1	0	0	0.0%	0.0%	10	10
40		10	1	1	1	0	0	0.0%	0.0%	10	10
60		10	1	1	1	0	0	0.0%	0.0%	10	10
80		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
100		10	0.8	0	1	0.1333	0.4216	52.7%	20.0%	8	10

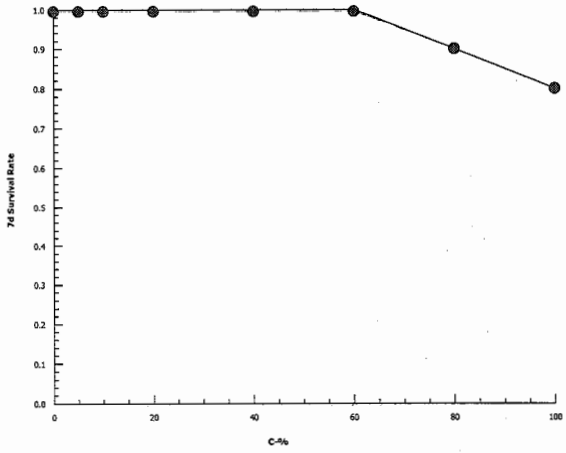
7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
5		1	1	1	1	1	1	1	1	1	1
10		1	1	1	1	1	1	1	1	1	1
20		1	1	1	1	1	1	1	1	1	1
40		1	1	1	1	1	1	1	1	1	1
60		1	1	1	1	1	1	1	1	1	1
80		1	1	1	1	1	1	1	0	1	1
100		0	1	1	1	1	1	0	1	1	1

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	10-0812-0029	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	26 Aug-13 9:41	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	02-7357-8818	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.4
Analyzed:	26 Aug-13 9:37	**Analysis:**	Nonlinear Regression	**Official Results:**	Yes
Batch ID:	05-4821-7786	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Jeslin Wijaya
Start Date:	16 Aug-13 12:45	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	23 Aug-13 13:00	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	7d 0h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	01-3124-0736	**Code:**	7D29320	**Client:**	Rescan
Sample Date:	13 Aug-13 16:50	**Material:**	Water Sample	**Project:**	
Receive Date:	15 Aug-13 12:30	**Source:**	Rescan		
Sample Age:	68h (11.2 °C)	**Station:**	BJ u/s		

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Log-Logistic EV [Y=A/(1+(X/D)^C)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
14	-147	300.3	307.1	0.3421	Yes	0.08326	2.342	0.9947	Non-Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	60.28	N/A	72.11	1.659	1.387	NA
IC10	67.85	N/A	78.74	1.474	1.27	NA
IC15	73.01	48.37	83.21	1.37	1.202	2.067
IC20	77.16	61.86	86.62	1.296	1.154	1.617
IC25	80.75	69.1	89.48	1.238	1.118	1.447
IC40	90.13	82.4	97.67	1.11	1.024	1.214
IC50	96.11	87.83	105.2	1.041	0.9509	1.139

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	15.1	0.543	14.04	16.16	27.81	<0.0001	Significant Parameter
C	6.312	2.255	1.893	10.73	2.799	0.0065	Significant Parameter
D	96.11	4.443	87.4	104.8	21.63	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	649.4158	649.4158	1	43.09	<0.0001	Significant
Lack of Fit	6.671703	1.334341	5	0.08326	0.9947	Non-Significant
Pure Error	1153.9	16.02639	72			
Residual	1160.572	15.07236	77			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	6.163	14.07	0.5208	Equal Variances
	Mod Levene Equality of Variance	0.3282	2.14	0.9387	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9865	0.9691	0.5646	Normal Distribution
	Anderson-Darling A2 Normality	0.3825	2.492	0.4027	Normal Distribution

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	02-7357-8818	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.4
Analyzed:	26 Aug-13 9:37	**Analysis:**	Nonlinear Regression	**Official Results:**	Yes

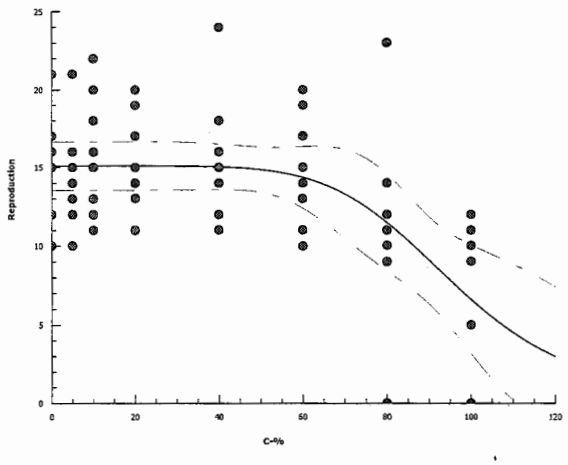
Reproduction Summary

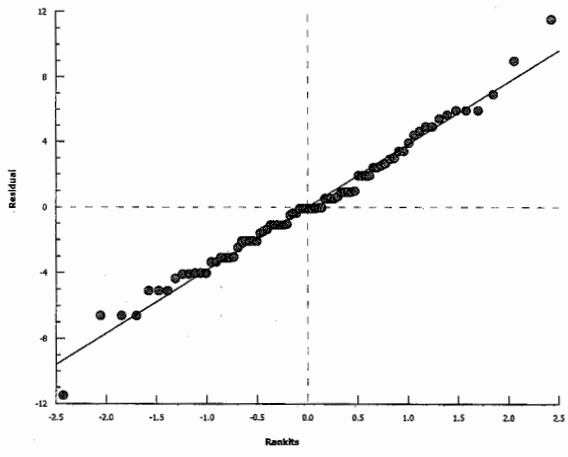
			Calculated Variate						
C-%	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**
0	Negative Control	10	15	10	21	1.095	3.464	23.09%	0.0%
5		10	14.9	10	21	1.14	3.604	24.19%	0.67%
10		10	15.8	11	22	1.093	3.458	21.88%	-5.33%
20		10	15	11	20	0.8944	2.828	18.86%	0.0%
40		10	14.7	11	24	1.283	4.057	27.6%	2.0%
60		10	14.4	10	20	1.077	3.406	23.65%	4.0%
80		10	11.5	0	23	1.765	5.583	48.55%	23.33%
100		10	6.6	0	12	1.551	4.904	74.3%	56.0%

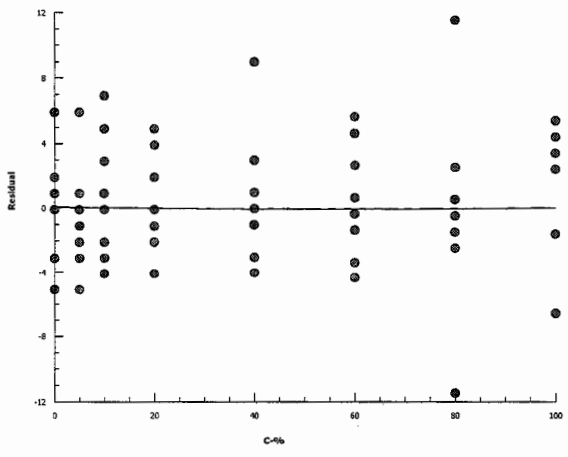
Reproduction Detail

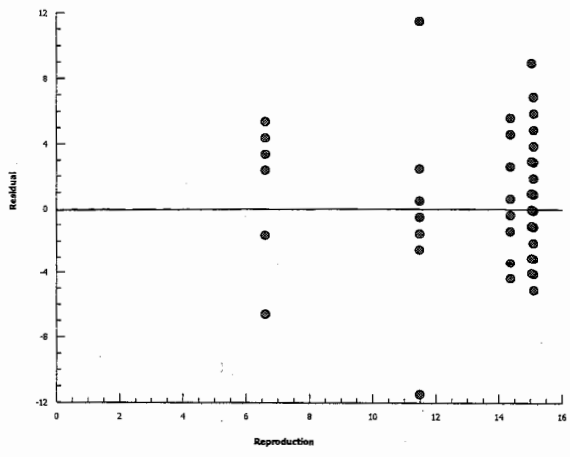
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	17	15	12	10	10	17	21	15	17	16
5		21	14	13	13	21	15	14	16	12	10
10		16	11	22	15	20	15	13	16	18	12
20		11	19	13	13	20	14	14	14	17	15
40		16	11	15	11	12	14	18	24	15	11
60		10	17	11	11	15	13	14	14	19	20
80		12	10	12	12	11	23	9	0	12	14
100		0	10	9	0	11	9	0	10	12	5

Graphics — 3P Log-Logistic EV [Y=A/(1+(X/D)^C)]









Ceriodaphnia dubia Summary Sheet

Client: Rescan / Erm
Work Order No.: 13417

Start Date/Time: August 16, 2013 @ 1200h
Set up by: KLP

Sample Information:

Sample ID: Camp Creek (CC)
Sample Date: August 13, 2013
Date Received: August 15, 2013
Sample Volume: 1 x 40L

Test Validity Criteria:

1) Mean survival of first generation controls is ≥80 %
2) At least 60% of controls have produced three broods within 8 days
3) An average of ≥15 live young produced per surviving female in the control solutions during the first three broods.
4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 080213
Age of young (Day 0): <24-h (within 12-h)
Avg No. young in first 3 broods of previous 7 d: 27
Mortality (%) in previous 7 d: JW ~~0~~ 5
Individual female # used ≥8 young on test day: 1, 2, 4, 5, 7, 9, 10, 14, 17, 20

NaCl Reference Toxicant Results:

Reference Toxicant ID: Cd 101
Stock Solution ID: 13NaCl02
Date Initiated: August 21, 2013

7-d LC50 (95% CL): 2.0 (1.7 - 2.3) g/L NaCL
7-d IC50 (95% CL): 1.5 (1.2 - 1.8) g/L NaCL

7-d LC50 Reference Toxicant Mean and Historical Range: 1.7 (1.1 - 2.5) g/L NaCL CV (%): 23
7-d IC50 Reference Toxicant Mean and Historical Range: 1.2 (0.8 - 1.7) g/L NaCL CV (%): 21

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	77.0 (62.8 - 90.4) JW	
IC25 % (v/v) (95% CL)		63.4 (55.7 - 72.9)
IC50 % (v/v) (95% CL)		75.2 (65.6 - 89.8)

Reviewed by: JBL
Date reviewed: Sept. 24/13

Chronic Freshwater Toxicity Test
Initial and Final Water Quality Measurements

Client: Rescan
Sample ID: camp creek (CCC)
Work Order #: 13417

Start Date & Time: August 16/13 @ 1200
Stop Date & Time: Aug 23/13 @ 1700h
Test Species: *Ceriodaphnia dubia*

% (v/v) Concentration: control	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.5	24.0	24.5	24.0	24.5	24.0	25.5
DO (mg/L)	8.2	6.7	8.2	7.3	8.1	7.0	8.3	7.2	8.0	6.9	8.3	7.0	8.2	7.5
pH	7.8	7.7	8.0	7.7	8.2	7.9	8.1	7.9	8.1	7.7	8.2	7.7	8.1	7.6
Cond. (µS/cm)	205	207		206		207		207		210		212		210
Initials	KLP	AWD		AWD		EMM		EMM		EMM		EMM		EMM

Concentration: 5	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.5	24.0	24.5	24.0	24.5	24.0	25.5
DO (mg/L)	8.1	7.1	8.2	7.2	8.2	7.1	8.2	7.3	7.7	6.8	8.2	6.7	8.0	7.6
pH	8.1	7.7	8.1	7.7	8.1	7.9	8.1	7.9	8.2	7.6	7.9	7.6	8.1	7.7
Cond. (µS/cm)	198	201		204		198		200		203		203		205
Initials	KLP	AWD		AWD		EMM		EMM		EMM		EMM		EMM

Concentration: 40	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.5	24.0	24.5	24.0	24.5	24.0	25.5
DO (mg/L)	8.1	7.0	8.2	7.2	8.3	7.1	8.1	7.3	7.7	6.6	8.2	6.4	8.3	7.7
pH	8.1	7.6	8.1	7.5	8.2	7.6	8.1	7.6	8.2	7.5	7.8	7.5	7.9	7.8
Cond. (µS/cm)	141	145		143		142		143		143		145		169
Initials	KLP	AWD		AWD		EMM		EMM		EMM		EMM		EMM

Concentration: 100	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.5	24.0	24.5	24.5	24.5	24.0	25.5
DO (mg/L)	8.1	7.0	8.3	7.3	8.3	7.1	8.1	7.5	7.7	6.9	8.1	6.8	7.9	7.5
pH	8.1	7.6	8.2	7.4	8.3	7.2	8.0	7.3	7.2	7.1	6.9	7.0	7.2	7.8
Cond. (µS/cm)	38	36		37		35		36		35		37		40
Initials	KLP	AWD		AWD		EMM		EMM		EMM		EMM		EMM

	Control	100% (v/v)		
Hardness*	98	18		
Alkalinity*	86	4		

* mg/L as CaCO3

Analysts: JW, EMM, KLP, AWD

Reviewed by: JW

Date reviewed: Sep-24/13

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L) ; pH = 6 to 8.5

Sample Description: clear

Comments: **Broodboard Used:** 080213

Chronic Freshwater Toxicity Test
C. dubia Reproduction Data

Client: Rescan.
Sample ID: Camp Creek (CC)
Work Order: 13417

Start Date & Time: August 16/13 @ 1200
Stop Date & Time:
Set up by: KL/EMM

% (v/v)

Concentration: Control

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AD
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AD
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	✓	✓	✓	✓	✓	✓	✓	3	2	✓	KLP
5	4	4	4	4	3	2	4	✓	✓	3	KLP
6	5	6	5	6	6	✓	7	7	8	✓	KLP
7	8	9	✓	✓	10	5	8	9	7	6	EMM
8											
Total	17	19	9	10	19	7	19	19	17	9	EMM

Concentration: 5

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AD
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AD
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	✓	✓	✓	✓	✓	✓	✓	✓	3	✓	KLP
5	4	3	4	2	3	3	2	✓	3	3	KLP
6	6	7	6	5	7	5	7	7	5	7	KLP
7	8	✓	10	9	11	7	✓	7	9	✓	EMM
8											
Total	18	10	20	16	21	15	9	17	17	10	EMM

Concentration: 10

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AD
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AD
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	✓	✓	✓	✓	✓	✓	✓	4	✓	4	KLP
5	4	3	5	4	3	3	4	✓	5	✓	KLP
6	9	6	9	7	5	7	6	8	8	6	KLP
7	12	7	11	9	✓	8	7	9	10	10	EMM
8											
Total	25	16	25	20	8	18	17	21	23	20	EMM

Concentration: 20

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AD
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AD
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	✓	✓	✓	✓ 5 juv	✓	✓	✓	✓	✓	✓	KLP
5	3	4	4	2 3 juv	✓	3	4	✓	5	3	KLP
6	4	7	7	✓	9	7	8	7	9	8	KLP
7	8	9	10	✓	11	9	10	10	6	12	EMM
8											
Total	15	20	21	3	25	19	22	17	20	23	EMM

Concentration: 40

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AD
2	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	AD
3	✓	✓		✓	✓	✓	✓	✓	✓	✓	EMM
4	✓	✓		✓	✓	5	✓	✓	✓	✓	KLP
5	3	3		2	3	3 juv	3	2	4	4	KLP
6	6	9		9	9	10	7	10	8	9	KLP
7	10	12		10	11	14	10	9 JW9	12	12	JW
8											
Total	19	24	0 X	21	23	29	20	21	24	25	JW

Concentration: 60

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AD
2	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	AD
3	✓		X	✓	✓	✓	✓	✓	✓	✓	EMM
4	✓			3	3	✓	4	✓	2	✓	KLP
5	✓			✓	✓	3	✓	3	✓	2	KLP
6	5			6	6	5	6	3	7	✓	KLP
7	10			11	10	12	7	✓	9	✓	JW
8											
Total	15	0 X	0 X	20	19	20	17	6	18	2	JW

Concentration: 80

Days	A	B	C	D	E	F	G	H	I	J	Init
1	X	✓	✓	✓	X	X	✓	✓	✓	✓	AD
2		✓	4	✓			✓	✓	✓	X	AD
3		X		✓			✓	✓	✓		EMM
4				✓			2	✓	✓		KLP
5				✓			✓	2	✓		KLP
6				3			4	7	4		KLP
7				8			11	10	8		EMM
8											
Total	0 X	0 X	0 X	11	0 X	0 X	17	19	12	0 X	JW

Concentration: 100

Days	A	B	C	D	E	F	G	H	I	J	Init
1	X	X	✓	✓	X	X	✓	✓	✓	✓	AD
2	|	|	X	X	|	|	X	✓	X	✓	AD
3	|	|	|	|	|	|	|	✓	|	✓	EMM
4	|	|	|	|	|	|	|	✓	|	✓	KLP
5	|	|	|	|	|	|	|	4	|	2	KLP
6	|	|	|	|	|	|	|	9	|	5	KLP
7	|	|	|	|	|	|	|	11	|	10	EMM
8											
Total	0 X	0 X	0 X	0 X	0 X	0 X	0 X	24	0 X	17	EMM

Concentration:

Days	A	B	C	D	E	F	G	H	I	J	Init
1											
2											
3											
4											
5											
6											
7											
8											
Total											

Notes: X = mortality.

Sample Description: clear
Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JGL

Date reviewed: Sep. 17/13

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	13-7897-1838	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	26 Aug-13 10:04	**Analysis:**	Linear Regression (MLE)	**Official Results:**	Yes
Batch ID:	09-8419-0786	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Jeslin Wijaya
Start Date:	16 Aug-13 12:00	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	23 Aug-13 17:00	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	7d 5h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	04-8428-8921	**Code:**	1CDDA999	**Client:**	Rescan
Sample Date:	13 Aug-13 18:30	**Material:**	Water Sample	**Project:**	
Receive Date:	15 Aug-13 12:30	**Source:**	Rescan		
Sample Age:	65h (11.2 °C)	**Station:**	Camp Creek (CC)		

Linear Regression Options

Model Function	Threshold Option	Threshold	Optimized	Pooled	Het Corr	Weighted
Log-Gompertz [log(-log(1-P)=A+B*log(X)]	Control Threshold	1E-07	No	Yes	No	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
4	-20.28	46.95	44.71	1.933		0.9858				Lack of Fit Not Tested

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	36.05	12.52	49.31	2.774	2.028	7.986
EC10	44.46	20.06	56.85	2.249	1.759	4.985
EC15	50.45	26.56	62.11	1.982	1.61	3.765
EC20	55.33	32.53	66.46	1.807	1.505	3.074
EC25	59.58	38.15	70.36	1.678	1.421	2.621
EC40	70.43	53.62	81.65	1.42	1.225	1.865
EC50	76.98	62.79	90.45	1.299	1.106	1.593

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Slope	7.903	2.267	3.459	12.35	3.486	0.0131	Significant Parameter
Intercept	-15.27	4.33	-23.76	-6.787	-3.528	0.0124	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	40.65552	40.65552	1	485.7	<0.0001	Significant
Residual	0.502274	0.083712	6			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	0.5023	12.59	0.9978	Non-Significant Heterogenity
	Likelihood Ratio GOF	0.5721	12.59	0.9968	Non-Significant Heterogenity
Distribution	Shapiro-Wilk W Normality	0.929	0.6805	0.5070	Normal Distribution
	Anderson-Darling A2 Normality	0.3446	2.492	0.4901	Normal Distribution

7d Survival Rate Summary — Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
5		10	1	1	1	0	0	0.0%	0.0%	10	10
10		10	1	1	1	0	0	0.0%	0.0%	10	10
20		10	1	1	1	0	0	0.0%	0.0%	10	10
40		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
60		10	0.8	0	1	0.1333	0.4216	52.7%	20.0%	8	10
80		10	0.4	0	1	0.1633	0.5164	129.1%	60.0%	4	10
100		10	0.2	0	1	0.1333	0.4216	210.8%	80.0%	2	10

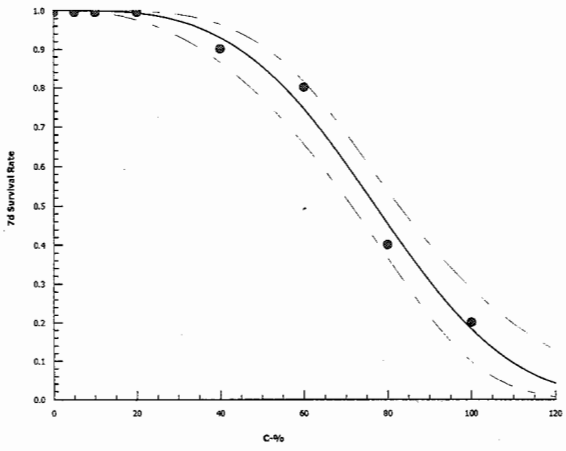
Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

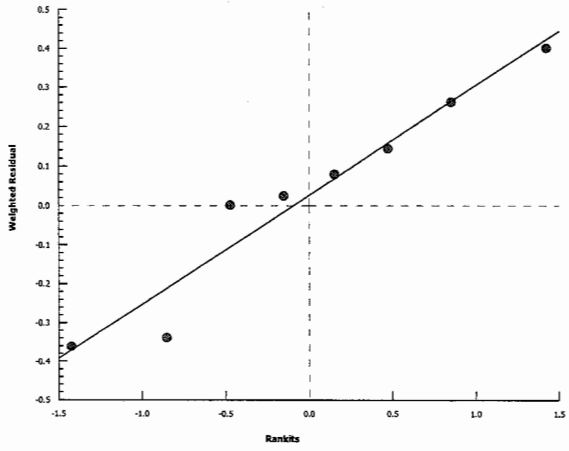
Analysis ID: 13-7897-1838 **Endpoint:** 7d Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 26 Aug-13 10:04 **Analysis:** Linear Regression (MLE) **Official Results:** Yes

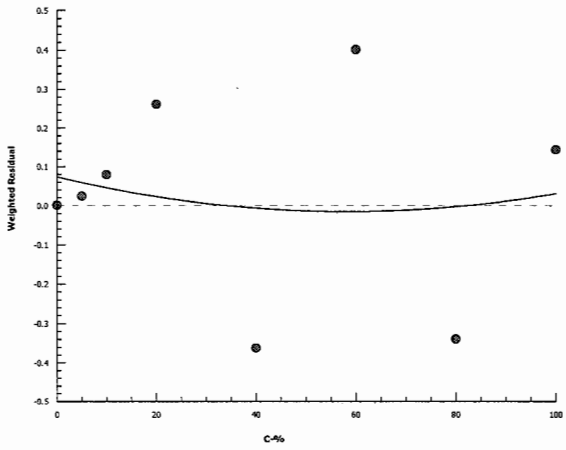
7d Survival Rate Detail

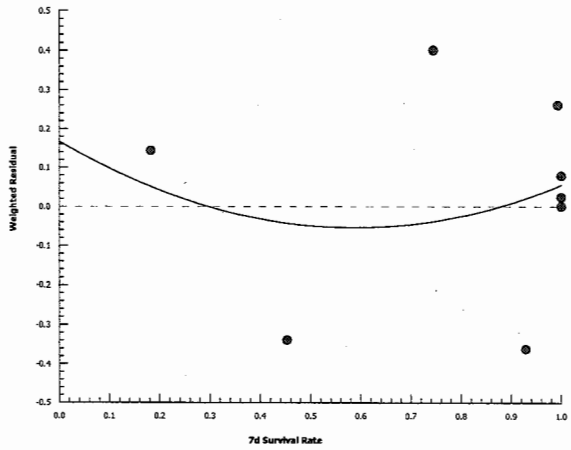
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
5		1	1	1	1	1	1	1	1	1	1
10		1	1	1	1	1	1	1	1	1	1
20		1	1	1	1	1	1	1	1	1	1
40		1	1	0	1	1	1	1	1	1	1
60		1	0	0	1	1	1	1	1	1	1
80		0	0	0	1	0	0	1	1	1	0
100		0	0	0	0	0	0	0	1	0	1

Graphics Log-Gompertz [log(-log(1-P)=A+B*log(X)]









CETIS Analytical Report

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	03-5669-2846	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.4
Analyzed:	26 Aug-13 10:05	**Analysis:**	Nonlinear Regression	**Official Results:**	Yes
Batch ID:	09-8419-0786	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Jeslin Wijaya
Start Date:	16 Aug-13 12:00	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	23 Aug-13 17:00	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	7d 5h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	04-8428-8921	**Code:**	1CDDA999	**Client:**	Rescan
Sample Date:	13 Aug-13 18:30	**Material:**	Water Sample	**Project:**	
Receive Date:	15 Aug-13 12:30	**Source:**	Rescan		
Sample Age:	65h (11.2 °C)	**Station:**	Camp Creek (CC)		

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
4P Log-Logistic+Hormesis EV [Y=A(1+EX)/(1+(2ED+1)(X/D)^C)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
8	-191.4	391.3	400.3	0.3965	Yes	0.4072	2.499	0.8029	Non-Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	56	N/A	65.01	1.786	1.538	NA
IC10	57.78	N/A	66.8	1.731	1.497	NA
IC15	59.59	N/A	68.68	1.678	1.456	NA
IC20	61.47	N/A	70.7	1.627	1.414	NA
IC25	63.41	55.69	72.91	1.577	1.372	1.796
IC40	69.94	61.59	81.4	1.43	1.228	1.624
IC50	75.17	65.63	89.81	1.33	1.114	1.524

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	14.62	1.669	11.34	17.89	8.758	<0.0001	Significant Parameter
C	4.027	1.007	2.054	6	4.001	0.0001	Significant Parameter
D	75.17	6.617	62.21	88.14	11.36	<0.0001	Significant Parameter
E	0.01944	0.01247	-0.005	0.04387	1.559	0.1232	Non-Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	2544.091	2544.091	1	54.91	<0.0001	Significant
Lack of Fit	77.89609	19.47402	4	0.4072	0.8029	Non-Significant
Pure Error	3443.5	47.82639	72			
Residual	3521.396	46.33416	76			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	8.812	14.07	0.2664	Equal Variances
	Mod Levene Equality of Variance	0.4954	2.14	0.8349	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9784	0.9691	0.1947	Normal Distribution
	Anderson-Darling A2 Normality	0.6017	2.492	0.1193	Normal Distribution

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID: 03-5669-2846 **Endpoint:** Reproduction **CETIS Version:** CETISv1.8.4
Analyzed: 26 Aug-13 10:05 **Analysis:** Nonlinear Regression **Official Results:** Yes

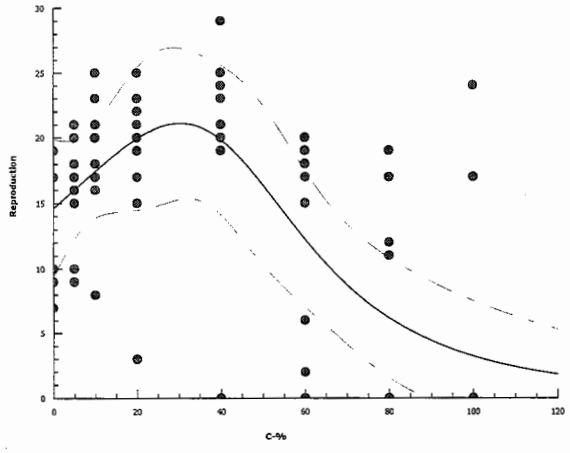
Reproduction Summary

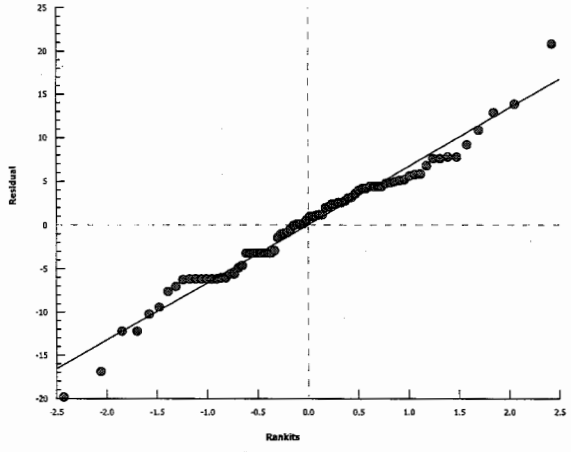
			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	14.5	7	19	1.6	5.061	34.9%	0.0%
5		10	15.3	9	21	1.35	4.27	27.91%	-5.52%
10		10	19.3	8	25	1.592	5.034	26.08%	-33.1%
20		10	18.5	3	25	1.945	6.151	33.25%	-27.59%
40		10	20.6	0	29	2.464	7.792	37.82%	-42.07%
60		10	11.7	0	20	2.729	8.629	73.75%	19.31%
80		10	5.9	0	19	2.51	7.937	134.5%	59.31%
100		10	4.1	0	24	2.783	8.8	214.6%	71.72%

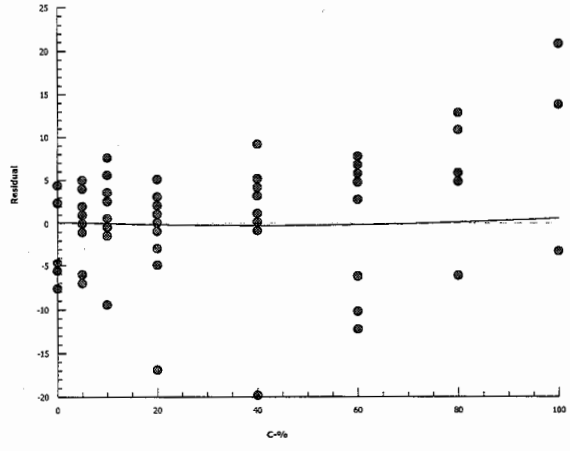
Reproduction Detail

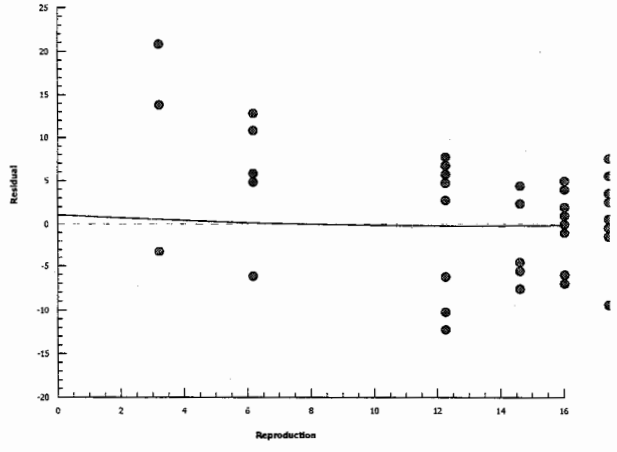
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	17	19	9	10	19	7	19	19	17	9
5		18	10	20	16	21	15	9	17	17	10
10		25	16	25	20	8	18	17	21	23	20
20		15	20	21	3	25	19	22	17	20	23
40		19	24	0	21	23	29	20	21	24	25
60		15	0	0	20	19	20	17	6	18	2
80		0	0	0	11	0	0	17	19	12	0
100		0	0	0	0	0	0	0	24	0	17

Graphics 4P Log-Logistic+Hormesis EV [Y=A(1+EX)/(1+(2ED+1)(X/D)^C)]









Ceriodaphnia dubia Summary Sheet

Client: Rescan / Erm
Work Order No.: 13417

Start Date/Time: August 16, 2013 @ 1300h
Set up by: KLP

Sample Information:

Sample ID: Adit
Sample Date: August 13, 2013
Date Received: August 15, 2013
Sample Volume: 2 x 20L

Test Validity Criteria:

1) Mean survival of first generation controls is ≥80 %
2) At least 60% of controls have produced three broods within 8 days
3) An average of ≥15 live young produced per surviving female in the control solutions during the first three broods.
4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 080913
Age of young (Day 0): <24-h (within 12-h)
Avg No. young in first 3 broods of previous 7 d: 20
Mortality (%) in previous 7 d: 5
Individual female # used ≥8 young on test day: 6, 21, 22, 25, 30, 31, 34, 37.

NaCl Reference Toxicant Results:

Reference Toxicant ID: Cd 101
Stock Solution ID: 13NaCl
Date Initiated: August 21 / 13

7-d LC50 (95% CL): 2.0 (1.7 - 2.3) g/L NaCL
7-d IC50 (95% CL): 1.5 (1.2 - 1.8) g/L NaCL

7-d LC50 Reference Toxicant Mean and Historical Range: 1.7 (1.1 - 2.5) g/L NaCL CV (%): 23
7-d IC50 Reference Toxicant Mean and Historical Range: 1.2 (0.8 - 1.7) g/L NaCL CV (%): 21

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	> 100	
IC25 % (v/v) (95% CL)		77.6 (63.3 - 89.9)
IC50 % (v/v) (95% CL)		> 100

Reviewed by: JGL
Date reviewed: Sept. 16/13

Chronic Freshwater Toxicity Test
Initial and Final Water Quality Measurements

Client: Rescan
Sample ID: adit
Work Order #: 13417

Start Date & Time: August 16/13 @ 1300
Stop Date & Time: August 23/13 @ 1200h
Test Species: *Ceriodaphnia dubia*

% (v/v) Concentration: control	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.5	24.0	25.0	24.0	25.0	24.0	24.5
DO (mg/L)	8.2	6.7	8.2	7.3	8.1	7.0	8.3	7.0	8.0	6.6	8.3	6.7	8.2	7.1
pH	7.8	7.7	8.0	7.7	8.2	8.0	8.1	7.8	8.1	7.4	8.2	7.8	8.1	7.4
Cond. (µS/cm)	205	207		206		206		207		210		212		212
Initials	KLP	AS		AS		EMM		EMM		EMM		EMM		KLP

Concentration: 5	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.5	24.0	25.0	24.0	25.0	24.0	24.5
DO (mg/L)	8.0	7.1	8.1	7.2	8.1	7.0	8.0	7.1	7.7	6.8	8.2	6.8	8.0	7.0
pH	8.1	8.0	8.1	8.0	8.0	7.9	8.1	7.8	8.2	7.3	7.9	7.7	8.1	7.2
Cond. (µS/cm)	221	224		226		223		221		221		226		225
Initials	KLP	AS		AS		EMM		EMM		EMM		EMM		KLP

Concentration: 40	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.5	24.0	25.0	24.0	25.0	24.0	24.5
DO (mg/L)	8.0	7.0	8.1	7.2	8.2	7.1	8.0	7.0	7.8	6.9	8.2	6.6	8.0	7.0
pH	8.1	8.0	8.2	8.1	8.1	8.0	8.2	7.8	8.2	7.2	8.0	7.8	8.0	7.4
Cond. (µS/cm)	332	326		323		330		331		341		328		339
Initials	KLP	AS		AS		EMM		EMM		EMM		EMM		KLP

Concentration: 100	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.5	24.0	25.0	24.0	25.0	24.0	24.5
DO (mg/L)	8.2	7.0	8.3	7.1	8.2	7.1	8.2	6.8	7.8	6.9	8.1	6.7	8.0	6.9
pH	8.1	8.0	8.3	8.1	8.2	8.0	8.1	7.8	8.1	7.4	8.0	7.9	7.9	7.5
Cond. (µS/cm)	532	529		530		540		542		540		533		527
Initials	KLP	AS		AS		EMM		EMM		EMM		EMM		KLP

	Control	100% (v/v)		
Hardness*	98	180		
Alkalinity*	86	124		

* mg/L as CaCO3

Analysts: KLP, AWD, EMM
Reviewed by: JGL
Date reviewed: Sept. 16/13

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L) ; pH = 6 to 8.5

Sample Description: Slightly turbid

Comments: Broodboard Used: 080913

Chronic Freshwater Toxicity Test
C. dubia Reproduction Data

Client: Rescan
Sample ID: Adit
Work Order: 13417

Start Date & Time: August 16/13 @ 1300
Stop Date & Time: August 23/13 @ 1200h
Set up by: KLP/EMM

% (v/v)

Days	Concentration: Control										
	A	B	C	D	E	F	G	H	I	J	Init
1											
2											
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	✓	4	3	✓	4	✓	✓	✓	2	4	KLP
5	5	6	✓	4	✓	4	5	4	6	✓	EMM
6	8	✓	9	8	6	7	5	7	✓	7	EMM
7	✓	8	5	✓	9	7	9	7	7	9	KLP
8											
Total	13	18	17	12	19	18	19	18	15	20	KLP

Days	Concentration: 5										
	A	B	C	D	E	F	G	H	I	J	Init
1											
2											
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	✓	✓	✓	✓	3	✓	✓	4	✓	✓	KLP
5	3	4	4	4	✓	5	5	✓	5	6	EMM
6	4	6	7	10	8	9	6	8	10	7	EMM
7	✓	6	9	6	10	✓	✓	10	7	8	KLP
8											
Total	7	16	20	20 16 KLP	21	14	11	22	22	21	KLP

Days	Concentration: 10										
	A	B	C	D	E	F	G	H	I	J	Init
1											
2											
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	3	1	4	✓	✓	✓	✓	3	✓	✓	KLP
5	6	7	✓	4	6	5	6	7	5	6	EMM
6	✓	✓	9	6	10	9	8	✓	7	10	EMM
7	8	9	9	7	8	✓	8 12	8	8	✓	JW
8											
Total	17	17	22	17	24	14	26	18	20	16	JW

Days	Concentration: 20										
	A	B	C	D	E	F	G	H	I	J	Init
1											
2											
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	✓	3	✓	✓	3	✓	✓	✓	1	✓	KLP
5	3	✓	08 3	3	✓	4	3	4	5	8	EMM
6	8	6	5	7	7	8	6	8	✓	9	EMM
7	6	8	5	8	8	7	8	✓	9	7	KLP
8											
Total	17	17 14 04	14	18	18	19	17	12	15	21	KLP

Days	Concentration: 40										
	A	B	C	D	E	F	G	H	I	J	Init
1											
2											
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	✓	✓	2	✓	✓	✓	✓	2	✓	✓	KLP
5	5	4	7	5	2	6	5	5	6	4	EMM
6	10	8	✓	7	✓	6	6	✓	4	✓	EMM
7	3	9	8	8	6	11	8	8	9	7	KLP
8											
Total	18	21	17	20	8	23	19	15	19	11	KLP

Days	Concentration: 60										
	A	B	C	D	E	F	G	H	I	J	Init
1											
2											
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	✓	5	✓	3	4	✓	✓	5	✓	✓	KLP
5	4	✓	5	✓	✓	4	4	✓	3	4	EMM
6	5	3	2	6	4	✓	8	9	✓	6	EMM
7	✓	12	8	9	9	9	10	11	8	✓	KLP
8											
Total	9	20	15	18	17	13	22	25	11	10	KLP

Days	Concentration: 80										
	A	B	C	D	E	F	G	H	I	J	Init
1											
2							+				
3	✓	✓	✓	✓	✓	✓	|	✓	✓	✓	EMM
4	✓	✓	✓	✓	✓	✓	|	✓	✓	✓	KLP
5	4	3	✓	3	4	4	|	3	5	3	EMM
6	4	7	4	7	6	5	|	✓	3	8	EMM
7	7	✓	9	✓	✓	8	|	7	9	10	KLP
8							|				
Total	15	10	13	10	10	17	04	10	17	21	KLP

Days	Concentration: 100										
	A	B	C	D	E	F	G	H	I	J	Init
1											
2									X		
3	✓	✓	✓	✓	✓	✓	✓	X	|	✓	EMM
4	✓	✓	✓	✓	✓	✓	✓	|	|	✓	KLP
5	4	3	3	4	4	3	6	|	|	4	EMM
6	4	5	2	✓	6	8	7	|	|	✓	EMM
7	6	4	7	6	2	8	✓	|	|	7	KLP
8											
Total	10	12	12	10	12	19	13	04	04	11	KLP

Days	Concentration:										
	A	B	C	D	E	F	G	H	I	J	Init
1											
2											
3											
4											
5											
6											
7											
8											
Total											

Notes: X = mortality.

Sample Description: Slightly turbid

Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JGW

Date reviewed: Sep. 16/13

CETIS Analytical Report

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID:	11-7309-4562	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	26 Aug-13 10:14	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	19-6456-9602	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Jeslin Wijaya
Start Date:	16 Aug-13 13:00	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	23 Aug-13 12:00	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	6d 23h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	14-0302-3037	**Code:**	53A06EBD	**Client:**	Rescan
Sample Date:	13 Aug-13 16:15	**Material:**	Water Sample	**Project:**	
Receive Date:	15 Aug-13 12:30	**Source:**	Rescan		
Sample Age:	69h (11.2 °C)	**Station:**	Adit		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1164383	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	69.29	63.56	N/A	1.443	NA	1.573
EC10	80	67.33	N/A	1.25	NA	1.485
EC15	89.45	71.31	N/A	1.118	NA	1.402
EC20	100	75.53	N/A	1	NA	1.324
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
5		10	1	1	1	0	0	0.0%	0.0%	10	10
10		10	1	1	1	0	0	0.0%	0.0%	10	10
20		10	1	1	1	0	0	0.0%	0.0%	10	10
40		10	1	1	1	0	0	0.0%	0.0%	10	10
60		10	1	1	1	0	0	0.0%	0.0%	10	10
80		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
100		10	0.8	0	1	0.1333	0.4216	52.7%	20.0%	8	10

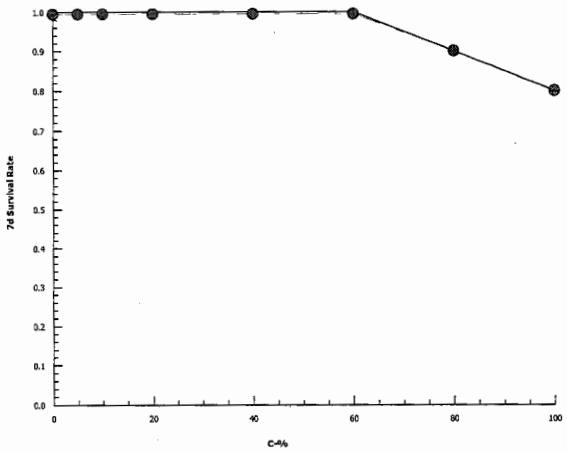
7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
5		1	1	1	1	1	1	1	1	1	1
10		1	1	1	1	1	1	1	1	1	1
20		1	1	1	1	1	1	1	1	1	1
40		1	1	1	1	1	1	1	1	1	1
60		1	1	1	1	1	1	1	1	1	1
80		1	1	1	1	1	1	0	1	1	1
100		1	1	1	1	1	1	1	0	0	1

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	11-7309-4562	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	26 Aug-13 10:14	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Analyst: JW QA: JW 9/16/13

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	20-1191-0121	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.4
Analyzed:	26 Aug-13 10:15	**Analysis:**	Nonlinear Regression	**Official Results:**	Yes
Batch ID:	19-6456-9602	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Jeslin Wijaya
Start Date:	16 Aug-13 13:00	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	23 Aug-13 12:00	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	6d 23h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	14-0302-3037	**Code:**	53A06EBD	**Client:**	Rescan
Sample Date:	13 Aug-13 16:15	**Material:**	Water Sample	**Project:**	
Receive Date:	15 Aug-13 12:30	**Source:**	Rescan		
Sample Age:	69h (11.2 °C)	**Station:**	Adit		

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Log-Logistic EV [Y=A/(1+(X/D)^C)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
13	-159.6	325.5	332.4	0.2564	Yes	0.3642	2.342	0.8714	Non-Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	46.09	N/A	63.08	2.17	1.585	NA
IC10	56.9	N/A	73.1	1.758	1.368	NA
IC15	64.82	39.42	79.94	1.543	1.251	2.537
IC20	71.51	53.57	85.22	1.398	1.173	1.867
IC25	77.56	63.32	89.92	1.289	1.112	1.579
IC40	94.29	80.46	108.7	1.061	0.9199	1.243
IC50	105.7	85.75	130.3	0.946	0.7673	1.166

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	17.61	0.7022	16.23	18.99	25.08	<0.0001	Significant Parameter
C	3.547	1.516	0.575	6.519	2.339	0.0219	Significant Parameter
D	105.7	10.68	84.78	126.6	9.897	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	604.2457	604.2457	1	29.24	<0.0001	Significant
Lack of Fit	39.24179	7.848359	5	0.3642	0.8714	Non-Significant
Pure Error	1551.7	21.55139	72			
Residual	1590.942	20.66158	77			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	11.11	14.07	0.1341	Equal Variances
	Mod Levene Equality of Variance	0.9113	2.14	0.5029	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9747	0.9691	0.1127	Normal Distribution
	Anderson-Darling A2 Normality	0.7442	2.492	0.0523	Normal Distribution

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID: 20-1191-0121 **Endpoint:** Reproduction **CETIS Version:** CETISv1.8.4
Analyzed: 26 Aug-13 10:15 **Analysis:** Nonlinear Regression **Official Results:** Yes

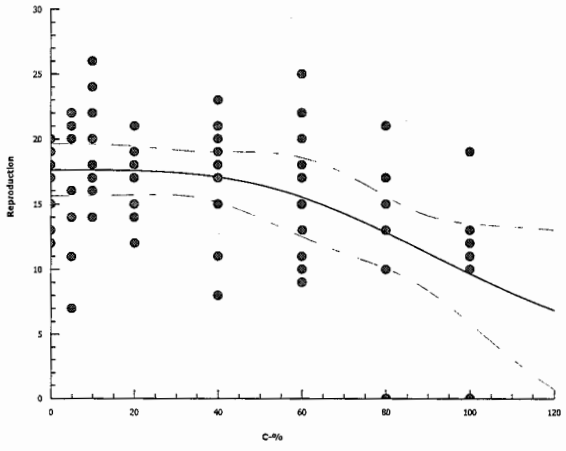
Reproduction Summary

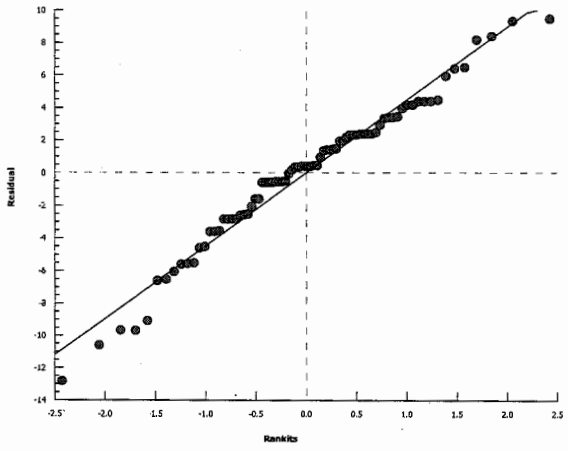
			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	16.9	12	20	0.8492	2.685	15.89%	0.0%
5		10	17.4	7	22	1.648	5.211	29.95%	-2.96%
10		10	19.1	14	26	1.206	3.814	19.97%	-13.02%
20		10	16.8	12	21	0.8138	2.573	15.32%	0.59%
40		10	17.1	8	23	1.456	4.606	26.93%	-1.18%
60		10	16	9	25	1.693	5.354	33.46%	5.33%
80		10	12.3	0	21	1.826	5.774	46.95%	27.22%
100		10	9.9	0	19	1.835	5.801	58.6%	41.42%

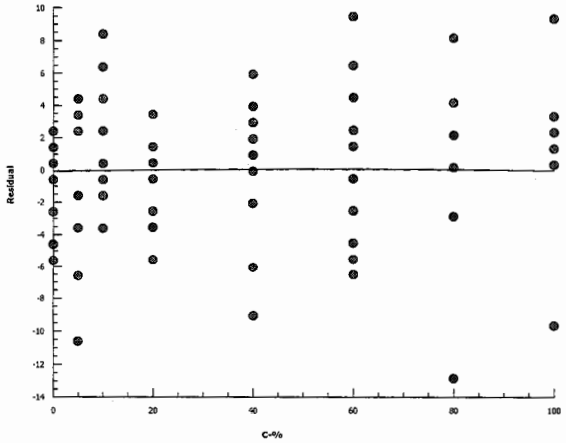
Reproduction Detail

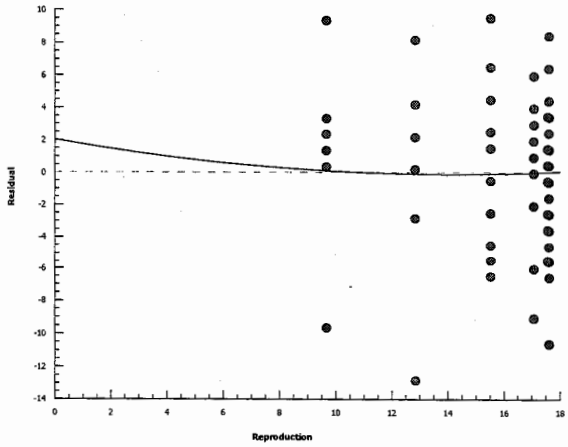
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	13	18	17	12	19	18	19	18	15	20
5		7	16	20	20	21	14	11	22	22	21
10		17	17	22	17	24	14	26	18	20	16
20		17	17	14	18	18	19	17	12	15	21
40		18	21	17	20	8	23	19	15	19	11
60		9	20	15	18	17	13	22	25	11	10
80		15	10	13	10	10	17	0	10	17	21
100		10	12	12	10	12	19	13	0	0	11

Graphics 3P Log-Logistic EV [Y=A/(1+(X/D)^C)]









Chronic Freshwater Toxicity Test
Initial and Final Water Quality Measurements

Client: Rescan
Sample ID: BJ2
Work Order #: 13417

Start Date & Time: August 15/13 @ 1630h
Stop Date & Time: August 23/13 @ 1130h
Test Species: *Ceriodaphnia dubia*

%(v/v) Concentration: Control	Days																
	0	1		2		3		4		5		6		7		7	8
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old final	new	new	Final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		24.0	24.5
DO (mg/L)	8.3	7.4	8.2	6.7	8.2	7.3	8.1	6.8	8.3	7.1	8.0	7.2	8.3	7.3		8.2	6.7
pH	8.1	7.4	7.8	7.7	8.0	7.7	8.1	7.8	8.1	7.8	8.1	7.5	8.2	7.6		8.1	7.5
Cond. (µS/cm)	205	205		207		206		206		207		210		—		212	223
Initials	KLP	KLP		AWD		AWD		EMM		EMM		EMM		EMM		KLP	KLP

Concentration: 5	Days																
	0	1		2		3		4		5		6		7		7	8
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old final	new	new	Final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	25.0		24.0	24.5
DO (mg/L)	8.1	7.7	8.1	7.2	8.2	7.3	8.2	6.9	8.2	6.8	7.8	7.3	8.2	7.2		7.8	6.9
pH	7.8	7.7	8.1	7.8	8.2	7.6	8.2	7.7	8.2	7.4	8.2	7.5	8.0	7.7		7.8	7.6
Cond. (µS/cm)	200	201		205		201		200		200		201		209			209
Initials	KLP	KLP		AWD		AWD		EMM		EMM		EMM		EMM			KLP

Concentration: 40	Days																
	0	1		2		3		4		5		6		7		7	8
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old final	new	new	Final
Temperature (°C)	24.5	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		24.0	24.5
DO (mg/L)	8.0	7.8	8.2	7.1	8.2	7.3	8.2	6.3	8.1	6.7	7.9	7.3	8.2	7.2		7.9	6.9
pH	7.8	7.4	8.1	7.6	8.3	7.5	8.2	7.6	8.2	7.3	8.1	7.2	7.9	7.5		7.8	7.6
Cond. (µS/cm)	153	156		151		149		153		154		156		158		—	161
Initials	KLP	KLP		AWD		AWD		EMM		EMM		EMM		EMM			KLP

Concentration: 100	Days																
	0	1		2		3		4		5		6		7		7	8
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old final	new	new	Final
Temperature (°C)	25.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		24.0	24.5
DO (mg/L)	7.9	7.7	8.4	7.3	8.3	7.2	8.3	6.6	8.2	6.9	7.9	7.2	8.2	7.1		7.9	7.1
pH	7.9	7.3	8.2	7.5	8.3	7.5	8.3	7.4	7.8	7.2	7.8	7.3	7.4	7.5		7.5	7.8
Cond. (µS/cm)	74	72		68		69		69		69		69		69		—	77
Initials	KLP	KLP		AWD		AWD		EMM		EMM		EMM		EMM			KLP

	Control	100% (v/v)		
Hardness*	98	30		
Alkalinity*	86	18		

Analysts: KLP, EMM, AWD
Reviewed by: JOV
Date reviewed: Sep. 17/13

* mg/L as CaCO3

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L) ; pH = 6 to 8.5

Sample Description: Slightly turbid

Comments: **Broodboard Used:** 080113

Chronic Freshwater Toxicity Test
C. dubia Reproduction Data

Client: Rescan
Sample ID: ~~0334~~ BJ2
Work Order: 13417

Start Date & Time: August 15/13 @ 1615h
Stop Date & Time: August 23/13 @ 1130h
Set up by: KLP

% (v/v)

Concentration: Control

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AS
3	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	AS
4	✓		✓	✓	✓	✓	✓	X	✓	✓	EMM
5	3		4	2	3	3	2		2	4	EMM
6	9		8	6	8	9	4		7	10	EMM
7	10		9	8	10	✓	✓		✓	10	EMM
8	✓		✓	9	✓	8	7		8	✓	KLP
Total	22	0*	21	16	21	20	13	0*	17	24	EMM

Concentration: 5

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AS
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AS
4	✓	✓	✓	✓	✓	✓	✓	✓	2*	✓	EMM
5	4	✓	4	4	4	4	3	3	✓	4	EMM
6	8	6	9	10	11	6	4	6	7	9	EMM
7	10	12	10	9	8	✓	10	10	9	12	EMM
8	✓	✓	✓	✓	✓	10	✓	✓	✓	✓	KLP
Total	22	18	23	23	23	20	17	19	18	25	KLP

Concentration: 10

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AS
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AS
4	3	X	✓	✓	✓	✓	✓	✓	✓	✓	EMM
5	✓		2	4	4	3	3	2	2	4	EMM
6	6		6	8	8	5	6	8	4	7	EMM
7	10		9	10	11	✓	11	✓	8	✓	EMM
8	✓		✓	✓	✓	10	✓	9	✓	10	KLP
Total	19	0*	17	22	23	18	20	19	14	21	KLP

Concentration: 20

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2											AS
3											AS
4	✓		✓	✓	✓	✓	✓	✓	✓	✓	EMM
5	4	2	3	5	3	3	2	3	4	4	EMM
6	4	6	2	9	10	6	6	10	9	9	EMM
7	✓	✓	✓	✓	12	✓	10	4	7	12	EMM
8	7	8	12	9	✓	8	✓	9	✓	✓	KLP
Total	15	16	17	23	25	17	18	17	20	25	KLP

Concentration: 40

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2											AS
3											AS
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
5	4	2	3	2	3	✓	4	3	4	3	EMM
6	7	8	8	5	7	5	4	9	6	✓	EMM
7	11	13	✓	9	10	10	✓	✓	✓	9	EMM
8	✓	✓	9	✓	X	✓	10	9	10	11	KLP
Total	22	23	20	16	20*	15	18	21	20	23	KLP

Concentration: 60

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	—	—	EMM
2											AS
3											AS
4	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	EMM
5	3	3	3		2	3	2	4*	3	3	EMM
6	8	9	9		7	6	7	10	4	✓	EMM
7	✓	10	13		10	4	✓	✓	12	12	EMM
8	10	11	7*		10	11	9	11	12	11	KLP
Total	21	22	25*	0*	19	13	18	25	19	26	KLP

Concentration: 80

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AS
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	AS
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
5	2	✓	4	4	2	4	3	3	3	4	EMM
6	✓	3	3	6	10	9	10	7	8	4	EMM
7	9	10	12	✓	✓	12	✓	8	8	6	EMM
8	7	✓	10	9	11	✓	9	✓	13	10	KLP
Total	18	13	19	19	23	25	22	18	19	14	KLP

Concentration: 100

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓		✓	✓	✓	✓	AS
3	✓	✓	✓	✓	✓		✓	✓	✓	✓	AS
4	✓	✓	✓	✓	✓		✓	✓	✓	X	EMM
5	3	2	3	3	3		✓	2	3		EMM
6	5	2	✓	7	8		4	4	9		EMM
7	10	6	4	✓	✓		8	8	✓		EMM
8	10	8	5	9	9		~~10~~	10	11		KLP
Total	18	10	12	19	20	0*	12	14	23	0*	KLP

Concentration:

Days	A	B	C	D	E	F	G	H	I	J	Init
1											
2											
3											
4											
5											
6											
7											
8											
Total											

Notes: X = mortality.

Sample Description: turbid, light murky brown

Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JOH

Date reviewed: Sep. 4/13

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	19-9610-5471	**Endpoint:**	~~7d~~ 8-d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	26 Aug-13 10:30	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	08-4029-3728	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Jeslin Wijaya
Start Date:	15 Aug-13 16:30	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	20% Perrier Water
Ending Date:	23 Aug-13 11:30	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	7d 19h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	12-6899-6918	**Code:**	4BA35B36	**Client:**	Rescan
Sample Date:	13 Aug-13 09:40	**Material:**	Water Sample	**Project:**	
Receive Date:	15 Aug-13 12:30	**Source:**	Rescan		
Sample Age:	55h (11.2 °C)	**Station:**	BJ2		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	2110736	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.8	0.8 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	83.89	9.672	N/A	1.192	NA	10.34
EC10	93.01	32.28	N/A	1.075	NA	3.098
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	0.8	0	1	0.1333	0.4216	52.7%	0.0%	8	10
5		10	1	1	1	0	0	0.0%	-25.0%	10	10
10		10	0.9	0	1	0.1	0.3162	35.14%	-12.5%	9	10
20		10	1	1	1	0	0	0.0%	-25.0%	10	10
40		10	0.9	0	1	0.1	0.3162	35.14%	-12.5%	9	10
60		10	0.8	0	1	0.1333	0.4216	52.7%	0.0%	8	10
80		10	1	1	1	0	0	0.0%	-25.0%	10	10
100		10	0.8	0	1	0.1333	0.4216	52.7%	0.0%	8	10

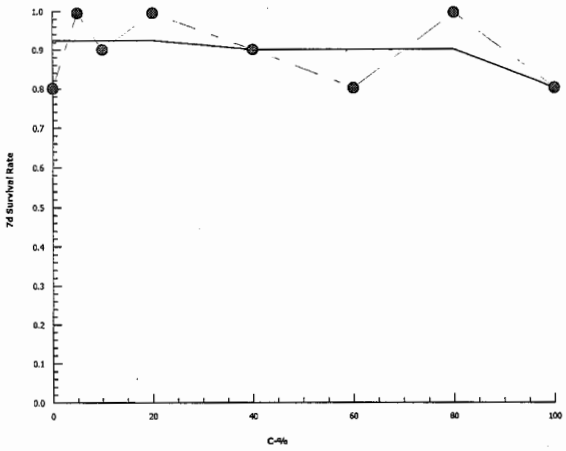
7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	0	1	1	1	1	1	0	1	1
5		1	1	1	1	1	1	1	1	1	1
10		1	0	1	1	1	1	1	1	1	1
20		1	1	1	1	1	1	1	1	1	1
40		1	1	1	1	0	1	1	1	1	1
60		1	1	0	0	1	1	1	1	1	1
80		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	0	1	1	1	0

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	19-9610-5471	**Endpoint:**	~~7d~~ 8d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	26 Aug-13 10:30	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	16-1174-8497	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.4
Analyzed:	26 Aug-13 10:31	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	08-4029-3728	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Jeslin Wijaya
Start Date:	15 Aug-13 16:30	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	20% Perrier Water
Ending Date:	23 Aug-13 11:30	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	7d 19h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	12-6899-6918	**Code:**	4BA35B36	**Client:**	Rescan
Sample Date:	13 Aug-13 09:40	**Material:**	Water Sample	**Project:**	
Receive Date:	15 Aug-13 12:30	**Source:**	Rescan		
Sample Age:	55h (11.2 °C)	**Station:**	BJ2		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	843254	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	15.4	15 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	82.91	6.778	88.82	1.206	1.126	14.75
IC10	85.92	9.244	99.83	1.164	1.002	10.82
IC15	89.04	57.97	N/A	1.123	NA	1.725
IC20	92.27	82.47	N/A	1.084	NA	1.213
IC25	~~95.62~~	~~85.49~~	~~N/A~~	~~1.046~~	~~NA~~	~~1.17~~
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

JGH > 100 By data observation.

Reproduction Summary

			Calculated Variate						
C-%	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**
0	Negative Control	10	15.4	0	24	2.758	8.72	56.63%	0.0%
5		10	20.8	17	25	0.8667	2.741	13.18%	-35.06%
10		10	17.3	0	23	2.087	6.601	38.15%	-12.34%
20		10	19.3	15	25	1.184	3.743	19.39%	-25.32%
40		10	19.8	15	23	0.8667	2.741	13.84%	-28.57%
60		10	18.8	0	26	2.43	7.685	40.88%	-22.08%
80		10	19	13	25	1.174	3.712	19.54%	-23.38%
100		10	12.8	0	23	2.494	7.885	61.6%	16.88%

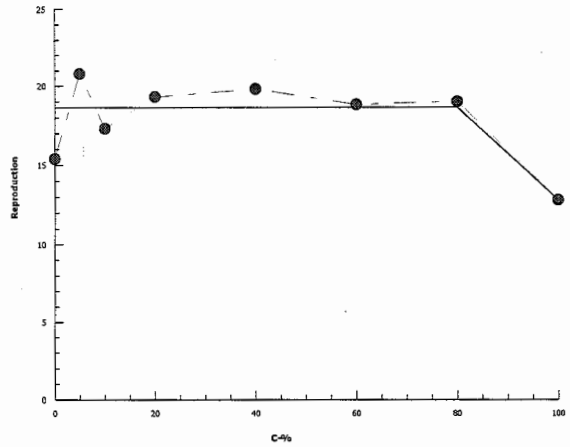
Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	22	0	21	16	21	20	13	0	17	24
5		22	18	23	23	23	20	17	19	18	25
10		19	0	17	22	23	18	20	19	14	21
20		15	16	17	23	25	17	18	17	20	25
40		22	23	20	16	20	15	18	21	20	23
60		21	22	25	0	19	13	18	25	19	26
80		18	13	19	19	23	25	22	18	19	14
100		18	10	12	19	20	0	12	14	23	0

Ceriodaphnia 7-d Survival and Reproduction Test **Nautilus Environmental**

Analysis ID:	16-1174-8497	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.4
Analyzed:	26 Aug-13 10:31	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Analyst: JW QA: JGL
fem: 17/13

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	06-9327-7772	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.4
Analyzed:	24 Sep-13 9:03	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	08-4029-3728	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Jeslin Wijaya
Start Date:	15 Aug-13 16:30	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	20% Perrier Water
Ending Date:	23 Aug-13 11:30	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	7d 19h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	12-6899-6918	**Code:**	4BA35B36	**Client:**	Rescan
Sample Date:	13 Aug-13 09:40	**Material:**	Water Sample	**Project:**	
Receive Date:	15 Aug-13 12:30	**Source:**	Rescan		
Sample Age:	55h (11.2 °C)	**Station:**	BJ2		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C < T	NA	NA	41.3%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		5	84.5	74	3	18	0.2367	Asymp	Non-Significant Effect
		10	101.5	74	5	18	0.7961	Asymp	Non-Significant Effect
		20	95.5	74	3	18	0.6094	Asymp	Non-Significant Effect
		40	93.5	74	4	18	0.5381	Asymp	Non-Significant Effect
		60	91	74	4	18	0.4477	Asymp	Non-Significant Effect
		80	97	74	2	18	0.6609	Asymp	Non-Significant Effect
		100	119.5	74	2	18	0.9938	Asymp	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	15.4	15 - NL	Yes	Passes Acceptability Criteria
PMSD	0.4126	0.13 - 0.47	Yes	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	486.2	69.45715	7	1.959	0.0727	Non-Significant Effect
Error	2553	35.45833	72			
Total	3039.2		79			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	25.37	18.48	0.0007	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8917	0.9579	<0.0001	Non-normal Distribution

Reproduction Summary

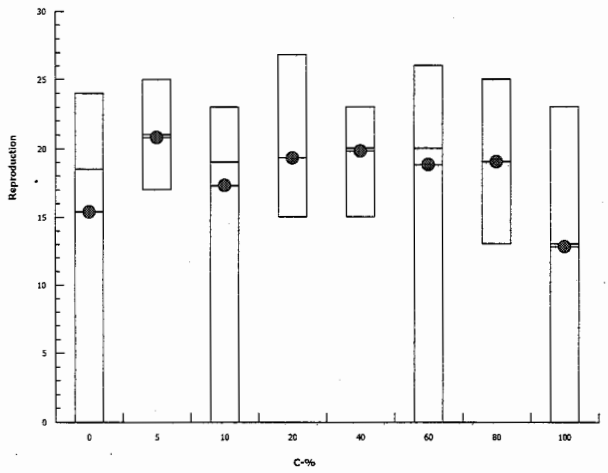
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	10	15.4	9.162	21.64	18.5	0	24	2.758	56.63%	0.0%
5		10	20.8	18.84	22.76	21	17	25	0.8667	13.18%	-35.06%
10		10	17.3	12.58	22.02	19	0	23	2.087	38.15%	-12.34%
20		10	19.3	16.62	21.98	17.5	15	25	1.184	19.39%	-25.32%
40		10	19.8	17.84	21.76	20	15	23	0.8667	13.84%	-28.57%
60		10	18.8	13.3	24.3	20	0	26	2.43	40.88%	-22.08%
80		10	19	16.34	21.66	19	13	25	1.174	19.54%	-23.38%
100		10	12.8	7.159	18.44	13	0	23	2.494	61.6%	16.88%

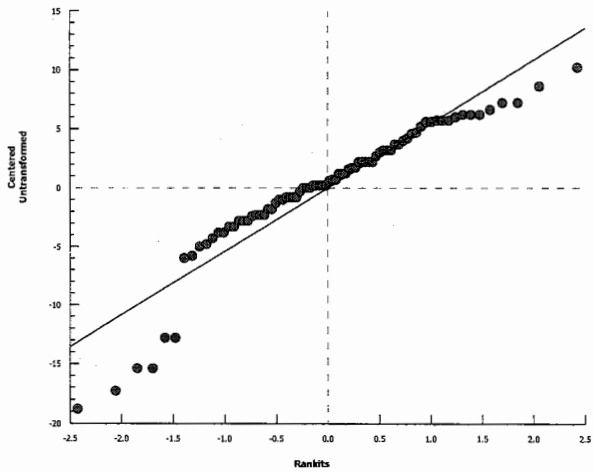
Analysis ID: 06-9327-7772 **Endpoint:** Reproduction **CETIS Version:** CETISv1.8.4
Analyzed: 24 Sep-13 9:03 **Analysis:** Nonparametric-Control vs Treatments **Official Results:** Yes

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	22	0	21	16	21	20	13	0	17	24
5		22	18	23	23	23	20	17	19	18	25
10		19	0	17	22	23	18	20	19	14	21
20		15	16	17	23	25	17	18	17	20	25
40		22	23	20	16	20	15	18	21	20	23
60		21	22	25	0	19	13	18	25	19	26
80		18	13	19	19	23	25	22	18	19	14
100		18	10	12	19	20	0	12	14	23	0

Graphics





Ceriodaphnia dubia Summary Sheet

Client: Rescan / Erm
Work Order No.: 13417

Start Date/Time: August 15, 2013 @ 1615h
Set up by: KLP

Sample Information:

Sample ID: BJ 4
Sample Date: August 13, 2013
Date Received: August 15, 2013
Sample Volume: 2 x 20L

Test Validity Criteria:

1) Mean survival of first generation controls is ≥80 %
2) At least 60% of controls have produced three broods within 8 days
3) An average of ≥15 live young produced per surviving female in the control solutions during the first three broods.
4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 080113
Age of young (Day 0): <24-h (within 12-h)
Avg No. young in first 3 broods of previous 7 d: 37
Mortality (%) in previous 7 d: 7.5
Individual female # used ≥8 young on test day: 20, 26, 29, 32, 35, 40, 4, 8, 25

NaCl Reference Toxicant Results:

Reference Toxicant ID: Cd 101
Stock Solution ID: 13 NaCl 02
Date Initiated: August 21, 2013

7-d LC50 (95% CL): 2.0 (1.7 - 2.3) g/L NaCL
7-d IC50 (95% CL): 1.5 (1.2 - 1.8) g/L NaCL

7-d LC50 Reference Toxicant Mean and Historical Range: 1.7 (1.1-2.5) g/L NaCL CV (%): 23
7-d IC50 Reference Toxicant Mean and Historical Range: 1.2 (0.8-1.7) g/L NaCL CV (%): 21

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	> 100	
IC25 % (v/v) (95% CL)		9.7 (7.0 - 12.8)
IC50 % (v/v) (95% CL)		28.5 (24.1 - 33.4)

Reviewed by: JCL
Date reviewed: Sep. 16/13

Chronic Freshwater Toxicity Test
Initial and Final Water Quality Measurements

Client: Rescan
Sample ID: BJ4
Work Order #: 13417

Start Date & Time: August 15/13 @ 1615h
Stop Date & Time: August 23/13 @ 1100h
Test Species: *Ceriodaphnia dubia*

Control

Days	0	1		2		3		4		5		6		7	7	8
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old final	new	Final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.5
DO (mg/L)	8.3	7.7	8.2	6.7	8.2	7.3	8.1	7.1	8.3	8.0	8.0	6.5	8.3	8.1	8.2	6.1
pH	8.1	7.4	7.8	7.7	8.0	7.8	8.2	7.6	8.1	7.6	8.1	7.6	8.2	7.8	8.1	7.5
Cond. (µS/cm)	205	205		207		206		207		207		210		—	212	222
Initials	KLP	KLP		AW		AW		EMM		EMM		EMM		EMM		KLP

5

Days	0	1		2		3		4		5		6		7	7	8
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old final	new	Final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.5
DO (mg/L)	8.0	7.7	8.1	6.8	8.2	6.9	8.2	7.1	8.2	7.2	7.9	6.8	8.3	7.9	8.0	6.3
pH	7.7	7.7	8.0	7.7	8.1	7.8	8.1	7.7	8.1	7.5	8.2	7.6	8.1	7.8	7.9	7.6
Cond. (µS/cm)	200	211		199		202		200		200		205		209	—	226
Initials	KLP	KLP		AW		AW		EMM		EMM		EMM		EMM		KLP

40

Days	0	1		2		3		4		5		6		7	7	8
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old final	new	Final
Temperature (°C)	24.5	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.5
DO (mg/L)	8.0	7.8	8.1	6.7	8.2	6.9	8.3	7.1	8.1	7.1	7.9	6.8	8.2	7.6	8.0	6.7
pH	7.7	7.6	8.1	7.6	8.2	7.7	8.1	7.6	8.2	7.4	8.2	7.5	8.0	7.6	7.8	7.6
Cond. (µS/cm)	151	153		149		146		151		152		158		158		159
Initials	KLP	KLP		AW		AW		EMM		EMM		EMM		EMM		KLP

100

Days	0	1		2		3		4		5		6		7	7	8
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old final	new	Final
Temperature (°C)	25.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.5
DO (mg/L)	8.0	7.8	8.4	6.7	8.3	6.7	8.3	7.1	8.0	7.1	7.8	6.9	8.0	7.4	8.0	6.9
pH	7.7	7.4	8.2	7.5	8.3	7.6	8.3	7.3	8.3	7.3	8.2	7.5	7.8	7.6	7.8	7.7
Cond. (µS/cm)	63	62		59		58		58		59		59		60	—	66
Initials	KLP	KLP		AW		AW		EMM		EMM		EMM		EMM		KLP

	Control	100 % (v/v)		
Hardness*	98	32		
Alkalinity*	86	20		

* mg/L as CaCO3

Analysts: KLP, EMM, AW, JW
Reviewed by: JGL
Date reviewed: Sept. 16/13

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L) ; pH = 6 to 8.5

Sample Description: turbid, light murky brown

Comments: Broodboard Used: 08 01 13

Chronic Freshwater Toxicity Test
C. dubia Reproduction Data

Client: Rescan
Sample ID: ~~BJ7~~ BJ4
Work Order: 13417

Start Date & Time: August 15/13 @ ~~1630h~~ 1615h JW
Stop Date & Time: August 23/13 @ 1100h
Set up by: KLP

%(V/V)

Concentration: Control

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	/	/	/	/	/	/	/	/	/	/	AS
3	/	/	/	/	/	/	/	/	/	/	AS
4	✓	4	✓	3	✓	5	✓	✓	✓	✓	EMM
5	4	✓	4	✓	5	✓	4	4	4	4	EMM
6	8	9	10	6	12	6	10	10	12	9	EMM
7	9	10	9	7	✓	18	✓	✓	✓	✓	KLP
8	✓	✓	10	✓	9	✓	9	12	12	13	KLP
Total	21	23	23	16	26	29	23	26	28	26	KLP

Concentration: 5

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	/	/	/	/	/	/	/	/	/	/	AS
3	/	/	/	/	/	/	/	/	/	/	AS
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
5	4	3	3	3	3	4	4	3	4	4	EMM
6	7	8	10	9	10	7	8	✓	6	8	EMM
7	✓	11	✓	7	9	9	✓	6	✓	9	JW
8	9	✓	11	8	10	✓	10	10	8	10	KLP
Total	20	22	24	19	22	20	22	19	18	21	KLP

Concentration: 10

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	/	/	/	/	/	/	/	/	/	/	AS
3	/	/	/	/	/	/	/	/	/	/	AS
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
5	2	2	3	3	4	3	2	4	2	3	EMM
6	6	8	8	9	8	6	8	✓	✓	9	EMM
7	6	7	7	8	5	8	✓	✓	8	7	JW
8	7	7	10	8	6	11	8	8	9	9	KLP
Total	14	17	18	20	17	17	18	12	19	19	KLP

Concentration: 20

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	/	/	/	/	/	/	/	/	/	/	AS
3	/	/	/	/	/	/	/	/	/	/	AS
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
5	✓	2	✓	3	2	2	2	✓	2	✓	EMM
6	2	8	6	8	✓	4	4	3	7	6	EMM
7	6	✓	7	6	7	8	6	6	✓	6	JW
8	✓	8	X	✓	10	✓	8	✓	9	7	KLP
Total	8	18	13*	17	19	14	12	9	18	19	KLP

Concentration: 40

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	/	/	/	/	/	/	/	/	/	/	AS
3	/	/	/	/	/	/	/	/	/	/	AS
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
5	✓	2	✓	3	2	3	2	✓	2	✓	EMM
6	2	3	4	3	4	8	6	2	✓	4	EMM
7	4	4	6	6	5	4	✓	5	4	5	JW
8	✓	✓	✓	✓	6	✓	8	✓	6	✓	KLP
Total	6	9	10	12	11	15	16	7	12	9	KLP

Concentration: 60

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	/	/	/	/	/	/	/	/	/	/	AS
3	/	/	/	/	/	/	/	/	/	/	AS
4	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	EMM
5	✓	✓	✓	2	✓	✓	|	✓	✓	✓	EMM
6	✓	✓	4	3	2	4	|	✓	✓	2	EMM
7	✓	✓	4	5	4	3	|	✓	4	4	JW
8	4	✓	✓	✓	✓	✓	|	✓	✓	5	KLP
Total	8	0	8	10	6	7	0*	0	4	11	KLP

Concentration: 80

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	/	/	/	/	/	/	/	/	/	/	AS
3	/	/	/	/	/	/	/	/	/	/	AS
4	/	/	/	/	/	✓	✓	✓	X	✓	EMM
5	/	/	/	✓	✓	3	✓	✓	|	✓	EMM
6	4	✓	✓	2	✓	✓	✓	✓	|	✓	EMM
7	2	2	4	2	2	4	2	2	|	3	JW
8	✓	2	3	✓	✓	5	3	✓	|	✓	KLP
Total	6	4	7	4	2	12	5	2	0*	3	KLP

Concentration: 100

Days	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	/	/	/	/	/	/	/	/	/	/	AS
3	/	/	/	/	/	/	/	/	/	/	AS
4	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	EMM
5	✓	2	3 JW	✓	|	✓	✓	✓	✓	✓	EMM
6	✓	✓	4 5		|	4	3	5	✓	✓	EMM
7	1	3	✓	✓	|	✓	3	3	1	✓	JW
8	✓	4	4	1	|	4	✓	✓	✓	1	KLP
Total	1	9	12	1	0*	8	6	3	1	1	KLP

Concentration:

Days	A	B	C	D	E	F	G	H	I	J	Init
1											
2											
3											
4											
5											
6											
7											
8											
Total											

Notes: X = mortality.

Sample Description: slightly turbid

Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JW

Date reviewed: Sep. 16/13

CETIS Analytical Report

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	04-2806-0117	**Endpoint:**	8d (JW) ~~7d~~ Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	26 Aug-13 10:56	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	04-3333-2535	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Jeslin Wijaya
Start Date:	15 Aug-13 16:15	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	23 Aug-13 11:00	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	7d 19h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	08-5258-9715	**Code:**	32D17C93	**Client:**	Rescan
Sample Date:	13 Aug-13 09:00	**Material:**	Water Sample	**Project:**	
Receive Date:	15 Aug-13 12:30	**Source:**	Rescan		
Sample Age:	55h (11.2 °C)	**Station:**	BJ4		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	334076	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	40	13.4	N/A	2.5	NA	7.462
EC10	100	17.85	N/A	1	NA	5.601
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
5		10	1	1	1	0	0	0.0%	0.0%	10	10
10		10	1	1	1	0	0	0.0%	0.0%	10	10
20		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
40		10	1	1	1	0	0	0.0%	0.0%	10	10
60		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
80		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
100		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10

7d Survival Rate Detail

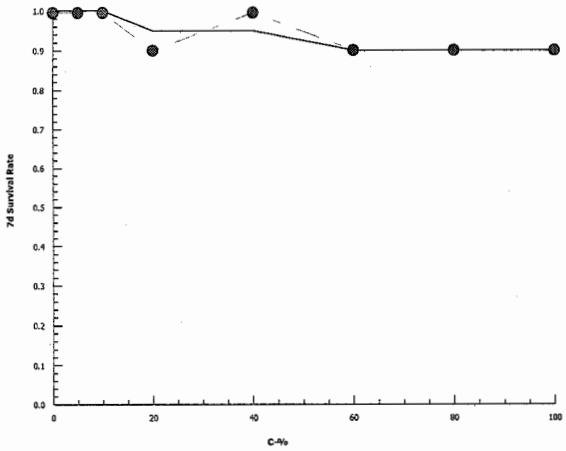
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
5		1	1	1	1	1	1	1	1	1	1
10		1	1	1	1	1	1	1	1	1	1
20		1	1	0	1	1	1	1	1	1	1
40		1	1	1	1	1	1	1	1	1	1
60		1	1	1	1	1	1	0	1	1	1
80		1	1	1	1	1	1	1	1	0	1
100		1	1	1	1	0	1	1	1	1	1

Ceriodaphnia 7-d Survival and Reproduction Test **Nautilus Environmental**

Analysis ID:	04-2806-0117	**Endpoint:**	~~7d~~ 8d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	26 Aug-13 10:56	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

JW

Graphics



CETIS Analytical Report

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	21-4584-9571	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.4
Analyzed:	26 Aug-13 10:56	**Analysis:**	Nonlinear Regression	**Official Results:**	Yes
Batch ID:	04-3333-2535	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Jeslin Wijaya
Start Date:	15 Aug-13 16:15	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	23 Aug-13 11:00	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	7d 19h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	08-5258-9715	**Code:**	32D17C93	**Client:**	Rescan
Sample Date:	13 Aug-13 09:00	**Material:**	Water Sample	**Project:**	
Receive Date:	15 Aug-13 12:30	**Source:**	Rescan		
Sample Age:	55h (11.2 °C)	**Station:**	BJ4		

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Log-Gompertz EV [Y=A*exp(log(0.5)(X/D)^C)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
5	-137.7	281.8	288.6	0.8117	Yes	0.73	2.342	0.6032	Non-Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	1.175	N/A	3.218	85.13	31.08	NA
IC10	2.836	1.099	4.932	35.27	20.28	91.03
IC15	4.82	2.793	7.162	20.75	13.96	35.8
IC20	7.106	4.743	9.797	14.07	10.21	21.08
IC25	9.698	6.983	12.77	10.31	7.828	14.32
IC40	19.59	15.89	23.75	5.106	4.21	6.293
IC50	28.46	24.12	33.36	3.514	2.998	4.146

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	24.08	1.041	22.04	26.12	23.13	<0.0001	Significant Parameter
C	0.8169	0.09708	0.6266	1.007	8.414	<0.0001	Significant Parameter
D	28.46	3.614	21.37	35.54	7.874	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	4096.509	4096.509	1	342.5	<0.0001	Significant
Lack of Fit	44.44053	8.888106	5	0.73	0.6032	Non-Significant
Pure Error	876.6	12.175	72			
Residual	921.0405	11.96157	77			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	8.926	14.07	0.2580	Equal Variances
	Mod Levene Equality of Variance	1.275	2.14	0.2751	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9907	0.9691	0.8383	Normal Distribution
	Anderson-Darling A2 Normality	0.2681	2.492	0.7114	Normal Distribution

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	21-4584-9571	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.4
Analyzed:	26 Aug-13 10:56	**Analysis:**	Nonlinear Regression	**Official Results:**	Yes

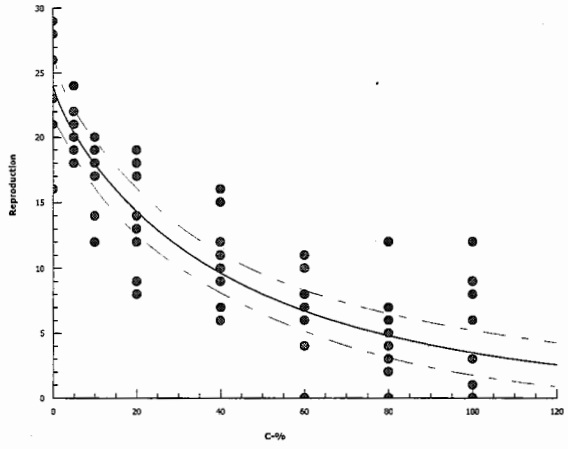
Reproduction Summary

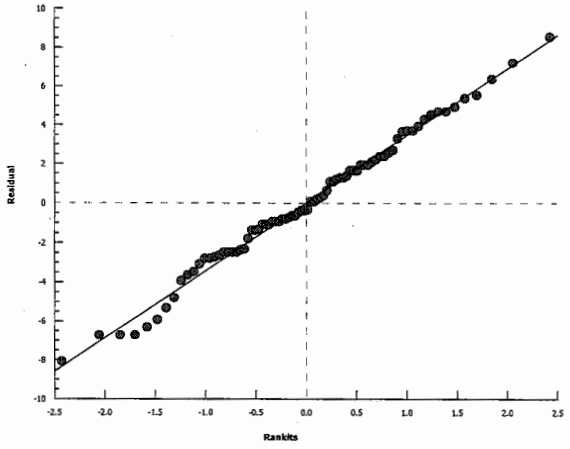
			Calculated Variate						
C-%	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**
0	Negative Control	10	24.1	16	29	1.197	3.784	15.7%	0.0%
5		10	20.7	18	24	0.5783	1.829	8.84%	14.11%
10		10	17.1	12	20	0.7667	2.424	14.18%	29.05%
20		10	14.7	8	19	1.3	4.111	27.97%	39.0%
40		10	10.7	6	16	1.012	3.199	29.9%	55.6%
60		10	5.4	0	11	1.327	4.195	77.69%	77.59%
80		10	4.5	0	12	1.057	3.342	74.26%	81.33%
100		10	4.2	0	12	1.34	4.237	100.9%	82.57%

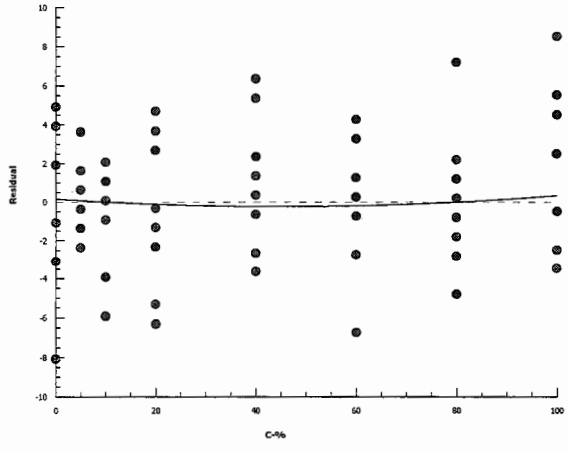
Reproduction Detail

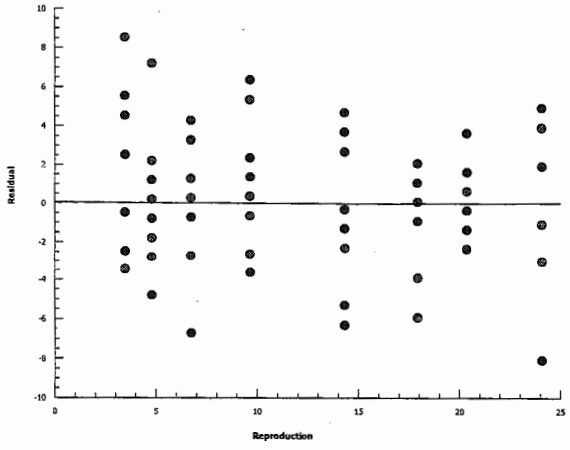
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	21	23	23	16	26	29	23	26	28	26
5		20	22	24	19	22	20	22	19	18	21
10		14	17	18	20	17	17	18	12	19	19
20		8	18	13	17	19	14	12	9	18	19
40		6	9	10	12	11	15	16	7	12	9
60		8	0	8	10	6	7	0	0	4	11
80		6	4	7	4	2	12	5	2	0	3
100		1	9	12	1	0	8	6	3	1	1

Graphics — 3P Log-Gompertz EV [Y=A*exp(log(0.5)(X/D)^C)]









APPENDIX B - *Daphnia magna* Toxicity Test Data

Daphnia magna Summary Sheet

Client: Rescan / Erm
Work Order No.: 13418

Start Date/Time: August 18, 2013 @ 1000h
Test Species: *Daphnia magna*
Set up by: AND

Sample Information:

Sample ID: BJ U/S
Sample Date: August 13, 2013
Date Received: August 15, 2013
Sample Volume: 2 x 20L

Test Validity Criteria:
≥ 90% mean control survival (no more than 2 mortalities in any control replicate)

WQ Ranges:
T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

Test Organism Information:

Broodstock No.: 073113 A
Age of young (Day 0): <24 h
Avg No. young per brood in previous 7 d: 23
Mortality (%) in previous 7 d: 0
Days to first brood: 9

NaCl Reference Toxicant Results:

Reference Toxicant ID: Dm 102
Stock Solution ID: 13 Na 02
Date Initiated: August 8, 2013
48-h LC50 (95% CL): 4.2 (3.7 - 4.8) g/LNaCL

Reference Toxicant Mean and Historical Range: 4.0 (3.7 - 4.3) g/L NaCL
Reference Toxicant CV (%): 4

Test Results: The 48-h LC 50 is > 100 % (v/v).

Reviewed by: JOL
Date reviewed: Sept. 13/13

Freshwater Acute
48 Hour Toxicity Test Data Sheet

Client: Rescan
Sample ID: BJ 415
Work Order No.: 13418

Start Date/Time: Aug 18/13 @ 1500h
No. Organisms/volume: 10/200mL
Test Organism: *D.magna*
Set up by: AS

DO meter: DO- 1 pH meter: pH- 1 Conductivity meter: C- 1

Concentration % (v/v)	Rep	Number of Live Organisms 24	Number of Live Organisms 48	No. Immobilized 48	Temperature (°C) 0	Temperature (°C) 24	Temperature (°C) 48	Dissolved oxygen (mg/L) 0	Dissolved oxygen (mg/L) 24	Dissolved oxygen (mg/L) 48	pH 0	pH 24	pH 48	Conductivity (µS/cm) 0	Conductivity (µS/cm) 48
Control	A	10	10	0	20.5	20.5	20.0	8.6		8.2	7.8		7.8	345	360
	B														
	C														
	D														
6.25	A	10	10	0	20.5	20.5	20.0	8.6		8.2	7.9		7.9	323	352
	B														
	C														
	D														
12.5	A	10	10	0	20.5	20.5	20.0	8.7		8.2	7.9		7.9	292	299
	B														
	C														
	D														
25	A	10	10	0	20.5	20.5	20.0	8.7		8.3	8.2		7.9	251	259
	B														
	C														
	D														
50	A	10	10	0	20.5	20.5	20.0	8.8		8.3	8.2		7.9	186	193
	B														
	C														
	D														
100	A	10	10	0	20.5	20.5	20.0	8.8		8.2	8.0		7.9	57	61
	B														
	C														
	D														
Technician Initials		KP	YL	YL	AS	KP	YL AS			YL	AS		YL	AS	YL

WQ Ranges: T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

	Hardness*	Alkalinity*
Conc.	*(mg/L as CaCo3)	
Control (MHW)	100	70
Highest conc.	260	160

	Initial WQ	Adjustment	Adjusted WQ
Temp (°C)	20.5		
DO (mg/L)	8.8		
pH	8.0		
Cond (µS/cm)	57		

Sample Description: clear

Comments: Batch#: 073113A 7-d previous # young/brood: 23 Day of 1st Brood: 9 Previous 7-d % Mortality: 0

Reviewed by: JGL Date reviewed: Sept. 13/13

Daphnia magna Summary Sheet

Client: Rescan / Erm
Work Order No.: 13418

Start Date/Time: August 18, 2013 @ 1005h
Test Species: *Daphnia magna*
Set up by: ~~Erm~~ AWD
JW

Sample Information:

Sample ID: Camp Creek (CC)
Sample Date: August 13, 2013
Date Received: August 15, 2013
Sample Volume: 40 x 1L

Test Validity Criteria:

≥ 90% mean control survival (no more than 2 mortalities in any control replicate)

WQ Ranges:

T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

Test Organism Information:

Broodstock No.: 073113 B
Age of young (Day 0): <24 h
Avg No. young per brood in previous 7 d: 24
Mortality (%) in previous 7 d: 0
Days to first brood: 9

NaCl Reference Toxicant Results:

Reference Toxicant ID: Dm 102
Stock Solution ID: 13 NaCl 02
Date Initiated: August 8, 2013
48-h LC50 (95% CL): 4.2 (3.7 - 4.8) g/L NaCL

Reference Toxicant Mean and Historical Range: 4.0 (3.7 - 4.3) g/L NaCL
Reference Toxicant CV (%): 4

Test Results: The 48-h LC50 is >100 % (v/v).

Reviewed by: JGH

Date reviewed: Sep. 13/13

Freshwater Acute
48 Hour Toxicity Test Data Sheet

Client: Rescan
Sample ID: Camp Creek (CC)
Work Order No.: 13418

Start Date/Time: Aug 18/13 @ 1005h
No. Organisms/volume: 10/200mL
Test Organism: *D.magna*
Set up by: AM

DO meter: DO- 1 pH meter: pH- 1 Conductivity meter: C- 1

Concentration % (v/v)	Rep	Number of Live Organisms 24	Number of Live Organisms 48	No. Immobilized 48	Temperature (°C) 0	Temperature (°C) 24	Temperature (°C) 48	Dissolved oxygen (mg/L) 0	Dissolved oxygen (mg/L) 24	Dissolved oxygen (mg/L) 48	pH 0	pH 24	pH 48	Conductivity (µS/cm) 0	Conductivity (µS/cm) 48
Control	A	10	10	~~45~~ 0	20.5	20.5	20.0	8.6		8.2	7.8		7.8	340	360
	B														
	C														
	D														
6.25	A	10	10	0	20.5	20.5	20.0	8.6		8.2	7.9		8.1	327	339
	B														
	C														
	D														
12.5	A	10	10	0	20.5	20.5	20.0	8.7		8.2	8.0		8.1	313	321
	B														
	C														
	D														
25	A	10	10	0	20.5	20.5	20.0	8.8		8.3	8.0		8.1	302	309
	B														
	C														
	D														
50	A	10	10	0	20.5	20.5	20.0	8.8		8.3	8.0		8.0	227	236
	B														
	C														
	D														
100	A	10	10	~~47~~ 0	20.5	20.5	20.0	8.9		8.2	8.2		8.0	101	110
	B														
	C														
	D														
Technician Initials		KH	VL	VV	AM	KH	VL	AM		VL	AM		VV	AM	VV

WQ Ranges: T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

	Hardness*	Alkalinity*
Conc.	*(mg/L as CaCo3)	
Control (MHW)	100	70
Highest conc.	30	18

	Initial WQ	Adjustment	Adjusted WQ
Temp (°C)	20.5		20.5
DO (mg/L)	8.9 AM		8.8
pH	~~8.2~~ 7.8		8.2
Cond (µS/cm)	35	Hardness adjusted	101

Sample Description: Clear

Comments: Batch#: 0731138 7-d previous # young/brood: 24 Day of 1st Brood: 9 Previous 7-d % Mortality: 0

Reviewed by: JGK Date reviewed: Sep. 13/13

Daphnia magna Summary Sheet

Client: Rescan
Work Order No.: 13418

Start Date/Time: August 18, 2013 @ 1010h
Test Species: *Daphnia magna*
Set up by: AWD

Sample Information:

Sample ID: Adit
Sample Date: August 13, 2013
Date Received: August 15, 2013
Sample Volume: 2 x 20L

Test Validity Criteria:
≥ 90% mean control survival (no more than 2 mortalities in any control replicate)

WQ Ranges:
T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

Test Organism Information:

Broodstock No.: 073113 A
Age of young (Day 0): <24 h
Avg No. young per brood in previous 7 d: 23
Mortality (%) in previous 7 d: 0
Days to first brood: 9

NaCl Reference Toxicant Results:

Reference Toxicant ID: OM 102
Stock Solution ID: 13NA02
Date Initiated: August 8, 2013
48-h LC50 (95% CL): 4.2 (3.7 - 4.8) g/LNaCL

Reference Toxicant Mean and Historical Range: 4.0 (3.7 - 4.3) g/L NaCL
Reference Toxicant CV (%): 4

Test Results: The 48-h LC50 is >100 %v (v/v).

Reviewed by: JGh

Date reviewed: Sep. 13/13

Freshwater Acute
48 Hour Toxicity Test Data Sheet

@ 1015

Client: Rescan
Sample ID: Adit
Work Order No.: 13418

Start Date/Time: Aug 18/13 AM
No. Organisms/volume: 10/200mL
Test Organism: *D.magna*
Set up by: AM

DO meter: DO- 1 pH meter: pH- 1 Conductivity meter: C- 1

Concentration %(v/v)	Rep	Number of Live Organisms 24	48	No. Immobilized 48	Temperature (°C) 0	24	48	Dissolved oxygen (mg/L) 0	24	48	pH 0	24	48	Conductivity (µS/cm) 0	48
Control	A	10	10	NL	20.5	20.5	20.0	8.6		8.3	7.8		7.9	340	359
	B														
	C														
	D														
6.25	A	10	10	0	20.5	20.5	20.0	8.7		8.3	7.8		8.0	368	376
	B														
	C														
	D														
12.5	A	10	10	0	20.5	20.5	20.0	8.7		8.2	7.9		8.1	395	403
	B														
	C														
	D														
25	A	10	10	0	20.5	20.5	20.0	8.8		8.3	7.9		8.1	419	426
	B														
	C														
	D														
50	A	10	10	0	20.5	20.5	20.0	8.8		8.2	8.0		8.1	451	459
	B														
	C														
	D														
100	A	10	10	0	20.6	20.5	20.0	8.8		8.3	8.0		8.2	531	539
	B														
	C														
	D														
Technician Initials		KH	NL	NL	AM	KH	NL	AM		NL	AM		NL	AM	NL

WQ Ranges: T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

	Hardness*	Alkalinity*
Conc.	*(mg/L as CaCo3)	
Control (MHW)	100	70
Highest conc.	180	124

	Initial WQ	Adjustment	Adjusted WQ
Temp (°C)	20.5 AM		
DO (mg/L)	8.8		
pH	8.0		
Cond (µS/cm)	531		

Sample Description: slightly turbid

Comments: Batch#: 073133A 7-d previous # young/brood: 23 Day of 1st Brood: 9 Previous 7-d % Mortality: 0

Reviewed by: JGL Date reviewed: Aug. 13/13

Daphnia magna Summary Sheet

Client: Rescan / EMM
Work Order No.: 13418

Start Date/Time: August 15, 2013 @ 1630h
Test Species: *Daphnia magna*
Set up by: EMM

Test Validity Criteria:
≥ 90% mean control survival (no more than 2 mortalities in any control replicate)

WQ Ranges:
T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

Sample Information:

Sample ID: BJ 2
Sample Date: August 13, 2013
Date Received: August 15, 2013
Sample Volume: 2 x 20L

Test Organism Information:

Broodstock No.: 072413 B
Age of young (Day 0): <24 h
Avg No. young per brood in previous 7 d: 19
Mortality (%) in previous 7 d: 0
Days to first brood: 9

NaCl Reference Toxicant Results:

Reference Toxicant ID: DM 102
Stock Solution ID: 13 NA 02
Date Initiated: August 8, 2013
48-h LC50 (95% CL): 4.2 (3.7 - 4.8) g/LNaCL

Reference Toxicant Mean and Historical Range: 4.0 (3.7 - 4.3) g/L NaCL
Reference Toxicant CV (%): 4

Test Results: The 48-h LC 50 is > 100 % (v/v).

Reviewed by: JGH
Date reviewed: Sep. 13/13

Freshwater Acute
48 Hour Toxicity Test Data Sheet

Client: Roscan
Sample ID: BJ2
Work Order No.: 13418

Start Date/Time: aug 15/13 @ 1630
No. Organisms/volume: 10/200mL
Test Organism: *D.magna*
Set up by: Emm

DO meter: DO-3 pH meter: pH-3 Conductivity meter: C-3

Concentration % (v/v)	Rep	Number of Live Organisms 24	Number of Live Organisms 48	No. Immobilized 48	Temperature (°C) 0	Temperature (°C) 24	Temperature (°C) 48	Dissolved oxygen (mg/L) 0	Dissolved oxygen (mg/L) 24	Dissolved oxygen (mg/L) 48	pH 0	pH 24	pH 48	Conductivity (µS/cm) 0	Conductivity (µS/cm) 48
control	A	10	10	0	21.5	20.5	20.6	8.6		8.7	7.9		8.0	357	360
	B														
	C														
	D														
6.25	A	10[1]	10[1]	0	21.5	20.5	20.6	8.4		8.7	7.8		8.1	341	345
	B														
	C														
	D														
12.5	A	10[1]	10[1]	0	21.0	20.5	20.6	8.4		8.8	7.9		8.1	327	326
	B														
	C														
	D														
25	A	10[1]	10[1]	0	21.0	20.5	20.5	8.3		8.8	7.9		8.2	288	285
	B														
	C														
	D														
50	A	10[1]	10[1]	0	20.5	20.5	20.6	8.4		8.8	7.9		8.4	217	222
	B														
~~10~~	C														
	D														
100	A	10[1]	10[1]	0	19.0	20.5	20.6	8.9		8.9	8.0		8.5	67	77
	B														
	C														
	D														
Technician Initials		KP	AM	AM	Emm	KP	AS	Emm		AM	Emm		AS	Emm	AM

WQ Ranges: T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

	Hardness*	Alkalinity*
Conc.	*(mg/L as CaCo3)	
Control (MHW)	100	70
Highest conc.	30	18

	Initial WQ	Adjustment	Adjusted WQ
Temp (°C)	19.0		
DO (mg/L)	8.9		
pH	8.0		
Cond (µS/cm)	67		

Sample Description: ~~clear, some white ppt~~ slightly turbid ① Debris attached to daphnids

Comments: Batch#: 072413A+B 7-d previous # young/brood: 19 Day of 1st Brood: 9 Previous 7-d % Mortality: 0

Reviewed by: JGH Date reviewed: Sep. 13/13

Daphnia magna Summary Sheet

Client: Rescan
Work Order No.: 13418

Start Date/Time: August 16, 2013 @ 1530h
Test Species: *Daphnia magna*
Set up by: KLP

Sample Information:

Sample ID: BJ 4
Sample Date: August 13, 2013
Date Received: August 15, 2013
Sample Volume: 2 x 20L

Test Validity Criteria:

≥ 90% mean control survival (no more than 2 mortalities in any control replicate)

WQ Ranges:

T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

Test Organism Information:

Broodstock No.: 072413 A+B
Age of young (Day 0): <24 h
Avg No. young per brood in previous 7 d: 18
Mortality (%) in previous 7 d: 0
Days to first brood: 8

NaCl Reference Toxicant Results:

Reference Toxicant ID: Dm 102
Stock Solution ID: 13NA02
Date Initiated: August 8, 2013
48-h LC50 (95% CL): 4.2 (3.7 - 4.8) g/LNaCL

Reference Toxicant Mean and Historical Range: 4.0 (3.7 - 4.3) g/L NaCL
Reference Toxicant CV (%): 4

Test Results: The 48-h LC50 is >100 % (v/v).

Reviewed by: JGL

Date reviewed: Sept. 13/13

Freshwater Acute
48 Hour Toxicity Test Data Sheet

Client: Rescan
Sample ID: BJ4
Work Order No.: 13418

Start Date/Time: Aug 16/13 @ 1530h
No. Organisms/volume: 10/200mL
Test Organism: *D.magna*
Set up by: KLP

DO meter: DO- 1 pH meter: pH- 1 Conductivity meter: C- 1

Concentration % (v/v)	Rep	Number of Live Organisms 24	Number of Live Organisms 48	No. Immobilized 48	Temperature (°C) 0	Temperature (°C) 24	Temperature (°C) 48	Dissolved oxygen (mg/L) 0	Dissolved oxygen (mg/L) 24	Dissolved oxygen (mg/L) 48	pH 0	pH 24	pH 48	Conductivity (µS/cm) 0	Conductivity (µS/cm) 48
Control	A	10	10	0	22.0	20.5	20.5	8.3		8.4	7.9		7.9	355	357
	B														
	C														
	D														
6.25	A	10	10	0	22.0	20.5	20.5	8.3		8.4	7.9		7.9	340	346
	B														
	C														
	D														
12.5	A	10	10	0	22.0	20.5	20.5	8.4		8.4	7.9		7.8	322	326
	B														
	C														
	D														
25	A	10	10	0	22.0	20.5	20.5	8.4		8.5	7.9		7.7	282	287
	B														
	C														
	D														
50	A	10	10	0	22.0	20.5	20.5	8.4		8.5	7.9		7.6	212	216
	B														
	C														
	D														
100	A	10	10	0	22.0	20.6	20.5	8.6		8.5	8.0		7.4	61	71
	B														
	C														
	D														
Technician Initials		AM	AM	AM	AM KLP	AM	AM	AM KLP		AM	KLP		AM	KLP	AM

WQ Ranges: T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

Conc.	Hardness* *(mg/L as CaCo3)	Alkalinity*
Control (MHW)	100	70
Highest conc.	32	20

	Initial WQ	Adjustment	Adjusted WQ
Temp (°C)	22.0		
DO (mg/L)	8.6		
pH	8.0		
Cond (µS/cm)	61		

Sample Description: turbid, light murky brown

Comments: Batch#: 07041313A1B 7-d previous # young/brood: 18 Day of 1st Brood: 8 Previous 7-d % Mortality: 0

Reviewed by: JGH Date reviewed: Sept. 13/13

Client: Rescan

W.O.#: 13418 / 13417

Hardness and Alkalinity Datasheet

	Alkalinity						Hardness			
Sample ID	Sample Date	Sample Volume (mL)	(mL) 0.02N HCL/H_2SO_4 used to pH 4.5	(mL) of 0.02N HCL/H_2SO_4 used to pH 4.2	Total Alkalinity ($mg/LCaCO_3$)		Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness ($mg/L\ CaCO_3$)	Technician
BS u/s	Aug. 15/13	50	0.9	1.0	16		50	1.3	26	YL
BS 2	"	"	1.0	1.1	18		"	1.5	30	"
BS 4	"	"	1.1	1.2	20		"	1.6	32	"
Adit	"	"	6.3	6.4	124		10[D]	1.8	180	"
Camp Creek (ccc)	"	"	0.3	0.4	4		50	0.9	18	"
MHW	"	50	3.7	3.9	70		50	5.0	100	KLP
20% Perrier	Aug 16/13	50	4.5	4.7	86		50	4.9	98	KLP
Camp Creek (cc) Hardness Adj.	Aug	50	1.0	1.1	18		50	1.5	30	KLP

Notes: [D] Diluted to 100 mL w/ DI water

Reviewed by: JOL

Date Reviewed: Sep. 13/13

APPENDIX C – Chain of Custody Form

Nautilus Environmental

BRITISH COLUMBIA
8664 Commerce Court
Burnaby British Columbia Canada V5A 4N7
Phone 604.420.8773
Fax 604.357.1361

Chain of Custody

0805

Date 14 Aug 2013 Page 1 of 1

Sample Collection by: Allegra Cairns.

Report to:
Company Rescan/Erm.
Address 1111 West Hastings
City Vancouver Prov. BC PC V6E 2J3
Contact Allegra Cairns.
Phone No. 604 687 4277

Invoice to:
Company Same as report to.
Address
City Prov. PC
Contact
Phone No.

ANALYSIS REQUIRED

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NUMBER OF CONTAINERS	COMMENTS	96hr D.magna WO#13418 LC50 48	7-d Ceriodaphnia WO#13417	RECEIPT TEMPERATURE (°C)
BJ U/S	13 14 Aug 2013	16:50	Water	20L jug	2	2 x 20L jugs			11.0
Camp Creek		18:30			40	40 x 1L bottles			
Adit		16:15			2	2 x 20L jugs			
BJ 2		9:40			2	2 x 20L jugs			
BJ 4		9:00	↓	↓	2	2 x 20L jugs			
BJ 200m D/S		13:40	↓	↓	2	2 x 20L jugs.	Not Tested as per client request		

PROJECT INFORMATION
CLIENT
P.O. NO.
SHIPPED VIA:

SAMPLE RECEIPT
TOTAL NO. OF CONTAINERS: 50
REC'D GOOD CONDITION: 4

RELINQUISHED BY (CLIENT)
(Signature) A. C. 6:15 (Time)
(Printed Name) Allegra Cairns. 14 Aug 2013 (Date)
(Company)

RELINQUISHED BY (COURIER)
(Signature) (Time)
(Printed Name) (Date)
(Company)

RECEIVED BY (COURIER)
(Signature) (Time)
(Printed Name) (Date)
(Company)

RECEIVED BY (LABORATORY)
(Signature) K Pearcy 1230h (Time)
(Printed Name) Krysta Pearcy Aug 15/13 (Date)
(Company) Nautilus Environmental

SPECIAL INSTRUCTIONS/COMMENTS:
Brucejack
Project # 0194150-0008-0098
Nautilus Contact: Armando Tang

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Appendix 2.2-2. Analytical Results for Water Quality Used in Toxicity Assays, 2013

Sample ID			BJ U/S	Camp Creek	Adit	BJ2	SC0
Station Type			Stream	Stream	Effluent	Stream	Stream
Date Sampled		Detection	13-Aug-2013	13-Aug-2013	13-Aug-2013	13-Aug-2013	13-Aug-2013
ALS Sample ID	Units	Limit	L1348329-6	L1348329-8	L1348329-5	L1348329-2	L1348329-1
Physical Tests							
Colour, True	CU	5.0	2.5	2.5	2.5	2.5	2.5
Conductivity	µS/cm	2.0	52.9	32.1	524.0	70.4	58.7
Hardness (as $CaCO_3$)	mg/L	0.50	24.10	12.70	102.00	25.90	27.20
pH	pH	0.10	7.95	7.74	8.27	8.13	8.04
Total Suspended Solids	mg/L	1.0	3.6	29.6	132.0	8.0	136.0
Total Dissolved Solids	mg/L	10	37	23	349	44	48
Turbidity	NTU	0.10	6.44	31.20	73.50	4.90	76.60
Anions and Nutrients							
Acidity (as CaCO3)	mg/L	1.0	1.8	1.8	0.5	1.2	1.5
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	2.0	15.1	2.7	127.0	17.9	19.4
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	2.0	1.0	1.0	1.0	1.0	1.0
Alkalinity, Hydroxide (as $CaCO_3$)	mg/L	2.0	1.0	1.0	1.0	1.0	1.0
Alkalinity, Total (as $CaCO_3$)	mg/L	2.0	15.1	2.7	127.0	17.9	19.4
Ammonia, Total (as N)	mg/L	0.0050	0.0025	0.0289	0.2970	0.0066	0.0025
Bromide (Br)	mg/L	0.050	0.025	0.025	0.025	0.025	0.025
Chloride (Cl)	mg/L	0.50	0.25	0.25	2.15	0.25	0.25
Fluoride (F)	mg/L	0.020	0.023	0.010	0.430	0.031	0.010
Nitrate (as N)	mg/L	0.0050	0.0078	0.0123	1.1000	0.0243	0.0074
Nitrite (as N)	mg/L	0.0010	0.0005	0.0005	0.1920	0.0084	0.0005
Total Kjeldahl Nitrogen	mg/L	0.050	0.025	0.025	0.580	0.025	0.025
Total Nitrogen	mg/L	0.050	0.025	0.057	1.880	0.074	0.025
Orthophosphate-Dissolved (as P)	mg/L	0.0010	0.0005	0.0020	0.0005	0.0005	0.0005
Phosphorus (P)	mg/L	0.0020	0.0037	0.0229	0.1310	0.0113	0.2150
Sulphate (SO_4)	mg/L	0.50	8.61	9.86	132.00	13.20	8.89
Cyanides							
Cyanide, Total	mg/L	0.0010	0.0005	0.0005	0.0005	0.0005	0.0005
Cyanide, Weak Acid Diss	mg/L	0.0010	0.0005	0.0005	0.0005	0.0005	0.0005
Organic / Inorganic Carbon							
Total Organic Carbon	mg/L	0.50	0.25	0.25	0.90	0.25	0.25
Total Metals							
Aluminum (Al)	mg/L	0.0030	0.2440	0.9030	2.3000	0.2570	4.4600
Antimony (Sb)	mg/L	0.00010	0.00035	0.00020	0.00918	0.00058	0.00278
Arsenic (As)	mg/L	0.00010	0.00088	0.00200	0.02780	0.00232	0.01640
Barium (Ba)	mg/L	0.000050	0.043000	0.038000	0.130000	0.038700	0.151000
Beryllium (Be)	mg/L	0.00010	0.00005	0.00005	0.00012	0.00005	0.00012
Bismuth (Bi)	mg/L	0.00050	0.00025	0.00025	0.00025	0.00025	0.00025
Boron (B)	mg/L	0.010	0.005	0.005	0.106	0.005	0.005
Cadmium (Cd)	mg/L	0.000010	0.000005	0.000061	0.000106	0.000032	0.000206
Calcium (Ca)	mg/L	0.020	9.230	4.810	35.100	10.100	12.100
Chromium (Cr)	mg/L	0.00010	0.00012	0.00016	0.00109	0.00020	0.00392
Cobalt (Co)	mg/L	0.00010	0.00005	0.00066	0.00090	0.00015	0.00323
Copper (Cu)	mg/L	0.00050	0.00025	0.00197	0.01070	0.00115	0.03010
Iron (Fe)	mg/L	0.030	0.091	0.942	2.790	0.267	7.460
Lead (Pb)	mg/L	0.000050	0.000139	0.000655	0.005150	0.000590	0.007500
Lithium (Li)	mg/L	0.00050	0.00111	0.00113	0.23500	0.00691	0.00375
Magnesium (Mg)	mg/L	0.0050	0.2990	0.3520	4.4900	0.4140	2.6300
Manganese (Mn)	mg/L	0.000050	0.009120	0.124000	0.231000	0.026100	0.275000
Mercury (Hg)	mg/L	0.000010	0.000005	0.000005	0.000005	0.000005	0.000023
Molybdenum (Mo)	mg/L	0.000050	0.000361	0.000073	0.007200	0.000532	0.000722
Nickel (Ni)	mg/L	0.00050	0.00025	0.00025	0.00151	0.00025	0.00326
Phosphorus (P)	mg/L	0.30	0.15	0.15	0.15	0.15	0.15

Appendix 2.2-2. Analytical Results for Water Quality Used in Toxicity Assays, 2013

Sample ID			BJ U/S	Camp Creek	Adit	BJ2	SC0
Station Type			Stream	Stream	Effluent	Stream	Stream
Date Sampled		Detection	13-Aug-2013	13-Aug-2013	13-Aug-2013	13-Aug-2013	13-Aug-2013
ALS Sample ID	Units	Limit	L1348329-6	L1348329-8	L1348329-5	L1348329-2	L1348329-1
Total Metals *(cont'd)*							
Potassium (K)	mg/L	0.050	0.174	0.272	6.400	0.335	1.420
Selenium (Se)	mg/L	0.00010	0.00005	0.00005	0.00060	0.00010	0.00023
Silicon (Si)	mg/L	0.050	1.080	3.440	9.270	0.978	11.600
Silver (Ag)	mg/L	0.000010	0.000005	0.000039	0.000718	0.000034	0.000192
Sodium (Na)	mg/L	2.0	1.0	1.0	74.0	2.5	1.0
Strontium (Sr)	mg/L	0.00020	0.06310	0.02590	1.15000	0.08690	0.06500
Thallium (Tl)	mg/L	0.000010	0.000005	0.000016	0.000111	0.000013	0.000063
Tin (Sn)	mg/L	0.00010	0.00005	0.00005	0.00005	0.00005	0.00005
Titanium (Ti)	mg/L	0.010	0.005	0.040	0.057	0.005	0.225
Uranium (U)	mg/L	0.000010	0.000038	0.000039	0.000933	0.000068	0.000109
Vanadium (V)	mg/L	0.0010	0.0005	0.0012	0.0063	0.0005	0.0152
Zinc (Zn)	mg/L	0.0030	0.0015	0.0079	0.0200	0.0053	0.0319
Dissolved Metals							
Dissolved Metals Filtration Location	-	-	LAB	LAB	LAB	LAB	LAB
Aluminum (Al)	mg/L	0.0030	0.0100	0.0251	0.0488	0.0234	0.1360
Antimony (Sb)	mg/L	0.00010	0.00032	0.00005	0.00997	0.00061	0.00061
Arsenic (As)	mg/L	0.00010	0.00063	0.00034	0.01340	0.00107	0.00104
Barium (Ba)	mg/L	0.000050	0.034600	0.017000	0.054500	0.031300	0.025200
Beryllium (Be)	mg/L	0.00010	0.00005	0.00005	0.00005	0.00005	0.00005
Bismuth (Bi)	mg/L	0.00050	0.00025	0.00025	0.00025	0.00025	0.00025
Boron (B)	mg/L	0.010	0.005	0.005	0.109	0.005	0.005
Cadmium (Cd)	mg/L	0.000010	0.000005	0.000049	0.000005	0.000032	0.000005
Calcium (Ca)	mg/L	0.020	9.220	4.730	34.000	9.730	9.950
Chromium (Cr)	mg/L	0.00010	0.00005	0.00005	0.00005	0.00005	0.00014
Cobalt (Co)	mg/L	0.00010	0.00005	0.00032	0.00010	0.00016	0.00005
Copper (Cu)	mg/L	0.00050	0.00025	0.00025	0.00025	0.00025	0.00025
Iron (Fe)	mg/L	0.030	0.015	0.015	0.015	0.015	0.050
Lead (Pb)	mg/L	0.000050	0.000025	0.000025	0.000025	0.000025	0.000074
Lithium (Li)	mg/L	0.00050	0.00025	0.00025	0.25800	0.00643	0.00025
Magnesium (Mg)	mg/L	0.0050	0.2680	0.2120	4.1000	0.3780	0.5760
Manganese (Mn)	mg/L	0.000050	0.000642	0.109000	0.110000	0.012000	0.001500
Mercury (Hg)	mg/L	0.000010	0.000005	0.000005	0.000005	0.000005	0.000005
Molybdenum (Mo)	mg/L	0.000050	0.000343	0.000025	0.007580	0.000467	0.000489
Nickel (Ni)	mg/L	0.00050	0.00025	0.00025	0.00064	0.00025	0.00025
Phosphorus (P)	mg/L	0.30	0.15	0.15	0.15	0.15	0.15
Potassium (K)	mg/L	0.050	0.102	0.095	5.850	0.252	0.154
Selenium (Se)	mg/L	0.00010	0.00005	0.00005	0.00022	0.00005	0.00005
Silicon (Si)	mg/L	0.050	0.514	0.268	3.130	0.453	0.421
Silver (Ag)	mg/L	0.000010	0.000005	0.000005	0.000005	0.000005	0.000005
Sodium (Na)	mg/L	2.0	1.0	1.0	75.0	2.4	1.0
Strontium (Sr)	mg/L	0.00020	0.06060	0.02340	1.18000	0.08670	0.05510
Thallium (Tl)	mg/L	0.000010	0.000005	0.000005	0.000050	0.000005	0.000005
Tin (Sn)	mg/L	0.00010	0.00005	0.00005	0.00005	0.00005	0.00005
Titanium (Ti)	mg/L	0.010	0.005	0.005	0.005	0.005	0.005
Uranium (U)	mg/L	0.000010	0.000023	0.000005	0.000856	0.000048	0.000018
Vanadium (V)	mg/L	0.0010	0.0005	0.0005	0.0005	0.0005	0.0005
Zinc (Zn)	mg/L	0.0030	0.0015	0.0015	0.0015	0.0015	0.0015

Appendix 3

Sediment Quality

Appendix 3.1-1. Current and Historical Names of Sediment Quality Sites

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Appendix 3.2-2. Sediment Hydrocarbons, Analytical Results, 2013

Appendix 3.3-1. Lake and Stream Sediment Quality Relative Percent Difference Results, 2010 to 2013

Appendix 3.1-1. Current and Historical Names of Sediment Quality Sites

Watershed	Water Body Name	Current Sample Site ID	Historical Sample Site ID	Historical Source	Sediment Quality: Size Fraction Used for Metal Analysis
Brucejack	Brucejack Lake	BJ	Brucejack Lake 30m	Newhawk (1989)	117 µm
	Brucejack Lake	BJ	Brucejack Lake 88m	Newhawk (1989)	117 µm
	Brucejack Creek Upstream	BJ U/S	Upper Foot Bridge	Newhawk (1989)	117 µm
	Brucejack Creek Outflow	BJ OF	60 m Below Portal	Newhawk (1989)	117 µm
	Brucejack Creek 2	BJ2	4	Godin and Chamberlain (1990)	150 µm
	Brucejack Creek 2	BJ2	Downstream Gage	Newhawk (1989)	117 µm
		Unknown*	Below Camp Waterfall	Newhawk (1989)	117 µm
Sulphurets/Unuk	Sulphurets Creek 3	SC3	3	Godin and Chamberlain (1990)	150 µm
	Unuk River 1A	UR1A	1	Godin and Chamberlain (1990)	150 µm
	Unuk River 1	UR1	2	Godin and Chamberlain (1990)	150 µm

year of sample collection is not clearly stated in the Newhawk report (1987/1988), therefore it was assumed samples were collected in 1988

**** could not accurately identify sample location, therefore data is included in Appendix 3 only***

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			Trib 2	Trib 2	Trib 2	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ (Shallow)	BJ (Shallow)	BJ (Shallow)	BJ (Shallow)
Replicate			1	2	3	1	2	2	3	1	2	3	1	1	1	2	3	1
Source			BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	NH	NH	BJ	BJ	BJ	BJ
Area			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Included/Excluded			Exclude	Exclude	Exclude	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		Detection	10-Aug-2013	10-Aug-2013	10-Aug-2013	8-Sep-2012	8-Sep-2012	8-Sep-2012	8-Sep-2012	9-Aug-2013	9-Aug-2013	9-Aug-2013	1988	1988	8-Sep-2012	8-Sep-2012	8-Sep-2012	10-Aug-2013
ALS Sample ID	Units	Limits	L1346191-16	L1346191-17	L1346191-18	L1207305-13	L1207305-14	L1207305-16	L1207305-15	L1346191-7	L1346191-8	L1346191-9	NA	NA	L1207305-10	L1207305-11	L1207305-12	L1346191-13
Physical Tests																		
Moisture	%	0.25 - 0.1	20.5	24	21.8	53.2	55.3	59.5	58.2	68.6	57.8	58.9	-	-	54.9	46.1	51.5	44.8
pH (1:2 soil:water)	pH	0.1 - 0.01	7.97	7.7	8.13	7.04	6.87	6.96	6.95	7.33	7.19	7.22	-	-	7.29	7.34	6.92	6.81
Particle Size																		
% Gravel (>2mm)	%	1 - 0.1	59.4	36.5	58	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	-	4.63	1.04	<0.10	<0.10
% Sand (2.0mm - 0.063mm)	%	1 - 0.1	38.9	58.8	40.1	0.57	0.4	0.69	0.44	0.54	0.28	0.17	-	-	12.5	11	7.32	23.3
% Silt (0.063mm - 4µm)	%	1 - 0.1	1.28	4.01	1.53	41.2	44.4	42.1	44.5	35	33.2	36.4	-	-	52.5	55.5	58.4	43.5
% Silt (0.063mm - 0.0312mm)	%	0.1	-	-	-	8.2	8.1	9.1	9.2	-	-	-	-	-	13.9	15.3	13.7	-
% Silt (0.0312mm - 0.004mm)	%	0.1	-	-	-	33.1	36.3	33.1	35.2	-	-	-	-	-	38.6	40.2	44.7	-
% Clay (<4µm)	%	1 - 0.1	0.48	0.71	0.34	58.2	55.2	57.2	55.1	64.4	66.5	63.4	-	-	30.3	32.5	34.3	33.2
Texture	-	-	Sand	Sand	Sand	Silty clay	Silty clay	Silty clay	Silty clay	Silty clay	Silty clay	Silty clay	-	-	Silt loam	Silt loam / Silty clay	Silty clay loam	Loam / Clay loam
Anions and Nutrients																		
Total Nitrogen by LECO	%	17 - 0.02	0.031	0.034	0.025	0.086	0.088	0.085	0.09	0.057	0.042	0.052	-	-	0.071	0.06	0.084	0.035
Cyanides																		
Cyanide, Total	mg/kg	3 - 0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	<0.050	<0.050	<0.050	<0.050
Organic / Inorganic Carbon																		
$CaCO_3$ Equivalent	%	0.8 - 0.09	<0.80	<0.80	<0.80	1.17	1.23	1.65	1.13	0.96	1.54	1.15	-	-	0.92	1.08	1.38	1
Inorganic Carbon	%	0.1 - 0.1	<0.10	<0.10	<0.10	0.14	0.15	0.2	0.13	0.11	0.18	0.14	-	-	0.11	0.13	0.17	0.12
Total Carbon by Combustion	%	0.1 - 0.1	0.4	0.5	0.3	0.8	0.7	0.7	0.8	0.6	0.5	0.5	-	-	0.4	0.4	0.5	0.4
Total Organic Carbon	%	0.7 - 0.1	0.39	0.46	0.35	0.62	0.59	0.54	0.69	0.5	0.33	0.4	-	-	0.32	0.24	0.33	0.27
Plant Available Nutrients																		
Cation Exchange Capacity	meq/100g	2 - 0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Ammonium-N	mg/kg	4.8 - 1	3	3.7	2.5	1.8	1.9	2	2.2	4.1	5.2	6.9	-	-	2.1	1.5	2.7	3.3
Nitrate+Nitrite-N	mg/kg	16 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Nitrate-N	mg/kg	16 - 1	<4.0	<4.0	<4.0	<2.0	<2.0	<2.0	<4.0	<6.0	<6.0	<6.0	-	-	<2.0	<2.0	<2.0	<6.0
Nitrite-N	mg/kg	3.2 - 0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Phosphate-P	mg/kg	8 - 2	5.9	4.7	4.3	2.1	2.2	2.5	<2.0	<2.0	<2.0	2.8	-	-	<2.0	<2.0	<2.0	3.4
Available Sulphate-S	mg/kg	3 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																		
Size Fraction	µm		63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	117 µm	117 µm	63 µm	63 µm	63 µm	63 µm
Aluminum (Al)	mg/kg	14300 - 50	21000	20600	24500	14800	15400	16200	13800	19400	20800	19500	24000	23900	16500	16000	16400	17700
Antimony (Sb)	mg/kg	10 - 0.1	12.5	12.9	13.5	39.7	38.1	39.5	45.9	21.5	19	20.9	5	<5	7.93	7.36	6.9	9.39
Arsenic (As)	mg/kg	5 - 0.05	271	324	282	184	169	170	180	152	145	148	145	155	142	148	146	153
Barium (Ba)	mg/kg	1 - 0.5	463	621	565	617	625	695	620	650	698	676	610	520	329	333	345	440
Beryllium (Be)	mg/kg	0.5 - 0.1	0.6	0.76	0.65	0.59	0.63	0.64	0.57	0.84	0.86	0.82	<0.5	<0.5	0.53	0.51	0.51	0.61
Bismuth (Bi)	mg/kg	24 - 0.1	0.19	0.23	0.2	0.37	0.37	0.36	0.4	0.4	0.31	0.34	<2	<2	0.18	0.18	0.17	0.21
Boron (B)	mg/kg	5 - 5	<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
Cadmium (Cd)	mg/kg	0.5 - 0.05	0.804	1.04	0.911	2.42	2.29	2.28	2.6	1.91	1.49	1.57	<0.5	<0.5	0.555	0.484	0.515	0.687
Calcium (Ca)	mg/kg	100 - 50	15600	9850	12700	3860	3810	3990	3620	4600	5030	4410	5.7	5.4	5230	5110	5000	5280
Chromium (Cr)	mg/kg	2 - 0.5	39	22.3	52.3	5.29	6.33	5.87	5.15	14.1	9.61	7.63	5	5	4.58	4.91	4.57	6.15
Cobalt (Co)	mg/kg	10 - 0.1	27	34.4	28.6	16.8	17.1	16.8	15.6	18.5	19.5	19.2	20	19	16.4	16.5	17.5	18.7
Copper (Cu)	mg/kg	1 - 0.5	52.2	63.7	67.9	79.9	79.2	79	83.8	71.3	64.8	68.3	42	37	35.5	34.4	36.5	43.1

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			Trib 2	Trib 2	Trib 2	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ (Shallow)	BJ (Shallow)	BJ (Shallow)	BJ (Shallow)
Replicate			1	2	3	1	2	2	3	1	2	3	1	1	1	2	3	1
Source			BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	NH	NH	BJ	BJ	BJ	BJ
Area			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Included/Excluded			Exclude	Exclude	Exclude	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		Detection	10-Aug-2013	10-Aug-2013	10-Aug-2013	8-Sep-2012	8-Sep-2012	8-Sep-2012	8-Sep-2012	9-Aug-2013	9-Aug-2013	9-Aug-2013	1988	1988	8-Sep-2012	8-Sep-2012	8-Sep-2012	10-Aug-2013
ALS Sample ID	Units	Limits	L1346191-16	L1346191-17	L1346191-18	L1207305-13	L1207305-14	L1207305-16	L1207305-15	L1346191-7	L1346191-8	L1346191-9	NA	NA	L1207305-10	L1207305-11	L1207305-12	L1346191-13
Metals *(cont'd)*																		
Gallium (Ga)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Fe)	mg/kg	100 - 50	66300	65100	63100	42600	40800	41700	41000	38900	40300	40000	41500	42500	43700	42800	42900	48400
Lanthanum (La)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	20	20	-	-	-	-
Lead (Pb)	mg/kg	30 - 0.1	20.7	23.4	20.1	226	224	221	250	195	157	177	22	22	35.1	30.1	33	46.5
Lithium (Li)	mg/kg	5 - 1	37.3	35.8	47	15	16.2	16.2	13.6	21.1	23.9	21.9	-	-	21.4	19.9	18.8	22.9
Magnesium (Mg)	mg/kg	50 - 10	11900	11200	14600	6220	6390	6340	5500	7030	8170	7450	9400	8800	7020	7150	7270	7860
Manganese (Mn)	mg/kg	1 - 0.2	3350	4010	3940	2410	2290	2240	2390	2650	2390	2400	2190	2200	1850	1880	1910	2120
Mercury (Hg)	mg/kg	1 - 0.005	0.498	0.549	0.441	0.549	0.551	0.547	0.554	0.571	0.582	0.56	<1	<1	0.737	0.81	0.733	0.708
Molybdenum (Mo)	mg/kg	4 - 0.1	8.29	7.76	11.9	7.39	7.93	6.89	7.69	6.79	5.42	5.5	<1	<1	3.7	3.36	3.52	4.25
Nickel (Ni)	mg/kg	5 - 0.5	29.9	19.8	38.3	7.65	7.84	7.95	7.03	13.3	11	9.72	2	2	6.61	6.57	6.64	8.28
Phosphorus (P)	mg/kg	50 - 10	2040	1960	2080	1430	1340	1340	1440	1190	1180	1200	1020	1180	1760	1660	1740	1820
Potassium (K)	mg/kg	200 - 100	970	1100	1170	2610	2670	2990	2640	3440	3470	3080	3.9	3.4	2210	2330	2660	2170
Selenium (Se)	mg/kg	11 - 0.1	2	2.78	2.1	1.82	1.8	1.82	2.05	1.01	0.85	1	<10	<10	0.63	0.5	0.58	0.66
Silicon (Si)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (Ag)	mg/kg	2 - 0.05	1.04	3.05	1.25	74.5	70.7	71.7	89	39.4	30.7	37.2	1	1	6.42	4.22	4.37	8.75
Sodium (Na)	mg/kg	200 - 0.1	240	300	290	210	200	190	170	240	190	180	0.2	0.2	230	310	370	200
Strontium (Sr)	mg/kg	0.5 - 0.1	45.8	51.5	44.9	33.5	33.5	36.5	33.2	38.6	41.6	37.9	47	43	29.6	29.4	29.4	31.6
Sulfur (S)-Total	mg/kg	500 - 100	5300	7800	11500	-	-	-	-	3300	3800	2500	-	-	-	-	-	2500
Thallium (Tl)	mg/kg	10 - 0.05	0.719	0.71	0.833	0.741	0.813	0.845	0.716	0.925	0.962	0.88	10	10	0.851	0.984	0.78	0.809
Tin (Sn)	mg/kg	8 - 0.2	24.5	10.1	17.5	0.36	0.35	0.34	0.38	2.51	3.22	2.94	-	-	0.29	0.28	0.28	0.76
Titanium (Ti)	mg/kg	100 - 1	704	548	863	213	238	272	208	213	333	238	700	600	233	268	231	261
Tungsten (W)	mg/kg	5 - 5	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-	-	-
Uranium (U)	mg/kg	10 - 0.05	1.77	2.6	1.78	1.9	2.03	1.99	1.77	2.21	2.24	2.21	<10	<10	2.1	2.11	2.11	2.16
Vanadium (V)	mg/kg	2 - 0.2	119	103	137	44.5	46.9	48.6	41.6	52.8	59	54.9	70	66	47.8	49.9	50.7	51.9
Zinc (Zn)	mg/kg	2 - 1	152	187	174	306	297	300	328	266	221	237	112	103	117	110	121	143

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			BJ (Shallow)	BJ (Shallow)	BJ U/S	BJ U/S	BJ U/S	BJ U/S	BJ U/S	BJ U/S	BJ U/S	BJ U/S	BJ U/S	BJ U/S	BJ U/S	BJ U/S of CC	BJ U/S of CC
Replicate			**2**	**3**	**1**	**2**	**2**	**3**	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**2**	**1**	**2**
Source			BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	NH	NH	BJ	BJ
Area			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Included/Excluded			Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		**Detection**	10-Aug-2013	10-Aug-2013	13-Dec-2012	13-Dec-2012	13-Dec-2012	13-Dec-2012	15-Aug-2013	15-Aug-2013	15-Aug-2013	15-Aug-2013	15-Aug-2013	15-Aug-2013	1988	1988	7-Sep-2012	7-Sep-2012
ALS Sample ID	**Units**	**Limits**	L1346191-14	L1346191-15	L1250701-4	L1250701-5	L1250701-7	L1250701-6	L1350212-1	L1350212-12	L1350212-2	L1350212-13	L1350212-3	L1350212-14	NA	NA	L1207305-7	L1207305-8
Physical Tests																		
Moisture	%	0.25 - 0.1	43.4	53.2	19.9	39.2	28.3	48.4	50.5	46	37.2	33.8	39.2	36	-	-	34.9	34.2
pH (1:2 soil:water)	pH	0.1 - 0.01	7.02	6.92	7.13	6.44	6.43	6.57	6.03	6.15	6.34	6.49	6.42	6.13			7.73	7.76
Particle Size																		
% Gravel (>2mm)	%	1 - 0.1	<0.10	<0.10	21.9	29.1	24.7	16.7	<0.10	0.13	0.31	0.78	4.19	0.79	-	-	9.94	1.96
% Sand (2.0mm - 0.063mm)	%	1 - 0.1	29.9	6.74	67.9	51.8	55.4	38.3	7.14	9.52	30.2	32	19.6	20.6	-	-	29.9	10.4
% Silt (0.063mm - 4µm)	%	1 - 0.1	40.7	48	6.32	11.9	12.7	24.5	55.8	47.4	38.6	35.7	43.7	45	-	-	37.8	52.9
% Silt (0.063mm - 0.0312mm)	%	0.1	-	-	1.68	3.28	3.5	4.18	-	-	-	-	-	-	-	-	7.6	14.3
% Silt (0.0312mm - 0.004mm)	%	0.1	-	-	4.64	8.64	9.25	20.4	-	-	-	-	-	-	-	-	30.1	38.5
% Clay (<4µm)	%	1 - 0.1	29.4	45.3	3.88	7.23	7.2	20.4	37.1	42.9	30.9	31.5	32.6	33.6	-	-	22.4	34.7
Texture	-	-	Loam	Silty clay loam	Sand / Loamy sand	Sandy loam	Sandy loam	Loam	Silty clay loam	Silty clay loam	Loam	Loam / Clay loam	Clay loam	Clay loam	-	-	Loam	Silty clay loam
Anions and Nutrients																		
Total Nitrogen by LECO	%	17 - 0.02	0.042	0.054	0.026	0.039	0.039	0.046	0.082	0.086	0.057	0.055	0.059	0.059	-	-	0.068	0.055
Cyanides																		
Cyanide, Total	mg/kg	3 - 0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.052	0.052	<0.050	<0.050	<0.050	<0.050	-	-	<0.050	<0.050
Organic / Inorganic Carbon																		
$CaCO_3$ Equivalent	%	0.8 - 0.09	1.64	3.22	<0.80	<0.80	<0.80	<0.80	1.37	1.04	1.23	1.17	1.11	1.39	-	-	1.25	2.93
Inorganic Carbon	%	0.1 - 0.1	0.2	0.39	<0.10	<0.10	<0.10	<0.10	0.16	0.12	0.15	0.14	0.13	0.17	-	-	0.15	0.35
Total Carbon by Combustion	%	0.1 - 0.1	0.4	0.5	0.2	0.2	0.2	0.4	0.8	0.9	0.6	0.6	0.7	0.6	-	-	1.2	1.8
Total Organic Carbon	%	0.7 - 0.1	0.19	0.13	0.17	0.23	0.23	0.44	0.67	0.76	0.5	0.45	0.52	0.48	-	-	1.06	1.49
Plant Available Nutrients																		
Cation Exchange Capacity	meq/100g	2 - 0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Ammonium-N	mg/kg	4.8 - 1	4.5	5	5.9	4.3	5.5	9.4	17.3	18.2	6.5	7	6.6	6.7	-	-	2.6	2.4
Nitrate+Nitrite-N	mg/kg	16 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Nitrate-N	mg/kg	16 - 1	<6.0	<6.0	<1.0	<1.0	<1.0	<1.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	-	-	<2.0	<2.0
Nitrite-N	mg/kg	3.2 - 0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Phosphate-P	mg/kg	8 - 2	4.4	<2.0	6.8	3.5	7.8	2	3.2	<2.0	5.1	3	3.8	4.8	-	-	3	<2.0
Available Sulphate-S	mg/kg	3 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																		
Size Fraction	µm		63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	117 µm	117 µm	63 µm	63 µm
Aluminum (Al)	mg/kg	14300 - 50	17200	19700	19800	20000	20500	22300	20200	20300	21100	20000	21200	19600	6000	6100	6360	6280
Antimony (Sb)	mg/kg	10 - 0.1	11.5	10.3	7.74	7.03	6.69	7.04	7.24	7.72	6.53	7.05	6.76	6.76	15	15	8.49	12.1
Arsenic (As)	mg/kg	5 - 0.05	155	153	212	145	140	88.1	225	226	93.1	96.7	78.6	73.1	155	160	131	152
Barium (Ba)	mg/kg	1 - 0.5	457	513	516	311	346	434	352	350	359	350	332	317	220	270	152	99.2
Beryllium (Be)	mg/kg	0.5 - 0.1	0.63	0.65	0.76	0.66	0.68	0.69	0.69	0.71	0.67	0.64	0.68	0.65	<0.5	<0.5	0.26	0.3
Bismuth (Bi)	mg/kg	24 - 0.1	0.23	0.22	0.23	0.25	0.21	0.2	0.2	0.21	0.23	0.24	0.24	0.23	<2	<2	0.57	0.91
Boron (B)	mg/kg	5 - 5	<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
Cadmium (Cd)	mg/kg	0.5 - 0.05	0.795	0.779	1.16	0.568	0.586	0.587	0.547	0.531	0.38	0.397	0.396	0.416	<0.5	<0.5	1.24	1.33
Calcium (Ca)	mg/kg	100 - 50	5200	5380	4660	4010	4030	5410	5330	5050	4530	4820	5270	5120	0.8	0.9	6990	12200
Chromium (Cr)	mg/kg	2 - 0.5	7.77	11	17.1	12.1	24.2	7.67	6.05	9.59	9.35	13.1	6.41	6.33	<1	4	14.1	19.8
Cobalt (Co)	mg/kg	10 - 0.1	19.1	19.3	24.3	18.1	18.5	19.6	16.7	17	16.9	17.2	16.3	15.7	8	8	13.2	13.5
Copper (Cu)	mg/kg	1 - 0.5	49.8	47.5	45.8	42.2	42.7	37.6	36.6	35.4	34.4	35	32.5	31.9	21	20	61.8	62.3

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			BJ (Shallow)	BJ (Shallow)	BJ U/S	BJ U/S	BJ U/S	BJ U/S	BJ U/S	BJ U/S	BJ U/S	BJ U/S	BJ U/S	BJ U/S	BJ U/S	BJ U/S	BJ U/S of CC	BJ U/S of CC
Replicate			**2**	**3**	**1**	**2**	**2**	**3**	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**2**	**1**	**2**
Source			BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	NH	NH	BJ	BJ
Area			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Included/Excluded			Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		**Detection**	10-Aug-2013	10-Aug-2013	13-Dec-2012	13-Dec-2012	13-Dec-2012	13-Dec-2012	15-Aug-2013	15-Aug-2013	15-Aug-2013	15-Aug-2013	15-Aug-2013	15-Aug-2013	1988	1988	7-Sep-2012	7-Sep-2012
ALS Sample ID	**Units**	**Limits**	L1346191-14	L1346191-15	L1250701-4	L1250701-5	L1250701-7	L1250701-6	L1350212-1	L1350212-12	L1350212-2	L1350212-13	L1350212-3	L1350212-14	NA	NA	L1207305-7	L1207305-8
Metals *(cont'd)*																		
Gallium (Ga)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Fe)	mg/kg	100 - 50	50100	46500	48900	46200	46200	42000	47000	46900	47000	45900	45700	43700	40100	44600	56100	53500
Lanthanum (La)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	10	10	-	-
Lead (Pb)	mg/kg	30 - 0.1	53.3	53.6	35	30.6	28.1	29.1	34.5	36	28.1	30.6	31.2	30.8	182	108	83.2	79.8
Lithium (Li)	mg/kg	5 - 1	22.7	23.8	26.6	26.3	25.3	29.5	26.6	28.9	27.3	28.1	27.4	27.6	-	-	<5.0	<5.0
Magnesium (Mg)	mg/kg	50 - 10	7360	7970	8270	8020	8000	9310	8380	8350	8680	8160	8190	7810	2000	1800	2670	1490
Manganese (Mn)	mg/kg	1 - 0.2	2810	2070	3510	2650	2780	1220	995	1010	869	971	872	829	798	948	509	573
Mercury (Hg)	mg/kg	1 - 0.005	0.699	0.651	0.673	0.584	0.575	0.556	0.591	0.528	0.489	0.484	0.553	0.536	<1	<1	0.192	0.473
Molybdenum (Mo)	mg/kg	4 - 0.1	5.24	4.46	5.78	4.39	5.47	2.81	4.53	4.84	3.13	3.31	3.51	3.43	4	3	5.39	6.02
Nickel (Ni)	mg/kg	5 - 0.5	10.7	11.8	17.5	12.5	20.1	8.76	7.47	10.4	10.2	13	7.16	7.31	1	<1	6.32	7.16
Phosphorus (P)	mg/kg	50 - 10	1790	1610	1680	1630	1720	1480	1500	1480	1460	1440	1700	1630	960	1150	1560	1140
Potassium (K)	mg/kg	200 - 100	2170	2660	1890	2150	2430	2520	2190	2300	2180	2050	2090	1800	1.3	14	2620	2800
Selenium (Se)	mg/kg	11 - 0.1	0.88	0.7	0.9	0.95	0.91	0.73	0.85	0.8	0.88	0.88	0.87	0.86	<10	<10	4.39	4.51
Silicon (Si)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (Ag)	mg/kg	2 - 0.05	11.6	10.8	3.5	2.29	2.61	2.39	2.95	3.02	2.04	2.69	2.26	2.18	20.2	11.2	18.6	26.2
Sodium (Na)	mg/kg	200 - 0.1	200	250	190	210	220	200	160	230	190	210	190	160	<0.1	<0.1	100	<100
Strontium (Sr)	mg/kg	0.5 - 0.1	34.7	36.8	32	27.7	29	37.3	34	35.2	34.4	37.5	34.4	32.5	11	12	44.3	53.5
Sulfur (S)-Total	mg/kg	500 - 100	2900	2700	2400	1300	1100	1700	1600	1900	1600	2200	1500	1500	-	-	-	-
Thallium (Tl)	mg/kg	10 - 0.05	0.71	0.783	2.14	1.04	0.972	1.23	1.12	1.18	0.835	0.945	0.995	0.955	10	<10	0.482	0.587
Tin (Sn)	mg/kg	8 - 0.2	1.66	1.29	0.37	0.46	0.57	0.41	1.25	0.67	0.63	0.62	0.69	0.83	-	-	0.32	0.4
Titanium (Ti)	mg/kg	100 - 1	202	279	381	370	454	560	455	487	686	678	619	540	<100	<100	87.3	85.3
Tungsten (W)	mg/kg	5 - 5	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Uranium (U)	mg/kg	10 - 0.05	2.15	2.23	4.09	2.67	2.44	2.45	2.14	2.26	1.77	1.91	2.11	2.06	<10	<10	0.52	0.709
Vanadium (V)	mg/kg	2 - 0.2	47.4	55.2	59.3	53.9	56	64.9	59.8	60	65.7	62.8	64.7	59.6	13	15	22.6	15.6
Zinc (Zn)	mg/kg	2 - 1	153	158	145	118	123	127	129	131	115	116	116	115	107	96	115	121

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			BJ U/S of CC	BJ Inter	BJ Inter	BJ Inter	Adit	Adit	Adit	BJ OF	BJ OF	BJ 200m D/S	BJ 200m D/S	BJ 200m D/S	BJ 200m D/S	BJ 200m D/S	BJ 200m D/S	BJ2
Replicate			**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**1**	**2**	**3**	**1**	**2**	**3**	**1**
Source			BJ	BJ	BJ	BJ	BJ	BJ	BJ	NH	NH	BJ	BJ	BJ	BJ	BJ	BJ	GC
Area			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Included/Excluded			Include	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		**Detection**	7-Sep-2012	7-Sep-2012	7-Sep-2012	7-Sep-2012	19-Aug-2011	19-Aug-2011	19-Aug-2011	1988	1988	13-Dec-2012	13-Dec-2012	13-Dec-2012	15-Aug-2013	15-Aug-2013	15-Aug-2013	8-Aug-1988
ALS Sample ID	**Units**	**Limits**	L1207305-9	L1207305-4	L1207305-5	L1207305-6	L1053635-22	L1053635-23	L1053635-24	NA	NA	L1250701-1	L1250701-2	L1250701-3	L1350212-9	L1350212-10	L1350212-11	NA
Physical Tests																		
Moisture	%	0.25 - 0.1	34.6	18	24.2	18.1	15.6	11.4	22.1	-	-	27.6	11.5	36.5	25.1	28.2	30.4	-
pH (1:2 soil:water)	pH	0.1 - 0.01	6.62	6.63	6.57	6.95	6.95	6.88	6.74			8.2	8.17	8.16	7.82	7.44	7.23	
Particle Size																		
% Gravel (>2mm)	%	1 - 0.1	3.98	3.23	3.32	4.04	55.6	42.8	0.62	-	-	5.57	27.5	34.4	1.43	6.7	0.62	-
% Sand (2.0mm - 0.063mm)	%	1 - 0.1	47.5	77.7	72.4	89.2	42	52.5	96.5	-	-	78.7	58.9	46.5	52.9	76.3	29	-
% Silt (0.063mm - 4µm)	%	1 - 0.1	38.8	15.1	19.5	4.29	1.65	2.86	1.5	-	-	12.5	10.8	15.2	37.4	12	58.2	-
% Silt (0.063mm - 0.0312mm)	%	0.1	15.8	7.1	9.2	1.5	-	-	-	-	-	4.81	4.21	5.82	-	-	-	-
% Silt (0.0312mm - 0.004mm)	%	0.1	23	8	10.3	2.8	-	-	-	-	-	7.73	6.59	9.36	-	-	-	-
% Clay (<4µm)	%	1 - 0.1	9.72	4.05	4.78	2.52	0.71	1.79	1.36	-	-	3.16	2.8	3.99	8.27	5.08	12.2	-
Texture	-	-	Loam / Sandy loam	Loamy sand	Loamy sand	Sand	-	-	-	-	-	Loamy sand	Loamy sand	Sandy loam	Sandy loam	Loamy sand	Silt loam	-
Anions and Nutrients																		
Total Nitrogen by LECO	%	17 - 0.02	0.076	0.04	0.039	0.034	<4.3	<4.7	<4.3	-	-	<0.020	<0.020	0.027	0.033	0.031	0.042	-
Cyanides																		
Cyanide, Total	mg/kg	3 - 0.05	<0.050	<0.050	<0.050	<0.050	<3.0	<3.0	<3.0	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-
Organic / Inorganic Carbon																		
$CaCO_3$ Equivalent	%	0.8 - 0.09	<0.80	<0.80	<0.80	<0.80	-	-	-	-	-	<0.80	<0.80	<0.80	0.88	<0.80	<0.80	-
Inorganic Carbon	%	0.1 - 0.1	<0.10	<0.10	<0.10	<0.10	-	-	-	-	-	<0.10	<0.10	<0.10	0.11	<0.10	<0.10	-
Total Carbon by Combustion	%	0.1 - 0.1	0.9	0.1	0.1	<0.1	-	-	-	-	-	0.2	0.2	0.3	0.3	0.2	0.4	-
Total Organic Carbon	%	0.7 - 0.1	0.87	0.14	0.15	<0.10	<0.10	<0.10	<0.10	-	-	0.22	0.18	0.27	0.2	0.22	0.42	-
Plant Available Nutrients																		
Cation Exchange Capacity	meq/100g	2 - 0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Ammonium-N	mg/kg	4.8 - 1	1.9	2.6	2.8	1.4	<1.6	<2.4	<1.6	-	-	5	4.9	7.8	3.4	12.5	11.7	-
Nitrate+Nitrite-N	mg/kg	16 - 2	-	-	-	-	<4.0	<4.0	<4.0	-	-	-	-	-	-	-	-	-
Available Nitrate-N	mg/kg	16 - 1	<2.0	<2.0	<2.0	<2.0	<4.0	<4.0	<4.0	-	-	<1.0	<1.0	<1.0	<4.0	<1.0	<4.0	-
Nitrite-N	mg/kg	3.2 - 0.4	-	-	-	-	<0.80	<0.80	<0.80	-	-	-	-	-	-	-	-	-
Available Phosphate-P	mg/kg	8 - 2	6.5	5.9	5	9.2	10.9	9.6	10.8	-	-	5.1	6.6	5.5	4.6	6.4	3.5	-
Available Sulphate-S	mg/kg	3 - 2	-	-	-	-	23.9	17.2	18	-	-	-	-	-	-	-	-	-
Metals																		
Size Fraction	µm		63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	117 µm	117 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	150 µm
Aluminum (Al)	mg/kg	14300 - 50	10800	11100	10900	8420	11400	7290	9160	8500	9000	7060	6630	6830	9830	9950	10100	9880
Antimony (Sb)	mg/kg	10 - 0.1	13.4	9.79	9.93	15.2	26.3	31.1	31.7	10	10	36.6	41.8	30.7	16.2	19.4	16.9	-
Arsenic (As)	mg/kg	5 - 0.05	148	105	111	174	374	452	380	140	135	241	244	214	181	192	166	220
Barium (Ba)	mg/kg	1 - 0.5	267	215	227	305	264	339	229	330	210	132	105	143	209	196	276	342
Beryllium (Be)	mg/kg	0.5 - 0.1	0.46	0.38	0.38	0.31	0.96	0.41	0.7	<0.5	<0.5	0.53	0.47	0.47	0.42	0.46	0.47	0.5
Bismuth (Bi)	mg/kg	24 - 0.1	0.5	0.23	0.24	0.39	0.57	0.66	0.72	24	<2	0.56	0.59	0.57	0.49	0.53	0.46	-
Boron (B)	mg/kg	5 - 5	<5.0	<5.0	<5.0	<5.0	-	-	-	-	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	-
Cadmium (Cd)	mg/kg	0.5 - 0.05	0.782	0.716	0.783	0.749	3.14	2.06	2.12	<0.5	<0.5	2.94	2.9	2.47	1.15	1.75	1.18	3.9
Calcium (Ca)	mg/kg	100 - 50	2530	4240	4080	2810	3640	2410	3060	2.7	3.3	8540	6750	7190	5460	4540	4080	3530
Chromium (Cr)	mg/kg	2 - 0.5	5.36	2.8	2.78	6.88	18.4	29.8	8.1	4	2	4.64	4.23	8.95	4.89	4.72	3.7	6.3
Cobalt (Co)	mg/kg	10 - 0.1	11.8	11.6	11.3	10.3	29.8	14.4	30.7	12	12	14	14.7	14.1	13.8	16.9	13.2	<10
Copper (Cu)	mg/kg	1 - 0.5	44.4	31.5	32.6	35.5	104	69.7	87.5	35	46	85.9	87.4	73.9	51.4	62.7	46.7	92.4

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			BJ U/S of CC	BJ Inter	BJ Inter	BJ Inter	Adit	Adit	Adit	BJ OF	BJ OF	BJ 200m D/S	BJ 200m D/S	BJ 200m D/S	BJ 200m D/S	BJ 200m D/S	BJ 200m D/S	BJ2
Replicate			**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**1**	**2**	**3**	**1**	**2**	**3**	**1**
Source			BJ	BJ	BJ	BJ	BJ	BJ	BJ	NH	NH	BJ	BJ	BJ	BJ	BJ	BJ	GC
Area			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Included/Excluded			Include	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		**Detection**	7-Sep-2012	7-Sep-2012	7-Sep-2012	7-Sep-2012	19-Aug-2011	19-Aug-2011	19-Aug-2011	1988	1988	13-Dec-2012	13-Dec-2012	13-Dec-2012	15-Aug-2013	15-Aug-2013	15-Aug-2013	8-Aug-1988
ALS Sample ID	**Units**	**Limits**	L1207305-9	L1207305-4	L1207305-5	L1207305-6	L1053635-22	L1053635-23	L1053635-24	NA	NA	L1250701-1	L1250701-2	L1250701-3	L1350212-9	L1350212-10	L1350212-11	NA
Metals *(cont'd)*																		
Gallium (Ga)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Fe)	mg/kg	100 - 50	51400	46300	46900	53600	78000	70500	101000	41800	45100	47300	54000	48500	56000	56000	54300	48000
Lanthanum (La)	mg/kg	0 - 0	-	-	-	-	-	-	-	10	10	-	-	-	-	-	-	-
Lead (Pb)	mg/kg	30 - 0.1	87.1	65.2	69.4	154	195	156	138	60	100	183	185	161	81.6	94.9	92.1	140
Lithium (Li)	mg/kg	5 - 1	12.4	15	14.5	10.6	-	-	-	-	-	7.1	7.9	8.4	15.5	15.5	14.9	-
Magnesium (Mg)	mg/kg	50 - 10	3970	4670	4620	3280	3850	2590	3310	3300	3400	1870	2050	2310	3990	3850	3810	3650
Manganese (Mn)	mg/kg	1 - 0.2	811	841	875	1030	3750	1040	2200	1430	958	805	671	767	888	1030	962	963
Mercury (Hg)	mg/kg	1 - 0.005	0.389	0.294	0.281	0.307	0.413	0.293	0.562	<1	<1	0.354	0.413	0.354	0.332	0.345	0.322	0.343
Molybdenum (Mo)	mg/kg	4 - 0.1	4.2	2.47	2.53	5.43	12	9.33	9.5	1	1	16.2	12	11.7	4.32	4.78	4.62	8
Nickel (Ni)	mg/kg	5 - 0.5	4.94	3.51	3.6	4.36	16.8	18.8	8.03	1	2	7.11	7.31	9.67	6.65	7.74	5.48	20
Phosphorus (P)	mg/kg	50 - 10	1780	2220	2340	2120	2460	2630	2960	1020	1190	2170	2260	2150	2230	2170	2030	1400
Potassium (K)	mg/kg	200 - 100	1140	940	1020	1300	1330	2600	830	1.3	1.2	2240	1760	1570	1190	1420	1310	-
Selenium (Se)	mg/kg	11 - 0.1	2.19	1.06	1.17	3.21	3.46	4.5	4.1	<10	<10	2.89	3.25	2.9	2.49	2.88	2.44	-
Silicon (Si)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	707
Silver (Ag)	mg/kg	2 - 0.05	16.1	15.5	15.4	20.1	36.7	41.7	54	12.2	33.6	58.9	67.3	45.4	19.9	29.1	20.6	46
Sodium (Na)	mg/kg	200 - 0.1	<100	110	150	<100	<100	<100	<100	0.1	0.1	170	140	160	140	130	150	200
Strontium (Sr)	mg/kg	0.5 - 0.1	19.7	21	21.3	21.8	44.2	34.4	27.1	23	28	75.8	59.4	62.2	32.7	27.9	28.3	28
Sulfur (S)-Total	mg/kg	500 - 100	-	-	-	-	-	-	-	-	-	23900	27100	21300	14100	17500	11800	-
Thallium (Tl)	mg/kg	10 - 0.05	0.284	0.144	0.148	0.223	0.45	0.43	0.32	10	<10	0.477	0.448	0.407	0.333	0.409	0.311	-
Tin (Sn)	mg/kg	8 - 0.2	0.4	0.33	0.34	0.3	0.76	0.84	1.27	-	-	0.33	0.27	0.35	0.58	0.74	0.46	<8
Titanium (Ti)	mg/kg	100 - 1	216	158	157	178	148	87.7	125	<100	100	85.1	94.6	98.6	144	166	176	179
Tungsten (W)	mg/kg	5 - 5	-	-	-	-	-	-	-	<5	<5	-	-	-	-	-	-	-
Uranium (U)	mg/kg	10 - 0.05	1.19	0.969	0.966	0.96	2.41	1.14	2.3	<10	<10	1.16	1.03	0.987	0.969	1.15	1.06	-
Vanadium (V)	mg/kg	2 - 0.2	28.7	29.3	28.9	25.4	27.8	22.7	25.9	18	23	18.7	18.7	17.7	26.2	29.7	27.2	32
Zinc (Zn)	mg/kg	2 - 1	129	136	144	120	405	267	279	120	215	361	359	312	181	233	186	441

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			BJ2	BJ2	BJ2	BJ2	BJ2	BJ2	BJ2	BJ2	BJ2	BJ2	BJ2	BJ2	BJ2	BJ2	BJ2	BJ2
Replicate			2	3	4	1	2	3	1	2	3	1	2	3	4	5	1	2
Source			GC	GC	GC	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	NH	NH
Area			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Included/Excluded			Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		Detection	8-Aug-1988	8-Aug-1988	8-Aug-1988	19-Aug-2011	19-Aug-2011	19-Aug-2011	7-Sep-2012	7-Sep-2012	7-Sep-2012	14-Aug-2013	14-Aug-2013	14-Aug-2013	14-Aug-2013	14-Aug-2013	1988	1988
ALS Sample ID	Units	Limits	NA	NA	NA	L1053635-25	L1053635-26	L1053635-27	L1207305-1	L1207305-2	L1207305-3	L1350212-4	L1350212-5	L1350212-6	L1350212-7	L1350212-8	NA	NA
Physical Tests																		
Moisture	%	0.25 - 0.1	-	-	-	26.2	21.1	15	56.2	62.8	52.6	43.3	40.4	39.6	35.6	46.2	-	-
pH (1:2 soil:water)	pH	0.1 - 0.01				6.67	7.22	6.96	7.38	7.48	7.69	7.12	7.58	7.2	7.49	7.48		
Particle Size																		
% Gravel (>2mm)	%	1 - 0.1	-	-	-	30.2	25.7	31.4	<0.10	<0.10	<0.10	3.03	<0.10	19.5	9.93	<0.10	-	-
% Sand (2.0mm - 0.063mm)	%	1 - 0.1	-	-	-	38	47.6	62.2	3.43	3.53	9.98	15.1	20.3	30	74.2	2.21	-	-
% Silt (0.063mm - 4µm)	%	1 - 0.1	-	-	-	19.9	17.4	5.11	60.8	54.5	63.4	61.6	61.6	38.6	10.2	51	-	-
% Silt (0.063mm - 0.0312mm)	%	0.1	-	-	-	-	-	-	18.3	12.7	22.9	-	-	-	-	-	-	-
% Silt (0.0312mm - 0.004mm)	%	0.1	-	-	-	-	-	-	42.5	41.8	40.5	-	-	-	-	-	-	-
% Clay (<4µm)	%	1 - 0.1	-	-	-	11.9	9.26	1.31	35.8	42	26.6	20.3	18.2	11.9	5.63	46.8	-	-
Texture	-	-	-	-	-	-	-	-	Silty clay loam	Silty clay loam	Silt loam	Silt loam	Silt loam	Loam	Loamy sand	Silt Clay loam / Silty clay	-	-
Anions and Nutrients																		
Total Nitrogen by LECO	%	17 - 0.02	-	-	-	7.5	<4.3	<4.3	0.108	0.113	0.089	0.051	0.061	0.051	0.045	0.069	-	-
Cyanides																		
Cyanide, Total	mg/kg	3 - 0.05	-	-	-	<3.0	<3.0	<3.0	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-
Organic / Inorganic Carbon																		
$CaCO_3$ Equivalent	%	0.8 - 0.09	-	-	-	-	-	-	1.29	1.06	1.08	0.88	1.25	0.82	<0.80	1.58	-	-
Inorganic Carbon	%	0.1 - 0.1	-	-	-	-	-	-	0.15	0.13	0.13	0.11	0.15	<0.10	<0.10	0.19	-	-
Total Carbon by Combustion	%	0.1 - 0.1	-	-	-	-	-	-	1	0.9	0.8	0.5	0.6	0.5	0.3	0.9	-	-
Total Organic Carbon	%	0.7 - 0.1	-	-	-	0.56	0.53	0.19	0.88	0.77	0.7	0.42	0.47	0.49	0.34	0.74	-	-
Plant Available Nutrients																		
Cation Exchange Capacity	meq/100g	2 - 0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Ammonium-N	mg/kg	4.8 - 1	-	-	-	7.5	2.6	<1.6	5.2	7.2	2.6	6.6	21.9	4.6	5.2	5.1	-	-
Nitrate+Nitrite-N	mg/kg	16 - 2	-	-	-	<4.0	<4.0	<4.0	-	-	-	-	-	-	-	-	-	-
Available Nitrate-N	mg/kg	16 - 1	-	-	-	<4.0	<4.0	<4.0	<2.0	<2.0	<2.0	<4.0	<4.0	<4.0	<1.0	<4.0	-	-
Nitrite-N	mg/kg	3.2 - 0.4	-	-	-	<0.80	<0.80	<0.80	-	-	-	-	-	-	-	-	-	-
Available Phosphate-P	mg/kg	8 - 2	-	-	-	2.5	2.6	4.1	3.9	2.6	4.5	2.7	2.9	3	3.3	2.5	-	-
Available Sulphate-S	mg/kg	3 - 2	-	-	-	39.4	37.3	13.1	-	-	-	-	-	-	-	-	-	-
Metals																		
Size Fraction	µm		150 µm	150 µm	150 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	117 µm	117 µm
Aluminum (Al)	mg/kg	14300 - 50	10600	11900	10800	13700	12900	10500	10800	11700	11200	11800	11400	12100	11200	14400	14300	13700
Antimony (Sb)	mg/kg	10 - 0.1	-	-	-	17.4	14.5	28.4	10.8	10.8	12	13.5	14.2	14	13.1	13.5	5	5
Arsenic (As)	mg/kg	5 - 0.05	233	271	251	317	333	261	229	269	217	268	198	248	237	312	255	245
Barium (Ba)	mg/kg	1 - 0.5	370	413	405	312	265	275	313	358	344	291	304	272	259	389	240	240
Beryllium (Be)	mg/kg	0.5 - 0.1	0.6	0.7	0.6	1.22	1.06	0.88	0.6	0.59	0.57	0.58	0.49	0.79	0.71	0.78	<0.5	<0.5
Bismuth (Bi)	mg/kg	24 - 0.1	-	-	-	0.41	0.46	0.4	0.46	0.48	0.46	0.46	0.47	0.48	0.47	0.59	<2	<2
Boron (B)	mg/kg	5 - 5	-	-	-	-	-	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	-	-
Cadmium (Cd)	mg/kg	0.5 - 0.05	4.1	3.3	4.4	4.07	4.67	4.75	1.6	2.08	1.51	1.82	1.36	3.16	3.12	2.33	<0.5	<0.5
Calcium (Ca)	mg/kg	100 - 50	4640	3550	3560	3020	3030	3540	3980	2930	4170	3750	5410	3530	3570	4070	2.9	2.9
Chromium (Cr)	mg/kg	2 - 0.5	11	5.6	8.7	13.5	19.2	12.2	9.03	13.2	8.44	8.21	8.42	10.7	13.3	13.2	4	2
Cobalt (Co)	mg/kg	10 - 0.1	<10	<10	<10	20.2	21.6	21.9	12.7	13.7	13	14.7	13.6	21.1	19.4	15.7	19	17
Copper (Cu)	mg/kg	1 - 0.5	98.4	85.1	101	134	141	128	62.5	70.4	60.9	62.6	52.8	82.8	80.2	83	78	71

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			BJ2	BJ2	BJ2	BJ2	BJ2	BJ2	BJ2	BJ2	BJ2	BJ2	BJ2	BJ2	BJ2	BJ2	BJ2	BJ2
Replicate			2	3	4	1	2	3	1	2	3	1	2	3	4	5	1	2
Source			GC	GC	GC	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	NH	NH
Area			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Included/Excluded			Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		Detection	8-Aug-1988	8-Aug-1988	8-Aug-1988	19-Aug-2011	19-Aug-2011	19-Aug-2011	7-Sep-2012	7-Sep-2012	7-Sep-2012	14-Aug-2013	14-Aug-2013	14-Aug-2013	14-Aug-2013	14-Aug-2013	1988	1988
ALS Sample ID	Units	Limits	NA	NA	NA	L1053635-25	L1053635-26	L1053635-27	L1207305-1	L1207305-2	L1207305-3	L1350212-4	L1350212-5	L1350212-6	L1350212-7	L1350212-8	NA	NA
Metals *(cont'd)*																		
Gallium (Ga)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Fe)	mg/kg	100 - 50	52200	54300	51600	56300	52000	49600	45600	44800	48400	55600	52900	47100	45600	54600	55100	56300
Lanthanum (La)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	20
Lead (Pb)	mg/kg	30 - 0.1	150	110	160	108	93.9	125	91.7	103	95.2	90.8	87.3	98.4	92.2	119	86	98
Lithium (Li)	mg/kg	5 - 1	-	-	-	-	-	-	13.8	14.3	13.3	16.3	15.8	17.9	17.1	17.9	-	-
Magnesium (Mg)	mg/kg	50 - 10	4530	4200	3590	4190	3800	3680	3940	4140	3980	4200	4170	4070	4050	4510	4800	4800
Manganese (Mn)	mg/kg	1 - 0.2	1190	1440	1110	1190	1330	2120	1080	1150	1140	1110	1170	1580	1580	1120	1165	1030
Mercury (Hg)	mg/kg	1 - 0.005	0.42	0.345	0.317	0.405	0.316	0.439	0.291	0.297	0.308	0.302	0.325	0.363	0.365	0.36	<1	<1
Molybdenum (Mo)	mg/kg	4 - 0.1	10	9	10	7.24	8	7.43	4.23	4.42	4.27	4.62	4.92	6.07	5.93	5.41	<1	1
Nickel (Ni)	mg/kg	5 - 0.5	20	17	6	13.9	15.8	13.7	7.79	10	7.38	8.89	8.05	12.1	14.3	10.6	4	1
Phosphorus (P)	mg/kg	50 - 10	1500	1500	1500	1820	1550	1850	1690	1590	1830	2000	2020	1760	1760	1730	1370	1500
Potassium (K)	mg/kg	200 - 100	-	-	-	1870	2050	1350	1820	2350	2010	1590	1600	1760	1530	2440	1.4	1.2
Selenium (Se)	mg/kg	11 - 0.1	-	-	-	3.27	4.03	2.45	3.31	3.96	3.15	3.85	2.76	3.79	3.44	4.84	<10	<10
Silicon (Si)	mg/kg	0 - 0	748	833	766	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (Ag)	mg/kg	2 - 0.05	52	38	56	24.5	22.2	46.4	12	11.6	13.7	15.2	16.2	15.2	13.1	14.4	6.6	7.4
Sodium (Na)	mg/kg	200 - 0.1	100	170	100	120	110	<100	200	190	270	180	140	130	130	160	0.2	0.2
Strontium (Sr)	mg/kg	0.5 - 0.1	35	27	28	22.3	25.2	24.5	29.6	26.8	30.3	25.6	35	24.3	23.4	33.8	21	21
Sulfur (S)-Total	mg/kg	500 - 100	-	-	-	-	-	-	-	-	-	9700	9700	9300	11500	9600	-	-
Thallium (Tl)	mg/kg	10 - 0.05	-	-	-	0.47	0.66	0.66	0.393	0.488	0.388	0.369	0.354	0.651	0.575	0.545	10	<10
Tin (Sn)	mg/kg	8 - 0.2	10	<8	21	0.49	0.41	0.55	0.49	0.53	0.52	0.56	0.57	1.27	0.63	1.14	-	-
Titanium (Ti)	mg/kg	100 - 1	180	207	160	97.3	58.9	82.8	113	99.6	145	171	136	84.5	88.4	99.7	200	200
Tungsten (W)	mg/kg	5 - 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5
Uranium (U)	mg/kg	10 - 0.05	-	-	-	2.23	2.36	2.5	1.02	0.964	1.05	1.17	1.03	1.41	1.29	1.26	<10	<10
Vanadium (V)	mg/kg	2 - 0.2	37	45	38	29.1	24.3	25.4	26.1	27.5	27.8	28.1	27.3	26.3	24.8	30	32	32
Zinc (Zn)	mg/kg	2 - 1	493	324	434	446	430	363	180	202	178	220	192	332	313	255	286	267

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			BJ3	BJ3	BJ3	Unknown	Unknown	SC0	SC0	SC0	SUL	SUL	SUL	SUL	SUL	SUL	SUL	SUL
Replicate			1	2	3	1	2	1	2	3	1	2	3	1 (deep)	2 (deep)	1 (mid)	2 (mid)	1 (shallow)
Source			BJ	BJ	BJ	NH	NH	BJ	BJ	BJ	KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM
Area			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Included/Excluded			Include	Include	Include	Exclude	Exclude	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		Detection	7-Aug-2013	7-Aug-2013	7-Aug-2013	1988	1988	8-Aug-2013	8-Aug-2013	8-Aug-2013	22-Aug-2008	22-Aug-2008	22-Aug-2008	16-Aug-2009	16-Aug-2009	16-Aug-2009	16-Aug-2009	16-Aug-2009
ALS Sample ID	Units	Limits	L1346191-1	L1346191-2	L1346191-3	NA	NA	L1346191-4	L1346191-5	L1346191-6	L676344-82	L676344-83	L676344-84	L807781-8	L807781-7	L807781-9	L807781-10	L807781-12
Physical Tests																		
Moisture	%	0.25 - 0.1	46.2	50.9	20.4	-	-	16.9	24.5	25.9	36.2	35.6	12	57	60.8	44.9	41	47.3
pH (1:2 soil:water)	pH	0.1 - 0.01	6.72	7.01	6.83			9.92	9.28	8.9	7.53	7.65	7.58	8.08	8.14	8.19	7.97	7.43
Particle Size																		
% Gravel (>2mm)	%	1 - 0.1	9.8	3.22	22.6	-	-	7.49	21.6	<0.10	<1	1	37	<1.0	<1.0	<1.0	<1.0	<1.0
% Sand (2.0mm - 0.063mm)	%	1 - 0.1	50.9	33.9	47.4	-	-	86.4	71.5	83.5	3	9	58	<1.0	<1.0	<1.0	<1.0	34
% Silt (0.063mm - 4µm)	%	1 - 0.1	30	54.1	25.3	-	-	4.85	5.64	15.1	50	48	5	34	53	64	64	36
% Silt (0.063mm - 0.0312mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Silt (0.0312mm - 0.004mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Clay (<4µm)	%	1 - 0.1	9.27	8.82	4.65	-	-	1.26	1.26	1.47	47	42	1	66	47	36	36	30
Texture	-	-	Sandy loam	Silt loam	Sandy loam	-	-	Sand	Sand	Sand	-	-	-	-	-	-	-	-
Anions and Nutrients																		
Total Nitrogen by LECO	%	17 - 0.02	0.059	0.048	0.036	-	-	<0.020	<0.020	<0.020	0.05	0.05	0.04	0.076	0.1	0.07	0.069	0.084
Cyanides																		
Cyanide, Total	mg/kg	3 - 0.05	<0.050	<0.050	<0.050	-	-	<0.050	<0.050	<0.050	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Organic / Inorganic Carbon																		
$CaCO_3$ Equivalent	%	0.8 - 0.09	0.93	<0.80	1.09	-	-	6.39	6.34	6.37	-	-	-	4.06	3.98	4.81	5.16	0.91
Inorganic Carbon	%	0.1 - 0.1	0.11	<0.10	0.13	-	-	0.77	0.76	0.76	-	-	-	0.453	0.432	0.542	0.586	<0.090
Total Carbon by Combustion	%	0.1 - 0.1	0.7	0.5	0.4	-	-	0.9	0.9	0.9	-	-	-	0.9	1	1	1	0.7
Total Organic Carbon	%	0.7 - 0.1	0.55	0.54	0.32	-	-	0.14	0.11	0.15	0.4	0.3	0.1	0.39	0.49	0.42	0.32	0.64
Plant Available Nutrients																		
Cation Exchange Capacity	meq/100g	2 - 0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Ammonium-N	mg/kg	4.8 - 1	10	14	2.5	-	-	<1.6	<1.6	<1.6	-	-	-	-	-	-	-	-
Nitrate+Nitrite-N	mg/kg	16 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Nitrate-N	mg/kg	16 - 1	<4.0	<4.0	<4.0	-	-	<4.0	<4.0	<4.0	-	-	-	-	-	-	-	-
Nitrite-N	mg/kg	3.2 - 0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Phosphate-P	mg/kg	8 - 2	3	3.4	3.5	-	-	<2.0	<2.0	<2.0	1	<1	<1	<2.0	<2.0	<2.0	<2.0	<2.0
Available Sulphate-S	mg/kg	3 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																		
Size Fraction	µm		63 µm	63 µm	63 µm	117 µm	117 µm	63 µm	63 µm	63 µm	2000 µm	2000 µm	2000 µm	63 µm	63 µm	63 µm	63 µm	63 µm
Aluminum (Al)	mg/kg	14300 - 50	9500	9650	10400	10700	11600	13700	13100	11800	21100	21400	13000	25200	28200	22400	22900	19800
Antimony (Sb)	mg/kg	10 - 0.1	16.6	14.3	14.5	5	5	12.3	12.8	14	13	13	<10	15	15	14	15	25
Arsenic (As)	mg/kg	5 - 0.05	201	204	228	110	140	153	177	235	106	112	69.2	98.4	101	110	109	137
Barium (Ba)	mg/kg	1 - 0.5	314	270	308	140	260	118	103	81.3	401	379	85.2	510	555	466	464	458
Beryllium (Be)	mg/kg	0.5 - 0.1	0.49	0.46	0.49	<0.5	<0.5	0.33	0.31	0.31	0.51	0.54	<0.50	0.62	0.67	0.57	0.55	<0.50
Bismuth (Bi)	mg/kg	24 - 0.1	0.46	0.43	0.44	<2	<2	0.26	0.34	0.36	<20	<20	<20	<20	<20	<20	<20	<20
Boron (B)	mg/kg	5 - 5	<5.0	<5.0	<5.0	-	-	<5.0	<5.0	<5.0	-	-	-	-	-	-	-	-
Cadmium (Cd)	mg/kg	0.5 - 0.05	1.98	1.72	1.81	<0.5	<0.5	1.76	1.65	1.76	1.15	1.1	<0.50	1.39	1.18	1.55	1.44	0.77
Calcium (Ca)	mg/kg	100 - 50	3640	3780	3670	4	3.7	38800	33400	33000	25800	23500	12800	21000	16400	26700	30300	7880
Chromium (Cr)	mg/kg	2 - 0.5	5.28	4.39	6.41	3	3	24.4	19.1	15.5	20.1	20.6	15	22.2	23.4	17.9	19.2	17.2
Cobalt (Co)	mg/kg	10 - 0.1	12.9	13.9	13.6	18	20	22.4	23.9	28.6	20.1	20	11.5	20.8	20.6	20.7	20.6	15.1
Copper (Cu)	mg/kg	1 - 0.5	54.2	52.4	56.5	52	53	176	164	177	286	280	118	404	537	275	289	626

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			BJ3	BJ3	BJ3	Unknown	Unknown	SC0	SC0	SC0	SUL	SUL	SUL	SUL	SUL	SUL	SUL	SUL
Replicate			1	2	3	1	2	1	2	3	1	2	3	1 (deep)	2 (deep)	1 (mid)	2 (mid)	1 (shallow)
Source			BJ	BJ	BJ	NH	NH	BJ	BJ	BJ	KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM
Area			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Included/Excluded			Include	Include	Include	Exclude	Exclude	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		Detection	7-Aug-2013	7-Aug-2013	7-Aug-2013	1988	1988	8-Aug-2013	8-Aug-2013	8-Aug-2013	22-Aug-2008	22-Aug-2008	22-Aug-2008	16-Aug-2009	16-Aug-2009	16-Aug-2009	16-Aug-2009	16-Aug-2009
ALS Sample ID	Units	Limits	L1346191-1	L1346191-2	L1346191-3	NA	NA	L1346191-4	L1346191-5	L1346191-6	L676344-82	L676344-83	L676344-84	L807781-8	L807781-7	L807781-9	L807781-10	L807781-12
Metals *(cont'd)*																		
Gallium (Ga)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Fe)	mg/kg	100 - 50	48300	50900	54400	39700	49100	52100	54900	64800	49500	49400	35200	50100	52500	49800	49500	60300
Lanthanum (La)	mg/kg	0 - 0	-	-	-	10	10	-	-	-	-	-	-	-	-	-	-	-
Lead (Pb)	mg/kg	30 - 0.1	96	82.9	87.5	36	74	43	48.7	64.5	51	50	<30	53	56	50	50	65
Lithium (Li)	mg/kg	5 - 1	13.7	14.2	14.8	-	-	16.3	14.2	15.2	24.3	24	17	25.7	26.6	23.3	23.6	18.7
Magnesium (Mg)	mg/kg	50 - 10	3560	3960	4150	4700	4300	10900	10500	9500	14800	14500	10200	14900	15400	14200	14400	11200
Manganese (Mn)	mg/kg	1 - 0.2	933	1010	1040	1670	1820	1320	1220	1080	1870	1830	932	1680	1520	1770	1700	995
Mercury (Hg)	mg/kg	1 - 0.005	0.302	0.283	0.3	<1	<1	0.329	0.36	0.46	0.373	0.351	0.124	0.392	0.451	0.369	0.371	1.45
Molybdenum (Mo)	mg/kg	4 - 0.1	7.03	4.24	4.54	<1	<1	3.34	2.65	2.56	<4.0	<4.0	4.3	<4.0	5.1	<4.0	<4.0	10.8
Nickel (Ni)	mg/kg	5 - 0.5	6.86	6.9	7.26	7	4	24.5	21.4	21.9	18.1	18.6	9.7	19.8	21.1	18.7	18.5	15.3
Phosphorus (P)	mg/kg	50 - 10	1990	2040	1950	1200	1430	1640	1910	2080	1370	1370	1070	1560	1420	1780	1850	1990
Potassium (K)	mg/kg	200 - 100	1510	1290	1340	1	1.2	970	980	910	2230	2520	820	3390	4270	2750	2880	2680
Selenium (Se)	mg/kg	11 - 0.1	2.64	2.45	2.9	<10	<10	2.34	2.6	3.57	<2.0	<2.0	<2.0	<2.0	<3.0	<2.0	<3.0	6.99
Silicon (Si)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (Ag)	mg/kg	2 - 0.05	20.4	16.8	16.1	4.4	12	1.81	1.73	2.04	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Sodium (Na)	mg/kg	200 - 0.1	130	170	160	0.1	0.2	130	110	<100	<200	<200	<200	230	410	210	220	<200
Strontium (Sr)	mg/kg	0.5 - 0.1	25.2	24.9	26.3	17	23	155	127	125	111	102	47.2	103	93.7	114	130	89
Sulfur (S)-Total	mg/kg	500 - 100	6900	9100	7900	-	-	19100	40100	34400	-	-	-	3890	3320	4110	4570	6220
Thallium (Tl)	mg/kg	10 - 0.05	0.324	0.285	0.308	<10	10	0.19	0.227	0.261	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tin (Sn)	mg/kg	8 - 0.2	1.23	2.67	0.73	-	-	7.13	2.62	0.41	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Titanium (Ti)	mg/kg	100 - 1	149	172	160	<100	100	651	612	636	512	603	430	618	604	689	770	436
Tungsten (W)	mg/kg	5 - 5	-	-	-	<5	<5	-	-	-	-	-	-	-	-	-	-	-
Uranium (U)	mg/kg	10 - 0.05	1.11	1.03	1.07	<10	<10	0.411	0.452	0.445	-	-	-	-	-	-	-	-
Vanadium (V)	mg/kg	2 - 0.2	24.9	26.6	26.4	27	30	64.7	59.8	56.5	80.9	82.6	58.5	86	96.2	80.6	85.2	71.9
Zinc (Zn)	mg/kg	2 - 1	227	217	213	127	154	187	186	201	210	208	106	225	233	209	202	182

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			SUL	SUL	SUL	SUL	SC1	SC1	SC1	SC1	SC1	SC1	SC1	SC1	SC1	SC1	SC1	SC2
Replicate			2 (shallow)	1	2	3	1	2	3	1	2	3	1	2	3	4	5	1
Source			KSM	BJ	BJ	BJ	KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM
Area			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Included/Excluded			Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		Detection	16-Aug-2009	10-Aug-2013	10-Aug-2013	10-Aug-2013	19-Aug-2008	19-Aug-2008	19-Aug-2008	21-Aug-2009	21-Aug-2009	21-Aug-2009	2-Dec-2012	2-Dec-2012	2-Dec-2012	2-Dec-2012	2-Dec-2012	18-Aug-2008
ALS Sample ID	Units	Limits	L807781-11	L1346191-10	L1346191-11	L1346191-12	L676344-70	L676344-71	L676344-72	L810729-35	L810729-36	L810729-37	L1246043-58	L1246043-59	L1246043-60	L1246043-61	L1246043-62	L676344-58
Physical Tests																		
Moisture	%	0.25 - 0.1	37.7	53.9	53.6	57.1	11.2	10.4	11.4	9.62	23.6	25.2	29.8	23.5	30	36.3	16.9	15.6
pH (1:2 soil:water)	pH	0.1 - 0.01	6.79	8	8.17	8.01	7.75	7.77	7.86	8.3	8.09	8.14	7.99	7.82	8.23	8.05	7.75	7.86
Particle Size																		
% Gravel (>2mm)	%	1 - 0.1	1	<0.10	<0.10	<0.10	15	37	13	24	32	7	4.42	24	<0.10	2.4	26.8	<1
% Sand (2.0mm - 0.063mm)	%	1 - 0.1	50	0.35	0.16	<0.10	73	60	84	72	39	63	78.1	70.8	62.3	90.7	68.6	93
% Silt (0.063mm - 4µm)	%	1 - 0.1	32	49.6	44.8	42.2	9	3	2	3	23	23	14.4	4.34	35.4	6.01	3.73	6
% Silt (0.063mm - 0.0312mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Silt (0.0312mm - 0.004mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Clay (<4µm)	%	1 - 0.1	17	50.1	55	57.7	3	1	<1	1	6	7	3.07	0.81	2.24	0.86	0.98	<1
Texture	-	-	-	Silty clay	Silty clay	Silty clay	-	-	-	-	-	-	Loamy sand	Sand	Sandy loam	Sand	Sand	-
Anions and Nutrients																		
Total Nitrogen by LECO	%	17 - 0.02	0.063	0.034	0.034	0.043	0.03	0.03	0.02	0.036	0.061	0.059	0.086	0.033	0.027	0.049	0.032	<0.02
Cyanides																		
Cyanide, Total	mg/kg	3 - 0.05	<3.0	<0.050	<0.050	<0.050	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<0.050	<0.050	<0.050	<0.050	<0.050	<3.0
Organic / Inorganic Carbon																		
$CaCO_3$ Equivalent	%	0.8 - 0.09	0.78	3.71	4.38	3.22	-	-	-	5.59	1.89	1.76	2.33	0.99	4.94	4.13	3.07	-
Inorganic Carbon	%	0.1 - 0.1	<0.090	0.45	0.53	0.39	-	-	-	0.641	0.187	0.185	0.28	0.12	0.59	0.5	0.37	-
Total Carbon by Combustion	%	0.1 - 0.1	0.5	0.7	0.7	0.7	-	-	-	0.9	0.6	0.6	1.3	0.3	0.8	1.1	0.6	-
Total Organic Carbon	%	0.7 - 0.1	0.4	0.27	0.22	0.31	0.4	0.3	0.3	0.29	0.43	0.42	1.05	0.23	0.24	0.58	0.26	0.2
Plant Available Nutrients																		
Cation Exchange Capacity	meq/100g	2 - 0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Ammonium-N	mg/kg	4.8 - 1	-	3.1	3.6	6.5	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate+Nitrite-N	mg/kg	16 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Nitrate-N	mg/kg	16 - 1	-	<6.0	<6.0	<6.0	-	-	-	-	-	-	-	-	-	-	-	-
Nitrite-N	mg/kg	3.2 - 0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Phosphate-P	mg/kg	8 - 2	<2.0	3	3.6	3.2	1	1	<1	-	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	1
Available Sulphate-S	mg/kg	3 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																		
Size Fraction	µm		63 µm	63 µm	63 µm	63 µm	2000 µm	2000 µm	2000 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	2000 µm
Aluminum (Al)	mg/kg	14300 - 50	15900	23200	25600	22800	16200	15500	16600	19300	20100	21900	15200	17900	11800	15300	18700	13600
Antimony (Sb)	mg/kg	10 - 0.1	33	16	17.1	16.4	<10	<10	<10	18	16	17	15.7	32.8	11.7	17.7	16.6	<10
Arsenic (As)	mg/kg	5 - 0.05	165	111	111	109	32	36	41.4	237	151	174	172	665	161	257	174	33.2
Barium (Ba)	mg/kg	1 - 0.5	358	498	508	483	113	123	122	422	447	473	333	306	104	319	362	111
Beryllium (Be)	mg/kg	0.5 - 0.1	<0.50	0.65	0.67	0.63	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.44	0.54	0.3	0.46	0.48	<0.50
Bismuth (Bi)	mg/kg	24 - 0.1	<20	0.33	0.33	0.34	<20	<20	<20	<20	<20	<20	0.35	1.07	0.25	0.42	0.35	<20
Boron (B)	mg/kg	5 - 5	-	<5.0	<5.0	<5.0	-	-	-	-	-	-	<5.0	<5.0	<5.0	<5.0	<5.0	-
Cadmium (Cd)	mg/kg	0.5 - 0.05	0.57	1.34	1.35	1.33	0.61	0.55	0.85	3.73	1.9	2.14	2.18	4.86	0.951	2.86	2.99	0.92
Calcium (Ca)	mg/kg	100 - 50	5130	18200	16600	14700	10900	14600	17900	20500	11200	11400	15300	10500	29100	17300	14500	17500
Chromium (Cr)	mg/kg	2 - 0.5	14	22.3	23.9	22.7	19.5	22.6	19.6	53.9	18.4	18.5	19.4	38.3	13.9	22.4	25.8	15.4
Cobalt (Co)	mg/kg	10 - 0.1	12.9	21.2	22	21.5	12.9	12.2	14.8	40.1	26.8	27.6	24.8	56	19.5	29.3	40.2	13.6
Copper (Cu)	mg/kg	1 - 0.5	688	642	622	684	117	101	96.2	428	271	285	257	584	241	290	366	109

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			SUL	SUL	SUL	SUL	SC1	SC1	SC1	SC1	SC1	SC1	SC1	SC1	SC1	SC1	SC1	SC2
Replicate			2 (shallow)	1	2	3	1	2	3	1	2	3	1	2	3	4	5	1
Source			KSM	BJ	BJ	BJ	KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM
Area			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Included/Excluded			Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		Detection	16-Aug-2009	10-Aug-2013	10-Aug-2013	10-Aug-2013	19-Aug-2008	19-Aug-2008	19-Aug-2008	21-Aug-2009	21-Aug-2009	21-Aug-2009	2-Dec-2012	2-Dec-2012	2-Dec-2012	2-Dec-2012	2-Dec-2012	18-Aug-2008
ALS Sample ID	Units	Limits	L807781-11	L1346191-10	L1346191-11	L1346191-12	L676344-70	L676344-71	L676344-72	L810729-35	L810729-36	L810729-37	L1246043-58	L1246043-59	L1246043-60	L1246043-61	L1246043-62	L676344-58
Metals *(cont'd)*																		
Gallium (Ga)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Fe)	mg/kg	100 - 50	64200	52300	53800	52000	35700	35200	38700	69700	54900	56400	55100	105000	49700	65600	57800	38100
Lanthanum (La)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead (Pb)	mg/kg	30 - 0.1	75	59.8	63.9	63.3	<30	32	<30	100	55	64	66.3	149	34	80.2	70.4	<30
Lithium (Li)	mg/kg	5 - 1	15.9	21.6	22	20.2	15.4	16.4	18.2	22.2	21.1	22.1	14.6	19.2	14.5	15.2	20.1	10.5
Magnesium (Mg)	mg/kg	50 - 10	8980	13000	14200	13300	12200	12100	13700	14500	12600	13200	10400	11700	8970	10400	12900	10600
Manganese (Mn)	mg/kg	1 - 0.2	700	1700	1710	1700	1140	1190	1310	4860	2270	2580	1790	5030	1150	1910	3760	646
Mercury (Hg)	mg/kg	1 - 0.005	1.91	0.474	0.472	0.551	0.0785	0.0688	0.0766	0.461	0.335	0.352	0.337	0.523	0.351	0.38	0.339	0.0839
Molybdenum (Mo)	mg/kg	4 - 0.1	14.1	5.3	5.21	5.84	<4.0	<4.0	<4.0	7.3	<4.0	<4.0	3.48	10.8	3.53	3.95	4.8	6.7
Nickel (Ni)	mg/kg	5 - 0.5	12.8	20.4	21.4	21.7	15.5	16.3	17.2	59.2	21.7	22.8	24.8	53.2	17.1	31.1	32.8	17
Phosphorus (P)	mg/kg	50 - 10	2260	1450	1460	1400	1050	1050	1220	1980	2440	2210	1890	1730	1890	2030	1950	1380
Potassium (K)	mg/kg	200 - 100	2570	3130	3180	2780	1200	1120	1080	2740	3000	3880	1540	1970	910	1540	2100	1610
Selenium (Se)	mg/kg	11 - 0.1	14.5	2.25	2.23	2.51	<2.0	<2.0	<2.0	3.75	<4.0	<3.0	3.53	6.41	3.48	4.37	2.5	<6.0
Silicon (Si)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (Ag)	mg/kg	2 - 0.05	<2.0	1.55	1.62	1.62	<2.0	<2.0	<2.0	2.6	<2.0	<2.0	1.75	5.57	1.19	1.95	1.63	<2.0
Sodium (Na)	mg/kg	200 - 0.1	<200	230	220	240	<200	<200	<200	290	370	620	110	130	<100	110	150	<200
Strontium (Sr)	mg/kg	0.5 - 0.1	104	102	94.8	88.4	51.8	74.2	80	117	62.7	64.1	93.2	77	97.7	110	91.8	63.4
Sulfur (S)-Total	mg/kg	500 - 100	6000	5500	4800	4200	-	-	-	3580	4190	3720	-	-	-	-	-	-
Thallium (Tl)	mg/kg	10 - 0.05	<1.0	0.261	0.267	0.237	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.191	0.456	0.165	0.198	0.248	<1.0
Tin (Sn)	mg/kg	8 - 0.2	<5.0	0.71	0.58	1.98	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<0.20	0.76	0.21	0.23	0.36	<5.0
Titanium (Ti)	mg/kg	100 - 1	374	581	593	431	487	463	427	789	855	826	465	661	672	489	691	872
Tungsten (W)	mg/kg	5 - 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium (U)	mg/kg	10 - 0.05	-	0.728	0.723	0.702	-	-	-	-	-	-	0.486	0.737	0.306	0.494	0.515	-
Vanadium (V)	mg/kg	2 - 0.2	63	86.5	90.3	82.8	68	65.4	73.3	84.1	82.7	84.9	67	84.5	59.7	72	85.2	72.6
Zinc (Zn)	mg/kg	2 - 1	163	238	248	249	118	116	120	334	218	230	272	522	131	336	291	122

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			SC2	SC2	SC2	SC2	SC2	SC2	SC2	SC2	SC2	SC2	SC2	SC3	SC3	SC3	SC3	SC3
Replicate			2	3	1	2	3	1	2	3	1	2	3	1	2	3	4	1
Source			KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM	BJ	BJ	BJ	GC	GC	GC	GC	KSM
Area			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Included/Excluded			Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		Detection	18-Aug-2008	18-Aug-2008	21-Aug-2009	21-Aug-2009	21-Aug-2009	2-Dec-2012	2-Dec-2012	2-Dec-2012	5-Sep-2013	5-Sep-2013	5-Sep-2013	8-Aug-1988	8-Aug-1988	8-Aug-1988	8-Aug-1988	19-Aug-2008
ALS Sample ID	Units	Limits	L676344-59	L676344-60	L810729-38	L810729-39	L810729-40	L1246043-63	L1246043-64	L1246043-65	L1360633-13	L1360633-14	L1360633-15	NA	NA	NA	NA	L676344-73
Physical Tests																		
Moisture	%	0.25 - 0.1	15.2	18.2	17.2	9.44	9.46	17.2	22	23.5	22.1	25.2	24.4	-	-	-	-	16.1
pH (1:2 soil:water)	pH	0.1 - 0.01	7.91	7.9	8.29	8.07	8.1	7.97	7.75	7.67	8.08	8.4	8.32					7.95
Particle Size																		
% Gravel (>2mm)	%	1 - 0.1	3	<1	<1.0	34	42	24.6	18.6	21.3	1.5	<0.10	<0.10	-	-	-	-	2
% Sand (2.0mm - 0.063mm)	%	1 - 0.1	67	95	96	60	51	71.5	78.6	75.3	83.7	47.3	58.1	-	-	-	-	91
% Silt (0.063mm - 4µm)	%	1 - 0.1	28	4	3	4	5	3.62	2.48	3.08	13.7	49.5	39	-	-	-	-	7
% Silt (0.063mm - 0.0312mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Silt (0.0312mm - 0.004mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Clay (<4µm)	%	1 - 0.1	2	1	<1.0	1	2	0.32	0.26	0.35	1.12	3.19	2.93	-	-	-	-	<1
Texture	-	-	-	-	-	-	-	Sand	Sand	Sand	Sand	Sandy loam	Sandy loam	-	-	-	-	-
Anions and Nutrients																		
Total Nitrogen by LECO	%	17 - 0.02	<0.02	<0.02	0.03	0.049	0.032	0.032	0.03	0.032	<0.020	<0.020	<0.020	-	-	-	-	<0.02
Cyanides																		
Cyanide, Total	mg/kg	3 - 0.05	<3.0	<3.0	<3.0	<3.0	<3.0	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-	-	<3.0
Organic / Inorganic Carbon																		
$CaCO_3$ Equivalent	%	0.8 - 0.09	-	-	2.62	2.71	2	2.4	2.34	1.66	-	-	-	-	-	-	-	-
Inorganic Carbon	%	0.1 - 0.1	-	-	0.285	0.296	0.215	0.29	0.28	0.2	-	-	-	-	-	-	-	-
Total Carbon by Combustion	%	0.1 - 0.1	-	-	0.5	0.6	0.4	0.6	0.5	0.5	-	-	-	-	-	-	-	-
Total Organic Carbon	%	0.7 - 0.1	0.2	0.2	0.2	0.26	0.21	0.28	0.21	0.27	0.14	0.13	0.12	-	-	-	-	0.2
Plant Available Nutrients																		
Cation Exchange Capacity	meq/100g	2 - 0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Ammonium-N	mg/kg	4.8 - 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate+Nitrite-N	mg/kg	16 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Nitrate-N	mg/kg	16 - 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrite-N	mg/kg	3.2 - 0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Phosphate-P	mg/kg	8 - 2	2	2	-	-	-	2.7	2.2	<2.0	4.2	<2.0	2.2	-	-	-	-	1
Available Sulphate-S	mg/kg	3 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																		
Size Fraction	µm		2000 µm	2000 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	150 µm	150 µm	150 µm	150 µm	2000 µm
Aluminum (Al)	mg/kg	14300 - 50	13200	13000	12100	22600	20000	13600	19500	14700	13700	13300	13400	12900	12500	13400	13500	13000
Antimony (Sb)	mg/kg	10 - 0.1	<10	<10	<10	<10	<10	4.87	5.92	5.73	7.28	3.77	3.73	-	-	-	-	<10
Arsenic (As)	mg/kg	5 - 0.05	47.9	41.9	236	109	89.3	58.5	76	70.9	95.6	40.5	47.7	44	51	78	57	41.2
Barium (Ba)	mg/kg	1 - 0.5	106	72.4	119	430	378	188	204	155	130	236	228	261	244	269	257	87.3
Beryllium (Be)	mg/kg	0.5 - 0.1	<0.50	<0.50	<0.50	<0.50	<0.50	0.45	0.36	0.43	0.44	0.29	0.28	0.3	0.3	0.3	0.3	<0.50
Bismuth (Bi)	mg/kg	24 - 0.1	<20	<20	<20	<20	<20	0.62	0.83	0.54	3.38	0.8	0.6	-	-	-	-	<20
Boron (B)	mg/kg	5 - 5	-	-	-	-	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	-	-	-	-	-
Cadmium (Cd)	mg/kg	0.5 - 0.05	1.33	0.77	2.19	2.65	2.72	2.91	2.72	3.5	2.82	1.28	1.5	1	2	2.1	1.8	0.84
Calcium (Ca)	mg/kg	100 - 50	14700	16400	16900	16700	14100	17800	20600	16900	12000	17800	17400	19100	18600	17900	19200	15800
Chromium (Cr)	mg/kg	2 - 0.5	14.4	13.2	17.8	28	25.4	20.2	30.6	24.4	18.8	15.5	17.5	17.7	17.3	20.3	19.9	15
Cobalt (Co)	mg/kg	10 - 0.1	18.5	19	44	29	25.6	22.1	28.4	25.1	26.3	16.7	18.1	<10	<10	<10	<10	16.9
Copper (Cu)	mg/kg	1 - 0.5	171	163	340	321	298	339	311	358	306	136	156	176	182	243	209	134

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			SC2	SC2	SC2	SC2	SC2	SC2	SC2	SC2	SC2	SC2	SC2	SC3	SC3	SC3	SC3	SC3
Replicate			2	3	1	2	3	1	2	3	1	2	3	1	2	3	4	1
Source			KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM	BJ	BJ	BJ	GC	GC	GC	GC	KSM
Area			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Included/Excluded			Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		Detection	18-Aug-2008	18-Aug-2008	21-Aug-2009	21-Aug-2009	21-Aug-2009	2-Dec-2012	2-Dec-2012	2-Dec-2012	5-Sep-2013	5-Sep-2013	5-Sep-2013	8-Aug-1988	8-Aug-1988	8-Aug-1988	8-Aug-1988	19-Aug-2008
ALS Sample ID	Units	Limits	L676344-59	L676344-60	L810729-38	L810729-39	L810729-40	L1246043-63	L1246043-64	L1246043-65	L1360633-13	L1360633-14	L1360633-15	NA	NA	NA	NA	L676344-73
Metals *(cont'd)*																		
Gallium (Ga)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Fe)	mg/kg	100 - 50	45800	52500	106000	72900	63300	51600	64300	57600	63300	39600	43000	50100	50900	62800	57800	51000
Lanthanum (La)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead (Pb)	mg/kg	30 - 0.1	<30	<30	65	35	31	25	26.7	25.6	33.3	17.4	19.3	18	24	22	33	<30
Lithium (Li)	mg/kg	5 - 1	10.2	10.6	8.2	13.8	14.5	8	9.4	7.9	9.1	7.7	7.8	-	-	-	-	10.2
Magnesium (Mg)	mg/kg	50 - 10	9650	9950	8370	15800	13500	9050	14300	10800	8530	8180	8140	8540	8570	9070	9430	9750
Manganese (Mn)	mg/kg	1 - 0.2	668	619	692	1270	1100	977	1210	1140	828	700	730	633	628	712	715	619
Mercury (Hg)	mg/kg	1 - 0.005	0.0978	0.115	0.388	0.186	0.18	0.135	0.18	0.165	0.204	0.0971	0.102	0.06	0.06	0.084	0.079	0.0883
Molybdenum (Mo)	mg/kg	4 - 0.1	12	7.7	17	10.2	9.5	8.62	8.56	8.42	9.31	4.61	5.79	10	10	10	10	8.3
Nickel (Ni)	mg/kg	5 - 0.5	18.9	16.4	32.7	38.4	29.5	25.1	38.5	30.4	22.4	16.2	17.8	20	20	24	31	15.2
Phosphorus (P)	mg/kg	50 - 10	1480	1300	2480	2110	2120	2080	1960	2000	2340	1850	1920	1600	1600	1790	1670	1120
Potassium (K)	mg/kg	200 - 100	1530	1540	1840	3370	2630	1910	2760	1960	1750	2310	2320	-	-	-	-	1670
Selenium (Se)	mg/kg	11 - 0.1	<8.0	<10	19.1	8.41	<11	5.65	7.53	6.61	7.02	2.84	3.15	-	-	-	-	<8.0
Silicon (Si)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	845	922	1090	1130	-
Silver (Ag)	mg/kg	2 - 0.05	<2.0	<2.0	3.5	<2.0	<2.0	0.957	1.36	1.26	1.44	0.692	0.664	<2	<2	<2	<2	<2.0
Sodium (Na)	mg/kg	200 - 0.1	<200	<200	240	490	330	240	250	210	280	380	330	220	200	210	210	<200
Strontium (Sr)	mg/kg	0.5 - 0.1	55.5	58.2	71.8	86.9	79.3	82.5	91.3	75.6	60.9	88	84.2	89	84	80	84	60.3
Sulfur (S)-Total	mg/kg	500 - 100	-	-	-	5440	-	-	-	-	-	-	-	-	-	-	-	-
Thallium (Tl)	mg/kg	10 - 0.05	<1.0	<1.0	<1.0	<1.0	<1.0	0.174	0.214	0.197	0.197	0.16	0.162	-	-	-	-	<1.0
Tin (Sn)	mg/kg	8 - 0.2	<5.0	<5.0	<5.0	<5.0	<5.0	0.29	0.39	0.36	0.33	0.33	0.34	<8	<8	<8	<8	<5.0
Titanium (Ti)	mg/kg	100 - 1	911	949	1240	1700	1630	1180	1520	1080	1320	1330	1330	1350	1250	1350	1240	876
Tungsten (W)	mg/kg	5 - 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium (U)	mg/kg	10 - 0.05	-	-	1.92	-	3.66	1.14	0.924	1.11	2.23	0.901	0.922	-	-	-	-	-
Vanadium (V)	mg/kg	2 - 0.2	74.7	75.8	119	125	110	79.9	112	83.5	85.9	72.8	74.8	84	81	95	88	73.8
Zinc (Zn)	mg/kg	2 - 1	157	115	201	227	204	240	243	281	244	141	158	114	123	154	133	116

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			SC3	SC3	SC3	SC3	SC3	SC3	SC3	SC3	SC3	SC3	SC3	SC3	SC3	UR1A	UR1A	UR1A
Replicate			2	3	1	2	3	1	2	3	4	5	1	2	3	1	2	3
Source			KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM	BJ	BJ	BJ	GC	GC	GC
Area			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Included/Excluded			Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		Detection	19-Aug-2008	19-Aug-2008	21-Aug-2009	21-Aug-2009	21-Aug-2009	2-Dec-2012	2-Dec-2012	2-Dec-2012	2-Dec-2012	2-Dec-2012	4-Sep-2013	4-Sep-2013	4-Sep-2013	8-Aug-1988	8-Aug-1988	8-Aug-1988
ALS Sample ID	Units	Limits	L676344-74	L676344-75	L810729-41	L810729-42	L810729-43	L1246043-69	L1246043-70	L1246043-71	L1246043-72	L1246043-73	L1359398-13	L1359398-14	L1359398-15	NA	NA	NA
Physical Tests																		
Moisture	%	0.25 - 0.1	17.5	16.3	15.7	16.2	17.1	21.6	17.7	21.7	20.8	20.6	15.8	19.6	15.3	-	-	-
pH (1:2 soil:water)	pH	0.1 - 0.01	7.96	7.93	8.31	8.24	8.31	7.72	8.16	8.15	8.09	8.17	8.28	8.23	8.27			
Particle Size																		
% Gravel (>2mm)	%	1 - 0.1	<1	<1	<1.0	3	1	33.2	10.2	14.6	28.1	16.2	<0.10	1.58	0.28	-	-	-
% Sand (2.0mm - 0.063mm)	%	1 - 0.1	95	93	85	71	91	65.7	81.8	82.7	70.3	81.2	81.6	82.8	87	-	-	-
% Silt (0.063mm - 4µm)	%	1 - 0.1	4	6	13	23	8	0.93	7.56	2.46	1.5	2.33	17.2	14.5	11.9	-	-	-
% Silt (0.063mm - 0.0312mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Silt (0.0312mm - 0.004mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Clay (<4µm)	%	1 - 0.1	1	1	2	3	1	0.1	0.45	0.22	0.14	0.27	1.23	1.14	0.83	-	-	-
Texture	-	-	-	-	-	-	-	Sand	Sand	Sand	Sand	Sand	Loamy sand	Sand	Sand	-	-	-
Anions and Nutrients																		
Total Nitrogen by LECO	%	17 - 0.02	<0.02	<0.02	0.029	0.03	0.028	0.027	0.035	0.029	0.027	0.037	<0.020	<0.020	0.021	-	-	-
Cyanides																		
Cyanide, Total	mg/kg	3 - 0.05	<3.0	<3.0	<3.0	<3.0	<3.0	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Organic / Inorganic Carbon																		
$CaCO_3$ Equivalent	%	0.8 - 0.09	-	-	3.43	3.53	3.1	1.37	1.75	1.97	1.37	1.71	-	-	-	-	-	-
Inorganic Carbon	%	0.1 - 0.1	-	-	0.386	0.397	0.346	0.16	0.21	0.24	0.16	0.21	-	-	-	-	-	-
Total Carbon by Combustion	%	0.1 - 0.1	-	-	0.5	0.6	0.5	0.4	0.5	0.4	0.4	0.4	-	-	-	-	-	-
Total Organic Carbon	%	0.7 - 0.1	0.2	0.2	0.16	0.17	0.16	0.21	0.3	0.18	0.23	0.23	0.11	<0.10	<0.10	-	-	-
Plant Available Nutrients																		
Cation Exchange Capacity	meq/100g	2 - 0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Ammonium-N	mg/kg	4.8 - 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate+Nitrite-N	mg/kg	16 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Nitrate-N	mg/kg	16 - 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrite-N	mg/kg	3.2 - 0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Phosphate-P	mg/kg	8 - 2	1	2	-	-	-	2.8	2.6	3.3	2.9	3.2	2.2	4	4.1	-	-	-
Available Sulphate-S	mg/kg	3 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																		
Size Fraction	µm		2000 µm	2000 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	150 µm	150 µm	150 µm
Aluminum (Al)	mg/kg	14300 - 50	12900	12200	14400	15400	14000	16000	14500	15300	15200	14000	11000	11200	11000	17800	16400	17900
Antimony (Sb)	mg/kg	10 - 0.1	<10	<10	<10	<10	<10	6.58	5.12	4.18	4.29	4.34	6.49	6.04	7	-	-	-
Arsenic (As)	mg/kg	5 - 0.05	28.9	44.9	67.5	56.3	81.2	74.1	56.5	55.5	54.2	58.3	76.8	73.7	150	20	18	22
Barium (Ba)	mg/kg	1 - 0.5	89.7	78.1	251	294	176	189	190	207	189	153	79.6	95.7	64.5	280	367	310
Beryllium (Be)	mg/kg	0.5 - 0.1	<0.50	<0.50	<0.50	<0.50	<0.50	0.44	0.39	0.5	0.46	0.36	0.28	0.29	0.28	0.6	0.6	0.6
Bismuth (Bi)	mg/kg	24 - 0.1	<20	<20	<20	<20	<20	0.65	0.6	0.54	0.76	0.48	1.16	0.82	1.25	-	-	-
Boron (B)	mg/kg	5 - 5	-	-	-	-	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	-	-	-
Cadmium (Cd)	mg/kg	0.5 - 0.05	0.94	1.08	2.04	1.73	2.05	4.08	2.24	4.1	3.98	3.81	1.8	1.71	2.4	1	0.9	0.9
Calcium (Ca)	mg/kg	100 - 50	16400	14800	23100	22400	22400	18800	19800	18300	18300	15000	16400	16700	11400	20600	22200	20700
Chromium (Cr)	mg/kg	2 - 0.5	14.6	15	16.7	18.3	16.9	28	22.4	23.6	24.5	21.4	14.7	16.5	17.9	46.3	43.9	45.9
Cobalt (Co)	mg/kg	10 - 0.1	15.2	17.3	21.5	19.5	24.3	28.4	21.7	24.3	24.6	23.1	21.9	21.7	32.3	<10	<10	<10
Copper (Cu)	mg/kg	1 - 0.5	121	158	224	209	229	334	216	335	304	305	180	168	251	71.4	69	74.6

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			SC3	SC3	SC3	SC3	SC3	SC3	SC3	SC3	SC3	SC3	SC3	SC3	SC3	UR1A	UR1A	UR1A
Replicate			2	3	1	2	3	1	2	3	4	5	1	2	3	1	2	3
Source			KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM	BJ	BJ	BJ	GC	GC	GC
Area			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Included/Excluded			Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		Detection	19-Aug-2008	19-Aug-2008	21-Aug-2009	21-Aug-2009	21-Aug-2009	2-Dec-2012	2-Dec-2012	2-Dec-2012	2-Dec-2012	2-Dec-2012	4-Sep-2013	4-Sep-2013	4-Sep-2013	8-Aug-1988	8-Aug-1988	8-Aug-1988
ALS Sample ID	Units	Limits	L676344-74	L676344-75	L810729-41	L810729-42	L810729-43	L1246043-69	L1246043-70	L1246043-71	L1246043-72	L1246043-73	L1359398-13	L1359398-14	L1359398-15	NA	NA	NA
Metals *(cont'd)*																		
Gallium (Ga)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Fe)	mg/kg	100 - 50	45500	49600	52400	47900	58800	59400	48100	50500	49200	49600	52900	54500	80600	40600	40000	40200
Lanthanum (La)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead (Pb)	mg/kg	30 - 0.1	<30	<30	<30	<30	<30	30.3	20.6	22.3	23.4	21.1	34.2	31.7	43.1	10	20	10
Lithium (Li)	mg/kg	5 - 1	10.2	9.6	11	11.3	10.6	10	9.2	9.4	9.3	7.5	8.4	8.2	6.8	-	-	-
Magnesium (Mg)	mg/kg	50 - 10	9930	9180	9810	10500	9800	11600	9760	10100	10400	9770	6900	6800	6660	13700	13000	13500
Manganese (Mn)	mg/kg	1 - 0.2	638	598	729	773	721	1210	844	1110	1140	1030	615	667	625	850	783	853
Mercury (Hg)	mg/kg	1 - 0.005	0.0753	0.101	0.167	0.17	0.173	0.156	0.12	0.123	0.119	0.116	0.2	0.206	0.385	0.236	0.186	0.215
Molybdenum (Mo)	mg/kg	4 - 0.1	7.6	7.6	14.9	12.9	13.6	10.7	7.07	8.93	7.9	7.39	6.24	6.73	8.59	5	5	5
Nickel (Ni)	mg/kg	5 - 0.5	14.3	16.4	20.1	20	21.6	31.8	24.4	26.7	27.2	24.5	16.5	16.6	20.4	48	40	43
Phosphorus (P)	mg/kg	50 - 10	1120	1180	2170	2000	2140	1910	2060	2050	2000	2040	2080	1970	2210	1700	1730	1670
Potassium (K)	mg/kg	200 - 100	1700	1570	1840	1970	1760	1840	1680	1880	1810	1680	1420	1420	1340	-	-	-
Selenium (Se)	mg/kg	11 - 0.1	<10	<8.0	<8.0	<6.0	<8.0	7.47	4.81	4.85	4.55	4.75	5.65	5.58	10.2	-	-	-
Silicon (Si)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	1450	1250	1300
Silver (Ag)	mg/kg	2 - 0.05	<2.0	<2.0	<2.0	<2.0	<2.0	1.32	1.16	0.921	0.951	0.919	1.16	1	1.5	<2	<2	<2
Sodium (Na)	mg/kg	200 - 0.1	<200	<200	260	280	250	250	270	280	270	270	230	240	230	320	290	340
Strontium (Sr)	mg/kg	0.5 - 0.1	59	53.8	103	101	97.8	87.5	88.2	85.3	85.1	71	65.8	69.8	48.1	103	107	103
Sulfur (S)-Total	mg/kg	500 - 100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium (Tl)	mg/kg	10 - 0.05	<1.0	<1.0	<1.0	<1.0	<1.0	0.184	0.169	0.171	0.182	0.156	0.177	0.169	0.179	-	-	-
Tin (Sn)	mg/kg	8 - 0.2	<5.0	<5.0	<5.0	<5.0	<5.0	0.35	0.31	0.33	0.34	0.23	0.26	0.31	0.36	<8	<8	<8
Titanium (Ti)	mg/kg	100 - 1	808	774	1450	1410	1420	1320	1370	1400	1280	1100	979	1160	1200	848	984	922
Tungsten (W)	mg/kg	5 - 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium (U)	mg/kg	10 - 0.05	-	-	1.16	2.19	1.87	0.87	0.893	1.01	0.945	0.805	1.15	0.899	1.46	-	-	-
Vanadium (V)	mg/kg	2 - 0.2	70.5	69.4	85.2	87.9	87.8	93.2	86.3	89.6	86.7	80.4	69.9	72.6	84.8	100	110	110
Zinc (Zn)	mg/kg	2 - 1	123	133	159	147	159	312	204	323	321	295	162	161	205	159	115	138

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			UR1A	UR1A	UR1A	UR1A	UR1A	UR1A	UR1A	UR1A	UR1A	UR1A	UR1	UR1	UR1	UR1	UR1	UR1
Replicate			4	1	2	3	1	2	3	1	2	3	1	2	3	4	1	2
Source			GC	KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM	GC	GC	GC	GC	KSM	KSM
Area			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Included/Excluded			Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		Detection	8-Aug-1988	17-Aug-2008	17-Aug-2008	17-Aug-2008	14-Aug-2009	14-Aug-2009	14-Aug-2009	30-Nov-2012	30-Nov-2012	30-Nov-2012	8-Aug-1988	8-Aug-1988	8-Aug-1988	8-Aug-1988	19-Aug-2008	19-Aug-2008
ALS Sample ID	Units	Limits	NA	L676344-55	L676344-56	L676344-57	L806369-1	L806369-2	L806369-3	L1244734-66	L1244734-67	L1244734-68	NA	NA	NA	NA	L676344-79	L676344-80
Physical Tests																		
Moisture	%	0.25 - 0.1	-	16.9	18.1	17.1	8.69	17.1	18.5	25.5	19.5	14.7	-	-	-	-	17.9	15.3
pH (1:2 soil:water)	pH	0.1 - 0.01		7.74	7.51	7.71	7.96	8.12	8.16	8.14	8.23	8.29					8.03	8.13
Particle Size																		
% Gravel (>2mm)	%	1 - 0.1	-	<1	<1	<1	50	1	2	0.32	24.4	50.1	-	-	-	-	<1	<1
% Sand (2.0mm - 0.063mm)	%	1 - 0.1	-	47	57	57	47	89	91	87	73.7	48.9	-	-	-	-	83	96
% Silt (0.063mm - 4µm)	%	1 - 0.1	-	50	40	39	3	10	6	11.9	1.65	0.86	-	-	-	-	16	4
% Silt (0.063mm - 0.0312mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Silt (0.0312mm - 0.004mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Clay (<4µm)	%	1 - 0.1	-	3	3	3	1	1	1	0.85	0.24	0.19	-	-	-	-	1	<1
Texture	-	-	-	-	-	-	-	-	-	Sand	Sand	Sand	-	-	-	-	-	-
Anions and Nutrients																		
Total Nitrogen by LECO	%	17 - 0.02	-	0.03	0.03	0.02	0.09	0.089	0.09	0.054	0.055	0.057	-	-	-	-	0.03	0.03
Cyanides																		
Cyanide, Total	mg/kg	3 - 0.05	-	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<0.050	<0.050	<0.050	-	-	-	-	<3.0	<3.0
Organic / Inorganic Carbon																		
$CaCO_3$ Equivalent	%	0.8 - 0.09	-	-	-	-	8.01	10.2	9.38	3.85	3.12	3.01	-	-	-	-	-	-
Inorganic Carbon	%	0.1 - 0.1	-	-	-	-	0.565	0.676	0.664	0.46	0.37	0.36	-	-	-	-	-	-
Total Carbon by Combustion	%	0.1 - 0.1	-	-	-	-	1	1	1.1	0.9	0.8	0.8	-	-	-	-	-	-
Total Organic Carbon	%	0.7 - 0.1	-	0.4	0.5	0.4	0.4	0.35	0.4	0.47	0.45	0.46	-	-	-	-	0.2	0.2
Plant Available Nutrients																		
Cation Exchange Capacity	meq/100g	2 - 0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Ammonium-N	mg/kg	4.8 - 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate+Nitrite-N	mg/kg	16 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Nitrate-N	mg/kg	16 - 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrite-N	mg/kg	3.2 - 0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Phosphate-P	mg/kg	8 - 2	-	<1	<1	<1	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	-	-	-	-	1	1
Available Sulphate-S	mg/kg	3 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																		
Size Fraction	µm		150 µm	2000 µm	2000 µm	2000 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	150 µm	150 µm	150 µm	150 µm	2000 µm	2000 µm
Aluminum (Al)	mg/kg	14300 - 50	16700	15500	15400	15500	16200	15200	15400	15600	16300	16200	16800	17200	13800	16000	14200	13800
Antimony (Sb)	mg/kg	10 - 0.1	-	<10	<10	<10	<10	<10	<10	4.35	5.2	4.96	-	-	-	-	<10	<10
Arsenic (As)	mg/kg	5 - 0.05	18	31.1	28.5	28.9	54.8	54.9	51.9	48.1	56.9	50.6	43	40	73	31	32.3	26.2
Barium (Ba)	mg/kg	1 - 0.5	353	182	171	169	188	149	163	185	183	310	300	261	229	262	138	109
Beryllium (Be)	mg/kg	0.5 - 0.1	0.6	0.54	0.55	0.55	0.56	0.53	0.52	0.62	0.69	0.69	0.4	0.4	0.4	0.4	<0.50	<0.50
Bismuth (Bi)	mg/kg	24 - 0.1	-	<20	<20	<20	<20	<20	<20	0.1	0.12	0.11	-	-	-	-	<20	<20
Boron (B)	mg/kg	5 - 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium (Cd)	mg/kg	0.5 - 0.05	0.9	<0.50	<0.50	<0.50	0.5	0.5	0.5	0.942	1.21	1.06	1	2	2.3	2	0.73	0.65
Calcium (Ca)	mg/kg	100 - 50	23000	28900	29000	28400	33400	34800	35100	21700	21200	20600	21200	20200	19000	20400	19900	16100
Chromium (Cr)	mg/kg	2 - 0.5	43.5	38.1	36.2	37.8	43.5	40.3	38.5	45.3	49.6	52.7	29.7	30.5	25.6	25.9	22.7	22.1
Cobalt (Co)	mg/kg	10 - 0.1	<10	14.3	13.6	13.5	17.2	17.4	16.9	18.5	22	19.9	<10	<10	<10	<10	13.6	12.3
Copper (Cu)	mg/kg	1 - 0.5	72	67.8	65	65.5	90.9	86.4	87.1	75.6	90.5	78.9	169	166	190	145	107	95.6

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			UR1A	UR1A	UR1A	UR1A	UR1A	UR1A	UR1A	UR1A	UR1A	UR1A	UR1	UR1	UR1	UR1	UR1	UR1
Replicate			4	1	2	3	1	2	3	1	2	3	1	2	3	4	1	2
Source			GC	KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM	KSM	GC	GC	GC	GC	KSM	KSM
Area			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Included/Excluded			Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		Detection	8-Aug-1988	17-Aug-2008	17-Aug-2008	17-Aug-2008	14-Aug-2009	14-Aug-2009	14-Aug-2009	30-Nov-2012	30-Nov-2012	30-Nov-2012	8-Aug-1988	8-Aug-1988	8-Aug-1988	8-Aug-1988	19-Aug-2008	19-Aug-2008
ALS Sample ID	Units	Limits	NA	L676344-55	L676344-56	L676344-57	L806369-1	L806369-2	L806369-3	L1244734-66	L1244734-67	L1244734-68	NA	NA	NA	NA	L676344-79	L676344-80
Metals *(cont'd)*																		
Gallium (Ga)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Fe)	mg/kg	100 - 50	40000	36300	35400	35600	42400	41900	40700	42500	46300	45600	50800	51800	67800	47800	38700	38000
Lanthanum (La)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead (Pb)	mg/kg	30 - 0.1	10	<30	<30	<30	<30	<30	<30	18.8	23.1	18.6	21	19	27	20	<30	<30
Lithium (Li)	mg/kg	5 - 1	-	18.6	18.1	18.5	17.6	16.2	15.9	18	21.1	21.7	-	-	-	-	13.3	13
Magnesium (Mg)	mg/kg	50 - 10	13100	14000	13800	13800	14300	13900	13900	13500	13600	13100	11700	12100	9900	10800	10900	10800
Manganese (Mn)	mg/kg	1 - 0.2	820	847	846	827	871	824	821	864	1010	891	832	878	698	753	695	646
Mercury (Hg)	mg/kg	1 - 0.005	0.219	0.558	0.222	0.312	0.291	0.365	0.261	0.305	0.369	0.318	0.11	0.1	0.089	0.12	0.0988	0.0976
Molybdenum (Mo)	mg/kg	4 - 0.1	5	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	1.78	2.37	2.61	8	9	10	9	7.7	5.2
Nickel (Ni)	mg/kg	5 - 0.5	38	38.1	35.6	36.3	45.1	40.9	39.4	52.9	63.5	62.6	31	29	27	24	22.1	21.7
Phosphorus (P)	mg/kg	50 - 10	1790	1560	1490	1520	2010	2180	2160	1830	1970	1750	1810	1600	1660	1500	1240	1070
Potassium (K)	mg/kg	200 - 100	-	1140	1190	1190	1240	1040	1100	1010	1060	1220	-	-	-	-	1570	1570
Selenium (Se)	mg/kg	11 - 0.1	-	<4.0	<2.0	<2.0	2.83	<3.0	2.93	2.76	3.43	2.82	-	-	-	-	<4.0	<8.0
Silicon (Si)	mg/kg	0 - 0	1320	-	-	-	-	-	-	-	-	-	1280	1320	1190	902	-	-
Silver (Ag)	mg/kg	2 - 0.05	<2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	0.901	1.11	0.82	<2	<2	<2	<2	<2.0	<2.0
Sodium (Na)	mg/kg	200 - 0.1	300	290	290	290	360	330	340	300	260	260	280	280	240	260	220	<200
Strontium (Sr)	mg/kg	0.5 - 0.1	112	119	121	119	134	135	136	110	112	116	99	95	87	97	80.5	63.5
Sulfur (S)-Total	mg/kg	500 - 100	-	-	-	-	1510	2460	2290	-	-	-	-	-	-	-	-	-
Thallium (Tl)	mg/kg	10 - 0.05	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.174	0.223	0.202	-	-	-	-	<1.0	<1.0
Tin (Sn)	mg/kg	8 - 0.2	<8	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	0.32	0.33	0.76	<8	<8	<8	<8	<5.0	<5.0
Titanium (Ti)	mg/kg	100 - 1	946	738	753	738	1060	947	1060	796	756	846	1370	1310	1130	1360	894	725
Tungsten (W)	mg/kg	5 - 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium (U)	mg/kg	10 - 0.05	-	-	-	-	-	-	-	0.36	0.397	0.405	-	-	-	-	-	-
Vanadium (V)	mg/kg	2 - 0.2	110	86.3	86.4	86.6	101	98.9	100	92.8	94	91.6	100	100	97	94	76.5	70.6
Zinc (Zn)	mg/kg	2 - 1	127	114	111	114	124	116	115	148	175	162	138	167	139	152	120	109

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			UR1	UR1	UR1	UR1	UR1	UR1	UR1	UR1	UR1	UR1	UR2	UR2	UR2	UR2	UR2	UR2
Replicate			3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Source			KSM	KSM	KSM	KSM	KSM	KSM	KSM	BJ	BJ	BJ	KSM	KSM	KSM	KSM	KSM	KSM
Area			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Included/Excluded			Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		Detection	19-Aug-2008	14-Aug-2009	14-Aug-2009	14-Aug-2009	29-Nov-2012	29-Nov-2012	29-Nov-2012	3-Sep-2013	3-Sep-2013	3-Sep-2013	14-Aug-2009	14-Aug-2009	14-Aug-2009	30-Nov-2012	30-Nov-2012	30-Nov-2012
ALS Sample ID	Units	Limits	L676344-81	L806369-4	L806369-5	L806369-6	L1244734-58	L1244734-59	L1244734-60	L1359398-7	L1359398-8	L1359398-9	L806369-7	L806369-8	L806369-9	L1244734-61	L1244734-62	L1244734-63
Physical Tests																		
Moisture	%	0.25 - 0.1	16.3	14	18.9	18.4	11.2	16.9	15.7	18.4	28	17	16	13	18.3	11.2	27.8	19.4
pH (1:2 soil:water)	pH	0.1 - 0.01	8.11	8.14	8.06	8.52	7.99	8.09	8.05	8.33	8.36	8.39	8.06	8.28	8.44	7.93	7.65	7.55
Particle Size																		
% Gravel (>2mm)	%	1 - 0.1	<1	18	4	1	30.2	45.8	47.2	<0.10	<0.10	<0.10	36	41	10	53.6	<0.10	25.7
% Sand (2.0mm - 0.063mm)	%	1 - 0.1	95	77	88	92	67.8	51.8	50	72.9	68.8	67.1	61	57	86	45.8	79.5	66.6
% Silt (0.063mm - 4µm)	%	1 - 0.1	4	4	8	5	1.63	2.15	2.51	25.4	29.3	30.7	3	2	4	0.58	20	7.48
% Silt (0.063mm - 0.0312mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Silt (0.0312mm - 0.004mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Clay (<4µm)	%	1 - 0.1	1	1	1	1	0.32	0.25	0.29	1.67	1.86	2.16	<1.0	<1.0	<1.0	<0.10	0.47	0.17
Texture	-	-	-	-	-	-	Sand	Sand	Sand	Loamy sand	Loamy sand	Sandy loam	-	-	-	Sand	Loamy sand	Sand
Anions and Nutrients																		
Total Nitrogen by LECO	%	17 - 0.02	0.02	0.074	0.079	0.081	0.046	0.048	0.044	<0.020	<0.020	<0.020	0.072	0.064	0.075	0.029	0.038	0.031
Cyanides																		
Cyanide, Total	mg/kg	3 - 0.05	<3.0	<3.0	<3.0	<3.0	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<3.0	<3.0	<3.0	<0.050	<0.050	<0.050
Organic / Inorganic Carbon																		
$CaCO_3$ Equivalent	%	0.8 - 0.09	-	7.26	7.21	7.31	2.88	2.51	2.38	-	-	-	5.22	5.15	5.5	1	0.81	<0.80
Inorganic Carbon	%	0.1 - 0.1	-	0.379	0.396	0.409	0.35	0.3	0.29	-	-	-	0.164	0.152	0.156	0.12	<0.10	<0.10
Total Carbon by Combustion	%	0.1 - 0.1	-	0.6	0.6	0.7	0.6	0.7	0.6	-	-	-	0.3	0.3	0.3	0.3	0.2	0.2
Total Organic Carbon	%	0.7 - 0.1	0.3	0.25	0.23	0.25	0.27	0.36	0.31	0.19	0.13	0.12	0.13	0.1	0.16	0.13	0.25	0.19
Plant Available Nutrients																		
Cation Exchange Capacity	meq/100g	2 - 0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Ammonium-N	mg/kg	4.8 - 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate+Nitrite-N	mg/kg	16 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Nitrate-N	mg/kg	16 - 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrite-N	mg/kg	3.2 - 0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Phosphate-P	mg/kg	8 - 2	1	<2.0	<2.0	<2.0	3.2	4.3	3.2	<2.0	2.2	4.6	<2.0	<2.0	<2.0	2.1	<2.0	2.7
Available Sulphate-S	mg/kg	3 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																		
Size Fraction	µm		2000 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm
Aluminum (Al)	mg/kg	14300 - 50	13000	14700	14600	15200	16800	16800	29700	13000	13500	13500	12600	14200	13000	8830	14800	13200
Antimony (Sb)	mg/kg	10 - 0.1	<10	<10	<10	<10	5.02	4.4	8.97	4.57	4.82	3.95	<10	<10	<10	1.11	1.77	2.09
Arsenic (As)	mg/kg	5 - 0.05	41.1	85.5	65.8	64.1	58.1	53.6	99.2	46.6	52.3	42.3	57.4	41.1	62.8	13.1	24.3	28.2
Barium (Ba)	mg/kg	1 - 0.5	89.6	141	153	143	238	235	370	184	198	248	121	305	129	106	161	153
Beryllium (Be)	mg/kg	0.5 - 0.1	<0.50	<0.50	<0.50	<0.50	0.64	0.64	1.02	0.41	0.38	0.39	<0.50	<0.50	<0.50	0.24	0.37	0.37
Bismuth (Bi)	mg/kg	24 - 0.1	<20	<20	<20	<20	0.39	0.33	0.72	0.56	0.39	0.36	<20	<20	<20	0.13	0.3	0.38
Boron (B)	mg/kg	5 - 5	-	-	-	-	-	-	-	<5.0	<5.0	<5.0	-	-	-	-	-	-
Cadmium (Cd)	mg/kg	0.5 - 0.05	0.81	1.45	1.46	1.39	3.13	4.52	6.51	1.37	1.37	1.16	0.66	0.62	0.53	0.713	0.798	0.696
Calcium (Ca)	mg/kg	100 - 50	16700	25100	24600	25300	18300	16900	32500	20200	20400	19600	15900	17500	17900	6040	8690	8510
Chromium (Cr)	mg/kg	2 - 0.5	20.2	24.1	23.5	24.2	80.8	41.9	92	21.3	23.4	21.6	41.4	36.3	39.2	23.1	37.8	40.4
Cobalt (Co)	mg/kg	10 - 0.1	15.1	25.9	21.9	22.0	23.6	24.1	43.3	17.4	18	15.3	24.6	20.3	24.4	9.5	16.7	17.4
Copper (Cu)	mg/kg	1 - 0.5	104	214	195	197	347	391	512	134	142	127	144	134	140	86.1	94.6	91.5

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			UR1	UR1	UR1	UR1	UR1	UR1	UR1	UR1	UR1	UR1	UR2	UR2	UR2	UR2	UR2	UR2
Replicate			3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Source			KSM	KSM	KSM	KSM	KSM	KSM	KSM	BJ	BJ	BJ	KSM	KSM	KSM	KSM	KSM	KSM
Area			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Included/Excluded			Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		Detection	19-Aug-2008	14-Aug-2009	14-Aug-2009	14-Aug-2009	29-Nov-2012	29-Nov-2012	29-Nov-2012	3-Sep-2013	3-Sep-2013	3-Sep-2013	14-Aug-2009	14-Aug-2009	14-Aug-2009	30-Nov-2012	30-Nov-2012	30-Nov-2012
ALS Sample ID	Units	Limits	L676344-81	L806369-4	L806369-5	L806369-6	L1244734-58	L1244734-59	L1244734-60	L1359398-7	L1359398-8	L1359398-9	L806369-7	L806369-8	L806369-9	L1244734-61	L1244734-62	L1244734-63
Metals *(cont'd)*																		
Gallium (Ga)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Fe)	mg/kg	100 - 50	42900	62500	52900	53500	50300	49600	91800	44100	44300	38700	78100	57200	74800	21600	43100	50700
Lanthanum (La)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead (Pb)	mg/kg	30 - 0.1	<30	36	<30	<30	22.6	21.7	41.8	21.7	21.6	19.6	<30	<30	31	7.42	15.3	14.5
Lithium (Li)	mg/kg	5 - 1	12.4	12.1	12.0	12.6	15.8	13.1	25.5	11	10.7	10.4	9.5	10.6	9.5	5.8	10.7	9.3
Magnesium (Mg)	mg/kg	50 - 10	10300	11200	11000	11500	12400	11900	21400	8750	8970	8770	10100	10700	10200	6360	11500	10300
Manganese (Mn)	mg/kg	1 - 0.2	636	801	777	793	1200	1350	2140	739	736	726	629	674	642	400	490	532
Mercury (Hg)	mg/kg	1 - 0.005	0.128	0.292	0.170	0.162	0.254	0.224	0.605	0.147	0.141	0.118	0.182	0.113	0.183	0.074	0.129	0.109
Molybdenum (Mo)	mg/kg	4 - 0.1	5.6	9.4	10.3	9.5	5.66	5.47	11.6	5.59	5.54	4.46	6.2	6.3	6.3	2	3.15	2.78
Nickel (Ni)	mg/kg	5 - 0.5	20.8	31.7	29.9	28.0	72.4	43.3	92.6	20.7	22.9	20.1	31.2	29.6	29.5	18.6	29.7	27.6
Phosphorus (P)	mg/kg	50 - 10	1140	2100	2040	2000	2120	2180	3680	1820	1930	2030	2270	2060	2320	834	1830	1810
Potassium (K)	mg/kg	200 - 100	1400	1650	1630	1690	1530	1560	2570	1480	1510	1600	1120	1440	1220	810	1210	1130
Selenium (Se)	mg/kg	11 - 0.1	<6.0	6.96	5.03	5.37	3.78	3.5	7.56	3.39	3.29	2.29	4.37	3.44	<3.0	0.89	1.58	1.83
Silicon (Si)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (Ag)	mg/kg	2 - 0.05	<2.0	<2.0	<2.0	<2.0	0.839	0.814	1.58	0.692	0.799	0.606	<2.0	<2.0	<2.0	0.222	0.451	0.664
Sodium (Na)	mg/kg	200 - 0.1	<200	280	280	290	300	290	490	310	310	320	450	500	430	360	630	670
Strontium (Sr)	mg/kg	0.5 - 0.1	68.4	98.9	96.6	100	96	89.9	161	93.3	93	90.2	64.5	78.3	71.1	35.3	51.4	49.4
Sulfur (S)-Total	mg/kg	500 - 100	-	-	7010	5050	-	-	-	-	-	-	2940	2550	2180	-	-	-
Thallium (Tl)	mg/kg	10 - 0.05	<1.0	<1.0	<1.0	<1.0	0.179	0.174	0.323	0.142	0.138	0.136	<1.0	<1.0	<1.0	0.058	0.101	0.095
Tin (Sn)	mg/kg	8 - 0.2	<5.0	<5.0	<5.0	<5.0	0.82	0.34	1.02	0.35	0.34	0.35	<5.0	<5.0	<5.0	0.22	0.26	0.25
Titanium (Ti)	mg/kg	100 - 1	682	1290	1160	1180	1040	1040	1700	1280	1290	1280	1290	1620	1260	843	1140	1160
Tungsten (W)	mg/kg	5 - 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium (U)	mg/kg	10 - 0.05	-	1.28	-	-	0.657	0.774	1.28	0.818	0.751	0.735	-	-	-	0.634	1.8	3.88
Vanadium (V)	mg/kg	2 - 0.2	69.4	97.7	88.5	90.9	92.5	89	159	81.8	82.9	78.3	157	120	153	47.1	92.9	112
Zinc (Zn)	mg/kg	2 - 1	120	178	170	162	310	411	557	146	150	139	119	112	111	88.7	106	99.9

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			UR2	UR2	UR2	UR2	UR2	Divide	Divide	Divide	Divide OF	Divide OF	Divide OF	L3	L3	L3	KL	KL
Replicate			4	5	1	2	3	1	2	3	1	2	3	1	2	3	1	2
Source			KSM	KSM	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ
Area			MA	MA	MA	MA	MA	R	R	R	R	R	R	R	R	R	AP	AP
Included/Excluded			Include	Include	Include	Include	Include	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Include	Include
Date Sampled		Detection	30-Nov-2012	30-Nov-2012	2-Sep-2013	2-Sep-2013	2-Sep-2013	11-Aug-2013	11-Aug-2013	11-Aug-2013	12-Aug-2013	12-Aug-2013	12-Aug-2013	22-Oct-2013	22-Oct-2013	22-Oct-2013	12-Aug-2013	12-Aug-2013
ALS Sample ID	Units	Limits	L1244734-64	L1244734-65	L1359398-1	L1359398-2	L1359398-3	L1347688-1	L1347688-2	L1347688-3	L1347688-7	L1347688-8	L1347688-9	L1384234-1	L1384234-2	L1384234-3	L1347688-4	L1347688-5
Physical Tests																		
Moisture	%	0.25 - 0.1	11.2	19.7	28.6	21.5	30	55.5	54	50.7	26.6	17	38.5	39.9	51.7	35.4	29.7	24.9
pH (1:2 soil:water)	pH	0.1 - 0.01	7.72	7.81	8.36	8.32	8.17	6.36	6.33	6.42	6.69	6.91	6.82	8.1	7.55	7.71	8.23	8.21
Particle Size																		
% Gravel (>2mm)	%	1 - 0.1	38.9	9.66	<0.10	<0.10	<0.10	0.12	<0.10	<0.10	18.6	24.1	48.7	9.24	0.18	0.36	<0.10	<0.10
% Sand (2.0mm - 0.063mm)	%	1 - 0.1	59.5	81.3	66.2	21.9	13.5	1.73	1	0.95	66.6	65.7	44.8	23.2	11	17	10.1	9.38
% Silt (0.063mm - 4µm)	%	1 - 0.1	1.53	8.69	32.6	71.6	79.2	61	64.4	66.7	10.6	8.5	5.53	37.5	53.2	48.2	77.5	77.2
% Silt (0.063mm - 0.0312mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Silt (0.0312mm - 0.004mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Clay (<4µm)	%	1 - 0.1	0.1	0.34	1.21	6.47	7.33	37.2	34.7	32.4	4.3	1.72	0.93	30	35.7	34.4	12.5	13.4
Texture	-	-	Sand	Sand	Sandy loam	Silt loam	Silt loam / Silt	Silty clay loam	Silt loam	Silt loam	Loamy sand	Sand	Sand	Loam	Silty clay loam	Silt loam / Silty clay	Silt	Silt
Anions and Nutrients																		
Total Nitrogen by LECO	%	17 - 0.02	0.026	0.028	<0.020	0.02	<0.020	0.065	0.069	0.065	0.045	0.048	0.048	0.053	0.078	0.079	0.023	0.024
Cyanides																		
Cyanide, Total	mg/kg	3 - 0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Organic / Inorganic Carbon																		
$CaCO_3$ Equivalent	%	0.8 - 0.09	0.91	0.82	-	-	-	0.99	<0.80	<0.80	<0.80	<0.80	<0.80	2.28	1.08	<0.80	3.84	3.93
Inorganic Carbon	%	0.1 - 0.1	0.11	<0.10	-	-	-	0.12	<0.10	<0.10	<0.10	<0.10	<0.10	0.27	0.13	<0.10	0.46	0.47
Total Carbon by Combustion	%	0.1 - 0.1	0.2	0.2	-	-	-	0.8	0.7	0.7	0.3	0.5	0.5	0.6	0.5	0.4	0.8	0.8
Total Organic Carbon	%	0.7 - 0.1	<0.10	0.19	0.12	0.22	0.17	0.64	0.72	0.7	0.33	0.49	0.49	0.35	0.33	0.4	0.35	0.34
Plant Available Nutrients																		
Cation Exchange Capacity	meq/100g	2 - 0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Ammonium-N	mg/kg	4.8 - 1	-	-	-	-	-	2.9	2.9	2.2	1.1	1.5	1.8	2.2	2.1	2	<1.6	<1.6
Nitrate+Nitrite-N	mg/kg	16 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Nitrate-N	mg/kg	16 - 1	-	-	-	-	-	<4.0	<4.0	<4.0	<1.0	<1.0	<1.0	<4.0	<1.0	<1.0	<4.0	<4.0
Nitrite-N	mg/kg	3.2 - 0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Phosphate-P	mg/kg	8 - 2	<2.0	2.2	2	<2.0	<2.0	13.1	14	14.1	15.2	7.2	6.2	3.2	4.6	3.9	<2.0	<2.0
Available Sulphate-S	mg/kg	3 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																		
Size Fraction	µm		63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm
Aluminum (Al)	mg/kg	14300 - 50	13800	14700	14500	18400	15900	23800	24400	23900	24600	20200	23500	30500	30500	30000	16000	15500
Antimony (Sb)	mg/kg	10 - 0.1	1.94	2.03	1.72	2.12	2.05	1.61	1.64	1.65	1.6	1.72	1.73	2.8	2.75	2.68	2.71	2.88
Arsenic (As)	mg/kg	5 - 0.05	31.3	29.7	25.8	23.6	23.1	20.1	19.9	20.1	29	26.3	27.3	23.8	21.4	22	26.2	26.9
Barium (Ba)	mg/kg	1 - 0.5	177	213	260	361	329	433	449	432	364	279	325	253	237	237	341	309
Beryllium (Be)	mg/kg	0.5 - 0.1	0.33	0.36	0.31	0.44	0.45	0.99	0.96	0.92	0.98	0.79	0.97	1.36	1.4	1.35	0.49	0.48
Bismuth (Bi)	mg/kg	24 - 0.1	0.61	0.36	0.23	0.29	0.45	0.39	0.39	0.4	0.36	0.3	0.29	0.12	0.12	0.12	0.21	0.22
Boron (B)	mg/kg	5 - 5	-	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<10	<10	<5.0	<5.0
Cadmium (Cd)	mg/kg	0.5 - 0.05	0.751	0.771	0.855	0.875	0.873	0.442	0.446	0.443	0.835	0.614	0.707	0.337	0.307	0.296	0.936	0.885
Calcium (Ca)	mg/kg	100 - 50	8930	9270	12900	14400	14000	7490	7750	7940	4640	4190	4390	13900	12100	12500	20900	20900
Chromium (Cr)	mg/kg	2 - 0.5	45.4	42.2	27.9	30.6	29	7.77	8.18	8.1	26.7	38.2	52.3	27.9	27.3	29.8	21.9	21.2
Cobalt (Co)	mg/kg	10 - 0.1	18.1	18.1	15.5	16	15.5	18.3	18.1	18	28.4	30.9	32.1	30.4	29.4	30.7	17	17
Copper (Cu)	mg/kg	1 - 0.5	98.1	104	93.6	99.3	101	46.8	46.6	46.1	54.1	61.5	73	156	149	157	44.1	45.6

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			UR2	UR2	UR2	UR2	UR2	Divide	Divide	Divide	Divide OF	Divide OF	Divide OF	L3	L3	L3	KL	KL
Replicate			4	5	1	2	3	1	2	3	1	2	3	1	2	3	1	2
Source			KSM	KSM	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ
Area			MA	MA	MA	MA	MA	R	R	R	R	R	R	R	R	R	AP	AP
Included/Excluded			Include	Include	Include	Include	Include	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Include	Include
Date Sampled		Detection	30-Nov-2012	30-Nov-2012	2-Sep-2013	2-Sep-2013	2-Sep-2013	11-Aug-2013	11-Aug-2013	11-Aug-2013	12-Aug-2013	12-Aug-2013	12-Aug-2013	22-Oct-2013	22-Oct-2013	22-Oct-2013	12-Aug-2013	12-Aug-2013
ALS Sample ID	Units	Limits	L1244734-64	L1244734-65	L1359398-1	L1359398-2	L1359398-3	L1347688-1	L1347688-2	L1347688-3	L1347688-7	L1347688-8	L1347688-9	L1384234-1	L1384234-2	L1384234-3	L1347688-4	L1347688-5
Metals *(cont'd)*																		
Gallium (Ga)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Fe)	mg/kg	100 - 50	50900	52000	39300	38400	36800	43200	43700	44600	43200	43500	44900	65200	62600	65700	44500	44500
Lanthanum (La)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead (Pb)	mg/kg	30 - 0.1	15.9	17.3	14.2	17.9	18.3	18.9	19	19	23.9	18	18.1	17.6	17.2	17.6	19.2	18.8
Lithium (Li)	mg/kg	5 - 1	9	9.4	8.1	11.4	11	22.1	22	21.8	29.6	33.2	32.7	26.8	26.5	27.2	18.8	18.9
Magnesium (Mg)	mg/kg	50 - 10	10400	10600	9580	11300	10600	10400	10300	10400	10300	10000	10200	23700	23200	24100	10000	9840
Manganese (Mn)	mg/kg	1 - 0.2	610	592	640	763	719	1600	1630	1590	2350	2390	2490	1610	1520	1600	1260	1220
Mercury (Hg)	mg/kg	1 - 0.005	0.0808	0.0861	0.0666	0.0653	0.0599	0.12	0.111	0.12	0.104	0.146	0.136	0.19	0.175	0.177	0.127	0.126
Molybdenum (Mo)	mg/kg	4 - 0.1	3.59	2.84	2.83	3.07	3.3	1.91	1.88	1.92	3.69	4.03	5.57	1.15	1.19	1.18	2.15	2.18
Nickel (Ni)	mg/kg	5 - 0.5	32.2	29	21.9	24.4	23.6	12.4	12.7	12.6	49	71.5	81.5	27.4	26.1	27.9	33	32.3
Phosphorus (P)	mg/kg	50 - 10	1720	1790	1630	1630	1660	1320	1390	1310	1320	1260	1290	1950	1930	1870	1640	1620
Potassium (K)	mg/kg	200 - 100	1170	1310	1650	1960	1840	2740	2930	3030	2320	1540	1650	6810	6580	6950	1140	1110
Selenium (Se)	mg/kg	11 - 0.1	2.09	1.77	1.66	1.27	1.18	0.67	0.65	0.66	0.7	1.24	1.41	0.64	0.54	0.6	1.25	1.33
Silicon (Si)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (Ag)	mg/kg	2 - 0.05	0.494	0.489	0.341	0.42	0.488	0.415	0.388	0.402	0.428	0.398	0.437	0.262	0.252	0.255	0.524	0.485
Sodium (Na)	mg/kg	200 - 0.1	600	600	840	910	870	230	270	250	150	140	130	720	730	720	190	180
Strontium (Sr)	mg/kg	0.5 - 0.1	53.8	56.3	71.2	84.3	83.6	71.9	74.1	76.5	57.2	57.6	44.2	106	100	106	88.1	86.6
Sulfur (S)-Total	mg/kg	500 - 100	-	-	-	-	-	<500	600	600	900	1000	800	1800	1600	1600	7000	7000
Thallium (Tl)	mg/kg	10 - 0.05	0.096	0.116	0.092	0.134	0.124	0.143	0.157	0.154	0.23	0.182	0.209	0.276	0.268	0.277	0.163	0.166
Tin (Sn)	mg/kg	8 - 0.2	0.42	0.32	0.31	0.4	0.38	2.39	1.09	1.18	3.97	5.14	2.77	0.83	0.82	0.86	0.64	0.42
Titanium (Ti)	mg/kg	100 - 1	1260	1430	1570	1710	1520	1220	1270	1310	799	481	441	1900	1880	1930	1460	1410
Tungsten (W)	mg/kg	5 - 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium (U)	mg/kg	10 - 0.05	3.89	4.48	1.33	1.33	1.59	1.83	1.84	1.89	2.01	1.62	1.68	0.989	0.992	1	0.781	0.754
Vanadium (V)	mg/kg	2 - 0.2	114	120	83.9	87.7	82.1	82.3	83.4	85.6	64.1	56.1	59.1	198	193	202	68.7	67.7
Zinc (Zn)	mg/kg	2 - 1	106	110	110	122	119	99.2	98.9	100	155	154	161	134	128	133	120	119

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			KL	BR1	BR1	BR1	BR2	BR2	BR2	BL1	BL1	ST1	ST1	ST1	ST2	ST2	ST2	TL1
Replicate			**3**	**1**	**2**	**3**	**1**	**2**	**3**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1 (Deep)**
Source			BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	KSM
Area			AP	AP	AP	AP	AP	AP	AP	FF	FF	AP	AP	AP	AP	AP	AP	AP
Included/Excluded			Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		**Detection**	12-Aug-2013	26-Aug-2010	26-Aug-2010	26-Aug-2010	26-Aug-2010	26-Aug-2010	26-Aug-2010	25-Aug-2010	25-Aug-2010	27-Aug-2010	27-Aug-2010	27-Aug-2010	27-Aug-2010	27-Aug-2010	27-Aug-2010	17-Aug-2009
ALS Sample ID	**Units**	**Limits**	L1347688-6	L927313-12	L927313-13	L927313-14	L927313-15	L927313-16	L927313-17	L927313-1	L927313-2	L927313-24	L927313-25	L927313-26	L927313-18	L927313-19	L927313-20	L807781-1
Physical Tests																		
Moisture	%	0.25 - 0.1	23	16.6	17.7	17.1	18	22.2	19.8	13	34.1	52.4	28.5	33.8	13.8	13.5	14.9	90
pH (1:2 soil:water)	pH	0.1 - 0.01	8.23	8.3	8.27	8.3	8.18	8.14	8.16	8.3	8.05	5.83	6.41	6.11	8.18	8.62	8.46	6.39
Particle Size																		
% Gravel (>2mm)	%	1 - 0.1	<0.10	0.41	<0.10	<0.10	<0.10	<0.10	<0.10	35.9	<0.10	<0.10	3.25	<0.10	<0.10	3.09	0.34	<1.0
% Sand (2.0mm - 0.063mm)	%	1 - 0.1	10.6	87.4	78.1	75.1	69.8	38.9	26.3	62.4	3.22	15.3	50.5	46	84.9	89.1	96.2	2
% Silt (0.063mm - 4µm)	%	1 - 0.1	76.9	10.2	19.8	22.5	26.8	55.8	66.5	0.88	75.4	72.4	38.9	41.5	13.7	6.98	1.96	44
% Silt (0.063mm - 0.0312mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Silt (0.0312mm - 0.004mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Clay (<4µm)	%	1 - 0.1	12.5	2	2.1	2.45	3.4	5.24	7.21	0.81	21.4	12.3	7.4	12.6	1.42	0.86	1.48	54
Texture	-	-	Silt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anions and Nutrients																		
Total Nitrogen by LECO	%	17 - 0.02	0.024	0.02	<0.020	0.023	0.043	0.075	0.053	0.027	0.082	0.247	0.152	0.198	0.036	0.037	0.045	1.43
Cyanides																		
Cyanide, Total	mg/kg	3 - 0.05	<0.050	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Organic / Inorganic Carbon																		
$CaCO_3$ Equivalent	%	0.8 - 0.09	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.11
Inorganic Carbon	%	0.1 - 0.1	0.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.193
Total Carbon by Combustion	%	0.1 - 0.1	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.9
Total Organic Carbon	%	0.7 - 0.1	0.34	0.13	0.1	0.21	0.31	0.9	0.64	0.19	0.68	3.28	1.88	2.71	0.34	0.25	0.39	15.8
Plant Available Nutrients																		
Cation Exchange Capacity	meq/100g	2 - 0.8	-	2.33	2.36	2.7	2.33	3.66	2.56	2.74	2.34	11.2	7.39	9.89	2.18	2.09	2.36	-
Available Ammonium-N	mg/kg	4.8 - 1	<1.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate+Nitrite-N	mg/kg	16 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Nitrate-N	mg/kg	16 - 1	<4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrite-N	mg/kg	3.2 - 0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Phosphate-P	mg/kg	8 - 2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.3	2.6	2.7	<2.0	<2.0	<2.0	37.1
Available Sulphate-S	mg/kg	3 - 2	-	11.2	13	10.2	16.5	16.2	21.6	12	17.2	31.9	23.8	31.4	15.6	11.3	7.9	-
Metals																		
Size Fraction	µm		63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm
Aluminum (Al)	mg/kg	14300 - 50	15200	13300	13100	14600	13400	13900	12700	14100	18600	22000	21800	22100	12800	13400	19700	11700
Antimony (Sb)	mg/kg	10 - 0.1	2.75	1.65	2.29	1.8	2.85	2.89	3.5	1.84	3.23	0.98	0.94	0.92	3.21	3.22	2.94	<10
Arsenic (As)	mg/kg	5 - 0.05	25.8	17.3	21.3	19.5	31.4	29.5	31.9	12.9	43.3	14	15.6	15.2	31.5	31.4	32.7	7.5
Barium (Ba)	mg/kg	1 - 0.5	305	339	281	371	256	208	186	382	267	119	131	154	224	213	289	256
Beryllium (Be)	mg/kg	0.5 - 0.1	0.47	0.43	0.48	0.51	0.43	0.44	0.44	0.39	0.58	0.61	0.65	0.65	0.43	0.43	0.53	<0.50
Bismuth (Bi)	mg/kg	24 - 0.1	0.21	0.19	0.18	0.22	0.13	0.13	0.13	0.16	0.18	0.19	0.17	0.18	0.12	0.12	0.14	<20
Boron (B)	mg/kg	5 - 5	5.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium (Cd)	mg/kg	0.5 - 0.05	0.892	1.1	1.57	1.35	1.2	1.43	1.34	1.31	1.23	0.332	0.335	0.287	1.14	1.19	1.85	1.52
Calcium (Ca)	mg/kg	100 - 50	20900	12000	12700	13000	15300	14100	16500	7270	9850	3040	3060	2960	18700	18400	20200	8910
Chromium (Cr)	mg/kg	2 - 0.5	21.1	23.1	20.6	20.1	21.9	23.1	19.2	135	26.1	72.7	74.6	72.3	18.8	26.6	85	30.4
Cobalt (Co)	mg/kg	10 - 0.1	16.7	13.1	14.3	14.7	14.6	15.2	14.4	12.8	20.6	21.9	20.4	22.2	14.1	14.6	21.6	17.4
Copper (Cu)	mg/kg	1 - 0.5	44	33.6	39.2	38.5	30.3	31.5	30.2	47.9	41.9	60.9	61.2	63.3	29.2	32.2	64.8	43

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			KL	BR1	BR1	BR1	BR2	BR2	BR2	BL1	BL1	ST1	ST1	ST1	ST2	ST2	ST2	TL1
Replicate			3	1	2	3	1	2	3	2	3	1	2	3	1	2	3	1 (Deep)
Source			BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	KSM
Area			AP	AP	AP	AP	AP	AP	AP	FF	FF	AP	AP	AP	AP	AP	AP	AP
Included/Excluded			Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Date Sampled		Detection	12-Aug-2013	26-Aug-2010	26-Aug-2010	26-Aug-2010	26-Aug-2010	26-Aug-2010	26-Aug-2010	25-Aug-2010	25-Aug-2010	27-Aug-2010	27-Aug-2010	27-Aug-2010	27-Aug-2010	27-Aug-2010	27-Aug-2010	17-Aug-2009
ALS Sample ID	Units	Limits	L1347688-6	L927313-12	L927313-13	L927313-14	L927313-15	L927313-16	L927313-17	L927313-1	L927313-2	L927313-24	L927313-25	L927313-26	L927313-18	L927313-19	L927313-20	L807781-1
Metals *(cont'd)*																		
Gallium (Ga)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Fe)	mg/kg	100 - 50	43800	36900	43200	42000	40900	39400	37700	31800	47000	44000	44900	43700	39300	40300	45200	43900
Lanthanum (La)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead (Pb)	mg/kg	30 - 0.1	18.8	31.6	47.3	40.1	13.9	13.5	14.5	21	22.8	12.5	14.3	15.8	13.4	16	26.1	<30
Lithium (Li)	mg/kg	5 - 1	18.8	18.3	18.6	20	16.4	17	15.9	20.5	19.5	35.6	40.9	42.3	15.3	16.3	22.5	13.3
Magnesium (Mg)	mg/kg	50 - 10	9810	8680	8790	9500	8160	8340	7880	8930	10500	13900	13900	14000	7990	8390	12300	3030
Manganese (Mn)	mg/kg	1 - 0.2	1210	918	924	1020	1060	1190	1210	949	1830	352	663	740	1060	1120	1870	3620
Mercury (Hg)	mg/kg	1 - 0.005	0.131	0.198	0.263	0.208	0.0861	0.089	0.0867	0.109	0.127	0.131	0.136	0.136	0.0795	0.0778	0.0896	0.197
Molybdenum (Mo)	mg/kg	4 - 0.1	2.2	2.1	2.17	1.84	2.49	2.49	2.68	14.3	2.47	2.13	2.82	2.38	2.39	3.02	6.64	<4.0
Nickel (Ni)	mg/kg	5 - 0.5	31.9	24.2	22.9	23.9	27.1	31.2	25.4	99.1	31.1	109	105	106	23.6	29.8	88.2	83.9
Phosphorus (P)	mg/kg	50 - 10	1610	1260	1430	1390	1870	1590	1610	947	2040	1180	1150	1140	1730	1640	1730	958
Potassium (K)	mg/kg	200 - 100	1020	1050	1030	1200	780	830	720	1110	1440	1150	1110	990	740	780	1340	1000
Selenium (Se)	mg/kg	11 - 0.1	1.28	0.56	0.74	0.69	0.84	0.94	0.78	1.24	0.76	1.55	1.41	1.22	0.77	0.79	1.03	5.65
Silicon (Si)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (Ag)	mg/kg	2 - 0.05	0.482	0.612	1.05	0.866	0.289	0.282	0.306	0.365	0.37	0.368	0.325	0.336	0.286	0.277	0.308	<2.0
Sodium (Na)	mg/kg	200 - 0.1	190	130	130	140	<100	<100	<100	210	140	150	110	<100	<100	<100	130	270
Strontium (Sr)	mg/kg	0.5 - 0.1	87.3	56.5	61.6	61.5	87.7	79.6	92.1	49.8	53.2	34.6	37.4	36.8	102	101	104	143
Sulfur (S)-Total	mg/kg	500 - 100	7100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.62
Thallium (Tl)	mg/kg	10 - 0.05	0.162	0.16	0.25	0.21	0.21	0.22	0.23	0.13	0.29	<0.10	<0.10	<0.10	0.22	0.23	0.23	<1.0
Tin (Sn)	mg/kg	8 - 0.2	0.41	0.75	0.48	0.44	0.24	0.21	0.23	85.4	1.45	0.3	0.53	0.55	0.22	0.97	2.58	<5.0
Titanium (Ti)	mg/kg	100 - 1	1280	956	1120	1160	277	221	137	435	278	19.8	20.4	16.1	180	193	220	149
Tungsten (W)	mg/kg	5 - 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium (U)	mg/kg	10 - 0.05	0.709	0.563	0.653	0.673	0.353	0.326	0.303	0.319	0.385	0.26	0.216	0.219	0.32	0.322	0.331	-
Vanadium (V)	mg/kg	2 - 0.2	64.4	56.9	68.3	66.5	42.3	40.7	35.8	44	50.9	52.5	50.3	50.4	38	39.9	54.1	21.6
Zinc (Zn)	mg/kg	2 - 1	118	139	175	159	140	149	135	127	147	156	128	135	127	133	196	189

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			TL1	TL1	TL1	TL1	TL1	TL1	TL1	TL1	TL1	TL1	TL1	TC2	TC2	TC2	WL1	WL1
Replicate			**2 (Deep)**	**1 (Mid)**	**2 (Mid)**	**1 (Shallow)**	**2 (Shallow)**	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**2**	**3**	**1**	**2**
Source			KSM	KSM	KSM	KSM	KSM	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ
Area			AP	AP	AP	AP	AP	AP	AP	AP	AP	AP	AP	AP	AP	AP	AP	AP
Included/Excluded			Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Exclude	Exclude
Date Sampled		**Detection**	17-Aug-2009	17-Aug-2009	17-Aug-2009	17-Aug-2009	17-Aug-2009	25-Aug-2010	25-Aug-2010	25-Aug-2010	25-Aug-2010	25-Aug-2010	25-Aug-2010	27-Aug-2010	27-Aug-2010	27-Aug-2010	28-Aug-2010	28-Aug-2010
ALS Sample ID	**Units**	**Limits**	L807781-2	L807781-3	L807781-4	L807781-5	L807781-6	L927313-3	L927313-6	L927313-4	L927313-7	L927313-5	L927313-8	L927313-21	L927313-22	L927313-23	L927313-30	L927313-31
Physical Tests																		
Moisture	%	0.25 - 0.1	88.2	72.9	79.5	86.2	76	92.1	92.4	93.6	93.4	93.6	92.8	14.5	14.8	18.6	28	32.4
pH (1:2 soil:water)	pH	0.1 - 0.01	6.51	6.48	6.57	6.79	6.52	5.8	5.22	5.52	5.44	5.72	5.47	8.08	8.53	8.51	7.89	7.93
Particle Size																		
% Gravel (>2mm)	%	1 - 0.1	<1.0	2	<1.0	25	4	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.73	<0.10	<0.10	<0.10
% Sand (2.0mm - 0.063mm)	%	1 - 0.1	1	47	45	30	35	-	1.18	0.64	0.46	0.72	0.81	80.6	89.2	93	0.51	0.59
% Silt (0.063mm - 4µm)	%	1 - 0.1	45	36	36	29	42	-	83.1	80.8	81.2	91	88.1	17.2	8.9	6.28	69.5	78.5
% Silt (0.063mm - 0.0312mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Silt (0.0312mm - 0.004mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Clay (<4µm)	%	1 - 0.1	53	16	18	16	19	-	15.8	18.5	18.4	8.29	11.1	2.13	1.22	0.72	30	21
Texture	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anions and Nutrients																		
Total Nitrogen by LECO	%	17 - 0.02	1.23	0.474	0.598	0.673	0.321	1.46	1.56	1.56	1.51	1.75	1.76	0.063	0.061	0.061	0.092	0.077
Cyanides																		
Cyanide, Total	mg/kg	3 - 0.05	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Organic / Inorganic Carbon																		
$CaCO_3$ Equivalent	%	0.8 - 0.09	2.58	<0.70	<0.70	<0.70	<0.70	-	-	-	-	-	-	-	-	-	-	-
Inorganic Carbon	%	0.1 - 0.1	0.262	<0.090	<0.090	<0.090	<0.090	-	-	-	-	-	-	-	-	-	-	-
Total Carbon by Combustion	%	0.1 - 0.1	14	5.9	6.7	12.6	4.3	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon	%	0.7 - 0.1	13.8	5.85	6.62	12.5	4.21	16.6	17.9	17.3	16.9	19.8	19.8	0.63	0.62	0.56	0.83	0.74
Plant Available Nutrients																		
Cation Exchange Capacity	meq/100g	2 - 0.8	-	-	-	-	-	2.59	72.3	71.3	80.2	70.7	72.5	1.75	1.94	1.93	5.24	3.9
Available Ammonium-N	mg/kg	4.8 - 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate+Nitrite-N	mg/kg	16 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Nitrate-N	mg/kg	16 - 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrite-N	mg/kg	3.2 - 0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Phosphate-P	mg/kg	8 - 2	39.5	9.7	10.9	12.4	6.8	31	46.3	19.3	35.3	34.2	39.6	<2.0	<2.0	<2.0	<2.0	<2.0
Available Sulphate-S	mg/kg	3 - 2	-	-	-	-	-	886	1460	1260	1550	1750	1850	45.7	39.2	39	79.3	72
Metals																		
Size Fraction	µm		63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm
Aluminum (Al)	mg/kg	14300 - 50	15100	13800	13900	14000	18500	11100	18600	9520	8930	11200	11400	9180	9010	9500	14500	10700
Antimony (Sb)	mg/kg	10 - 0.1	<10	<10	<10	<10	<10	0.65	11.4	0.93	0.96	0.89	0.9	5.55	5.96	6.69	6.1	5.08
Arsenic (As)	mg/kg	5 - 0.05	11.6	19.3	10.8	8.3	9.8	6.31	28.6	7.68	7.55	5	5.07	44.5	53.2	55.6	51.7	42.2
Barium (Ba)	mg/kg	1 - 0.5	71.1	242	216	240	199	57.4	276	57.7	62.9	127	132	115	110	112	194	166
Beryllium (Be)	mg/kg	0.5 - 0.1	0.51	<0.50	<0.50	<0.50	0.54	0.53	0.43	0.46	0.45	0.5	0.46	0.31	0.33	0.33	0.52	0.36
Bismuth (Bi)	mg/kg	24 - 0.1	<20	<20	<20	<20	<20	<0.10	0.39	<0.10	<0.10	<0.10	0.1	0.15	0.16	0.17	0.21	0.18
Boron (B)	mg/kg	5 - 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium (Cd)	mg/kg	0.5 - 0.05	1.28	0.83	0.92	0.95	0.83	1.57	2.56	1.65	1.64	2.39	2.46	6.9	8.1	8.34	4.51	4.02
Calcium (Ca)	mg/kg	100 - 50	8280	9100	9950	12200	8060	10300	7970	9210	9150	11400	10900	17100	16700	18400	9350	11800
Chromium (Cr)	mg/kg	2 - 0.5	35.2	47.6	38.4	41.7	47.5	29.8	54.1	30.3	30.7	38.8	43.2	15	15	17.9	17.8	13
Cobalt (Co)	mg/kg	10 - 0.1	16.6	16.2	13.1	10.9	13.9	18.1	9.91	17.5	17.2	17.8	18.3	11.1	11.5	12.3	15.3	12.8
Copper (Cu)	mg/kg	1 - 0.5	55.5	25.3	22.4	23.3	30.7	36.1	322	38.8	37.7	38.5	39	37.8	40.9	42.6	47.4	36.2

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			TL1	TL1	TL1	TL1	TL1	TL1	TL1	TL1	TL1	TL1	TL1	TC2	TC2	TC2	WL1	WL1
Replicate			**2 (Deep)**	**1 (Mid)**	**2 (Mid)**	**1 (Shallow)**	**2 (Shallow)**	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**2**	**3**	**1**	**2**
Source			KSM	KSM	KSM	KSM	KSM	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ
Area			AP	AP	AP	AP	AP	AP	AP	AP	AP	AP	AP	AP	AP	AP	AP	AP
Included/Excluded			Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Exclude	Exclude
Date Sampled		**Detection**	17-Aug-2009	17-Aug-2009	17-Aug-2009	17-Aug-2009	17-Aug-2009	25-Aug-2010	25-Aug-2010	25-Aug-2010	25-Aug-2010	25-Aug-2010	25-Aug-2010	27-Aug-2010	27-Aug-2010	27-Aug-2010	28-Aug-2010	28-Aug-2010
ALS Sample ID	**Units**	**Limits**	L807781-2	L807781-3	L807781-4	L807781-5	L807781-6	L927313-3	L927313-6	L927313-4	L927313-7	L927313-5	L927313-8	L927313-21	L927313-22	L927313-23	L927313-30	L927313-31
Metals *(cont'd)*																		
Gallium (Ga)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Fe)	mg/kg	100 - 50	39800	65500	55900	38000	32600	43400	34600	40700	39900	25300	25800	35200	36400	38800	43300	34900
Lanthanum (La)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead (Pb)	mg/kg	30 - 0.1	<30	<30	<30	<30	<30	9.75	192	8.63	8.7	8.46	8.65	12.8	15.1	14.4	21.3	15.7
Lithium (Li)	mg/kg	5 - 1	21.4	25.4	25.8	30.8	48.4	13.5	23.7	9.1	7.6	11.2	10.3	16.4	16.2	16.5	22	17
Magnesium (Mg)	mg/kg	50 - 10	4590	5990	5960	4970	7040	3660	11000	2820	2690	4110	4080	5720	5530	5980	7050	5780
Manganese (Mn)	mg/kg	1 - 0.2	3050	700	599	831	973	1370	307	2580	2500	901	954	1080	1060	1160	1060	1170
Mercury (Hg)	mg/kg	1 - 0.005	0.192	0.152	0.148	0.132	0.143	0.123	0.129	0.128	0.128	0.139	0.136	0.314	0.342	0.362	0.321	0.347
Molybdenum (Mo)	mg/kg	4 - 0.1	4	<4.0	<4.0	<4.0	<4.0	2.18	5.65	4.13	4.21	3.45	3.91	5.24	5.66	5.75	5.45	4.08
Nickel (Ni)	mg/kg	5 - 0.5	83	84.3	75.4	71.5	88.9	79	38.5	82.3	81.3	95.5	100	34.5	35.5	38.2	39.2	31
Phosphorus (P)	mg/kg	50 - 10	960	974	990	780	1120	1020	887	963	842	1080	1100	1060	1050	1080	1210	1040
Potassium (K)	mg/kg	200 - 100	1140	1440	1400	1130	1230	630	3240	480	410	690	680	780	730	770	1610	1100
Selenium (Se)	mg/kg	11 - 0.1	2.47	<0.50	<0.50	<0.50	<2.0	4.75	1.19	5.99	5.95	6.36	6.55	5.33	6.04	6.28	4.15	3.45
Silicon (Si)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (Ag)	mg/kg	2 - 0.05	<2.0	<2.0	<2.0	<2.0	<2.0	0.464	1.26	0.498	0.487	0.481	0.495	0.645	0.678	0.734	0.643	0.592
Sodium (Na)	mg/kg	200 - 0.1	220	270	300	<200	<200	440	19900	190	180	370	280	<100	<100	<100	<100	<100
Strontium (Sr)	mg/kg	0.5 - 0.1	126	133	139	164	117	163	81.2	152	152	189	190	102	100	108	51.8	62.3
Sulfur (S)-Total	mg/kg	500 - 100	3.37	1.79	1.64	1.68	0.2	-	-	-	-	-	-	-	-	-	-	-
Thallium (Tl)	mg/kg	10 - 0.05	<1.0	<1.0	<1.0	<1.0	<1.0	0.14	0.58	0.12	0.11	0.14	0.15	0.45	0.53	0.52	0.58	0.47
Tin (Sn)	mg/kg	8 - 0.2	<5.0	<5.0	<5.0	<5.0	<5.0	0.69	22.2	0.51	0.44	0.71	0.62	<0.20	0.21	<0.20	0.39	<0.20
Titanium (Ti)	mg/kg	100 - 1	100	196	209	91.7	31.8	75.9	976	53.6	43.1	113	120	130	138	120	105	96.2
Tungsten (W)	mg/kg	5 - 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium (U)	mg/kg	10 - 0.05	-	-	-	-	-	0.46	1.71	0.469	0.456	0.66	0.677	0.356	0.373	0.381	0.488	0.397
Vanadium (V)	mg/kg	2 - 0.2	28.2	31.1	28.5	28	34.8	19.3	84.2	16.6	15.5	19	19.7	27.7	27.5	28.7	36.2	27.9
Zinc (Zn)	mg/kg	2 - 1	186	135	130	142	205	199	388	183	180	226	228	465	538	547	333	280

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			WL1	TC3	TC3	TC3	TD1	TD1	TD1	WC4	WC4	WC4	WC2	WC2	WC2	WC5	WC5	WC5
Replicate			3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Source			BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ
Area			AP	AP	AP	AP	FF	FF	FF	FF	FF	FF	FF	FF	FF	AP	AP	AP
Included/Excluded			Exclude	Include	Include	Include	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Include	Include	Include
Date Sampled		Detection	28-Aug-2010	27-Aug-2010	27-Aug-2010	27-Aug-2010	26-Aug-2010	26-Aug-2010	26-Aug-2010	21-Aug-2011	21-Aug-2011	21-Aug-2011	21-Aug-2011	21-Aug-2011	21-Aug-2011	21-Aug-2011	21-Aug-2011	21-Aug-2011
ALS Sample ID	Units	Limits	L927313-32	L927313-27	L927313-28	L927313-29	L927313-9	L927313-10	L927313-11	L1053635-7	L1053635-8	L1053635-9	L1053635-4	L1053635-5	L1053635-6	L1053635-10	L1053635-11	L1053635-12
Physical Tests																		
Moisture	%	0.25 - 0.1	38.9	18.2	21.3	19.9	18.3	18.1	18.1	88.9	77.3	84.3	17.2	5.98	13.9	17.8	17.1	17.8
pH (1:2 soil:water)	pH	0.1 - 0.01	8	8.46	8.26	8.12	8.67	8.4	8.38	5.84	6.34	5.8	6.67	6.9	6.84	6.75	6.91	6.99
Particle Size																		
% Gravel (>2mm)	%	1 - 0.1	<0.10	4.61	0.11	<0.10	0.81	<0.10	<0.10	<0.10	<0.10	<0.10	20.9	84.2	84.4	12.9	48.7	51.9
% Sand (2.0mm - 0.063mm)	%	1 - 0.1	0.7	93.5	92.5	89.7	97.1	98.4	97.3	28.9	74.2	55.8	68.6	14.4	14.6	79.6	50.5	46.1
% Silt (0.063mm - 4µm)	%	1 - 0.1	64.3	0.86	5.96	8.91	1.11	0.68	1.47	55.5	20.8	36.3	5.97	0.89	0.75	5.55	0.71	1.16
% Silt (0.063mm - 0.0312mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Silt (0.0312mm - 0.004mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Clay (<4µm)	%	1 - 0.1	35	0.98	1.39	1.31	0.98	0.93	1.27	15.6	5.02	7.96	4.54	0.44	0.24	1.99	<0.10	0.84
Texture	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anions and Nutrients																		
Total Nitrogen by LECO	%	17 - 0.02	0.089	0.06	0.061	0.063	<0.020	<0.020	<0.020	49	23.6	29.5	<4.1	<4.3	<4.3	<4.3	<4.3	<4.3
Cyanides																		
Cyanide, Total	mg/kg	3 - 0.05	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Organic / Inorganic Carbon																		
$CaCO_3$ Equivalent	%	0.8 - 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inorganic Carbon	%	0.1 - 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Carbon by Combustion	%	0.1 - 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon	%	0.7 - 0.1	0.72	0.52	0.62	0.62	0.15	0.11	0.11	20.2	9.28	11.2	0.84	0.58	0.64	0.63	0.52	0.54
Plant Available Nutrients																		
Cation Exchange Capacity	meq/100g	2 - 0.8	4.39	1.29	1.36	1.71	2.14	2.56	2.61	-	-	-	-	-	-	-	-	-
Available Ammonium-N	mg/kg	4.8 - 1	-	-	-	-	-	-	-	49.1	23.6	29.5	1.5	1.8	<1.6	<1.6	<1.6	<1.6
Nitrate+Nitrite-N	mg/kg	16 - 2	-	-	-	-	-	-	-	<16	<8.0	<8.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Available Nitrate-N	mg/kg	16 - 1	-	-	-	-	-	-	-	<16	<8.0	<8.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Nitrite-N	mg/kg	3.2 - 0.4	-	-	-	-	-	-	-	<3.2	<1.6	<1.6	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Available Phosphate-P	mg/kg	8 - 2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	96.4	114	53.5	2.7	2.2	3.1	3.3	2.3	<2.0
Available Sulphate-S	mg/kg	3 - 2	69.5	16.5	25.5	37	8.6	7.4	6.7	63	37.2	43	6.7	18.5	15.5	7.4	8.2	6.7
Metals																		
Size Fraction	µm		63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm
Aluminum (Al)	mg/kg	14300 - 50	14500	12400	10300	9740	16700	16600	16800	18000	19600	19500	17800	20200	10500	19900	21500	20900
Antimony (Sb)	mg/kg	10 - 0.1	5.48	5.29	5.67	6.48	3.06	2.87	2.99	0.28	0.22	0.25	0.92	0.97	0.54	0.89	1.2	1.49
Arsenic (As)	mg/kg	5 - 0.05	49.6	47	56.8	70	33	31.3	33.3	4.23	3.48	3.75	13.3	17.1	10.1	15.5	19.2	22.4
Barium (Ba)	mg/kg	1 - 0.5	234	164	98.2	90.9	1090	668	694	252	330	244	159	253	147	157	198	173
Beryllium (Be)	mg/kg	0.5 - 0.1	0.49	0.4	0.34	0.33	0.52	0.55	0.52	0.54	0.65	0.63	0.61	0.73	0.39	0.57	0.67	0.61
Bismuth (Bi)	mg/kg	24 - 0.1	0.22	0.19	0.19	0.19	0.16	0.15	0.14	<0.10	<0.10	<0.10	0.16	0.17	<0.10	0.16	0.2	0.19
Boron (B)	mg/kg	5 - 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium (Cd)	mg/kg	0.5 - 0.05	4.45	6.38	7.38	8.71	1.79	2.41	1.66	0.984	0.95	0.868	0.397	1.09	0.591	0.293	0.464	0.457
Calcium (Ca)	mg/kg	100 - 50	9390	22000	18000	17200	28000	24700	25000	4510	5040	3550	2600	4230	2080	2750	3630	3900
Chromium (Cr)	mg/kg	2 - 0.5	19.9	85.2	20.8	17.6	115	80	53.7	49.5	51.4	63.1	74.5	86.2	46.8	74.5	89.8	108
Cobalt (Co)	mg/kg	10 - 0.1	16.6	15.3	13	13.7	15.6	15.6	14.6	18.5	19.6	23.6	23.9	45.8	25	19.8	27.8	26.2
Copper (Cu)	mg/kg	1 - 0.5	46.3	86.7	44.1	47.8	42.2	42.8	42.9	23.1	21.2	23	46.4	52.6	27.9	49.8	65.8	70.8

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			WL1	TC3	TC3	TC3	TD1	TD1	TD1	WC4	WC4	WC4	WC2	WC2	WC2	WC5	WC5	WC5
Replicate			**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
Source			BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ
Area			AP	AP	AP	AP	FF	FF	FF	FF	FF	FF	FF	FF	FF	AP	AP	AP
Included/Excluded			Exclude	Include	Include	Include	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Include	Include	Include
Date Sampled		**Detection**	28-Aug-2010	27-Aug-2010	27-Aug-2010	27-Aug-2010	26-Aug-2010	26-Aug-2010	26-Aug-2010	21-Aug-2011	21-Aug-2011	21-Aug-2011	21-Aug-2011	21-Aug-2011	21-Aug-2011	21-Aug-2011	21-Aug-2011	21-Aug-2011
ALS Sample ID	**Units**	**Limits**	L927313-32	L927313-27	L927313-28	L927313-29	L927313-9	L927313-10	L927313-11	L1053635-7	L1053635-8	L1053635-9	L1053635-4	L1053635-5	L1053635-6	L1053635-10	L1053635-11	L1053635-12
Metals *(cont'd)*																		
Gallium (Ga)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Fe)	mg/kg	100 - 50	43300	43200	41000	42800	44000	42200	43400	18600	19600	21300	35700	45200	23700	39500	46700	46400
Lanthanum (La)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead (Pb)	mg/kg	30 - 0.1	21.6	30.5	15.4	16.1	28.5	22.2	28.2	5.45	4.94	5.19	10.2	12.6	6.92	10.3	12.9	13.3
Lithium (Li)	mg/kg	5 - 1	22.6	22.4	18	17.1	37.7	37.9	37	-	-	-	-	-	-	-	-	-
Magnesium (Mg)	mg/kg	50 - 10	7390	8180	6420	6100	11800	11800	11700	4820	5400	5220	10500	10500	5560	13400	14800	14300
Manganese (Mn)	mg/kg	1 - 0.2	1710	1830	1330	1170	1470	1680	1420	1030	624	897	1630	5180	2860	941	1460	1280
Mercury (Hg)	mg/kg	1 - 0.005	0.344	0.373	0.382	0.43	0.133	0.175	0.126	0.178	0.155	0.17	0.167	0.147	0.0886	0.126	0.127	0.138
Molybdenum (Mo)	mg/kg	4 - 0.1	5.43	10.5	5.42	5.41	12.9	9.05	6.13	1.19	1.02	1.2	2.17	3.16	1.93	1.86	3.15	4.37
Nickel (Ni)	mg/kg	5 - 0.5	40.5	86	39.7	38.3	78.4	63.7	40.5	62	67	76.1	102	121	64.8	104	128	130
Phosphorus (P)	mg/kg	50 - 10	1120	1130	1140	1200	1050	1100	1090	1440	1180	1260	888	1270	670	900	1030	1120
Potassium (K)	mg/kg	200 - 100	1510	1240	800	710	1500	1290	1250	860	850	840	1190	1280	670	1280	1470	1580
Selenium (Se)	mg/kg	11 - 0.1	3.75	4.81	5.67	6.58	0.41	0.56	0.4	1.28	1.11	1.36	1.35	2.03	1.15	1.22	1.55	1.55
Silicon (Si)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (Ag)	mg/kg	2 - 0.05	0.663	0.923	0.78	0.785	0.368	0.372	0.531	0.447	0.42	0.403	0.468	0.413	0.226	0.345	0.383	0.988
Sodium (Na)	mg/kg	200 - 0.1	<100	110	<100	<100	160	150	180	200	300	140	<100	<100	<100	<100	120	130
Strontium (Sr)	mg/kg	0.5 - 0.1	54.7	126	102	98.9	117	106	100	79.1	111	60.1	31.8	50.2	26.2	33.1	43.8	41.2
Sulfur (S)-Total	mg/kg	500 - 100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium (Tl)	mg/kg	10 - 0.05	0.56	0.45	0.53	0.61	0.25	0.23	0.25	0.2	0.23	0.22	0.12	0.2	0.11	<0.10	0.13	0.118
Tin (Sn)	mg/kg	8 - 0.2	0.38	60	1.14	0.64	11.1	21.1	57.8	0.38	0.3	0.94	0.29	1.49	0.38	0.29	0.41	2.17
Titanium (Ti)	mg/kg	100 - 1	65.8	93	116	120	727	583	886	73.9	69.6	74.1	36.5	50.5	27.6	31.2	34.9	43.3
Tungsten (W)	mg/kg	5 - 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium (U)	mg/kg	10 - 0.05	0.47	0.383	0.388	0.379	0.561	0.535	0.585	0.177	0.184	0.165	0.227	0.229	0.11	0.192	0.191	0.226
Vanadium (V)	mg/kg	2 - 0.2	35.5	33.4	30	29.3	71.2	62.2	76.8	37.3	39.7	40.4	48.5	56.7	29.8	50.4	56.9	56.8
Zinc (Zn)	mg/kg	2 - 1	335	415	484	581	176	206	158	130	142	147	134	181	100	120	158	145

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			WC1	WC1	WC1	L1	L1	L1	L2	L2	L2	BIR1	BIR1	BIR1	BIR2	BIR2	BIR2	MC1
Replicate			1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1
Source			BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ
Area			AP	AP	AP	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
Included/Excluded			Include	Include	Include	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude
Date Sampled		Detection	20-Aug-2011	20-Aug-2011	20-Aug-2011	24-Aug-2011	24-Aug-2011	24-Aug-2011	24-Aug-2011	24-Aug-2011	24-Aug-2011	20-Aug-2011	20-Aug-2011	20-Aug-2011	22-Aug-2011	22-Aug-2011	22-Aug-2011	22-Aug-2011
ALS Sample ID	Units	Limits	L1053635-1	L1053635-2	L1053635-3	L1053635-28	L1053635-29	L1053635-30	L1053635-31	L1053635-32	L1053635-33	L1053635-13	L1053635-14	L1053635-15	L1053635-16	L1053635-17	L1053635-18	L1053635-19
Physical Tests																		
Moisture	%	0.25 - 0.1	19	22.8	18.2	90.1	88.6	81.8	93.1	89.5	65.5	21.6	19.3	20.9	24.7	22.7	22.9	22.5
pH (1:2 soil:water)	pH	0.1 - 0.01	7.09	7.17	7.18	6.3	6.35	6.02	6.34	6.44	5.88	7.5	7.69	7.61	8.09	7.66	7.84	7.16
Particle Size																		
% Gravel (>2mm)	%	1 - 0.1	0.44	3.32	23.4	<0.10	<0.10	<0.10	<0.10	<0.10	4.25	0.19	<0.10	0.12	<0.10	<0.10	<0.10	65.3
% Sand (2.0mm - 0.063mm)	%	1 - 0.1	95.5	92.7	74.1	3.53	2.61	26.5	1.32	3.25	66.3	96.4	66.3	52.8	96.7	50	95.8	33.4
% Silt (0.063mm - 4µm)	%	1 - 0.1	3.31	2.5	2.03	79.6	72.3	65	85.9	81.6	25.9	3.26	31.6	42.5	2.35	44.1	3.19	0.91
% Silt (0.063mm - 0.0312mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Silt (0.0312mm - 0.004mm)	%	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Clay (<4µm)	%	1 - 0.1	0.72	1.53	0.53	16.9	25.1	8.51	12.7	15.2	3.57	0.14	2.13	4.53	0.85	5.89	1.02	0.37
Texture	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anions and Nutrients																		
Total Nitrogen by LECO	%	17 - 0.02	<2.6	<2.2	<4.1	45	38	59	<31	23	16	<4.3	<4.3	<4.3	<2.6	<4.3	<4.3	<4.3
Cyanides																		
Cyanide, Total	mg/kg	3 - 0.05	<3.0	<3.0	<3.0	<3.0	4.2	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Organic / Inorganic Carbon																		
$CaCO_3$ Equivalent	%	0.8 - 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inorganic Carbon	%	0.1 - 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Carbon by Combustion	%	0.1 - 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon	%	0.7 - 0.1	0.57	0.54	0.52	14.4	12.4	14	19.3	20	6.46	0.26	1.48	0.62	0.27	0.97	0.38	0.44
Plant Available Nutrients																		
Cation Exchange Capacity	meq/100g	2 - 0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Ammonium-N	mg/kg	4.8 - 1	<1.6	<1.0	<1.0	45.1	38.3	58.6	18.5	23.1	16	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6
Nitrate+Nitrite-N	mg/kg	16 - 2	<2.0	<2.0	<4.0	<10	<10	<16	<30	<16	<10	<4.0	<4.0	<4.0	<2.0	<4.0	<4.0	<4.0
Available Nitrate-N	mg/kg	16 - 1	<2.0	<2.0	<4.0	<10	<10	<16	<30	<16	<10	<4.0	<4.0	<4.0	<2.0	<4.0	<4.0	<4.0
Nitrite-N	mg/kg	3.2 - 0.4	<0.40	<0.40	<0.80	<2.0	<2.0	<3.2	<6.0	<3.2	<2.0	<0.80	<0.80	<0.80	<0.40	<0.80	<0.80	<0.80
Available Phosphate-P	mg/kg	8 - 2	3.1	2.5	3.1	46.9	16.1	49.6	16.3	9.8	36.1	<2.0	2.1	2.6	<2.0	2.1	<2.0	4.7
Available Sulphate-S	mg/kg	3 - 2	10	6.5	7.1	31.3	36.2	32.5	57.3	35.5	22.3	20.5	66.3	41.8	13.5	18	18.7	7.7
Metals																		
Size Fraction	µm		63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm	63 µm
Aluminum (Al)	mg/kg	14300 - 50	19100	21800	19700	25300	25700	30400	16000	10000	17600	16000	17800	18300	18100	19400	17600	19000
Antimony (Sb)	mg/kg	10 - 0.1	1	1.16	0.99	0.61	0.54	0.39	0.35	0.25	0.33	2.46	2.52	1.78	1.98	1.69	2.1	1.98
Arsenic (As)	mg/kg	5 - 0.05	15.3	18.3	16.6	7.5	8	5.68	2.58	1.38	3.15	35.7	29.7	20.9	28.4	20.3	25.5	26.4
Barium (Ba)	mg/kg	1 - 0.5	153	209	173	217	241	186	132	83.5	133	116	271	241	159	244	164	224
Beryllium (Be)	mg/kg	0.5 - 0.1	0.57	0.67	0.61	0.79	0.93	0.97	0.45	0.37	0.49	0.41	0.45	0.58	0.51	0.58	0.52	0.79
Bismuth (Bi)	mg/kg	24 - 0.1	0.15	0.19	0.17	0.11	<0.10	0.11	<0.10	<0.10	<0.10	0.26	0.2	0.16	0.21	0.17	0.18	0.19
Boron (B)	mg/kg	5 - 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium (Cd)	mg/kg	0.5 - 0.05	0.358	0.46	0.495	0.712	1.08	0.371	0.642	0.512	0.464	1.18	1.11	0.83	0.925	0.768	0.939	0.751
Calcium (Ca)	mg/kg	100 - 50	2780	3410	3610	4080	3380	2990	4480	2770	2980	6920	7560	5880	10400	5610	8810	3820
Chromium (Cr)	mg/kg	2 - 0.5	78.4	103	78.7	52.5	47.9	61.3	26.9	14.6	51.2	63.5	58.1	66.3	65.4	68.2	57.3	73.1
Cobalt (Co)	mg/kg	10 - 0.1	20.2	26.4	26.6	15.6	45.4	17.8	12.6	6.07	12.4	16.1	16.7	16.1	16.5	17.6	16.4	38.4
Copper (Cu)	mg/kg	1 - 0.5	48.9	60.1	58.3	39.2	31.7	34.2	24.2	13.9	18.8	50	49.8	46.6	53.2	51	52.7	65.8

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			WC1	WC1	WC1	L1	L1	L1	L2	L2	L2	BIR1	BIR1	BIR1	BIR2	BIR2	BIR2	MC1
Replicate			1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1
Source			BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ
Area			AP	AP	AP	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
Included/Excluded			Include	Include	Include	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude
Date Sampled		Detection	20-Aug-2011	20-Aug-2011	20-Aug-2011	24-Aug-2011	24-Aug-2011	24-Aug-2011	24-Aug-2011	24-Aug-2011	24-Aug-2011	20-Aug-2011	20-Aug-2011	20-Aug-2011	22-Aug-2011	22-Aug-2011	22-Aug-2011	22-Aug-2011
ALS Sample ID	Units	Limits	L1053635-1	L1053635-2	L1053635-3	L1053635-28	L1053635-29	L1053635-30	L1053635-31	L1053635-32	L1053635-33	L1053635-13	L1053635-14	L1053635-15	L1053635-16	L1053635-17	L1053635-18	L1053635-19
Metals *(cont'd)*																		
Gallium (Ga)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Fe)	mg/kg	100 - 50	37800	44500	41700	21800	32200	23500	7980	7230	13800	44100	42300	38700	42300	39600	40800	52300
Lanthanum (La)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead (Pb)	mg/kg	30 - 0.1	10	11.9	11.3	8.11	7.51	7.44	4.2	2.09	6.8	13	12.3	10.2	11.7	10.3	10.4	13.6
Lithium (Li)	mg/kg	5 - 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium (Mg)	mg/kg	50 - 10	12900	14600	13000	5610	4910	6690	1610	575	4740	12000	12600	12700	12500	13100	12600	9730
Manganese (Mn)	mg/kg	1 - 0.2	1080	1450	1550	424	1720	501	286	127	255	627	771	725	735	814	753	4140
Mercury (Hg)	mg/kg	1 - 0.005	0.124	0.134	0.135	0.255	0.204	0.173	0.159	0.0985	0.0985	0.181	0.162	0.134	0.154	0.173	0.155	0.153
Molybdenum (Mo)	mg/kg	4 - 0.1	1.92	2.69	2.34	1.62	2	1.61	0.88	0.43	1.1	2.02	2.13	1.74	2.04	1.79	1.86	5.35
Nickel (Ni)	mg/kg	5 - 0.5	103	130	112	62.7	84.9	64.8	38.5	21.9	52.7	82.1	80.1	90.2	80.1	95.4	76.2	120
Phosphorus (P)	mg/kg	50 - 10	908	1070	1050	1640	1330	1500	757	398	676	1010	1160	1040	1020	992	1020	1150
Potassium (K)	mg/kg	200 - 100	1360	2070	1100	910	850	1110	410	150	590	760	1110	1190	940	1230	810	850
Selenium (Se)	mg/kg	11 - 0.1	1.22	1.59	1.48	1.87	1.47	1.31	1.05	0.62	0.79	1.86	1.46	1.14	1.65	1.15	1.39	2.07
Silicon (Si)	mg/kg	0 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (Ag)	mg/kg	2 - 0.05	0.545	0.432	0.385	0.764	0.519	0.681	0.407	0.174	0.255	0.498	0.384	0.295	0.328	0.313	0.309	0.378
Sodium (Na)	mg/kg	200 - 0.1	<100	140	<100	110	120	<100	160	<100	<100	<100	140	150	120	180	120	<100
Strontium (Sr)	mg/kg	0.5 - 0.1	31.5	40	41.2	53.1	45	40.1	61.2	38.9	37.4	39.2	47.4	40.6	47.3	39.4	43.4	47.4
Sulfur (S)-Total	mg/kg	500 - 100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium (Tl)	mg/kg	10 - 0.05	0.11	0.146	0.12	0.13	0.2	0.18	<0.10	<0.10	0.12	0.14	0.16	0.13	0.13	0.14	0.13	0.16
Tin (Sn)	mg/kg	8 - 0.2	0.36	0.42	0.31	0.38	0.22	0.32	0.39	<0.20	0.27	1.16	0.44	0.34	0.48	0.36	0.54	0.42
Titanium (Ti)	mg/kg	100 - 1	29	63.5	25.6	63	79.7	47.3	160	70.7	76	448	670	396	723	399	630	27
Tungsten (W)	mg/kg	5 - 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium (U)	mg/kg	10 - 0.05	0.207	0.265	0.213	0.242	0.199	0.291	0.18	0.085	0.136	0.288	0.286	0.228	0.234	0.259	0.269	0.162
Vanadium (V)	mg/kg	2 - 0.2	51.5	61	52.8	41.2	40.6	43.9	18.2	9.4	35.3	53.5	59	56	63	60.8	62	62.4
Zinc (Zn)	mg/kg	2 - 1	127	150	146	133	177	118	92.4	73.8	112	156	153	132	140	128	137	217

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			MC1	MC1
Replicate			2	3
Source			BJ	BJ
Area			FF	FF
Included/Excluded			Exclude	Exclude
Date Sampled		Detection	22-Aug-2011	22-Aug-2011
ALS Sample ID	Units	Limits	L1053635-20	L1053635-21
Physical Tests				
Moisture	%	0.25 - 0.1	17.2	22
pH (1:2 soil:water)	pH	0.1 - 0.01	7.08	7.04
Particle Size				
% Gravel (>2mm)	%	1 - 0.1	58.5	47.2
% Sand (2.0mm - 0.063mm)	%	1 - 0.1	38.5	48.3
% Silt (0.063mm - 4µm)	%	1 - 0.1	2.12	2.84
% Silt (0.063mm - 0.0312mm)	%	0.1	-	-
% Silt (0.0312mm - 0.004mm)	%	0.1	-	-
% Clay (<4µm)	%	1 - 0.1	0.86	1.62
Texture	-	-	-	-
Anions and Nutrients				
Total Nitrogen by LECO	%	17 - 0.02	<4.7	<4.3
Cyanides				
Cyanide, Total	mg/kg	3 - 0.05	<3.0	<3.0
Organic / Inorganic Carbon				
$CaCO_3$ Equivalent	%	0.8 - 0.09	-	-
Inorganic Carbon	%	0.1 - 0.1	-	-
Total Carbon by Combustion	%	0.1 - 0.1	-	-
Total Organic Carbon	%	0.7 - 0.1	0.57	0.86
Plant Available Nutrients				
Cation Exchange Capacity	meq/100g	2 - 0.8	-	-
Available Ammonium-N	mg/kg	4.8 - 1	<2.4	3.3
Nitrate+Nitrite-N	mg/kg	16 - 2	<4.0	<4.0
Available Nitrate-N	mg/kg	16 - 1	<4.0	<4.0
Nitrite-N	mg/kg	3.2 - 0.4	<0.80	<0.80
Available Phosphate-P	mg/kg	8 - 2	4.7	7.7
Available Sulphate-S	mg/kg	3 - 2	10.2	7.5
Metals				
Size Fraction	µm		63 µm	63 µm
Aluminum (Al)	mg/kg	14300 - 50	19000	18400
Antimony (Sb)	mg/kg	10 - 0.1	1.5	1.63
Arsenic (As)	mg/kg	5 - 0.05	20.4	21.3
Barium (Ba)	mg/kg	1 - 0.5	195	262
Beryllium (Be)	mg/kg	0.5 - 0.1	0.75	0.72
Bismuth (Bi)	mg/kg	24 - 0.1	0.18	0.17
Boron (B)	mg/kg	5 - 5	-	-
Cadmium (Cd)	mg/kg	0.5 - 0.05	0.716	0.807
Calcium (Ca)	mg/kg	100 - 50	4070	4260
Chromium (Cr)	mg/kg	2 - 0.5	79	65.5
Cobalt (Co)	mg/kg	10 - 0.1	31.8	32.2
Copper (Cu)	mg/kg	1 - 0.5	57.7	59.6

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-1. Sediment Quality, Analytical Results, 1988 to 2013

Sample ID			MC1	MC1
Replicate			2	3
Source			BJ	BJ
Area			FF	FF
Included/Excluded			Exclude	Exclude
Date Sampled		Detection	22-Aug-2011	22-Aug-2011
ALS Sample ID	Units	Limits	L1053635-20	L1053635-21
Metals *(cont'd)*				
Gallium (Ga)	mg/kg	0 - 0	-	-
Iron (Fe)	mg/kg	100 - 50	45700	44600
Lanthanum (La)	mg/kg	0 - 0	-	-
Lead (Pb)	mg/kg	30 - 0.1	12.2	11.7
Lithium (Li)	mg/kg	5 - 1	-	-
Magnesium (Mg)	mg/kg	50 - 10	9050	8880
Manganese (Mn)	mg/kg	1 - 0.2	3590	3590
Mercury (Hg)	mg/kg	1 - 0.005	0.156	0.144
Molybdenum (Mo)	mg/kg	4 - 0.1	4.78	3.8
Nickel (Ni)	mg/kg	5 - 0.5	107	103
Phosphorus (P)	mg/kg	50 - 10	1240	1260
Potassium (K)	mg/kg	200 - 100	980	990
Selenium (Se)	mg/kg	11 - 0.1	2.07	1.98
Silicon (Si)	mg/kg	0 - 0	-	-
Silver (Ag)	mg/kg	2 - 0.05	0.421	0.38
Sodium (Na)	mg/kg	200 - 0.1	<100	<100
Strontium (Sr)	mg/kg	0.5 - 0.1	48.1	49.5
Sulfur (S)-Total	mg/kg	500 - 100	-	-
Thallium (Tl)	mg/kg	10 - 0.05	0.15	0.15
Tin (Sn)	mg/kg	8 - 0.2	0.54	0.32
Titanium (Ti)	mg/kg	100 - 1	39.4	36.7
Tungsten (W)	mg/kg	5 - 5	-	-
Uranium (U)	mg/kg	10 - 0.05	0.181	0.168
Vanadium (V)	mg/kg	2 - 0.2	57.4	57.7
Zinc (Zn)	mg/kg	2 - 1	197	195

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 3.2-2. Sediment Hydrocarbons, Analytical Results, 2013

Sample ID		Detection	BJ	BJ	BJ	BJ U/S	BJ U/S	BJ U/S	BJ2	BJ2	BJ2	SC0	SC0	SC0	SC2	SC2
Replicate	**Units**	**Limits**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**
Source			BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ
Included/Excluded			Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include
Station Type			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
Date Sampled			9-Aug-2013	9-Aug-2013	9-Aug-2013	15-Aug-2013	15-Aug-2013	15-Aug-2013	14-Aug-2013	14-Aug-2013	14-Aug-2013	8-Aug-2013	8-Aug-2013	8-Aug-2013	5-Sep-2013	5-Sep-2013
ALS Sample ID			L1346191-7	L1346191-8	L1346191-9	L1350212-1	L1350212-2	L1350212-3	L1350212-4	L1350212-5	L1350212-6	L1346191-4	L1346191-5	L1346191-6	L1360633-13	L1360633-14
Hydrocarbons																
EPH10-19	mg/kg	200	<200	<200	<200	<200	<200	<200	400	350	250	<200	<200	<200	<200	<200
EPH19-32	mg/kg	200	<200	<200	<200	<200	<200	<200	470	450	310	<200	<200	<200	<200	<200
LEPH	mg/kg	200	<200	<200	<200	<200	<200	<200	400	350	250	<200	<200	<200	<200	<200
HEPH	mg/kg	200	<200	<200	<200	<200	<200	<200	470	450	310	<200	<200	<200	<200	<200
Polycyclic Aromatic Hydrocarbons																
Acenaphthene	mg/kg	0.007 - 0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0070	<0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Acenaphthylene	mg/kg	0.008 - 0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0080	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Anthracene	mg/kg	0.004	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Benz(a)anthracene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b)fluoranthene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b+j+k)fluoranthene	mg/kg	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	<0.015	<0.015
Benzo(g,h,i)perylene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	mg/kg	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.040	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010
Fluorene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-c,d)pyrene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Naphthalene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Phenanthrene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Pyrene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Surrogate: Acenaphthene d10	%	-	74.8	79.5	79.2	83.6	83.1	82.9	82.5	83.8	79.4	78.9	85.8	81.6	93.5	97.9
Surrogate: Chrysene d12	%	-	96.9	93.9	86.8	93.9	93.8	89	99.1	96.3	99.3	95.5	83.4	80.1	70	33.7
Surrogate: Naphthalene d8	%	-	75.6	80	80.6	81.2	80.1	80.9	79.4	79.8	75.9	80.6	86	83.5	91.7	97
Surrogate: Phenanthrene d10	%	-	87.9	90.3	83.8	94.8	92.4	94.3	100	99.6	98.3	82.3	90.6	82.9	95.4	93.9
B(a)P Total Potency Equivalent	mg/kg	0.02	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
IACR (CCME)	mg/kg	0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MA = Mine Site Area and Downstream Receiving Environment; R = Potential Reference

Appendix 3.2-2. Sediment Hydrocarbons, Analytical Results, 2013

Sample ID		Detection	SC2	SC3	SC3	SC3	UR1	UR1	UR1	UR2	UR2	UR2	Divide OF	Divide OF	Divide OF
Replicate	Units	Limits	3	1	2	3	1	2	3	1	2	3	1	2	3
Source			BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ
Included/Excluded			Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Exclude	Exclude	Exclude
Station Type			MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	R	R	R
Date Sampled			5-Sep-2013	4-Sep-2013	4-Sep-2013	4-Sep-2013	3-Sep-2013	3-Sep-2013	3-Sep-2013	2-Sep-2013	2-Sep-2013	2-Sep-2013	12-Aug-2013	12-Aug-2013	12-Aug-2013
ALS Sample ID			L1360633-15	L1359398-13	L1359398-14	L1359398-15	L1359398-7	L1359398-8	L1359398-9	L1359398-1	L1359398-2	L1359398-3	L1347688-7	L1347688-8	L1347688-9
Hydrocarbons															
EPH10-19	mg/kg	200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200
EPH19-32	mg/kg	200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200
LEPH	mg/kg	200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200
HEPH	mg/kg	200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200
Polycyclic Aromatic Hydrocarbons															
Acenaphthene	mg/kg	0.007 - 0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Acenaphthylene	mg/kg	0.008 - 0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Anthracene	mg/kg	0.004	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Benz(a)anthracene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b)fluoranthene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b+j+k)fluoranthene	mg/kg	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	<0.015
Benzo(g,h,i)perylene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	mg/kg	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Fluorene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-c,d)pyrene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Naphthalene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Phenanthrene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Pyrene	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Surrogate: Acenaphthene d10	%	-	101.3	83.5	89.6	94.2	92.2	93.8	91.3	102.7	91.6	85.7	77	79.5	79.9
Surrogate: Chrysene d12	%	-	47.2	51.2	75.5	72.2	Not Reportable	61.7	Not Reportable	95.9	76.7	Not Reportable	81.7	81.7	76.5
Surrogate: Naphthalene d8	%	-	100.5	83.1	88.3	92.3	93.3	93.8	90.7	102.8	91.6	86.5	80.1	83.7	81.1
Surrogate: Phenanthrene d10	%	-	98.4	79.9	85.9	89.3	87.4	92.3	93	103.9	89.2	86.3	82.4	83	81.9
B(a)P Total Potency Equivalent	mg/kg	0.02	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
IACR (CCME)	mg/kg	0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15

Source: BJ = Brucejack Baseline Studies; KSM = Kerr-Sulphurets-Mitchell Baseline Studies; GC = Godin and Chamberlain 1990; NH = Newhawk 1989

Area: MS = Mine Site Area and Downstream Receiving Environment Sampling Sites; FF = Far-field (outside of Regional Study Area) ; OS = Off-Site Ancillary Project Infrastructure; R = Reference

Appendix 3.3-1. Lake and Stream Sediment Quality Relative Percent Difference Results, 2010 to 2013

Site		BJ			BJ U/S			BJ U/S			BJ U/S			BJ U/S		
Replicate		1			2			1			2			3		
Date Sampled		08-Sep-12	08-Sep-12		13-Dec-12	13-Dec-12		15-Aug-13	15-Aug-13		15-Aug-13	15-Aug-13		15-Aug-13	15-Aug-13	
SampleType		63 µm	63 µm		63 µm	63 µm		63 µm	63 µm		63 µm	63 µm		63 µm	63 µm	
ALS Sample ID	Units	L1207305-13	L1207305-16	RPD [†]	L1250701-5	L1250701-7	RPD	L1350212-1	L1350212-12	RPD	L1350212-2	L1350212-13	RPD	L1350212-3	L1350212-14	RPD
Physical Tests																
Moisture	%	53.2	59.5	11.2	39.2	28.3	32.3	50.5	46	9.3	37.2	33.8	9.6	39.2	36	8.5
pH (1:2 soil:water)	pH	7.04	6.96	n/a[‡]	6.44	6.43	0.2	6.03	6.15	2.0	6.34	6.49	2.3	6.42	6.13	4.6
Particle Size																
% Gravel (>2mm)	%	<0.10	<0.10	n/a	29.1	24.7	16.4	<0.10	0.13	n/a	0.31	0.78	n/a	4.19	0.79	n/a
% Sand (2.0mm - 0.063mm)	%	0.57	0.69	n/a	51.8	55.4	6.7	7.14	9.52	28.6	30.2	32	5.8	19.6	20.6	5.0
% Silt (0.063mm - 4um)	%	41.2	42.1	n/a	11.9	12.7	6.5	55.8	47.4	16.3	38.6	35.7	7.8	43.7	45	2.9
% Silt (0.063mm - 0.0312mm)	%	8.2	9.1	n/a	3.28	3.50	6.5	-	-	-	-	-	-	-	-	-
% Silt (0.0312mm - 0.004mm)	%	33.1	33.1	n/a	8.64	9.25	6.8	-	-	-	-	-	-	-	-	-
% Clay (<4um)	%	58.2	57.2	n/a	7.23	7.20	0.4	37.1	42.9	14.5	30.9	31.5	1.9	32.6	33.6	3.0
Texture	-	Silty clay	Silty clay	-	Sandy loam	Sandy loam	-	Silty clay	Silty clay	-	Loam	Loam / Clay	-	Clay loam	Clay loam	-
Anions and Nutrients																
Total Nitrogen by LECO	%	0.086	0.085	1.2	0.039	0.039	n/a	0.082	0.086	n/a	0.057	0.055	n/a	0.059	0.059	n/a
Cyanides																
Cyanide, Total	mg/kg	<0.050	<0.050	n/a	<0.050	<0.050	n/a	0.052	0.052	n/a	<0.050	<0.050	n/a	<0.050	<0.050	n/a
Organic / Inorganic Carbon				-												
$CaCO_3$ Equivalent	%	1.17	1.65	34.0	<0.80	<0.80	n/a	1.37	1.04	n/a	1.23	1.17	n/a	1.11	1.39	n/a
Inorganic Carbon	%	0.14	0.20	n/a	<0.10	<0.10	n/a	0.16	0.12	n/a	0.15	0.14	n/a	0.13	0.17	n/a
Total Carbon by Combustion	%	0.8	0.7	n/a	0.2	0.2	n/a	0.8	0.9	11.8	0.6	0.6	n/a	0.7	0.6	n/a
Total Organic Carbon	%	0.62	0.54	n/a	0.23	0.23	n/a	0.67	0.76	12.6	0.5	0.45	n/a	0.52	0.48	n/a
Plant Available Nutrients																
Cation Exchange Capacity	mg/kg	-	-	-	4.3	5.5	n/a	17.3	18.2	5.1	6.5	7	7.4	6.6	6.7	n/a
Available Ammonium-N	mg/kg	1.8	2.0	n/a	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate+Nitrite-N	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Nitrate-N	mg/kg	<2.0	<2.0	n/a	<1.0	<1.0	n/a	<4.0	<4.0	n/a	<4.0	<4.0	n/a	<4.0	<4.0	n/a
Available Nitrate-N	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Available Phosphate-P	mg/kg	2.1	2.5	n/a	3.5	7.8	n/a	3.2	<2.0	n/a	5.1	3	n/a	3.8	4.8	n/a
Available Sulphate-S	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																
Aluminum (Al)	mg/kg	14,800	16,200	n/a	20,000	20,500	2.5	20,200	20,300	0.5	21,100	20,000	5.4	21,200	19,600	7.8
Antimony (Sb)	mg/kg	39.7	39.5	n/a	7.03	6.69	5.0	7.24	7.72	6.4	6.53	7.05	7.7	6.76	6.76	n/a
Arsenic (As)	mg/kg	184	170	n/a	145	140	3.5	225	226	0.4	93.1	96.7	3.8	78.6	73.1	7.3
Barium (Ba)	mg/kg	617	695	n/a	311	346	10.7	352	350	0.6	359	350	2.5	332	317	4.6
Beryllium (Be)	mg/kg	0.59	0.64	n/a	0.66	0.68	3.0	0.69	0.71	2.9	0.67	0.64	n/a	0.68	0.65	n/a
Bismuth (Bi)	mg/kg	0.37	0.36	n/a	0.25	0.21	n/a	0.2	0.21	n/a	0.23	0.24	n/a	0.24	0.23	n/a
Boron (B)	mg/kg	<5.0	<5.0	n/a	<5.0	<5.0	n/a	<5.0	<5.0	n/a	<5.0	<5.0	n/a	<5.0	<5.0	n/a
Cadmium (Cd)	mg/kg	2.42	2.28	n/a	0.568	0.586	3.1	0.547	0.531	3.0	0.38	0.397	n/a	0.396	0.416	n/a
Calcium (Ca)	mg/kg	3,860	3,990	n/a	4,010	4,030	0.5	5,330	5,050	5.4	4,530	4,820	6.2	5,270	5,120	2.9
Chromium (Cr)	mg/kg	5.29	5.87	n/a	12.1	24.2	66.7	6.05	9.59	45.3	9.35	13.1	n/a	6.41	6.33	n/a

Notes:

[†] *Relative percent difference (RPD).*

[‡] *Not applicable when values are less than five times the detection limit.*

Red and italicized values exceed the 20% relative percent difference and are more than five times the detection limit.

Red and bold values exceed the 50% relative percent difference and are more than five times the detection limit.

Appendix 3.3-1. Lake and Stream Sediment Quality Relative Percent Difference Results, 2010 to 2013

Site		BJ			BJ U/S			BJ U/S			BJ U/S			BJ U/S		
Replicate		1			2			1			2			3		
Date Sampled		08-Sep-12	08-Sep-12		13-Dec-12	13-Dec-12		15-Aug-13	15-Aug-13		15-Aug-13	15-Aug-13		15-Aug-13	15-Aug-13	
SampleType		63 µm	63 µm		63 µm	63 µm		63 µm	63 µm		63 µm	63 µm		63 µm	63 µm	
ALS Sample ID	Units	L1207305-13	L1207305-16	RPD [†]	L1250701-5	L1250701-7	RPD	L1350212-1	L1350212-12	RPD	L1350212-2	L1350212-13	RPD	L1350212-3	L1350212-14	RPD
Metals *(cont'd)*																
Cobalt (Co)	mg/kg	16.8	16.8	n/a	18.1	18.5	2.2	16.7	17	1.8	16.9	17.2	1.8	16.3	15.7	3.8
Copper (Cu)	mg/kg	79.9	79.0	n/a	42.2	42.7	1.2	36.6	35.4	3.3	34.4	35	1.7	32.5	31.9	1.9
Iron (Fe)	mg/kg	42,600	41,700	n/a	46,200	46,200	0.0	47,000	46,900	0.2	47,000	45,900	2.4	45,700	43,700	4.5
Lead (Pb)	mg/kg	226	221	n/a	30.6	28.1	8.5	34.5	36	4.3	28.1	30.6	8.5	31.2	30.8	1.3
Lithium (Li)	mg/kg	15.0	16.2	n/a	26.3	25.3	3.9	26.6	28.9	8.3	27.3	28.1	2.9	27.4	27.6	0.7
Magnesium (Mg)	mg/kg	6,220	6,340	n/a	8,020	8,000	0.2	8,380	8,350	0.4	8,680	8,160	6.2	8,190	7,810	4.8
Manganese (Mn)	mg/kg	2,410	2,240	n/a	2,650	2,780	4.8	995	1,010	1.5	869	971	11.1	872	829	5.1
Mercury (Hg)	mg/kg	0.549	0.547	n/a	0.584	0.575	1.6	0.591	0.528	11.3	0.489	0.484	n/a	0.553	0.536	n/a
Molybdenum (Mo)	mg/kg	7.39	6.89	n/a	4.39	5.47	21.9	4.53	4.84	6.6	3.13	3.31	n/a	3.51	3.43	n/a
Nickel (Ni)	mg/kg	7.65	7.95	n/a	12.5	20.1	46.6	7.47	10.4	32.8	10.2	13	n/a	7.16	7.31	n/a
Phosphorus (P)	mg/kg	1,430	1,340	n/a	1,630	1,720	5.4	1,500	1,480	1.3	1,460	1,440	1.4	1,700	1,630	4.2
Potassium (K)	mg/kg	2,610	2,990	n/a	2,150	2,430	12.2	2,190	2,300	4.9	2,180	2,050	6.1	2,090	1,800	14.9
Selenium (Se)	mg/kg	1.82	1.82	n/a	0.95	0.91	4.3	0.85	0.8	6.1	0.88	0.88	n/a	0.87	0.86	n/a
Silver (Ag)	mg/kg	74.5	71.7	n/a	2.29	2.61	13.1	2.95	3.02	2.3	2.04	2.69	n/a	2.26	2.18	n/a
Sodium (Na)	mg/kg	210	190	n/a	210	220	n/a	160	230	n/a	190	210	n/a	190	160	n/a
Strontium (Sr)	mg/kg	33.5	36.5	n/a	27.7	29.0	4.6	34	35.2	3.5	34.4	37.5	8.6	34.4	32.5	5.7
Sulphur (S)	mg/kg	-	-	-	1,300	1,100	n/a	1,600	1,900	n/a	1,600	2,200	n/a	1,500	1,500	n/a
Thallium (Tl)	mg/kg	0.741	0.845	n/a	1.04	0.972	6.8	1.12	1.18	5.2	0.835	0.945	n/a	0.995	0.955	n/a
Tin (Sn)	mg/kg	0.36	0.34	n/a	0.46	0.57	n/a	1.25	0.67	n/a	0.63	0.62	n/a	0.69	0.83	n/a
Titanium (Ti)	mg/kg	213	272	n/a	370	454	20.4	455	487	6.8	686	678	1.2	619	540	13.6
Uranium (U)	mg/kg	1.90	1.99	4.6	2.67	2.44	9.0	2.14	2.26	5.5	1.77	1.91	n/a	2.11	2.06	n/a
Vanadium (V)	mg/kg	44.5	48.6	8.8	53.9	56.0	3.8	59.8	60	0.3	65.7	62.8	4.5	64.7	59.6	8.2
Zinc (Zn)	mg/kg	306	300	2.0	118	123	4.1	129	131	1.5	115	116	0.9	116	115	0.9

Notes:

[†] *Relative percent difference (RPD).*

[‡] *Not applicable when values are less than five times the detection limit.*

Red and italicized values exceed the 20% relative percent difference and are more than five times the detection limit.

Red and bold values exceed the 50% relative percent difference and are more than five times the detection limit.

Appendix 3.3-1. Lake and Stream Sediment Quality Relative Percent Difference Results, 2010 to 2013

Site		TL1			TL1			TL1		
Replicate		1			2			3		
Date Sampled		25-Aug-10	25-Aug-10		25-Aug-10	25-Aug-10		25-Aug-10	25-Aug-10	
SampleType		63 µm	63 µm		63 µm	63 µm		63 µm	63 µm	
ALS Sample ID	Units	L927313-3	L927313-6	*RPD*	L927313-4	L927313-7	*RPD*	L927313-5	L927313-8	*RPD*
Physical Tests										
Moisture	%	92.1	92.4	0.3	93.6	93.4	0.2	93.6	92.8	0.9
pH (1:2 soil:water)	pH	5.80	5.22	n/a	5.52	5.44	n/a	5.72	5.47	n/a
Particle Size										
% Gravel (>2mm)	%	-	<0.10	-	<0.10	<0.10	n/a	<0.10	<0.10	n/a
% Sand (2.0mm - 0.063mm)	%	-	1.18	-	0.64	0.46	n/a	0.72	0.81	n/a
% Silt (0.063mm - 4um)	%	-	83.1	-	80.8	81.2	0.5	91.0	88.1	3.2
% Silt (0.063mm - 0.0312mm)	%	-	-	-	-	-	-	-	-	-
% Silt (0.0312mm - 0.004mm)	%	-	-	-	-	-	-	-	-	-
% Clay (<4um)	%	-	15.8	-	18.5	18.4	0.5	8.29	11.1	29.0
Texture	-	-	-	-	-	-	-	-	-	-
Anions and Nutrients										
Total Nitrogen by LECO	%	1.46	1.56	6.6	1.56	1.51	3.3	1.75	1.76	0.6
Cyanides										
Cyanide, Total	mg/kg	<3.0	<3.0	n/a	<3.0	<3.0	n/a	<3.0	<3.0	n/a
Organic / Inorganic Carbon				-			-			-
$CaCO_3$ Equivalent	%	-	-	-	-	-	-	-	-	-
Inorganic Carbon	%	-	-	-	-	-	-	-	-	-
Total Carbon by Combustion	%	-	-	-	-	-	-	-	-	-
Total Organic Carbon	%	16.6	17.9	n/a	17.3	16.9	n/a	19.8	19.8	n/a
Plant Available Nutrients										
Cation Exchange Capacity	mg/kg	2.59	72.3	186.2	71.3	80.2	11.7	70.7	72.5	2.5
Available Ammonium-N	mg/kg	-	-	-	-	-	-	-	-	-
Nitrate+Nitrite-N	mg/kg	-	-	-	-	-	-	-	-	-
Available Nitrate-N	mg/kg	-	-	-	-	-	-	-	-	-
Available Nitrate-N	mg/kg	-	-	-	-	-	-	-	-	-
Available Phosphate-P	mg/kg	31.0	46.3	39.6	19.3	35.3	58.6	34.2	39.6	14.6
Available Sulphate-S	mg/kg	886	1460	48.9	1260	1550	20.6	1750	1850	5.6
Metals										
Aluminum (Al)	mg/kg	11,100	18,600	50.5	9,520	8,930	6.4	11,200	11,400	1.8
Antimony (Sb)	mg/kg	0.65	11.4	n/a	0.93	0.96	n/a	0.89	0.90	n/a
Arsenic (As)	mg/kg	6.31	28.6	n/a	7.68	7.55	n/a	5.00	5.07	n/a
Barium (Ba)	mg/kg	57.4	276	n/a	57.7	62.9	n/a	127	132	n/a
Beryllium (Be)	mg/kg	0.53	0.43	n/a	0.46	0.45	n/a	0.50	0.46	n/a
Bismuth (Bi)	mg/kg	<0.10	0.39	n/a	<0.10	<0.10	n/a	<0.10	0.10	n/a
Boron (B)	mg/kg	-	-	-	-	-	-	-	-	-
Cadmium (Cd)	mg/kg	1.57	2.56	n/a	1.65	1.64	n/a	2.39	2.46	2.9
Calcium (Ca)	mg/kg	10,300	7,970	25.5	9,210	9,150	0.7	11,400	10,900	4.5
Chromium (Cr)	mg/kg	29.8	54.1	57.9	30.3	30.7	1.3	38.8	43.2	10.7

Notes:

† *Relative percent difference (RPD).*

‡ *Not applicable when values are less than five times the detection limit.*

Red and italicized values exceed the 20% relative percent difference and are more than five times the detection limit.

Red and bold values exceed the 50% relative percent difference and are more than five times the detection limit.

Appendix 3.3-1. Lake and Stream Sediment Quality Relative Percent Difference Results, 2010 to 2013

Site		TL1			TL1			TL1		
Replicate		1			2			3		
Date Sampled		25-Aug-10	25-Aug-10		25-Aug-10	25-Aug-10		25-Aug-10	25-Aug-10	
SampleType		63 µm	63 µm		63 µm	63 µm		63 µm	63 µm	
ALS Sample ID	Units	L927313-3	L927313-6	*RPD*	L927313-4	L927313-7	*RPD*	L927313-5	L927313-8	*RPD*
Metals										
Cobalt (Co)	mg/kg	18.1	9.91	58.5	17.5	17.2	1.7	17.8	18.3	2.8
Copper (Cu)	mg/kg	36.1	322	159.7	38.8	37.7	2.9	38.5	39.0	1.3
Iron (Fe)	mg/kg	43,400	34,600	22.6	40,700	39,900	2.0	25,300	25,800	2.0
Lead (Pb)	mg/kg	9.75	192	n/a	8.63	8.70	n/a	8.46	8.65	n/a
Lithium (Li)	mg/kg	13.5	23.7	n/a	9.1	7.6	n/a	11.2	10.3	n/a
Magnesium (Mg)	mg/kg	3,660	11,000	n/a	2,820	2,690	n/a	4,110	4,080	n/a
Manganese (Mn)	mg/kg	1,370	307	n/a	2,580	2,500	n/a	901	954	n/a
Mercury (Hg)	mg/kg	0.123	0.129	n/a	0.128	0.128	n/a	0.139	0.136	n/a
Molybdenum (Mo)	mg/kg	2.18	5.65	n/a	4.13	4.21	n/a	3.45	3.91	n/a
Nickel (Ni)	mg/kg	79.0	38.5	n/a	82.3	81.3	n/a	95.5	100	n/a
Phosphorus (P)	mg/kg	1,020	887	n/a	963	842	n/a	1,080	1,100	n/a
Potassium (K)	mg/kg	630	3,240	n/a	480	410	n/a	690	680	n/a
Selenium (Se)	mg/kg	4.75	1.19	n/a	5.99	5.95	n/a	6.36	6.55	n/a
Silver (Ag)	mg/kg	0.464	1.26	n/a	0.498	0.487	n/a	0.481	0.495	n/a
Sodium (Na)	mg/kg	440	19900	n/a	190	180	n/a	370	280	n/a
Strontium (Sr)	mg/kg	163	81.2	n/a	152	152	n/a	189	190	n/a
Sulphur (S)	mg/kg	-	-	-	-	-	-	-	-	-
Thallium (Tl)	mg/kg	0.14	0.58	n/a	0.12	0.11	n/a	0.14	0.15	n/a
Tin (Sn)	mg/kg	0.69	22.2	n/a	0.51	0.44	n/a	0.71	0.62	n/a
Titanium (Ti)	mg/kg	75.9	976	171.1	53.6	43.1	21.7	113	120	6.0
Uranium (U)	mg/kg	0.460	1.71	115.2	0.469	0.456	2.8	0.660	0.677	2.5
Vanadium (V)	mg/kg	19.3	84.2	125.4	16.6	15.5	6.9	19.0	19.7	3.6
Zinc (Zn)	mg/kg	199	388	64.4	183	180	1.7	226	228	0.9

Notes:

† *Relative percent difference (RPD).*

‡ *Not applicable when values are less than five times the detection limit.*

Red and italicized values exceed the 20% relative percent difference and are more than five times the detection limit.

Red and bold values exceed the 50% relative percent difference and are more than five times the detection limit.

Appendix 4

Tissue Residues

Appendix 4.1-1. Tissue Residues in Stream Benthic Invertebrates, 2013

Appendix 4.1-1. Tissue Residues in Stream Benthic Invertebrates, 2013

Sample ID Date Sampled ALS Sample ID	CCME Guideline for the Protection of Wildlife Consumer of Aquatic Biota[a]	BC Guideline for the Protection of Wildlife[b]	Units	Realized Detection Limit	BJ U/S 15-Aug-2013 L1354112-1	BJ2 14-Aug-2013 L1354112-2	SC2 5-Sep-2013 L1362914-10	SC3 5-Sep-2013 L1362914-9	UR1 3-Sep-2013 L1362914-6	UR2 2-Sep-2013 L1362914-4	DIVIDE OF 11-Aug-2013 L1354112-3
Physical Tests											
% Moisture			%	0.10	94.4	90.5	78.1	86.7	87.4	88.5	94.7
Metals											
Aluminum (Al)			mg/kg wwt	0.40	676	1180	2320	403	696	731	281
Antimony (Sb)			mg/kg wwt	0.0020	0.0239	0.0188	0.0279	0.0214	0.0366	0.0235	0.0052
Arsenic (As)			mg/kg wwt	0.0040	15.0	9.77	1.14	0.381	1.71	1.05	0.237
Barium (Ba)			mg/kg wwt	0.010	23.6	37.1	25.9	6.58	15.0	13.7	8.31
Beryllium (Be)			mg/kg wwt	0.0020	0.0448	0.0561	0.0570	0.0151	0.0263	0.0208	0.0093
Bismuth (Bi)			mg/kg wwt	0.0020	0.0100	0.0192	0.0209	0.0035	0.0138	0.0107	0.0031
Boron (B)			mg/kg wwt	0.20	0.26	0.49	0.25	<0.20	0.27	0.23	<0.20
Cadmium (Cd)			mg/kg wwt	0.0020	0.125	0.121	0.700	0.364	2.17	1.24	0.121
Calcium (Ca)			mg/kg wwt	10	225	273	2860	336	341	545	177
Cesium (Cs)			mg/kg wwt	0.0010	0.603	0.672	0.109	0.0376	0.100	0.0742	0.106
Chromium (Cr)			mg/kg wwt	0.010	0.203	0.372	3.54	0.410	0.728	1.42	0.197
Cobalt (Co)			mg/kg wwt	0.0040	0.435	0.471	1.39	0.438	1.42	0.858	0.266
Copper (Cu)			mg/kg wwt	0.010	1.97	2.73	20.1	8.61	24.4	11.6	1.61
Gallium (Ga)			mg/kg wwt	0.0040	0.170	0.276	0.829	0.152	0.205	0.258	0.0703
Iron (Fe)			mg/kg wwt	0.20	1960	1530	4070	765	1150	1330	282
Lead (Pb)			mg/kg wwt	0.0040	2.39	4.08	0.875	0.216	1.00	0.619	0.211
Lithium (Li)			mg/kg wwt	0.020	0.674	1.06	1.44	0.266	0.365	0.364	0.222
Magnesium (Mg)			mg/kg wwt	20	214	296	1630	281	342	476	114
Manganese (Mn)			mg/kg wwt	0.0040	43.7	56.9	113	17.5	49.1	30.0	25.2
Mercury (Hg)	0.033[c]	0.033[c]	mg/kg wwt	0.0010	0.0290	0.0186	0.0080	0.0068	0.0101	0.0059	0.0049
Molybdenum (Mo)			mg/kg wwt	0.0040	0.222	0.277	0.255	0.140	0.260	0.880	0.0614
Nickel (Ni)			mg/kg wwt	0.010	0.214	0.381	1.87	0.397	0.802	0.966	0.315
Phosphorus (P)			mg/kg wwt	100	270	390	990	780	910	760	220
Potassium (K)			mg/kg wwt	400	<400	560	760	<400	550	480	<400
Rhenium (Re)			mg/kg wwt	0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0034	<0.0020
Rubidium (Rb)			mg/kg wwt	0.010	1.10	2.20	1.90	0.425	1.10	0.984	0.362
Selenium (Se)		1	mg/kg wwt	0.020	0.238	0.289	0.863	0.560	0.787	0.447	0.298
Sodium (Na)			mg/kg wwt	400	<400	<400	<400	<400	<400	<400	<400
Strontium (Sr)			mg/kg wwt	0.010	1.89	3.30	11.7	2.45	2.71	3.28	1.24
Tellurium (Te)			mg/kg wwt	0.0040	0.0171	0.0102	0.0102	<0.0040	0.0078	0.0045	<0.0040
Thallium (Tl)			mg/kg wwt	0.00040	0.0456	0.0587	0.0136	0.00356	0.0108	0.00793	0.00395
Thorium (Th)			mg/kg wwt	0.0020	0.148	0.157	0.160	0.0290	0.0424	0.0749	0.0370
Tin (Sn)			mg/kg wwt	0.020	<0.020	<0.020	0.023	<0.020	<0.020	<0.020	<0.020
Uranium (U)			mg/kg wwt	0.00040	0.155	0.0671	0.0604	0.0134	0.0271	0.127	0.0150
Vanadium (V)			mg/kg wwt	0.020	1.45	2.11	11.1	2.17	2.85	3.64	0.700
Yttrium (Y)			mg/kg wwt	0.0020	0.508	0.717	1.10	0.279	0.344	0.449	0.186
Zinc (Zn)			mg/kg wwt	0.10	8.85	13.9	44.4	24.5	74.3	49.3	17.6
Zirconium (Zr)			mg/kg wwt	0.040	0.425	0.576	0.285	0.106	0.131	0.237	0.068

[a] *Canadian tissue residue guideline for the protection of wildlife consumer of aquatic biota, Canadian Council of Ministers of the Environment, accessed January 2014; all units are in mg/kg wwt unless otherwise noted.*

[b] *British Columbia tissue residue guideline for the protection of wildlife, accessed January 2014.*

[c] *Methylmercury guideline.*

Appendix 5

Primary Producers

Appendix 5.1-1. Periphyton Biomass (as Chlorophyll *a*) in Streams, 2008 to 2013

Appendix 5.1-2. Phytoplankton Biomass (as Chlorophyll *a*) in Lakes, 2008 to 2013

Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Appendix 5.3-1. Periphyton Quality Control Report, 2012 to 2013

Appendix 5.3-2. Phytoplankton Quality Control Report, 2012 to 2013

Appendix 5.4-1. Periphyton Reference Photographs, 2012

Appendix 5.4-2. Periphyton Reference Photographs, 2013

Appendix 5.4-3. Phytoplankton Reference Photographs, 2012

Appendix 5.4-4. Phytoplankton Reference Photographs, 2013

Appendix 5.1-1. Periphyton Biomass (as Chlorophyll *a*) in Streams, 2008 to 2013

Sample ID	Replicate	Area	Date Sampled	Included/ Excluded	ALS Sample ID	Realized Detection Limit (µg)	Area Sampled (cm^2)	Volume Filtered (L)	Total Volume (L)	Portion Filtered	Portion Analyzed (cm^2)	Chlorophyll *a* (µg/L)	Chlorophyll *a* (µg)	Chlorophyll *a* (µg/cm^2)
Adit	1	MA	19-Aug-2011	Exclude	L1058344-20	0.01	24.9	-	-	1.00	24.90	-	0.98	**0.039**
Adit	2	MA	19-Aug-2011	Exclude	L1058344-21	0.1	24.9	-	-	1.00	24.90	-	7.95	**0.319**
Adit	3	MA	19-Aug-2011	Exclude	L1058344-22	0.01	24.9	-	-	1.00	24.90	-	1.44	**0.058**
BIR1	1	FF	20-Aug-2011	Exclude	L1058344-11	0.1	24.9	-	-	1.00	24.90	-	1.91	**0.077**
BIR1	2	FF	20-Aug-2011	Exclude	L1058344-12	0.1	24.9	-	-	1.00	24.90	-	1.73	**0.069**
BIR1	3	FF	20-Aug-2011	Exclude	L1058344-13	0.1	24.9	-	-	1.00	24.90	-	0.49	**0.020**
BIR2	1	FF	22-Aug-2011	Exclude	L1058344-14	0.01	24.9	-	-	1.00	24.90	-	0.10	**0.004**
BIR2	2	FF	22-Aug-2011	Exclude	L1058344-15	0.01	24.9	-	-	1.00	24.90	-	0.53	**0.021**
BIR2	3	FF	22-Aug-2011	Exclude	L1058344-16	0.01	24.9	-	-	1.00	24.90	-	0.02	**0.001**
BJ U/S	1	MA	15-Aug-2013	Exclude	L1354123-36	0.1	58.9	0.020	0.281	0.07	4.19	79	1.574	**0.375**
BJ U/S	2	MA	15-Aug-2013	Exclude	L1354123-37	0.1	58.9	0.020	0.118	0.17	9.98	123	2.460	**0.246**
BJ U/S	3	MA	15-Aug-2013	Exclude	L1354123-38	0.1	58.9	0.020	0.349	0.06	3.38	125	2.500	**0.741**
BJ U/S of CC	1	MA	7-Sep-2012	Include	L1218234-7	0.01	58.9	0.020	0.050	0.40	23.56	-	0.41	**0.018**
BJ U/S of CC	2	MA	7-Sep-2012	Include	L1218234-8	0.01	58.9	0.015	0.105	0.14	8.41	-	0.29	**0.034**
BJ U/S of CC	3	MA	7-Sep-2012	Include	L1218234-9	0.01	58.9	0.020	0.040	0.50	29.45	-	0.42	**0.014**
BJ Inter	1	MA	7-Sep-2012	Exclude	L1218234-4	0.1	58.9	0.006	0.126	0.05	2.80	-	3.77	**1.344**
BJ Inter	2	MA	7-Sep-2012	Exclude	L1218234-5	0.1	78.5	0.005	0.145	0.03	2.71	-	9.48	**3.501**
BJ Inter	3	MA	7-Sep-2012	Exclude	L1218234-6	0.01	58.9	0.007	0.127	0.06	3.25	-	2.88	**0.887**
BJ2	1	MA	19-Aug-2011	Include	L1058344-23	0.1	24.9	-	-	1.00	24.90	-	13.80	**0.554**
BJ2	2	MA	19-Aug-2011	Include	L1058344-24	0.1	24.9	-	-	1.00	24.90	-	6.85	**0.275**
BJ2	3	MA	19-Aug-2011	Include	L1058344-25	0.1	24.9	-	-	1.00	24.90	-	4.84	**0.194**
BJ2	1	MA	7-Sep-2012	Include	L1218234-1	0.01	58.9	0.005	0.130	0.04	2.27	-	2.31	**1.020**
BJ2	2	MA	7-Sep-2012	Include	L1218234-2	0.1	58.9	0.009	0.099	0.09	5.35	-	3.87	**0.723**
BJ2	3	MA	7-Sep-2012	Include	L1218234-3	0.1	58.9	0.008	0.233	0.03	2.02	-	5.38	**2.660**
BJ2	1	MA	14-Aug-2013	Exclude	L1354123-33	1.0	58.9	0.020	0.314	0.06	3.75	593	11.860	**3.161**
BJ2	2	MA	14-Aug-2013	Exclude	L1354123-34	1.0	78.5	0.020	0.385	0.05	4.08	877	17.540	**4.299**
BJ2	3	MA	14-Aug-2013	Exclude	L1354123-35	1.0	58.9	0.020	0.259	0.08	4.55	851	17.020	**3.742**
BJ3	1	MA	7-Aug-2013	Exclude	L1354123-1	0.1	58.9	0.020	0.180	0.11	6.54	-	11.10	**1.696**
BJ3	2	MA	7-Aug-2013	Exclude	L1354123-2	0.1	58.9	0.040	0.350	0.11	6.73	-	22.20	**3.298**
BJ3	3	MA	7-Aug-2013	Exclude	L1354123-3	1.0	58.9	0.020	0.190	0.11	6.20	-	50.00	**8.065**
SC0	1	MA	8-Aug-2013	Include	L1354123-4	0.01	58.9	0.050	0.050	1.00	58.90	-	0.20	**0.003**
SC0	2	MA	8-Aug-2013	Include	L1354123-5	0.01	58.9	0.050	0.050	1.00	58.90	-	0.02	**0.000**
SC0	3	MA	8-Aug-2013	Include	L1354123-6	0.01	58.9	0.050	0.050	1.00	58.90	-	0.15	**0.002**
SC1	1	MA	19-Aug-2008	Include	L676275-70	0.006	12.0	0.10	0.30	0.33	4.00	2.34	0.234	**0.059**
SC1	2	MA	19-Aug-2008	Include	L676275-71	0.006	12.0	0.10	0.30	0.33	4.00	4.82	0.482	**0.121**
SC1	3	MA	19-Aug-2008	Include	L676275-72	0.006	12.0	0.10	0.30	0.33	4.00	8.75	0.875	**0.219**
SC1	1	MA	21-Aug-2009	Include	L810576-67	0.01	8.0	-	-	1.00	8.00	-	1.12	**0.140**
SC1	2	MA	21-Aug-2009	Include	L810576-68	0.1	8.0	-	-	1.00	8.00	-	18.70	**2.338**
SC1	3	MA	21-Aug-2009	Include	L810576-69	0.1	8.0	-	-	1.00	8.00	-	3.56	**0.445**
SC2	1	MA	19-Aug-2008	Include	L676275-58	0.004	6.0	0.15	0.30	0.50	3.00	3.71	0.557	**0.186**
SC2	2	MA	19-Aug-2008	Include	L676275-59	0.004	6.0	0.15	0.30	0.50	3.00	0.28	0.041	**0.014**
SC2	3	MA	19-Aug-2008	Include	L676275-60	0.004	6.0	0.15	0.30	0.50	3.00	1.38	0.207	**0.069**
SC2	1	MA	21-Aug-2009	Include	L810576-70	0.01	8.0	-	-	1.00	8.00	-	0.08	**0.010**
SC2	2	MA	21-Aug-2009	Include	L810576-71	0.01	8.0	-	-	1.00	8.00	-	0.01	**0.002**
SC2	3	MA	21-Aug-2009	Include	L810576-72	0.01	8.0	-	-	1.00	8.00	-	0.04	**0.004**
SC2	1	MA	5-Sep-2013	Include	L1362898-25	0.01	58.9	-	-	1.00	58.90	-	0.07	**0.001**
SC2	2	MA	5-Sep-2013	Include	L1362898-26	0.01	58.9	-	-	1.00	58.90	-	0.08	**0.001**

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area); R = Potential Reference

Appendix 5.1-1. Periphyton Biomass (as Chlorophyll *a*) in Streams, 2008 to 2013

Sample ID	Replicate	Area	Date Sampled	Included/ Excluded	ALS Sample ID	Realized Detection Limit (µg)	Area Sampled (cm^2)	Volume Filtered (L)	Total Volume (L)	Portion Filtered	Portion Analyzed (cm^2)	Chlorophyll *a* (µg/L)	Chlorophyll *a* (µg)	Chlorophyll *a* (µg/cm^2)
SC2	3	MA	5-Sep-2013	Include	L1362898-27	0.01	58.9	-	-	1.00	58.90	-	0.32	**0.005**
SC3	1	MA	19-Aug-2008	Include	L676275-73	0.006	6.0	0.10	0.30	0.33	2.00	3.35	0.335	**0.168**
SC3	2	MA	19-Aug-2008	Include	L676275-74	0.006	6.0	0.10	0.30	0.33	2.00	0.31	0.031	**0.015**
SC3	3	MA	19-Aug-2008	Include	L676275-75	0.006	6.0	0.10	0.30	0.33	2.00	1.22	0.122	**0.061**
SC3	1	MA	21-Aug-2009	Include	L810576-73	0.01	8.0	-	-	1.00	8.00	-	0.01	**0.001**
SC3	2	MA	21-Aug-2009	Include	L810576-74	0.01	8.0	-	-	1.00	8.00	-	0.02	**0.003**
SC3	3	MA	21-Aug-2009	Include	L810576-75	0.01	8.0	-	-	1.00	8.00	-	0.11	**0.014**
SC3	1	MA	5-Sep-2013	Include	L1362898-22	0.01	58.9	-	-	1.00	58.90	-	2.31	**0.039**
SC3	2	MA	5-Sep-2013	Include	L1362898-23	0.1	58.9	-	-	1.00	58.90	-	3.19	**0.054**
SC3	3	MA	5-Sep-2013	Include	L1362898-24	0.01	58.9	-	-	1.00	58.90	-	0.33	**0.006**
UR1A	1	MA	19-Aug-2008	Include	L676275-55	0.006	6.0	0.10	0.30	0.33	2.00	7.89	0.789	**0.395**
UR1A	2	MA	19-Aug-2008	Include	L676275-56	0.006	6.0	0.10	0.30	0.33	2.00	2.25	0.225	**0.113**
UR1A	3	MA	19-Aug-2008	Include	L676275-57	0.006	6.0	0.10	0.30	0.33	2.00	1.07	0.107	**0.054**
UR1A	1	MA	14-Aug-2009	Include	L810576-16	0.01	12.0	-	-	1.00	12.00	-	0.08	**0.007**
UR1A	2	MA	14-Aug-2009	Include	L810576-17	0.01	12.0	-	-	1.00	12.00	-	0.21	**0.018**
UR1A	3	MA	14-Aug-2009	Include	L810576-18	0.01	16.0	-	-	1.00	16.00	-	1.76	**0.110**
UR1	1	MA	19-Aug-2008	Include	L676275-79	0.006	6.0	0.10	0.30	0.33	2.00	0.99	0.099	**0.049**
UR1	2	MA	19-Aug-2008	Include	L676275-80	0.006	6.0	0.10	0.30	0.33	2.00	0.33	0.033	**0.016**
UR1	3	MA	19-Aug-2008	Include	L676275-81	0.006	6.0	0.10	0.30	0.33	2.00	12.40	1.240	**0.620**
UR1	1	MA	14-Aug-2009	Include	L810576-10	0.01	16.0	-	-	1.00	16.00	-	0.02	**0.001**
UR1	2	MA	14-Aug-2009	Include	L810576-11	0.01	16.0	-	-	1.00	16.00	-	0.02	**0.001**
UR1	3	MA	14-Aug-2009	Include	L810576-12	0.01	12.0	-	-	1.00	12.00	-	0.04	**0.003**
UR1	1	MA	3-Sep-2013	Include	L1362898-16	0.1	58.9	0.020	0.103	0.19	11.44	-	4.14	**0.362**
UR1	2	MA	3-Sep-2013	Include	L1362898-17	0.1	58.9	-	-	1.00	58.90	-	2.97	**0.050**
UR1	3	MA	3-Sep-2013	Include	L1362898-18	0.1	58.9	-	-	1.00	58.90	-	7.13	**0.121**
UR2	1	MA	14-Aug-2009	Include	L810576-13	0.01	16.0	-	-	1.00	16.00	-	0.03	**0.002**
UR2	2	MA	14-Aug-2009	Include	L810576-14	0.01	12.0	-	-	1.00	12.00	-	0.01	**0.001**
UR2	3	MA	14-Aug-2009	Include	L810576-15	0.01	12.0	-	-	1.00	12.00	-	0.02	**0.002**
UR2	1	MA	2-Sep-2013	Include	L1362898-10	0.1	58.9	-	-	1.00	58.90	-	10.80	**0.183**
UR2	2	MA	2-Sep-2013	Include	L1362898-11	0.1	58.9	0.020	0.116	0.17	10.16	-	4.36	**0.429**
UR2	3	MA	2-Sep-2013	Include	L1362898-12	0.1	58.9	0.023	0.102	0.23	13.28	-	5.34	**0.402**
Divide OF	1	R	12-Aug-2013	Exclude	L1354123-30	0.01	58.9	-	-	1.00	58.90	-	1.20	**0.020**
Divide OF	2	R	12-Aug-2013	Exclude	L1354123-31	0.01	58.9	-	-	1.00	58.90	-	0.80	**0.014**
Divide OF	3	R	12-Aug-2013	Exclude	L1354123-32	0.01	58.9	-	-	1.00	58.90	-	0.30	**0.005**
BR1	1	AP	26-Aug-2010	Include	L927318-10	0.01	28.8	-	-	1.00	28.80	-	2.02	**0.070**
BR1	2	AP	26-Aug-2010	Include	L927318-11	0.01	28.8	-	-	1.00	28.80	-	0.11	**0.004**
BR1	3	AP	26-Aug-2010	Include	L927318-12	0.1	28.8	-	-	1.00	28.80	-	16.90	**0.587**
BR2	1	AP	27-Aug-2010	Include	L927318-13	0.1	28.8	-	-	1.00	28.80	-	4.07	**0.141**
BR2	2	AP	27-Aug-2010	Include	L927318-14	0.1	28.8	-	-	1.00	28.80	-	10.80	**0.375**
BR2	3	AP	27-Aug-2010	Include	L927318-15	0.1	28.8	-	-	1.00	28.80	-	10.10	**0.351**
ST1	1	AP	27-Aug-2010	Include	L927318-22	0.01	14.4	-	-	1.00	14.40	-	0.99	**0.068**
ST1	2	AP	27-Aug-2010	Include	L927318-23	0.01	14.4	-	-	1.00	14.40	-	1.52	**0.106**
ST1	3	AP	27-Aug-2010	Include	L927318-24	0.01	14.4	-	-	1.00	14.40	-	1.59	**0.110**
ST2	1	AP	27-Aug-2010	Include	L927318-16	0.1	14.4	-	-	1.00	14.40	-	3.25	**0.226**
ST2	2	AP	27-Aug-2010	Include	L927318-17	0.1	14.4	-	-	1.00	14.40	-	9.23	**0.641**
ST2	3	AP	27-Aug-2010	Include	L927318-18	0.01	14.4	-	-	1.00	14.40	-	2.05	**0.142**
TC2	1	AP	27-Aug-2010	Include	L927318-19	0.01	14.4	-	-	1.00	14.40	-	0.03	**0.002**

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Appendix 5.1-1. Periphyton Biomass (as Chlorophyll *a*) in Streams, 2008 to 2013

Sample ID	Replicate	Area	Date Sampled	Included/ Excluded	ALS Sample ID	Realized Detection Limit (µg)	Area Sampled (cm^2)	Volume Filtered (L)	Total Volume (L)	Portion Filtered	Portion Analyzed (cm^2)	Chlorophyll *a* (µg/L)	Chlorophyll *a* (µg)	Chlorophyll *a* (µg/cm^2)
TC2	2	AP	27-Aug-2010	Include	L927318-20	0.01	14.4	-	-	1.00	14.40	-	0.11	**0.008**
TC2	3	AP	27-Aug-2010	Include	L927318-21	0.01	14.4	-	-	1.00	14.40	-	0.60	**0.042**
TC3	1	AP	27-Aug-2010	Include	L927318-25	0.01	14.4	-	-	1.00	14.40	-	0.06	**0.004**
TC3	2	AP	27-Aug-2010	Include	L927318-26	0.01	14.4	-	-	1.00	14.40	-	0.02	**0.001**
TC3	3	AP	27-Aug-2010	Include	L927318-27	0.01	14.4	-	-	1.00	14.40	-	0.23	**0.016**
TD1	1	FF	26-Aug-2010	Exclude	L927318-7	0.01	28.8	-	-	1.00	28.80	-	0.06	**0.002**
TD1	2	FF	26-Aug-2010	Exclude	L927318-8	0.01	28.8	-	-	1.00	28.80	-	0.18	**0.006**
TD1	3	FF	26-Aug-2010	Exclude	L927318-9	0.01	28.8	-	-	1.00	28.80	-	0.41	**0.014**
WC2	1	AP	21-Aug-2011	Exclude	L1058344-4	0.01	24.9	-	-	1.00	24.90	-	1.48	**0.059**
WC2	2	AP	21-Aug-2011	Exclude	L1058344-5	0.01	24.9	-	-	1.00	24.90	-	1.71	**0.069**
WC2	3	AP	21-Aug-2011	Exclude	L1058344-6	0.1	24.9	-	-	1.00	24.90	-	4.90	**0.197**
WC5	1	AP	21-Aug-2011	Include	L1058344-8	0.01	24.9	-	-	1.00	24.90	-	0.30	**0.012**
WC5	2	AP	21-Aug-2011	Include	L1058344-9	0.01	24.9	-	-	1.00	24.90	-	0.42	**0.017**
WC5	3	AP	21-Aug-2011	Include	L1058344-10	0.01	24.9	-	-	1.00	24.90	-	0.16	**0.006**
WC1	1	FF	20-Aug-2011	Include	L1058344-1	0.1	24.9	-	-	1.00	24.90	-	18.80	**0.755**
WC1	2	FF	20-Aug-2011	Include	L1058344-2	0.1	24.9	-	-	1.00	24.90	-	12.50	**0.502**
WC1	3	FF	20-Aug-2011	Include	L1058344-3	0.1	24.9	-	-	1.00	24.90	-	10.20	**0.410**
MC1	1	FF	22-Aug-2011	Exclude	L1058344-17	1	24.9	-	-	1.00	24.90	-	29.10	**1.169**
MC1	2	FF	22-Aug-2011	Exclude	L1058344-18	0.1	24.9	-	-	1.00	24.90	-	19.00	**0.763**
MC1	3	FF	22-Aug-2011	Exclude	L1058344-19	0.1	24.9	-	-	1.00	24.90	-	8.54	**0.343**

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Appendix 5.1-2. Phytoplankton Biomass (as Chlorophyll *a*) in Lakes, 2008 to 2013

Site ID	Sample ID	Replicate	Area	Date Sampled	Included/ Excluded	ALS Sample ID	Realized Detection Limit (µg)	Volume Sampled (L)	Chlorophyll *a* (*µ* g)	Chlorophyll *a* (*µ* g/L)
BJ	BJ Deep (1m)	1	MA	8-Sep-2012	Include	L1218234-13	0.01	0.5	0.024	0.048
BJ	BJ Deep (1m)	2	MA	8-Sep-2012	Include	L1218234-14	0.01	0.5	0.047	0.094
BJ	BJ Deep (1m)	3	MA	8-Sep-2012	Include	L1218234-15	0.01	0.5	0.052	0.104
BJ	BJ Lake (1m)	1	MA	9-Aug-2013	Include	L1354123-7	0.01	0.5	-	0.092
BJ	BJ Lake (15m)	1	MA	9-Aug-2013	Include	L1354123-10	0.01	0.5	-	0.164
BJ	BJ Lake (30m)	1	MA	9-Aug-2013	Include	L1354123-13	0.01	0.5	-	0.047
BJ	BJ Lake (50m)	1	MA	9-Aug-2013	Include	L1354123-14	0.01	0.5	-	0.031
BJ	BJ Lake (70m)	1	MA	9-Aug-2013	Include	L1354123-16	0.01	0.5	-	<0.010
BJ	BJ Lake (1m)	2	MA	9-Aug-2013	Include	L1354123-8	0.01	0.5	-	0.111
BJ	BJ Lake (15m)	2	MA	9-Aug-2013	Include	L1354123-11	0.01	0.5	-	0.082
BJ	BJ Lake (50m)	2	MA	9-Aug-2013	Include	L1354123-15	0.01	0.5	-	0.040
BJ	BJ Lake (70m)	2	MA	9-Aug-2013	Include	L1354123-17	0.01	0.5	-	0.051
BJ	BJ Lake (1m)	3	MA	9-Aug-2013	Include	L1354123-9	0.01	0.5	-	0.073
BJ (Shallow)	BJ Shallow (1m)	1	MA	8-Sep-2012	Include	L1218234-10	0.01	0.5	0.090	0.180
BJ (Shallow)	BJ Shallow (1m)	2	MA	8-Sep-2012	Include	L1218234-11	0.01	0.5	0.033	0.066
BJ (Shallow)	BJ Shallow (1m)	3	MA	8-Sep-2012	Include	L1218234-12	0.01	0.5	0.032	0.064
BJ (Shallow)	BJ Lake shallow	1	MA	10-Aug-2013	Include	L1354123-18	0.01	0.5	-	0.075
BJ (Shallow)	BJ Lake shallow	2	MA	10-Aug-2013	Include	L1354123-19	0.01	0.5	-	0.112
BJ (Shallow)	BJ Lake shallow	3	MA	10-Aug-2013	Include	L1354123-20	0.01	0.5	-	0.133
SUL	SUL Shallow	1	MA	22-Aug-2008	Include	L676275-82	0.004	-	-	0.069
SUL	SUL Mid	1	MA	22-Aug-2008	Include	L676275-83	0.004	-	-	0.070
SUL	SUL Deep	1	MA	22-Aug-2008	Include	L676275-84	0.002	-	-	0.024
SUL	SUL Shallow	1	MA	16-Aug-2009	Include	L810572-17	0.07	-	-	<0.070
SUL	SUL Mid	1	MA	16-Aug-2009	Include	L810572-15	0.04	-	-	<0.040
SUL	SUL Deep	1	MA	16-Aug-2009	Include	L810572-13	0.04	-	-	<0.040
SUL	SUL Shallow	2	MA	16-Aug-2009	Include	L810572-18	0.07	-	-	<0.070
SUL	SUL Mid	2	MA	16-Aug-2009	Include	L810572-16	0.02	-	-	0.486
SUL	SUL Deep	2	MA	16-Aug-2009	Include	L810572-14	0.04	-	-	<0.040
SUL	SUL Lake	1	MA	10-Aug-2013	Include	L1354123-21	0.01	0.5	-	<0.010
SUL	SUL Lake	2	MA	10-Aug-2013	Include	L1354123-22	0.01	0.5	-	<0.010
SUL	SUL Lake	3	MA	10-Aug-2013	Include	L1354123-23	0.01	0.5	-	<0.010
Divide	Divide Lake	1	R	11-Aug-2013	Exclude	L1354123-24	0.01	0.5	-	0.081
Divide	Divide Lake	2	R	11-Aug-2013	Exclude	L1354123-25	0.01	0.5	-	0.034
Divide	Divide Lake	3	R	12-Aug-2013	Exclude	L1354123-26	0.01	0.5	-	0.040
KL	Knipple Lake	1	AP	12-Aug-2013	Include	L1354123-27	0.01	0.25	-	<0.010
KL	Knipple Lake	2	AP	12-Aug-2013	Include	L1354123-28	0.01	0.25	-	<0.010
KL	Knipple Lake	3	AP	12-Aug-2013	Include	L1354123-29	0.01	0.25	-	<0.010
BL1	BL1	1	AP	25-Aug-2010	Include	L927318-1	0.01	0.25	<0.010	<0.010

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Appendix 5.1-2. Phytoplankton Biomass (as Chlorophyll *a*) in Lakes, 2008 to 2013

Site ID	Sample ID	Replicate	Area	Date Sampled	Included/ Excluded	ALS Sample ID	Realized Detection Limit (µg)	Volume Sampled (L)	Chlorophyll *a* (*µ* g)	Chlorophyll *a* (*µ* g/L)
BL1	BL1	2	AP	25-Aug-2010	Include	L927318-2	0.01	0.25	0.010	0.040
BL1	BL1	3	AP	25-Aug-2010	Include	L927318-3	0.01	0.25	0.016	0.064
TL1	TDL Shallow	1	AP	17-Aug-2009	Include	L810572-11	0.04	-	-	0.685
TL1	TDL Mid	1	AP	17-Aug-2009	Include	L810572-9	0.04	-	-	1.200
TL1	TDL Deep	1	AP	17-Aug-2009	Include	L810572-7	0.04	-	-	1.250
TL1	TDL Shallow	2	AP	17-Aug-2009	Include	L810572-12	0.04	-	-	1.040
TL1	TDL Mid	2	AP	17-Aug-2009	Include	L810572-10	0.04	-	-	1.200
TL1	TDL Deep	2	AP	17-Aug-2009	Include	L810572-8	0.04	-	-	0.948
TL1	TL1	1	AP	25-Aug-2010	Include	L927318-4	0.01	0.25	0.213	0.852
TL1	TL1	2	AP	25-Aug-2010	Include	L927318-5	0.01	0.25	0.293	1.172
TL1	TL1	3	AP	25-Aug-2010	Include	L927318-6	0.01	0.25	0.153	0.612
WL1	WL1	1	AP	28-Aug-2010	Exclude	L927318-28	0.01	0.25	0.014	0.056
WL1	WL1	2	AP	28-Aug-2010	Exclude	L927318-29	0.01	0.25	0.012	0.048
WL1	WL1	3	AP	28-Aug-2010	Exclude	L927318-30	0.01	0.25	<0.010	<0.010
L1	L1	1	FF	23-Aug-2011	Exclude	L1058344-26	0.1	1.00	2.590	2.590
L2	L2	1	FF	24-Aug-2011	Exclude	L1058344-27	0.01	0.85	2.390	2.812

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm^2)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
BJ U/S	1	15-Aug-2013	MA	Exclude	6530.05-13		58.9	222	0.0021%	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthidiaceae	*Achnanthidium*	
BJ U/S	1	15-Aug-2013	MA	Exclude	6530.05-13		58.9	222	0.0021%	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Anabaena*	
BJ U/S	1	15-Aug-2013	MA	Exclude	6530.05-13		58.9	222	0.0021%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
BJ U/S	1	15-Aug-2013	MA	Exclude	6530.05-13		58.9	222	0.0021%	Bacillariophyta	Bacillariophyceae	Pennales	Pleurosigmataceae	*Gyrosigma*	
BJ U/S	1	15-Aug-2013	MA	Exclude	6530.05-13		58.9	222	0.0021%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BJ U/S	1	15-Aug-2013	MA	Exclude	6530.05-13		58.9	222	0.0021%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Leptolyngbya*	
BJ U/S	1	15-Aug-2013	MA	Exclude	6530.05-13		58.9	222	0.0021%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BJ U/S	1	15-Aug-2013	MA	Exclude	6530.05-13		58.9	222	0.0021%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BJ U/S	1	15-Aug-2013	MA	Exclude	6530.05-13		58.9	222	0.0021%	Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
BJ U/S	1	15-Aug-2013	MA	Exclude	6530.05-13		58.9	222	0.0021%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
BJ U/S	1	15-Aug-2013	MA	Exclude	6530.05-13		58.9	222	0.0021%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BJ U/S	2	15-Aug-2013	MA	Exclude	6530.05-14		58.9	100	0.0033%	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthidiaceae	*Achnanthidium*	
BJ U/S	2	15-Aug-2013	MA	Exclude	6530.05-14		58.9	100	0.0033%	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Anabaena*	
BJ U/S	2	15-Aug-2013	MA	Exclude	6530.05-14		58.9	100	0.0033%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
BJ U/S	2	15-Aug-2013	MA	Exclude	6530.05-14		58.9	100	0.0033%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BJ U/S	2	15-Aug-2013	MA	Exclude	6530.05-14		58.9	100	0.0033%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Leptolyngbya*	
BJ U/S	2	15-Aug-2013	MA	Exclude	6530.05-14		58.9	100	0.0033%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	
BJ U/S	2	15-Aug-2013	MA	Exclude	6530.05-14		58.9	100	0.0033%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BJ U/S	2	15-Aug-2013	MA	Exclude	6530.05-14		58.9	100	0.0033%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BJ U/S	2	15-Aug-2013	MA	Exclude	6530.05-14		58.9	100	0.0033%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BJ U/S	3	15-Aug-2013	MA	Exclude	6530.05-15		58.9	280	0.0011%	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthidiaceae	*Achnanthidium*	
BJ U/S	3	15-Aug-2013	MA	Exclude	6530.05-15		58.9	280	0.0011%	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Anabaena*	
BJ U/S	3	15-Aug-2013	MA	Exclude	6530.05-15		58.9	280	0.0011%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
BJ U/S	3	15-Aug-2013	MA	Exclude	6530.05-15		58.9	280	0.0011%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BJ U/S	3	15-Aug-2013	MA	Exclude	6530.05-15		58.9	280	0.0011%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Leptolyngbya*	
BJ U/S	3	15-Aug-2013	MA	Exclude	6530.05-15		58.9	280	0.0011%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	
BJ U/S	3	15-Aug-2013	MA	Exclude	6530.05-15		58.9	280	0.0011%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BJ U/S	3	15-Aug-2013	MA	Exclude	6530.05-15		58.9	280	0.0011%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BJ U/S	3	15-Aug-2013	MA	Exclude	6530.05-15		58.9	280	0.0011%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BJ U/S	3	15-Aug-2013	MA	Exclude	6530.05-15		58.9	280	0.0011%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BJ U/S	3	15-Aug-2013	MA	Exclude	6530.05-15		58.9	280	0.0011%	Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
BJ U/S	3	15-Aug-2013	MA	Exclude	6530.05-15		58.9	280	0.0011%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BJ U/S of CC	1	7-Sep-2012	MA	Include	6204.5-7		58.9	90	0.0674%	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
BJ U/S of CC	1	7-Sep-2012	MA	Include	6204.5-7		58.9	90	0.0674%	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Anabaena*	
BJ U/S of CC	1	7-Sep-2012	MA	Include	6204.5-7		58.9	90	0.0674%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
BJ U/S of CC	1	7-Sep-2012	MA	Include	6204.5-7		58.9	90	0.0674%	Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	
BJ U/S of CC	1	7-Sep-2012	MA	Include	6204.5-7		58.9	90	0.0674%	Bacillariophyta	Bacillariophyceae	Pennales	Rhopalodiaceae	*Epithemia*	
BJ U/S of CC	1	7-Sep-2012	MA	Include	6204.5-7		58.9	90	0.0674%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BJ U/S of CC	1	7-Sep-2012	MA	Include	6204.5-7		58.9	90	0.0674%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	
BJ U/S of CC	1	7-Sep-2012	MA	Include	6204.5-7		58.9	90	0.0674%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BJ U/S of CC	1	7-Sep-2012	MA	Include	6204.5-7		58.9	90	0.0674%	Bacillariophyta	Bacillariophyceae	Pennales	Pleurosigmataceae	*Pleurosigma*	
BJ U/S of CC	1	7-Sep-2012	MA	Include	6204.5-7		58.9	90	0.0674%	Chlorophyta	Chlorophyceae	Chaetophorales	Chaetophoraceae	*Stigeoclonium*	
BJ U/S of CC	1	7-Sep-2012	MA	Include	6204.5-7		58.9	90	0.0674%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BJ U/S of CC	2	7-Sep-2012	MA	Include	6204.5-8		58.9	90	0.0164%	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
BJ U/S of CC	2	7-Sep-2012	MA	Include	6204.5-8		58.9	90	0.0164%	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Anabaena*	
BJ U/S of CC	2	7-Sep-2012	MA	Include	6204.5-8		58.9	90	0.0164%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
BJ U/S of CC	2	7-Sep-2012	MA	Include	6204.5-8		58.9	90	0.0164%	Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	
BJ U/S of CC	2	7-Sep-2012	MA	Include	6204.5-8		58.9	90	0.0164%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BJ U/S of CC	2	7-Sep-2012	MA	Include	6204.5-8		58.9	90	0.0164%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	
BJ U/S of CC	2	7-Sep-2012	MA	Include	6204.5-8		58.9	90	0.0164%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	
BJ U/S of CC	2	7-Sep-2012	MA	Include	6204.5-8		58.9	90	0.0164%	Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Mougeotia*	
BJ U/S of CC	2	7-Sep-2012	MA	Include	6204.5-8		58.9	90	0.0164%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BJ U/S of CC	2	7-Sep-2012	MA	Include	6204.5-8		58.9	90	0.0164%	Chlorophyta	Chlorophyceae	Chaetophorales	Chaetophoraceae	*Stigeoclonium*	
BJ U/S of CC	2	7-Sep-2012	MA	Include	6204.5-8		58.9	90	0.0164%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BJ U/S of CC	3	7-Sep-2012	MA	Include	6204.5-9		58.9	100	0.0139%	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Anabaena*	
BJ U/S of CC	3	7-Sep-2012	MA	Include	6204.5-9		58.9	100	0.0139%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
BJ U/S of CC	3	7-Sep-2012	MA	Include	6204.5-9		58.9	100	0.0139%	Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	
BJ U/S of CC	3	7-Sep-2012	MA	Include	6204.5-9		58.9	100	0.0139%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BJ U/S of CC	3	7-Sep-2012	MA	Include	6204.5-9		58.9	100	0.0139%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
BJ U/S	1	15-Aug-2013	*Achnanthidium* sp.		15.0	1.0	15.0	701,672.0	3,160.7	53.7		ok	ok	ok
BJ U/S	1	15-Aug-2013	*Anabaena* sp.		13.0	7.2	93.0	4,350,366.1	19,596.2	332.7		ok	ok	ok
BJ U/S	1	15-Aug-2013	*Cymbella* sp.		22.0	1.0	22.0	1,029,118.9	4,635.7	78.7		ok	ok	ok
BJ U/S	1	15-Aug-2013	*Gyrosigma* sp.		1.0	1.0	1.0	46,778.1	210.7	3.6		ok	ok	ok
BJ U/S	1	15-Aug-2013	*Hannaea arcus*		29.0	1.0	29.0	1,356,565.8	6,110.7	103.7		ok	ok	ok
BJ U/S	1	15-Aug-2013	*Leptolyngbya* sp.		27.0	14.0	377.0	17,635,355.2	79,438.5	1,348.7		ok	ok	ok
BJ U/S	1	15-Aug-2013	*Navicula* sp.		13.0	1.0	13.0	608,115.7	2,739.3	46.5		ok	ok	ok
BJ U/S	1	15-Aug-2013	*Nitzschia* sp.		162.0	1.0	162.0	7,578,057.1	34,135.4	579.5		ok	ok	ok
BJ U/S	1	15-Aug-2013	*Phormidium* sp.		1.0	12.0	12.0	561,337.6	2,528.5	42.9		ok	ok	ok
BJ U/S	1	15-Aug-2013	*Pseudanabaena* sp.		3.0	11.0	33.0	1,543,678.3	6,953.5	118.1		ok	ok	ok
BJ U/S	1	15-Aug-2013	*Synedra* sp.		14.0	1.0	14.0	654,893.8	2,950.0	50.1		ok	ok	ok
BJ U/S	2	15-Aug-2013	*Achnanthidium* sp.		9.0	1.0	9.0	268,888.9	2,688.9	45.7		ok	ok	ok
BJ U/S	2	15-Aug-2013	*Anabaena* sp.		2.0	15.5	31.0	926,172.8	9,261.7	157.2		ok	ok	ok
BJ U/S	2	15-Aug-2013	*Cymbella* sp.		16.0	1.0	16.0	478,024.7	4,780.2	81.2		ok	ok	ok
BJ U/S	2	15-Aug-2013	*Hannaea arcus*		86.0	1.0	86.0	2,569,382.7	25,693.8	436.2		ok	ok	ok
BJ U/S	2	15-Aug-2013	*Leptolyngbya* sp.		63.0	28.9	1,820.0	54,375,308.6	543,753.1	9,231.8		ok	ok	ok
BJ U/S	2	15-Aug-2013	*Meridion* sp.		6.0	1.0	6.0	179,259.3	1,792.6	30.4		ok	ok	ok
BJ U/S	2	15-Aug-2013	*Navicula* sp.		6.0	1.0	6.0	179,259.3	1,792.6	30.4		ok	ok	ok
BJ U/S	2	15-Aug-2013	*Nitzschia* sp.		107.0	1.0	107.0	3,196,790.1	31,967.9	542.7		ok	ok	ok
BJ U/S	2	15-Aug-2013	*Synedra* sp.		5.0	1.0	5.0	149,382.7	1,493.8	25.4		ok	ok	ok
BJ U/S	3	15-Aug-2013	*Achnanthidium* sp.		16.0	1.0	16.0	1,442,268.8	5,151.0	87.5		ok	ok	ok
BJ U/S	3	15-Aug-2013	*Anabaena* sp.		16.0	5.9	94.0	8,473,329.1	30,261.9	513.8		ok	ok	ok
BJ U/S	3	15-Aug-2013	*Cymbella* sp.		13.0	1.0	13.0	1,171,843.4	4,185.2	71.1		ok	ok	ok
BJ U/S	3	15-Aug-2013	*Hannaea arcus*		64.0	1.0	64.0	5,769,075.1	20,603.8	349.8		ok	ok	ok
BJ U/S	3	15-Aug-2013	*Leptolyngbya* sp.		60.0	0.0	1.0	90,141.8	321.9	5.5		ok	ok	ok
BJ U/S	3	15-Aug-2013	*Meridion* sp.		7.0	1.0	7.0	630,992.6	2,253.5	38.3		ok	ok	ok
BJ U/S	3	15-Aug-2013	*Navicula* sp.		7.0	1.0	7.0	630,992.6	2,253.5	38.3		ok	ok	ok
BJ U/S	3	15-Aug-2013	*Nitzschia* sp.		103.0	1.0	103.0	9,284,605.3	33,159.3	563.0		ok	ok	ok
BJ U/S	3	15-Aug-2013	*Phormidium* sp.		1.0	21.0	21.0	1,892,977.8	6,760.6	114.8		ok	ok	ok
BJ U/S	3	15-Aug-2013	*Synedra* sp.		13.0	1.0	13.0	1,171,843.4	4,185.2	71.1		ok	ok	ok
BJ U/S of CC	1	7-Sep-2012	*Achnanthes* sp.		2.0	1.0	2.0	2,969.1	33.0	0.6	33	ok	ok	ok
BJ U/S of CC	1	7-Sep-2012	*Anabaena* sp.		3.0	16.3	49.0	72,742.9	808.3	13.7	40	ok	ok	ok
BJ U/S of CC	1	7-Sep-2012	*Cymbella* sp.		2.0	1.0	2.0	2,969.1	33.0	0.6	120	ok	ok	ok
BJ U/S of CC	1	7-Sep-2012	*Dinobryon* sp.		34.0	1.0	35.0	51,959.2	577.3	9.8		ok	ok	ok
BJ U/S of CC	1	7-Sep-2012	*Epithemia* sp.		1.0	1.0	1.0	1,484.5	16.5	0.3		ok	ok	ok
BJ U/S of CC	1	7-Sep-2012	*Gomphonema* sp.		5.0	1.2	6.0	8,907.3	99.0	1.7	183	ok	ok	ok
BJ U/S of CC	1	7-Sep-2012	*Meridion* sp.		1.0	2.0	2.0	2,969.1	33.0	0.6		ok	ok	ok
BJ U/S of CC	1	7-Sep-2012	*Navicula* sp.		21.0	1.0	21.0	31,175.5	346.4	5.9	78	ok	ok	ok
BJ U/S of CC	1	7-Sep-2012	*Pleurosigma* sp.		1.0	1.0	1.0	1,484.5	16.5	0.3		ok	ok	ok
BJ U/S of CC	1	7-Sep-2012	*Stigeoclonium* sp.		1.0	4.0	4.0	5,938.2	66.0	1.1		ok	ok	ok
BJ U/S of CC	1	7-Sep-2012	*Synedra* sp.		231.0	1.1	245.0	363,714.4	4,041.3	68.6	98	ok	ok	ok
BJ U/S of CC	2	7-Sep-2012	*Achnanthes* sp.		9.0	1.1	10.0	60,972.5	677.5	11.5	33	ok	ok	ok
BJ U/S of CC	2	7-Sep-2012	*Anabaena* sp.		2.0	28.5	57.0	347,543.5	3,861.6	65.6	40	ok	ok	ok
BJ U/S of CC	2	7-Sep-2012	*Cymbella* sp.		7.0	1.0	7.0	42,680.8	474.2	8.1	120	ok	ok	ok
BJ U/S of CC	2	7-Sep-2012	*Dinobryon* sp.		70.0	1.1	80.0	487,780.3	5,419.8	92.0		ok	ok	ok
BJ U/S of CC	2	7-Sep-2012	*Gomphonema* sp.		9.0	1.1	10.0	60,972.5	677.5	11.5	183	ok	ok	ok
BJ U/S of CC	2	7-Sep-2012	*Hannaea* sp.		1.0	1.0	1.0	6,097.3	67.7	1.2		ok	ok	ok
BJ U/S of CC	2	7-Sep-2012	*Meridion* sp.		1.0	2.0	2.0	12,194.5	135.5	2.3		ok	ok	ok
BJ U/S of CC	2	7-Sep-2012	*Mougeotia* sp.		3.0	3.3	10.0	60,972.5	677.5	11.5	2,258	ok	ok	ok
BJ U/S of CC	2	7-Sep-2012	*Navicula* sp.		14.0	1.0	14.0	85,361.6	948.5	16.1	78	ok	ok	ok
BJ U/S of CC	2	7-Sep-2012	*Stigeoclonium* sp.		2.0	3.5	7.0	42,680.8	474.2	8.1		ok	ok	ok
BJ U/S of CC	2	7-Sep-2012	*Synedra* sp.		191.0	1.0	200.0	1,219,450.7	13,549.5	230.0	98	ok	ok	ok
BJ U/S of CC	3	7-Sep-2012	*Anabaena* sp.		10.0	14.7	147.0	1,054,466.2	10,544.7	179.0	40	ok	ok	ok
BJ U/S of CC	3	7-Sep-2012	*Cymbella* sp.		3.0	1.0	3.0	21,519.7	215.2	3.7	120	ok	ok	ok
BJ U/S of CC	3	7-Sep-2012	*Dinobryon* sp.		47.0	1.0	49.0	351,488.7	3,514.9	59.7		ok	ok	ok
BJ U/S of CC	3	7-Sep-2012	*Gomphonema* sp.		11.0	1.1	12.0	86,078.9	860.8	14.6	183	ok	ok	ok
BJ U/S of CC	3	7-Sep-2012	*Navicula* sp.		10.0	1.0	10.0	71,732.4	717.3	12.2	78	ok	ok	ok

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm^2)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
BJ U/S of CC	3	7-Sep-2012	MA	Include	6204.5-9		58.9	100	0.0139%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BJ Inter	1	7-Sep-2012	MA	Exclude	6204.5-4		58.9	100	0.0053%	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
BJ Inter	1	7-Sep-2012	MA	Exclude	6204.5-4		58.9	100	0.0053%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BJ Inter	1	7-Sep-2012	MA	Exclude	6204.5-4		58.9	100	0.0053%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BJ Inter	1	7-Sep-2012	MA	Exclude	6204.5-4		58.9	100	0.0053%	Chrysophyta	Chrysophyceae	Chromulinales	Chrysocapsaceae	*Chrysocapsella*	*planctonica*
BJ Inter	1	7-Sep-2012	MA	Exclude	6204.5-4		58.9	100	0.0053%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BJ Inter	2	7-Sep-2012	MA	Exclude	6204.5-5	Lab Dup	58.9	100	0.0051%	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
BJ Inter	2	7-Sep-2012	MA	Exclude	6204.5-5		58.9	130	0.0011%	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
BJ Inter	2	7-Sep-2012	MA	Exclude	6204.5-5	Lab Dup	58.9	100	0.0051%	Chrysophyta	Chrysophyceae	Chromulinales	Chrysocapsaceae	*Chrysocapsella*	*planctonica*
BJ Inter	2	7-Sep-2012	MA	Exclude	6204.5-5		58.9	130	0.0011%	Chrysophyta	Chrysophyceae	Chromulinales	Chrysocapsaceae	*Chrysocapsella*	*planctonica*
BJ Inter	2	7-Sep-2012	MA	Exclude	6204.5-5	Lab Dup	58.9	100	0.0051%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BJ Inter	2	7-Sep-2012	MA	Exclude	6204.5-5		58.9	130	0.0011%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BJ Inter	2	7-Sep-2012	MA	Exclude	6204.5-5		58.9	130	0.0011%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	
BJ Inter	2	7-Sep-2012	MA	Exclude	6204.5-5	Lab Dup	58.9	100	0.0051%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BJ Inter	2	7-Sep-2012	MA	Exclude	6204.5-5		58.9	130	0.0011%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BJ Inter	2	7-Sep-2012	MA	Exclude	6204.5-5	Lab Dup	58.9	100	0.0051%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BJ Inter	2	7-Sep-2012	MA	Exclude	6204.5-5		58.9	130	0.0011%	Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*
BJ Inter	3	7-Sep-2012	MA	Exclude	6204.5-6		58.9	130	0.0012%	Chrysophyta	Chrysophyceae	Chromulinales	Chrysocapsaceae	*Chrysocapsella*	*planctonica*
BJ Inter	3	7-Sep-2012	MA	Exclude	6204.5-6		58.9	130	0.0012%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BJ Inter	3	7-Sep-2012	MA	Exclude	6204.5-6		58.9	130	0.0012%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BJ Inter	3	7-Sep-2012	MA	Exclude	6204.5-6		58.9	130	0.0012%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Anabaena/Nostoc*	
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Caloneis*	
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cf.*
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Euglenophyta	Euglenophyceae	Euglenales	Euglenaceae	*Euglena*	
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*	
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum/parvulum*
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Chrysophyta	Chrysophyceae	Chromulinales		*Hydrurus/Chromulina*	
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*	
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Schizotrichaceae	*Schizothrix*	
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Surirellaceae	*Surirella*	*angusta*
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*acus*
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9								
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Chlorophyta					
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Chrysophyta					
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Chrysophyta					
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Chrysophyta					
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Bacillariophyta	Bacillariophyceae				
Adit	1	19-Aug-2011	MA	Exclude	110497		24.9			Cyanophyta	Myxophyceae	Oscillatoriales			
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*flexella*

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
BJ U/S of CC	3	7-Sep-2012	*Synedra* sp.		227.0	1.0	233.0	1,671,364.8	16,713.6	283.8	98	ok	ok	ok
BJ Inter	1	7-Sep-2012	*Achnanthes* sp.		2.0	1.0	2.0	37,521.6	375.2	6.4	33	ok	ok	ok
BJ Inter	1	7-Sep-2012	*Gomphonema* sp.		1.0	1.0	1.0	18,760.8	187.6	3.2	183	ok	ok	ok
BJ Inter	1	7-Sep-2012	*Navicula* sp.		2.0	1.0	2.0	37,521.6	375.2	6.4	78	ok	ok	ok
BJ Inter	1	7-Sep-2012	*Chrysocapsella planctonica*		290.0	1.2	335.0	6,284,861.5	62,848.6	1,067.0		ok	ok	ok
BJ Inter	1	7-Sep-2012	*Synedra* sp.		10.0	2.0	20.0	375,215.6	3,752.2	63.7	98	ok	ok	ok
BJ Inter	2	7-Sep-2012	*Achnanthes* sp.		1.0	1.0	1.0	19,511.2	195.1	3.3	33	Exclude	ok	ok
BJ Inter	2	7-Sep-2012	*Achnanthes* sp.		1.0	1.0	1.0	90,587.8	696.8	11.8	33	ok	ok	ok
BJ Inter	2	7-Sep-2012	*Chrysocapsella planctonica*		291.0	1.2	337.0	6,575,278.4	65,752.8	1,116.3		Exclude	ok	ok
BJ Inter	2	7-Sep-2012	*Chrysocapsella planctonica*		300.0	1.7	502.0	45,475,060.3	349,808.2	5,939.0		ok	ok	ok
BJ Inter	2	7-Sep-2012	*Gomphonema* sp.		1.0	1.0	1.0	19,511.2	195.1	3.3	183	Exclude	ok	ok
BJ Inter	2	7-Sep-2012	*Gomphonema* sp.		1.0	7.0	7.0	634,114.4	4,877.8	82.8	183	ok	ok	ok
BJ Inter	2	7-Sep-2012	*Hannaea* sp.		1.0	1.0	1.0	90,587.8	696.8	11.8		ok	ok	ok
BJ Inter	2	7-Sep-2012	*Navicula* sp.		3.0	1.0	3.0	58,533.6	585.3	9.9	78	Exclude	ok	ok
BJ Inter	2	7-Sep-2012	*Synedra* sp.		4.0	1.0	4.0	362,351.1	2,787.3	47.3	98	ok	ok	ok
BJ Inter	2	7-Sep-2012	*Synedra* sp.		8.0	2.3	18.0	351,201.8	3,512.0	59.6	98	Exclude	ok	ok
BJ Inter	2	7-Sep-2012	*Tabellaria flocculosa*		1.0	22.0	22.0	1,992,930.9	15,330.2	260.3	344	ok	ok	ok
BJ Inter	3	7-Sep-2012	*Chrysocapsella planctonica*		301.0	1.2	354.0	28,367,908.4	218,214.7	3,704.8		ok	ok	ok
BJ Inter	3	7-Sep-2012	*Gomphonema* sp.		1.0	12.0	12.0	961,624.0	7,397.1	125.6	183	ok	ok	ok
BJ Inter	3	7-Sep-2012	*Navicula* sp.		1.0	1.0	1.0	80,135.3	616.4	10.5	78	ok	ok	ok
BJ Inter	3	7-Sep-2012	*Synedra* sp.		2.0	1.0	2.0	160,270.7	1,232.9	20.9	98	ok	ok	ok
Adit	1	19-Aug-2011	*Achnanthes minutissima*							86.5		ok	ok	ok
Adit	1	19-Aug-2011	*Achnanthes* spp.							17.3		ok	ok	ok
Adit	1	19-Aug-2011	*Anabaena/Nostoc* sp.							103.8		ok	ok	ok
Adit	1	19-Aug-2011	*Caloneis* spp.							17.3		ok	ok	ok
Adit	1	19-Aug-2011	*Cymbella* cf. *cestaii*							<17.3		Exclude	ok	Exclude
Adit	1	19-Aug-2011	*Cymbella minuta*							34.6		ok	ok	ok
Adit	1	19-Aug-2011	*Cymbella sinuata*							<17.3		Exclude	ok	ok
Adit	1	19-Aug-2011	*Cymbella* spp.							<17.3		Exclude	ok	ok
Adit	1	19-Aug-2011	*Diatoma mesodon*							1,730.0		ok	ok	ok
Adit	1	19-Aug-2011	*Euglena* spp.							<17.3		Exclude	ok	ok
Adit	1	19-Aug-2011	*Eunotia* spp.							<17.3		Exclude	ok	ok
Adit	1	19-Aug-2011	*Gomphonema angustatum/parvulum*							<17.3		Exclude	ok	ok
Adit	1	19-Aug-2011	*Gomphonema* spp.							34.6		ok	ok	ok
Adit	1	19-Aug-2011	*Homoeothrix varians*							<17.3		Exclude	ok	ok
Adit	1	19-Aug-2011	*Hydrurus* sp.							17.3		ok	ok	ok
Adit	1	19-Aug-2011	*Hydrurus/Chromulina* sp.							277.4		ok	ok	ok
Adit	1	19-Aug-2011	*Melosira* spp.							<17.3		Exclude	ok	ok
Adit	1	19-Aug-2011	*Meridion circulare*							69.2		ok	ok	ok
Adit	1	19-Aug-2011	*Navicula* spp.							17.3		ok	ok	ok
Adit	1	19-Aug-2011	*Nitzschia* spp.							138.4		ok	ok	ok
Adit	1	19-Aug-2011	*Oscillatoria* sp.	cf.						5,131.9		ok	ok	Exclude
Adit	1	19-Aug-2011	*Phormidium* sp.							<17.3		Exclude	ok	ok
Adit	1	19-Aug-2011	*Pinnularia* spp.							17.3		ok	ok	ok
Adit	1	19-Aug-2011	*Pseudanabaena* sp.							50,720.5		ok	ok	ok
Adit	1	19-Aug-2011	*Schizothrix* sp.							<17.3		Exclude	ok	ok
Adit	1	19-Aug-2011	*Surirella angusta*							<17.3		Exclude	ok	ok
Adit	1	19-Aug-2011	*Synedra acus*							51.9		ok	ok	ok
Adit	1	19-Aug-2011	*Synedra* spp.							121.1		ok	ok	ok
Adit	1	19-Aug-2011	Unknown alga sp.							51.9		ok	Exclude	Exclude
Adit	1	19-Aug-2011	Unknown Chlorophyte (filament) sp.							<17.3		Exclude	ok	Exclude
Adit	1	19-Aug-2011	Unknown Chrysophyte (colony)							121.1		ok	ok	Exclude
Adit	1	19-Aug-2011	Unknown Chrysophyte (cyst)							693.5		ok	ok	Exclude
Adit	1	19-Aug-2011	Unknown Chrysophyte sp. 2	?						8,542.4		ok	ok	Exclude
Adit	1	19-Aug-2011	Unknown diatom							<17.3		Exclude	ok	Exclude
Adit	1	19-Aug-2011	Unknown Oscillatoriales							3,051.4		ok	ok	Exclude
Adit	2	19-Aug-2011	*Achnanthes flexella*							<25.5		Exclude	ok	ok

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm²)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	*Amphora*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Anabaena/Nostoc*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Anomoeoneidaceae	*Anomoeoneis*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	*Aphanocapsa*	*rivularis*
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Caloneis*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Cyanophyta	Myxophyceae	Nostocales	Rivulariaceae	*Calothrix/Rivularia*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Cosmarium*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cf.*
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cistula*
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Denticula*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Diploneidaceae	*Diploneis*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Euglenophyta	Euglenophyceae	Euglenales	Euglenaceae	*Euglena*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*construens*
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*pinnata*
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum/parvulum*
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Chlorophyta	Chlorophyceae	Oedogoniales	Oedogoniaceae	*Oedogonium*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Chlorophyta	Chlorophyceae	Chaetophorales	Chaetophoraceae	*Stigeoclonium*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*acus*
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9								
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Chlorophyta					
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Chrysophyta					
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Bacillariophyta	Bacillariophyceae				
Adit	2	19-Aug-2011	MA	Exclude	110498		24.9			Cyanophyta	Myxophyceae	Oscillatoriales			
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Anabaena/Nostoc*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	*Aphanocapsa*	*rivularis*
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Caloneis*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Cyanophyta	Myxophyceae	Nostocales	Rivulariaceae	*Calothrix/Rivularia*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Cosmarium*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cf.*
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cistula*
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
Adit	2	19-Aug-2011	*Achnanthes minutissima*							42,593.6		ok	ok	ok
Adit	2	19-Aug-2011	*Achnanthes* spp.							9,127.2		ok	ok	ok
Adit	2	19-Aug-2011	*Amphora* sp.							<25.5		Exclude	ok	ok
Adit	2	19-Aug-2011	*Anabaena/Nostoc* sp.							1,173.0		ok	ok	ok
Adit	2	19-Aug-2011	*Anomoeoneis* sp.							<25.5		Exclude	ok	ok
Adit	2	19-Aug-2011	*Aphanocapsa* cf. *rivularis*							7,177.2		ok	ok	Exclude
Adit	2	19-Aug-2011	*Caloneis* spp.							<25.5		Exclude	ok	ok
Adit	2	19-Aug-2011	*Calothrix/Rivularia* spp.							15,618.3		ok	ok	ok
Adit	2	19-Aug-2011	*Chamaesiphon* spp.							119,414.2		ok	ok	ok
Adit	2	19-Aug-2011	*Cosmarium* spp.							<25.5		Exclude	ok	ok
Adit	2	19-Aug-2011	*Cymbella* cf. *cestaii*							204.0		ok	ok	Exclude
Adit	2	19-Aug-2011	*Cymbella cistula*							102.0		ok	ok	ok
Adit	2	19-Aug-2011	*Cymbella minuta*							15,972.6		ok	ok	ok
Adit	2	19-Aug-2011	*Cymbella sinuata*							25.5		ok	ok	ok
Adit	2	19-Aug-2011	*Cymbella* spp.							153.0		ok	ok	ok
Adit	2	19-Aug-2011	*Denticula* sp.							<25.5		Exclude	ok	ok
Adit	2	19-Aug-2011	*Diatoma mesodon*							102.0		ok	ok	ok
Adit	2	19-Aug-2011	*Diploneis* sp.							<25.5		Exclude	ok	ok
Adit	2	19-Aug-2011	*Euglena* spp.							<25.5		Exclude	ok	ok
Adit	2	19-Aug-2011	*Fragilaria construens*							<25.5		Exclude	ok	ok
Adit	2	19-Aug-2011	*Fragilaria pinnata*							<25.5		Exclude	ok	ok
Adit	2	19-Aug-2011	*Fragilaria* spp.							<25.5		Exclude	ok	ok
Adit	2	19-Aug-2011	*Fragilaria vaucheriae*							7,606.0		ok	ok	ok
Adit	2	19-Aug-2011	*Gomphonema angustatum/parvulum*							<25.5		Exclude	ok	ok
Adit	2	19-Aug-2011	*Gomphonema* spp.							102.0		ok	ok	ok
Adit	2	19-Aug-2011	*Hannaea arcus*							1,383.9		ok	ok	ok
Adit	2	19-Aug-2011	*Homoeothrix varians*							484.5		ok	ok	ok
Adit	2	19-Aug-2011	*Meridion circulare*							51.0		ok	ok	ok
Adit	2	19-Aug-2011	*Navicula* spp.							51.0		ok	ok	ok
Adit	2	19-Aug-2011	*Nitzschia* spp.							1,581.6		ok	ok	ok
Adit	2	19-Aug-2011	*Oedogonium* spp.							<25.5		Exclude	ok	ok
Adit	2	19-Aug-2011	*Oscillatoria* sp.	cf.						14,827.5		ok	ok	Exclude
Adit	2	19-Aug-2011	*Phormidium* sp.							<25.5		Exclude	ok	ok
Adit	2	19-Aug-2011	*Pinnularia* spp.							25.5		ok	ok	ok
Adit	2	19-Aug-2011	*Pseudanabaena* sp.							73,778.2		ok	ok	ok
Adit	2	19-Aug-2011	*Stigeoclonium* sp.							33,466.4		ok	ok	ok
Adit	2	19-Aug-2011	*Synedra acus*							9,127.2		ok	ok	ok
Adit	2	19-Aug-2011	*Synedra* spp.							9,887.8		ok	ok	ok
Adit	2	19-Aug-2011	*Tabellaria flocculosa*							<25.5		Exclude	ok	ok
Adit	2	19-Aug-2011	Unknown alga sp.							395.4		ok	Exclude	Exclude
Adit	2	19-Aug-2011	Unknown Chlorophyte sp.							25.5		ok	ok	Exclude
Adit	2	19-Aug-2011	Unknown Chrysophyte (cyst)							1,383.9		ok	ok	Exclude
Adit	2	19-Aug-2011	Unknown diatom							51.0		ok	ok	Exclude
Adit	2	19-Aug-2011	Unknown Oscillatoriales							1,779.3		ok	ok	Exclude
Adit	3	19-Aug-2011	*Achnanthes minutissima*							28,234.8		ok	ok	ok
Adit	3	19-Aug-2011	*Achnanthes* spp.							2,732.4		ok	ok	ok
Adit	3	19-Aug-2011	*Anabaena/Nostoc* sp.							732.0		ok	ok	ok
Adit	3	19-Aug-2011	*Aphanocapsa* cf. *rivularis*							8,521.2		ok	ok	Exclude
Adit	3	19-Aug-2011	*Caloneis* spp.							<30.5		Exclude	ok	ok
Adit	3	19-Aug-2011	*Calothrix/Rivularia* spp.							12,545.1		ok	ok	ok
Adit	3	19-Aug-2011	*Chamaesiphon* spp.							67,399.2		ok	ok	ok
Adit	3	19-Aug-2011	*Cosmarium* spp.							<30.5		Exclude	ok	ok
Adit	3	19-Aug-2011	*Cymbella* cf. *cestaii*							<30.5		Exclude	ok	Exclude
Adit	3	19-Aug-2011	*Cymbella cistula*							<30.5		Exclude	ok	ok
Adit	3	19-Aug-2011	*Cymbella minuta*							946.8		ok	ok	ok
Adit	3	19-Aug-2011	*Cymbella* spp.							<30.5		Exclude	ok	ok
Adit	3	19-Aug-2011	*Diatoma mesodon*							61.0		ok	ok	ok

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm²)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Diploneidaceae	*Diploneis*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*construens*
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Frustulia*	*rhomboides*
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum/parvulum*
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pleurosigmataceae	*Pleurosigma/Gyrosigma*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Schizotrichaceae	*Schizothrix*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Chlorophyta	Chlorophyceae	Chaetophorales	Chaetophoraceae	*Stigeoclonium*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Surirellaceae	*Surirella*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*acus*
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9								
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Chrysophyta					
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Chrysophyta					
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Cyanophyta	Myxophyceae	Nostocales			
Adit	3	19-Aug-2011	MA	Exclude	110499		24.9			Cyanophyta	Myxophyceae	Oscillatoriales			
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Anabaena/Nostoc*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Caloneis*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Cyanophyta	Myxophyceae	Nostocales	Rivulariaceae	*Calothrix/Rivularia*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cf.*
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Not Designated	*Diatomella*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Diploneidaceae	*Diploneis*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Lyngbya*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Chlorophyta	Chlorophyceae	Oedogoniales	Oedogoniaceae	*Oedogonium*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Schizotrichaceae	*Schizothrix*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Surirellaceae	*Surirella*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*acus*

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
Adit	3	19-Aug-2011	*Dinobryon* sp.							122.0		ok	ok	ok
Adit	3	19-Aug-2011	*Diploneis* sp.							<30.5		Exclude	ok	ok
Adit	3	19-Aug-2011	*Eunotia* spp.							<30.5		Exclude	ok	ok
Adit	3	19-Aug-2011	*Fragilaria construens*							<30.5		Exclude	ok	ok
Adit	3	19-Aug-2011	*Fragilaria* spp.							61.0		ok	ok	ok
Adit	3	19-Aug-2011	*Fragilaria vaucheriae*							710.1		ok	ok	ok
Adit	3	19-Aug-2011	*Frustulia rhomboides*							<30.5		Exclude	ok	ok
Adit	3	19-Aug-2011	*Gomphonema angustatum/parvulum*							<30.5		Exclude	ok	ok
Adit	3	19-Aug-2011	*Gomphonema* spp.							183.0		ok	ok	ok
Adit	3	19-Aug-2011	*Hannaea arcus*							122.0		ok	ok	ok
Adit	3	19-Aug-2011	*Homoeothrix varians*							<30.5		Exclude	ok	ok
Adit	3	19-Aug-2011	*Meridion circulare*							122.0		ok	ok	ok
Adit	3	19-Aug-2011	*Navicula* spp.							183.0		ok	ok	ok
Adit	3	19-Aug-2011	*Nitzschia* spp.							1,420.2		ok	ok	ok
Adit	3	19-Aug-2011	*Oscillatoria* sp.	cf.						132,976.8		ok	ok	Exclude
Adit	3	19-Aug-2011	*Phormidium* sp.							976.0		ok	ok	ok
Adit	3	19-Aug-2011	*Pinnularia* spp.							<30.5		Exclude	ok	ok
Adit	3	19-Aug-2011	*Pleurosigma/Gyrosigma* sp.							<30.5		Exclude	ok	ok
Adit	3	19-Aug-2011	*Pseudanabaena* sp.							17,305.2		ok	ok	ok
Adit	3	19-Aug-2011	*Schizothrix* sp.							<30.5		Exclude	ok	ok
Adit	3	19-Aug-2011	*Stigeoclonium* sp.							4,023.9		ok	ok	ok
Adit	3	19-Aug-2011	*Surirella* spp.							<30.5		Exclude	ok	ok
Adit	3	19-Aug-2011	*Synedra acus*							2,840.4		ok	ok	ok
Adit	3	19-Aug-2011	*Synedra* spp.							2,603.7		ok	ok	ok
Adit	3	19-Aug-2011	Unknown alga sp.							1,183.5		ok	Exclude	Exclude
Adit	3	19-Aug-2011	Unknown Chrysophyte (cyst)							1,183.5		ok	ok	Exclude
Adit	3	19-Aug-2011	Unknown Chrysophyte sp.							236.7		ok	ok	Exclude
Adit	3	19-Aug-2011	Unknown diatom							<30.5		Exclude	ok	Exclude
Adit	3	19-Aug-2011	Unknown Oscillatoriales							4,260.6		ok	ok	Exclude
BJ2	1	19-Aug-2011	*Achnanthes minutissima*							892.8		ok	ok	ok
BJ2	1	19-Aug-2011	*Achnanthes* spp.							148.8		ok	ok	ok
BJ2	1	19-Aug-2011	*Anabaena/Nostoc* sp.							<148.8		Exclude	ok	ok
BJ2	1	19-Aug-2011	*Caloneis* spp.							148.8		ok	ok	ok
BJ2	1	19-Aug-2011	*Calothrix/Rivularia* spp.							4,166.4		ok	ok	ok
BJ2	1	19-Aug-2011	*Chamaesiphon* spp.							29,752.5		ok	ok	ok
BJ2	1	19-Aug-2011	*Cymbella* cf. *cestaii*							7,142.4		ok	ok	Exclude
BJ2	1	19-Aug-2011	*Cymbella minuta*							1,190.4		ok	ok	ok
BJ2	1	19-Aug-2011	*Diatoma mesodon*							892.8		ok	ok	ok
BJ2	1	19-Aug-2011	*Diatomella* sp.							<148.8		Exclude	ok	ok
BJ2	1	19-Aug-2011	*Dinobryon* sp.							297.6		ok	ok	ok
BJ2	1	19-Aug-2011	*Diploneis* sp.							<148.8		Exclude	ok	ok
BJ2	1	19-Aug-2011	*Fragilaria* spp.							148.8		ok	ok	ok
BJ2	1	19-Aug-2011	*Fragilaria vaucheriae*							148.8		ok	ok	ok
BJ2	1	19-Aug-2011	*Gomphonema* spp.							148.8		ok	ok	ok
BJ2	1	19-Aug-2011	*Hannaea arcus*							148.8		ok	ok	ok
BJ2	1	19-Aug-2011	*Lyngbya* spp.							7,737.6		ok	ok	ok
BJ2	1	19-Aug-2011	*Meridion circulare*							446.4		ok	ok	ok
BJ2	1	19-Aug-2011	*Navicula* spp.							297.6		ok	ok	ok
BJ2	1	19-Aug-2011	*Nitzschia* spp.							2,380.8		ok	ok	ok
BJ2	1	19-Aug-2011	*Oedogonium* spp.							<148.8		Exclude	ok	ok
BJ2	1	19-Aug-2011	*Oscillatoria* sp.	cf.						728,156.4		ok	ok	Exclude
BJ2	1	19-Aug-2011	*Phormidium* sp.							453,380.4		ok	ok	ok
BJ2	1	19-Aug-2011	*Pinnularia* spp.							148.8		ok	ok	ok
BJ2	1	19-Aug-2011	*Pseudanabaena* sp.							22,022.4		ok	ok	ok
BJ2	1	19-Aug-2011	*Schizothrix* sp.							3,709,476.0		ok	ok	ok
BJ2	1	19-Aug-2011	*Surirella* spp.							<148.8		Exclude	ok	ok
BJ2	1	19-Aug-2011	*Synedra acus*							36,636.8		ok	ok	ok

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm²)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BJ2	1	19-Aug-2011	MA	Include	110500		24.9								
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Chlorophyta					
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Chrysophyta					
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Chrysophyta					
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Bacillariophyta	Bacillariophyceae				
BJ2	1	19-Aug-2011	MA	Include	110500		24.9			Cyanophyta	Myxophyceae	Oscillatoriales			
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*lanceolata*
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	*Amphora*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Anabaena/Nostoc*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Caloneis*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Cyanophyta	Myxophyceae	Nostocales	Rivulariaceae	*Calothrix/Rivularia*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cf.*
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Diploneidaceae	*Diploneis*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*pinnata*
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum/parvulum*
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Lyngbya*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Neidiaceae	*Neidium*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Nostoc*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Chlorophyta	Chlorophyceae	Oedogoniales	Oedogoniaceae	*Oedogonium*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Schizotrichaceae	*Schizothrix*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Surirellaceae	*Surirella*	*angusta*
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Surirellaceae	*Surirella*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*acus*
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Chrysophyta	Xanthophyceae	Heterotrichales	Tribonemataceae	*Tribonema*	
BJ2	2	19-Aug-2011	MA	Include	110501		24.9								
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Chlorophyta					
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Chrysophyta					
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Chrysophyta					
BJ2	2	19-Aug-2011	MA	Include	110501		24.9			Cyanophyta	Myxophyceae	Oscillatoriales			
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Anabaena/Nostoc*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Anomoeoneidaceae	*Anomoeoneis*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Caloneis*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Cyanophyta	Myxophyceae	Nostocales	Rivulariaceae	*Calothrix/Rivularia*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cf.*
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cistula*
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
BJ2	1	19-Aug-2011	*Synedra* spp.							8,330.7		ok	ok	ok
BJ2	1	19-Aug-2011	Unknown alga sp.							1,488.0		ok	Exclude	Exclude
BJ2	1	19-Aug-2011	Unknown Chlorophyte sp.							148.8		ok	ok	Exclude
BJ2	1	19-Aug-2011	Unknown Chrysophyte (cyst)							1,190.1		ok	ok	Exclude
BJ2	1	19-Aug-2011	Unknown Chrysophyte sp.							892.8		ok	ok	Exclude
BJ2	1	19-Aug-2011	Unknown diatom							<148.8		Exclude	ok	Exclude
BJ2	1	19-Aug-2011	Unknown Oscillatoriales							64,265.4		ok	ok	Exclude
BJ2	2	19-Aug-2011	*Achnanthes lanceolata*							<98.1		Exclude	ok	ok
BJ2	2	19-Aug-2011	*Achnanthes minutissima*							392.4		ok	ok	ok
BJ2	2	19-Aug-2011	*Achnanthes* spp.							196.2		ok	ok	ok
BJ2	2	19-Aug-2011	*Amphora* sp.							<98.1		Exclude	ok	ok
BJ2	2	19-Aug-2011	*Anabaena/Nostoc* sp.							2,158.2		ok	ok	ok
BJ2	2	19-Aug-2011	*Caloneis* spp.							98.1		ok	ok	ok
BJ2	2	19-Aug-2011	*Calothrix/Rivularia* spp.							1,471.5		ok	ok	ok
BJ2	2	19-Aug-2011	*Chamaesiphon* spp.							43,147.5		ok	ok	ok
BJ2	2	19-Aug-2011	*Cymbella* cf. *cestaii*							6,276.0		ok	ok	Exclude
BJ2	2	19-Aug-2011	*Cymbella minuta*							490.5		ok	ok	ok
BJ2	2	19-Aug-2011	*Cymbella* spp.							<98.1		Exclude	ok	ok
BJ2	2	19-Aug-2011	*Diatoma mesodon*							588.6		ok	ok	ok
BJ2	2	19-Aug-2011	*Diploneis* sp.							<98.1		Exclude	ok	ok
BJ2	2	19-Aug-2011	*Fragilaria pinnata*							<98.1		Exclude	ok	ok
BJ2	2	19-Aug-2011	*Fragilaria vaucheriae*							196.2		ok	ok	ok
BJ2	2	19-Aug-2011	*Gomphonema angustatum/parvulum*							<98.1		Exclude	ok	ok
BJ2	2	19-Aug-2011	*Hannaea arcus*							98.1		ok	ok	ok
BJ2	2	19-Aug-2011	*Lyngbya* spp.							2,354.4		ok	ok	ok
BJ2	2	19-Aug-2011	*Melosira* spp.							196.2		ok	ok	ok
BJ2	2	19-Aug-2011	*Meridion circulare*							<98.1		Exclude	ok	ok
BJ2	2	19-Aug-2011	*Navicula* spp.							98.1		ok	ok	ok
BJ2	2	19-Aug-2011	*Neidium* sp.							<98.1		Exclude	ok	ok
BJ2	2	19-Aug-2011	*Nitzschia* spp.							98.1		ok	ok	ok
BJ2	2	19-Aug-2011	*Nostoc* spp.							<98.1		Exclude	ok	ok
BJ2	2	19-Aug-2011	*Oedogonium* spp.							<98.1		Exclude	ok	ok
BJ2	2	19-Aug-2011	*Oscillatoria* sp.	cf.						413,616.7		ok	ok	Exclude
BJ2	2	19-Aug-2011	*Phormidium* sp.							630,991.9		ok	ok	ok
BJ2	2	19-Aug-2011	*Pinnularia* spp.							98.1		ok	ok	ok
BJ2	2	19-Aug-2011	*Pseudanabaena* sp.							98,847.0		ok	ok	ok
BJ2	2	19-Aug-2011	*Schizothrix* sp.							2,699,075.4		ok	ok	ok
BJ2	2	19-Aug-2011	*Surirella angusta*							<98.1		Exclude	ok	ok
BJ2	2	19-Aug-2011	*Surirella* spp.							<98.1		Exclude	ok	ok
BJ2	2	19-Aug-2011	*Synedra acus*							7,845.0		ok	ok	ok
BJ2	2	19-Aug-2011	*Synedra* spp.							6,276.0		ok	ok	ok
BJ2	2	19-Aug-2011	*Tribonema* spp.	cf.						<98.1		Exclude	ok	Exclude
BJ2	2	19-Aug-2011	Unknown alga sp.							981.0		ok	Exclude	Exclude
BJ2	2	19-Aug-2011	Unknown Chlorophyte sp.							98.1		ok	ok	Exclude
BJ2	2	19-Aug-2011	Unknown Chrysophyte (cyst)							490.5		ok	ok	Exclude
BJ2	2	19-Aug-2011	Unknown Chrysophyte sp.							98.1		ok	ok	Exclude
BJ2	2	19-Aug-2011	Unknown Oscillatoriales							19,612.5		ok	ok	Exclude
BJ2	3	19-Aug-2011	*Achnanthes minutissima*							5,000.8		ok	ok	ok
BJ2	3	19-Aug-2011	*Achnanthes* spp.							1,052.8		ok	ok	ok
BJ2	3	19-Aug-2011	*Anabaena/Nostoc* sp.							3,948.0		ok	ok	ok
BJ2	3	19-Aug-2011	*Anomoeoneis* sp.							<131.6		Exclude	ok	ok
BJ2	3	19-Aug-2011	*Caloneis* spp.							<131.6		Exclude	ok	ok
BJ2	3	19-Aug-2011	*Calothrix/Rivularia* spp.							1,579.2		ok	ok	ok
BJ2	3	19-Aug-2011	*Chamaesiphon* spp.							13,263.9		ok	ok	ok
BJ2	3	19-Aug-2011	*Cymbella* cf. *cestaii*							51,040.6		ok	ok	Exclude
BJ2	3	19-Aug-2011	*Cymbella cistula*							<131.6		Exclude	ok	ok
BJ2	3	19-Aug-2011	*Cymbella minuta*							2,105.6		ok	ok	ok

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm²)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Diploneidaceae	*Diploneis*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum/parvulum*
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Neidiaceae	*Neidium*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pleurosigmataceae	*Pleurosigma/Gyrosigma*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Schizotrichaceae	*Schizothrix*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Surirellaceae	*Surirella*	*angusta*
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Surirellaceae	*Surirella*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*acus*
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BJ2	3	19-Aug-2011	MA	Include	110502		24.9								
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Chlorophyta	Chlorophyceae	Chaetophorales			
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Chrysophyta					
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Chrysophyta					
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Bacillariophyta	Bacillariophyceae				
BJ2	3	19-Aug-2011	MA	Include	110502		24.9			Cyanophyta	Myxophyceae	Oscillatoriales			
BJ2	1	7-Sep-2012	MA	Include	6204.5-1		58.9	150	0.0055%	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
BJ2	1	7-Sep-2012	MA	Include	6204.5-1		58.9	150	0.0055%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
BJ2	1	7-Sep-2012	MA	Include	6204.5-1		58.9	150	0.0055%	Bacillariophyta	Bacillariophyceae	Pennales	Rhopalodiaceae	*Epithemia*	
BJ2	1	7-Sep-2012	MA	Include	6204.5-1		58.9	150	0.0055%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	
BJ2	1	7-Sep-2012	MA	Include	6204.5-1		58.9	150	0.0055%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	
BJ2	1	7-Sep-2012	MA	Include	6204.5-1		58.9	150	0.0055%	Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*	
BJ2	1	7-Sep-2012	MA	Include	6204.5-1		58.9	150	0.0055%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	
BJ2	1	7-Sep-2012	MA	Include	6204.5-1		58.9	150	0.0055%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BJ2	1	7-Sep-2012	MA	Include	6204.5-1		58.9	150	0.0055%	Chlorophyta	Chlorophyceae	Oedogoniales	Oedogoniaceae	*Oedogonium*	
BJ2	1	7-Sep-2012	MA	Include	6204.5-1		58.9	150	0.0055%	Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	
BJ2	1	7-Sep-2012	MA	Include	6204.5-1		58.9	150	0.0055%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BJ2	2	7-Sep-2012	MA	Include	6204.5-2		58.9	140	0.0051%	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
BJ2	2	7-Sep-2012	MA	Include	6204.5-2		58.9	140	0.0051%	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Cosmarium*	
BJ2	2	7-Sep-2012	MA	Include	6204.5-2		58.9	140	0.0051%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
BJ2	2	7-Sep-2012	MA	Include	6204.5-2		58.9	140	0.0051%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	
BJ2	2	7-Sep-2012	MA	Include	6204.5-2		58.9	140	0.0051%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BJ2	2	7-Sep-2012	MA	Include	6204.5-2		58.9	140	0.0051%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	
BJ2	2	7-Sep-2012	MA	Include	6204.5-2		58.9	140	0.0051%	Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*	
BJ2	2	7-Sep-2012	MA	Include	6204.5-2		58.9	140	0.0051%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	
BJ2	2	7-Sep-2012	MA	Include	6204.5-2		58.9	140	0.0051%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BJ2	2	7-Sep-2012	MA	Include	6204.5-2		58.9	140	0.0051%	Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	
BJ2	2	7-Sep-2012	MA	Include	6204.5-2		58.9	140	0.0051%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BJ2	2	7-Sep-2012	MA	Include	6204.5-2		58.9	140	0.0051%	Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*
BJ2	3	7-Sep-2012	MA	Include	6204.5-3		58.9	150	0.0045%	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
BJ2	3	7-Sep-2012	MA	Include	6204.5-3		58.9	150	0.0045%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
BJ2	3	7-Sep-2012	MA	Include	6204.5-3		58.9	150	0.0045%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BJ2	3	7-Sep-2012	MA	Include	6204.5-3		58.9	150	0.0045%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	
BJ2	3	7-Sep-2012	MA	Include	6204.5-3		58.9	150	0.0045%	Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*	
BJ2	3	7-Sep-2012	MA	Include	6204.5-3		58.9	150	0.0045%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
BJ2	3	19-Aug-2011	*Cymbella* spp.							394.8		ok	ok	ok
BJ2	3	19-Aug-2011	*Diatoma mesodon*							131.6		ok	ok	ok
BJ2	3	19-Aug-2011	*Dinobryon* sp.							131.6		ok	ok	ok
BJ2	3	19-Aug-2011	*Diploneis* sp.							<131.6		Exclude	ok	ok
BJ2	3	19-Aug-2011	*Fragilaria vaucheriae*							263.2		ok	ok	ok
BJ2	3	19-Aug-2011	*Gomphonema angustatum/parvulum*							<131.6		Exclude	ok	ok
BJ2	3	19-Aug-2011	*Gomphonema* spp.							131.6		ok	ok	ok
BJ2	3	19-Aug-2011	*Hannaea arcus*							<131.6		Exclude	ok	ok
BJ2	3	19-Aug-2011	*Meridion circulare*							263.2		ok	ok	ok
BJ2	3	19-Aug-2011	*Navicula* spp.							526.4		ok	ok	ok
BJ2	3	19-Aug-2011	*Neidium* sp.							<131.6		Exclude	ok	ok
BJ2	3	19-Aug-2011	*Nitzschia* spp.							12,243.6		ok	ok	ok
BJ2	3	19-Aug-2011	*Oscillatoria* sp.	cf.						467,217.8		ok	ok	Exclude
BJ2	3	19-Aug-2011	*Phormidium* sp.							98,969.1		ok	ok	ok
BJ2	3	19-Aug-2011	*Pinnularia* spp.							394.8		ok	ok	ok
BJ2	3	19-Aug-2011	*Pleurosigma/Gyrosigma* sp.							<131.6		Exclude	ok	ok
BJ2	3	19-Aug-2011	*Pseudanabaena* sp.							51,015.0		ok	ok	ok
BJ2	3	19-Aug-2011	*Schizothrix* sp.							400,472.4		ok	ok	ok
BJ2	3	19-Aug-2011	*Surirella angusta*							394.8		ok	ok	ok
BJ2	3	19-Aug-2011	*Surirella* spp.							131.6		ok	ok	ok
BJ2	3	19-Aug-2011	*Synedra acus*							9,182.7		ok	ok	ok
BJ2	3	19-Aug-2011	*Synedra* spp.							8,162.4		ok	ok	ok
BJ2	3	19-Aug-2011	Unknown alga sp.							1,052.8		ok	Exclude	Exclude
BJ2	3	19-Aug-2011	Unknown Chaetophorales sp.							<131.6		Exclude	ok	Exclude
BJ2	3	19-Aug-2011	Unknown Chrysophyte (cyst)							1,316.0		ok	ok	Exclude
BJ2	3	19-Aug-2011	Unknown Chrysophyte sp.							263.2		ok	ok	Exclude
BJ2	3	19-Aug-2011	Unknown diatom							131.6		ok	ok	Exclude
BJ2	3	19-Aug-2011	Unknown Oscillatoriales							90,806.7		ok	ok	Exclude
BJ2	1	7-Sep-2012	*Achnanthes* sp.		11.0	1.3	14.0	256,084.7	1,707.2	29.0	33	ok	ok	ok
BJ2	1	7-Sep-2012	*Cymbella* sp.		5.0	1.0	5.0	91,458.8	609.7	10.4	120	ok	ok	ok
BJ2	1	7-Sep-2012	*Epithemia* sp.		1.0	1.0	1.0	18,291.8	121.9	2.1		ok	ok	ok
BJ2	1	7-Sep-2012	*Fragilaria* sp.		2.0	1.5	3.0	54,875.3	365.8	6.2	122	ok	ok	ok
BJ2	1	7-Sep-2012	*Hannaea* sp.		177.0	1.2	220.0	4,024,187.5	26,827.9	455.5		ok	ok	ok
BJ2	1	7-Sep-2012	*Melosira* sp.		3.0	6.0	18.0	329,251.7	2,195.0	37.3	1,205	ok	ok	ok
BJ2	1	7-Sep-2012	*Meridion* sp.		4.0	1.5	6.0	109,750.6	731.7	12.4		ok	ok	ok
BJ2	1	7-Sep-2012	*Navicula* sp.		17.0	1.0	17.0	310,959.9	2,073.1	35.2	78	ok	ok	ok
BJ2	1	7-Sep-2012	*Oedogonium* sp.		1.0	4.0	4.0	73,167.0	487.8	8.3	18,421	ok	ok	ok
BJ2	1	7-Sep-2012	*Oscillatoria* sp.		8.0	21.3	170.0	3,109,599.4	20,730.7	352.0	5	ok	ok	ok
BJ2	1	7-Sep-2012	*Synedra* sp.		75.0	1.2	93.0	1,701,133.8	11,340.9	192.5	98	ok	ok	ok
BJ2	2	7-Sep-2012	*Achnanthes* sp.		21.0	1.1	23.0	448,757.9	3,205.4	54.4	33	ok	ok	ok
BJ2	2	7-Sep-2012	*Cosmarium* sp.		1.0	1.0	1.0	19,511.2	139.4	2.4		ok	ok	ok
BJ2	2	7-Sep-2012	*Cymbella* sp.		3.0	1.0	3.0	58,533.6	418.1	7.1	120	ok	ok	ok
BJ2	2	7-Sep-2012	*Fragilaria* sp.		2.0	1.5	3.0	58,533.6	418.1	7.1	122	ok	ok	ok
BJ2	2	7-Sep-2012	*Gomphonema* sp.		6.0	1.0	6.0	117,067.3	836.2	14.2	183	ok	ok	ok
BJ2	2	7-Sep-2012	*Hannaea* sp.		89.0	1.1	102.0	1,990,143.6	14,215.3	241.3		ok	ok	ok
BJ2	2	7-Sep-2012	*Melosira* sp.		1.0	2.0	2.0	39,022.4	278.7	4.7	1,205	ok	ok	ok
BJ2	2	7-Sep-2012	*Meridion* sp.		2.0	3.0	6.0	117,067.3	836.2	14.2		ok	ok	ok
BJ2	2	7-Sep-2012	*Navicula* sp.		76.0	1.0	76.0	1,482,852.1	10,591.8	179.8	78	ok	ok	ok
BJ2	2	7-Sep-2012	*Oscillatoria* sp.		18.0	24.7	445.0	8,682,489.3	62,017.8	1,052.9	5	ok	ok	ok
BJ2	2	7-Sep-2012	*Synedra* sp.		84.0	1.2	97.0	1,892,587.6	13,518.5	229.5	98	ok	ok	ok
BJ2	2	7-Sep-2012	*Tabellaria flocculosa*		1.0	5.0	5.0	97,556.1	696.8	11.8	344	ok	ok	ok
BJ2	3	7-Sep-2012	*Achnanthes* sp.		6.0	1.2	7.0	155,202.8	1,034.7	17.6	33	ok	ok	ok
BJ2	3	7-Sep-2012	*Cymbella* sp.		3.0	1.0	3.0	66,515.5	443.4	7.5	120	ok	ok	ok
BJ2	3	7-Sep-2012	*Gomphonema* sp.		5.0	1.0	5.0	110,859.2	739.1	12.5	183	ok	ok	ok
BJ2	3	7-Sep-2012	*Hannaea* sp.		200.0	1.2	240.0	5,321,239.6	35,474.9	602.3		ok	ok	ok
BJ2	3	7-Sep-2012	*Melosira* sp.		4.0	3.5	14.0	310,405.6	2,069.4	35.1	1,205	ok	ok	ok
BJ2	3	7-Sep-2012	*Meridion* sp.		1.0	2.0	2.0	44,343.7	295.6	5.0		ok	ok	ok

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm²)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
BJ2	3	7-Sep-2012	MA	Include	6204.5-3		58.9	150	0.0045%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BJ2	3	7-Sep-2012	MA	Include	6204.5-3		58.9	150	0.0045%	Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	
BJ2	3	7-Sep-2012	MA	Include	6204.5-3		58.9	150	0.0045%	Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
BJ2	3	7-Sep-2012	MA	Include	6204.5-3		58.9	150	0.0045%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BJ2	1	14-Aug-2013	MA	Exclude	6530.05-10		58.9	262	0.0004%	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthidiaceae	*Achnanthidium*	
BJ2	1	14-Aug-2013	MA	Exclude	6530.05-10		58.9	262	0.0004%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
BJ2	1	14-Aug-2013	MA	Exclude	6530.05-10		58.9	262	0.0004%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BJ2	1	14-Aug-2013	MA	Exclude	6530.05-10		58.9	262	0.0004%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BJ2	1	14-Aug-2013	MA	Exclude	6530.05-10		58.9	262	0.0004%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BJ2	2	14-Aug-2013	MA	Exclude	6530.05-11		78.5	308	0.0006%	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Anabaena*	
BJ2	2	14-Aug-2013	MA	Exclude	6530.05-11		78.5	308	0.0006%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
BJ2	2	14-Aug-2013	MA	Exclude	6530.05-11		78.5	308	0.0006%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BJ2	2	14-Aug-2013	MA	Exclude	6530.05-11		78.5	308	0.0006%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Leptolyngbya*	
BJ2	2	14-Aug-2013	MA	Exclude	6530.05-11		78.5	308	0.0006%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	
BJ2	2	14-Aug-2013	MA	Exclude	6530.05-11		78.5	308	0.0006%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BJ2	2	14-Aug-2013	MA	Exclude	6530.05-11		78.5	308	0.0006%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BJ2	2	14-Aug-2013	MA	Exclude	6530.05-11		78.5	308	0.0006%	Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
BJ2	3	14-Aug-2013	MA	Exclude	6530.05-12		58.9	320	0.0006%	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthidiaceae	*Achnanthidium*	
BJ2	3	14-Aug-2013	MA	Exclude	6530.05-12		58.9	320	0.0006%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
BJ2	3	14-Aug-2013	MA	Exclude	6530.05-12		58.9	320	0.0006%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BJ2	3	14-Aug-2013	MA	Exclude	6530.05-12		58.9	320	0.0006%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Leptolyngbya*	
BJ2	3	14-Aug-2013	MA	Exclude	6530.05-12		58.9	320	0.0006%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BJ2	3	14-Aug-2013	MA	Exclude	6530.05-12		58.9	320	0.0006%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BJ2	3	14-Aug-2013	MA	Exclude	6530.05-12		58.9	320	0.0006%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
BJ3	1	7-Aug-2013	MA	Exclude	6530.05-01		58.9	204	0.0008%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
BJ3	1	7-Aug-2013	MA	Exclude	6530.05-01		58.9	204	0.0008%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BJ3	1	7-Aug-2013	MA	Exclude	6530.05-01		58.9	204	0.0008%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	
BJ3	1	7-Aug-2013	MA	Exclude	6530.05-01		58.9	204	0.0008%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BJ3	1	7-Aug-2013	MA	Exclude	6530.05-01		58.9	204	0.0008%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BJ3	2	7-Aug-2013	MA	Exclude	6530.05-02		58.9	500	0.0010%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
BJ3	2	7-Aug-2013	MA	Exclude	6530.05-02		58.9	500	0.0010%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BJ3	2	7-Aug-2013	MA	Exclude	6530.05-02		58.9	500	0.0010%	Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	
BJ3	2	7-Aug-2013	MA	Exclude	6530.05-02		58.9	500	0.0010%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	
BJ3	2	7-Aug-2013	MA	Exclude	6530.05-02		58.9	500	0.0010%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BJ3	2	7-Aug-2013	MA	Exclude	6530.05-02		58.9	500	0.0010%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BJ3	3	7-Aug-2013	MA	Exclude	6530.05-03		58.9	196	0.0006%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
BJ3	3	7-Aug-2013	MA	Exclude	6530.05-03		58.9	196	0.0006%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BJ3	3	7-Aug-2013	MA	Exclude	6530.05-03		58.9	196	0.0006%	Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	
BJ3	3	7-Aug-2013	MA	Exclude	6530.05-03		58.9	196	0.0006%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BJ3	3	7-Aug-2013	MA	Exclude	6530.05-03		58.9	196	0.0006%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
SC0	1	8-Aug-2013	MA	Include	6530.05-04		58.9	64	1.1389%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
SC0	1	8-Aug-2013	MA	Include	6530.05-04		58.9	64	1.1389%	Bacillariophyta	Bacillariophyceae	Pennales	Rhopalodiaceae	*Epithemia*	
SC0	1	8-Aug-2013	MA	Include	6530.05-04		58.9	64	1.1389%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
SC0	1	8-Aug-2013	MA	Include	6530.05-04		58.9	64	1.1389%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
SC0	1	8-Aug-2013	MA	Include	6530.05-04		58.9	64	1.1389%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
SC0	1	8-Aug-2013	MA	Include	6530.05-04		58.9	64	1.1389%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
SC0	2	8-Aug-2013	MA	Include	6530.05-05		58.9	60	1.2149%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
SC0	2	8-Aug-2013	MA	Include	6530.05-05		58.9	60	1.2149%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
SC0	2	8-Aug-2013	MA	Include	6530.05-05		58.9	60	1.2149%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
SC0	3	8-Aug-2013	MA	Include	6530.05-06		58.9	59	1.2355%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
SC0	3	8-Aug-2013	MA	Include	6530.05-06		58.9	59	1.2355%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
SC0	3	8-Aug-2013	MA	Include	6530.05-06		58.9	59	1.2355%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
SC0	3	8-Aug-2013	MA	Include	6530.05-06		58.9	59	1.2355%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
SC0	3	8-Aug-2013	MA	Include	6530.05-06		58.9	59	1.2355%	Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	
SC1	1	19-Aug-2008	MA	Include	MC82					Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Caloneis*	*ventricosa*
SC1	1	19-Aug-2008	MA	Include	MC82					Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
SC1	1	19-Aug-2008	MA	Include	MC82					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
BJ2	3	7-Sep-2012	*Navicula* sp.		24.0	1.0	24.0	532,124.0	3,547.5	60.2	78	ok	ok	ok
BJ2	3	7-Sep-2012	*Oscillatoria* sp.		9.0	25.6	230.0	5,099,521.3	33,996.8	577.2	5	ok	ok	ok
BJ2	3	7-Sep-2012	*Phormidium* sp.		3.0	27.3	82.0	1,818,090.2	12,120.6	205.8		ok	ok	ok
BJ2	3	7-Sep-2012	*Synedra* sp.		51.0	1.2	63.0	1,396,825.4	9,312.2	158.1	98	ok	ok	ok
BJ2	1	14-Aug-2013	*Achnanthidium* sp.		8.0	1.0	8.0	1,858,442.9	7,093.3	120.4		ok	ok	ok
BJ2	1	14-Aug-2013	*Cymbella* sp.		12.0	1.0	12.0	2,787,664.4	10,639.9	180.6		ok	ok	ok
BJ2	1	14-Aug-2013	*Hannaea arcus*		270.0	1.0	270.0	62,722,449.0	239,398.7	4,064.5		ok	ok	ok
BJ2	1	14-Aug-2013	*Navicula* sp.		7.0	1.0	7.0	1,626,137.6	6,206.6	105.4		ok	ok	ok
BJ2	1	14-Aug-2013	*Nitzschia* sp.		3.0	1.0	3.0	696,916.1	2,660.0	45.2		ok	ok	ok
BJ2	2	14-Aug-2013	*Anabaena* sp.		1.0	14.0	14.0	2,317,463.7	7,524.2	95.9		ok	ok	ok
BJ2	2	14-Aug-2013	*Cymbella* sp.		9.0	1.0	9.0	1,489,798.1	4,837.0	61.6		ok	ok	ok
BJ2	2	14-Aug-2013	*Hannaea arcus*		268.0	1.0	268.0	44,362,876.6	144,035.3	1,834.8		ok	ok	ok
BJ2	2	14-Aug-2013	*Leptolyngbya* sp.		11.0	31.2	343.0	56,777,860.7	184,343.7	2,348.3		ok	ok	ok
BJ2	2	14-Aug-2013	*Meridion* sp.		5.0	1.0	5.0	827,665.6	2,687.2	34.2		ok	ok	ok
BJ2	2	14-Aug-2013	*Navicula* sp.		4.0	1.0	4.0	662,132.5	2,149.8	27.4		ok	ok	ok
BJ2	2	14-Aug-2013	*Nitzschia* sp.		1.0	1.0	1.0	165,533.1	537.4	6.8		ok	ok	ok
BJ2	2	14-Aug-2013	*Phormidium* sp.		1.0	19.0	19.0	3,145,129.3	10,211.5	130.1		ok	ok	ok
BJ2	3	14-Aug-2013	*Achnanthidium* sp.		7.0	1.0	7.0	1,102,444.4	3,445.1	58.5		ok	ok	ok
BJ2	3	14-Aug-2013	*Cymbella* sp.		19.0	1.0	19.0	2,992,349.2	9,351.1	158.8		ok	ok	ok
BJ2	3	14-Aug-2013	*Hannaea arcus*		241.0	1.0	241.0	37,955,587.3	118,611.2	2,013.8		ok	ok	ok
BJ2	3	14-Aug-2013	*Leptolyngbya* sp.		6.0	31.2	187.0	29,451,015.9	92,034.4	1,562.6		ok	ok	ok
BJ2	3	14-Aug-2013	*Navicula* sp.		17.0	1.0	17.0	2,677,365.1	8,366.8	142.1		ok	ok	ok
BJ2	3	14-Aug-2013	*Nitzschia* sp.		8.0	1.0	8.0	1,259,936.5	3,937.3	66.8		ok	ok	ok
BJ2	3	14-Aug-2013	*Pseudanabaena* sp.		2.0	13.0	26.0	4,094,793.7	12,796.2	217.3		ok	ok	ok
BJ3	1	7-Aug-2013	*Cymbella* sp.		44.0	1.0	44.0	5,444,564.7	26,689.0	453.1		ok	ok	ok
BJ3	1	7-Aug-2013	*Hannaea arcus*		229.0	1.0	229.0	28,336,484.2	138,904.3	2,358.3		ok	ok	ok
BJ3	1	7-Aug-2013	*Meridion* sp.		13.0	1.3	17.0	2,103,581.8	10,311.7	175.1		ok	ok	ok
BJ3	1	7-Aug-2013	*Nitzschia* sp.		9.0	1.0	9.0	1,113,661.0	5,459.1	92.7		ok	ok	ok
BJ3	1	7-Aug-2013	*Synedra* sp.		5.0	1.0	5.0	618,700.5	3,032.8	51.5		ok	ok	ok
BJ3	2	7-Aug-2013	*Cymbella* sp.		125.0	1.0	125.0	12,804,232.8	25,608.5	434.8		ok	ok	ok
BJ3	2	7-Aug-2013	*Hannaea arcus*		159.0	1.0	159.0	16,286,984.1	32,574.0	553.0		ok	ok	ok
BJ3	2	7-Aug-2013	*Homoeothrix* sp.		1.0	76.0	76.0	7,784,973.5	15,569.9	264.3		ok	ok	ok
BJ3	2	7-Aug-2013	*Meridion* sp.		1.0	1.0	1.0	102,433.9	204.9	3.5		ok	ok	ok
BJ3	2	7-Aug-2013	*Nitzschia* sp.		7.0	1.0	7.0	717,037.0	1,434.1	24.3		ok	ok	ok
BJ3	2	7-Aug-2013	*Synedra* sp.		7.0	1.0	7.0	717,037.0	1,434.1	24.3		ok	ok	ok
BJ3	3	7-Aug-2013	*Cymbella* sp.		100.0	1.0	100.0	17,823,492.1	90,936.2	1,543.9		ok	ok	ok
BJ3	3	7-Aug-2013	*Hannaea arcus*		185.0	1.0	185.0	32,973,460.3	168,231.9	2,856.2		ok	ok	ok
BJ3	3	7-Aug-2013	*Homoeothrix* sp.		9.0	21.3	192.0	34,221,104.8	174,597.5	2,964.3		ok	ok	ok
BJ3	3	7-Aug-2013	*Nitzschia* sp.		3.0	1.0	3.0	534,704.8	2,728.1	46.3		ok	ok	ok
BJ3	3	7-Aug-2013	*Synedra* sp.		3.0	1.0	3.0	534,704.8	2,728.1	46.3		ok	ok	ok
SC0	1	8-Aug-2013	*Cymbella* sp.		12.0	1.0	12.0	1,053.6	16.5	0.3		ok	ok	ok
SC0	1	8-Aug-2013	*Epithemia* sp.		1.0	1.0	1.0	87.8	1.4	0.0		ok	ok	ok
SC0	1	8-Aug-2013	*Hannaea arcus*		5.0	1.0	5.0	439.0	6.9	0.1		ok	ok	ok
SC0	1	8-Aug-2013	*Navicula* sp.		28.0	1.0	28.0	2,458.4	38.4	0.7		ok	ok	ok
SC0	1	8-Aug-2013	*Nitzschia* sp.		21.0	1.0	21.0	1,843.8	28.8	0.5		ok	ok	ok
SC0	1	8-Aug-2013	*Synedra* sp.		1.0	1.0	1.0	87.8	1.4	0.0		ok	ok	ok
SC0	2	8-Aug-2013	*Hannaea arcus*		1.0	1.0	1.0	82.3	1.4	0.0		ok	ok	ok
SC0	2	8-Aug-2013	*Navicula* sp.		1.0	1.0	1.0	82.3	1.4	0.0		ok	ok	ok
SC0	2	8-Aug-2013	*Nitzschia* sp.		1.0	1.0	1.0	82.3	1.4	0.0		ok	ok	ok
SC0	3	8-Aug-2013	*Cymbella* sp.		2.0	1.0	2.0	161.9	2.7	0.0		ok	ok	ok
SC0	3	8-Aug-2013	*Hannaea arcus*		21.0	1.1	23.0	1,861.6	31.6	0.5		ok	ok	ok
SC0	3	8-Aug-2013	*Navicula* sp.		4.0	1.0	4.0	323.8	5.5	0.1		ok	ok	ok
SC0	3	8-Aug-2013	*Nitzschia* sp.		5.0	1.0	5.0	404.7	6.9	0.1		ok	ok	ok
SC0	3	8-Aug-2013	*Oscillatoria* sp.		1.0	1.0	1.0	80.9	1.4	0.0		ok	ok	ok
SC1	1	19-Aug-2008	*Caloneis ventricosa*							1,683.2	412,377	ok	ok	ok
SC1	1	19-Aug-2008	*Cymbella minuta*							52,178.3	19,305,969	ok	ok	ok
SC1	1	19-Aug-2008	*Fragilaria vaucheriae*							6,732.7	1,939,013	ok	ok	ok

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm^2)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
SC1	1	19-Aug-2008	MA	Include	MC82					Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
SC1	1	19-Aug-2008	MA	Include	MC82					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
SC1	1	19-Aug-2008	MA	Include	MC82					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
SC1	1	19-Aug-2008	MA	Include	MC82					Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	*mutica*
SC1	1	19-Aug-2008	MA	Include	MC82					Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
SC1	1	19-Aug-2008	MA	Include	MC82					Bacillariophyta	Bacillariophyceae	Pennales	Rhoicospheniaceae	*Rhoicosphenia*	*abbreviata*
SC1	2	19-Aug-2008	MA	Include	MC83					Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
SC1	2	19-Aug-2008	MA	Include	MC83					Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
SC1	2	19-Aug-2008	MA	Include	MC83					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
SC1	2	19-Aug-2008	MA	Include	MC83					Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
SC1	2	19-Aug-2008	MA	Include	MC83					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
SC1	2	19-Aug-2008	MA	Include	MC83					Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	*mutica*
SC1	2	19-Aug-2008	MA	Include	MC83					Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
SC1	3	19-Aug-2008	MA	Include	MC84					Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*flexella*
SC1	3	19-Aug-2008	MA	Include	MC84					Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*lanceolata*
SC1	3	19-Aug-2008	MA	Include	MC84					Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
SC1	3	19-Aug-2008	MA	Include	MC84					Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Caloneis*	*ventricosa*
SC1	3	19-Aug-2008	MA	Include	MC84					Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
SC1	3	19-Aug-2008	MA	Include	MC84					Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
SC1	3	19-Aug-2008	MA	Include	MC84					Bacillariophyta	Bacillariophyceae	Pennales	Not Designated	*Diatomella*	*balfouriana*
SC1	3	19-Aug-2008	MA	Include	MC84					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
SC1	3	19-Aug-2008	MA	Include	MC84					Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
SC1	3	19-Aug-2008	MA	Include	MC84					Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	*cryptocephala*
SC1	3	19-Aug-2008	MA	Include	MC84					Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	*gregaria*
SC1	3	19-Aug-2008	MA	Include	MC84					Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	*frustulum*
SC1	3	19-Aug-2008	MA	Include	MC84					Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	*microcephala*
SC1	1	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
SC1	1	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
SC1	1	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
SC1	1	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
SC1	1	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*subclavatum*
SC1	1	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
SC1	2	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*hauckiana*
SC1	2	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
SC1	2	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
SC1	2	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
SC1	2	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*olivaceum*
SC1	2	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
SC1	2	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*rumpens*
SC1	2	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*ulna*
SC1	3	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*lanceolata*
SC1	3	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Caloneis*	*ventricosa*
SC1	3	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
SC1	3	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
SC1	3	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*construens*
SC1	3	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
SC1	3	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
SC1	3	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
SC1	3	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
SC1	3	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	*minima*
SC1	3	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	*mutica*
SC2	1	18-Aug-2008	MA	Include	MC28										
SC2	2	18-Aug-2008	MA	Include	MC29					Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
SC2	2	18-Aug-2008	MA	Include	MC29					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
SC2	2	18-Aug-2008	MA	Include	MC29					Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
SC2	2	18-Aug-2008	MA	Include	MC29					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
SC2	2	18-Aug-2008	MA	Include	MC29					Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	*paleacea*

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
SC1	1	19-Aug-2008	*Gomphonema angustatum*							11,782.2	2,120,795	ok	ok	ok
SC1	1	19-Aug-2008	*Hannaea arcus*							3,366.3	5,891,098	ok	ok	ok
SC1	1	19-Aug-2008	*Meridion circulare*							5,049.5	1,944,062	ok	ok	ok
SC1	1	19-Aug-2008	*Navicula mutica*							1,683.2	92,574	ok	ok	ok
SC1	1	19-Aug-2008	*Pinnularia* sp.							1,683.2	673,268	ok	ok	ok
SC1	1	19-Aug-2008	*Rhoicosphenia abbreviata*							1,683.2	196,931	ok	ok	ok
SC1	2	19-Aug-2008	*Achnanthes minutissima*							1,355.2	67,758	ok	ok	ok
SC1	2	19-Aug-2008	*Cymbella minuta*							18,972.4	7,019,772	ok	ok	ok
SC1	2	19-Aug-2008	*Fragilaria vaucheriae*							13,551.7	3,902,885	ok	ok	ok
SC1	2	19-Aug-2008	*Gomphonema angustatum*							9,486.2	1,707,512	ok	ok	ok
SC1	2	19-Aug-2008	*Meridion circulare*							1,355.2	521,740	ok	ok	ok
SC1	2	19-Aug-2008	*Navicula mutica*							1,355.2	74,534	ok	ok	ok
SC1	2	19-Aug-2008	*Pinnularia* sp.							1,355.2	542,067	ok	ok	ok
SC1	3	19-Aug-2008	*Achnanthes flexella*							1,482.3	718,892	ok	ok	ok
SC1	3	19-Aug-2008	*Achnanthes lanceolata*							4,446.8	800,416	ok	ok	ok
SC1	3	19-Aug-2008	*Achnanthes minutissima*							8,893.5	444,676	ok	ok	ok
SC1	3	19-Aug-2008	*Caloneis ventricosa*							1,482.3	363,152	ok	ok	ok
SC1	3	19-Aug-2008	*Cymbella minuta*							54,843.3	20,292,035	ok	ok	ok
SC1	3	19-Aug-2008	*Cymbella sinuata*							2,964.5	415,031	ok	ok	ok
SC1	3	19-Aug-2008	*Diatomella balfouriana*							1,482.3	889,351	ok	ok	ok
SC1	3	19-Aug-2008	*Fragilaria vaucheriae*							7,411.3	2,134,443	ok	ok	ok
SC1	3	19-Aug-2008	*Gomphonema angustatum*							14,822.5	3,201,665	ok	ok	ok
SC1	3	19-Aug-2008	*Navicula cryptocephala* var. *veneta*							4,446.8	422,442	ok	ok	ok
SC1	3	19-Aug-2008	*Navicula gregaria*							1,482.3	259,394	ok	ok	ok
SC1	3	19-Aug-2008	*Nitzschia frustulum*							1,482.3	177,870	ok	ok	ok
SC1	3	19-Aug-2008	*Nitzschia microcephala*							1,482.3	148,225	ok	ok	ok
SC1	1	21-Aug-2009	*Achnanthes minutissima*							719.1	71,907	ok	ok	ok
SC1	1	21-Aug-2009	*Cymbella minuta*							2,396.9	886,852	ok	ok	ok
SC1	1	21-Aug-2009	*Fragilaria vaucheriae*							239.7	69,031	ok	ok	ok
SC1	1	21-Aug-2009	*Gomphonema angustatum*							4,074.7	880,140	ok	ok	ok
SC1	1	21-Aug-2009	*Gomphonema subclavatum*							239.7	143,814	ok	ok	ok
SC1	1	21-Aug-2009	*Hannaea arcus*							958.8	1,677,827	ok	ok	ok
SC1	2	21-Aug-2009	*Achnanthes hauckiana*							1,249.4	59,973	ok	ok	ok
SC1	2	21-Aug-2009	*Cymbella minuta*							49,977.8	18,491,800	ok	ok	ok
SC1	2	21-Aug-2009	*Fragilaria vaucheriae*							9,995.6	3,454,468	ok	ok	ok
SC1	2	21-Aug-2009	*Gomphonema angustatum*							11,245.0	2,428,923	ok	ok	ok
SC1	2	21-Aug-2009	*Gomphonema olivaceum*							1,249.4	281,125	ok	ok	ok
SC1	2	21-Aug-2009	*Hannaea arcus*							4,997.8	8,746,121	ok	ok	ok
SC1	2	21-Aug-2009	*Synedra rumpens*							1,249.4	174,922	ok	ok	ok
SC1	2	21-Aug-2009	*Synedra ulna*							2,498.9	4,972,795	ok	ok	ok
SC1	3	21-Aug-2009	*Achnanthes lanceolata*							1,797.7	323,581	ok	ok	ok
SC1	3	21-Aug-2009	*Caloneis ventricosa* var. *minuta*							599.2	167,783	ok	ok	ok
SC1	3	21-Aug-2009	*Cymbella minuta*							4,194.6	1,551,990	ok	ok	ok
SC1	3	21-Aug-2009	*Cymbella sinuata*							599.2	83,891	ok	ok	ok
SC1	3	21-Aug-2009	*Fragilaria construens* var. *venter*							599.2	28,763	ok	ok	ok
SC1	3	21-Aug-2009	*Fragilaria vaucheriae*							2,396.9	690,306	ok	ok	ok
SC1	3	21-Aug-2009	*Gomphonema angustatum*							5,992.2	1,294,324	ok	ok	ok
SC1	3	21-Aug-2009	*Hannaea arcus*							1,198.4	2,097,284	ok	ok	ok
SC1	3	21-Aug-2009	*Meridion circulare*							1,198.4	461,403	ok	ok	ok
SC1	3	21-Aug-2009	*Navicula minima*							599.2	26,366	ok	ok	ok
SC1	3	21-Aug-2009	*Navicula mutica*							10,786.0	593,232	ok	ok	ok
SC2	1	18-Aug-2008								<1699		Exclude	ok	ok
SC2	2	18-Aug-2008	*Cymbella minuta*							9,222.9	3,412,474	ok	ok	ok
SC2	2	18-Aug-2008	*Fragilaria vaucheriae*							2,305.7	664,049	ok	ok	ok
SC2	2	18-Aug-2008	*Gomphonema angustatum*							4,611.5	1,245,092	ok	ok	ok
SC2	2	18-Aug-2008	*Meridion circulare*							2,305.7	887,704	ok	ok	ok
SC2	2	18-Aug-2008	*Nitzschia paleacea*							2,305.7	225,961	ok	ok	ok

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm²)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
SC2	3	18-Aug-2008	MA	Include	MC30					Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*lanceolata*
SC2	3	18-Aug-2008	MA	Include	MC30					Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
SC2	3	18-Aug-2008	MA	Include	MC30					Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
SC2	3	18-Aug-2008	MA	Include	MC30					Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	*cryptocephala*
SC2	3	18-Aug-2008	MA	Include	MC30					Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	*mutica*
SC2	3	18-Aug-2008	MA	Include	MC30					Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	*borealis*
SC2	1	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
SC2	2	21-Aug-2009	MA	Include			8								
SC2	3	21-Aug-2009	MA	Include			8								
SC2	1	5-Sep-2013	MA	Include	6538.01-25		58.9	102	0.9188%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
SC2	1	5-Sep-2013	MA	Include	6538.01-25		58.9	102	0.9188%	Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
SC2	2	5-Sep-2013	MA	Include	6538.01-26		58.9	119	0.9844%	Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
SC2	3	5-Sep-2013	MA	Include	6538.01-27		58.9	92	1.0187%	Chrysophyta	Chrysophyceae	Chromulinales	Chrysosphaeraceae	*Chrysosphaera*	
SC2	3	5-Sep-2013	MA	Include	6538.01-27		58.9	92	1.0187%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
SC2	3	5-Sep-2013	MA	Include	6538.01-27		58.9	92	1.0187%	Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
SC3	2	19-Aug-2008	MA	Include	MC23					Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*lanceolata*
SC3	2	19-Aug-2008	MA	Include	MC23					Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
SC3	2	19-Aug-2008	MA	Include	MC23					Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*tumida*
SC3	2	19-Aug-2008	MA	Include	MC23					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
SC3	2	19-Aug-2008	MA	Include	MC23					Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
SC3	2	19-Aug-2008	MA	Include	MC23					Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	*gregaria*
SC3	2	19-Aug-2008	MA	Include	MC23					Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	*mutica*
SC3	2	19-Aug-2008	MA	Include	MC23					Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
SC3	3	19-Aug-2008	MA	Include	MC24					Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*tumida*
SC3	3	19-Aug-2008	MA	Include	MC24					Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
SC3	3	19-Aug-2008	MA	Include	MC24					Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	*mutica*
SC3	3	19-Aug-2008	MA	Include	MC24					Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	*palea*
SC3	3	19-Aug-2008	MA	Include	MC24					Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	*paleacea*
SC3	3	19-Aug-2008	MA	Include	MC24					Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	*palea*
SC3	3	19-Aug-2008	MA	Include	MC24					Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	*paleacea*
SC3	1	19-Sep-2008	MA	Include	MC30										
SC3	1	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
SC3	2	21-Aug-2009	MA	Include			8			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
SC3	2	21-Aug-2009	MA	Include			8			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	
SC3	1	5-Sep-2013	MA	Include	6538.01-22		58.9	76	0.4624%	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthidiaceae	*Achnanthidium*	
SC3	1	5-Sep-2013	MA	Include	6538.01-22		58.9	76	0.4624%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
SC3	1	5-Sep-2013	MA	Include	6538.01-22		58.9	76	0.4624%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
SC3	1	5-Sep-2013	MA	Include	6538.01-22		58.9	76	0.4624%	Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	
SC3	1	5-Sep-2013	MA	Include	6538.01-22		58.9	76	0.4624%	Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
SC3	1	5-Sep-2013	MA	Include	6538.01-22		58.9	76	0.4624%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
SC3	1	5-Sep-2013	MA	Include	6538.01-22		58.9	76	0.4624%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
SC3	1	5-Sep-2013	MA	Include	6538.01-22		58.9	76	0.4624%	Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
SC3	2	5-Sep-2013	MA	Include	6538.01-23		58.9	77	1.2847%	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthidiaceae	*Achnanthidium*	
SC3	2	5-Sep-2013	MA	Include	6538.01-23		58.9	77	1.2847%	Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
SC3	2	5-Sep-2013	MA	Include	6538.01-23		58.9	77	1.2847%	Chrysophyta	Chrysophyceae	Chromulinales	Chrysosphaeraceae	*Chrysosphaera*	
SC3	2	5-Sep-2013	MA	Include	6538.01-23		58.9	77	1.2847%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
SC3	2	5-Sep-2013	MA	Include	6538.01-23		58.9	77	1.2847%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
SC3	2	5-Sep-2013	MA	Include	6538.01-23		58.9	77	1.2847%	Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	
SC3	2	5-Sep-2013	MA	Include	6538.01-23		58.9	77	1.2847%	Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
SC3	3	5-Sep-2013	MA	Include	6538.01-24		58.9	105	0.8926%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
SC3	3	5-Sep-2013	MA	Include	6538.01-24		58.9	105	0.8926%	Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
UR1A	1	17-Aug-2008	MA	Include	MC31					Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*lanceolata*
UR1A	1	17-Aug-2008	MA	Include	MC31					Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
UR1A	1	17-Aug-2008	MA	Include	MC31					Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
UR1A	1	17-Aug-2008	MA	Include	MC31					Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
UR1A	1	17-Aug-2008	MA	Include	MC31					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
UR1A	1	17-Aug-2008	MA	Include	MC31					Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
UR1A	1	17-Aug-2008	MA	Include	MC31					Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*tenellum*
UR1A	1	17-Aug-2008	MA	Include	MC31					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
SC2	3	18-Aug-2008	*Achnanthes lanceolata*							2,962.9	533,330	ok	ok	ok
SC2	3	18-Aug-2008	*Cymbella minuta*							1,481.5	548,145	ok	ok	ok
SC2	3	18-Aug-2008	*Gomphonema angustatum*							4,444.4	799,996	ok	ok	ok
SC2	3	18-Aug-2008	*Navicula cryptocephala*							1,481.5	274,073	ok	ok	ok
SC2	3	18-Aug-2008	*Navicula mutica*							7,407.4	407,405	ok	ok	ok
SC2	3	18-Aug-2008	*Pinnularia borealis*							1,481.5	325,924	ok	ok	ok
SC2	1	21-Aug-2009	*Gomphonema angustatum*							193.2	34,771	ok	ok	ok
SC2	2	21-Aug-2009								0.0		ok	ok	ok
SC2	3	21-Aug-2009								0.0		ok	ok	ok
SC2	1	5-Sep-2013	*Hannaea arcus*		3.0	1.0	3.0	326.5	3.2	0.1		ok	ok	ok
SC2	1	5-Sep-2013	*Hydrurus foetidus*		10.0	2.9	29.0	3,156.2	30.9	0.5		ok	ok	ok
SC2	2	5-Sep-2013	*Hydrurus foetidus*		16.0	7.6	122.0	12,392.8	104.1	1.8		ok	ok	ok
SC2	3	5-Sep-2013	*Chrysosphaera* sp.		1.0	32.0	32.0	3,141.3	34.1	0.6		ok	ok	ok
SC2	3	5-Sep-2013	*Cymbella* sp.		1.0	1.0	1.0	98.2	1.1	0.0		ok	ok	ok
SC2	3	5-Sep-2013	*Hydrurus foetidus*		10.0	4.3	43.0	4,221.1	45.9	0.8		ok	ok	ok
SC3	2	19-Aug-2008	*Achnanthes lanceolata*							6,101.2	1,098,214	ok	ok	ok
SC3	2	19-Aug-2008	*Cymbella minuta*							6,101.2	2,257,440	ok	ok	ok
SC3	2	19-Aug-2008	*Cymbella tumida*							79,315.5	198,288,690	ok	ok	ok
SC3	2	19-Aug-2008	*Fragilaria vaucheriae*							6,101.2	1,757,143	ok	ok	ok
SC3	2	19-Aug-2008	*Gomphonema angustatum*							36,607.1	6,589,286	ok	ok	ok
SC3	2	19-Aug-2008	*Navicula gregaria*							18,303.6	3,203,125	ok	ok	ok
SC3	2	19-Aug-2008	*Navicula mutica*							12,202.4	671,131	ok	ok	ok
SC3	2	19-Aug-2008	*Navicula* sp.							6,101.2	915,179	ok	ok	ok
SC3	3	19-Aug-2008	*Cymbella tumida*							18,791.7	46,979,167	ok	ok	ok
SC3	3	19-Aug-2008	*Gomphonema angustatum*							6,263.9	1,127,500	ok	ok	ok
SC3	3	19-Aug-2008	*Navicula mutica*							6,263.9	344,514	ok	ok	ok
SC3	3	19-Aug-2008	*Nitzschia palea*							12,527.8	2,255,000	ok	ok	ok
SC3	3	19-Aug-2008	*Nitzschia paleacea*							6,263.9	613,861	ok	ok	ok
SC3	1	19-Sep-2008								<2224		Exclude	ok	ok
SC3	1	21-Aug-2009	*Gomphonema angustatum*							199.7	35,953	ok	ok	ok
SC3	2	21-Aug-2009	*Gomphonema angustatum*							248.1	44,663	ok	ok	ok
SC3	2	21-Aug-2009	*Oscillatoria* sp.							124.1	307,680	ok	ok	ok
SC3	1	5-Sep-2013	*Achnanthidium* sp.		17.0	1.0	17.0	3,676.2	48.4	0.8		ok	ok	ok
SC3	1	5-Sep-2013	*Cymbella* sp.		79.0	1.0	79.0	17,083.7	224.8	3.8		ok	ok	ok
SC3	1	5-Sep-2013	*Gomphonema* sp.		38.0	1.0	38.0	8,217.5	108.1	1.8		ok	ok	ok
SC3	1	5-Sep-2013	*Homoeothrix* sp.		56.0	7.1	400.0	86,499.7	1,138.2	19.3		ok	ok	ok
SC3	1	5-Sep-2013	*Hydrurus foetidus*		34.0	8.3	282.0	60,982.3	802.4	13.6		ok	ok	ok
SC3	1	5-Sep-2013	*Navicula* sp.		8.0	1.0	8.0	1,730.0	22.8	0.4		ok	ok	ok
SC3	1	5-Sep-2013	*Nitzschia* sp.		13.0	1.0	13.0	2,811.2	37.0	0.6		ok	ok	ok
SC3	1	5-Sep-2013	*Phormidium* sp.		55.0	15.1	828.0	179,054.4	2,356.0	40.0		ok	ok	ok
SC3	2	5-Sep-2013	*Achnanthidium* sp.		1.0	1.0	1.0	77.8	1.0	0.0		ok	ok	ok
SC3	2	5-Sep-2013	*Chamaesiphon* sp.		1.0	1.0	1.0	77.8	1.0	0.0		ok	ok	ok
SC3	2	5-Sep-2013	*Chrysosphaera* sp.		3.0	28.7	86.0	6,693.9	86.9	1.5		ok	ok	ok
SC3	2	5-Sep-2013	*Cymbella* sp.		11.0	1.0	11.0	856.2	11.1	0.2		ok	ok	ok
SC3	2	5-Sep-2013	*Hannaea arcus*		5.0	1.0	5.0	389.2	5.1	0.1		ok	ok	ok
SC3	2	5-Sep-2013	*Homoeothrix* sp.		3.0	13.0	39.0	3,035.6	39.4	0.7		ok	ok	ok
SC3	2	5-Sep-2013	*Hydrurus foetidus*		22.0	4.7	103.0	8,017.1	104.1	1.8		ok	ok	ok
SC3	3	5-Sep-2013	*Cymbella* spp.		6.0	1.0	6.0	672.2	6.4	0.1		ok	ok	ok
SC3	3	5-Sep-2013	*Hydrurus foetidus*		161.0	7.7	1,240.0	138,925.9	1,323.1	22.5		ok	ok	ok
UR1A	1	17-Aug-2008	*Achnanthes lanceolata*							1,772.8	319,104	ok	ok	ok
UR1A	1	17-Aug-2008	*Achnanthes minutissima*							1,772.8	88,640	ok	ok	ok
UR1A	1	17-Aug-2008	*Cymbella minuta*							6,204.8	2,295,774	ok	ok	ok
UR1A	1	17-Aug-2008	*Cymbella sinuata*							1,772.8	248,192	ok	ok	ok
UR1A	1	17-Aug-2008	*Fragilaria vaucheriae*							886.4	255,283	ok	ok	ok
UR1A	1	17-Aug-2008	*Gomphonema angustatum*							64,707.2	11,647,288	ok	ok	ok
UR1A	1	17-Aug-2008	*Gomphonema tenellum*							886.4	186,144	ok	ok	ok
UR1A	1	17-Aug-2008	*Hannaea arcus*							5,318.4	9,307,193	ok	ok	ok

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm²)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
UR1A	1	17-Aug-2008	MA	Include	MC31					Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
UR1A	1	17-Aug-2008	MA	Include	MC31					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*tenera*
UR1A	2	17-Aug-2008	MA	Include	MC32					Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
UR1A	2	17-Aug-2008	MA	Include	MC32					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
UR1A	2	17-Aug-2008	MA	Include	MC32					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
UR1A	2	17-Aug-2008	MA	Include	MC32					Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	*cryptocephala*
UR1A	3	17-Aug-2008	MA	Include	MC33					Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
UR1A	3	17-Aug-2008	MA	Include	MC33					Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
UR1A	3	17-Aug-2008	MA	Include	MC33					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
UR1A	3	17-Aug-2008	MA	Include	MC33					Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
UR1A	3	17-Aug-2008	MA	Include	MC33					Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*subclavatum*
UR1A	3	17-Aug-2008	MA	Include	MC33					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
UR1A	3	17-Aug-2008	MA	Include	MC33					Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	*cryptocephala*
UR1A	3	17-Aug-2008	MA	Include	MC33					Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	*gregaria*
UR1A	3	17-Aug-2008	MA	Include	MC33					Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	*microcephala*
UR1A	3	17-Aug-2008	MA	Include	MC33					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*radians*
UR1A	1	14-Aug-2009	MA	Include			12			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
UR1A	1	14-Aug-2009	MA	Include			12			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
UR1A	1	14-Aug-2009	MA	Include			12			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Hantzschia*	*amphioxys*
UR1A	2	14-Aug-2009	MA	Include			12			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*affinis*
UR1A	2	14-Aug-2009	MA	Include			12			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
UR1A	2	14-Aug-2009	MA	Include			12			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
UR1A	2	14-Aug-2009	MA	Include			12			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	
UR1A	3	14-Aug-2009	MA	Include			16			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
UR1A	3	14-Aug-2009	MA	Include			16			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
UR1A	3	14-Aug-2009	MA	Include			16			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
UR1	1	19-Aug-2008	MA	Include	MC37										
UR1	2	19-Aug-2008	MA	Include	MC38					Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
UR1	2	19-Aug-2008	MA	Include	MC38					Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	*frustulum*
UR1	3	19-Aug-2008	MA	Include	MC39					Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	*palea*
UR1	1	14-Aug-2009	MA	Include			16			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*pinnata*
UR1	1	14-Aug-2009	MA	Include			16			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
UR1	1	14-Aug-2009	MA	Include			16			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
UR1	2	14-Aug-2009	MA	Include			16			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
UR1	2	14-Aug-2009	MA	Include			16			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	*cryptocephala*
UR1	3	14-Aug-2009	MA	Include			12			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
UR1	3	14-Aug-2009	MA	Include			12			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
UR1	3	14-Aug-2009	MA	Include			12			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
UR1	1	3-Sep-2013	MA	Include	6538.01-16		58.9	108	0.0084%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
UR1	1	3-Sep-2013	MA	Include	6538.01-16		58.9	108	0.0084%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
UR1	1	3-Sep-2013	MA	Include	6538.01-16		58.9	108	0.0084%	Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
UR1	1	3-Sep-2013	MA	Include	6538.01-16		58.9	108	0.0084%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Leptolyngbya*	
UR1	2	3-Sep-2013	MA	Include	6538.01-17		58.9	86	0.4843%	Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
UR1	2	3-Sep-2013	MA	Include	6538.01-17		58.9	86	0.4843%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
UR1	2	3-Sep-2013	MA	Include	6538.01-17		58.9	86	0.4843%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
UR1	2	3-Sep-2013	MA	Include	6538.01-17		58.9	86	0.4843%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
UR1	2	3-Sep-2013	MA	Include	6538.01-17		58.9	86	0.4843%	Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
UR1	2	3-Sep-2013	MA	Include	6538.01-17		58.9	86	0.4843%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Leptolyngbya*	
UR1	2	3-Sep-2013	MA	Include	6538.01-17		58.9	86	0.4843%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
UR1	2	3-Sep-2013	MA	Include	6538.01-17		58.9	86	0.4843%	Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
UR1	3	3-Sep-2013	MA	Include	6538.01-18		58.9	66	0.0631%	Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
UR1	3	3-Sep-2013	MA	Include	6538.01-18		58.9	66	0.0631%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
UR1	3	3-Sep-2013	MA	Include	6538.01-18		58.9	66	0.0631%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
UR1	3	3-Sep-2013	MA	Include	6538.01-18		58.9	66	0.0631%	Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
UR1	3	3-Sep-2013	MA	Include	6538.01-18		58.9	66	0.0631%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Leptolyngbya*	
UR1	3	3-Sep-2013	MA	Include	6538.01-18		58.9	66	0.0631%	Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
UR2	1	14-Aug-2009	MA	Include			16			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
UR1A	1	17-Aug-2008	*Navicula* sp.							886.4	265,920	ok	ok	ok
UR1A	1	17-Aug-2008	*Synedra tenera*							886.4	265,920	ok	ok	ok
UR1A	2	17-Aug-2008	*Gomphonema angustatum*							590.9	106,368	ok	ok	ok
UR1A	2	17-Aug-2008	*Hannaea arcus*							590.9	1,034,133	ok	ok	ok
UR1A	2	17-Aug-2008	*Meridion circulare*							2,363.7	910,037	ok	ok	ok
UR1A	2	17-Aug-2008	*Navicula cryptocephala* var. *veneta*							1,772.8	168,416	ok	ok	ok
UR1A	3	17-Aug-2008	*Achnanthes minutissima*							12,045.9	602,297	ok	ok	ok
UR1A	3	17-Aug-2008	*Cymbella minuta*							2,409.2	891,400	ok	ok	ok
UR1A	3	17-Aug-2008	*Fragilaria vaucheriae*							8,432.2	3,885,538	ok	ok	ok
UR1A	3	17-Aug-2008	*Gomphonema angustatum*							4,818.4	867,308	ok	ok	ok
UR1A	3	17-Aug-2008	*Gomphonema subclavatum*							1,204.6	722,756	ok	ok	ok
UR1A	3	17-Aug-2008	*Hannaea arcus*							3,613.8	6,324,119	ok	ok	ok
UR1A	3	17-Aug-2008	*Navicula cryptocephala* var. *veneta*							1,204.6	114,436	ok	ok	ok
UR1A	3	17-Aug-2008	*Navicula gregaria*							1,204.6	210,804	ok	ok	ok
UR1A	3	17-Aug-2008	*Nitzschia microcephala*							1,204.6	120,459	ok	ok	ok
UR1A	3	17-Aug-2008	*Synedra radians*							1,204.6	433,654	ok	ok	ok
UR1A	1	14-Aug-2009	*Fragilaria vaucheriae*							102.0	29,362	ok	ok	ok
UR1A	1	14-Aug-2009	*Gomphonema angustatum*							611.7	110,107	ok	ok	ok
UR1A	1	14-Aug-2009	*Hantzschia amphioxys*							203.9	41,800	ok	ok	ok
UR1A	2	14-Aug-2009	*Cymbella affinis*							145.0	260,995	ok	ok	ok
UR1A	2	14-Aug-2009	*Cymbella sinuata*							290.0	40,599	ok	ok	ok
UR1A	2	14-Aug-2009	*Gomphonema angustatum*							290.0	52,199	ok	ok	ok
UR1A	2	14-Aug-2009	*Oscillatoria* sp.							145.0	179,797	ok	ok	ok
UR1A	3	14-Aug-2009	*Cymbella sinuata*							437.0	61,182	ok	ok	ok
UR1A	3	14-Aug-2009	*Gomphonema* sp.							218.5	43,702	ok	ok	ok
UR1A	3	14-Aug-2009	*Hannaea arcus*							874.0	1,529,554	ok	ok	ok
UR1	1	19-Aug-2008								<3574		Exclude	ok	ok
UR1	2	19-Aug-2008	*Gomphonema angustatum*							2,501.8	450,333	ok	ok	ok
UR1	2	19-Aug-2008	*Nitzschia frustulum*							2,501.8	300,222	ok	ok	ok
UR1	3	19-Aug-2008	*Nitzschia palea*							3,221.4	579,857	ok	ok	ok
UR1	1	14-Aug-2009	*Fragilaria pinnata*							58.0	3,477	ok	ok	ok
UR1	1	14-Aug-2009	*Fragilaria vaucheriae*							58.0	16,690	ok	ok	ok
UR1	1	14-Aug-2009	*Gomphonema angustatum*							58.0	10,431	ok	ok	ok
UR1	2	14-Aug-2009	*Gomphonema angustatum*							41.9	7,550	ok	ok	ok
UR1	2	14-Aug-2009	*Navicula cryptocephala* var. *veneta*							83.9	7,970	ok	ok	ok
UR1	3	14-Aug-2009	*Cymbella minuta*							150.6	55,712	ok	ok	ok
UR1	3	14-Aug-2009	*Gomphonema angustatum*							75.3	13,552	ok	ok	ok
UR1	3	14-Aug-2009	*Meridion circulare*							75.3	28,986	ok	ok	ok
UR1	1	3-Sep-2013	*Cymbella* sp.	6.0	1.0	6.0	71,118.4	658.5	11.2			ok	ok	ok
UR1	1	3-Sep-2013	*Gomphonema* sp.	141.0	1.2	163.0	1,932,049.0	17,889.3	303.7			ok	ok	ok
UR1	1	3-Sep-2013	*Hydrurus foetidus*	92.0	7.1	650.0	7,704,489.8	71,337.9	1,211.2			ok	ok	ok
UR1	1	3-Sep-2013	*Leptolyngbya* sp.	61.0	37.7	2,300.0	27,262,040.8	252,426.3	4,285.7			ok	ok	ok
UR1	2	3-Sep-2013	*Chamaesiphon* sp.	29.0	1.7	50.0	10,323.4	120.0	2.0			ok	ok	ok
UR1	2	3-Sep-2013	*Cymbella* sp.	10.0	1.0	10.0	2,064.7	24.0	0.4			ok	ok	ok
UR1	2	3-Sep-2013	*Gomphonema* sp.	70.0	1.0	70.0	14,452.8	168.1	2.9			ok	ok	ok
UR1	2	3-Sep-2013	*Hannaea arcus*	5.0	1.0	5.0	1,032.3	12.0	0.2			ok	ok	ok
UR1	2	3-Sep-2013	*Hydrurus foetidus*	93.0	6.5	600.0	123,881.0	1,440.5	24.5			ok	ok	ok
UR1	2	3-Sep-2013	*Leptolyngbya* sp.	57.0	32.5	1,850.0	381,966.3	4,441.5	75.4			ok	ok	ok
UR1	2	3-Sep-2013	*Navicula* sp.	8.0	1.0	8.0	1,651.7	19.2	0.3			ok	ok	ok
UR1	2	3-Sep-2013	*Phormidium* sp.	28.0	15.6	438.0	90,433.1	1,051.5	17.9			ok	ok	ok
UR1	3	3-Sep-2013	*Chamaesiphon* sp.	87	3.1	266	421,483.3	6,386.1	108.4			ok	ok	ok
UR1	3	3-Sep-2013	*Cymbella* spp.	42	1.0	42	66,550.0	1,008.3	17.1			ok	ok	ok
UR1	3	3-Sep-2013	*Gomphonema* sp.	7	1.0	7	11,091.7	168.1	2.9			ok	ok	ok
UR1	3	3-Sep-2013	*Hydrurus foetidus*	16	6.6	106	167,959.5	2,544.8	43.2			ok	ok	ok
UR1	3	3-Sep-2013	*Leptolyngbya* sp.	17	13.4	228	361,271.4	5,473.8	92.9			ok	ok	ok
UR1	3	3-Sep-2013	*Phormidium* sp.	131	27.0	3537	5,604,460.7	84,916.1	1,441.7			ok	ok	ok
UR2	1	14-Aug-2009	*Cymbella minuta*							39.7	14,681	ok	ok	ok

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm^2)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
UR2	1	14-Aug-2009	MA	Include			16			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
UR2	1	14-Aug-2009	MA	Include			16			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
UR2	2	14-Aug-2009	MA	Include			12			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
UR2	2	14-Aug-2009	MA	Include			12			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
UR2	2	14-Aug-2009	MA	Include			12			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
UR2	2	14-Aug-2009	MA	Include			12			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	*palea*
UR2	3	14-Aug-2009	MA	Include			12			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
UR2	3	14-Aug-2009	MA	Include			12			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
UR2	3	14-Aug-2009	MA	Include			12			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*
UR2	1	2-Sep-2013	MA	Include	6538.01-10		58.9	84	0.0163%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
UR2	1	2-Sep-2013	MA	Include	6538.01-10		58.9	84	0.0163%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
UR2	1	2-Sep-2013	MA	Include	6538.01-10		58.9	84	0.0163%	Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
UR2	1	2-Sep-2013	MA	Include	6538.01-10		58.9	84	0.0163%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Leptolyngbya*	
UR2	1	2-Sep-2013	MA	Include	6538.01-10		58.9	84	0.0163%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
UR2	2	2-Sep-2013	MA	Include	6538.01-11		58.9	92	0.0042%	Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	*Amphora*	
UR2	2	2-Sep-2013	MA	Include	6538.01-11		58.9	92	0.0042%	Chrysophyta	Chrysophyceae	Chromulinales	Chrysosphaeraceae	*Chrysosphaera*	
UR2	2	2-Sep-2013	MA	Include	6538.01-11		58.9	92	0.0042%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
UR2	2	2-Sep-2013	MA	Include	6538.01-11		58.9	92	0.0042%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
UR2	2	2-Sep-2013	MA	Include	6538.01-11		58.9	92	0.0042%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
UR2	2	2-Sep-2013	MA	Include	6538.01-11		58.9	92	0.0042%	Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
UR2	2	2-Sep-2013	MA	Include	6538.01-11		58.9	92	0.0042%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Leptolyngbya*	
UR2	3	2-Sep-2013	MA	Include	6538.01-12		58.9	115	0.0079%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
UR2	3	2-Sep-2013	MA	Include	6538.01-12		58.9	115	0.0079%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
UR2	3	2-Sep-2013	MA	Include	6538.01-12		58.9	115	0.0079%	Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
UR2	3	2-Sep-2013	MA	Include	6538.01-12		58.9	115	0.0079%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Leptolyngbya*	
Divide OF	1	12-Aug-2013	R	Exclude	6530.05-07		58.9	116	0.0673%	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthidiaceae	*Achnanthidium*	
Divide OF	1	12-Aug-2013	R	Exclude	6530.05-07		58.9	116	0.0673%	Cyanophyta	Myxophyceae	Nostocales	Rivulariaceae	*Calothrix*	
Divide OF	1	12-Aug-2013	R	Exclude	6530.05-07		58.9	116	0.0673%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Leptolyngbya*	
Divide OF	1	12-Aug-2013	R	Exclude	6530.05-07		58.9	116	0.0673%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Leptolyngbya*	
Divide OF	1	12-Aug-2013	R	Exclude	6530.05-07		58.9	116	0.0673%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	
Divide OF	1	12-Aug-2013	R	Exclude	6530.05-07		58.9	116	0.0673%	Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Mougeotia*	
Divide OF	1	12-Aug-2013	R	Exclude	6530.05-07		58.9	116	0.0673%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
Divide OF	2	12-Aug-2013	R	Exclude	6530.05-08		58.9	90	0.2169%	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthidiaceae	*Achnanthidium*	
Divide OF	2	12-Aug-2013	R	Exclude	6530.05-08		58.9	90	0.2169%	Cyanophyta	Myxophyceae	Nostocales	Rivulariaceae	*Calothrix*	
Divide OF	2	12-Aug-2013	R	Exclude	6530.05-08		58.9	90	0.2169%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Leptolyngbya*	
Divide OF	2	12-Aug-2013	R	Exclude	6530.05-08		58.9	90	0.2169%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	
Divide OF	2	12-Aug-2013	R	Exclude	6530.05-08		58.9	90	0.2169%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
Divide OF	3	12-Aug-2013	R	Exclude	6530.05-09		58.9	100	0.1562%	Cyanophyta	Myxophyceae	Nostocales	Rivulariaceae	*Calothrix*	
Divide OF	3	12-Aug-2013	R	Exclude	6530.05-09		58.9	100	0.1562%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
Divide OF	3	12-Aug-2013	R	Exclude	6530.05-09		58.9	100	0.1562%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Leptolyngbya*	
Divide OF	3	12-Aug-2013	R	Exclude	6530.05-09		58.9	100	0.1562%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	
Divide OF	3	12-Aug-2013	R	Exclude	6530.05-09		58.9	100	0.1562%	Chlorophyta	Chlorophyceae	Chlorococcales	Microsporaceae	*Microspora*	
Divide OF	3	12-Aug-2013	R	Exclude	6530.05-09		58.9	100	0.1562%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
Divide OF	3	12-Aug-2013	R	Exclude	6530.05-09		58.9	100	0.1562%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
Divide OF	3	12-Aug-2013	R	Exclude	6530.05-09		58.9	100	0.1562%	Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	
Divide OF	3	12-Aug-2013	R	Exclude	6530.05-09		58.9	100	0.1562%	Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Zygnema*	
BR1	1	26-Aug-2010	AP	Include	100422		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
BR1	1	26-Aug-2010	AP	Include	100422		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cistula*
BR1	1	26-Aug-2010	AP	Include	100422		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
BR1	1	26-Aug-2010	AP	Include	100422		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*tenuis*
BR1	1	26-Aug-2010	AP	Include	100422		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
BR1	1	26-Aug-2010	AP	Include	100422		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BR1	1	26-Aug-2010	AP	Include	100422		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BR1	1	26-Aug-2010	AP	Include	100422		28.8			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
BR1	1	26-Aug-2010	AP	Include	100422		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BR1	1	26-Aug-2010	AP	Include	100422		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BR1	1	26-Aug-2010	AP	Include	100422		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BR1	1	26-Aug-2010	AP	Include	100422		28.8			Euglenophyta	Euglenophyceae	Euglenales	Euglenaceae	*Trachelomonas*	

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
UR2	1	14-Aug-2009	*Fragilaria vaucheriae*							79.4	34,282	ok	ok	ok
UR2	1	14-Aug-2009	*Gomphonema angustatum*							39.7	7,142	ok	ok	ok
UR2	2	14-Aug-2009	*Achnanthes minutissima*							77.8	3,889	ok	ok	ok
UR2	2	14-Aug-2009	*Cymbella minuta*							155.6	57,557	ok	ok	ok
UR2	2	14-Aug-2009	*Gomphonema angustatum*							311.1	56,002	ok	ok	ok
UR2	2	14-Aug-2009	*Nitzschia palea*							77.8	14,000	ok	ok	ok
UR2	3	14-Aug-2009	*Cymbella minuta*							157.6	58,330	ok	ok	ok
UR2	3	14-Aug-2009	*Fragilaria vaucheriae*							78.8	22,701	ok	ok	ok
UR2	3	14-Aug-2009	*Gomphonema angustatum*							315.3	56,753	ok	ok	ok
UR2	1	2-Sep-2013	*Gomphonema* sp.		63.0	1.0	63.0	387,200.0	4,609.5	78.3		ok	ok	ok
UR2	1	2-Sep-2013	*Hannaea arcus*		3.0	1.0	3.0	18,438.1	219.5	3.7		ok	ok	ok
UR2	1	2-Sep-2013	*Hydrurus foetidus*		86.0	11.0	950.0	5,838,730.2	69,508.7	1,180.1		ok	ok	ok
UR2	1	2-Sep-2013	*Leptolyngbya* sp.		147.0	50.0	7,350.0	45,173,333.3	537,777.8	9,130.4		ok	ok	ok
UR2	1	2-Sep-2013	*Nitzschia* sp.		1.0	1.0	1.0	6,146.0	73.2	1.2		ok	ok	ok
UR2	2	2-Sep-2013	*Amphora* sp.		6.0	1.0	6.0	141,358.7	1,536.5	26.1		ok	ok	ok
UR2	2	2-Sep-2013	*Chrysosphaera* sp.		1.0	44.0	44.0	1,036,630.7	11,267.7	191.3		ok	ok	ok
UR2	2	2-Sep-2013	*Cymbella* sp.		23.0	1.0	23.0	541,875.1	5,889.9	100.0		ok	ok	ok
UR2	2	2-Sep-2013	*Gomphonema* sp.		22.0	1.0	22.0	518,315.3	5,633.9	95.7		ok	ok	ok
UR2	2	2-Sep-2013	*Hannaea arcus*		8.0	1.0	8.0	188,478.3	2,048.7	34.8		ok	ok	ok
UR2	2	2-Sep-2013	*Hydrurus foetidus*		232.0	23.3	5,400.0	127,222,857.1	1,382,857.1	23,478.0		ok	ok	ok
UR2	2	2-Sep-2013	*Leptolyngbya* sp.		8.0	34.5	276.0	6,502,501.6	70,679.4	1,200.0		ok	ok	ok
UR2	3	2-Sep-2013	*Cymbella* sp.		10.0	1.0	10.0	126,213.2	1,097.5	18.6		ok	ok	ok
UR2	3	2-Sep-2013	*Gomphonema* sp.		10.0	1.0	10.0	126,213.2	1,097.5	18.6		ok	ok	ok
UR2	3	2-Sep-2013	*Hydrurus foetidus*		274.0	5.1	1,400.0	17,669,841.3	153,650.8	2,608.7		ok	ok	ok
UR2	3	2-Sep-2013	*Leptolyngbya* sp.		6.0	24.5	147.0	1,855,333.3	16,133.3	273.9		ok	ok	ok
Divide OF	1	12-Aug-2013	*Achnanthidium* sp.		13.0	1.0	13.0	19,308.8	166.5	2.8		ok	ok	ok
Divide OF	1	12-Aug-2013	*Calothrix* sp.		274.0	9.1	2,489.0	3,696,889.3	31,869.7	541.1		ok	ok	ok
Divide OF	1	12-Aug-2013	*Leptolyngbya* sp.		5.0	12.0	60.0	89,117.5	768.3	13.0		ok	ok	ok
Divide OF	1	12-Aug-2013	*Meridion* sp.		3.0	1.7	5.0	7,426.5	64.0	1.1		ok	ok	ok
Divide OF	1	12-Aug-2013	*Mougeotia* sp.		1.0	1.0	1.0	1,485.3	12.8	0.2		ok	ok	ok
Divide OF	1	12-Aug-2013	*Nitzschia* sp.		4.0	1.0	4.0	5,941.2	51.2	0.9		ok	ok	ok
Divide OF	2	12-Aug-2013	*Achnanthidium* sp.		15.0	1.0	15.0	6,914.3	76.8	1.3		ok	ok	ok
Divide OF	2	12-Aug-2013	*Calothrix* sp.		271.0	11.1	3,012.0	1,388,388.6	15,426.5	261.9		ok	ok	ok
Divide OF	2	12-Aug-2013	*Leptolyngbya* sp.		4.0	13.0	52.0	23,969.5	266.3	4.5		ok	ok	ok
Divide OF	2	12-Aug-2013	*Meridion* sp.		5.0	1.6	8.0	3,687.6	41.0	0.7		ok	ok	ok
Divide OF	2	12-Aug-2013	*Nitzschia* sp.		5.0	1.0	5.0	2,304.8	25.6	0.4		ok	ok	ok
Divide OF	3	12-Aug-2013	*Calothrix* sp.		213.0	9.3	1,983.0	1,269,539.7	12,695.4	215.5		ok	ok	ok
Divide OF	3	12-Aug-2013	*Cymbella* sp.		1.0	1.0	1.0	640.2	6.4	0.1		ok	ok	ok
Divide OF	3	12-Aug-2013	*Leptolyngbya* sp.		47.0	21.6	1,017.0	651,095.2	6,511.0	110.5		ok	ok	ok
Divide OF	3	12-Aug-2013	*Meridion* sp.		14.0	1.9	26.0	16,645.5	166.5	2.8		ok	ok	ok
Divide OF	3	12-Aug-2013	*Microspora* sp.		1.0	21.0	21.0	13,444.4	134.4	2.3		ok	ok	ok
Divide OF	3	12-Aug-2013	*Navicula* sp.		1.0	1.0	1.0	640.2	6.4	0.1		ok	ok	ok
Divide OF	3	12-Aug-2013	*Nitzschia* sp.		13.0	1.0	13.0	8,322.8	83.2	1.4		ok	ok	ok
Divide OF	3	12-Aug-2013	*Oscillatoria* sp.		1.0	19.0	19.0	12,164.0	121.6	2.1		ok	ok	ok
Divide OF	3	12-Aug-2013	*Zygnema* sp.		9.0	8.6	77.0	49,296.3	493.0	8.4		ok	ok	ok
BR1	1	26-Aug-2010	*Achnanthes minutissima*							111.2		ok	ok	ok
BR1	1	26-Aug-2010	*Cymbella cistula*							<111.2		Exclude	ok	ok
BR1	1	26-Aug-2010	*Cymbella minuta*							1,556.8		ok	ok	ok
BR1	1	26-Aug-2010	*Diatoma tenuis*							1,000.8		ok	ok	ok
BR1	1	26-Aug-2010	*Fragilaria vaucheriae*							889.6		ok	ok	ok
BR1	1	26-Aug-2010	*Gomphonema* spp.							111.2		ok	ok	ok
BR1	1	26-Aug-2010	*Hannaea arcus*							<111.2		Exclude	ok	ok
BR1	1	26-Aug-2010	*Hydrurus* cf. *foetidus*							1,445.6		ok	ok	Exclude
BR1	1	26-Aug-2010	*Navicula* spp.							<111.2		Exclude	ok	ok
BR1	1	26-Aug-2010	*Nitzschia* spp.							333.6		ok	ok	ok
BR1	1	26-Aug-2010	*Synedra* spp.							222.4		ok	ok	ok
BR1	1	26-Aug-2010	*Trachelomonas* sp.							<111.2		Exclude	ok	ok

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm²)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
BR1	1	26-Aug-2010	AP	Include	100422		28.8			Chrysophyte					
BR1	1	26-Aug-2010	AP	Include	100422		28.8			Bacillariophyta	Bacillariophyceae				
BR1	2	26-Aug-2010	AP	Include	100423		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
BR1	2	26-Aug-2010	AP	Include	100423		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*tenuis*
BR1	2	26-Aug-2010	AP	Include	100423		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*	
BR1	2	26-Aug-2010	AP	Include	100423		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	
BR1	2	26-Aug-2010	AP	Include	100423		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
BR1	2	26-Aug-2010	AP	Include	100423		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BR1	2	26-Aug-2010	AP	Include	100423		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BR1	2	26-Aug-2010	AP	Include	100423		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BR1	2	26-Aug-2010	AP	Include	100423		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BR1	2	26-Aug-2010	AP	Include	100423		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BR1	2	26-Aug-2010	AP	Include	100423		28.8								
BR1	3	26-Aug-2010	AP	Include	100424		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Anomoeoneidaceae	*Anomoeoneis*	
BR1	3	26-Aug-2010	AP	Include	100424		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
BR1	3	26-Aug-2010	AP	Include	100424		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
BR1	3	26-Aug-2010	AP	Include	100424		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*tenuis*
BR1	3	26-Aug-2010	AP	Include	100424		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*construens*
BR1	3	26-Aug-2010	AP	Include	100424		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*pinnata*
BR1	3	26-Aug-2010	AP	Include	100424		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
BR1	3	26-Aug-2010	AP	Include	100424		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BR1	3	26-Aug-2010	AP	Include	100424		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
BR1	3	26-Aug-2010	AP	Include	100424		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BR1	3	26-Aug-2010	AP	Include	100424		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BR1	3	26-Aug-2010	AP	Include	100424		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*ulna*
BR1	3	26-Aug-2010	AP	Include	100424		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*fenestrata*
BR1	3	26-Aug-2010	AP	Include	100424		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*
BR1	3	26-Aug-2010	AP	Include	100424		28.8			Chrysophyta					
BR1	3	26-Aug-2010	AP	Include	100424		28.8			Cyanophyta	Myxophyceae	Oscillatoriales			
BR2	1	26-Aug-2010	AP	Include	100425		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
BR2	1	26-Aug-2010	AP	Include	100425		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
BR2	1	26-Aug-2010	AP	Include	100425		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cistula*
BR2	1	26-Aug-2010	AP	Include	100425		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
BR2	1	26-Aug-2010	AP	Include	100425		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
BR2	1	26-Aug-2010	AP	Include	100425		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
BR2	1	26-Aug-2010	AP	Include	100425		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BR2	1	26-Aug-2010	AP	Include	100425		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BR2	1	26-Aug-2010	AP	Include	100425		28.8			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
BR2	1	26-Aug-2010	AP	Include	100425		28.8			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
BR2	1	26-Aug-2010	AP	Include	100425		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
BR2	1	26-Aug-2010	AP	Include	100425		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BR2	1	26-Aug-2010	AP	Include	100425		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BR2	1	26-Aug-2010	AP	Include	100425		28.8			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
BR2	1	26-Aug-2010	AP	Include	100425		28.8								
BR2	2	26-Aug-2010	AP	Include	100426		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
BR2	2	26-Aug-2010	AP	Include	100426		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
BR2	2	26-Aug-2010	AP	Include	100426		28.8			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Clastidium*	
BR2	2	26-Aug-2010	AP	Include	100426		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Cocconeis*	*placentula*
BR2	2	26-Aug-2010	AP	Include	100426		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
BR2	2	26-Aug-2010	AP	Include	100426		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	
BR2	2	26-Aug-2010	AP	Include	100426		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
BR2	2	26-Aug-2010	AP	Include	100426		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BR2	2	26-Aug-2010	AP	Include	100426		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BR2	2	26-Aug-2010	AP	Include	100426		28.8			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
BR2	2	26-Aug-2010	AP	Include	100426		28.8			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
BR2	2	26-Aug-2010	AP	Include	100426		28.8			Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*	
BR2	2	26-Aug-2010	AP	Include	100426		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
BR1	1	26-Aug-2010	Unknown Chrysophyte (cyst)							<111.2		Exclude	ok	Exclude
BR1	1	26-Aug-2010	Unknown diatom							<111.2		Exclude	ok	Exclude
BR1	2	26-Aug-2010	*Cymbella minuta*							44.4		ok	ok	ok
BR1	2	26-Aug-2010	*Diatoma tenuis*							<22.2		Exclude	ok	ok
BR1	2	26-Aug-2010	*Eunotia* spp.							<22.2		Exclude	ok	ok
BR1	2	26-Aug-2010	*Fragilaria* sp.							<22.2		Exclude	ok	ok
BR1	2	26-Aug-2010	*Fragilaria vaucheriae*							111.0		ok	ok	ok
BR1	2	26-Aug-2010	*Gomphonema* spp.							<22.2		Exclude	ok	ok
BR1	2	26-Aug-2010	*Hannaea arcus*							<22.2		Exclude	ok	ok
BR1	2	26-Aug-2010	*Navicula* spp.							<22.2		Exclude	ok	ok
BR1	2	26-Aug-2010	*Nitzschia* spp.							44.4		ok	ok	ok
BR1	2	26-Aug-2010	*Synedra* spp.							22.2		ok	ok	ok
BR1	2	26-Aug-2010	Unknown alga sp.							22.2		ok	Exclude	Exclude
BR1	3	26-Aug-2010	*Anomoeoneis* sp.							<53.4		Exclude	ok	ok
BR1	3	26-Aug-2010	*Cymbella minuta*							53.4		ok	ok	ok
BR1	3	26-Aug-2010	*Cymbella sinuata*							<53.4		Exclude	ok	ok
BR1	3	26-Aug-2010	*Diatoma tenuis*							<53.4		Exclude	ok	ok
BR1	3	26-Aug-2010	*Fragilaria construens*							<53.4		Exclude	ok	ok
BR1	3	26-Aug-2010	*Fragilaria pinnata*							<53.4		Exclude	ok	ok
BR1	3	26-Aug-2010	*Fragilaria vaucheriae*							106.8		ok	ok	ok
BR1	3	26-Aug-2010	*Hannaea arcus*							<53.4		Exclude	ok	ok
BR1	3	26-Aug-2010	*Meridion circulare*							<53.4		Exclude	ok	ok
BR1	3	26-Aug-2010	*Navicula* spp.							<53.4		Exclude	ok	ok
BR1	3	26-Aug-2010	*Synedra* spp.							<53.4		Exclude	ok	ok
BR1	3	26-Aug-2010	*Synedra ulna*							<53.4		Exclude	ok	ok
BR1	3	26-Aug-2010	*Tabellaria fenestrata*							<53.4		Exclude	ok	ok
BR1	3	26-Aug-2010	*Tabellaria flocculosa*							<53.4		Exclude	ok	ok
BR1	3	26-Aug-2010	Unknown Chrysophyte sp.							<53.4		Exclude	ok	Exclude
BR1	3	26-Aug-2010	Unknown Oscillatoriales							<53.4		Exclude	ok	Exclude
BR2	1	26-Aug-2010	*Achnanthes minutissima*							6,007.8		ok	ok	ok
BR2	1	26-Aug-2010	*Achnanthes* spp.							4,005.2		ok	ok	ok
BR2	1	26-Aug-2010	*Cymbella cistula*							<129.2		Exclude	ok	ok
BR2	1	26-Aug-2010	*Cymbella minuta*							123,304.0		ok	ok	ok
BR2	1	26-Aug-2010	*Cymbella sinuata*							516.7		ok	ok	ok
BR2	1	26-Aug-2010	*Fragilaria vaucheriae*							20,026.0		ok	ok	ok
BR2	1	26-Aug-2010	*Gomphonema* spp.							12,015.6		ok	ok	ok
BR2	1	26-Aug-2010	*Hannaea arcus*							2,066.8		ok	ok	ok
BR2	1	26-Aug-2010	*Homoeothrix varians*							2,697,275.0		ok	ok	ok
BR2	1	26-Aug-2010	*Hydrurus foetidus*							3,616.9		ok	ok	ok
BR2	1	26-Aug-2010	*Meridion circulare*							<129.2		Exclude	ok	ok
BR2	1	26-Aug-2010	*Navicula* spp.							258.3		ok	ok	ok
BR2	1	26-Aug-2010	*Nitzschia* spp.							14,018.2		ok	ok	ok
BR2	1	26-Aug-2010	*Pseudanabaena* spp.							23,768.2		ok	ok	ok
BR2	1	26-Aug-2010	Unknown alga sp.							1,550.1		ok	Exclude	Exclude
BR2	2	26-Aug-2010	*Achnanthes minutissima*							73,581.9		ok	ok	ok
BR2	2	26-Aug-2010	*Achnanthes* spp.							1,821.0		ok	ok	ok
BR2	2	26-Aug-2010	*Clastidium* sp.							45,550.7		ok	ok	ok
BR2	2	26-Aug-2010	*Cocconeis placentula*							<58.7		Exclude	ok	ok
BR2	2	26-Aug-2010	*Cymbella minuta*							28,225.5		ok	ok	ok
BR2	2	26-Aug-2010	*Fragilaria* sp.							<58.7		Exclude	ok	ok
BR2	2	26-Aug-2010	*Fragilaria vaucheriae*							9,105.0		ok	ok	ok
BR2	2	26-Aug-2010	*Gomphonema* spp.							15,478.5		ok	ok	ok
BR2	2	26-Aug-2010	*Hannaea arcus*							<58.7		Exclude	ok	ok
BR2	2	26-Aug-2010	*Homoeothrix varians*							8,332,274.2		ok	ok	ok
BR2	2	26-Aug-2010	*Hydrurus foetidus*							52,809.0		ok	ok	ok
BR2	2	26-Aug-2010	*Melosira* sp.							<58.7		Exclude	ok	ok
BR2	2	26-Aug-2010	*Navicula* spp.							<58.7		Exclude	ok	ok

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm^2)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
BR2	2	26-Aug-2010	AP	Include	100426		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BR2	2	26-Aug-2010	AP	Include	100426		28.8			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
BR2	2	26-Aug-2010	AP	Include	100426		28.8			Cyanophyta	Myxophyceae	Oscillatoriales	Schizotrichaceae	*Schizothrix*	
BR2	2	26-Aug-2010	AP	Include	100426		28.8								
BR2	3	26-Aug-2010	AP	Include	100427		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
BR2	3	26-Aug-2010	AP	Include	100427		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
BR2	3	26-Aug-2010	AP	Include	100427		28.8			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
BR2	3	26-Aug-2010	AP	Include	100427		28.8			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Clastidium*	
BR2	3	26-Aug-2010	AP	Include	100427		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Cocconeis*	*placentula*
BR2	3	26-Aug-2010	AP	Include	100427		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
BR2	3	26-Aug-2010	AP	Include	100427		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
BR2	3	26-Aug-2010	AP	Include	100427		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
BR2	3	26-Aug-2010	AP	Include	100427		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BR2	3	26-Aug-2010	AP	Include	100427		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BR2	3	26-Aug-2010	AP	Include	100427		28.8			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
BR2	3	26-Aug-2010	AP	Include	100427		28.8			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
BR2	3	26-Aug-2010	AP	Include	100427		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
BR2	3	26-Aug-2010	AP	Include	100427		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BR2	3	26-Aug-2010	AP	Include	100427		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BR2	3	26-Aug-2010	AP	Include	100427		28.8								
BR2	3	26-Aug-2010	AP	Include	100427		28.8			Chrysophyte					
BR2	3	26-Aug-2010	AP	Include	100427		28.8			Cyanophyta	Myxophyceae	Oscillatoriales			
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cistula*
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Not Designated	*Diatomella*	
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Diploneidaceae	*Diploneis*	
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*	
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*construens*
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Frustulia*	*rhomboides*
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Chlorophyta	Chlorophyceae	Chlorococcales	Microsporaceae	*Microspora*	
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Neidiaceae	*Neidium*	
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Staurastrum*	
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Stauroneidaceae	*Stauroneis*	
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Surirellaceae	*Surirella*	
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*ulna*
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*fenestrata*
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Chrysophyta	Xanthophyceae	Heterotrichales	Tribonemataceae	*Tribonema*	
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Chlorophyta	Chlorophyceae	Ulotrichales	Ulotrichaceae	*Ulothrix*	*zonata*
ST1	1	27-Aug-2010	AP	Include	100434		14.4								
ST1	1	27-Aug-2010	AP	Include	100434		14.4								

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
BR2	2	26-Aug-2010	*Nitzschia* spp.							469.8		ok	ok	ok
BR2	2	26-Aug-2010	*Pseudanabaena* spp.							1,174.5		ok	ok	ok
BR2	2	26-Aug-2010	*Schizothrix* sp.	cf.						<58.7		Exclude	ok	Exclude
BR2	2	26-Aug-2010	Unknown alga sp.							910.5		ok	Exclude	Exclude
BR2	3	26-Aug-2010	*Achnanthes minutissima*							7,557.0		ok	ok	ok
BR2	3	26-Aug-2010	*Achnanthes* spp.							2,267.1		ok	ok	ok
BR2	3	26-Aug-2010	*Chamaesiphon* spp.							151,210.8		ok	ok	ok
BR2	3	26-Aug-2010	*Clastidium* sp.							11,631.6		ok	ok	ok
BR2	3	26-Aug-2010	*Cocconeis placentula*							<97.5		Exclude	ok	ok
BR2	3	26-Aug-2010	*Cymbella minuta*							390.0		ok	ok	ok
BR2	3	26-Aug-2010	*Cymbella sinuata*							<97.5		Exclude	ok	ok
BR2	3	26-Aug-2010	*Fragilaria vaucheriae*							585.0		ok	ok	ok
BR2	3	26-Aug-2010	*Gomphonema* spp.							97.5		ok	ok	ok
BR2	3	26-Aug-2010	*Hannaea arcus*							<97.5		Exclude	ok	ok
BR2	3	26-Aug-2010	*Homoeothrix varians*							4,925,982.6		ok	ok	ok
BR2	3	26-Aug-2010	*Hydrurus foetidus*							165,750.3		ok	ok	ok
BR2	3	26-Aug-2010	*Meridion circulare*							<97.5		Exclude	ok	ok
BR2	3	26-Aug-2010	*Navicula* spp.							<97.5		Exclude	ok	ok
BR2	3	26-Aug-2010	*Nitzschia* spp.							292.5		ok	ok	ok
BR2	3	26-Aug-2010	Unknown alga sp.							5,815.8		ok	Exclude	Exclude
BR2	3	26-Aug-2010	Unknown Chrysophyte (cyst)							<97.5		Exclude	ok	Exclude
BR2	3	26-Aug-2010	Unknown Oscillatoriales							<97.5		Exclude	ok	Exclude
ST1	1	27-Aug-2010	*Achnanthes minutissima*							51,167.6		ok	ok	ok
ST1	1	27-Aug-2010	*Achnanthes* spp.							3,674.4		ok	ok	ok
ST1	1	27-Aug-2010	*Chamaesiphon* spp.							54,789.4		ok	ok	ok
ST1	1	27-Aug-2010	*Cymbella cistula*							<59.2		Exclude	ok	ok
ST1	1	27-Aug-2010	*Cymbella minuta*							1,657.6		ok	ok	ok
ST1	1	27-Aug-2010	*Cymbella sinuata*							236.8		ok	ok	ok
ST1	1	27-Aug-2010	*Cymbella* spp.							<59.2		Exclude	ok	ok
ST1	1	27-Aug-2010	*Diatoma mesodon*							355.2		ok	ok	ok
ST1	1	27-Aug-2010	*Diatomella* sp.							<59.2		Exclude	ok	ok
ST1	1	27-Aug-2010	*Diploneis* sp.							<59.2		Exclude	ok	ok
ST1	1	27-Aug-2010	*Eunotia* spp.							59.2		ok	ok	ok
ST1	1	27-Aug-2010	*Fragilaria construens*							<59.2		Exclude	ok	ok
ST1	1	27-Aug-2010	*Fragilaria vaucheriae*							4,133.7		ok	ok	ok
ST1	1	27-Aug-2010	*Frustulia rhomboides*							236.8		ok	ok	ok
ST1	1	27-Aug-2010	*Gomphonema* spp.							5,052.3		ok	ok	ok
ST1	1	27-Aug-2010	*Hannaea arcus*							473.6		ok	ok	ok
ST1	1	27-Aug-2010	*Homoeothrix varians*							408,269.4		ok	ok	ok
ST1	1	27-Aug-2010	*Meridion circulare*							710.4		ok	ok	ok
ST1	1	27-Aug-2010	*Microspora* sp.							<59.2		Exclude	ok	ok
ST1	1	27-Aug-2010	*Navicula* spp.							1,065.6		ok	ok	ok
ST1	1	27-Aug-2010	*Neidium* sp.							<59.2		Exclude	ok	ok
ST1	1	27-Aug-2010	*Nitzschia* spp.							4,133.7		ok	ok	ok
ST1	1	27-Aug-2010	*Pinnularia* spp.							<59.2		Exclude	ok	ok
ST1	1	27-Aug-2010	*Pseudanabaena* spp.							1,657.6		ok	ok	ok
ST1	1	27-Aug-2010	*Staurastrum* sp.							<59.2		Exclude	ok	ok
ST1	1	27-Aug-2010	*Stauroneis* sp.							<59.2		Exclude	ok	ok
ST1	1	27-Aug-2010	*Surirella* spp.							59.2		ok	ok	ok
ST1	1	27-Aug-2010	*Synedra* spp.							710.4		ok	ok	ok
ST1	1	27-Aug-2010	*Synedra ulna*							<59.2		Exclude	ok	ok
ST1	1	27-Aug-2010	*Tabellaria fenestrata*							<59.2		Exclude	ok	ok
ST1	1	27-Aug-2010	*Tabellaria flocculosa*							<59.2		Exclude	ok	ok
ST1	1	27-Aug-2010	*Tribonema* sp.							<59.2		Exclude	ok	ok
ST1	1	27-Aug-2010	*Ulothrix zonata*							<59.2		Exclude	ok	ok
ST1	1	27-Aug-2010	Unknown alga (filament)							<59.2		Exclude	Exclude	Exclude
ST1	1	27-Aug-2010	Unknown alga sp.							3,215.1		ok	Exclude	Exclude

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm²)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Chrysophyta					
ST1	1	27-Aug-2010	AP	Include	100434		14.4			Bacillariophyta	Bacillariophyceae				
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*lanceolata*
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Rhodophyta	Florideophyceae	Acrochaetiales	Acrochaetiaceae	*Audouinella*	
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Not Designated	*Diatomella*	
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*	
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Frustulia*	*rhomboides*
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Chlorophyta	Chlorophyceae	Chlorococcales	Microsporaceae	*Microspora*	
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Neidiaceae	*Neidium*	
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Surirellaceae	*Surirella*	
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*ulna*
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*
ST1	2	27-Aug-2010	AP	Include	100435		14.4								
ST1	2	27-Aug-2010	AP	Include	100435		14.4								
ST1	2	27-Aug-2010	AP	Include	100435		14.4								
ST1	2	27-Aug-2010	AP	Include	100435		14.4			Cyanophyta	Myxophyceae	Oscillatoriales			
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*lanceolata*
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Rhodophyta	Florideophyceae	Acrochaetiales	Acrochaetiaceae	*Audouinella*	
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Closterium*	
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Cosmarium*	
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*	
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*construens*
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Frustulia*	*rhomboides*
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*	
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Chlorophyta	Chlorophyceae	Chlorococcales	Microsporaceae	*Microspora*	
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
ST1	1	27-Aug-2010	Unknown Chrysophyte (cyst)							118.4		ok	ok	Exclude
ST1	1	27-Aug-2010	Unknown diatom							<59.2		Exclude	ok	Exclude
ST1	2	27-Aug-2010	*Achnanthes lanceolata*							<57.9		Exclude	ok	ok
ST1	2	27-Aug-2010	*Achnanthes minutissima*							25,894.5		ok	ok	ok
ST1	2	27-Aug-2010	*Achnanthes* spp.							1,345.8		ok	ok	ok
ST1	2	27-Aug-2010	*Audouinella* sp.							<57.9		Exclude	ok	ok
ST1	2	27-Aug-2010	*Chamaesiphon* spp.							29,347.1		ok	ok	ok
ST1	2	27-Aug-2010	*Cymbella minuta*							579.0		ok	ok	ok
ST1	2	27-Aug-2010	*Cymbella sinuata*							57.9		ok	ok	ok
ST1	2	27-Aug-2010	*Cymbella* spp.							<57.9		Exclude	ok	ok
ST1	2	27-Aug-2010	*Diatoma mesodon*							115.8		ok	ok	ok
ST1	2	27-Aug-2010	*Diatomella* sp.							<57.9		Exclude	ok	ok
ST1	2	27-Aug-2010	*Eunotia* spp.							231.6		ok	ok	ok
ST1	2	27-Aug-2010	*Fragilaria vaucheriae*							926.4		ok	ok	ok
ST1	2	27-Aug-2010	*Frustulia rhomboides*							347.4		ok	ok	ok
ST1	2	27-Aug-2010	*Gomphonema* spp.							810.6		ok	ok	ok
ST1	2	27-Aug-2010	*Hannaea arcus*							347.4		ok	ok	ok
ST1	2	27-Aug-2010	*Homoeothrix varians*							153,640.7		ok	ok	ok
ST1	2	27-Aug-2010	*Hydrurus foetidus*							115.8		ok	ok	ok
ST1	2	27-Aug-2010	*Meridion circulare*							463.2		ok	ok	ok
ST1	2	27-Aug-2010	*Microspora* sp.							<57.9		Exclude	ok	ok
ST1	2	27-Aug-2010	*Navicula* spp.							579.0		ok	ok	ok
ST1	2	27-Aug-2010	*Neidium* sp.							<57.9		Exclude	ok	ok
ST1	2	27-Aug-2010	*Nitzschia* spp.							1,158.0		ok	ok	ok
ST1	2	27-Aug-2010	*Pinnularia* spp.							<57.9		Exclude	ok	ok
ST1	2	27-Aug-2010	*Pseudanabaena* spp.							926.4		ok	ok	ok
ST1	2	27-Aug-2010	*Surirella* spp.							57.9		ok	ok	ok
ST1	2	27-Aug-2010	*Synedra* spp.							694.8		ok	ok	ok
ST1	2	27-Aug-2010	*Synedra ulna*							<57.9		Exclude	ok	ok
ST1	2	27-Aug-2010	*Tabellaria flocculosa*							<57.9		Exclude	ok	ok
ST1	2	27-Aug-2010	Unknown alga (colony)							<57.9		Exclude	Exclude	Exclude
ST1	2	27-Aug-2010	Unknown alga (flagellate)							<57.9		Exclude	Exclude	Exclude
ST1	2	27-Aug-2010	Unknown alga sp.							1,726.3		ok	Exclude	Exclude
ST1	2	27-Aug-2010	Unknown Oscillatoriales							694.8		ok	ok	Exclude
ST1	3	27-Aug-2010	*Achnanthes lanceolata*							121.2		ok	ok	ok
ST1	3	27-Aug-2010	*Achnanthes minutissima*							2,893.6		ok	ok	ok
ST1	3	27-Aug-2010	*Achnanthes* spp.							1,409.7		ok	ok	ok
ST1	3	27-Aug-2010	*Audouinella* sp.							363.6		ok	ok	ok
ST1	3	27-Aug-2010	*Chamaesiphon* spp.							75,957.0		ok	ok	ok
ST1	3	27-Aug-2010	*Closterium* spp.							<60.6		Exclude	ok	ok
ST1	3	27-Aug-2010	*Cosmarium* spp.							<60.6		Exclude	ok	ok
ST1	3	27-Aug-2010	*Cymbella minuta*							484.8		ok	ok	ok
ST1	3	27-Aug-2010	*Cymbella sinuata*							121.2		ok	ok	ok
ST1	3	27-Aug-2010	*Cymbella* spp.							<60.6		Exclude	ok	ok
ST1	3	27-Aug-2010	*Diatoma mesodon*							60.6		ok	ok	ok
ST1	3	27-Aug-2010	*Eunotia* spp.							121.2		ok	ok	ok
ST1	3	27-Aug-2010	*Fragilaria construens*							<60.6		Exclude	ok	ok
ST1	3	27-Aug-2010	*Fragilaria vaucheriae*							606.0		ok	ok	ok
ST1	3	27-Aug-2010	*Frustulia rhomboides*							60.6		ok	ok	ok
ST1	3	27-Aug-2010	*Gomphonema* spp.							606.0		ok	ok	ok
ST1	3	27-Aug-2010	*Hannaea arcus*							<60.6		Exclude	ok	ok
ST1	3	27-Aug-2010	*Homoeothrix varians*							356,274.5		ok	ok	ok
ST1	3	27-Aug-2010	*Hydrurus foetidus*							939.8		ok	ok	ok
ST1	3	27-Aug-2010	*Melosira* sp.							<60.6		Exclude	ok	ok
ST1	3	27-Aug-2010	*Meridion circulare*							484.8		ok	ok	ok
ST1	3	27-Aug-2010	*Microspora* sp.							<60.6		Exclude	ok	ok
ST1	3	27-Aug-2010	*Navicula* spp.							969.6		ok	ok	ok

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm²)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Neidiaceae	*Neidium*	
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Stauroneidaceae	*Stauroneis*	
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Surirellaceae	*Surirella*	
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*ulna*
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*
ST1	3	27-Aug-2010	AP	Include	100436		14.4								
ST1	3	27-Aug-2010	AP	Include	100436		14.4								
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Chlorophyta					
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Chrysophyta					
ST1	3	27-Aug-2010	AP	Include	100436		14.4			Cyanophyta	Myxophyceae	Oscillatoriales			
ST2	1	27-Aug-2010	AP	Include	100428		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
ST2	1	27-Aug-2010	AP	Include	100428		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
ST2	1	27-Aug-2010	AP	Include	100428		14.4			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
ST2	1	27-Aug-2010	AP	Include	100428		14.4			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Clastidium*	
ST2	1	27-Aug-2010	AP	Include	100428		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
ST2	1	27-Aug-2010	AP	Include	100428		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
ST2	1	27-Aug-2010	AP	Include	100428		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
ST2	1	27-Aug-2010	AP	Include	100428		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
ST2	1	27-Aug-2010	AP	Include	100428		14.4			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
ST2	1	27-Aug-2010	AP	Include	100428		14.4			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
ST2	1	27-Aug-2010	AP	Include	100428		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
ST2	1	27-Aug-2010	AP	Include	100428		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
ST2	1	27-Aug-2010	AP	Include	100428		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
ST2	1	27-Aug-2010	AP	Include	100428		14.4			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
ST2	1	27-Aug-2010	AP	Include	100428		14.4								
ST2	2	27-Aug-2010	AP	Include	100429		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
ST2	2	27-Aug-2010	AP	Include	100429		14.4			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
ST2	2	27-Aug-2010	AP	Include	100429		14.4			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Clastidium*	
ST2	2	27-Aug-2010	AP	Include	100429		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
ST2	2	27-Aug-2010	AP	Include	100429		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
ST2	2	27-Aug-2010	AP	Include	100429		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
ST2	2	27-Aug-2010	AP	Include	100429		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Frustulia*	*rhomboides*
ST2	2	27-Aug-2010	AP	Include	100429		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
ST2	2	27-Aug-2010	AP	Include	100429		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
ST2	2	27-Aug-2010	AP	Include	100429		14.4			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
ST2	2	27-Aug-2010	AP	Include	100429		14.4			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
ST2	2	27-Aug-2010	AP	Include	100429		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
ST2	2	27-Aug-2010	AP	Include	100429		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
ST2	2	27-Aug-2010	AP	Include	100429		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
ST2	3	27-Aug-2010	AP	Include	100430		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
ST2	3	27-Aug-2010	AP	Include	100430		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
ST2	3	27-Aug-2010	AP	Include	100430		14.4			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
ST2	3	27-Aug-2010	AP	Include	100430		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
ST2	3	27-Aug-2010	AP	Include	100430		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
ST2	3	27-Aug-2010	AP	Include	100430		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
ST2	3	27-Aug-2010	AP	Include	100430		14.4			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
ST2	3	27-Aug-2010	AP	Include	100430		14.4			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
ST2	3	27-Aug-2010	AP	Include	100430		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
ST2	3	27-Aug-2010	AP	Include	100430		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*fenestrata*
ST2	3	27-Aug-2010	AP	Include	100430		14.4			Bacillariophyta	Bacillariophyceae				
TC2	1	27-Aug-2010	AP	Include	100431		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
TC2	1	27-Aug-2010	AP	Include	100431		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
TC2	1	27-Aug-2010	AP	Include	100431		14.4			Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	*Chroococcus*	

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
ST1	3	27-Aug-2010	*Neidium* sp.							<60.6		Exclude	ok	ok
ST1	3	27-Aug-2010	*Nitzschia* spp.							1,818.0		ok	ok	ok
ST1	3	27-Aug-2010	*Pinnularia* spp.							<60.6		Exclude	ok	ok
ST1	3	27-Aug-2010	*Pseudanabaena* spp.							3,030.0		ok	ok	ok
ST1	3	27-Aug-2010	*Stauroneis* sp.							<60.6		Exclude	ok	ok
ST1	3	27-Aug-2010	*Surirella* spp.							<60.6		Exclude	ok	ok
ST1	3	27-Aug-2010	*Synedra* spp.							121.2		ok	ok	ok
ST1	3	27-Aug-2010	*Synedra ulna*							<60.6		Exclude	ok	ok
ST1	3	27-Aug-2010	*Tabellaria flocculosa*							<60.6		Exclude	ok	ok
ST1	3	27-Aug-2010	Unknown alga (colony)							<60.6		Exclude	Exclude	Exclude
ST1	3	27-Aug-2010	Unknown alga sp.							939.8		ok	Exclude	Exclude
ST1	3	27-Aug-2010	Unknown Chlorophyte sp.							<60.6		Exclude	ok	Exclude
ST1	3	27-Aug-2010	Unknown Chrysophyte (cyst)							<60.6		Exclude	ok	Exclude
ST1	3	27-Aug-2010	Unknown Oscillatoriales							1,454.4		ok	ok	Exclude
ST2	1	27-Aug-2010	*Achnanthes minutissima*							7,316.5		ok	ok	ok
ST2	1	27-Aug-2010	*Achnanthes* spp.							377.6		ok	ok	ok
ST2	1	27-Aug-2010	*Chamaesiphon* spp.							21,949.5		ok	ok	ok
ST2	1	27-Aug-2010	*Clastidium* sp.							29,266.0		ok	ok	ok
ST2	1	27-Aug-2010	*Cymbella minuta*							10,243.1		ok	ok	ok
ST2	1	27-Aug-2010	*Fragilaria vaucheriae*							27,802.7		ok	ok	ok
ST2	1	27-Aug-2010	*Gomphonema* spp.							11,706.4		ok	ok	ok
ST2	1	27-Aug-2010	*Hannaea arcus*							566.4		ok	ok	ok
ST2	1	27-Aug-2010	*Homoeothrix varians*							5,743,518.0		ok	ok	ok
ST2	1	27-Aug-2010	*Hydrurus foetidus*							30,729.3		ok	ok	ok
ST2	1	27-Aug-2010	*Meridion circulare*							188.8		ok	ok	ok
ST2	1	27-Aug-2010	*Navicula* spp.							377.6		ok	ok	ok
ST2	1	27-Aug-2010	*Nitzschia* spp.							377.6		ok	ok	ok
ST2	1	27-Aug-2010	*Pseudanabaena* spp.							2,454.4		ok	ok	ok
ST2	1	27-Aug-2010	Unknown alga sp.							1,463.3		ok	Exclude	Exclude
ST2	2	27-Aug-2010	*Achnanthes minutissima*							2,723.6		ok	ok	ok
ST2	2	27-Aug-2010	*Chamaesiphon* spp.							23,150.6		ok	ok	ok
ST2	2	27-Aug-2010	*Clastidium* sp.							13,618.0		ok	ok	ok
ST2	2	27-Aug-2010	*Cymbella minuta*							6,809.0		ok	ok	ok
ST2	2	27-Aug-2010	*Diatoma mesodon*							<175.7		Exclude	ok	ok
ST2	2	27-Aug-2010	*Fragilaria vaucheriae*							9,532.6		ok	ok	ok
ST2	2	27-Aug-2010	*Frustulia rhomboides*							<175.7		Exclude	ok	ok
ST2	2	27-Aug-2010	*Gomphonema* spp.							702.8		ok	ok	ok
ST2	2	27-Aug-2010	*Hannaea arcus*							175.7		ok	ok	ok
ST2	2	27-Aug-2010	*Homoeothrix varians*							12,566,599.1		ok	ok	ok
ST2	2	27-Aug-2010	*Hydrurus foetidus*							10,894.4		ok	ok	ok
ST2	2	27-Aug-2010	*Meridion circulare*							<175.7		Exclude	ok	ok
ST2	2	27-Aug-2010	*Navicula* spp.							<175.7		Exclude	ok	ok
ST2	2	27-Aug-2010	*Nitzschia* spp.							<175.7		Exclude	ok	ok
ST2	3	27-Aug-2010	*Achnanthes minutissima*							1,986.6		ok	ok	ok
ST2	3	27-Aug-2010	*Achnanthes* spp.							3,311.0		ok	ok	ok
ST2	3	27-Aug-2010	*Chamaesiphon* spp.							35,674.8		ok	ok	ok
ST2	3	27-Aug-2010	*Cymbella minuta*							<85.4		Exclude	ok	ok
ST2	3	27-Aug-2010	*Fragilaria vaucheriae*							<85.4		Exclude	ok	ok
ST2	3	27-Aug-2010	*Gomphonema* spp.							256.2		ok	ok	ok
ST2	3	27-Aug-2010	*Homoeothrix varians*							224,241.6		ok	ok	ok
ST2	3	27-Aug-2010	*Hydrurus foetidus*							53,512.2		ok	ok	ok
ST2	3	27-Aug-2010	*Navicula* spp.							<85.4		Exclude	ok	ok
ST2	3	27-Aug-2010	*Tabellaria fenestrata*							<85.4		Exclude	ok	ok
ST2	3	27-Aug-2010	Unknown diatom							<85.4		Exclude	ok	Exclude
TC2	1	27-Aug-2010	*Achnanthes minutissima*							<19.3		Exclude	ok	ok
TC2	1	27-Aug-2010	*Achnanthes* spp.							<19.3		Exclude	ok	ok
TC2	1	27-Aug-2010	*Chroococcus* sp.							<19.3		Exclude	ok	ok

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm²)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
TC2	1	27-Aug-2010	AP	Include	100431		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
TC2	1	27-Aug-2010	AP	Include	100431		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
TC2	1	27-Aug-2010	AP	Include	100431		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
TC2	1	27-Aug-2010	AP	Include	100431		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
TC2	1	27-Aug-2010	AP	Include	100431		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
TC2	1	27-Aug-2010	AP	Include	100431		14.4			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
TC2	1	27-Aug-2010	AP	Include	100431		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
TC2	1	27-Aug-2010	AP	Include	100431		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
TC2	1	27-Aug-2010	AP	Include	100431		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
TC2	1	27-Aug-2010	AP	Include	100431		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*
TC2	1	27-Aug-2010	AP	Include	100431		14.4								
TC2	1	27-Aug-2010	AP	Include	100431		14.4			Cyanophyta	Myxophyceae	Chroococcales			
TC2	1	27-Aug-2010	AP	Include	100431		14.4			Cyanophyta	Myxophyceae	Oscillatoriales			
TC2	2	27-Aug-2010	AP	Include	100432		14.4			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*	*falcatus*
TC2	2	27-Aug-2010	AP	Include	100432		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
TC2	2	27-Aug-2010	AP	Include	100432		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
TC2	2	27-Aug-2010	AP	Include	100432		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
TC2	2	27-Aug-2010	AP	Include	100432		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
TC2	2	27-Aug-2010	AP	Include	100432		14.4			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
TC2	2	27-Aug-2010	AP	Include	100432		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
TC2	2	27-Aug-2010	AP	Include	100432		14.4			Cyanophyta	Myxophyceae	Chroococcales			
TC2	2	27-Aug-2010	AP	Include	100432		14.4			Cyanophyta	Myxophyceae	Oscillatoriales			
TC2	3	27-Aug-2010	AP	Include	100433		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
TC2	3	27-Aug-2010	AP	Include	100433		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
TC2	3	27-Aug-2010	AP	Include	100433		14.4			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*	*falcatus*
TC2	3	27-Aug-2010	AP	Include	100433		14.4			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
TC2	3	27-Aug-2010	AP	Include	100433		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
TC2	3	27-Aug-2010	AP	Include	100433		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
TC2	3	27-Aug-2010	AP	Include	100433		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
TC2	3	27-Aug-2010	AP	Include	100433		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
TC2	3	27-Aug-2010	AP	Include	100433		14.4			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
TC2	3	27-Aug-2010	AP	Include	100433		14.4			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
TC2	3	27-Aug-2010	AP	Include	100433		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
TC2	3	27-Aug-2010	AP	Include	100433		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
TC2	3	27-Aug-2010	AP	Include	100433		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
TC2	3	27-Aug-2010	AP	Include	100433		14.4								
TC2	3	27-Aug-2010	AP	Include	100433		14.4			Bacillariophyta	Bacillariophyceae				
TC3	1	27-Aug-2010	AP	Include	100437		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
TC3	1	27-Aug-2010	AP	Include	100437		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
TC3	1	27-Aug-2010	AP	Include	100437		14.4			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
TC3	1	27-Aug-2010	AP	Include	100437		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
TC3	1	27-Aug-2010	AP	Include	100437		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
TC3	1	27-Aug-2010	AP	Include	100437		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
TC3	1	27-Aug-2010	AP	Include	100437		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
TC3	1	27-Aug-2010	AP	Include	100437		14.4			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
TC3	1	27-Aug-2010	AP	Include	100437		14.4			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
TC3	1	27-Aug-2010	AP	Include	100437		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
TC3	1	27-Aug-2010	AP	Include	100437		14.4			Chlorophyta	Chlorophyceae	Chlorococcales	Microsporaceae	*Microspora*	
TC3	1	27-Aug-2010	AP	Include	100437		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
TC3	1	27-Aug-2010	AP	Include	100437		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
TC3	1	27-Aug-2010	AP	Include	100437		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
TC3	1	27-Aug-2010	AP	Include	100437		14.4			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
TC3	1	27-Aug-2010	AP	Include	100437		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*ulna*
TC3	1	27-Aug-2010	AP	Include	100437		14.4								
TC3	1	27-Aug-2010	AP	Include	100437		14.4								
TC3	1	27-Aug-2010	AP	Include	100437		14.4			Chrysophyta					
TC3	1	27-Aug-2010	AP	Include	100437		14.4			Bacillariophyta	Bacillariophyceae				

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
TC2	1	27-Aug-2010	*Cymbella sinuata*							<19.3		Exclude	ok	ok
TC2	1	27-Aug-2010	*Cymbella* spp.							<19.3		Exclude	ok	ok
TC2	1	27-Aug-2010	*Fragilaria vaucheriae*							<19.3		Exclude	ok	ok
TC2	1	27-Aug-2010	*Gomphonema* spp.							<19.3		Exclude	ok	ok
TC2	1	27-Aug-2010	*Hannaea arcus*							<19.3		Exclude	ok	ok
TC2	1	27-Aug-2010	*Hydrurus foetidus*							19.3		ok	ok	ok
TC2	1	27-Aug-2010	*Navicula* spp.							<19.3		Exclude	ok	ok
TC2	1	27-Aug-2010	*Nitzschia* spp.							<19.3		Exclude	ok	ok
TC2	1	27-Aug-2010	*Pinnularia* spp.							<19.3		Exclude	ok	ok
TC2	1	27-Aug-2010	*Tabellaria flocculosa*							<19.3		Exclude	ok	ok
TC2	1	27-Aug-2010	Unknown alga sp.							38.6		ok	Exclude	Exclude
TC2	1	27-Aug-2010	Unknown Chroococcales sp.							19.3		ok	ok	Exclude
TC2	1	27-Aug-2010	Unknown Oscillatoriales							<19.3		Exclude	ok	Exclude
TC2	2	27-Aug-2010	*Ankistrodesmus falcatus*							<20.3		Exclude	ok	ok
TC2	2	27-Aug-2010	*Cymbella sinuata*							<20.3		Exclude	ok	ok
TC2	2	27-Aug-2010	*Fragilaria vaucheriae*							<20.3		Exclude	ok	ok
TC2	2	27-Aug-2010	*Gomphonema* spp.							<20.3		Exclude	ok	ok
TC2	2	27-Aug-2010	*Hannaea arcus*							<20.3		Exclude	ok	ok
TC2	2	27-Aug-2010	*Hydrurus foetidus*							527.8		ok	ok	ok
TC2	2	27-Aug-2010	*Nitzschia* spp.							<20.3		Exclude	ok	ok
TC2	2	27-Aug-2010	Unknown Chroococcales sp.							<20.3		Exclude	ok	Exclude
TC2	2	27-Aug-2010	Unknown Oscillatoriales							<20.3		Exclude	ok	Exclude
TC2	3	27-Aug-2010	*Achnanthes minutissima*							828.0		ok	ok	ok
TC2	3	27-Aug-2010	*Achnanthes* spp.							496.8		ok	ok	ok
TC2	3	27-Aug-2010	*Ankistrodesmus falcatus*							<21.4		Exclude	ok	ok
TC2	3	27-Aug-2010	*Chamaesiphon* spp.							40,137.3		ok	ok	ok
TC2	3	27-Aug-2010	*Cymbella minuta*							128.4		ok	ok	ok
TC2	3	27-Aug-2010	*Cymbella sinuata*							9,556.5		ok	ok	ok
TC2	3	27-Aug-2010	*Fragilaria vaucheriae*							<21.4		Exclude	ok	ok
TC2	3	27-Aug-2010	*Gomphonema* spp.							3,822.6		ok	ok	ok
TC2	3	27-Aug-2010	*Homoeothrix varians*							107,669.9		ok	ok	ok
TC2	3	27-Aug-2010	*Hydrurus foetidus*							14,653.3		ok	ok	ok
TC2	3	27-Aug-2010	*Meridion circulare*							<21.4		Exclude	ok	ok
TC2	3	27-Aug-2010	*Navicula* spp.							8,919.4		ok	ok	ok
TC2	3	27-Aug-2010	*Nitzschia* spp.							<21.4		Exclude	ok	ok
TC2	3	27-Aug-2010	Unknown alga sp.							165.6		ok	Exclude	Exclude
TC2	3	27-Aug-2010	Unknown diatom							165.6		ok	ok	Exclude
TC3	1	27-Aug-2010	*Achnanthes minutissima*							30.8		ok	ok	ok
TC3	1	27-Aug-2010	*Achnanthes* spp.							15.4		ok	ok	ok
TC3	1	27-Aug-2010	*Chamaesiphon* spp.							239.2		ok	ok	ok
TC3	1	27-Aug-2010	*Cymbella minuta*							15.4		ok	ok	ok
TC3	1	27-Aug-2010	*Cymbella sinuata*							77.0		ok	ok	ok
TC3	1	27-Aug-2010	*Fragilaria vaucheriae*							15.4		ok	ok	ok
TC3	1	27-Aug-2010	*Gomphonema* spp.							30.8		ok	ok	ok
TC3	1	27-Aug-2010	*Homoeothrix varians*							5,023.2		ok	ok	ok
TC3	1	27-Aug-2010	*Hydrurus foetidus*							169.4		ok	ok	ok
TC3	1	27-Aug-2010	*Meridion circulare*							<15.4		Exclude	ok	ok
TC3	1	27-Aug-2010	*Microspora* sp.							<15.4		Exclude	ok	ok
TC3	1	27-Aug-2010	*Navicula* spp.							123.2		ok	ok	ok
TC3	1	27-Aug-2010	*Nitzschia* spp.							30.8		ok	ok	ok
TC3	1	27-Aug-2010	*Pinnularia* spp.							<15.4		Exclude	ok	ok
TC3	1	27-Aug-2010	*Pseudanabaena* spp.							184.8		ok	ok	ok
TC3	1	27-Aug-2010	*Synedra ulna*							<15.4		Exclude	ok	ok
TC3	1	27-Aug-2010	Unknown alga (colony)							<15.4		Exclude	Exclude	Exclude
TC3	1	27-Aug-2010	Unknown alga sp.							15.4		ok	Exclude	Exclude
TC3	1	27-Aug-2010	Unknown Chrysophyte (cyst)							<15.4		Exclude	ok	Exclude
TC3	1	27-Aug-2010	Unknown diatom							<15.4		Exclude	ok	Exclude

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm^2)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
TC3	1	27-Aug-2010	AP	Include	100437		14.4			Cyanophyta	Myxophyceae	Nostocales			
TC3	2	27-Aug-2010	AP	Include	100438		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
TC3	2	27-Aug-2010	AP	Include	100438		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*construens*
TC3	2	27-Aug-2010	AP	Include	100438		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
TC3	2	27-Aug-2010	AP	Include	100438		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
TC3	2	27-Aug-2010	AP	Include	100438		14.4			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
TC3	2	27-Aug-2010	AP	Include	100438		14.4			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
TC3	2	27-Aug-2010	AP	Include	100438		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
TC3	2	27-Aug-2010	AP	Include	100438		14.4			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
TC3	2	27-Aug-2010	AP	Include	100438		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*ulna*
TC3	2	27-Aug-2010	AP	Include	100438		14.4			Cyanophyta	Myxophyceae	Chroococcales			
TC3	3	27-Aug-2010	AP	Include	100439		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
TC3	3	27-Aug-2010	AP	Include	100439		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
TC3	3	27-Aug-2010	AP	Include	100439		14.4			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
TC3	3	27-Aug-2010	AP	Include	100439		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cistula*
TC3	3	27-Aug-2010	AP	Include	100439		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
TC3	3	27-Aug-2010	AP	Include	100439		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
TC3	3	27-Aug-2010	AP	Include	100439		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
TC3	3	27-Aug-2010	AP	Include	100439		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
TC3	3	27-Aug-2010	AP	Include	100439		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Frustulia*	*rhomboides*
TC3	3	27-Aug-2010	AP	Include	100439		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
TC3	3	27-Aug-2010	AP	Include	100439		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
TC3	3	27-Aug-2010	AP	Include	100439		14.4			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
TC3	3	27-Aug-2010	AP	Include	100439		14.4			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
TC3	3	27-Aug-2010	AP	Include	100439		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
TC3	3	27-Aug-2010	AP	Include	100439		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
TC3	3	27-Aug-2010	AP	Include	100439		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
TC3	3	27-Aug-2010	AP	Include	100439		14.4			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
TC3	3	27-Aug-2010	AP	Include	100439		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
TC3	3	27-Aug-2010	AP	Include	100439		14.4			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*ulna*
TC3	3	27-Aug-2010	AP	Include	100439		14.4								
TC3	3	27-Aug-2010	AP	Include	100439		14.4			Cyanophyta	Myxophyceae	Oscillatoriales			
TD1	1	26-Aug-2010	FF	Exclude	100419		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
TD1	1	26-Aug-2010	FF	Exclude	100419		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Anomoeoneidaceae	*Anomoeoneis*	
TD1	1	26-Aug-2010	FF	Exclude	100419		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Cocconeis*	*placentula*
TD1	1	26-Aug-2010	FF	Exclude	100419		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
TD1	1	26-Aug-2010	FF	Exclude	100419		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
TD1	1	26-Aug-2010	FF	Exclude	100419		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*tenuis*
TD1	1	26-Aug-2010	FF	Exclude	100419		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
TD1	1	26-Aug-2010	FF	Exclude	100419		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
TD1	1	26-Aug-2010	FF	Exclude	100419		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
TD1	1	26-Aug-2010	FF	Exclude	100419		28.8			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
TD1	1	26-Aug-2010	FF	Exclude	100419		28.8			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
TD1	1	26-Aug-2010	FF	Exclude	100419		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
TD1	1	26-Aug-2010	FF	Exclude	100419		28.8			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
TD1	1	26-Aug-2010	FF	Exclude	100419		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
TD1	1	26-Aug-2010	FF	Exclude	100419		28.8								
TD1	1	26-Aug-2010	FF	Exclude	100419		28.8			Cyanophyta	Myxophyceae	Oscillatoriales			
TD1	2	26-Aug-2010	FF	Exclude	100420		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*lanceolata*
TD1	2	26-Aug-2010	FF	Exclude	100420		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
TD1	2	26-Aug-2010	FF	Exclude	100420		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cistula*
TD1	2	26-Aug-2010	FF	Exclude	100420		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
TD1	2	26-Aug-2010	FF	Exclude	100420		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
TD1	2	26-Aug-2010	FF	Exclude	100420		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
TD1	2	26-Aug-2010	FF	Exclude	100420		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
TD1	2	26-Aug-2010	FF	Exclude	100420		28.8			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
TD1	2	26-Aug-2010	FF	Exclude	100420		28.8			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
TC3	1	27-Aug-2010	Unknown diatom							<15.4		Exclude	ok	Exclude
TC3	2	27-Aug-2010	*Cymbella minuta*							10.9		ok	ok	ok
TC3	2	27-Aug-2010	*Fragilaria construens*							<10.9		Exclude	ok	ok
TC3	2	27-Aug-2010	*Fragilaria vaucheriae*							10.9		ok	ok	ok
TC3	2	27-Aug-2010	*Gomphonema* spp.							<10.9		Exclude	ok	ok
TC3	2	27-Aug-2010	*Homoeothrix varians*							<10.9		Exclude	ok	ok
TC3	2	27-Aug-2010	*Hydrurus foetidus*							32.7		ok	ok	ok
TC3	2	27-Aug-2010	*Nitzschia* spp.							<10.9		Exclude	ok	ok
TC3	2	27-Aug-2010	*Pseudanabaena* spp.							65.4		ok	ok	ok
TC3	2	27-Aug-2010	*Synedra ulna*							<10.9		Exclude	ok	ok
TC3	2	27-Aug-2010	Unknown Chroococcales sp.							<10.9		Exclude	ok	Exclude
TC3	3	27-Aug-2010	*Achnanthes minutissima*							150.0		ok	ok	ok
TC3	3	27-Aug-2010	*Achnanthes* spp.							30.0		ok	ok	ok
TC3	3	27-Aug-2010	*Chamaesiphon* spp.							464.8		ok	ok	ok
TC3	3	27-Aug-2010	*Cymbella cistula*							<15.0		Exclude	ok	ok
TC3	3	27-Aug-2010	*Cymbella minuta*							15.0		ok	ok	ok
TC3	3	27-Aug-2010	*Cymbella sinuata*							120.0		ok	ok	ok
TC3	3	27-Aug-2010	*Cymbella* spp.							<15.0		Exclude	ok	ok
TC3	3	27-Aug-2010	*Fragilaria vaucheriae*							<15.0		Exclude	ok	ok
TC3	3	27-Aug-2010	*Frustulia rhomboides*							<15.0		Exclude	ok	ok
TC3	3	27-Aug-2010	*Gomphonema* spp.							2,905.0		ok	ok	ok
TC3	3	27-Aug-2010	*Hannaea arcus*							<15.0		Exclude	ok	ok
TC3	3	27-Aug-2010	*Homoeothrix varians*							83,142.0		ok	ok	ok
TC3	3	27-Aug-2010	*Hydrurus foetidus*							330.0		ok	ok	ok
TC3	3	27-Aug-2010	*Navicula* spp.							180.0		ok	ok	ok
TC3	3	27-Aug-2010	*Nitzschia* spp.							90.0		ok	ok	ok
TC3	3	27-Aug-2010	*Pinnularia* spp.							<15.0		Exclude	ok	ok
TC3	3	27-Aug-2010	*Pseudanabaena* spp.							6,623.4		ok	ok	ok
TC3	3	27-Aug-2010	*Synedra* spp.							<15.0		Exclude	ok	ok
TC3	3	27-Aug-2010	*Synedra ulna*							<15.0		Exclude	ok	ok
TC3	3	27-Aug-2010	Unknown alga sp.							232.4		ok	Exclude	Exclude
TC3	3	27-Aug-2010	Unknown Oscillatoriales							<15.0		Exclude	ok	Exclude
TD1	1	26-Aug-2010	*Achnanthes minutissima*							58.2		ok	ok	ok
TD1	1	26-Aug-2010	*Anomoeoneis* sp.							<29.1		Exclude	ok	ok
TD1	1	26-Aug-2010	*Cocconeis placentula*							<29.1		Exclude	ok	ok
TD1	1	26-Aug-2010	*Cymbella minuta*							87.3		ok	ok	ok
TD1	1	26-Aug-2010	*Cymbella sinuata*							<29.1		Exclude	ok	ok
TD1	1	26-Aug-2010	*Diatoma tenuis*							<29.1		Exclude	ok	ok
TD1	1	26-Aug-2010	*Fragilaria vaucheriae*							116.4		ok	ok	ok
TD1	1	26-Aug-2010	*Gomphonema* spp.							29.1		ok	ok	ok
TD1	1	26-Aug-2010	*Hannaea arcus*							<29.1		Exclude	ok	ok
TD1	1	26-Aug-2010	*Homoeothrix varians*							6,635.2		ok	ok	ok
TD1	1	26-Aug-2010	*Hydrurus foetidus*							114,391.2		ok	ok	ok
TD1	1	26-Aug-2010	*Meridion circulare*							<29.1		Exclude	ok	ok
TD1	1	26-Aug-2010	*Pseudanabaena* spp.							<29.1		Exclude	ok	ok
TD1	1	26-Aug-2010	*Synedra* spp.							<29.1		Exclude	ok	ok
TD1	1	26-Aug-2010	Unknown alga sp.							<29.1		Exclude	Exclude	Exclude
TD1	1	26-Aug-2010	Unknown Oscillatoriales							<29.1		Exclude	ok	Exclude
TD1	2	26-Aug-2010	*Achnanthes lanceolata*							<18.6		Exclude	ok	ok
TD1	2	26-Aug-2010	*Achnanthes minutissima*							18.6		ok	ok	ok
TD1	2	26-Aug-2010	*Cymbella cistula*							<18.6		Exclude	ok	ok
TD1	2	26-Aug-2010	*Cymbella minuta*							130.2		ok	ok	ok
TD1	2	26-Aug-2010	*Fragilaria vaucheriae*							74.4		ok	ok	ok
TD1	2	26-Aug-2010	*Gomphonema* spp.							<18.6		Exclude	ok	ok
TD1	2	26-Aug-2010	*Hannaea arcus*							37.2		ok	ok	ok
TD1	2	26-Aug-2010	*Homoeothrix varians*							41,617.5		ok	ok	ok
TD1	2	26-Aug-2010	*Hydrurus foetidus*							1,297.8		ok	ok	ok

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm^2)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
TD1	2	26-Aug-2010	FF	Exclude	100420		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
TD1	2	26-Aug-2010	FF	Exclude	100420		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
TD1	2	26-Aug-2010	FF	Exclude	100420		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
TD1	2	26-Aug-2010	FF	Exclude	100420		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
TD1	2	26-Aug-2010	FF	Exclude	100420		28.8			Cyanophyta	Myxophyceae	Oscillatoriales			
TD1	3	26-Aug-2010	FF	Exclude	100421		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Anomoeoneidaceae	*Anomoeoneis*	
TD1	3	26-Aug-2010	FF	Exclude	100421		28.8			Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*	
TD1	3	26-Aug-2010	FF	Exclude	100421		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
TD1	3	26-Aug-2010	FF	Exclude	100421		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
TD1	3	26-Aug-2010	FF	Exclude	100421		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
TD1	3	26-Aug-2010	FF	Exclude	100421		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
TD1	3	26-Aug-2010	FF	Exclude	100421		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
TD1	3	26-Aug-2010	FF	Exclude	100421		28.8			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
TD1	3	26-Aug-2010	FF	Exclude	100421		28.8			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	*foetidus*
TD1	3	26-Aug-2010	FF	Exclude	100421		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
TD1	3	26-Aug-2010	FF	Exclude	100421		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
TD1	3	26-Aug-2010	FF	Exclude	100421		28.8			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*fenestrata*
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
WC4		21-Aug-2011	FF	Exclude	110484					Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	*Agmenellum*	*tenuissima*
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	*Amphora*	
WC4		21-Aug-2011	FF	Exclude	110484					Cyanophyta	Myxophyceae	Chroococcales		*Anacystis*	*limneticus*
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*	*falcatus*
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*	
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Arthrodesmus*	
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Asterionella*	*formosa*
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Botryococcus*	*braunii*
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Oedogoniales	Oedogoniaceae	*Bulbochaete*	
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Ceratoneis*	
WC4		21-Aug-2011	FF	Exclude	110484					Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Chroomonas*	*acuta*
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Closteriopsis*	
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Closterium*	
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Cosmarium*	
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigeniella*	*crucifera*
WC4		21-Aug-2011	FF	Exclude	110484					Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*	*ovata/erosa*
WC4		21-Aug-2011	FF	Exclude	110484					Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*	
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Desmodesmus*	*denticulatus*
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*anceps*
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	
WC4		21-Aug-2011	FF	Exclude	110484					Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	*divergens*
WC4		21-Aug-2011	FF	Exclude	110484					Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	*sertularia*
WC4		21-Aug-2011	FF	Exclude	110484					Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Euastrum*	
WC4		21-Aug-2011	FF	Exclude	110484					Euglenophyta	Euglenophyceae	Euglenales	Euglenaceae	*Euglena*	
WC4		21-Aug-2011	FF	Exclude	110484					Euglenophyta	Euglenophyceae	Euglenales	Euglenaceae	*Euglena*	
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*	
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*crotonensis*
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Frustulia*	*rhomboides*
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Frustulia*	
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*olivaceum*
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Zygnematales	Mesotaeniaceae	*Gonatozygon*	
WC4		21-Aug-2011	FF	Exclude	110484					Chrysophyta	Chrysophyceae	Chrysomonadales	Synuraceae	*Mallomonas*	*akrokomos*
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*	*italica*

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
TD1	2	26-Aug-2010	*Meridion circulare*							<18.6		Exclude	ok	ok
TD1	2	26-Aug-2010	*Nitzschia* spp.							18.6		ok	ok	ok
TD1	2	26-Aug-2010	*Pinnularia* spp.							<18.6		Exclude	ok	ok
TD1	2	26-Aug-2010	*Synedra* spp.							<18.6		Exclude	ok	ok
TD1	2	26-Aug-2010	Unknown Oscillatoriales							520.8		ok	ok	Exclude
TD1	3	26-Aug-2010	*Anomoeoneis* sp.							<29.9		Exclude	ok	ok
TD1	3	26-Aug-2010	*Cyclotella* sp.							<29.9		Exclude	ok	ok
TD1	3	26-Aug-2010	*Cymbella minuta*							29.9		ok	ok	ok
TD1	3	26-Aug-2010	*Cymbella sinuata*							<29.9		Exclude	ok	ok
TD1	3	26-Aug-2010	*Fragilaria vaucheriae*							<29.9		Exclude	ok	ok
TD1	3	26-Aug-2010	*Gomphonema* spp.							<29.9		Exclude	ok	ok
TD1	3	26-Aug-2010	*Hannaea arcus*							<29.9		Exclude	ok	ok
TD1	3	26-Aug-2010	*Homoeothrix varians*							358.8		ok	ok	ok
TD1	3	26-Aug-2010	*Hydrurus foetidus*							508.3		ok	ok	ok
TD1	3	26-Aug-2010	*Nitzschia* spp.							<29.9		Exclude	ok	ok
TD1	3	26-Aug-2010	*Synedra* spp.							<29.9		Exclude	ok	ok
TD1	3	26-Aug-2010	*Tabellaria fenestrata*							<29.9		Exclude	ok	ok
WC4		21-Aug-2011	*Achnanthes minutissima*						9.8			ok	ok	ok
WC4		21-Aug-2011	*Agmenellum tenuissima*						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Amphora* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Anacystis* cf. *limneticus*						<1.4			Exclude	ok	Exclude
WC4		21-Aug-2011	*Ankistrodesmus falcatus*						2.8			ok	ok	ok
WC4		21-Aug-2011	*Ankistrodesmus* sp.						1.4			ok	ok	ok
WC4		21-Aug-2011	*Arthrodesmus* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Asterionella formosa*						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Botryococcus braunii*						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Bulbochaete* sp.						25.2			ok	ok	ok
WC4		21-Aug-2011	*Ceratoneis* sp.						4.8			ok	ok	ok
WC4		21-Aug-2011	*Chroomonas acuta*						2.8			ok	ok	ok
WC4		21-Aug-2011	*Closteriopsis* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Closterium* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Cosmarium* sp.						1.4			ok	ok	ok
WC4		21-Aug-2011	*Crucigeniella crucifera*						5.6			ok	ok	ok
WC4		21-Aug-2011	*Cryptomonas ovata/erosa*						11.2			ok	ok	ok
WC4		21-Aug-2011	*Cryptomonas* sp.						1.4			ok	ok	ok
WC4		21-Aug-2011	*Cymbella minuta*						7.0			ok	ok	ok
WC4		21-Aug-2011	*Cymbella* sp.						4.8			ok	ok	ok
WC4		21-Aug-2011	*Desmodesmus* cf. *denticulatus*						<1.4			Exclude	ok	Exclude
WC4		21-Aug-2011	*Diatoma anceps*						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Diatoma* sp.	cf.					1.4			ok	ok	Exclude
WC4		21-Aug-2011	*Diatoma* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Dinobryon divergens*						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Dinobryon sertularia*						1.4			ok	ok	ok
WC4		21-Aug-2011	*Dinobryon* sp.						1.4			ok	ok	ok
WC4		21-Aug-2011	*Euastrum* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Euglena* sp.	cf.					<1.4			Exclude	ok	Exclude
WC4		21-Aug-2011	*Euglena* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Eunotia* sp.						1.4			ok	ok	ok
WC4		21-Aug-2011	*Fragilaria crotonensis*						2.8			ok	ok	ok
WC4		21-Aug-2011	*Fragilaria* sp.						7.0			ok	ok	ok
WC4		21-Aug-2011	*Frustulia rhomboides*						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Frustulia* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Gomphonema olivaceum*						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Gomphonema* sp.						2.8			ok	ok	ok
WC4		21-Aug-2011	*Gonatozygon* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Mallomonas akrokomos*						5.6			ok	ok	ok
WC4		21-Aug-2011	*Melosira italica*						<1.4			Exclude	ok	ok

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm^2)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*	
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	
WC4		21-Aug-2011	FF	Exclude	110484					Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	*Merismopedia*	
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Mougeotia*	
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Mougeotia*	
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Neidiaceae	*Neidium*	
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Oedogoniales	Oedogoniaceae	*Oedogonium*	
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Oedogoniales	Oedogoniaceae	*Oedogonium*	
WC4		21-Aug-2011	FF	Exclude	110484					Chrysophyta	Xanthophyceae	Heterococcales	Sciadaceae	*Ophiocytium*	
WC4		21-Aug-2011	FF	Exclude	110484					Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	*tenuis*
WC4		21-Aug-2011	FF	Exclude	110484					Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	*Pediastrum*	
WC4		21-Aug-2011	FF	Exclude	110484					Pyrrhophyta	Dinophyceae	Peridiniales		*Peridinium/Glenodinium*	
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
WC4		21-Aug-2011	FF	Exclude	110484					Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Planktolyngbya*	*limnetica*
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Pleurosigmataceae	*Pleurosigma/Gyrosigma*	
WC4		21-Aug-2011	FF	Exclude	110484					Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Quadrigula*	*closterioides*
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Scenedesmus*	*quadricauda*
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Scenedesmus*	
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Spirogyra*	
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Spondylosium*	*planum*
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Staurastrum*	
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Stauroneidaceae	*Stauroneis*	
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*ulna*
WC4		21-Aug-2011	FF	Exclude	110484					Chrysophyta	Chrysophyceae	Chrysomonadales	Synuraceae	*Synura*	
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*fenestrata*
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Chlorococcales	Chlorococcaceae	*Tetraedron*	
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Ulotrichales	Ulotrichaceae	*Ulothrix*	
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Xanthidium*	
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Zygnema*	
WC4		21-Aug-2011	FF	Exclude	110484										
WC4		21-Aug-2011	FF	Exclude	110484										
WC4		21-Aug-2011	FF	Exclude	110484										
WC4		21-Aug-2011	FF	Exclude	110484										
WC4		21-Aug-2011	FF	Exclude	110484					Bacillariophyta	Bacillariophyceae	Pennales			
WC4		21-Aug-2011	FF	Exclude	110484					Chlorophyta	Chlorophyceae	Zygnematales			
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	*Aphanocapsa*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Cyanophyta	Myxophyceae	Chroococcales	Synechococcaceae	*Aphanothece*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Rhodophyta	Florideophyceae	Acrochaetiales	Acrochaetiaceae	*Audouinella*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Caloneis*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Chrysophyta	Chrysophyceae	Chromulinales	Chromulinaceae	*Chromulina*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Closterium*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*	*fenestrata*
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cf.*
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*lunata*
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
WC4		21-Aug-2011	*Melosira* sp.						1.4			ok	ok	ok
WC4		21-Aug-2011	*Meridion* sp.						2.8			ok	ok	ok
WC4		21-Aug-2011	*Merismopedia* sp.						11.2			ok	ok	ok
WC4		21-Aug-2011	*Mougeotia* sp.	cf.					1.4			ok	ok	Exclude
WC4		21-Aug-2011	*Mougeotia* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Navicula* sp.						18.2			ok	ok	ok
WC4		21-Aug-2011	*Neidium* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Nitzschia* sp.						1.4			ok	ok	ok
WC4		21-Aug-2011	*Oedogonium* sp.	cf.					8.4			ok	ok	Exclude
WC4		21-Aug-2011	*Oedogonium* sp.						12.6			ok	ok	ok
WC4		21-Aug-2011	*Ophiocytium* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Oscillatoria* cf. *tenuis*						<1.4			Exclude	ok	Exclude
WC4		21-Aug-2011	*Oscillatoria* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Pediastrum* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Peridinium/Glenodinium* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Pinnularia* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Planktolyngbya limnetica*						109.2			ok	ok	ok
WC4		21-Aug-2011	*Pleurosigma/Gyrosigma* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Pseudanabaena* sp.	cf.					<1.4			Exclude	ok	Exclude
WC4		21-Aug-2011	*Quadrigula closterioides*						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Scenedesmus quadricauda*						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Scenedesmus* sp.						11.2			ok	ok	ok
WC4		21-Aug-2011	*Spirogyra* sp.	cf.					4.2			ok	ok	Exclude
WC4		21-Aug-2011	*Spondylosium planum*						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Staurastrum* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Stauroneis* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Synedra* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Synedra ulna*						1.4			ok	ok	ok
WC4		21-Aug-2011	*Synura* sp.	cf.					<1.4			Exclude	ok	Exclude
WC4		21-Aug-2011	*Tabellaria fenestrata*						4.2			ok	ok	ok
WC4		21-Aug-2011	*Tabellaria flocculosa*						179.2			ok	ok	ok
WC4		21-Aug-2011	*Tetraedron* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Ulothrix* sp.	cf.					2.8			ok	ok	Exclude
WC4		21-Aug-2011	*Xanthidium* sp.						<1.4			Exclude	ok	ok
WC4		21-Aug-2011	*Zygnema* sp.						2.8			ok	ok	ok
WC4		21-Aug-2011	Unknown alga (colony)						<1.4			Exclude	Exclude	Exclude
WC4		21-Aug-2011	Unknown alga (filament)						<1.4			Exclude	Exclude	Exclude
WC4		21-Aug-2011	Unknown alga (filament)						<1.4			Exclude	Exclude	Exclude
WC4		21-Aug-2011	Unknown alga sp.						<1.4			Exclude	Exclude	Exclude
WC4		21-Aug-2011	Unknown pennate diatom						5.6			ok	ok	Exclude
WC4		21-Aug-2011	Unknown Zygnematales						<1.4			Exclude	ok	Exclude
WC2	1	21-Aug-2011	*Achnanthes minutissima*							211.4		ok	ok	ok
WC2	1	21-Aug-2011	*Achnanthes* spp.							30.2		ok	ok	ok
WC2	1	21-Aug-2011	*Ankistrodesmus* spp.							39.0		ok	ok	ok
WC2	1	21-Aug-2011	*Aphanocapsa* sp.							93.6		ok	ok	ok
WC2	1	21-Aug-2011	*Aphanothece* sp.							<3.9		Exclude	ok	ok
WC2	1	21-Aug-2011	*Audouinella* sp.							<3.9		Exclude	ok	ok
WC2	1	21-Aug-2011	*Caloneis* spp.							<3.9		Exclude	ok	ok
WC2	1	21-Aug-2011	*Chamaesiphon* spp.							13,351.5		ok	ok	ok
WC2	1	21-Aug-2011	*Chromulina* sp.							7.8		ok	ok	ok
WC2	1	21-Aug-2011	*Closterium* spp.							<3.9		Exclude	ok	ok
WC2	1	21-Aug-2011	*Crucigenia fenestrata*							<3.9		Exclude	ok	ok
WC2	1	21-Aug-2011	*Cyclotella* spp.							39.0		ok	ok	ok
WC2	1	21-Aug-2011	*Cymbella* cf. *cestaii*							<3.9		Exclude	ok	Exclude
WC2	1	21-Aug-2011	*Cymbella lunata*							<3.9		Exclude	ok	ok
WC2	1	21-Aug-2011	*Cymbella minuta*							7.8		ok	ok	ok
WC2	1	21-Aug-2011	*Diatoma mesodon*							7.8		ok	ok	ok

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm²)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	*bavaricum*
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	*Elakatothrix*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Frustulia*	*rhomboides*
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum/parvulum*
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Hyalotheca*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Lyngbya*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Mougeotia*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Neidiaceae	*Neidium*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Oocystis*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Scenedesmus*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Stauroneidaceae	*Stauroneis*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Surirellaceae	*Surirella*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*fenestrata*
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9								
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Chlorophyta					
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Chlorophyta					
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Chrysophyta					
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Cryptophyta	Cryptophyceae	Cryptomonadales			
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Cyanophyta	Myxophyceae	Nostocales			
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Cyanophyta	Myxophyceae	Oscillatoriales			
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Rhodophyta					
WC2	1	21-Aug-2011	FF	Exclude	110481		24.9			Chlorophyta	Chlorophyceae	Ulotrichales			
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	*Aphanocapsa*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Cyanophyta	Myxophyceae	Chroococcales	Synechococcaceae	*Aphanothece*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Botryococcus*	*braunii*
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cf.*
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*lunata*
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*anceps*
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	*bavaricum*
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	*Elakatothrix*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
WC2	1	21-Aug-2011	*Dinobryon bavaricum*							23.4		ok	ok	ok
WC2	1	21-Aug-2011	*Dinobryon* sp.							3.9		ok	ok	ok
WC2	1	21-Aug-2011	*Elakatothrix* sp.	cf.						<3.9		Exclude	ok	Exclude
WC2	1	21-Aug-2011	*Eunotia* spp.							120.8		ok	ok	ok
WC2	1	21-Aug-2011	*Fragilaria vaucheriae*							15.6		ok	ok	ok
WC2	1	21-Aug-2011	*Frustulia rhomboides*							<3.9		Exclude	ok	ok
WC2	1	21-Aug-2011	*Gomphonema angustatum/parvulum*							<3.9		Exclude	ok	ok
WC2	1	21-Aug-2011	*Gomphonema* spp.							7.8		ok	ok	ok
WC2	1	21-Aug-2011	*Hannaea arcus*							23.4		ok	ok	ok
WC2	1	21-Aug-2011	*Homoeothrix varians*							20,781.9		ok	ok	ok
WC2	1	21-Aug-2011	*Hyalotheca* sp.							<3.9		Exclude	ok	ok
WC2	1	21-Aug-2011	*Lyngbya* spp.							<3.9		Exclude	ok	ok
WC2	1	21-Aug-2011	*Melosira* spp.							<3.9		Exclude	ok	ok
WC2	1	21-Aug-2011	*Meridion circulare*							<3.9		Exclude	ok	ok
WC2	1	21-Aug-2011	*Mougeotia* spp.							<3.9		Exclude	ok	ok
WC2	1	21-Aug-2011	*Navicula* spp.							23.4		ok	ok	ok
WC2	1	21-Aug-2011	*Neidium* sp.							<3.9		Exclude	ok	ok
WC2	1	21-Aug-2011	*Nitzschia* spp.							15.6		ok	ok	ok
WC2	1	21-Aug-2011	*Oocystis* sp.							23.4		ok	ok	ok
WC2	1	21-Aug-2011	*Oscillatoria* spp.							148.2		ok	ok	ok
WC2	1	21-Aug-2011	*Pinnularia* spp.							<3.9		Exclude	ok	ok
WC2	1	21-Aug-2011	*Pseudanabaena* sp.							70.2		ok	ok	ok
WC2	1	21-Aug-2011	*Scenedesmus* spp.							31.2		ok	ok	ok
WC2	1	21-Aug-2011	*Stauroneis* spp.							<3.9		Exclude	ok	ok
WC2	1	21-Aug-2011	*Surirella* spp.							<3.9		Exclude	ok	ok
WC2	1	21-Aug-2011	*Synedra* spp.							181.2		ok	ok	ok
WC2	1	21-Aug-2011	*Tabellaria* cf. *fenestrata*							<3.9		Exclude	ok	Exclude
WC2	1	21-Aug-2011	*Tabellaria flocculosa*							46.8		ok	ok	ok
WC2	1	21-Aug-2011	Unknown alga (flagellate)							7.8		ok	Exclude	Exclude
WC2	1	21-Aug-2011	Unknown alga sp.							181.2		ok	Exclude	Exclude
WC2	1	21-Aug-2011	Unknown Chlorophyte (colony) sp.							<3.9		Exclude	ok	Exclude
WC2	1	21-Aug-2011	Unknown Chlorophyte sp.							23.4		ok	ok	Exclude
WC2	1	21-Aug-2011	Unknown Chrysophyte (cyst)							90.6		ok	ok	Exclude
WC2	1	21-Aug-2011	Unknown Cryptomonadales							<3.9		Exclude	ok	Exclude
WC2	1	21-Aug-2011	Unknown diatom							27.3		ok	ok	Exclude
WC2	1	21-Aug-2011	Unknown Oscillatoriales							46.8		ok	ok	Exclude
WC2	1	21-Aug-2011	Unknown Rhodophyte (basal cells)							634.2		ok	ok	Exclude
WC2	1	21-Aug-2011	Unknown Ulotrichales							<3.9		Exclude	ok	Exclude
WC2	2	21-Aug-2011	*Achnanthes minutissima*							2,328.0		ok	ok	ok
WC2	2	21-Aug-2011	*Achnanthes* spp.							1,018.5		ok	ok	ok
WC2	2	21-Aug-2011	*Ankistrodesmus* spp.							48.5		ok	ok	ok
WC2	2	21-Aug-2011	*Aphanocapsa* sp.							116.4		ok	ok	ok
WC2	2	21-Aug-2011	*Aphanothece* sp.							155.2		ok	ok	ok
WC2	2	21-Aug-2011	*Botryococcus braunii*							<4.8		Exclude	ok	ok
WC2	2	21-Aug-2011	*Chamaesiphon* spp.							3,201.0		ok	ok	ok
WC2	2	21-Aug-2011	*Cyclotella* spp.							38.8		ok	ok	ok
WC2	2	21-Aug-2011	*Cymbella* cf. *cestaii*							<4.8		Exclude	ok	Exclude
WC2	2	21-Aug-2011	*Cymbella lunata*							<4.8		Exclude	ok	ok
WC2	2	21-Aug-2011	*Cymbella minuta*							9.7		ok	ok	ok
WC2	2	21-Aug-2011	*Cymbella* spp.							<4.8		Exclude	ok	ok
WC2	2	21-Aug-2011	*Diatoma anceps*							<4.8		Exclude	ok	ok
WC2	2	21-Aug-2011	*Diatoma mesodon*							4.8		ok	ok	ok
WC2	2	21-Aug-2011	*Dinobryon bavaricum*							38.8		ok	ok	ok
WC2	2	21-Aug-2011	*Dinobryon* sp.							9.7		ok	ok	ok
WC2	2	21-Aug-2011	*Elakatothrix* sp.	cf.						58.2		ok	ok	Exclude
WC2	2	21-Aug-2011	*Eunotia* spp.							29.1		ok	ok	ok
WC2	2	21-Aug-2011	*Fragilaria* spp.							<4.8		Exclude	ok	ok

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm^2)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Lyngbya*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Mougeotia*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Neidiaceae	*Neidium*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Oocystis*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Scenedesmus*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Stauroneidaceae	*Stauroneis*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Surirellaceae	*Stenopterobia*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*fenestrata*
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9								
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9								
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9								
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Chlorophyta					
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Chlorophyta					
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Chlorophyta					
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Chlorophyta					
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Chrysophyta					
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Cryptophyta	Cryptophyceae	Cryptomonadales			
WC2	2	21-Aug-2011	FF	Exclude	110482		24.9			Cyanophyta	Myxophyceae	Oscillatoriales			
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	*Aphanocapsa*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Caloneis*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Cyanophyta	Myxophyceae	Nostocales	Rivulariaceae	*Calothrix/Rivularia*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	*Chroococcus*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*	*fenestrata*
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cf.*
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*lunata*
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	*bavaricum*
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	*Elakatothrix*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*construens*
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Frustulia*	*rhomboides*
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum/parvulum*
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Lyngbya*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*	

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
WC2	2	21-Aug-2011	*Fragilaria vaucheriae*							9.7		ok	ok	ok
WC2	2	21-Aug-2011	*Gomphonema* spp.							77.6		ok	ok	ok
WC2	2	21-Aug-2011	*Hannaea arcus*							9.7		ok	ok	ok
WC2	2	21-Aug-2011	*Homoeothrix varians*							2,570.4		ok	ok	ok
WC2	2	21-Aug-2011	*Lyngbya* spp.							155.2		ok	ok	ok
WC2	2	21-Aug-2011	*Melosira* spp.							<4.8		Exclude	ok	ok
WC2	2	21-Aug-2011	*Mougeotia* spp.							<4.8		Exclude	ok	ok
WC2	2	21-Aug-2011	*Navicula* spp.							29.1		ok	ok	ok
WC2	2	21-Aug-2011	*Neidium* sp.							<4.8		Exclude	ok	ok
WC2	2	21-Aug-2011	*Nitzschia* spp.							4.8		ok	ok	ok
WC2	2	21-Aug-2011	*Oocystis* sp.							38.8		ok	ok	ok
WC2	2	21-Aug-2011	*Oscillatoria* spp.							475.3		ok	ok	ok
WC2	2	21-Aug-2011	*Pinnularia* spp.							<4.8		Exclude	ok	ok
WC2	2	21-Aug-2011	*Scenedesmus* spp.							19.4		ok	ok	ok
WC2	2	21-Aug-2011	*Stauroneis* spp.							<4.8		Exclude	ok	ok
WC2	2	21-Aug-2011	*Stenopterobia* sp.							<4.8		Exclude	ok	ok
WC2	2	21-Aug-2011	*Synedra* spp.							29.1		ok	ok	ok
WC2	2	21-Aug-2011	*Tabellaria* cf. *fenestrata*							<4.8		Exclude	ok	Exclude
WC2	2	21-Aug-2011	*Tabellaria flocculosa*							97.0		ok	ok	ok
WC2	2	21-Aug-2011	Unknown alga (basal cells)							264.6		ok	Exclude	Exclude
WC2	2	21-Aug-2011	Unknown alga (colony)							<4.8		Exclude	Exclude	Exclude
WC2	2	21-Aug-2011	Unknown alga sp.							189.0		ok	Exclude	Exclude
WC2	2	21-Aug-2011	Unknown Chlorophyte (basal cells)							<4.8		Exclude	ok	Exclude
WC2	2	21-Aug-2011	Unknown Chlorophyte (colony) sp.							97.0		ok	ok	Exclude
WC2	2	21-Aug-2011	Unknown Chlorophyte (filament) sp.							<4.8		Exclude	ok	Exclude
WC2	2	21-Aug-2011	Unknown Chlorophyte sp.							9.7		ok	ok	Exclude
WC2	2	21-Aug-2011	Unknown Chrysophyte (cyst)							29.1		ok	ok	Exclude
WC2	2	21-Aug-2011	Unknown Cryptomonadales							4.8		ok	ok	Exclude
WC2	2	21-Aug-2011	Unknown Oscillatoriales							<4.8		Exclude	ok	Exclude
WC2	3	21-Aug-2011	*Achnanthes minutissima*							37.6		ok	ok	ok
WC2	3	21-Aug-2011	*Achnanthes* spp.							9.4		ok	ok	ok
WC2	3	21-Aug-2011	*Ankistrodesmus* spp.							47.0		ok	ok	ok
WC2	3	21-Aug-2011	*Aphanocapsa* sp.							94.0		ok	ok	ok
WC2	3	21-Aug-2011	*Caloneis* spp.							<4.7		Exclude	ok	ok
WC2	3	21-Aug-2011	*Calothrix/Rivularia* spp.							253.8		ok	ok	ok
WC2	3	21-Aug-2011	*Chamaesiphon* spp.							120,335.2		ok	ok	ok
WC2	3	21-Aug-2011	*Chroococcus* sp.							56.4		ok	ok	ok
WC2	3	21-Aug-2011	*Crucigenia fenestrata*							37.6		ok	ok	ok
WC2	3	21-Aug-2011	*Cryptomonas* sp.							<4.7		Exclude	ok	ok
WC2	3	21-Aug-2011	*Cyclotella* spp.							65.8		ok	ok	ok
WC2	3	21-Aug-2011	*Cymbella* cf. *cestaii*							4.7		ok	ok	Exclude
WC2	3	21-Aug-2011	*Cymbella lunata*							<4.7		Exclude	ok	ok
WC2	3	21-Aug-2011	*Cymbella minuta*							4.7		ok	ok	ok
WC2	3	21-Aug-2011	*Cymbella* spp.							<4.7		Exclude	ok	ok
WC2	3	21-Aug-2011	*Diatoma mesodon*							<4.7		Exclude	ok	ok
WC2	3	21-Aug-2011	*Dinobryon bavaricum*							9.4		ok	ok	ok
WC2	3	21-Aug-2011	*Elakatothrix* sp.	cf.						84.6		ok	ok	Exclude
WC2	3	21-Aug-2011	*Eunotia* spp.							84.6		ok	ok	ok
WC2	3	21-Aug-2011	*Fragilaria construens*							<4.7		Exclude	ok	ok
WC2	3	21-Aug-2011	*Fragilaria vaucheriae*							9.4		ok	ok	ok
WC2	3	21-Aug-2011	*Frustulia rhomboides*							<4.7		Exclude	ok	ok
WC2	3	21-Aug-2011	*Gomphonema angustatum/parvulum*							<4.7		Exclude	ok	ok
WC2	3	21-Aug-2011	*Gomphonema* spp.							9.4		ok	ok	ok
WC2	3	21-Aug-2011	*Hannaea arcus*							18.8		ok	ok	ok
WC2	3	21-Aug-2011	*Homoeothrix varians*							19,823.2		ok	ok	ok
WC2	3	21-Aug-2011	*Lyngbya* spp.							796.4		ok	ok	ok
WC2	3	21-Aug-2011	*Melosira* spp.							<4.7		Exclude	ok	ok

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm^2)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	*Merismopedia*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Mougeotia*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	*pupula*
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Neidiaceae	*Neidium*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Oocystis*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Peroniaceae	*Peronia*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Scenedesmus*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Stauroneidaceae	*Stauroneis*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*fenestrata*
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Cyanophyta	Myxophyceae	Nostocales	Microchaetaceae	*Tolypothrix*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Euglenophyta	Euglenophyceae	Euglenales	Euglenaceae	*Trachelomonas*	
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9								
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9								
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9								
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9								
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9								
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Chlorophyta					
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Chlorophyta					
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Chlorophyta					
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Cyanophyta	Myxophyceae	Chroococcales			
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Chrysophyta					
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Chrysophyta					
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Cryptophyta	Cryptophyceae	Cryptomonadales			
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Bacillariophyta	Bacillariophyceae				
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Cyanophyta	Myxophyceae	Nostocales			
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Cyanophyta	Myxophyceae	Oscillatoriales			
WC2	3	21-Aug-2011	FF	Exclude	110483		24.9			Rhodophyta					
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*	
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Rhodophyta	Florideophyceae	Acrochaetiales	Acrochaetiaceae	*Audouinella*	
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*	
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cf.*
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	*Elakatothrix*	
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*	
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*pinnata*
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum/parvulum*
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Chrysophyta	Chrysophyceae	Chromulinales		*Hydrurus/Chromulina*	
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Lyngbya*	
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*	

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
WC2	3	21-Aug-2011	*Merismopedia* sp.							<4.7		Exclude	ok	ok
WC2	3	21-Aug-2011	*Mougeotia* spp.							<4.7		Exclude	ok	ok
WC2	3	21-Aug-2011	*Navicula pupula*							<4.7		Exclude	ok	ok
WC2	3	21-Aug-2011	*Navicula* spp.							18.8		ok	ok	ok
WC2	3	21-Aug-2011	*Neidium* sp.							<4.7		Exclude	ok	ok
WC2	3	21-Aug-2011	*Nitzschia* spp.							4.7		ok	ok	ok
WC2	3	21-Aug-2011	*Oocystis* sp.							28.2		ok	ok	ok
WC2	3	21-Aug-2011	*Oscillatoria* spp.							394.8		ok	ok	ok
WC2	3	21-Aug-2011	*Peronia* sp.							<4.7		Exclude	ok	ok
WC2	3	21-Aug-2011	*Pinnularia* spp.							<4.7		Exclude	ok	ok
WC2	3	21-Aug-2011	*Pseudanabaena* sp.							<4.7		Exclude	ok	ok
WC2	3	21-Aug-2011	*Scenedesmus* spp.							18.8		ok	ok	ok
WC2	3	21-Aug-2011	*Stauroneis* spp.							<4.7		Exclude	ok	ok
WC2	3	21-Aug-2011	*Synedra* spp.							18.8		ok	ok	ok
WC2	3	21-Aug-2011	*Tabellaria* cf. *fenestrata*							4.7		ok	ok	Exclude
WC2	3	21-Aug-2011	*Tabellaria flocculosa*							84.6		ok	ok	ok
WC2	3	21-Aug-2011	*Tolypothrix* sp.							<4.7		Exclude	ok	ok
WC2	3	21-Aug-2011	*Trachelomonas* spp.							<4.7		Exclude	ok	ok
WC2	3	21-Aug-2011	Unknown alga (basal cells)							325.8		ok	Exclude	Exclude
WC2	3	21-Aug-2011	Unknown alga (colony)							47.0		ok	Exclude	Exclude
WC2	3	21-Aug-2011	Unknown alga (filament)							<4.7		Exclude	Exclude	Exclude
WC2	3	21-Aug-2011	Unknown alga (flagellate)							9.4		ok	Exclude	Exclude
WC2	3	21-Aug-2011	Unknown alga sp.							398.2		ok	Exclude	Exclude
WC2	3	21-Aug-2011	Unknown Chlorophyte (colony) sp.							112.8		ok	ok	Exclude
WC2	3	21-Aug-2011	Unknown Chlorophyte (filament) sp.							<4.7		Exclude	ok	Exclude
WC2	3	21-Aug-2011	Unknown Chlorophyte sp.							18.8		ok	ok	Exclude
WC2	3	21-Aug-2011	Unknown Chroococcales sp.							75.2		ok	ok	Exclude
WC2	3	21-Aug-2011	Unknown Chrysophyte (cyst)							37.6		ok	ok	Exclude
WC2	3	21-Aug-2011	Unknown Chrysophyte sp.							72.4		ok	ok	Exclude
WC2	3	21-Aug-2011	Unknown Cryptomonadales							<4.7		Exclude	ok	Exclude
WC2	3	21-Aug-2011	Unknown diatom							<4.7		Exclude	ok	Exclude
WC2	3	21-Aug-2011	Unknown diatom							<4.7		Exclude	ok	Exclude
WC2	3	21-Aug-2011	Unknown Oscillatoriales							543.0		ok	ok	Exclude
WC2	3	21-Aug-2011	Unknown Rhodophyte (basal cells)							579.2		ok	ok	Exclude
WC5	1	21-Aug-2011	*Achnanthes minutissima*							61.0		ok	ok	ok
WC5	1	21-Aug-2011	*Achnanthes* spp.							12.2		ok	ok	ok
WC5	1	21-Aug-2011	*Ankistrodesmus* spp.							<6.1		Exclude	ok	ok
WC5	1	21-Aug-2011	*Audouinella* sp.							<6.1		Exclude	ok	ok
WC5	1	21-Aug-2011	*Chamaesiphon* spp.							614.9		ok	ok	ok
WC5	1	21-Aug-2011	*Cyclotella* spp.							12.2		ok	ok	ok
WC5	1	21-Aug-2011	*Cymbella* cf. *cestaii*							<6.1		Exclude	ok	Exclude
WC5	1	21-Aug-2011	*Cymbella minuta*							12.2		ok	ok	ok
WC5	1	21-Aug-2011	*Cymbella sinuata*							24.4		ok	ok	ok
WC5	1	21-Aug-2011	*Cymbella* spp.							<6.1		Exclude	ok	ok
WC5	1	21-Aug-2011	*Diatoma mesodon*							73.2		ok	ok	ok
WC5	1	21-Aug-2011	*Elakatothrix* sp.	cf.						<6.1		Exclude	ok	Exclude
WC5	1	21-Aug-2011	*Eunotia* spp.							36.6		ok	ok	ok
WC5	1	21-Aug-2011	*Fragilaria pinnata*							<6.1		Exclude	ok	ok
WC5	1	21-Aug-2011	*Fragilaria* spp.							24.4		ok	ok	ok
WC5	1	21-Aug-2011	*Fragilaria vaucheriae*							48.8		ok	ok	ok
WC5	1	21-Aug-2011	*Gomphonema angustatum/parvulum*							<6.1		Exclude	ok	ok
WC5	1	21-Aug-2011	*Gomphonema* spp.							6.1		ok	ok	ok
WC5	1	21-Aug-2011	*Hannaea arcus*							1,040.6		ok	ok	ok
WC5	1	21-Aug-2011	*Homoeothrix varians*							1,342.0		ok	ok	ok
WC5	1	21-Aug-2011	*Hydrurus/Chromulina* sp.							94.6		ok	ok	ok
WC5	1	21-Aug-2011	*Lyngbya* spp.							<6.1		Exclude	ok	ok
WC5	1	21-Aug-2011	*Melosira* spp.							24.4		ok	ok	ok

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm²)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Neidiaceae	*Neidium*	
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*
WC5	1	21-Aug-2011	AP	Include	110485		24.9								
WC5	1	21-Aug-2011	AP	Include	110485		24.9								
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Chlorophyta					
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Chrysophyta					
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Chrysophyta					
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Bacillariophyta	Bacillariophyceae				
WC5	1	21-Aug-2011	AP	Include	110485		24.9			Cyanophyta	Myxophyceae	Oscillatoriales			
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Caloneis*	
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cf.*
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*anceps*
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Not Designated	*Diatomella*	
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*	
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum/parvulum*
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Lyngbya*	
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Mougeotia*	
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Nostoc*	
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*
WC5	2	21-Aug-2011	AP	Include	110486		24.9								
WC5	2	21-Aug-2011	AP	Include	110486		24.9								
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Chlorophyta	Chlorophyceae	Chaetophorales			
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Chlorophyta					
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Chlorophyta					
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Chrysophyta					
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Chrysophyta					
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Bacillariophyta	Bacillariophyceae				
WC5	2	21-Aug-2011	AP	Include	110486		24.9			Cyanophyta	Myxophyceae	Oscillatoriales			
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*lanceolata*
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Anabaena*	
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*	
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Rhodophyta	Florideophyceae	Acrochaetiales	Acrochaetiaceae	*Audouinella*	
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Caloneis*	
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
WC5	1	21-Aug-2011	*Meridion circulare*							24.4		ok	ok	ok
WC5	1	21-Aug-2011	*Neidium* sp.							<6.1		Exclude	ok	ok
WC5	1	21-Aug-2011	*Nitzschia* spp.							12.2		ok	ok	ok
WC5	1	21-Aug-2011	*Pinnularia* spp.							<6.1		Exclude	ok	ok
WC5	1	21-Aug-2011	*Synedra* spp.							73.2		ok	ok	ok
WC5	1	21-Aug-2011	*Tabellaria flocculosa*							<6.1		Exclude	ok	ok
WC5	1	21-Aug-2011	Unknown alga (colony)							<6.1		Exclude	Exclude	Exclude
WC5	1	21-Aug-2011	Unknown alga sp.							236.5		ok	Exclude	Exclude
WC5	1	21-Aug-2011	Unknown Chlorophyte (colony) sp.							<6.1		Exclude	ok	Exclude
WC5	1	21-Aug-2011	Unknown Chrysophyte (colony)							804.1		ok	ok	Exclude
WC5	1	21-Aug-2011	Unknown Chrysophyte (cyst)							47.3		ok	ok	Exclude
WC5	1	21-Aug-2011	Unknown diatom (deformed)							<6.1		Exclude	ok	Exclude
WC5	1	21-Aug-2011	Unknown Oscillatoriales							97.6		ok	ok	Exclude
WC5	2	21-Aug-2011	*Achnanthes minutissima*							253.4		ok	ok	ok
WC5	2	21-Aug-2011	*Achnanthes* spp.							108.6		ok	ok	ok
WC5	2	21-Aug-2011	*Caloneis* spp.							<18.1		Exclude	ok	ok
WC5	2	21-Aug-2011	*Chamaesiphon* spp.							50,722.4		ok	ok	ok
WC5	2	21-Aug-2011	*Cymbella* cf. *cestaii*							18.1		ok	ok	Exclude
WC5	2	21-Aug-2011	*Cymbella minuta*							72.4		ok	ok	ok
WC5	2	21-Aug-2011	*Cymbella sinuata*							36.2		ok	ok	ok
WC5	2	21-Aug-2011	*Diatoma anceps*							<18.1		Exclude	ok	ok
WC5	2	21-Aug-2011	*Diatoma mesodon*							560.8		ok	ok	ok
WC5	2	21-Aug-2011	*Diatomella* sp.							<18.1		Exclude	ok	ok
WC5	2	21-Aug-2011	*Eunotia* spp.							36.2		ok	ok	ok
WC5	2	21-Aug-2011	*Fragilaria vaucheriae*							140.2		ok	ok	ok
WC5	2	21-Aug-2011	*Gomphonema angustatum/parvulum*							108.6		ok	ok	ok
WC5	2	21-Aug-2011	*Gomphonema* spp.							981.4		ok	ok	ok
WC5	2	21-Aug-2011	*Hannaea arcus*							325.8		ok	ok	ok
WC5	2	21-Aug-2011	*Homoeothrix varians*							6,869.8		ok	ok	ok
WC5	2	21-Aug-2011	*Hydrurus* sp.							841.2		ok	ok	ok
WC5	2	21-Aug-2011	*Lyngbya* spp.							2,932.2		ok	ok	ok
WC5	2	21-Aug-2011	*Meridion circulare*							36.2		ok	ok	ok
WC5	2	21-Aug-2011	*Mougeotia* spp.							<18.1		Exclude	ok	ok
WC5	2	21-Aug-2011	*Navicula* spp.							36.2		ok	ok	ok
WC5	2	21-Aug-2011	*Nitzschia* spp.							72.4		ok	ok	ok
WC5	2	21-Aug-2011	*Nostoc* spp.							<18.1		Exclude	ok	ok
WC5	2	21-Aug-2011	*Phormidium* sp.							<18.1		Exclude	ok	ok
WC5	2	21-Aug-2011	*Pinnularia* spp.							<18.1		Exclude	ok	ok
WC5	2	21-Aug-2011	*Pseudanabaena* sp.							289.6		ok	ok	ok
WC5	2	21-Aug-2011	*Synedra* spp.							72.4		ok	ok	ok
WC5	2	21-Aug-2011	*Tabellaria flocculosa*							18.1		ok	ok	ok
WC5	2	21-Aug-2011	Unknown alga (basal cells)							72.4		ok	Exclude	Exclude
WC5	2	21-Aug-2011	Unknown alga sp.							420.6		ok	Exclude	Exclude
WC5	2	21-Aug-2011	Unknown Chaetophorales sp.							<18.1		Exclude	ok	Exclude
WC5	2	21-Aug-2011	Unknown Chlorophyte (filament) sp.							<18.1		Exclude	ok	Exclude
WC5	2	21-Aug-2011	Unknown Chlorophyte sp.							36.2		ok	ok	Exclude
WC5	2	21-Aug-2011	Unknown Chrysophyte (colony)							56,658.0		ok	ok	Exclude
WC5	2	21-Aug-2011	Unknown Chrysophyte (cyst)							280.4		ok	ok	Exclude
WC5	2	21-Aug-2011	Unknown diatom (deformed)							36.2		ok	ok	Exclude
WC5	2	21-Aug-2011	Unknown Oscillatoriales							362.0		ok	ok	Exclude
WC5	3	21-Aug-2011	*Achnanthes lanceolata*							<5.0		Exclude	ok	ok
WC5	3	21-Aug-2011	*Achnanthes minutissima*							40.0		ok	ok	ok
WC5	3	21-Aug-2011	*Anabaena* sp.							<5.0		Exclude	ok	ok
WC5	3	21-Aug-2011	*Ankistrodesmus* spp.							<5.0		Exclude	ok	ok
WC5	3	21-Aug-2011	*Audouinella* sp.							<5.0		Exclude	ok	ok
WC5	3	21-Aug-2011	*Caloneis* spp.							5.0		ok	ok	ok
WC5	3	21-Aug-2011	*Chamaesiphon* spp.							2,972.0		ok	ok	ok

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm²)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Closterium*	
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Cocconeis*	*placentula*
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cf.*
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Rhopalodiaceae	*Epithemia*	
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*	
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum/parvulum*
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Lyngbya*	
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Neidiaceae	*Neidium*	
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Nostoc*	
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Chrysophyta	Xanthophyceae	Heterotrichales	Tribonemataceae	*Tribonema*	
WC5	3	21-Aug-2011	AP	Include	110487		24.9								
WC5	3	21-Aug-2011	AP	Include	110487		24.9								
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Chrysophyta					
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Chrysophyta					
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Chrysophyta					
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Bacillariophyta	Bacillariophyceae				
WC5	3	21-Aug-2011	AP	Include	110487		24.9			Cyanophyta	Myxophyceae	Oscillatoriales			
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*lanceolata*
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Actinotaenium*	
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Rhodophyta	Florideophyceae	Acrochaetiales	Acrochaetiaceae	*Audouinella*	
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Chrysophyta	Chrysophyceae	Chromulinales	Chromulinaceae	*Chromulina*	
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Closterium*	
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cf.*
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Frustulia*	*rhomboides*
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum/parvulum*
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Chrysophyta	Chrysophyceae	Chromulinales		*Hydrurus/Chromulina*	
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Lyngbya*	
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
WC5	3	21-Aug-2011	*Closterium* spp.							<5.0		Exclude	ok	ok
WC5	3	21-Aug-2011	*Cocconeis placentula*							<5.0		Exclude	ok	ok
WC5	3	21-Aug-2011	*Cymbella* cf. *cestaii*							50.0		ok	ok	Exclude
WC5	3	21-Aug-2011	*Cymbella minuta*							20.0		ok	ok	ok
WC5	3	21-Aug-2011	*Cymbella sinuata*							<5.0		Exclude	ok	ok
WC5	3	21-Aug-2011	*Cymbella* spp.							<5.0		Exclude	ok	ok
WC5	3	21-Aug-2011	*Diatoma mesodon*							50.0		ok	ok	ok
WC5	3	21-Aug-2011	*Epithemia* sp.							<5.0		Exclude	ok	ok
WC5	3	21-Aug-2011	*Eunotia* spp.							20.0		ok	ok	ok
WC5	3	21-Aug-2011	*Fragilaria vaucheriae*							30.0		ok	ok	ok
WC5	3	21-Aug-2011	*Gomphonema angustatum/parvulum*							10.0		ok	ok	ok
WC5	3	21-Aug-2011	*Gomphonema* spp.							5.0		ok	ok	ok
WC5	3	21-Aug-2011	*Hannaea arcus*							150.0		ok	ok	ok
WC5	3	21-Aug-2011	*Homoeothrix varians*							3,165.2		ok	ok	ok
WC5	3	21-Aug-2011	*Lyngbya* spp.							270.0		ok	ok	ok
WC5	3	21-Aug-2011	*Meridion circulare*							10.0		ok	ok	ok
WC5	3	21-Aug-2011	*Navicula* spp.							5.0		ok	ok	ok
WC5	3	21-Aug-2011	*Neidium* sp.							<5.0		Exclude	ok	ok
WC5	3	21-Aug-2011	*Nitzschia* spp.							10.0		ok	ok	ok
WC5	3	21-Aug-2011	*Nostoc* spp.							<5.0		Exclude	ok	ok
WC5	3	21-Aug-2011	*Oscillatoria* spp.							<5.0		Exclude	ok	ok
WC5	3	21-Aug-2011	*Phormidium* sp.							<5.0		Exclude	ok	ok
WC5	3	21-Aug-2011	*Pinnularia* spp.							<5.0		Exclude	ok	ok
WC5	3	21-Aug-2011	*Synedra* spp.							40.0		ok	ok	ok
WC5	3	21-Aug-2011	*Tabellaria flocculosa*							<5.0		Exclude	ok	ok
WC5	3	21-Aug-2011	*Tribonema* spp.	cf.						<5.0		Exclude	ok	Exclude
WC5	3	21-Aug-2011	Unknown alga (basal cells)							347.4		ok	Exclude	Exclude
WC5	3	21-Aug-2011	Unknown alga sp.							77.2		ok	Exclude	Exclude
WC5	3	21-Aug-2011	Unknown Chrysophyte (colony)							46,459.4		ok	ok	Exclude
WC5	3	21-Aug-2011	Unknown Chrysophyte (cyst)							20.0		ok	ok	Exclude
WC5	3	21-Aug-2011	Unknown Chrysophyte sp.							<5.0		Exclude	ok	Exclude
WC5	3	21-Aug-2011	Unknown diatom (deformed)							<5.0		Exclude	ok	Exclude
WC5	3	21-Aug-2011	Unknown Oscillatoriales							1,119.4		ok	ok	Exclude
WC1	1	20-Aug-2011	*Achnanthes lanceolata*							80.9		ok	ok	ok
WC1	1	20-Aug-2011	*Achnanthes minutissima*							63,922.1		ok	ok	ok
WC1	1	20-Aug-2011	*Achnanthes* spp.							9,648.6		ok	ok	ok
WC1	1	20-Aug-2011	*Actinotaenium* sp.							<40.5		Exclude	ok	ok
WC1	1	20-Aug-2011	*Audouinella* sp.							<40.5		Exclude	ok	ok
WC1	1	20-Aug-2011	*Chamaesiphon* spp.							80.9		ok	ok	ok
WC1	1	20-Aug-2011	*Chromulina* sp.							4,824.3		ok	ok	ok
WC1	1	20-Aug-2011	*Closterium* spp.							<40.5		Exclude	ok	ok
WC1	1	20-Aug-2011	*Cymbella* cf. *cestaii*							80.9		ok	ok	Exclude
WC1	1	20-Aug-2011	*Cymbella minuta*							2,507.3		ok	ok	ok
WC1	1	20-Aug-2011	*Cymbella sinuata*							161.9		ok	ok	ok
WC1	1	20-Aug-2011	*Cymbella* spp.							242.8		ok	ok	ok
WC1	1	20-Aug-2011	*Diatoma mesodon*							13,266.9		ok	ok	ok
WC1	1	20-Aug-2011	*Fragilaria* spp.							626.8		ok	ok	ok
WC1	1	20-Aug-2011	*Fragilaria vaucheriae*							940.2		ok	ok	ok
WC1	1	20-Aug-2011	*Frustulia rhomboides*							<40.5		Exclude	ok	ok
WC1	1	20-Aug-2011	*Gomphonema angustatum/parvulum*							313.4		ok	ok	ok
WC1	1	20-Aug-2011	*Gomphonema* spp.							2,820.7		ok	ok	ok
WC1	1	20-Aug-2011	*Hannaea arcus*							484,852.2		ok	ok	ok
WC1	1	20-Aug-2011	*Homoeothrix varians*							33,534.7		ok	ok	ok
WC1	1	20-Aug-2011	*Hydrurus/Chromulina* sp.							94,074.1		ok	ok	ok
WC1	1	20-Aug-2011	*Lyngbya* spp.							2,104.6		ok	ok	ok
WC1	1	20-Aug-2011	*Meridion circulare*							566.6		ok	ok	ok
WC1	1	20-Aug-2011	*Navicula* spp.							940.2		ok	ok	ok

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm^2)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Schizotrichaceae	*Schizothrix*	
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Chlorophyta	Chlorophyceae	Chaetophorales	Chaetophoraceae	*Stigeoclonium*	
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
WC1	1	20-Aug-2011	AP	Include	110478		24.9								
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Chrysophyta					
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Chrysophyta					
WC1	1	20-Aug-2011	AP	Include	110478		24.9			Cyanophyta	Myxophyceae	Oscillatoriales			
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*lanceolata*
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Rhodophyta	Florideophyceae	Acrochaetiales	Acrochaetiaceae	*Audouinella*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Caloneis*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Chrysophyta	Chrysophyceae	Chromulinales	Chromulinaceae	*Chromulina*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cf.*
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*anceps*
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Frustulia*	*rhomboides*
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum/parvulum*
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Chrysophyta	Chrysophyceae	Chromulinales		*Hydrurus/Chromulina*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Lyngbya*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Scenedesmus*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Schizotrichaceae	*Schizothrix*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Chlorophyta	Chlorophyceae	Chaetophorales	Chaetophoraceae	*Stigeoclonium*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Surirellaceae	*Surirella*	*angusta*
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Chrysophyta	Xanthophyceae	Heterotrichales	Tribonemataceae	*Tribonema*	
WC1	2	20-Aug-2011	AP	Include	110479		24.9								
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Chrysophyta					
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Chrysophyta					
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Bacillariophyta	Bacillariophyceae				
WC1	2	20-Aug-2011	AP	Include	110479		24.9			Cyanophyta	Myxophyceae	Oscillatoriales			
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*lanceolata*
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Rhodophyta	Florideophyceae	Acrochaetiales	Acrochaetiaceae	*Audouinella*	
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Cyanophyta	Myxophyceae	Nostocales	Rivulariaceae	*Calothrix/Rivularia*	

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
WC1	1	20-Aug-2011	*Nitzschia* spp.							2,820.7		ok	ok	ok
WC1	1	20-Aug-2011	*Oscillatoria* spp.							<40.5		Exclude	ok	ok
WC1	1	20-Aug-2011	*Phormidium* sp.							<40.5		Exclude	ok	ok
WC1	1	20-Aug-2011	*Pseudanabaena* sp.							15,670.4		ok	ok	ok
WC1	1	20-Aug-2011	*Schizothrix* sp.							15,357.0		ok	ok	ok
WC1	1	20-Aug-2011	*Stigeoclonium* sp.							4,209.3		ok	ok	ok
WC1	1	20-Aug-2011	*Synedra* spp.							39,802.8		ok	ok	ok
WC1	1	20-Aug-2011	Unknown alga sp.							313.4		ok	Exclude	Exclude
WC1	1	20-Aug-2011	Unknown Chrysophyte (cyst)							1,253.6		ok	ok	Exclude
WC1	1	20-Aug-2011	Unknown Chrysophyte sp.							80.9		ok	ok	Exclude
WC1	1	20-Aug-2011	Unknown Oscillatoriales							19,431.3		ok	ok	Exclude
WC1	2	20-Aug-2011	*Achnanthes lanceolata*							84.0		ok	ok	ok
WC1	2	20-Aug-2011	*Achnanthes minutissima*							10,031.9		ok	ok	ok
WC1	2	20-Aug-2011	*Achnanthes* spp.							1,303.7		ok	ok	ok
WC1	2	20-Aug-2011	*Audouinella* sp.							<42.0		Exclude	ok	ok
WC1	2	20-Aug-2011	*Caloneis* spp.							<42.0		Exclude	ok	ok
WC1	2	20-Aug-2011	*Chamaesiphon* spp.							168.0		ok	ok	ok
WC1	2	20-Aug-2011	*Chromulina* sp.							1,168.0		ok	ok	ok
WC1	2	20-Aug-2011	*Cymbella* cf. *cestaii*							84.0		ok	ok	Exclude
WC1	2	20-Aug-2011	*Cymbella minuta*							1,629.6		ok	ok	ok
WC1	2	20-Aug-2011	*Cymbella sinuata*							168.0		ok	ok	ok
WC1	2	20-Aug-2011	*Cymbella* spp.							651.8		ok	ok	ok
WC1	2	20-Aug-2011	*Diatoma anceps*							<42.0		Exclude	ok	ok
WC1	2	20-Aug-2011	*Diatoma mesodon*							4,236.9		ok	ok	ok
WC1	2	20-Aug-2011	*Eunotia* spp.							<42.0		Exclude	ok	ok
WC1	2	20-Aug-2011	*Fragilaria* spp.							977.7		ok	ok	ok
WC1	2	20-Aug-2011	*Fragilaria vaucheriae*							1,629.6		ok	ok	ok
WC1	2	20-Aug-2011	*Frustulia rhomboides*							42.0		ok	ok	ok
WC1	2	20-Aug-2011	*Gomphonema angustatum/parvulum*							84.0		ok	ok	ok
WC1	2	20-Aug-2011	*Gomphonema* spp.							252.0		ok	ok	ok
WC1	2	20-Aug-2011	*Hannaea arcus*							76,493.1		ok	ok	ok
WC1	2	20-Aug-2011	*Homoeothrix varians*							152,986.3		ok	ok	ok
WC1	2	20-Aug-2011	*Hydrurus/Chromulina* sp.							119,128.7		ok	ok	ok
WC1	2	20-Aug-2011	*Lyngbya* spp.							2,940.6		ok	ok	ok
WC1	2	20-Aug-2011	*Meridion circulare*							420.1		ok	ok	ok
WC1	2	20-Aug-2011	*Navicula* spp.							651.8		ok	ok	ok
WC1	2	20-Aug-2011	*Nitzschia* spp.							2,281.4		ok	ok	ok
WC1	2	20-Aug-2011	*Oscillatoria* spp.							2,436.5		ok	ok	ok
WC1	2	20-Aug-2011	*Phormidium* sp.							5,125.0		ok	ok	ok
WC1	2	20-Aug-2011	*Pinnularia* spp.							<42.0		Exclude	ok	ok
WC1	2	20-Aug-2011	*Pseudanabaena* sp.							27,051.0		ok	ok	ok
WC1	2	20-Aug-2011	*Scenedesmus* spp.							<42.0		Exclude	ok	ok
WC1	2	20-Aug-2011	*Schizothrix* sp.							1,596.3		ok	ok	ok
WC1	2	20-Aug-2011	*Stigeoclonium* sp.							1,008.2		ok	ok	ok
WC1	2	20-Aug-2011	*Surirella angusta*							<42.0		Exclude	ok	ok
WC1	2	20-Aug-2011	*Synedra* spp.							20,063.8		ok	ok	ok
WC1	2	20-Aug-2011	*Tribonema* spp.	cf.						<42.0		Exclude	ok	Exclude
WC1	2	20-Aug-2011	Unknown alga (colony)							<42.0		Exclude	Exclude	Exclude
WC1	2	20-Aug-2011	Unknown Chrysophyte (cyst)							1,629.6		ok	ok	Exclude
WC1	2	20-Aug-2011	Unknown Chrysophyte sp.							325.9		ok	ok	Exclude
WC1	2	20-Aug-2011	Unknown diatom							84.0		ok	ok	Exclude
WC1	2	20-Aug-2011	Unknown Oscillatoriales							12,058.9		ok	ok	Exclude
WC1	3	20-Aug-2011	*Achnanthes lanceolata*							<19.5		Exclude	ok	ok
WC1	3	20-Aug-2011	*Achnanthes minutissima*							907.7		ok	ok	ok
WC1	3	20-Aug-2011	*Achnanthes* spp.							151.3		ok	ok	ok
WC1	3	20-Aug-2011	*Audouinella* sp.							<19.5		Exclude	ok	ok
WC1	3	20-Aug-2011	*Calothrix/Rivularia* spp.							<19.5		Exclude	ok	ok

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm^2)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Chrysophyta	Chrysophyceae	Chromulinales	Chromulinaceae	*Chromulina*	
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*	*rectangularis*
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cf.*
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*anceps*
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum/parvulum*
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Lyngbya*	
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Selenastrum*	
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
WC1	3	20-Aug-2011	AP	Include	110480		24.9								
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Chlorophyta					
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Chlorophyta					
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Chrysophyta					
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Chrysophyta					
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Chrysophyta					
WC1	3	20-Aug-2011	AP	Include	110480		24.9			Bacillariophyta	Bacillariophyceae				
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9			Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	*Aphanocapsa*	*rivularis*
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Cocconeis*	*placentula*
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum/parvulum*
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9			Chrysophyta	Xanthophyceae	Rhizochloridales	Rhizochloridaceae	*Stipitococcus*	
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*ulna*
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9								
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9			Chrysophyta					
BIR1	1	20-Aug-2011	FF	Exclude	110488		24.9			Cyanophyta	Myxophyceae	Oscillatoriales			
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*lanceolata*
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	*Aphanocapsa*	*rivularis*
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Rhodophyta	Florideophyceae	Acrochaetiales	Acrochaetiaceae	*Audouinella*	
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Caloneis*	

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
WC1	3	20-Aug-2011	*Chamaesiphon* spp.							20,369.2		ok	ok	ok
WC1	3	20-Aug-2011	*Chromulina* sp.							2,909.9		ok	ok	ok
WC1	3	20-Aug-2011	*Crucigenia rectangularis*							<19.5		Exclude	ok	ok
WC1	3	20-Aug-2011	*Cymbella* cf. *cestaii*							<19.5		Exclude	ok	Exclude
WC1	3	20-Aug-2011	*Cymbella minuta*							38.9		ok	ok	ok
WC1	3	20-Aug-2011	*Cymbella sinuata*							151.3		ok	ok	ok
WC1	3	20-Aug-2011	*Cymbella* spp.							38.9		ok	ok	ok
WC1	3	20-Aug-2011	*Diatoma anceps*							<19.5		Exclude	ok	ok
WC1	3	20-Aug-2011	*Diatoma mesodon*							1,210.2		ok	ok	ok
WC1	3	20-Aug-2011	*Fragilaria* spp.							38.9		ok	ok	ok
WC1	3	20-Aug-2011	*Fragilaria vaucheriae*							453.8		ok	ok	ok
WC1	3	20-Aug-2011	*Gomphonema angustatum/parvulum*							77.9		ok	ok	ok
WC1	3	20-Aug-2011	*Gomphonema* spp.							194.7		ok	ok	ok
WC1	3	20-Aug-2011	*Hannaea arcus*							43,648.2		ok	ok	ok
WC1	3	20-Aug-2011	*Homoeothrix varians*							535,417.9		ok	ok	ok
WC1	3	20-Aug-2011	*Hydrurus* sp.							89,624.3		ok	ok	ok
WC1	3	20-Aug-2011	*Lyngbya* spp.							1,285.0		ok	ok	ok
WC1	3	20-Aug-2011	*Meridion circulare*							116.8		ok	ok	ok
WC1	3	20-Aug-2011	*Navicula* spp.							19.5		ok	ok	ok
WC1	3	20-Aug-2011	*Nitzschia* spp.							38.9		ok	ok	ok
WC1	3	20-Aug-2011	*Phormidium* sp.							390.0		ok	ok	ok
WC1	3	20-Aug-2011	*Pseudanabaena* sp.							819.0		ok	ok	ok
WC1	3	20-Aug-2011	*Selenastrum* sp.							<19.5		Exclude	ok	ok
WC1	3	20-Aug-2011	*Synedra* spp.							194.7		ok	ok	ok
WC1	3	20-Aug-2011	Unknown alga sp.							302.6		ok	Exclude	Exclude
WC1	3	20-Aug-2011	Unknown Chlorophyte (basal cells)							756.4		ok	ok	Exclude
WC1	3	20-Aug-2011	Unknown Chlorophyte (colony) sp.							<19.5		Exclude	ok	Exclude
WC1	3	20-Aug-2011	Unknown Chrysophyte (cyst)							151.3		ok	ok	Exclude
WC1	3	20-Aug-2011	Unknown Chrysophyte sp.							302.6		ok	ok	Exclude
WC1	3	20-Aug-2011	Unknown diatom							<19.5		Exclude	ok	Exclude
BIR1	1	20-Aug-2011	*Achnanthes minutissima*							<25.4		Exclude	ok	ok
BIR1	1	20-Aug-2011	*Achnanthes* spp.							<25.4		Exclude	ok	ok
BIR1	1	20-Aug-2011	*Aphanocapsa* cf. *rivularis*							2,434.9		ok	ok	Exclude
BIR1	1	20-Aug-2011	*Chamaesiphon* spp.							1,014.5		ok	ok	ok
BIR1	1	20-Aug-2011	*Cocconeis placentula*							<25.4		Exclude	ok	ok
BIR1	1	20-Aug-2011	*Cymbella minuta*							<25.4		Exclude	ok	ok
BIR1	1	20-Aug-2011	*Cymbella sinuata*							<25.4		Exclude	ok	ok
BIR1	1	20-Aug-2011	*Cymbella* spp.							<25.4		Exclude	ok	ok
BIR1	1	20-Aug-2011	*Diatoma mesodon*							<25.4		Exclude	ok	ok
BIR1	1	20-Aug-2011	*Gomphonema angustatum/parvulum*							<25.4		Exclude	ok	ok
BIR1	1	20-Aug-2011	*Gomphonema* spp.							25.4		ok	ok	ok
BIR1	1	20-Aug-2011	*Hannaea arcus*							50.8		ok	ok	ok
BIR1	1	20-Aug-2011	*Meridion circulare*							<25.4		Exclude	ok	ok
BIR1	1	20-Aug-2011	*Navicula* spp.							<25.4		Exclude	ok	ok
BIR1	1	20-Aug-2011	*Nitzschia* spp.							<25.4		Exclude	ok	ok
BIR1	1	20-Aug-2011	*Stipitococcus* sp.	cf.						<25.4		Exclude	ok	Exclude
BIR1	1	20-Aug-2011	*Synedra* spp.							<25.4		Exclude	ok	ok
BIR1	1	20-Aug-2011	*Synedra ulna*							<25.4		Exclude	ok	ok
BIR1	1	20-Aug-2011	Unknown alga sp.							50.8		ok	Exclude	Exclude
BIR1	1	20-Aug-2011	Unknown Chrysophyte (cyst)							<25.4		Exclude	ok	Exclude
BIR1	1	20-Aug-2011	Unknown Oscillatoriales							<25.4		Exclude	ok	Exclude
BIR1	2	20-Aug-2011	*Achnanthes lanceolata*							<28.8		Exclude	ok	ok
BIR1	2	20-Aug-2011	*Achnanthes minutissima*							<28.8		Exclude	ok	ok
BIR1	2	20-Aug-2011	*Achnanthes* spp.							<28.8		Exclude	ok	ok
BIR1	2	20-Aug-2011	*Aphanocapsa* cf. *rivularis*							170,418.6		ok	ok	Exclude
BIR1	2	20-Aug-2011	*Audouinella* sp.							<28.8		Exclude	ok	ok
BIR1	2	20-Aug-2011	*Caloneis* spp.							<28.8		Exclude	ok	ok

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm²)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Cocconeis*	*placentula*
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cf.*
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cistula*
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Rhopalodiaceae	*Epithemia*	
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Frustulia*	*rhomboides*
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum/parvulum*
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*	
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Mougeotia*	
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Rhoicospheniaceae	*Rhoicosphenia*	*abbreviata*
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Spirogyra*	
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Surirellaceae	*Surirella*	
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*ulna*
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Chlorophyta	Chlorophyceae	Ulotrichales	Ulotrichaceae	*Ulothrix*	*zonata*
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9								
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Chlorophyta					
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Chrysophyta					
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Cryptophyta	Cryptophyceae	Cryptomonadales			
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Cyanophyta	Myxophyceae	Oscillatoriales			
BIR1	2	20-Aug-2011	FF	Exclude	110489		24.9			Chlorophyta	Chlorophyceae	Ulotrichales			
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Anabaena/Nostoc*	
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	*Aphanocapsa*	*rivularis*
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Rhodophyta	Florideophyceae	Acrochaetiales	Acrochaetiaceae	*Audouinella*	
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*lunata*
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*tenuis*
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*	
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Frustulia*	*rhomboides*
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum/parvulum*
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Chrysophyta	Chrysophyceae	Chromulinales	Hydruraceae	*Hydrurus*	
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Mougeotia*	
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
BIR1	2	20-Aug-2011	*Chamaesiphon* spp.							92,094.9		ok	ok	ok
BIR1	2	20-Aug-2011	*Cocconeis placentula*							<28.8		Exclude	ok	ok
BIR1	2	20-Aug-2011	*Cymbella* cf. *cestaii*							<28.8		Exclude	ok	Exclude
BIR1	2	20-Aug-2011	*Cymbella cistula*							<28.8		Exclude	ok	ok
BIR1	2	20-Aug-2011	*Cymbella minuta*							173.1		ok	ok	ok
BIR1	2	20-Aug-2011	*Cymbella sinuata*							<28.8		Exclude	ok	ok
BIR1	2	20-Aug-2011	*Diatoma mesodon*							<28.8		Exclude	ok	ok
BIR1	2	20-Aug-2011	*Epithemia* sp.							<28.8		Exclude	ok	ok
BIR1	2	20-Aug-2011	*Fragilaria vaucheriae*							115.4		ok	ok	ok
BIR1	2	20-Aug-2011	*Frustulia rhomboides*							<28.8		Exclude	ok	ok
BIR1	2	20-Aug-2011	*Gomphonema angustatum/parvulum*							<28.8		Exclude	ok	ok
BIR1	2	20-Aug-2011	*Gomphonema* spp.							<28.8		Exclude	ok	ok
BIR1	2	20-Aug-2011	*Hannaea arcus*							519.3		ok	ok	ok
BIR1	2	20-Aug-2011	*Homoeothrix varians*							1,038.6		ok	ok	ok
BIR1	2	20-Aug-2011	*Hydrurus* sp.							<28.8		Exclude	ok	ok
BIR1	2	20-Aug-2011	*Melosira* spp.							<28.8		Exclude	ok	ok
BIR1	2	20-Aug-2011	*Meridion circulare*							<28.8		Exclude	ok	ok
BIR1	2	20-Aug-2011	*Mougeotia* spp.							<28.8		Exclude	ok	ok
BIR1	2	20-Aug-2011	*Navicula* spp.							28.8		ok	ok	ok
BIR1	2	20-Aug-2011	*Nitzschia* spp.							115.4		ok	ok	ok
BIR1	2	20-Aug-2011	*Pseudanabaena* sp.							519.3		ok	ok	ok
BIR1	2	20-Aug-2011	*Rhoicosphenia abbreviata*							<28.8		Exclude	ok	ok
BIR1	2	20-Aug-2011	*Spirogyra* spp.							<28.8		Exclude	ok	ok
BIR1	2	20-Aug-2011	*Surirella* spp.							<28.8		Exclude	ok	ok
BIR1	2	20-Aug-2011	*Synedra* spp.							57.7		ok	ok	ok
BIR1	2	20-Aug-2011	*Synedra ulna*							<28.8		Exclude	ok	ok
BIR1	2	20-Aug-2011	*Ulothrix zonata*							461.6		ok	ok	ok
BIR1	2	20-Aug-2011	Unknown alga sp.							57.7		ok	Exclude	Exclude
BIR1	2	20-Aug-2011	Unknown Chlorophyte (filament) sp.							<28.8		Exclude	ok	Exclude
BIR1	2	20-Aug-2011	Unknown Chrysophyte (cyst)							57.7		ok	ok	Exclude
BIR1	2	20-Aug-2011	Unknown Cryptomonadales							<28.8		Exclude	ok	Exclude
BIR1	2	20-Aug-2011	Unknown Oscillatoriales							807.8		ok	ok	Exclude
BIR1	2	20-Aug-2011	Unknown Ulotrichales							403.9		ok	ok	Exclude
BIR1	3	20-Aug-2011	*Achnanthes minutissima*							17.7		ok	ok	ok
BIR1	3	20-Aug-2011	*Achnanthes* spp.							<17.7		Exclude	ok	ok
BIR1	3	20-Aug-2011	*Anabaena/Nostoc* sp.							<17.7		Exclude	ok	ok
BIR1	3	20-Aug-2011	*Aphanocapsa* cf. *rivularis*							73,043.4		ok	ok	Exclude
BIR1	3	20-Aug-2011	*Audouinella* sp.							<17.7		Exclude	ok	ok
BIR1	3	20-Aug-2011	*Chamaesiphon* spp.							144,996.6		ok	ok	ok
BIR1	3	20-Aug-2011	*Cymbella lunata*							<17.7		Exclude	ok	ok
BIR1	3	20-Aug-2011	*Cymbella minuta*							70.8		ok	ok	ok
BIR1	3	20-Aug-2011	*Cymbella sinuata*							<17.7		Exclude	ok	ok
BIR1	3	20-Aug-2011	*Diatoma mesodon*							17.7		ok	ok	ok
BIR1	3	20-Aug-2011	*Diatoma tenuis*							<17.7		Exclude	ok	ok
BIR1	3	20-Aug-2011	*Eunotia* spp.							<17.7		Exclude	ok	ok
BIR1	3	20-Aug-2011	*Fragilaria vaucheriae*							17.7		ok	ok	ok
BIR1	3	20-Aug-2011	*Frustulia rhomboides*							<17.7		Exclude	ok	ok
BIR1	3	20-Aug-2011	*Gomphonema angustatum/parvulum*							17.7		ok	ok	ok
BIR1	3	20-Aug-2011	*Gomphonema* spp.							35.4		ok	ok	ok
BIR1	3	20-Aug-2011	*Hannaea arcus*							247.8		ok	ok	ok
BIR1	3	20-Aug-2011	*Homoeothrix varians*							460.2		ok	ok	ok
BIR1	3	20-Aug-2011	*Hydrurus* sp.							<17.7		Exclude	ok	ok
BIR1	3	20-Aug-2011	*Meridion circulare*							17.7		ok	ok	ok
BIR1	3	20-Aug-2011	*Mougeotia* spp.							<17.7		Exclude	ok	ok
BIR1	3	20-Aug-2011	*Navicula* spp.							<17.7		Exclude	ok	ok
BIR1	3	20-Aug-2011	*Nitzschia* spp.							88.5		ok	ok	ok
BIR1	3	20-Aug-2011	*Pseudanabaena* sp.							123.9		ok	ok	ok

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm^2)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Spirogyra*	
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*ulna*
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Chlorophyta	Chlorophyceae	Ulotrichales	Ulotrichaceae	*Ulothrix*	*zonata*
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9								
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Cryptophyta	Cryptophyceae	Cryptomonadales			
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Bacillariophyta	Bacillariophyceae				
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Cyanophyta	Myxophyceae	Oscillatoriales			
BIR1	3	20-Aug-2011	FF	Exclude	110490		24.9			Chlorophyta	Chlorophyceae	Ulotrichales			
BIR2	1	21-Aug-2011	FF	Exclude	110491		24.9			Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	*Aphanocapsa*	*rivularis*
BIR2	1	21-Aug-2011	FF	Exclude	110491		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
BIR2	1	21-Aug-2011	FF	Exclude	110491		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
BIR2	1	21-Aug-2011	FF	Exclude	110491		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
BIR2	1	21-Aug-2011	FF	Exclude	110491		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
BIR2	1	21-Aug-2011	FF	Exclude	110491		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
BIR2	1	21-Aug-2011	FF	Exclude	110491		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BIR2	1	21-Aug-2011	FF	Exclude	110491		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
BIR2	1	21-Aug-2011	FF	Exclude	110491		24.9								
BIR2	1	21-Aug-2011	FF	Exclude	110491		24.9			Chlorophyta	Chlorophyceae	Ulotrichales			
BIR2	2	21-Aug-2011	FF	Exclude	110492		24.9			Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	*Aphanocapsa*	*rivularis*
BIR2	2	21-Aug-2011	FF	Exclude	110492		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Caloneis*	
BIR2	2	21-Aug-2011	FF	Exclude	110492		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
BIR2	2	21-Aug-2011	FF	Exclude	110492		24.9			Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*	
BIR2	2	21-Aug-2011	FF	Exclude	110492		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
BIR2	2	21-Aug-2011	FF	Exclude	110492		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*sinuata*
BIR2	2	21-Aug-2011	FF	Exclude	110492		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
BIR2	2	21-Aug-2011	FF	Exclude	110492		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
BIR2	2	21-Aug-2011	FF	Exclude	110492		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
BIR2	2	21-Aug-2011	FF	Exclude	110492		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum/parvulum*
BIR2	2	21-Aug-2011	FF	Exclude	110492		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BIR2	2	21-Aug-2011	FF	Exclude	110492		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BIR2	2	21-Aug-2011	FF	Exclude	110492		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
BIR2	2	21-Aug-2011	FF	Exclude	110492		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
BIR2	2	21-Aug-2011	FF	Exclude	110492		24.9								
BIR2	2	21-Aug-2011	FF	Exclude	110492		24.9			Chrysophyta					
BIR2	3	21-Aug-2011	FF	Exclude	110493		24.9			Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	*Aphanocapsa*	*rivularis*
BIR2	3	21-Aug-2011	FF	Exclude	110493		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
BIR2	3	21-Aug-2011	FF	Exclude	110493		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Cocconeis*	*placentula*
BIR2	3	21-Aug-2011	FF	Exclude	110493		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
BIR2	3	21-Aug-2011	FF	Exclude	110493		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
BIR2	3	21-Aug-2011	FF	Exclude	110493		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
BIR2	3	21-Aug-2011	FF	Exclude	110493		24.9			Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*	
BIR2	3	21-Aug-2011	FF	Exclude	110493		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Caloneis*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Closterium*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Cosmarium*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Mesotaeniaceae	*Cylindrocystis*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cf.*
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cistula*
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*anceps*

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
BIR1	3	20-Aug-2011	*Spirogyra* spp.							<17.7		Exclude	ok	ok
BIR1	3	20-Aug-2011	*Synedra* spp.							35.4		ok	ok	ok
BIR1	3	20-Aug-2011	*Synedra ulna*							<17.7		Exclude	ok	ok
BIR1	3	20-Aug-2011	*Tabellaria flocculosa*							<17.7		Exclude	ok	ok
BIR1	3	20-Aug-2011	*Ulothrix zonata*							212.4		ok	ok	ok
BIR1	3	20-Aug-2011	Unknown alga sp.							17.7		ok	Exclude	Exclude
BIR1	3	20-Aug-2011	Unknown Cryptomonadales							<17.7		Exclude	ok	Exclude
BIR1	3	20-Aug-2011	Unknown diatom (deformed)							<17.7		Exclude	ok	Exclude
BIR1	3	20-Aug-2011	Unknown Oscillatoriales							<17.7		Exclude	ok	Exclude
BIR1	3	20-Aug-2011	Unknown Ulotrichales							<17.7		Exclude	ok	Exclude
BIR2	1	21-Aug-2011	*Aphanocapsa* cf. *rivularis*							106,603.2		ok	ok	Exclude
BIR2	1	21-Aug-2011	*Chamaesiphon* spp.							9,691.2		ok	ok	ok
BIR2	1	21-Aug-2011	*Cymbella minuta*							19.7		ok	ok	ok
BIR2	1	21-Aug-2011	*Cymbella* spp.							<19.7		Exclude	ok	ok
BIR2	1	21-Aug-2011	*Diatoma mesodon*							<19.7		Exclude	ok	ok
BIR2	1	21-Aug-2011	*Fragilaria vaucheriae*							19.7		ok	ok	ok
BIR2	1	21-Aug-2011	*Hannaea arcus*							59.1		ok	ok	ok
BIR2	1	21-Aug-2011	*Homoeothrix varians*							177.3		ok	ok	ok
BIR2	1	21-Aug-2011	Unknown alga sp.							39.4		ok	Exclude	Exclude
BIR2	1	21-Aug-2011	Unknown Ulotrichales							<19.7		Exclude	ok	Exclude
BIR2	2	21-Aug-2011	*Aphanocapsa* cf. *rivularis*							126,924.0		ok	ok	Exclude
BIR2	2	21-Aug-2011	*Caloneis* spp.							<34.4		Exclude	ok	ok
BIR2	2	21-Aug-2011	*Chamaesiphon* spp.							16,923.2		ok	ok	ok
BIR2	2	21-Aug-2011	*Cyclotella* spp.							<34.4		Exclude	ok	ok
BIR2	2	21-Aug-2011	*Cymbella minuta*							34.4		ok	ok	ok
BIR2	2	21-Aug-2011	*Cymbella sinuata*							<34.4		Exclude	ok	ok
BIR2	2	21-Aug-2011	*Cymbella* spp.							<34.4		Exclude	ok	ok
BIR2	2	21-Aug-2011	*Diatoma mesodon*							68.8		ok	ok	ok
BIR2	2	21-Aug-2011	*Fragilaria vaucheriae*							34.4		ok	ok	ok
BIR2	2	21-Aug-2011	*Gomphonema angustatum/parvulum*							34.4		ok	ok	ok
BIR2	2	21-Aug-2011	*Gomphonema* spp.							68.8		ok	ok	ok
BIR2	2	21-Aug-2011	*Hannaea arcus*							103.2		ok	ok	ok
BIR2	2	21-Aug-2011	*Homoeothrix varians*							412.8		ok	ok	ok
BIR2	2	21-Aug-2011	*Meridion circulare*							<34.4		Exclude	ok	ok
BIR2	2	21-Aug-2011	Unknown alga sp.							34.4		ok	Exclude	Exclude
BIR2	2	21-Aug-2011	Unknown Chrysophyte (cyst)							<34.4		Exclude	ok	Exclude
BIR2	3	21-Aug-2011	*Aphanocapsa* cf. *rivularis*							704.0		ok	ok	Exclude
BIR2	3	21-Aug-2011	*Chamaesiphon* spp.							<22.0		Exclude	ok	ok
BIR2	3	21-Aug-2011	*Cocconeis placentula*							<22.0		Exclude	ok	ok
BIR2	3	21-Aug-2011	*Cymbella minuta*							<22.0		Exclude	ok	ok
BIR2	3	21-Aug-2011	*Gomphonema* spp.							<22.0		Exclude	ok	ok
BIR2	3	21-Aug-2011	*Hannaea arcus*							44.0		ok	ok	ok
BIR2	3	21-Aug-2011	*Melosira* spp.							<22.0		Exclude	ok	ok
BIR2	3	21-Aug-2011	*Meridion circulare*							<22.0		Exclude	ok	ok
MC1	1	21-Aug-2011	*Achnanthes minutissima*							9,584.4		ok	ok	ok
MC1	1	21-Aug-2011	*Achnanthes* spp.							2,053.8		ok	ok	ok
MC1	1	21-Aug-2011	*Caloneis* spp.							<23.0		Exclude	ok	ok
MC1	1	21-Aug-2011	*Chamaesiphon* spp.							142,396.8		ok	ok	ok
MC1	1	21-Aug-2011	*Closterium* spp.							46.0		ok	ok	ok
MC1	1	21-Aug-2011	*Cosmarium* spp.							92.0		ok	ok	ok
MC1	1	21-Aug-2011	*Cyclotella* spp.							<23.0		Exclude	ok	ok
MC1	1	21-Aug-2011	*Cylindrocystis* sp.							<23.0		Exclude	ok	ok
MC1	1	21-Aug-2011	*Cymbella* cf. *cestaii*							<23.0		Exclude	ok	Exclude
MC1	1	21-Aug-2011	*Cymbella cistula*							23.0		ok	ok	ok
MC1	1	21-Aug-2011	*Cymbella minuta*							2,312.7		ok	ok	ok
MC1	1	21-Aug-2011	*Cymbella* spp.							<23.0		Exclude	ok	ok
MC1	1	21-Aug-2011	*Diatoma anceps*							<23.0		Exclude	ok	ok

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm^2)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Euastrum*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Frustulia*	*rhomboides*
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum/parvulum*
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*gracile*
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Lyngbya*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Neidiaceae	*Neidium*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Chlorophyta	Chlorophyceae	Oedogoniales	Oedogoniaceae	*Oedogonium*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Mesotaeniaceae	*Roya*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Scenedesmus*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Staurastrum*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*ulna*
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*fenestrata*
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9								
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9								
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9								
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Chlorophyta					
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Chlorophyta					
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Chlorophyta					
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Chrysophyta					
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Cryptophyta	Cryptophyceae	Cryptomonadales			
MC1	1	21-Aug-2011	FF	Exclude	110494		24.9			Cyanophyta	Myxophyceae	Oscillatoriales			
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Actinotaenium*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Rhodophyta	Florideophyceae	Acrochaetiales	Acrochaetiaceae	*Audouinella*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Chrysococcus*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Closterium*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Cosmarium*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cf.*
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cistula*
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*anceps*
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	*Elakatothrix*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*capucina*
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*crotonensis*
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Frustulia*	*rhomboides*
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum/parvulum*

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
MC1	1	21-Aug-2011	*Diatoma mesodon*							4,447.5		ok	ok	ok
MC1	1	21-Aug-2011	*Euastrum* sp.							<23.0		Exclude	ok	ok
MC1	1	21-Aug-2011	*Eunotia* spp.							138.0		ok	ok	ok
MC1	1	21-Aug-2011	*Fragilaria* spp.							355.8		ok	ok	ok
MC1	1	21-Aug-2011	*Fragilaria vaucheriae*							7,530.6		ok	ok	ok
MC1	1	21-Aug-2011	*Frustulia rhomboides*							<23.0		Exclude	ok	ok
MC1	1	21-Aug-2011	*Gomphonema angustatum/parvulum*							355.8		ok	ok	ok
MC1	1	21-Aug-2011	*Gomphonema gracile*							<23.0		Exclude	ok	ok
MC1	1	21-Aug-2011	*Gomphonema* spp.							533.7		ok	ok	ok
MC1	1	21-Aug-2011	*Hannaea arcus*							1,067.4		ok	ok	ok
MC1	1	21-Aug-2011	*Homoeothrix varians*							212,226.0		ok	ok	ok
MC1	1	21-Aug-2011	*Lyngbya* spp.							97,213.2		ok	ok	ok
MC1	1	21-Aug-2011	*Melosira* spp.							<23.0		Exclude	ok	ok
MC1	1	21-Aug-2011	*Navicula* spp.							23.0		ok	ok	ok
MC1	1	21-Aug-2011	*Neidium* sp.							<23.0		Exclude	ok	ok
MC1	1	21-Aug-2011	*Nitzschia* spp.							889.5		ok	ok	ok
MC1	1	21-Aug-2011	*Oedogonium* spp.							<23.0		Exclude	ok	ok
MC1	1	21-Aug-2011	*Phormidium* sp.							273,840.0		ok	ok	ok
MC1	1	21-Aug-2011	*Pinnularia* spp.							<23.0		Exclude	ok	ok
MC1	1	21-Aug-2011	*Roya* sp.							<23.0		Exclude	ok	ok
MC1	1	21-Aug-2011	*Scenedesmus* spp.							92.0		ok	ok	ok
MC1	1	21-Aug-2011	*Staurastrum* spp.							<23.0		Exclude	ok	ok
MC1	1	21-Aug-2011	*Synedra* spp.							711.6		ok	ok	ok
MC1	1	21-Aug-2011	*Synedra ulna*							3,558.0		ok	ok	ok
MC1	1	21-Aug-2011	*Tabellaria* cf. *fenestrata*							<23.0		Exclude	ok	Exclude
MC1	1	21-Aug-2011	*Tabellaria flocculosa*							1,779.0		ok	ok	ok
MC1	1	21-Aug-2011	Unknown alga (basal cells)							889.5		ok	Exclude	Exclude
MC1	1	21-Aug-2011	Unknown alga (flagellate)							177.9		ok	Exclude	Exclude
MC1	1	21-Aug-2011	Unknown alga sp.							711.6		ok	Exclude	Exclude
MC1	1	21-Aug-2011	Unknown Chlorophyte (colony) sp.							368.0		ok	ok	Exclude
MC1	1	21-Aug-2011	Unknown Chlorophyte (filament) sp.							<23.0		Exclude	ok	Exclude
MC1	1	21-Aug-2011	Unknown Chlorophyte sp.							138.0		ok	ok	Exclude
MC1	1	21-Aug-2011	Unknown Chrysophyte (cyst)							92.0		ok	ok	Exclude
MC1	1	21-Aug-2011	Unknown Cryptomonadales							<23.0		Exclude	ok	Exclude
MC1	1	21-Aug-2011	Unknown Oscillatoriales							1,779.0		ok	ok	Exclude
MC1	2	21-Aug-2011	*Achnanthes minutissima*							31,498.7		ok	ok	ok
MC1	2	21-Aug-2011	*Achnanthes* spp.							3,868.2		ok	ok	ok
MC1	2	21-Aug-2011	*Actinotaenium* sp.							<18.5		Exclude	ok	ok
MC1	2	21-Aug-2011	*Ankistrodesmus* spp.							37.0		ok	ok	ok
MC1	2	21-Aug-2011	*Audouinella* sp.							<18.5		Exclude	ok	ok
MC1	2	21-Aug-2011	*Chamaesiphon* spp.							270,774.0		ok	ok	ok
MC1	2	21-Aug-2011	*Chrysococcus* sp.							<18.5		Exclude	ok	ok
MC1	2	21-Aug-2011	*Closterium* spp.							74.0		ok	ok	ok
MC1	2	21-Aug-2011	*Cosmarium* spp.							185.0		ok	ok	ok
MC1	2	21-Aug-2011	*Cymbella* cf. *cestaii*							<18.5		Exclude	ok	Exclude
MC1	2	21-Aug-2011	*Cymbella cistula*							74.0		ok	ok	ok
MC1	2	21-Aug-2011	*Cymbella minuta*							3,315.6		ok	ok	ok
MC1	2	21-Aug-2011	*Cymbella* spp.							37.0		ok	ok	ok
MC1	2	21-Aug-2011	*Diatoma anceps*							<18.5		Exclude	ok	ok
MC1	2	21-Aug-2011	*Diatoma mesodon*							8,289.0		ok	ok	ok
MC1	2	21-Aug-2011	*Elakatothrix* sp.	cf.						<18.5		Exclude	ok	Exclude
MC1	2	21-Aug-2011	*Eunotia* spp.							185.0		ok	ok	ok
MC1	2	21-Aug-2011	*Fragilaria capucina*							<18.5		Exclude	ok	ok
MC1	2	21-Aug-2011	*Fragilaria* cf. *crotonensis*							<18.5		Exclude	ok	Exclude
MC1	2	21-Aug-2011	*Fragilaria vaucheriae*							9,394.2		ok	ok	ok
MC1	2	21-Aug-2011	*Frustulia rhomboides*							<18.5		Exclude	ok	ok
MC1	2	21-Aug-2011	*Gomphonema angustatum/parvulum*							430.8		ok	ok	ok

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm^2)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*gracile*
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Lyngbya*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Mougeotia*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Chlorophyta	Chlorophyceae	Oedogoniales	Oedogoniaceae	*Oedogonium*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Mesotaeniaceae	*Roya*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Scenedesmus*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Staurastrum*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*ulna*
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*fenestrata*
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9								
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9								
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Chlorophyta					
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Chlorophyta					
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Chrysophyta					
MC1	2	21-Aug-2011	FF	Exclude	110495		24.9			Cyanophyta	Myxophyceae	Oscillatoriales			
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Actinotaenium*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Caloneis*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Cyanophyta	Myxophyceae	Chroococcales	Chamaesiphonaceae	*Chamaesiphon*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Closterium*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Cosmarium*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*cistula*
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*lunata*
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*anceps*
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*mesodon*
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*	*tenuis*
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*crotonensis*
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*vaucheriae*
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Frustulia*	*rhomboides*
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum/parvulum*
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*gracile*
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Homoeothrix*	*varians*
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Lyngbya*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*	*circulare*
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Mougeotia*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	*pupula*
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Neidiaceae	*Neidium*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Mesotaeniaceae	*Netrium*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
MC1	2	21-Aug-2011	*Gomphonema gracile*							<18.5		Exclude	ok	ok
MC1	2	21-Aug-2011	*Gomphonema* spp.							1,436.0		ok	ok	ok
MC1	2	21-Aug-2011	*Hannaea arcus*							574.4		ok	ok	ok
MC1	2	21-Aug-2011	*Homoeothrix varians*							79,021.8		ok	ok	ok
MC1	2	21-Aug-2011	*Lyngbya* spp.							435,448.8		ok	ok	ok
MC1	2	21-Aug-2011	*Melosira* spp.							<18.5		Exclude	ok	ok
MC1	2	21-Aug-2011	*Mougeotia* spp.							<18.5		Exclude	ok	ok
MC1	2	21-Aug-2011	*Navicula* spp.							18.5		ok	ok	ok
MC1	2	21-Aug-2011	*Nitzschia* spp.							1,579.6		ok	ok	ok
MC1	2	21-Aug-2011	*Oedogonium* spp.							<18.5		Exclude	ok	ok
MC1	2	21-Aug-2011	*Phormidium* sp.							444.0		ok	ok	ok
MC1	2	21-Aug-2011	*Pinnularia* spp.							<18.5		Exclude	ok	ok
MC1	2	21-Aug-2011	*Pseudanabaena* sp.							555.0		ok	ok	ok
MC1	2	21-Aug-2011	*Roya* sp.							18.5		ok	ok	ok
MC1	2	21-Aug-2011	*Scenedesmus* spp.							148.0		ok	ok	ok
MC1	2	21-Aug-2011	*Staurastrum* spp.							<18.5		Exclude	ok	ok
MC1	2	21-Aug-2011	*Synedra* spp.							1,292.4		ok	ok	ok
MC1	2	21-Aug-2011	*Synedra ulna*							6,631.2		ok	ok	ok
MC1	2	21-Aug-2011	*Tabellaria* cf. *fenestrata*							37.0		ok	ok	Exclude
MC1	2	21-Aug-2011	*Tabellaria flocculosa*							2,297.6		ok	ok	ok
MC1	2	21-Aug-2011	Unknown alga (basal cells)							185.0		ok	Exclude	Exclude
MC1	2	21-Aug-2011	Unknown alga sp.							430.8		ok	Exclude	Exclude
MC1	2	21-Aug-2011	Unknown Chlorophyte (colony) sp.							148.0		ok	ok	Exclude
MC1	2	21-Aug-2011	Unknown Chlorophyte sp.							74.0		ok	ok	Exclude
MC1	2	21-Aug-2011	Unknown Chrysophyte (cyst)							143.6		ok	ok	Exclude
MC1	2	21-Aug-2011	Unknown Oscillatoriales							1,436.0		ok	ok	Exclude
MC1	3	21-Aug-2011	*Achnanthes minutissima*							10,353.0		ok	ok	ok
MC1	3	21-Aug-2011	*Achnanthes* spp.							555.8		ok	ok	ok
MC1	3	21-Aug-2011	*Actinotaenium* sp.							<23.1		Exclude	ok	ok
MC1	3	21-Aug-2011	*Ankistrodesmus* spp.							<23.1		Exclude	ok	ok
MC1	3	21-Aug-2011	*Caloneis* spp.							46.2		ok	ok	ok
MC1	3	21-Aug-2011	*Chamaesiphon* spp.							390,653.2		ok	ok	ok
MC1	3	21-Aug-2011	*Closterium* spp.							<23.1		Exclude	ok	ok
MC1	3	21-Aug-2011	*Cosmarium* spp.							23.1		ok	ok	ok
MC1	3	21-Aug-2011	*Cymbella cistula*							<23.1		Exclude	ok	ok
MC1	3	21-Aug-2011	*Cymbella lunata*							<23.1		Exclude	ok	ok
MC1	3	21-Aug-2011	*Cymbella minuta*							897.0		ok	ok	ok
MC1	3	21-Aug-2011	*Diatoma anceps*							<23.1		Exclude	ok	ok
MC1	3	21-Aug-2011	*Diatoma mesodon*							2,511.6		ok	ok	ok
MC1	3	21-Aug-2011	*Diatoma tenuis*							23.1		ok	ok	ok
MC1	3	21-Aug-2011	*Eunotia* spp.							92.4		ok	ok	ok
MC1	3	21-Aug-2011	*Fragilaria* cf. *crotonensis*							<23.1		Exclude	ok	Exclude
MC1	3	21-Aug-2011	*Fragilaria vaucheriae*							1,794.0		ok	ok	ok
MC1	3	21-Aug-2011	*Frustulia rhomboides*							<23.1		Exclude	ok	ok
MC1	3	21-Aug-2011	*Gomphonema angustatum/parvulum*							717.6		ok	ok	ok
MC1	3	21-Aug-2011	*Gomphonema gracile*							<23.1		Exclude	ok	ok
MC1	3	21-Aug-2011	*Gomphonema* spp.							717.6		ok	ok	ok
MC1	3	21-Aug-2011	*Hannaea arcus*							415.8		ok	ok	ok
MC1	3	21-Aug-2011	*Homoeothrix varians*							309,209.6		ok	ok	ok
MC1	3	21-Aug-2011	*Lyngbya* spp.							398,935.6		ok	ok	ok
MC1	3	21-Aug-2011	*Melosira* spp.							138.6		ok	ok	ok
MC1	3	21-Aug-2011	*Meridion circulare*							<23.1		Exclude	ok	ok
MC1	3	21-Aug-2011	*Mougeotia* spp.							<23.1		Exclude	ok	ok
MC1	3	21-Aug-2011	*Navicula pupula*							<23.1		Exclude	ok	ok
MC1	3	21-Aug-2011	*Neidium* sp.							<23.1		Exclude	ok	ok
MC1	3	21-Aug-2011	*Netrium* sp.	cf.						<23.1		Exclude	ok	Exclude
MC1	3	21-Aug-2011	*Nitzschia* spp.							369.2		ok	ok	ok

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	Lab Sample ID	QA/QC	Collection Area (cm^2)	Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Nostoc*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Chlorophyta	Chlorophyceae	Oedogoniales	Oedogoniaceae	*Oedogonium*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	*Phormidium*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Pseudanabaena*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Mesotaeniaceae	*Roya*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Scenedesmus*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Staurastrum*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Surirellaceae	*Surirella*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*ulna*
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9								
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9								
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9								
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9								
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Chlorophyta					
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Chlorophyta					
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Chlorophyta					
MC1	3	21-Aug-2011	FF	Exclude	110496		24.9			Chrysophyta					

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Appendix 5.2-1. Periphyton Taxa and Abundance in Streams, 2008 to 2013

Site	Replicate	Date	Taxon	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / sample	Cells / mL	Cells / cm²	Biovolume (µm³/cm²)	Diversity Scan / Duplicate Exclude	Exclude Taxa	Taxonomic Uncertainty Exclude
MC1	3	21-Aug-2011	*Nostoc* spp.							<23.1		Exclude	ok	ok
MC1	3	21-Aug-2011	*Oedogonium* spp.							<23.1		Exclude	ok	ok
MC1	3	21-Aug-2011	*Phormidium* sp.							287,123.2		ok	ok	ok
MC1	3	21-Aug-2011	*Pinnularia* spp.							<23.1		Exclude	ok	ok
MC1	3	21-Aug-2011	*Pseudanabaena* sp.							115.5		ok	ok	ok
MC1	3	21-Aug-2011	*Roya* sp.							<23.1		Exclude	ok	ok
MC1	3	21-Aug-2011	*Scenedesmus* spp.							92.4		ok	ok	ok
MC1	3	21-Aug-2011	*Staurastrum* spp.							<23.1		Exclude	ok	ok
MC1	3	21-Aug-2011	*Surirella* spp.							<23.1		Exclude	ok	ok
MC1	3	21-Aug-2011	*Synedra* spp.							358.8		ok	ok	ok
MC1	3	21-Aug-2011	*Synedra ulna*							1,435.2		ok	ok	ok
MC1	3	21-Aug-2011	*Tabellaria flocculosa*							323.4		ok	ok	ok
MC1	3	21-Aug-2011	Unknown alga (basal cells)							1,255.8		ok	Exclude	Exclude
MC1	3	21-Aug-2011	Unknown alga (colony)							<23.1		Exclude	Exclude	Exclude
MC1	3	21-Aug-2011	Unknown alga (flagellate)							46.2		ok	Exclude	Exclude
MC1	3	21-Aug-2011	Unknown alga sp.							1,435.2		ok	Exclude	Exclude
MC1	3	21-Aug-2011	Unknown Chlorophyte (colony) sp.							3,408.6		ok	ok	Exclude
MC1	3	21-Aug-2011	Unknown Chlorophyte (flagellate) sp.							46.2		ok	ok	Exclude
MC1	3	21-Aug-2011	Unknown Chlorophyte sp.							717.6		ok	ok	Exclude
MC1	3	21-Aug-2011	Unknown Chrysophyte (cyst)							92.4		ok	ok	Exclude

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Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	QA / QC	Lab Sample ID	Volume Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species	Taxon
BJ	1	8-Sep-2012	MA	Include		6204.3-1	310	0.17%	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	*Carteria*		*Carteria* sp.
BJ	1	8-Sep-2012	MA	Include		6204.3-1	310	0.17%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*		*Cymbella* sp.
BJ	1	8-Sep-2012	MA	Include		6204.3-1	310	0.17%	Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*		*Dinobryon* sp.
BJ	1	8-Sep-2012	MA	Include		6204.3-1	310	0.17%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*		*Fragilaria* sp.
BJ	1	8-Sep-2012	MA	Include		6204.3-1	310	0.17%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*		*Hannaea* sp.
BJ	1	8-Sep-2012	MA	Include		6204.3-1	310	0.17%	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Monoraphidium*		*Monoraphidium* sp.
BJ	1	8-Sep-2012	MA	Include		6204.3-1	310	0.17%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*		*Navicula* sp.
BJ	1	8-Sep-2012	MA	Include		6204.3-1	310	0.17%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*		*Synedra* sp.
BJ	2	8-Sep-2012	MA	Include		6204.3-2	260	0.19%	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	*Carteria*		*Carteria* sp.
BJ	2	8-Sep-2012	MA	Include		6204.3-2	260	0.19%	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Cocconeis*		*Cocconeis* sp.
BJ	2	8-Sep-2012	MA	Include		6204.3-2	260	0.19%	Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*		*Dinobryon* sp.
BJ	2	8-Sep-2012	MA	Include		6204.3-2	260	0.19%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*		*Fragilaria* sp.
BJ	2	8-Sep-2012	MA	Include		6204.3-2	260	0.19%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*		*Hannaea* sp.
BJ	2	8-Sep-2012	MA	Include		6204.3-2	260	0.19%	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Monoraphidium*		*Monoraphidium* sp.
BJ	2	8-Sep-2012	MA	Include		6204.3-2	260	0.19%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*		*Navicula* sp.
BJ	2	8-Sep-2012	MA	Include		6204.3-2	260	0.19%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*		*Synedra* sp.
BJ	3	8-Sep-2012	MA	Include	Lab Dup	6204.3-1_DUP	310	0.17%	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	*Carteria*		*Carteria* sp.
BJ	3	8-Sep-2012	MA	Include	Lab Dup	6204.3-1_DUP	310	0.17%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*		*Cymbella* sp.
BJ	3	8-Sep-2012	MA	Include	Lab Dup	6204.3-1_DUP	310	0.17%	Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*		*Dinobryon* sp.
BJ	3	8-Sep-2012	MA	Include		6204.3-3	300	0.15%	Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*		*Dinobryon* sp.
BJ	3	8-Sep-2012	MA	Include		6204.3-3	300	0.15%	Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	*Elakatothrix*		*Elakatothrix* sp.
BJ	3	8-Sep-2012	MA	Include	Lab Dup	6204.3-1_DUP	310	0.17%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*		*Fragilaria* sp.
BJ	3	8-Sep-2012	MA	Include		6204.3-3	300	0.15%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*		*Hannaea* sp.
BJ	3	8-Sep-2012	MA	Include	Lab Dup	6204.3-1_DUP	310	0.17%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*		*Hannaea* sp.
BJ	3	8-Sep-2012	MA	Include	Lab Dup	6204.3-1_DUP	310	0.17%	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Monoraphidium*		*Monoraphidium* sp.
BJ	3	8-Sep-2012	MA	Include		6204.3-3	300	0.15%	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Monoraphidium*		*Monoraphidium* sp.
BJ	3	8-Sep-2012	MA	Include	Lab Dup	6204.3-1_DUP	310	0.17%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*		*Navicula* sp.
BJ	3	8-Sep-2012	MA	Include	Lab Dup	6204.3-1_DUP	310	0.17%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*		*Synedra* sp.
BJ	3	8-Sep-2012	MA	Include	Lab Dup	6204.3-1_DUP	310	0.17%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*		*Navicula* sp.
BJ	3	8-Sep-2012	MA	Include	Lab Dup	6204.3-1_DUP	310	0.17%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*		*Synedra* sp.
BJ	3	8-Sep-2012	MA	Include		6204.3-3	300	0.15%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*		*Synedra* sp.
BJ	1	9-Aug-2013	MA	Include		6530.06-01	396	0.98%	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Chroomonas*	*nordstedtii*	*Chroomonas nordstedtii*
BJ	1	9-Aug-2013	MA	Include		6530.06-01	396	0.98%	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*		*Cyclotella* sp.
BJ	1	9-Aug-2013	MA	Include		6530.06-01	396	0.98%	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*		*Cymbella* sp.
BJ	1	9-Aug-2013	MA	Include		6530.06-01	396	0.98%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*		*Gomphonema* sp.
BJ	1	9-Aug-2013	MA	Include		6530.06-01	396	0.98%	Pyrrhophyta	Dinophyceae	Gymnodiniales	Gymnodiniaceae	*Gymnodinium*		*Gymnodinium* sp.
BJ	1	9-Aug-2013	MA	Include		6530.06-01	396	0.98%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*	*Hannaea arcus*
BJ	1	9-Aug-2013	MA	Include		6530.06-01	396	0.98%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*		*Navicula* sp.
BJ	1	9-Aug-2013	MA	Include		6530.06-01	396	0.98%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*		*Nitzschia* sp.
BJ	1	9-Aug-2013	MA	Include		6530.06-01	396	0.98%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*		*Synedra* sp.
BJ	2	9-Aug-2013	MA	Include		6530.06-02	487	0.97%	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Chroomonas*	*nordstedtii*	*Chroomonas nordstedtii*
BJ	2	9-Aug-2013	MA	Include		6530.06-02	487	0.97%	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*		*Cyclotella* sp.
BJ	2	9-Aug-2013	MA	Include		6530.06-02	487	0.97%	Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	*divergens*	*Dinobryon divergens*
BJ	2	9-Aug-2013	MA	Include		6530.06-02	487	0.97%	Pyrrhophyta	Dinophyceae	Gymnodiniales	Gymnodiniaceae	*Gymnodinium*		*Gymnodinium* sp.
BJ	2	9-Aug-2013	MA	Include		6530.06-02	487	0.97%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*	*Hannaea arcus*
BJ	2	9-Aug-2013	MA	Include		6530.06-02	487	0.97%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*		*Nitzschia* sp.
BJ	2	9-Aug-2013	MA	Include		6530.06-02	487	0.97%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*		*Synedra* sp.
BJ	3	9-Aug-2013	MA	Include		6530.06-03	459	1.12%	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Chroomonas*	*nordstedtii*	*Chroomonas nordstedtii*
BJ	3	9-Aug-2013	MA	Include		6530.06-03	459	1.12%	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*		*Cyclotella* sp.
BJ	3	9-Aug-2013	MA	Include		6530.06-03	459	1.12%	Pyrrhophyta	Dinophyceae	Gymnodiniales	Gymnodiniaceae	*Gymnodinium*		*Gymnodinium* sp.
BJ	3	9-Aug-2013	MA	Include		6530.06-03	459	1.12%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*	*Hannaea arcus*
BJ	3	9-Aug-2013	MA	Include		6530.06-03	459	1.12%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*		*Nitzschia* sp.
BJ	3	9-Aug-2013	MA	Include		6530.06-03	459	1.12%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*		*Synedra* sp.
BJ Shallow	1	10-Aug-2013	MA	Include		6530.06-13	361	1.15%	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*		*Cyclotella* sp.
BJ Shallow	1	10-Aug-2013	MA	Include		6530.06-13	361	1.15%	Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	*divergens*	*Dinobryon divergens*
BJ Shallow	1	10-Aug-2013	MA	Include		6530.06-13	361	1.15%	Pyrrhophyta	Dinophyceae	Gymnodiniales	Gymnodiniaceae	*Gymnodinium*		*Gymnodinium* sp.
BJ Shallow	1	10-Aug-2013	MA	Include		6530.06-13	361	1.15%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*	*Hannaea arcus*
BJ Shallow	1	10-Aug-2013	MA	Include		6530.06-13	361	1.15%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Leptolyngbya*		*Leptolyngbya* sp.
BJ Shallow	1	10-Aug-2013	MA	Include		6530.06-13	361	1.15%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*		*Synedra* sp.

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Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Replicate	Date	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / Sample	Cells / mL	Biovolume (µm³/ml)	Diversity Scan / Duplicate Exclude	Taxa Exclude	Taxonomic Uncertainty Exclude
BJ	1	8-Sep-2012		1.0	1.0	1.0	595.3	1.9		ok	ok	ok
BJ	1	8-Sep-2012		1.0	1.0	1.0	595.3	1.9		ok	ok	ok
BJ	1	8-Sep-2012		48.0	1.0	48.0	28,575.5	92.2		ok	ok	ok
BJ	1	8-Sep-2012		1.0	2.0	2.0	1,190.6	3.8		ok	ok	ok
BJ	1	8-Sep-2012		12.0	1.0	12.0	7,143.9	23.0		ok	ok	ok
BJ	1	8-Sep-2012		25.0	1.0	25.0	14,883.1	48.0		ok	ok	ok
BJ	1	8-Sep-2012		1.0	1.0	1.0	595.3	1.9		ok	ok	ok
BJ	1	8-Sep-2012		220.0	1.1	240.0	142,877.4	460.9		ok	ok	ok
BJ	2	8-Sep-2012		3.0	1.0	3.0	1,559.3	6.0		ok	ok	ok
BJ	2	8-Sep-2012		1.0	1.0	1.0	519.8	2.0		ok	ok	ok
BJ	2	8-Sep-2012		38.0	1.0	38.0	19,751.1	76.0		ok	ok	ok
BJ	2	8-Sep-2012		2.0	1.5	3.0	1,559.3	6.0		ok	ok	ok
BJ	2	8-Sep-2012		8.0	1.0	8.0	4,158.1	16.0		ok	ok	ok
BJ	2	8-Sep-2012		22.0	1.0	22.0	11,434.8	44.0		ok	ok	ok
BJ	2	8-Sep-2012		1.0	1.0	1.0	519.8	2.0		ok	ok	ok
BJ	2	8-Sep-2012		227.0	1.1	248.0	128,901.9	495.8		ok	ok	ok
BJ	3	8-Sep-2012		2.0	1.0	2.0	1,181.3	3.8		Exclude	ok	ok
BJ	3	8-Sep-2012		1.0	1.0	1.0	590.7	1.9		Exclude	ok	ok
BJ	3	8-Sep-2012		47.0	1.0	47.0	27,761.6	89.6		Exclude	ok	ok
BJ	3	8-Sep-2012		54.0	1.0	55.0	36,253.9	120.8		ok	ok	ok
BJ	3	8-Sep-2012		1.0	4.0	4.0	2,636.7	8.8		ok	ok	ok
BJ	3	8-Sep-2012		1.0	2.0	2.0	1,181.3	3.8		Exclude	ok	ok
BJ	3	8-Sep-2012		9.0	1.0	9.0	5,932.5	19.8		ok	ok	ok
BJ	3	8-Sep-2012		12.0	1.0	12.0	7,088.1	22.9		Exclude	ok	ok
BJ	3	8-Sep-2012		23.0	1.0	23.0	13,585.4	43.8		Exclude	ok	ok
BJ	3	8-Sep-2012		27.0	1.0	27.0	17,797.4	59.3		ok	ok	ok
BJ	3	8-Sep-2012		1.0	1.0	1.0	590.7	1.9		Exclude	ok	ok
BJ	3	8-Sep-2012		221.0	1.1	241.0	142,351.8	459.2		Exclude	ok	ok
BJ	3	8-Sep-2012		214.0	1.1	227.0	149,629.9	498.8		ok	ok	ok
BJ	1	9-Aug-2013		35.0	1.0	35.0	3,566.3	9.0		ok	ok	ok
BJ	1	9-Aug-2013		4.0	1.0	4.0	407.6	1.0		ok	ok	ok
BJ	1	9-Aug-2013		1.0	1.0	1.0	101.9	0.3		ok	ok	ok
BJ	1	9-Aug-2013		1.0	1.0	1.0	101.9	0.3		ok	ok	ok
BJ	1	9-Aug-2013		110.0	1.0	110.0	11,208.4	28.3		ok	ok	ok
BJ	1	9-Aug-2013		25.0	1.0	25.0	2,547.4	6.4		ok	ok	ok
BJ	1	9-Aug-2013		3.0	1.0	3.0	305.7	0.8		ok	ok	ok
BJ	1	9-Aug-2013		5.0	1.0	5.0	509.5	1.3		ok	ok	ok
BJ	1	9-Aug-2013		116.0	1.0	116.0	11,819.8	29.8		ok	ok	ok
BJ	2	9-Aug-2013		34.0	1.0	34.0	3,500.2	7.2		ok	ok	ok
BJ	2	9-Aug-2013		3.0	1.0	3.0	308.8	0.6		ok	ok	ok
BJ	2	9-Aug-2013		3.0	1.0	3.0	308.8	0.6		ok	ok	ok
BJ	2	9-Aug-2013		131.0	1.0	131.0	13,485.9	27.7		ok	ok	ok
BJ	2	9-Aug-2013		25.0	1.0	25.0	2,573.7	5.3		ok	ok	ok
BJ	2	9-Aug-2013		11.0	1.0	11.0	1,132.4	2.3		ok	ok	ok
BJ	2	9-Aug-2013		93.0	1.0	93.0	9,574.0	19.7		ok	ok	ok
BJ	3	9-Aug-2013		22.0	1.0	22.0	1,960.6	4.3		ok	ok	ok
BJ	3	9-Aug-2013		1.0	1.0	1.0	89.1	0.2		ok	ok	ok
BJ	3	9-Aug-2013		147.0	1.0	147.0	13,100.3	28.5		ok	ok	ok
BJ	3	9-Aug-2013		30.0	1.0	30.0	2,673.5	5.8		ok	ok	ok
BJ	3	9-Aug-2013		5.0	1.0	5.0	445.6	1.0		ok	ok	ok
BJ	3	9-Aug-2013		95.0	1.0	95.0	8,466.2	18.4		ok	ok	ok
BJ Shallow	1	10-Aug-2013		1.0	1.0	1.0	86.8	0.2		ok	ok	ok
BJ Shallow	1	10-Aug-2013		16.0	1.0	16.0	1,388.5	3.8		ok	ok	ok
BJ Shallow	1	10-Aug-2013		139.0	1.0	139.0	12,063.0	33.4		ok	ok	ok
BJ Shallow	1	10-Aug-2013		117.0	1.0	117.0	10,153.8	28.1		ok	ok	ok
BJ Shallow	1	10-Aug-2013		7.0	13.3	93.0	8,070.9	22.4		ok	ok	ok
BJ Shallow	1	10-Aug-2013		20.0	1.0	20.0	1,735.7	4.8		ok	ok	ok

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	QA / QC	Lab Sample ID	Volume Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species	Taxon
BJ Shallow	2	10-Aug-2013	MA	Include		6530.06-14	442	1.53%	Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	*divergens*	*Dinobryon divergens*
BJ Shallow	2	10-Aug-2013	MA	Include		6530.06-14	442	1.53%	Pyrrhophyta	Dinophyceae	Gymnodiniales	Gymnodiniaceae	*Gymnodinium*		*Gymnodinium* sp.
BJ Shallow	2	10-Aug-2013	MA	Include		6530.06-14	442	1.53%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*	*Hannaea arcus*
BJ Shallow	2	10-Aug-2013	MA	Include		6530.06-14	442	1.53%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Leptolyngbya*		*Leptolyngbya* sp.
BJ Shallow	2	10-Aug-2013	MA	Include		6530.06-14	442	1.53%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*		*Synedra* sp.
BJ Shallow	3	10-Aug-2013	MA	Include		6530.06-15	400	1.05%	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	*Aulacoseira*		*Aulacoseira* sp.
BJ Shallow	3	10-Aug-2013	MA	Include		6530.06-15	400	1.05%	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*		*Cyclotella* sp.
BJ Shallow	3	10-Aug-2013	MA	Include		6530.06-15	400	1.05%	Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	*divergens*	*Dinobryon divergens*
BJ Shallow	3	10-Aug-2013	MA	Include		6530.06-15	400	1.05%	Pyrrhophyta	Dinophyceae	Gymnodiniales	Gymnodiniaceae	*Gymnodinium*		*Gymnodinium* sp.
BJ Shallow	3	10-Aug-2013	MA	Include		6530.06-15	400	1.05%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*	*Hannaea arcus*
BJ Shallow	3	10-Aug-2013	MA	Include		6530.06-15	400	1.05%	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Monoraphidium*	*komarkovae*	*Monoraphidium komarkovae*
BJ Shallow	3	10-Aug-2013	MA	Include		6530.06-15	400	1.05%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*		*Synedra* sp.
SUL	1	22-Aug-2008	MA	Include		MC88			Chrysophyta	Chrysophyceae	Chromulinales	Chromulinaceae	*Kephyrion*		*Kephyrion* sp.
SUL	2	22-Aug-2008	MA	Include		MC89									
SUL	3	22-Aug-2008	MA	Include		MC90									Unknown alga sp.
SUL	1	16-Aug-2009	MA	Include											
SUL	1	16-Aug-2009	MA	Include											
SUL	1	16-Aug-2009	MA	Include											
SUL	2	16-Aug-2009	MA	Include											
SUL	2	16-Aug-2009	MA	Include											
SUL	2	16-Aug-2009	MA	Include					Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*	*Cymbella minuta*
SUL	2	16-Aug-2009	MA	Include					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*construens*	*Fragilaria construens* var. *venter*
SUL	2	16-Aug-2009	MA	Include					Bacillariophyta	Bacillariophyceae	Pennales	Surirellaceae	*Surirella*	*ovata*	*Surirella ovata*
SUL	1	10-Aug-2013	MA	Include		6530.06-04	441	0.39%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*		*Gomphonema* sp.
SUL	1	10-Aug-2013	MA	Include		6530.06-04	441	0.39%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*		*Navicula* sp.
SUL	1	10-Aug-2013	MA	Include		6530.06-04	441	0.39%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*		*Nitzschia* sp.
SUL	1	10-Aug-2013	MA	Include		6530.06-04	441	0.39%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*		*Synedra* sp.
SUL	2	10-Aug-2013	MA	Include		6530.06-05	428	0.40%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*		*Nitzschia* sp.
SUL	2	10-Aug-2013	MA	Include		6530.06-05	428	0.40%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*		*Synedra* sp.
SUL	3	10-Aug-2013	MA	Include		6530.06-06	500	0.39%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*		*Synedra* sp.
Divide	1	11-Aug-2013	R	Exclude		6530.06-07	400	1.40%	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Anabaena*		*Anabaena* sp.
Divide	1	11-Aug-2013	R	Exclude		6530.06-07	400	1.40%	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Closterium*		*Closterium* sp.
Divide	1	11-Aug-2013	R	Exclude		6530.06-07	400	1.40%	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*		*Cryptomonas* sp.
Divide	1	11-Aug-2013	R	Exclude		6530.06-07	400	1.40%	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*		*Cyclotella* sp.
Divide	1	11-Aug-2013	R	Exclude		6530.06-07	400	1.40%	Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	*divergens*	*Dinobryon divergens*
Divide	1	11-Aug-2013	R	Exclude		6530.06-07	400	1.40%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*		*Gomphonema* sp.
Divide	1	11-Aug-2013	R	Exclude		6530.06-07	400	1.40%	Pyrrhophyta	Dinophyceae	Gymnodiniales	Gymnodiniaceae	*Gymnodinium*		*Gymnodinium* sp.
Divide	1	11-Aug-2013	R	Exclude		6530.06-07	400	1.40%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*	*Hannaea arcus*
Divide	1	11-Aug-2013	R	Exclude		6530.06-07	400	1.40%	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Kirchneriella*	*subcapitata*	*Kirchneriella subcapitata*
Divide	1	11-Aug-2013	R	Exclude		6530.06-07	400	1.40%	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Monoraphidium*	*komarkovae*	*Monoraphidium komarkovae*
Divide	1	11-Aug-2013	R	Exclude		6530.06-07	400	1.40%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*		*Synedra* sp.
Divide	1	11-Aug-2013	R	Exclude		6530.06-07	400	1.40%	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Xanthidium*		*Xanthidium* sp.
Divide	2	11-Aug-2013	R	Exclude		6530.06-08	428	1.42%	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthidiaceae	*Achnanthidium*		*Achnanthidium* sp.
Divide	2	11-Aug-2013	R	Exclude		6530.06-08	428	1.42%	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Anabaena*		*Anabaena* sp.
Divide	2	11-Aug-2013	R	Exclude		6530.06-08	428	1.42%	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*		*Cyclotella* sp.
Divide	2	11-Aug-2013	R	Exclude		6530.06-08	428	1.42%	Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	*divergens*	*Dinobryon divergens*
Divide	2	11-Aug-2013	R	Exclude		6530.06-08	428	1.42%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*		*Gomphonema* sp.
Divide	2	11-Aug-2013	R	Exclude		6530.06-08	428	1.42%	Pyrrhophyta	Dinophyceae	Gymnodiniales	Gymnodiniaceae	*Gymnodinium*		*Gymnodinium* sp.
Divide	2	11-Aug-2013	R	Exclude		6530.06-08	428	1.42%	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Kirchneriella*	*subcapitata*	*Kirchneriella subcapitata*
Divide	2	11-Aug-2013	R	Exclude		6530.06-08	428	1.42%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Leptolyngbya*	*foveolarum*	*Leptolyngbya foveolarum*
Divide	2	11-Aug-2013	R	Exclude		6530.06-08	428	1.42%	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Monoraphidium*	*komarkovae*	*Monoraphidium komarkovae*
Divide	2	11-Aug-2013	R	Exclude		6530.06-08	428	1.42%	Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Mougeotia*		*Mougeotia* sp.
Divide	2	11-Aug-2013	R	Exclude		6530.06-08	428	1.42%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*		*Navicula* sp.
Divide	2	11-Aug-2013	R	Exclude		6530.06-08	428	1.42%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*		*Synedra* sp.
Divide	2	11-Aug-2013	R	Exclude		6530.06-08	428	1.42%	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Xanthidium*		*Xanthidium* sp.
Divide	3	11-Aug-2013	R	Exclude		6530.06-09	465	1.55%	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthidiaceae	*Achnanthidium*		*Achnanthidium* sp.
Divide	3	11-Aug-2013	R	Exclude		6530.06-09	465	1.55%	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Anabaena*		*Anabaena* sp.

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Replicate	Date	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / Sample	Cells / mL	Biovolume (µm³/ml)	Diversity Scan / Duplicate Exclude	Taxa Exclude	Taxonomic Uncertainty Exclude
BJ Shallow	2	10-Aug-2013		20.0	1.0	20.0	1,303.7	2.9		ok	ok	ok
BJ Shallow	2	10-Aug-2013		137.0	1.0	137.0	8,930.4	20.2		ok	ok	ok
BJ Shallow	2	10-Aug-2013		113.0	1.0	113.0	7,365.9	16.7		ok	ok	ok
BJ Shallow	2	10-Aug-2013		2.0	14.5	29.0	1,890.4	4.3		ok	ok	ok
BJ Shallow	2	10-Aug-2013		28.0	1.0	28.0	1,825.2	4.1		ok	ok	ok
BJ Shallow	3	10-Aug-2013		2.0	2.0	4.0	381.1	1.0		ok	ok	ok
BJ Shallow	3	10-Aug-2013		3.0	1.0	3.0	285.8	0.7		ok	ok	ok
BJ Shallow	3	10-Aug-2013		6.0	1.0	6.0	571.6	1.4		ok	ok	ok
BJ Shallow	3	10-Aug-2013		151.0	1.0	151.0	14,384.8	36.0		ok	ok	ok
BJ Shallow	3	10-Aug-2013		102.0	1.0	102.0	9,716.9	24.3		ok	ok	ok
BJ Shallow	3	10-Aug-2013		3.0	1.0	3.0	285.8	0.7		ok	ok	ok
BJ Shallow	3	10-Aug-2013		33.0	1.0	33.0	3,143.7	7.9		ok	ok	ok
SUL	1	22-Aug-2008						2.1	135.3	ok	ok	ok
SUL	2	22-Aug-2008						<3		Exclude	ok	ok
SUL	3	22-Aug-2008						2.6	262.8	ok	Exclude	Exclude
SUL	1	16-Aug-2009						0.0		ok	ok	ok
SUL	1	16-Aug-2009						0.0		ok	ok	ok
SUL	1	16-Aug-2009						0.0		ok	ok	ok
SUL	2	16-Aug-2009						0.0		ok	ok	ok
SUL	2	16-Aug-2009						0.0		ok	ok	ok
SUL	2	16-Aug-2009						1.4	503.8	ok	ok	ok
SUL	2	16-Aug-2009						1.4	130.7	ok	ok	ok
SUL	2	16-Aug-2009						1.4	394.9	ok	ok	ok
SUL	1	10-Aug-2013		1.0	1.0	1.0	259.3	0.6		ok	ok	ok
SUL	1	10-Aug-2013		2.0	1.0	2.0	518.6	1.2		ok	ok	ok
SUL	1	10-Aug-2013		2.0	1.0	2.0	518.6	1.2		ok	ok	ok
SUL	1	10-Aug-2013		5.0	1.0	5.0	1,296.4	2.9		ok	ok	ok
SUL	2	10-Aug-2013		1.0	1.0	1.0	249.7	0.6		ok	ok	ok
SUL	2	10-Aug-2013		2.0	1.0	2.0	499.4	1.2		ok	ok	ok
SUL	3	10-Aug-2013		2.0	1.0	2.0	512.2	1.0		ok	ok	ok
Divide	1	11-Aug-2013		2.0	14.5	29.0	2,072.5	5.2		ok	ok	ok
Divide	1	11-Aug-2013		1.0	1.0	1.0	71.5	0.2		ok	ok	ok
Divide	1	11-Aug-2013		1.0	1.0	1.0	71.5	0.2		ok	ok	ok
Divide	1	11-Aug-2013		5.0	1.0	5.0	357.3	0.9		ok	ok	ok
Divide	1	11-Aug-2013		39.0	1.0	39.0	2,787.2	7.0		ok	ok	ok
Divide	1	11-Aug-2013		38.0	0.0	1.0	71.5	0.2		ok	ok	ok
Divide	1	11-Aug-2013		28.0	1.0	28.0	2,001.0	5.0		ok	ok	ok
Divide	1	11-Aug-2013		2.0	1.0	2.0	142.9	0.4		ok	ok	ok
Divide	1	11-Aug-2013		59.0	1.0	59.0	4,216.5	10.5		ok	ok	ok
Divide	1	11-Aug-2013		102.0	1.0	102.0	7,289.5	18.2		ok	ok	ok
Divide	1	11-Aug-2013		18.0	1.0	18.0	1,286.4	3.2		ok	ok	ok
Divide	1	11-Aug-2013		5.0	1.0	5.0	357.3	0.9		ok	ok	ok
Divide	2	11-Aug-2013		1.0	1.0	1.0	70.5	0.2		ok	ok	ok
Divide	2	11-Aug-2013		3.0	9.3	28.0	1,974.0	4.6		ok	ok	ok
Divide	2	11-Aug-2013		2.0	1.0	2.0	141.0	0.3		ok	ok	ok
Divide	2	11-Aug-2013		69.0	1.0	69.0	4,864.4	11.4		ok	ok	ok
Divide	2	11-Aug-2013		1.0	1.0	1.0	70.5	0.2		ok	ok	ok
Divide	2	11-Aug-2013		30.0	1.0	30.0	2,115.0	4.9		ok	ok	ok
Divide	2	11-Aug-2013		55.0	1.0	55.0	3,877.4	9.1		ok	ok	ok
Divide	2	11-Aug-2013		3.0	29.3	88.0	6,203.9	14.5		ok	ok	ok
Divide	2	11-Aug-2013		117.0	1.0	117.0	8,248.3	19.3		ok	ok	ok
Divide	2	11-Aug-2013		1.0	1.0	1.0	70.5	0.2		ok	ok	ok
Divide	2	11-Aug-2013		5.0	1.0	5.0	352.5	0.8		ok	ok	ok
Divide	2	11-Aug-2013		12.0	1.0	12.0	846.0	2.0		ok	ok	ok
Divide	2	11-Aug-2013		1.0	1.0	1.0	70.5	0.2		ok	ok	ok
Divide	3	11-Aug-2013		5.0	1.0	5.0	322.2	0.7		ok	ok	ok
Divide	3	11-Aug-2013		5.0	10.6	53.0	3,415.0	7.3		ok	ok	ok

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	QA / QC	Lab Sample ID	Volume Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species	Taxon
Divide	3	11-Aug-2013	R	Exclude		6530.06-09	465	1.55%	Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	*divergens*	*Dinobryon divergens*
Divide	3	11-Aug-2013	R	Exclude		6530.06-09	465	1.55%	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*		*Gomphonema* sp.
Divide	3	11-Aug-2013	R	Exclude		6530.06-09	465	1.55%	Pyrrhophyta	Dinophyceae	Gymnodiniales	Gymnodiniaceae	*Gymnodinium*		*Gymnodinium* sp.
Divide	3	11-Aug-2013	R	Exclude		6530.06-09	465	1.55%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Hannaea*	*arcus*	*Hannaea arcus*
Divide	3	11-Aug-2013	R	Exclude		6530.06-09	465	1.55%	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Kirchneriella*	*subcapitata*	*Kirchneriella subcapitata*
Divide	3	11-Aug-2013	R	Exclude		6530.06-09	465	1.55%	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Leptolyngbya*	*foveolarum*	*Leptolyngbya foveolarum*
Divide	3	11-Aug-2013	R	Exclude		6530.06-09	465	1.55%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Meridion*		*Meridion* sp.
Divide	3	11-Aug-2013	R	Exclude		6530.06-09	465	1.55%	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Monoraphidium*	*komarkovae*	*Monoraphidium komarkovae*
Divide	3	11-Aug-2013	R	Exclude		6530.06-09	465	1.55%	Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Mougeotia*		*Mougeotia* sp.
Divide	3	11-Aug-2013	R	Exclude		6530.06-09	465	1.55%	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*		*Navicula* sp.
Divide	3	11-Aug-2013	R	Exclude		6530.06-09	465	1.55%	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*		*Nitzschia* sp.
Divide	3	11-Aug-2013	R	Exclude		6530.06-09	465	1.55%	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*		*Synedra* sp.
Divide	3	11-Aug-2013	R	Exclude		6530.06-09	465	1.55%	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Xanthidium*		*Xanthidium* sp.
KL	1	12-Aug-2013	AP	Include		6530.06-10	440	0.22%							
KL	2	12-Aug-2013	AP	Include		6530.06-11	484	0.17%							
KL	3	12-Aug-2013	AP	Include		6530.06-12	438	0.17%							
BL1	1	25-Aug-2010	AP	Include		100410			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*		*Cryptomonas* sp.
BL1	1	25-Aug-2010	AP	Include		100410									Unknown alga sp.
BL1	2	25-Aug-2010	AP	Include		100411			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*		*Cryptomonas* sp.
BL1	2	25-Aug-2010	AP	Include		100411									Unknown alga sp.
BL1	3	25-Aug-2010	AP	Include		100412			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*		*Cryptomonas* sp.
BL1	3	25-Aug-2010	AP	Include		100412									Unknown alga sp.
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*	*falcatus*	*Ankistrodesmus falcatus*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Asterionella*	*formosa*	*Asterionella formosa*
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Botryococcus*	*braunii*	*Botryococcus braunii*
TL1	1	17-Aug-2009	AP	Include					Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	*Ceratium*	*hirundinella*	*Ceratium hirundinella*
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	*Chlamydomonas*		*Chlamydomonas* sp.
TL1	1	17-Aug-2009	AP	Include					Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	*Chroococcus*	*minimus*	*Chroococcus minimus*
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Cosmarium*		*Cosmarium* sp.
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*	*quadrata*	*Crucigenia quadrata*
TL1	1	17-Aug-2009	AP	Include					Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*	*erosa*	*Cryptomonas erosa*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*	*comta*	*Cyclotella comta*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*	*stelligera*	*Cyclotella stelligera*
TL1	1	17-Aug-2009	AP	Include					Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	*sertularia*	*Dinobryon sertularia*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*construens*	*Fragilaria construens* var. *venter*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*acuminatum*	*Gomphonema acuminatum*
TL1	1	17-Aug-2009	AP	Include					Chrysophyta	Chrysophyceae	Chromulinales	Chromulinaceae	*Kephyrion*	*littorale*	*Kephyrion littorale*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	*minima*	*Navicula minima*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*	*dissipata*	*Nitzschia dissipata*
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Oocystis*	*pusilla*	*Oocystis pusilla*
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Quadrigula*	*closterioides*	*Quadrigula closterioides*
TL1	1	17-Aug-2009	AP	Include					Cryptophyta	Cryptophyceae	Pyrenomonadales	Pyrenomonadaceae	*Rhodomonas*	*minuta*	*Rhodomonas minuta*
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	*Sphaerocystis*	*schroeteri*	*Sphaerocystis schroeteri*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*radians*	*Synedra radians*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*rumpens*	*Synedra rumpens*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*clevei*	*Achnanthes clevei*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*	*Achnanthes minutissima*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Asterionella*	*formosa*	*Asterionella formosa*
TL1	1	17-Aug-2009	AP	Include					Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	*Chroococcus*	*minimus*	*Chroococcus minimus*
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Cosmarium*		*Cosmarium* sp.
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*	*quadrata*	*Crucigenia quadrata*
TL1	1	17-Aug-2009	AP	Include					Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*	*erosa*	*Cryptomonas erosa*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*	*comta*	*Cyclotella comta*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*	*stelligera*	*Cyclotella stelligera*
TL1	1	17-Aug-2009	AP	Include					Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	*sertularia*	*Dinobryon sertularia*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*construens*	*Fragilaria construens* var. *venter*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Frustulia*	*rhomboides*	*Frustulia rhomboides*

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Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Replicate	Date	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / Sample	Cells / mL	Biovolume (µm³/ml)	Diversity Scan / Duplicate Exclude	Taxa Exclude	Taxonomic Uncertainty Exclude
Divide	3	11-Aug-2013		42.0	1.0	42.0	2,706.2	5.8		ok	ok	ok
Divide	3	11-Aug-2013		3.0	1.0	3.0	193.3	0.4		ok	ok	ok
Divide	3	11-Aug-2013		31.0	1.0	31.0	1,997.5	4.3		ok	ok	ok
Divide	3	11-Aug-2013		3.0	1.0	3.0	193.3	0.4		ok	ok	ok
Divide	3	11-Aug-2013		70.0	1.0	70.0	4,510.4	9.7		ok	ok	ok
Divide	3	11-Aug-2013		4.0	30.3	121.0	7,796.5	16.8		ok	ok	ok
Divide	3	11-Aug-2013		3.0	1.0	3.0	193.3	0.4		ok	ok	ok
Divide	3	11-Aug-2013		122.0	1.0	122.0	7,861.0	16.9		ok	ok	ok
Divide	3	11-Aug-2013		1.0	1.0	1.0	64.4	0.1		ok	ok	ok
Divide	3	11-Aug-2013		2.0	1.0	2.0	128.9	0.3		ok	ok	ok
Divide	3	11-Aug-2013		3.0	1.0	3.0	193.3	0.4		ok	ok	ok
Divide	3	11-Aug-2013		5.0	1.0	5.0	322.2	0.7		ok	ok	ok
Divide	3	11-Aug-2013		1.0	1.0	1.0	64.4	0.1		ok	ok	ok
KL	1	12-Aug-2013						0.0		ok	ok	ok
KL	2	12-Aug-2013						0.0		ok	ok	ok
KL	3	12-Aug-2013						0.0		ok	ok	ok
BL1	1	25-Aug-2010	cf.					16.8		ok	ok	Exclude
BL1	1	25-Aug-2010						2.8		ok	Exclude	Exclude
BL1	2	25-Aug-2010	cf.					40.6		ok	ok	Exclude
BL1	2	25-Aug-2010						1.4		ok	Exclude	Exclude
BL1	3	25-Aug-2010	cf.					23.8		ok	ok	Exclude
BL1	3	25-Aug-2010						<1.4		Exclude	Exclude	Exclude
TL1	1	17-Aug-2009						3.6	136.4	ok	ok	ok
TL1	1	17-Aug-2009						1.8	800.2	ok	ok	ok
TL1	1	17-Aug-2009						1.8	2,618.7	ok	ok	ok
TL1	1	17-Aug-2009						1.8	17,821.8	ok	ok	ok
TL1	1	17-Aug-2009						1.8	591.0	ok	ok	ok
TL1	1	17-Aug-2009						78.2	4,379.1	ok	ok	ok
TL1	1	17-Aug-2009						5.5	1,145.7	ok	ok	ok
TL1	1	17-Aug-2009						7.3	618.3	ok	ok	ok
TL1	1	17-Aug-2009						10.9	5,673.9	ok	ok	ok
TL1	1	17-Aug-2009						21.8	49,537.3	ok	ok	ok
TL1	1	17-Aug-2009						3.6	200.0	ok	ok	ok
TL1	1	17-Aug-2009						1.8	218.2	ok	ok	ok
TL1	1	17-Aug-2009						1.8	523.7	ok	ok	ok
TL1	1	17-Aug-2009						1.8	3,164.3	ok	ok	ok
TL1	1	17-Aug-2009						1.8	172.8	ok	ok	ok
TL1	1	17-Aug-2009						1.8	80.0	ok	ok	ok
TL1	1	17-Aug-2009						1.8	489.2	ok	ok	ok
TL1	1	17-Aug-2009						5.5	500.8	ok	ok	ok
TL1	1	17-Aug-2009						1.8	174.6	ok	ok	ok
TL1	1	17-Aug-2009						23.6	472.8	ok	ok	ok
TL1	1	17-Aug-2009						3.6	1,527.6	ok	ok	ok
TL1	1	17-Aug-2009						1.8	654.7	ok	ok	ok
TL1	1	17-Aug-2009						1.8	254.6	ok	ok	ok
TL1	1	17-Aug-2009						2.7	405.1	ok	ok	ok
TL1	1	17-Aug-2009						2.7	135.0	ok	ok	ok
TL1	1	17-Aug-2009						5.4	14,259.2	ok	ok	ok
TL1	1	17-Aug-2009						102.6	5,746.9	ok	ok	ok
TL1	1	17-Aug-2009						2.7	567.1	ok	ok	ok
TL1	1	17-Aug-2009						18.9	1,606.9	ok	ok	ok
TL1	1	17-Aug-2009						21.6	11,234.5	ok	ok	ok
TL1	1	17-Aug-2009						27.0	61,303.6	ok	ok	ok
TL1	1	17-Aug-2009						10.8	594.1	ok	ok	ok
TL1	1	17-Aug-2009						2.7	324.1	ok	ok	ok
TL1	1	17-Aug-2009						2.7	388.9	ok	ok	ok
TL1	1	17-Aug-2009						2.7	2,916.6	ok	ok	ok

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Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	QA / QC	Lab Sample ID	Volume Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species	Taxon
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Oocystis*	*pusilla*	*Oocystis pusilla*
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Quadrigula*	*closterioides*	*Quadrigula closterioides*
TL1	1	17-Aug-2009	AP	Include					Cryptophyta	Cryptophyceae	Pyrenomonadales	Pyrenomonadaceae	*Rhodomonas*	*minuta*	*Rhodomonas minuta*
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	*Sphaerocystis*	*schroeteri*	*Sphaerocystis schroeteri*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*radians*	*Synedra radians*
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Chlorococcaceae	*Tetraedron*	*minimum*	*Tetraedron minimum*
TL1	1	17-Aug-2009	AP	Include											Unknown alga (flagellate)
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*	*falcatus*	*Ankistrodesmus falcatus*
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Botryococcus*	*braunii*	*Botryococcus braunii*
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	*Chlamydomonas*		*Chlamydomonas* sp.
TL1	1	17-Aug-2009	AP	Include					Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	*Chroococcus*	*minimus*	*Chroococcus minimus*
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Cosmarium*		*Cosmarium* sp.
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*	*quadrata*	*Crucigenia quadrata*
TL1	1	17-Aug-2009	AP	Include					Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*	*erosa*	*Cryptomonas erosa*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*	*comta*	*Cyclotella comta*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*angustatum*	*Gomphonema angustatum*
TL1	1	17-Aug-2009	AP	Include					Chrysophyta	Chrysophyceae	Chromulinales	Chromulinaceae	*Kephyrion*	*littorale*	*Kephyrion littorale*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	*cryptocephala*	*Navicula cryptocephala* var. *veneta*
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Quadrigula*	*closterioides*	*Quadrigula closterioides*
TL1	1	17-Aug-2009	AP	Include					Cryptophyta	Cryptophyceae	Pyrenomonadales	Pyrenomonadaceae	*Rhodomonas*	*minuta*	*Rhodomonas minuta*
TL1	1	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	*Sphaerocystis*	*schroeteri*	*Sphaerocystis schroeteri*
TL1	1	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*rumpens*	*Synedra rumpens*
TL1	1	17-Aug-2009	AP	Include											Unknown alga (flagellate)
TL1	2	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*	*falcatus*	*Ankistrodesmus falcatus*
TL1	2	17-Aug-2009	AP	Include					Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	*Chroococcus*	*minimus*	*Chroococcus minimus*
TL1	2	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Cosmarium*		*Cosmarium* sp.
TL1	2	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*	*quadrata*	*Crucigenia quadrata*
TL1	2	17-Aug-2009	AP	Include					Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*	*erosa*	*Cryptomonas erosa*
TL1	2	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*	*comta*	*Cyclotella comta*
TL1	2	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Botryococcus*	*braunii*	*Botryococcus braunii*
TL1	2	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Quadrigula*	*closterioides*	*Quadrigula closterioides*
TL1	2	17-Aug-2009	AP	Include					Cryptophyta	Cryptophyceae	Pyrenomonadales	Pyrenomonadaceae	*Rhodomonas*	*minuta*	*Rhodomonas minuta*
TL1	2	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	*Sphaerocystis*	*schroeteri*	*Sphaerocystis schroeteri*
TL1	2	17-Aug-2009	AP	Include											Unknown alga (flagellate)
TL1	2	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*	*falcatus*	*Ankistrodesmus falcatus*
TL1	2	17-Aug-2009	AP	Include					Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	*Ceratium*	*hirundinella*	*Ceratium hirundinella*
TL1	2	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	*Chlamydomonas*		*Chlamydomonas* sp.
TL1	2	17-Aug-2009	AP	Include					Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	*Chroococcus*	*minimus*	*Chroococcus minimus*
TL1	2	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*	*quadrata*	*Crucigenia quadrata*
TL1	2	17-Aug-2009	AP	Include					Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*	*erosa*	*Cryptomonas erosa*
TL1	2	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*	*comta*	*Cyclotella comta*
TL1	2	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*microcephala*	*Cymbella microcephala*

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Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Replicate	Date	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / Sample	Cells / mL	Biovolume (µm³/ml)	Diversity Scan / Duplicate Exclude	Taxa Exclude	Taxonomic Uncertainty Exclude
TL1	1	17-Aug-2009						2.7	145.8	ok	ok	ok
TL1	1	17-Aug-2009						8.1	2,333.3	ok	ok	ok
TL1	1	17-Aug-2009						35.1	702.2	ok	ok	ok
TL1	1	17-Aug-2009						13.5	6,616.5	ok	ok	ok
TL1	1	17-Aug-2009						2.7	972.2	ok	ok	ok
TL1	1	17-Aug-2009						2.7	486.1	ok	ok	ok
TL1	1	17-Aug-2009						2.7	54.0	ok	Exclude	Exclude
TL1	1	17-Aug-2009						1.8	368.2	ok	ok	ok
TL1	1	17-Aug-2009						3.7	5,301.6	ok	ok	ok
TL1	1	17-Aug-2009						1.8	598.3	ok	ok	ok
TL1	1	17-Aug-2009						82.8	4,638.9	ok	ok	ok
TL1	1	17-Aug-2009						3.7	773.1	ok	ok	ok
TL1	1	17-Aug-2009						9.2	782.3	ok	ok	ok
TL1	1	17-Aug-2009						9.2	4,786.1	ok	ok	ok
TL1	1	17-Aug-2009						35.0	79,394.4	ok	ok	ok
TL1	1	17-Aug-2009						1.8	331.3	ok	ok	ok
TL1	1	17-Aug-2009						1.8	174.9	ok	ok	ok
TL1	1	17-Aug-2009						1.8	174.9	ok	ok	ok
TL1	1	17-Aug-2009						7.4	1,060.3	ok	ok	ok
TL1	1	17-Aug-2009						29.5	589.1	ok	ok	ok
TL1	1	17-Aug-2009						1.8	2,061.7	ok	ok	ok
TL1	1	17-Aug-2009						1.8	257.7	ok	ok	ok
TL1	1	17-Aug-2009						5.5	110.4	ok	Exclude	Exclude
TL1	2	17-Aug-2009						1.6	40.6	ok	ok	ok
TL1	2	17-Aug-2009						81.1	4,542.4	ok	ok	ok
TL1	2	17-Aug-2009						1.6	340.7	ok	ok	ok
TL1	2	17-Aug-2009						13.0	1,765.1	ok	ok	ok
TL1	2	17-Aug-2009						8.1	4,218.0	ok	ok	ok
TL1	2	17-Aug-2009						21.1	47,874.1	ok	ok	ok
TL1	2	17-Aug-2009						1.6	194.7	ok	ok	ok
TL1	2	17-Aug-2009						8.1	1,576.9	ok	ok	ok
TL1	2	17-Aug-2009						1.6	311.5	ok	ok	ok
TL1	2	17-Aug-2009						17.8	356.9	ok	ok	ok
TL1	2	17-Aug-2009						6.5	3,179.7	ok	ok	ok
TL1	2	17-Aug-2009						1.6	227.1	ok	ok	ok
TL1	2	17-Aug-2009						4.8	8,729.0	ok	ok	ok
TL1	2	17-Aug-2009						2.4	23,762.4	ok	ok	ok
TL1	2	17-Aug-2009						106.7	5,974.5	ok	ok	ok
TL1	2	17-Aug-2009						9.7	989.3	ok	ok	ok
TL1	2	17-Aug-2009						7.3	3,782.6	ok	ok	ok
TL1	2	17-Aug-2009						46.1	104,578.7	ok	ok	ok
TL1	2	17-Aug-2009						7.3	400.1	ok	ok	ok
TL1	2	17-Aug-2009						4.8	349.2	ok	ok	ok
TL1	2	17-Aug-2009						4.8	213.4	ok	ok	ok
TL1	2	17-Aug-2009						7.3	4,320.9	ok	ok	ok
TL1	2	17-Aug-2009						7.3	1,920.4	ok	ok	ok
TL1	2	17-Aug-2009						46.1	921.4	ok	ok	ok
TL1	2	17-Aug-2009						4.8	2,715.7	ok	ok	ok
TL1	2	17-Aug-2009						2.4	48.5	ok	Exclude	Exclude
TL1	2	17-Aug-2009						8.7	260.2	ok	ok	ok
TL1	2	17-Aug-2009						2.2	21,249.0	ok	ok	ok
TL1	2	17-Aug-2009						2.2	704.7	ok	ok	ok
TL1	2	17-Aug-2009						104.1	5,828.3	ok	ok	ok
TL1	2	17-Aug-2009						13.0	1,658.7	ok	ok	ok
TL1	2	17-Aug-2009						17.3	9,020.0	ok	ok	ok
TL1	2	17-Aug-2009						23.9	54,141.7	ok	ok	ok
TL1	2	17-Aug-2009						4.3	229.8	ok	ok	ok

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Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	QA / QC	Lab Sample ID	Volume Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species	Taxon
TL1	2	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*	*minima*	*Navicula minima*
TL1	2	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Oocystis*	*pusilla*	*Oocystis pusilla*
TL1	2	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Quadrigula*	*closterioides*	*Quadrigula closterioides*
TL1	2	17-Aug-2009	AP	Include					Cryptophyta	Cryptophyceae	Pyrenomonadales	Pyrenomonadaceae	*Rhodomonas*	*minuta*	*Rhodomonas minuta*
TL1	2	17-Aug-2009	AP	Include					Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	*Sphaerocystis*	*schroeteri*	*Sphaerocystis schroeteri*
TL1	2	17-Aug-2009	AP	Include					Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*radians*	*Synedra radians*
TL1	2	17-Aug-2009	AP	Include											Unknown alga (flagellate)
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*	*Achnanthes minutissima*
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*		*Achnanthes* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Amphipleura*	*pellucida*	*Amphipleura pellucida*
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	*Amphora*		*Amphora* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Anabaena*		*Anabaena* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Cyanophyta	Myxophyceae	Chroococcales		*Anacystis*	*limneticus*	*Anacystis* cf. *limneticus*
TL1	1	25-Aug-2010	AP	Include		100413			Cyanophyta	Myxophyceae	Chroococcales		*Anacystis*	*elachista*	*Anacystis elachista*
TL1	1	25-Aug-2010	AP	Include		100413			Cyanophyta	Myxophyceae	Chroococcales		*Anacystis*		*Anacystis* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*		*Ankistrodesmus* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Asterionella*	*formosa*	*Asterionella formosa*
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Botryococcus*	*braunii*	*Botryococcus braunii*
TL1	1	25-Aug-2010	AP	Include		100413			Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	*Ceratium*		*Ceratium*
TL1	1	25-Aug-2010	AP	Include		100413			Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	*Ceratium*	*hirundinella*	*Ceratium hirundinella*
TL1	1	25-Aug-2010	AP	Include		100413			Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	*Ceratium*		*Ceratium* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Ceratoneis*		*Ceratoneis* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	*Chlamydomonas*		*Chlamydomonas* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Chroomonas*	*acuta*	*Chroomonas acuta*
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Closteriopsis*		*Closteriopsis* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Coelastrum*		*Coelastrum* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Cosmarium*		*Cosmarium* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*	*quadrata*	*Crucigenia quadrata*
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*	*rectangularis*	*Crucigenia rectangularis*
TL1	1	25-Aug-2010	AP	Include		100413			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*	*ovata/erosa*	*Cryptomonas ovata/erosa*
TL1	1	25-Aug-2010	AP	Include		100413			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*		*Cryptomonas* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*		*Cyclotella* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*	*Cymbella minuta*
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*		*Cymbella* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Diatoma*		*Diatoma* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Chrysophyta	Chrysophyceae	Hibberdiales	Stylococcaceae	*Diceras*	*phaseolus*	*Diceras phaseolus*
TL1	1	25-Aug-2010	AP	Include		100413			Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*		*Dinobryon* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	*Elakatothrix*	*gelatinosa*	*Elakatothrix gelatinosa*
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Volvocales	Volvocaceae	*Eudorina*		*Eudorina* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Volvocales	Volvocaceae	*Eudorina*		*Eudorina* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*		*Eunotia* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*crotonensis*	*Fragilaria crotonensis*
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*		*Fragilaria* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	*Gloeocystis*	*ampla*	*Gloeocystis* cf. *ampla*
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*olivaceum*	*Gomphonema olivaceum*
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*		*Gomphonema* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Lagerheimia*		*Lagerheimia* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*		*Melosira* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*		*Navicula* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Nephrocytium*		*Nephrocytium* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*		*Nitzschia* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Oedogoniales	Oedogoniaceae	*Oedogonium*		*Oedogonium* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Oocystis*		*Oocystis* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*		*Oscillatoria* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	*Pediastrum*		*Pediastrum* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*		*Pinnularia* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Quadrigula*	*closterioides*	*Quadrigula closterioides*

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Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Replicate	Date	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / Sample	Cells / mL	Biovolume (µm³/ml)	Diversity Scan / Duplicate Exclude	Taxa Exclude	Taxonomic Uncertainty Exclude
TL1	2	17-Aug-2009						2.2	95.4	ok	ok	ok
TL1	2	17-Aug-2009						19.5	8,219.5	ok	ok	ok
TL1	2	17-Aug-2009						6.5	1,046.0	ok	ok	ok
TL1	2	17-Aug-2009						26.0	520.4	ok	ok	ok
TL1	2	17-Aug-2009						8.7	3,642.7	ok	ok	ok
TL1	2	17-Aug-2009						2.2	780.6	ok	ok	ok
TL1	2	17-Aug-2009						4.3	86.7	ok	Exclude	Exclude
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010	cf.					<2.8		Exclude	ok	Exclude
TL1	1	25-Aug-2010						336.0		ok	ok	Exclude
TL1	1	25-Aug-2010						896.0		ok	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						8.4		ok	ok	ok
TL1	1	25-Aug-2010						44.8		ok	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						2.8		ok	ok	ok
TL1	1	25-Aug-2010	cf.					<2.8		Exclude	ok	Exclude
TL1	1	25-Aug-2010						16.8		ok	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						95.2		ok	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						2.8		ok	ok	ok
TL1	1	25-Aug-2010						5.6		ok	ok	ok
TL1	1	25-Aug-2010						5.6		ok	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010	cf.					<2.8		Exclude	ok	Exclude
TL1	1	25-Aug-2010						2.8		ok	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						5.6		ok	ok	ok
TL1	1	25-Aug-2010	cf.					<2.8		Exclude	ok	Exclude
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						28.0		ok	ok	Exclude
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						2.8		ok	ok	ok
TL1	1	25-Aug-2010	cf.					<2.8		Exclude	ok	Exclude
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010	cf.					<2.8		Exclude	ok	Exclude
TL1	1	25-Aug-2010						22.4		ok	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok

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Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	QA / QC	Lab Sample ID	Volume Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species	Taxon
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Scenedesmus*		*Scenedesmus* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Selenastrum*	*minutum*	*Selenastrum minutum*
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	*Sphaerocystis*	*schroeteri*	*Sphaerocystis schroeteri*
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Spondylosium*	*planum*	*Spondylosium planum*
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Staurastrum*		*Staurastrum* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*		*Synedra* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*ulna*	*Synedra ulna*
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Chlorococcales	Chlorococcaceae	*Tetraedron*	*minimum*	*Tetraedron minimum*
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Tetrasporales	Tetrasporaceae	*Tetraspora*		*Tetraspora* sp.
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Ulotrichales	Ulotrichaceae	*Ulothrix*		*Ulothrix* sp.
TL1	1	25-Aug-2010	AP	Include		100413									Unknown alga (colony)
TL1	1	25-Aug-2010	AP	Include		100413									Unknown alga sp.
TL1	1	25-Aug-2010	AP	Include		100413					Chaemosiphonales				Unknown Chaemosiphonales
TL1	1	25-Aug-2010	AP	Include		100413			Bacillariophyta	Bacillariophyceae	Pennales				Unknown pennate diatom
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Volvocales				Unknown Volvocales
TL1	1	25-Aug-2010	AP	Include		100413			Chlorophyta	Chlorophyceae	Zygnematales				Unknown Zygnematales
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*	*Achnanthes minutissima*
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Amphipleura*	*pellucida*	*Amphipleura pellucida*
TL1	2	25-Aug-2010	AP	Include		100414			Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Anabaena*		*Anabaena* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Cyanophyta	Myxophyceae	Chroococcales		*Anacystis*	*limneticus*	*Anacystis* cf. *limneticus*
TL1	2	25-Aug-2010	AP	Include		100414			Cyanophyta	Myxophyceae	Chroococcales		*Anacystis*	*elachista*	*Anacystis elachista*
TL1	2	25-Aug-2010	AP	Include		100414			Cyanophyta	Myxophyceae	Chroococcales		*Anacystis*		*Anacystis* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*		*Ankistrodesmus* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Asterionella*	*formosa*	*Asterionella formosa*
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Botryococcus*	*braunii*	*Botryococcus braunii*
TL1	2	25-Aug-2010	AP	Include		100414			Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	*Ceratium*	*hirundinella*	*Ceratium hirundinella*
TL1	2	25-Aug-2010	AP	Include		100414			Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	*Ceratium*		*Ceratium* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Ceratoneis*		*Ceratoneis* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	*Ceratium*		*Ceratium* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Ceratoneis*		*Ceratoneis* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Chroomonas*	*acuta*	*Chroomonas acuta*
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Cosmarium*		*Cosmarium* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*	*quadrata*	*Crucigenia quadrata*
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*	*rectangularis*	*Crucigenia rectangularis*
TL1	2	25-Aug-2010	AP	Include		100414			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*	*ovata/erosa*	*Cryptomonas ovata/erosa*
TL1	2	25-Aug-2010	AP	Include		100414			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*		*Cryptomonas* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*		*Cyclotella* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*	*minuta*	*Cymbella minuta*
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*		*Cymbella* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Chrysophyta	Chrysophyceae	Hibberdiales	Stylococcaceae	*Diceras*	*phaseolus*	*Diceras phaseolus*
TL1	2	25-Aug-2010	AP	Include		100414			Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*		*Dinobryon* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	*Elakatothrix*	*gelatinosa*	*Elakatothrix gelatinosa*
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Volvocales	Volvocaceae	*Eudorina*		*Eudorina* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*crotonensis*	*Fragilaria crotonensis*
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*		*Fragilaria* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	*Gloeocystis*	*ampla*	*Gloeocystis* cf. *ampla*
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*	*olivaceum*	*Gomphonema olivaceum*
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*		*Gomphonema* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Lagerheimia*		*Lagerheimia* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Lyngbya*		*Lyngbya* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*		*Melosira* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*		*Navicula* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*		*Nitzschia* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Oocystis*		*Oocystis* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*		*Oscillatoria* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	*Pediastrum*		*Pediastrum* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*		*Pinnularia* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Pennales	Pleurosigmataceae	*Pleurosigma/Gyrosigma*		*Pleurosigma/Gyrosigma* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Quadrigula*	*closterioides*	*Quadrigula closterioides*

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Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Replicate	Date	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / Sample	Cells / mL	Biovolume (µm³/ml)	Diversity Scan / Duplicate Exclude	Taxa Exclude	Taxonomic Uncertainty Exclude
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						14.0		ok	ok	ok
TL1	1	25-Aug-2010						44.8		ok	ok	ok
TL1	1	25-Aug-2010						19.6		ok	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	1	25-Aug-2010	cf.					<2.8		Exclude	ok	Exclude
TL1	1	25-Aug-2010	cf.					<2.8		Exclude	ok	Exclude
TL1	1	25-Aug-2010						11.2		ok	Exclude	Exclude
TL1	1	25-Aug-2010						<2.8		Exclude	Exclude	Exclude
TL1	1	25-Aug-2010						<2.8		Exclude	Exclude	Exclude
TL1	1	25-Aug-2010						<2.8		Exclude	ok	Exclude
TL1	1	25-Aug-2010						<2.8		Exclude	ok	Exclude
TL1	1	25-Aug-2010						<2.8		Exclude	ok	Exclude
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010	cf.					<2.8		Exclude	ok	Exclude
TL1	2	25-Aug-2010						459.2		ok	ok	Exclude
TL1	2	25-Aug-2010						1,064.0		ok	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						19.6		ok	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						22.4		ok	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						123.2		ok	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						5.6		ok	ok	ok
TL1	2	25-Aug-2010						2.8		ok	ok	ok
TL1	2	25-Aug-2010						2.8		ok	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010	cf.					<2.8		Exclude	ok	Exclude
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						2.8		ok	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	Exclude
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						5.6		ok	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010	cf.					<2.8		Exclude	ok	Exclude
TL1	2	25-Aug-2010						33.6		ok	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok

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Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	QA / QC	Lab Sample ID	Volume Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species	Taxon
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Scenedesmus*		*Scenedesmus* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Schroederia*		*Schroederia* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Selenastrum*	*minutum*	*Selenastrum minutum*
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	*Sphaerocystis*	*schroeteri*	*Sphaerocystis schroeteri*
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Spondylosium*	*planum*	*Spondylosium planum*
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Staurastrum*		*Staurastrum* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*		*Synedra* sp.
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*ulna*	*Synedra ulna*
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*	*Tabellaria flocculosa*
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Chlorococcales	Chlorococcaceae	*Tetraedron*	*minimum*	*Tetraedron minimum*
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Ulotrichales	Ulotrichaceae	*Ulothrix*		*Ulothrix* sp.
TL1	2	25-Aug-2010	AP	Include		100414									Unknown alga (colony)
TL1	2	25-Aug-2010	AP	Include		100414									Unknown alga (filament)
TL1	2	25-Aug-2010	AP	Include		100414									Unknown alga sp.
TL1	2	25-Aug-2010	AP	Include		100414			Bacillariophyta	Bacillariophyceae	Pennales				Unknown pennate diatom
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Volvocales				Unknown Volvocales
TL1	2	25-Aug-2010	AP	Include		100414			Chlorophyta	Chlorophyceae	Zygnematales				Unknown Zygnematales
TL1	3	25-Aug-2010	AP	Include		100415			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*	*Achnanthes minutissima*
TL1	3	25-Aug-2010	AP	Include		100415			Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Amphipleura*	*pellucida*	*Amphipleura pellucida*
TL1	3	25-Aug-2010	AP	Include		100415			Cyanophyta	Myxophyceae	Chroococcales		*Anacystis*	*limneticus*	*Anacystis* cf. *limneticus*
TL1	3	25-Aug-2010	AP	Include		100415			Cyanophyta	Myxophyceae	Chroococcales		*Anacystis*	*elachista*	*Anacystis elachista*
TL1	3	25-Aug-2010	AP	Include		100415			Cyanophyta	Myxophyceae	Chroococcales		*Anacystis*		*Anacystis* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*		*Ankistrodesmus* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	*Aphanizomenon*		*Aphanizomenon* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Asterionella*	*formosa*	*Asterionella formosa*
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Botryococcus*	*braunii*	*Botryococcus braunii*
TL1	3	25-Aug-2010	AP	Include		100415			Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	*Ceratium*		*Ceratium*
TL1	3	25-Aug-2010	AP	Include		100415			Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	*Ceratium*	*hirundinella*	*Ceratium hirundinella*
TL1	3	25-Aug-2010	AP	Include		100415			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Ceratoneis*		*Ceratoneis* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	*Chlamydomonas*		*Chlamydomonas* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Chroomonas*	*acuta*	*Chroomonas acuta*
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Cosmarium*		*Cosmarium* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*	*quadrata*	*Crucigenia quadrata*
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*	*rectangularis*	*Crucigenia rectangularis*
TL1	3	25-Aug-2010	AP	Include		100415			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*	*ovata/erosa*	*Cryptomonas ovata/erosa*
TL1	3	25-Aug-2010	AP	Include		100415			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*		*Cryptomonas* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*		*Cyclotella* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Bacillariophyta	Bacillariophyceae	Pennales	Surirellaceae	*Cymatopleura*		*Cymatopleura* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*		*Cymbella* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Chrysophyta	Chrysophyceae	Hibberdiales	Stylococcaceae	*Diceras*	*phaseolus*	*Diceras phaseolus*
TL1	3	25-Aug-2010	AP	Include		100415			Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*		*Dinobryon* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	*Elakatothrix*	*gelatinosa*	*Elakatothrix gelatinosa*
TL1	3	25-Aug-2010	AP	Include		100415			Bacillariophyta	Bacillariophyceae	Pennales	Rhopalodiaceae	*Epithemia*	*turgida*	*Epithemia turgida*
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Volvocales	Volvocaceae	*Eudorina*		*Eudorina* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*crotonensis*	*Fragilaria crotonensis*
TL1	3	25-Aug-2010	AP	Include		100415			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*		*Fragilaria* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	*Gloeocystis*	*ampla*	*Gloeocystis* cf. *ampla*
TL1	3	25-Aug-2010	AP	Include		100415			Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	*Gomphonema*		*Gomphonema* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Lagerheimia*		*Lagerheimia* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Lyngbya*		*Lyngbya* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*		*Melosira* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*		*Navicula* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*		*Nitzschia* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Oocystis*		*Oocystis* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	*tenuis*	*Oscillatoria* cf. *tenuis*
TL1	3	25-Aug-2010	AP	Include		100415			Bacillariophyta	Bacillariophyceae	Pennales	Pinnulariaceae	*Pinnularia*		*Pinnularia* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Planktolyngbya*	*limnetica*	*Planktolyngbya limnetica*

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Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Replicate	Date	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / Sample	Cells / mL	Biovolume (µm³/ml)	Diversity Scan / Duplicate Exclude	Taxa Exclude	Taxonomic Uncertainty Exclude
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						5.6		ok	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						8.4		ok	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	2	25-Aug-2010	cf.					<2.8		Exclude	ok	Exclude
TL1	2	25-Aug-2010						<2.8		Exclude	Exclude	Exclude
TL1	2	25-Aug-2010						<2.8		Exclude	Exclude	Exclude
TL1	2	25-Aug-2010						<2.8		Exclude	Exclude	Exclude
TL1	2	25-Aug-2010						<2.8		Exclude	ok	Exclude
TL1	2	25-Aug-2010						<2.8		Exclude	ok	Exclude
TL1	2	25-Aug-2010						<2.8		Exclude	ok	Exclude
TL1	3	25-Aug-2010						2.8		ok	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						537.6		ok	ok	Exclude
TL1	3	25-Aug-2010						1,232.0		ok	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010	cf.					<2.8		Exclude	ok	Exclude
TL1	3	25-Aug-2010						25.2		ok	ok	ok
TL1	3	25-Aug-2010						112.0		ok	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010	cf.					<2.8		Exclude	ok	Exclude
TL1	3	25-Aug-2010						11.2		ok	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						2.8		ok	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010	cf.					<2.8		Exclude	ok	Exclude
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						2.8		ok	ok	ok
TL1	3	25-Aug-2010						67.2		ok	ok	Exclude
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						14.0		ok	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010	cf.					2.8		ok	ok	Exclude
TL1	3	25-Aug-2010						22.4		ok	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	Exclude
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	QA / QC	Lab Sample ID	Volume Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species	Taxon
TL1	3	25-Aug-2010	AP	Include		100415			Bacillariophyta	Bacillariophyceae	Pennales	Pleurosigmataceae	*Pleurosigma/Gyrosigma*		*Pleurosigma/Gyrosigma* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Quadrigula*	*closterioides*	*Quadrigula closterioides*
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Scenedesmus*		*Scenedesmus* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Schroederia*		*Schroederia* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Selenastrum*	*minutum*	*Selenastrum minutum*
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	*Sphaerocystis*	*schroeteri*	*Sphaerocystis schroeteri*
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Spondylosium*	*planum*	*Spondylosium planum*
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Staurastrum*		*Staurastrum* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*	*ulna*	*Synedra ulna*
TL1	3	25-Aug-2010	AP	Include		100415			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*	*Tabellaria flocculosa*
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Chlorococcales	Chlorococcaceae	*Tetraedron*	*minimum*	*Tetraedron minimum*
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Tetrasporales	Tetrasporaceae	*Tetraspora*		*Tetraspora* sp.
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Ulotrichales	Ulotrichaceae	*Ulothrix*		*Ulothrix* sp.
TL1	3	25-Aug-2010	AP	Include		100415									Unknown alga (colony)
TL1	3	25-Aug-2010	AP	Include		100415									Unknown alga (filament)
TL1	3	25-Aug-2010	AP	Include		100415									Unknown alga sp.
TL1	3	25-Aug-2010	AP	Include		100415			Bacillariophyta	Bacillariophyceae	Pennales				Unknown pennate diatom
TL1	3	25-Aug-2010	AP	Include		100415			Chlorophyta	Chlorophyceae	Volvocales				Unknown Volvocales
WL1	1	28-Aug-2010	AP	Include		100416			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*		*Cryptomonas* sp.
WL1	1	28-Aug-2010	AP	Include		100416			Bacillariophyta	Bacillariophyceae	Pennales				Unknown pennate diatom
WL1	2	28-Aug-2010	AP	Include		100417			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*		*Cryptomonas* sp.
WL1	3	28-Aug-2010	AP	Include		100418			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*	*quadrata*	*Crucigenia quadrata*
WL1	3	28-Aug-2010	AP	Include		100418			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*	*rectangularis*	*Crucigenia rectangularis*
WL1	3	28-Aug-2010	AP	Include		100418			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*		*Cryptomonas* sp.
WL1	3	28-Aug-2010	AP	Include		100418			Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*		*Cyclotella* sp.
WL1	3	28-Aug-2010	AP	Include		100418			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Quadrigula*		*Quadrigula* sp.
WL1	3	28-Aug-2010	AP	Include		100418			Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Spirogyra*		*Spirogyra* sp.
WL1	3	28-Aug-2010	AP	Include		100418			Bacillariophyta	Bacillariophyceae	Pennales				Unknown pennate diatom
L1		23-Aug-2011	FF	Exclude		110503			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*	*Achnanthes minutissima*
L1		23-Aug-2011	FF	Exclude		110503			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*		*Achnanthes* sp.
L1		23-Aug-2011	FF	Exclude		110503			Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	*Agmenellum*	*tenuissima*	*Agmenellum tenuissima*
L1		23-Aug-2011	FF	Exclude		110503			Cyanophyta	Myxophyceae	Chroococcales		*Anacystis*	*elachista*	*Anacystis elachista*
L1		23-Aug-2011	FF	Exclude		110503			Cyanophyta	Myxophyceae	Chroococcales		*Anacystis*		*Anacystis* sp.
L1		23-Aug-2011	FF	Exclude		110503			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*	*falcatus*	*Ankistrodesmus falcatus*
L1		23-Aug-2011	FF	Exclude		110503			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*		*Ankistrodesmus* sp.
L1		23-Aug-2011	FF	Exclude		110503			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Botryococcus*	*braunii*	*Botryococcus braunii*
L1		23-Aug-2011	FF	Exclude		110503			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Chroomonas*	*acuta*	*Chroomonas acuta*
L1		23-Aug-2011	FF	Exclude		110503			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*	*quadrata*	*Crucigenia quadrata*
L1		23-Aug-2011	FF	Exclude		110503			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*		*Crucigenia* sp.
L1		23-Aug-2011	FF	Exclude		110503			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*	*tetrapedia*	*Crucigenia tetrapedia*
L1		23-Aug-2011	FF	Exclude		110503			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigeniella*	*crucifera*	*Crucigeniella crucifera*
L1		23-Aug-2011	FF	Exclude		110503			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*	*ovata/erosa*	*Cryptomonas ovata/erosa*
L1		23-Aug-2011	FF	Exclude		110503			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*		*Cryptomonas* sp.
L1		23-Aug-2011	FF	Exclude		110503			Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*	*glomerata*	*Cyclotella glomerata*
L1		23-Aug-2011	FF	Exclude		110503			Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*		*Cyclotella* sp.
L1		23-Aug-2011	FF	Exclude		110503			Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	*bavaricum*	*Dinobryon bavaricum*
L1		23-Aug-2011	FF	Exclude		110503			Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	*elegantissimum*	*Dinobryon elegantissimum*
L1		23-Aug-2011	FF	Exclude		110503			Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*		*Dinobryon* sp.
L1		23-Aug-2011	FF	Exclude		110503			Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	*Elakatothrix*	*gelatinosa*	*Elakatothrix gelatinosa*
L1		23-Aug-2011	FF	Exclude		110503			Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*		*Eunotia* sp.
L1		23-Aug-2011	FF	Exclude		110503			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*		*Fragilaria* sp.
L1		23-Aug-2011	FF	Exclude		110503			Bacillariophyta	Bacillariophyceae	Pennales	Amphipleuraceae	*Frustulia*		*Frustulia* sp.
L1		23-Aug-2011	FF	Exclude		110503			Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	*Gomphosphaeria*		*Gomphosphaeria* sp.
L1		23-Aug-2011	FF	Exclude		110503			Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*		*Melosira* sp.
L1		23-Aug-2011	FF	Exclude		110503			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*		*Navicula* sp.
L1		23-Aug-2011	FF	Exclude		110503			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Nephrocytium*		*Nephrocytium* sp.
L1		23-Aug-2011	FF	Exclude		110503			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*		*Nitzschia* sp.

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Replicate	Date	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / Sample	Cells / mL	Biovolume (µm³/ml)	Diversity Scan / Duplicate Exclude	Taxa Exclude	Taxonomic Uncertainty Exclude
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						16.8		ok	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						14.0		ok	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010						<2.8		Exclude	ok	ok
TL1	3	25-Aug-2010	cf.					<2.8		Exclude	ok	Exclude
TL1	3	25-Aug-2010	cf.					<2.8		Exclude	ok	Exclude
TL1	3	25-Aug-2010						<2.8		Exclude	Exclude	Exclude
TL1	3	25-Aug-2010						<2.8		Exclude	Exclude	Exclude
TL1	3	25-Aug-2010						2.8		ok	Exclude	Exclude
TL1	3	25-Aug-2010						<2.8		Exclude	ok	Exclude
TL1	3	25-Aug-2010						<2.8		Exclude	ok	Exclude
WL1	1	28-Aug-2010						1.4		ok	ok	ok
WL1	1	28-Aug-2010						<1.4		Exclude	ok	Exclude
WL1	2	28-Aug-2010						<1.4		Exclude	ok	ok
WL1	3	28-Aug-2010						<1.4		Exclude	ok	ok
WL1	3	28-Aug-2010						<1.4		Exclude	ok	ok
WL1	3	28-Aug-2010						1.4		ok	ok	ok
WL1	3	28-Aug-2010						<1.4		Exclude	ok	ok
WL1	3	28-Aug-2010						<1.4		Exclude	ok	ok
WL1	3	28-Aug-2010						<1.4		Exclude	ok	ok
WL1	3	28-Aug-2010						<1.4		Exclude	ok	Exclude
L1		23-Aug-2011						<1.4		Exclude	ok	ok
L1		23-Aug-2011						<1.4		Exclude	ok	ok
L1		23-Aug-2011						28.0		ok	ok	ok
L1		23-Aug-2011						70.0		ok	ok	ok
L1		23-Aug-2011						<1.4		Exclude	ok	ok
L1		23-Aug-2011						5.6		ok	ok	ok
L1		23-Aug-2011						2.8		ok	ok	ok
L1		23-Aug-2011						16.8		ok	ok	ok
L1		23-Aug-2011						4.2		ok	ok	ok
L1		23-Aug-2011						5.6		ok	ok	ok
L1		23-Aug-2011						<1.4		Exclude	ok	ok
L1		23-Aug-2011						<1.4		Exclude	ok	ok
L1		23-Aug-2011						16.8		ok	ok	ok
L1		23-Aug-2011						12.6		ok	ok	ok
L1		23-Aug-2011						4.2		ok	ok	ok
L1		23-Aug-2011						67.2		ok	ok	ok
L1		23-Aug-2011						<1.4		Exclude	ok	ok
L1		23-Aug-2011						49.0		ok	ok	ok
L1		23-Aug-2011						2.8		ok	ok	ok
L1		23-Aug-2011						4.2		ok	ok	ok
L1		23-Aug-2011						5.6		ok	ok	ok
L1		23-Aug-2011						1.4		ok	ok	ok
L1		23-Aug-2011						1.4		ok	ok	ok
L1		23-Aug-2011						<1.4		Exclude	ok	ok
L1		23-Aug-2011						<1.4		Exclude	ok	ok
L1		23-Aug-2011						1.4		ok	ok	ok
L1		23-Aug-2011						2.8		ok	ok	ok
L1		23-Aug-2011	cf.					<1.4		Exclude	ok	Exclude
L1		23-Aug-2011						<1.4		Exclude	ok	ok

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	QA / QC	Lab Sample ID	Volume Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species	Taxon
L1		23-Aug-2011	FF	Exclude		110503			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Oocystis*		*Oocystis* sp.
L1		23-Aug-2011	FF	Exclude		110503			Pyrrhophyta	Dinophyceae	Peridiniales	Peridiniaceae	*Peridinium*	*inconspicuum*	*Peridinium* cf. *inconspicuum*
L1		23-Aug-2011	FF	Exclude		110503			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Planktolyngbya*	*limnetica*	*Planktolyngbya limnetica*
L1		23-Aug-2011	FF	Exclude		110503			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Quadrigula*	*closterioides*	*Quadrigula closterioides*
L1		23-Aug-2011	FF	Exclude		110503			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Scenedesmus*		*Scenedesmus* sp.
L1		23-Aug-2011	FF	Exclude		110503			Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	*Sphaerocystis*	*schroeteri*	*Sphaerocystis schroeteri*
L1		23-Aug-2011	FF	Exclude		110503			Chrysophyta	Chrysophyceae	Chrysomonadales	Synuraceae	*Synura*		*Synura* sp.
L1		23-Aug-2011	FF	Exclude		110503			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*	*Tabellaria flocculosa*
L1		23-Aug-2011	FF	Exclude		110503			Chlorophyta	Chlorophyceae	Chlorococcales	Chlorococcaceae	*Tetraedron*	*minimum*	*Tetraedron minimum*
L1		23-Aug-2011	FF	Exclude		110503			Chlorophyta	Chlorophyceae	Ulotrichales	Ulotrichaceae	*Ulothrix*		*Ulothrix* sp.
L1		23-Aug-2011	FF	Exclude		110503									Unknown alga (colony)
L1		23-Aug-2011	FF	Exclude		110503									Unknown alga (filament)
L1		23-Aug-2011	FF	Exclude		110503			Bacillariophyta	Bacillariophyceae	Pennales				Unknown pennate diatom
L1		23-Aug-2011	FF	Exclude		110503			Chlorophyta	Chlorophyceae	Volvocales				Unknown Volvocales
L2		24-Aug-2011	FF	Exclude		110504			Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	*Achnanthes*	*minutissima*	*Achnanthes minutissima*
L2		24-Aug-2011	FF	Exclude		110504			Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	*Agmenellum*	*tenuissima*	*Agmenellum tenuissima*
L2		24-Aug-2011	FF	Exclude		110504			Cyanophyta	Myxophyceae	Chroococcales		*Anacystis*	*elachista*	*Anacystis elachista*
L2		24-Aug-2011	FF	Exclude		110504			Cyanophyta	Myxophyceae	Chroococcales		*Anacystis*		*Anacystis* sp.
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*	*falcatus*	*Ankistrodesmus falcatus*
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Ankistrodesmus*		*Ankistrodesmus* sp.
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Arthrodesmus*		*Arthrodesmus* sp.
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Botryococcus*	*braunii*	*Botryococcus braunii*
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*	*quadrata*	*Crucigenia quadrata*
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*		*Crucigenia* sp.
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigenia*	*tetrapedia*	*Crucigenia tetrapedia*
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Crucigeniella*	*crucifera*	*Crucigeniella crucifera*
L2		24-Aug-2011	FF	Exclude		110504			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*	*ovata/erosa*	*Cryptomonas ovata/erosa*
L2		24-Aug-2011	FF	Exclude		110504			Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	*Cryptomonas*		*Cryptomonas* sp.
L2		24-Aug-2011	FF	Exclude		110504			Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*	*glomerata*	*Cyclotella glomerata*
L2		24-Aug-2011	FF	Exclude		110504			Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	*Cyclotella*		*Cyclotella* sp.
L2		24-Aug-2011	FF	Exclude		110504			Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	*Cymbella*		*Cymbella* sp.
L2		24-Aug-2011	FF	Exclude		110504			Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	*bavaricum*	*Dinobryon bavaricum*
L2		24-Aug-2011	FF	Exclude		110504			Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*	*elegantissimum*	*Dinobryon elegantissimum*
L2		24-Aug-2011	FF	Exclude		110504			Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	*Dinobryon*		*Dinobryon* sp.
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	*Elakatothrix*	*gelatinosa*	*Elakatothrix gelatinosa*
L2		24-Aug-2011	FF	Exclude		110504			Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	*Eunotia*		*Eunotia* sp.
L2		24-Aug-2011	FF	Exclude		110504			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*	*crotonensis*	*Fragilaria crotonensis*
L2		24-Aug-2011	FF	Exclude		110504			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*		*Fragilaria* sp.
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	*Gloeocystis*	*ampla*	*Gloeocystis* cf. *ampla*
L2		24-Aug-2011	FF	Exclude		110504			Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	*Gomphosphaeria*		*Gomphosphaeria* sp.
L2		24-Aug-2011	FF	Exclude		110504			Chrysophyta	Chrysophyceae	Chrysomonadales	Synuraceae	*Mallomonas*	*pseudocoronata*	*Mallomonas* cf. *pseudocoronata*
L2		24-Aug-2011	FF	Exclude		110504			Chrysophyta	Chrysophyceae	Chrysomonadales	Synuraceae	*Mallomonas*		*Mallomonas* sp.
L2		24-Aug-2011	FF	Exclude		110504			Chrysophyta	Chrysophyceae	Chrysomonadales	Synuraceae	*Mallomonas*		*Mallomonas* sp.
L2		24-Aug-2011	FF	Exclude		110504			Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	*Melosira*		*Melosira* sp.
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Mougeotia*		*Mougeotia* sp.
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Mougeotia*		*Mougeotia* sp.
L2		24-Aug-2011	FF	Exclude		110504			Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*		*Navicula* sp.
L2		24-Aug-2011	FF	Exclude		110504			Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	*Nitzschia*		*Nitzschia* sp.
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Oedogoniales	Oedogoniaceae	*Oedogonium*		*Oedogonium* sp.
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Oocystis*		*Oocystis* sp.
L2		24-Aug-2011	FF	Exclude		110504			Cyanophyta	Myxophyceae	Oscillatoriales	Oscillatoriaceae	*Oscillatoria*	*tenuis*	*Oscillatoria* cf. *tenuis*
L2		24-Aug-2011	FF	Exclude		110504			Pyrrhophyta	Dinophyceae	Peridiniales	Peridiniaceae	*Peridinium*	*inconspicuum*	*Peridinium* cf. *inconspicuum*
L2		24-Aug-2011	FF	Exclude		110504			Euglenophyta	Euglenophyceae	Euglenales	Euglenaceae	*Phacus*		*Phacus* sp.
L2		24-Aug-2011	FF	Exclude		110504			Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	*Planktolyngbya*	*limnetica*	*Planktolyngbya limnetica*
L2		24-Aug-2011	FF	Exclude		110504			Bacillariophyta	Bacillariophyceae	Pennales	Pleurosigmataceae	*Pleurosigma/Gyrosigma*		*Pleurosigma/Gyrosigma* sp.
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Quadrigula*	*closterioides*	*Quadrigula closterioides*
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	*Scenedesmus*		*Scenedesmus* sp.

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Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Replicate	Date	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / Sample	Cells / mL	Biovolume (µm³/ml)	Diversity Scan / Duplicate Exclude	Taxa Exclude	Taxonomic Uncertainty Exclude
L1		23-Aug-2011						8.4		ok	ok	ok
L1		23-Aug-2011						1.4		ok	ok	Exclude
L1		23-Aug-2011						<1.4		Exclude	ok	ok
L1		23-Aug-2011						<1.4		Exclude	ok	ok
L1		23-Aug-2011						11.2		ok	ok	ok
L1		23-Aug-2011						5.0		ok	ok	ok
L1		23-Aug-2011	cf.					1.4		ok	ok	Exclude
L1		23-Aug-2011						1.4		ok	ok	ok
L1		23-Aug-2011						<1.4		Exclude	ok	ok
L1		23-Aug-2011	cf.					4.2		ok	ok	Exclude
L1		23-Aug-2011						<1.4		Exclude	Exclude	Exclude
L1		23-Aug-2011						<1.4		Exclude	Exclude	Exclude
L1		23-Aug-2011						2.8		ok	ok	Exclude
L1		23-Aug-2011						<1.4		Exclude	ok	Exclude
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						369.6		ok	ok	ok
L2		24-Aug-2011						126.0		ok	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						19.6		ok	ok	ok
L2		24-Aug-2011						5.6		ok	ok	ok
L2		24-Aug-2011						5.6		ok	ok	ok
L2		24-Aug-2011						112.0		ok	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						30.8		ok	ok	ok
L2		24-Aug-2011						22.4		ok	ok	ok
L2		24-Aug-2011						22.4		ok	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						47.6		ok	ok	ok
L2		24-Aug-2011						8.4		ok	ok	ok
L2		24-Aug-2011						22.4		ok	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						39.2		ok	ok	Exclude
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	Exclude
L2		24-Aug-2011	cf.					<2.8		Exclude	ok	Exclude
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011	cf.					<2.8		Exclude	ok	Exclude
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						8.4		ok	ok	ok
L2		24-Aug-2011	cf.					<2.8		Exclude	ok	Exclude
L2		24-Aug-2011						11.2		ok	ok	ok
L2		24-Aug-2011						11.2		ok	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	Exclude
L2		24-Aug-2011						39.2		ok	ok	Exclude
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Replicate	Date	Area	Excluded / Included	QA / QC	Lab Sample ID	Volume Received (mL)	Percent Counted	Division	Class	Order	Family	Genus	Species	Taxon
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Selenastrum*	*minutum*	*Selenastrum minutum*
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	*Selenastrum*		*Selenastrum* sp.
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	*Sphaerocystis*	*schroeteri*	*Sphaerocystis schroeteri*
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Zygnematales	Zygnemataceae	*Spirogyra*		*Spirogyra* sp.
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Spondylosium*	*planum*	*Spondylosium planum*
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Staurastrum*		*Staurastrum* sp.
L2		24-Aug-2011	FF	Exclude		110504			Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Synedra*		*Synedra* sp.
L2		24-Aug-2011	FF	Exclude		110504			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*fenestrata*	*Tabellaria fenestrata*
L2		24-Aug-2011	FF	Exclude		110504			Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	*Tabellaria*	*flocculosa*	*Tabellaria flocculosa*
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Ulotrichales	Ulotrichaceae	*Ulothrix*		*Ulothrix* sp.
L2		24-Aug-2011	FF	Exclude		110504									Unknown alga (colony)
L2		24-Aug-2011	FF	Exclude		110504									Unknown alga sp.
L2		24-Aug-2011	FF	Exclude		110504			Bacillariophyta	Bacillariophyceae	Pennales				Unknown pennate diatom
L2		24-Aug-2011	FF	Exclude		110504			Chlorophyta	Chlorophyceae	Zygnematales				Unknown Zygnematales

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Appendix 5.2-2. Phytoplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Replicate	Date	Taxonomic Notes	No. of Natural Units	Cells / Natural Unit	Total No. of Cells	Cells / Sample	Cells / mL	Biovolume (µm³/ml)	Diversity Scan / Duplicate Exclude	Taxa Exclude	Taxonomic Uncertainty Exclude
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						22.4		ok	ok	ok
L2		24-Aug-2011	cf.					<2.8		Exclude	ok	Exclude
L2		24-Aug-2011						14.0		ok	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011						<2.8		Exclude	ok	ok
L2		24-Aug-2011	cf.					<2.8		Exclude	ok	Exclude
L2		24-Aug-2011						<2.8		Exclude	Exclude	Exclude
L2		24-Aug-2011						<2.8		Exclude	Exclude	Exclude
L2		24-Aug-2011						<2.8		Exclude	ok	Exclude
L2		24-Aug-2011						<2.8		Exclude	ok	Exclude

MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 5.3-1. Periphyton Quality Control Report, 2012 to 2013

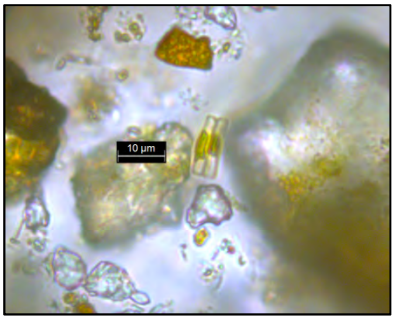
Site	Replicate	Date	Lab Sample ID	Taxon	Original Percent Counted	Original Abundance	Relative Abundance	Dominance Rank	Duplicate Percent Counted	Duplicate Abundance	Relative Abundance	Dominance Rank	Percent Similarity	Comments
BJ U/S	2	15-Aug-2013	6530.05-14	*Achnanthidium* sp.	0.5857%	9	3.00%	5	0.5945%	2	0.63%	4	0.6%	Differences are due to subsampling variance.
BJ U/S	2	15-Aug-2013	6530.05-14	*Anabaena* sp.	0.5857%	2	0.67%		0.5945%	0	0.00%		0.0%	
BJ U/S	2	15-Aug-2013	6530.05-14	*Cymbella* sp.	0.5857%	16	5.33%	4	0.5945%	0	0.00%		0.0%	
BJ U/S	2	15-Aug-2013	6530.05-14	*Hannaea arcus*	0.5857%	86	28.67%	2	0.5945%	94	29.47%	3	28.7%	
BJ U/S	2	15-Aug-2013	6530.05-14	*Leptolyngbya* sp.	0.5857%	63	21.00%	3	0.5945%	97	30.41%	2	21.0%	
BJ U/S	2	15-Aug-2013	6530.05-14	*Meridion* sp.	0.5857%	6	2.00%		0.5945%	0	0.00%		0.0%	
BJ U/S	2	15-Aug-2013	6530.05-14	*Navicula* sp.	0.5857%	6	2.00%		0.5945%	0	0.00%		0.0%	
BJ U/S	2	15-Aug-2013	6530.05-14	*Nitzschia* sp.	0.5857%	107	35.67%	1	0.5945%	126	39.50%	1	35.7%	
BJ U/S	2	15-Aug-2013	6530.05-14	*Synedra* sp.	0.5857%	5	1.67%		0.5945%	0	0.00%		0.0%	
BJ U/S	**2**	**15-Aug-2013**	**6530.05-14**	**Total**		**300**				**319**			**86.0%**	
BJ Inter	1	7-Sep-2012	6204.5-4	*Achnanthes* sp.	0.0533%	2	0.66%	4	0.0513%	1	0.33%	4	0.3%	
BJ Inter	1	7-Sep-2012	6204.5-4	*Chrysocapsella planctonica*	0.0533%	290	95.08%	1	0.0513%	291	95.72%	1	95.1%	
BJ Inter	1	7-Sep-2012	6204.5-4	*Gomphonema* sp.	0.0533%	1	0.33%		0.0513%	1	0.33%		0.3%	
BJ Inter	1	7-Sep-2012	6204.5-4	*Navicula* sp.	0.0533%	2	0.66%	4	0.0513%	3	0.99%	2	0.7%	
BJ Inter	1	7-Sep-2012	6204.5-4	*Synedra* sp.	0.0533%	10	3.28%	2	0.0513%	8	2.63%	2	2.6%	
BJ Inter	**1**	**7-Sep-2012**	**6204.5-4**	**Total**		**305**				**304**			**99.0%**	

Appendix 5.3-2. Phytoplankton Quality Control Report, 2012 to 2013

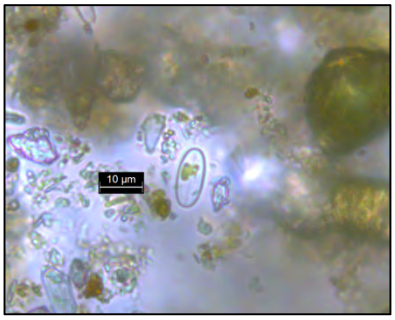
Site	Replicate	Date	Lab Sample ID	Taxon	Original Percent Counted	Original Abundance	Relative Abundance	Dominance Rank	Duplicate Percent Counted	Duplicate Abundance	Relative Abundance	Dominance Rank	Percent Similarity	Comments
BJ	1	8-Sep-2012	6204.3-1	*Carteria* sp.	0.168%	1	0.32%		0.169%	2	0.65%		0.3%	
BJ	1	8-Sep-2012	6204.3-1	*Cymbella* sp.	0.168%	1	0.32%		0.169%	1	0.32%		0.3%	
BJ	1	8-Sep-2012	6204.3-1	*Dinobryon* sp.	0.168%	48	15.53%	2	0.169%	47	15.26%	2	15.3%	
BJ	1	8-Sep-2012	6204.3-1	*Fragilaria* sp.	0.168%	1	0.32%		0.169%	1	0.32%		0.3%	
BJ	1	8-Sep-2012	6204.3-1	*Hannaea* sp.	0.168%	12	3.88%		0.169%	12	3.90%		3.9%	
BJ	1	8-Sep-2012	6204.3-1	*Monoraphidium* sp.	0.168%	25	8.09%	3	0.169%	23	7.47%	3	7.5%	
BJ	1	8-Sep-2012	6204.3-1	*Navicula* sp.	0.168%	1	0.32%		0.169%	1	0.32%		0.3%	
BJ	1	8-Sep-2012	6204.3-1	*Synedra* sp.	0.168%	220	71.20%	1	0.169%	221	71.75%	1	71.2%	
BJ	**1**	**8-Sep-2012**	**6204.3-1**	**Total**		**309**				**308**			**99.1%**	
BJ	3	9-Aug-2013	6530.06-03	*Chroomonas nordstedtii*	1.122%	22	7.33%		0.940%	0	0.00%		0.0%	Differences between the two taxa reports are due to subsampling variance.
BJ	3	9-Aug-2013	6530.06-03	*Cyclotella* sp.	1.122%	1	0.33%		0.940%	20	6.71%		0.3%	
BJ	3	9-Aug-2013	6530.06-03	*Gymnodinium* sp.	1.122%	147	49.00%	1	0.940%	152	51.01%	1	49.0%	
BJ	3	9-Aug-2013	6530.06-03	*Hannaea arcus*	1.122%	30	10.00%	3	0.940%	27	9.06%	2	9.1%	
BJ	3	9-Aug-2013	6530.06-03	*Leptolyngbya foveolarum*	1.122%	0	0.00%		0.940%	1	0.34%		0.0%	
BJ	3	9-Aug-2013	6530.06-03	*Mougeotia* sp.	1.122%	0	0.00%		0.940%	1	0.34%		0.0%	
BJ	3	9-Aug-2013	6530.06-03	*Navicula* sp.	1.122%	0	0.00%		0.940%	4	1.34%		0.0%	
BJ	3	9-Aug-2013	6530.06-03	*Nitzschia* sp.	1.122%	5	1.67%		0.940%	0	0.00%		0.0%	
BJ	3	9-Aug-2013	6530.06-03	*Synedra* sp.	1.122%	95	31.67%	2	0.940%	93	31.21%	3	31.2%	
BJ	**3**	**9-Aug-2013**	**6530.06-03**	**Total**		**300**				**298**			**89.6%**	
BJ Shallow	3	10-Aug-2013	6530.06-15	*Aulacoseira* sp.	1.050%	2	0.67%		1.134%	0	0.00%		0.0%	Differences between the two taxa reports are due to subsampling variance.
BJ Shallow	3	10-Aug-2013	6530.06-15	*Cyclotella* sp.	1.050%	3	1.00%		1.134%	50	16.56%	3	1.0%	
BJ Shallow	3	10-Aug-2013	6530.06-15	*Dinobryon divergens*	1.050%	6	2.00%		1.134%	0	0.00%		0.0%	
BJ Shallow	3	10-Aug-2013	6530.06-15	*Gymnodinium* sp.	1.050%	151	50.33%	1	1.134%	140	46.36%	1	46.4%	
BJ Shallow	3	10-Aug-2013	6530.06-15	*Hannaea arcus*	1.050%	102	34.00%	2	1.134%	55	18.21%	2	18.2%	
BJ Shallow	3	10-Aug-2013	6530.06-15	*Leptolyngbya foveolarum*	1.050%	0	0.00%		1.134%	15	4.97%		0.0%	
BJ Shallow	3	10-Aug-2013	6530.06-15	*Meridion* cf. *circulare*	1.050%	0	0.00%		1.134%	1	0.33%		0.0%	
BJ Shallow	3	10-Aug-2013	6530.06-15	*Monoraphidium komarkovae*	1.050%	3	1.00%		1.134%	0	0.00%		0.0%	
BJ Shallow	3	10-Aug-2013	6530.06-15	*Mougeotia* sp.	1.050%	0	0.00%		1.134%	1	0.33%		0.0%	
BJ Shallow	3	10-Aug-2013	6530.06-15	*Navicula* sp.	1.050%	0	0.00%		1.134%	12	3.97%		0.0%	
BJ Shallow	3	10-Aug-2013	6530.06-15	*Scenedesmus* sp.	1.050%	0	0.00%		1.134%	1	0.33%		0.0%	
BJ Shallow	3	10-Aug-2013	6530.06-15	*Synedra* sp.	1.050%	33	11.00%	3	1.134%	21	6.95%		7.0%	
BJ Shallow	3	10-Aug-2013	6530.06-15	*Thalassiosira* sp.	1.050%	0	0.00%		1.134%	6	1.99%		0.0%	
BJ Shallow	**3**	**10-Aug-2013**	**6530.06-15**	**Total**		**300**				**302**			**72.5%**	

Appendix 5.4-1. Periphyton Reference Photographs, 2012

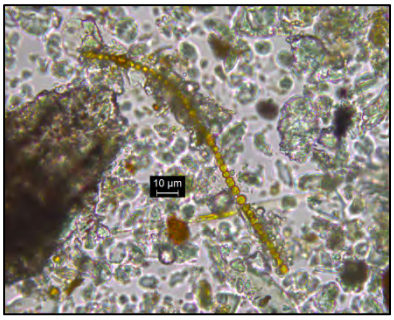
Reference photographs of abundant phytoplankton are shown below with EcoAnalysts, Inc. sample ID.



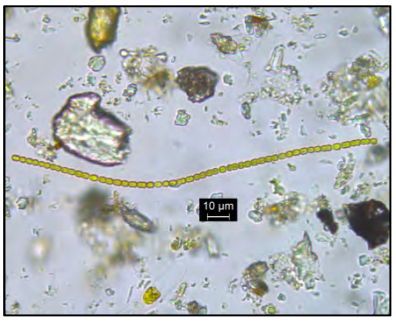
Achnanthes sp. - 6204.5.1



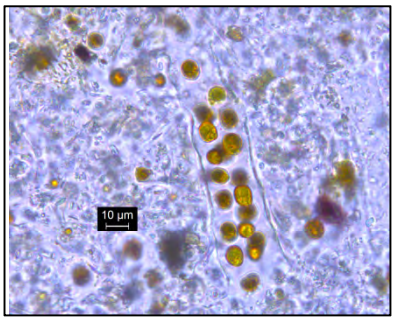
Achnanthes sp. - 6204.5.1



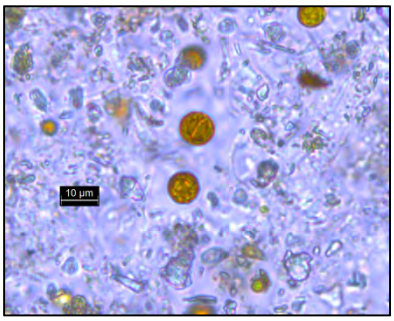
Anabaena sp. - 6204.5.7



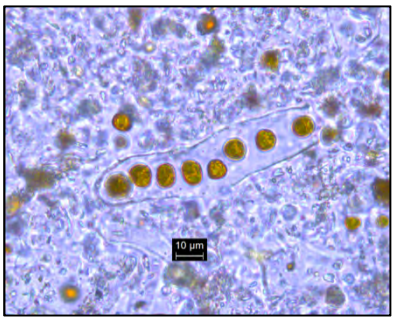
Anabaena sp. - 6204.5.8



Chrysocapsella planctonica - 6204.5.4

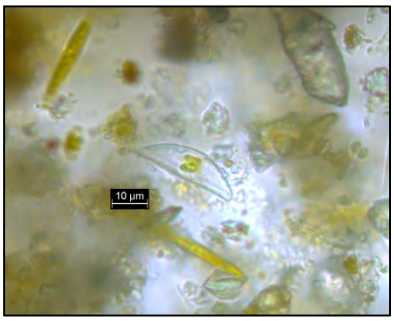


Chrysocapsella planctonica - 6204.5.4

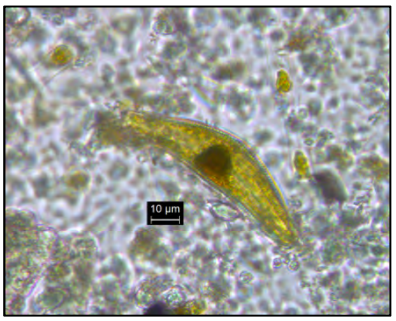


Chrysocapsella planctonica - 6204.5.4

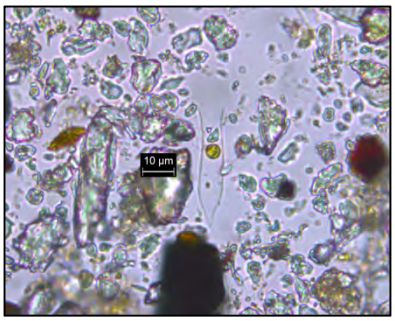
Cosmarium sp.



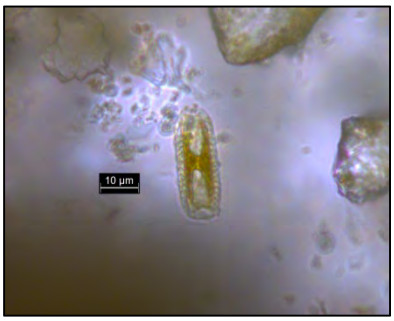
Cymbella sp. - 6204.5.1



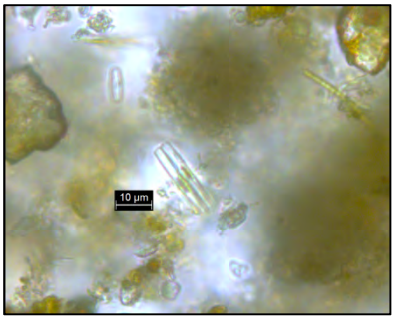
Cymbella sp. - 6204.5.7



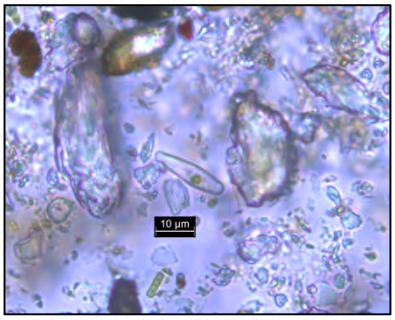
Dinobryon sp. - 6204.5.7



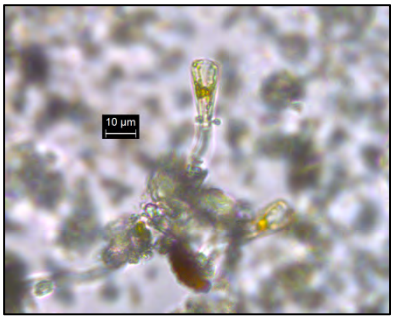
Epithemia sp. - 6204.5.1



Fragilaria sp. - 6204.5.1

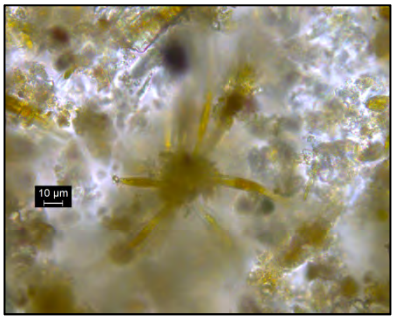


Gomphonema sp. - 6204.5.3



Gomphonema sp. - 6204.5.7

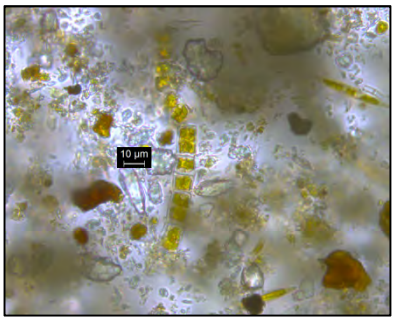
Gomphonema sp. - 6204.5.8



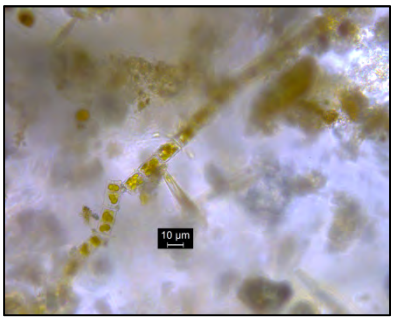
Hannaea sp. - 6204.5.1

Hannaea sp. - 6204.5.2

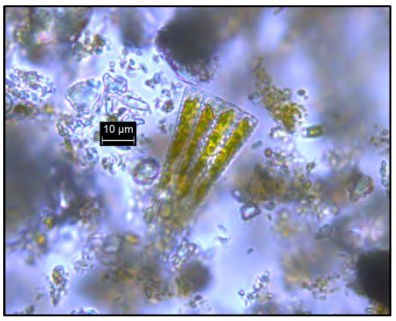
Hannaea sp. - 6204.5.1



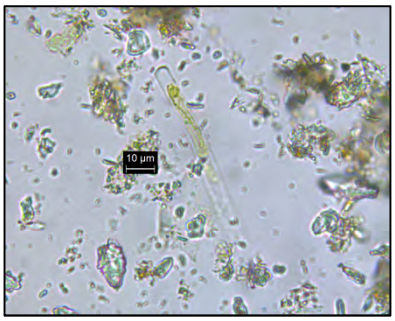
Melosira sp. - 6204.5.1



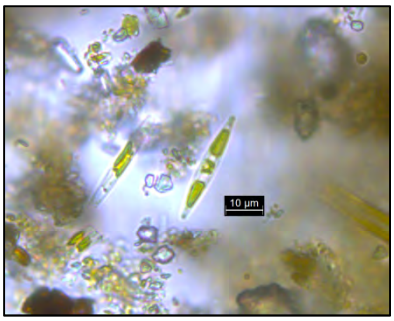
Melosira sp. - 6204.5.1



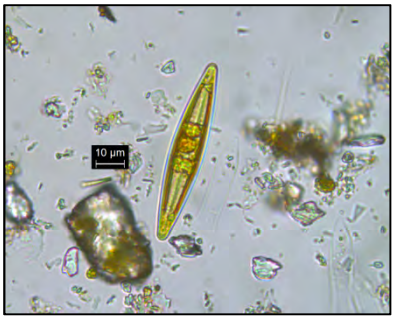
Meridion sp. - 6204.5.2



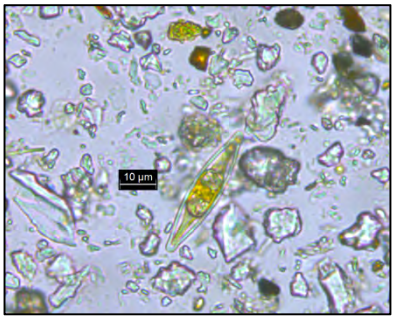
Mougeotia sp. - 6204.5.8



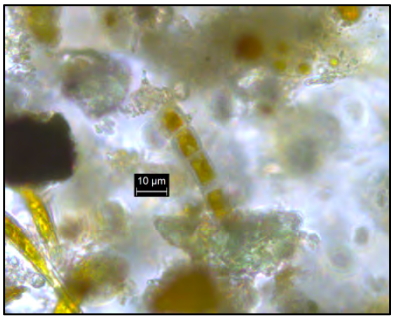
Navicula sp. - 6204.5.2



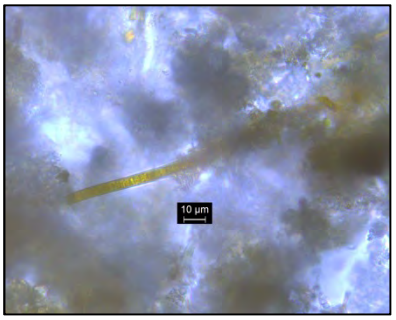
Navicula sp. - 6204.5.8



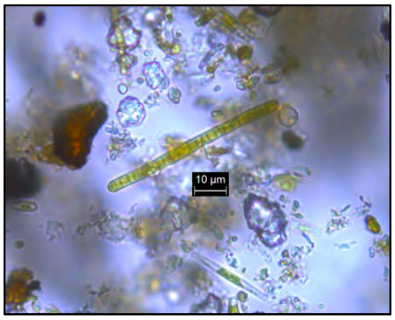
Navicula sp. - 6204.5.7



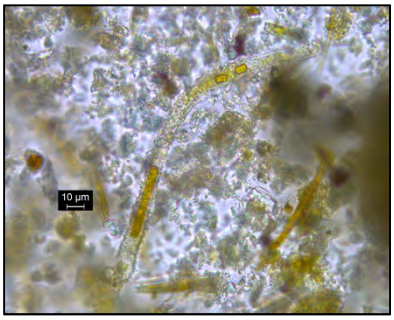
Oedogonium sp. - 6204.5.1



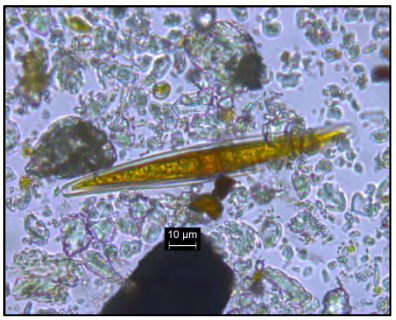
Oscillatoria sp. - 6204.5.1



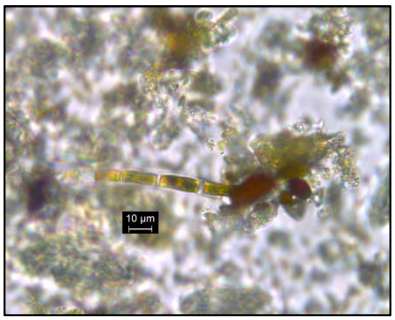
Oscillatoria sp. - 6204.5.2



Phormidium sp. - 6204.5.3

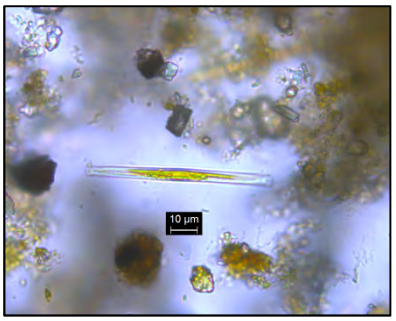


Pleurosigma sp. - 6204.5.7

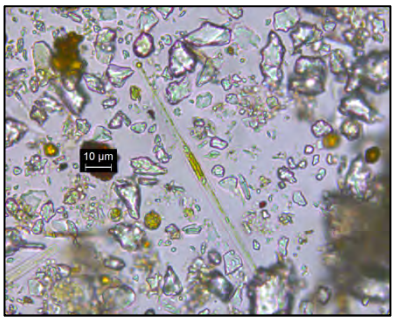


Stigeoclonium sp. - 6204.5.7

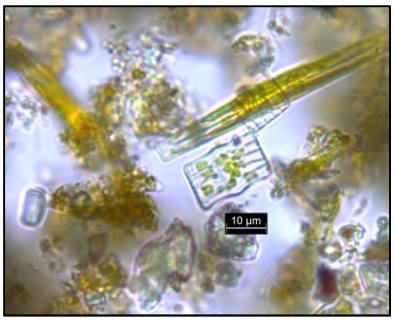
Synedra sp. - 6204.5.1



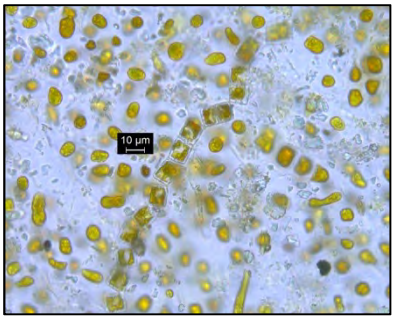
Synedra sp. - 6204.5.2



Synedra sp. - 6204.5.7



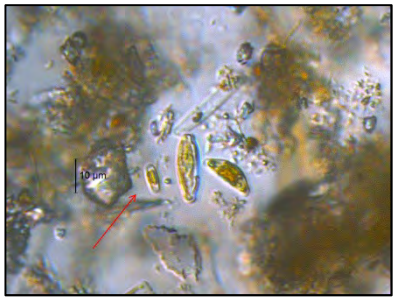
Tabellaria flocculosa - 6204.5.2



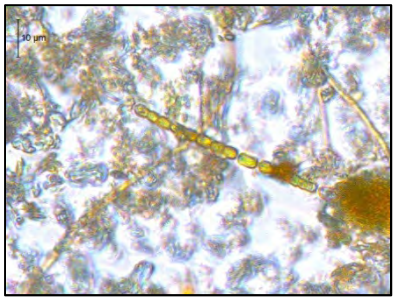
Tabellaria flocculosa - 6204.5.5

Appendix 5.4-2. Periphyton Reference Photographs, 2013

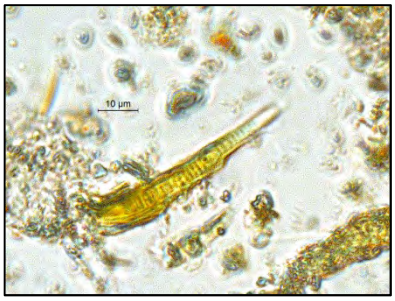
Reference photographs of abundant phytoplankton are shown below with EcoAnalysts, Inc. sample ID.



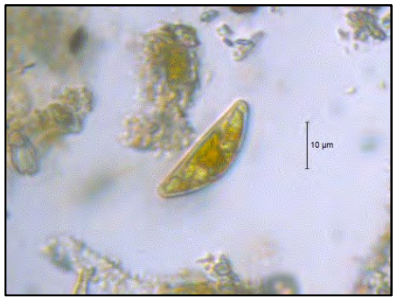
Achnanthidium sp. - 6530.05.02



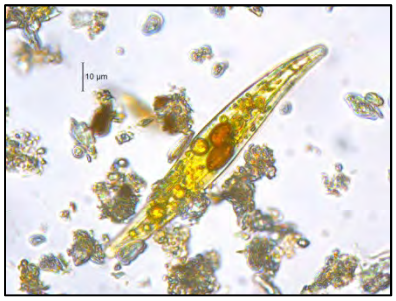
Anabaena sp. - 6530.05.11



Calothrix sp. - 6530.05.07

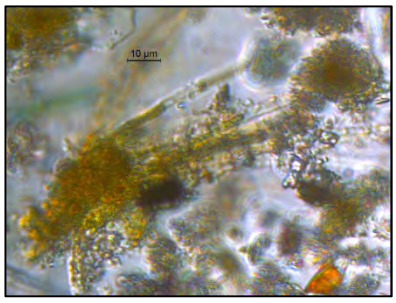


Cymbella sp. - 6530.05.01

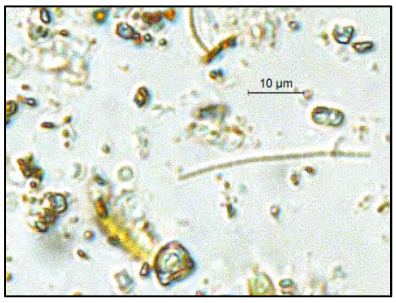


Gyrosigma sp. - 6530.05.13

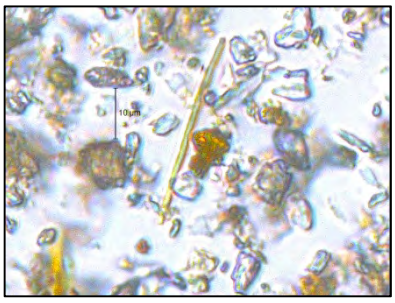
Hannaea arcus - 6530.02.01



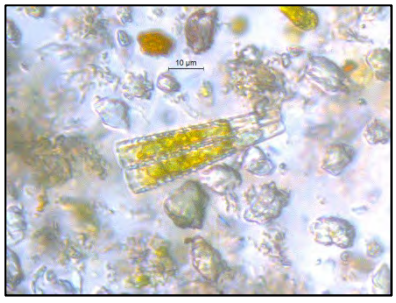
Homoeothrix sp. - 6530.05.02



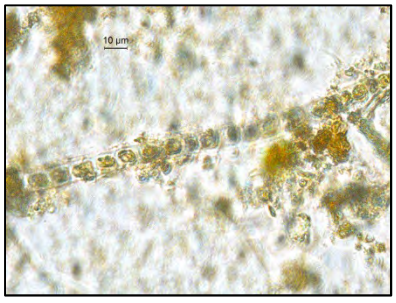
Leptolyngbya sp. - 6530.05.07



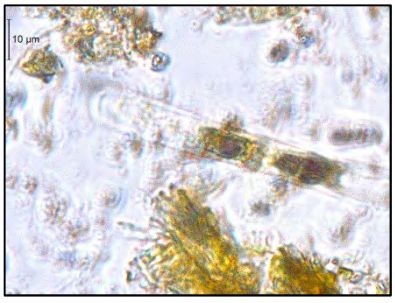
Leptolyngbya sp. - 6530.05.11



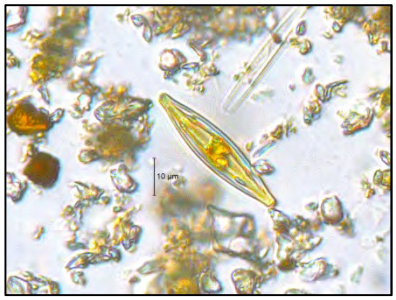
Meridion sp. - 6530.05.01



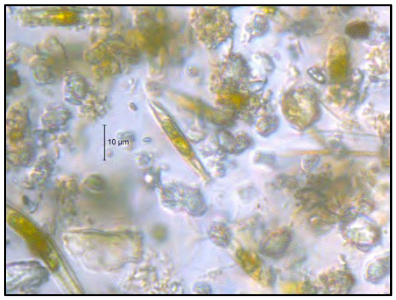
Microspora sp. - 6530.05.09



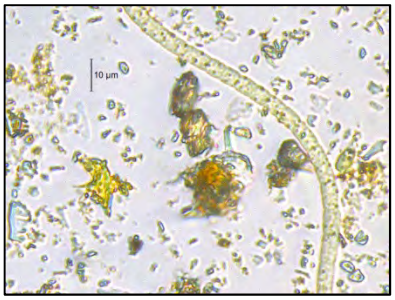
Mougeotia sp. - 6530.07



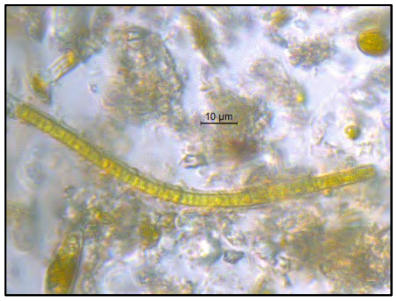
Navicula sp. - 6530.05



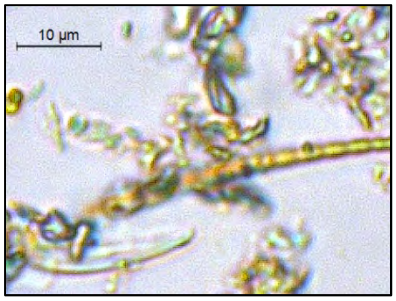
Nitzschia sp. - 6530.05.01



Oscillatoria sp. - 6530.05.06

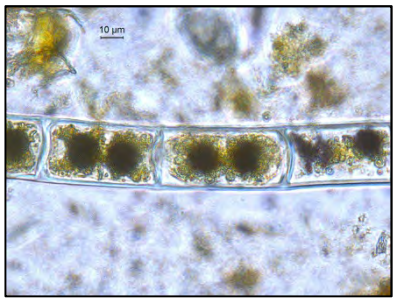


Phormidium sp. - 6539.05.01



Pseudanabaena sp. - 6530.05.12

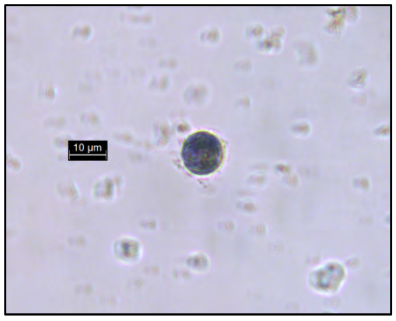
Synedra sp. - 6530.05.01



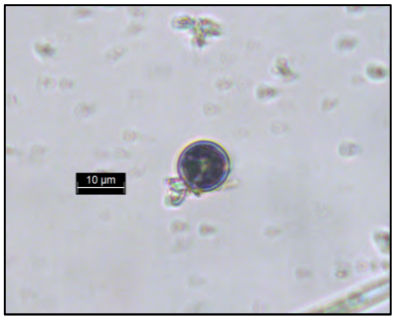
Zygnema sp. - 6530.05.09

Appendix 5.4-3. Phytoplankton Reference Photographs, 2012

Reference photographs of abundant phytoplankton are shown below with EcoAnalysts, Inc. sample ID.

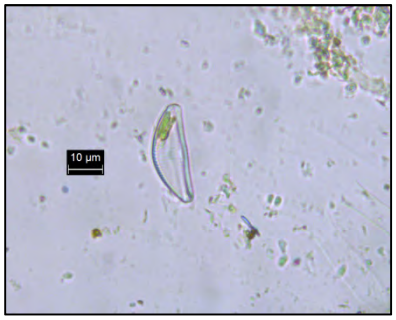


Carteria sp. - 6204.3.1



Carteria sp. - 6204.3.2

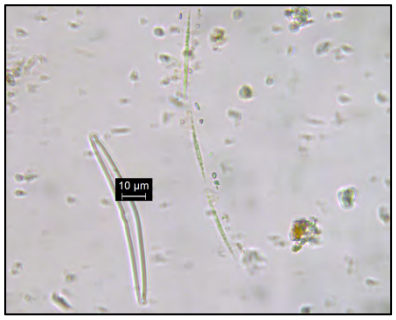
Cocconeis sp. - 6204.3.2



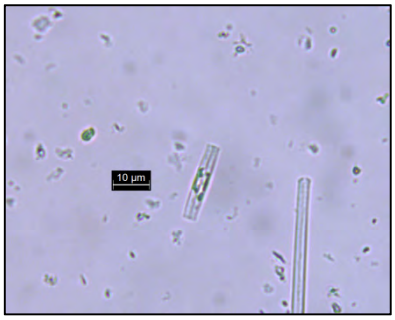
Cymbella sp. - 6204.3.1

Dinobryon sp. - 6204.3.2

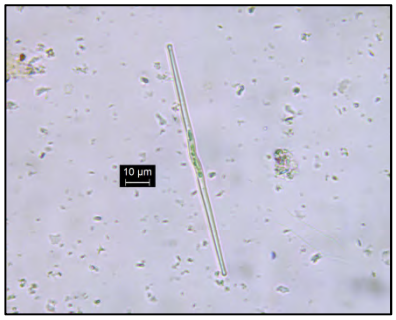
Dinobryon sp. - 6204.3.3



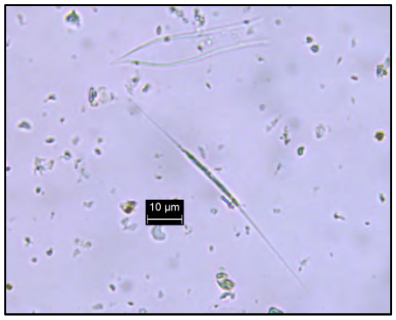
Elakatothrix sp. - 6204.3.3



Fragilaria sp. - 6204.3.1



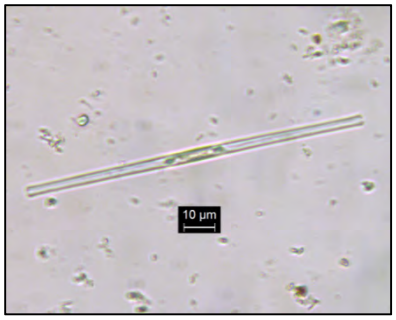
Hannaea sp. - 6204.3.1



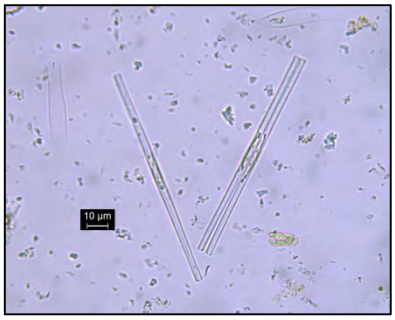
Monoraphidium sp. - 6204.3.1

Monoraphidium sp. - 6204.3.1

Navicula sp. - 6204.3.1



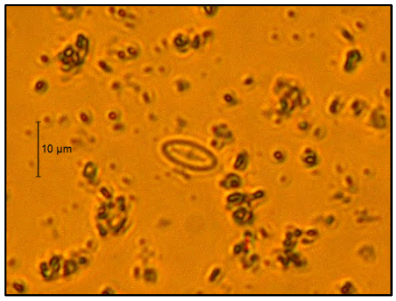
Synedra sp. - 6204.3.1



Synedra sp. - 6204.3.1

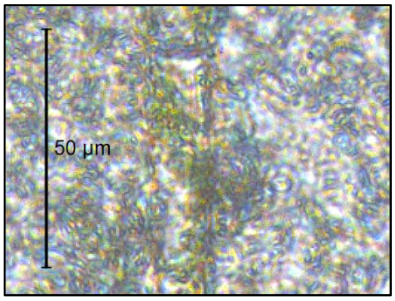
Appendix 5.4-4. Phytoplankton Reference Photographs, 2013

Reference photographs of abundant phytoplankton are shown below with EcoAnalysts, Inc. sample ID.

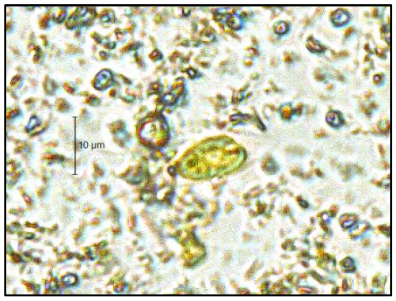


Achnanthidium sp. - 6530.06.08

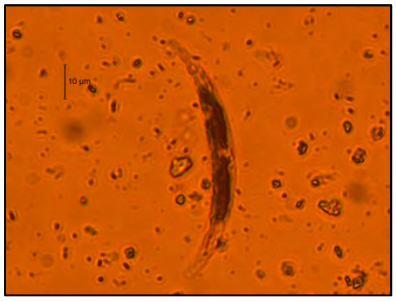
Anabaena sp. - 6530.06.07



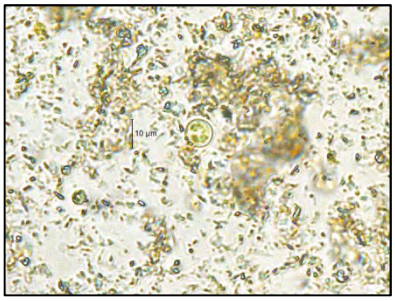
Aulacoseira sp. - 6530.06.12



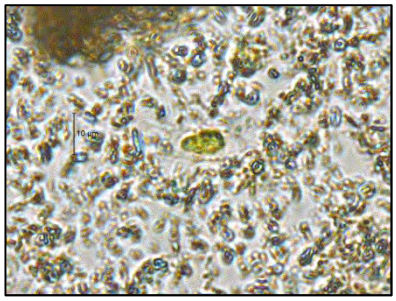
Chroomonas nordstedtii - 6530.06.01



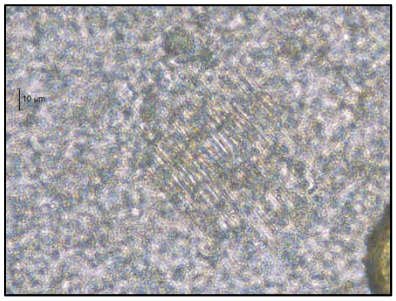
Closterium sp. - 6530.06.07



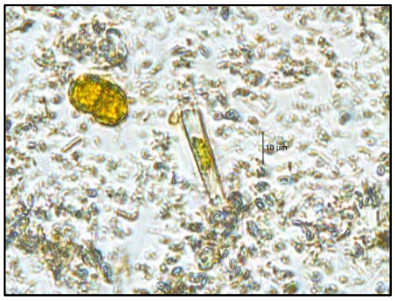
Cylotella sp. - 6530.06.01



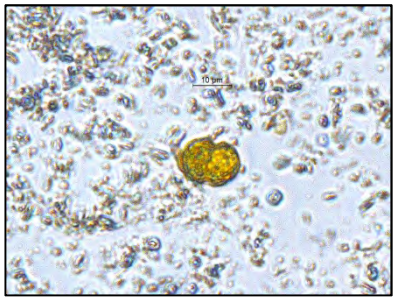
Dinobryon divergens - 6530.06.01



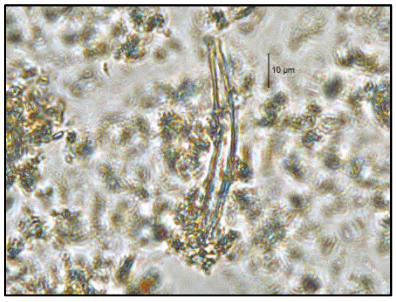
Fragilaria sp. - 6530.06.12



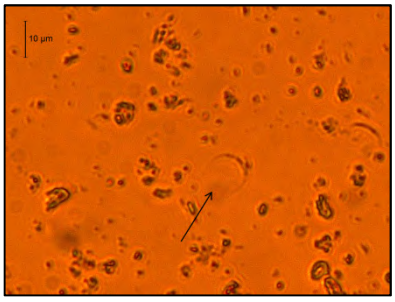
Gomphonema sp. - 6530.06.01



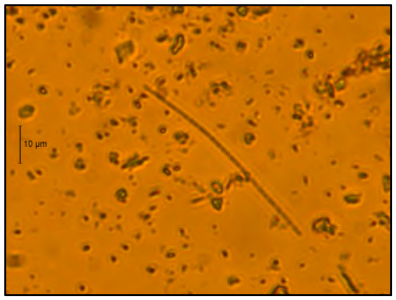
Gymnodinium sp. - 6530.06.01



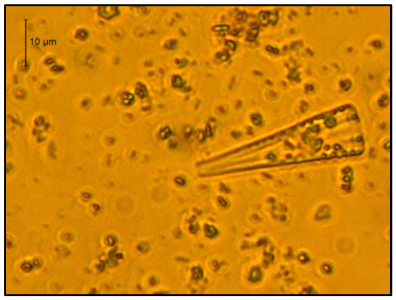
Hannaea arcus - 6530.06.01



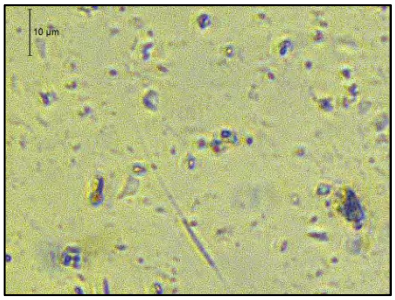
Kirchneriella



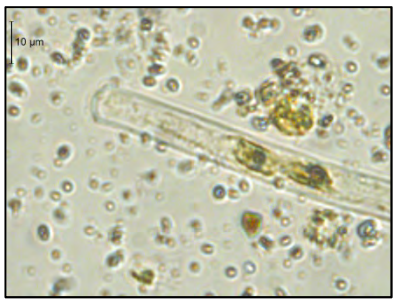
Leptolyngbya foveolarum - 6530.06.08



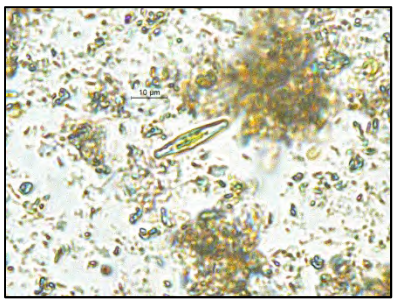
Meridion sp. - 6530.06.09



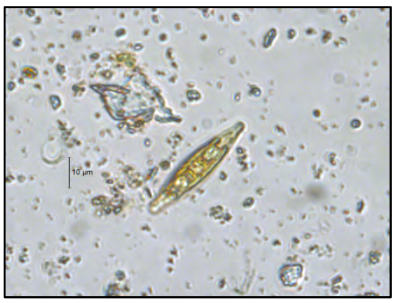
Monoaphidium komarkovae - 6530.06.07



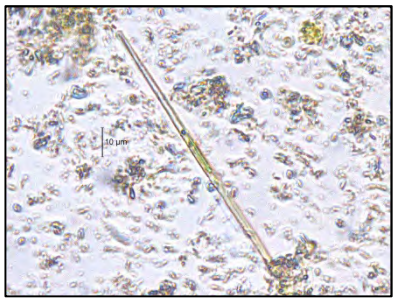
Mougeotia sp. - 6530.06.08



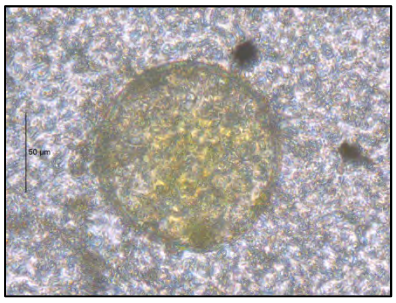
Navicula sp. - 6530.06.01



Navicula sp. - 6530.06.08



Synedra sp. - 6530.06.01



Thalassiosira sp. - 6530.06.12

Xanthidium sp. - 6530.06.07

Appendix 6

Aquatic Invertebrates

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Appendix 6.1-2. Benthic Invertebrate Taxa and Abundance in Streams (400µm CABIN Kick-Net), 2013

Appendix 6.1-3. Benthic Invertebrate Taxa and Abundance in Lakes (Ekman Sampler), 2008 to 2013

Appendix 6.2-1. Zooplankton Taxa and Abundance in Lakes, 2008 to 2013

Appendix 6.3-1. Benthic Invertebrate Quality Control Report , 2008 to 2013

Appendix 6.3-2. Zooplankton Quality Control Report, 2008 to 2013

Appendix 6.4-1. Zooplankton Reference Photographs, 2012

Appendix 6.4-2. Zooplankton Reference Photographs, 2013

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
BJ U/S	1	15-Aug-2013	MA	Include	6530.3-1	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ U/S	1	15-Aug-2013	MA	Include	6530.3-1	0.288	100%	Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
BJ U/S	1	15-Aug-2013	MA	Include	6530.3-1	0.288	100%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
BJ U/S	1	15-Aug-2013	MA	Include	6530.3-1	0.288	100%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota* sp.
BJ U/S	1	15-Aug-2013	MA	Include	6530.3-1	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
BJ U/S	1	15-Aug-2013	MA	Include	6530.3-1	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius* sp.
BJ U/S	1	15-Aug-2013	MA	Include	6530.3-1	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius (Euorthocladius) rivicola*
BJ U/S	1	15-Aug-2013	MA	Include	6530.3-1	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius (Euorthocladius)* sp.
BJ U/S	1	15-Aug-2013	MA	Include	6530.3-1	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ U/S	1	15-Aug-2013	MA	Include	6530.3-1	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parorthocladius*	*Parorthocladius* sp.
BJ U/S	1	15-Aug-2013	MA	Include	6530.3-1	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
BJ U/S	1	15-Aug-2013	MA	Include	6530.3-1	0.288	100%	Nematoda	Nematoda						Nematoda
BJ U/S	1	15-Aug-2013	MA	Include	6530.3-1	0.288	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
BJ U/S	2	15-Aug-2013	MA	Include	6530.3-2	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ U/S	2	15-Aug-2013	MA	Include	6530.3-2	0.288	100%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota* sp.
BJ U/S	2	15-Aug-2013	MA	Include	6530.3-2	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
BJ U/S	2	15-Aug-2013	MA	Include	6530.3-2	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius* sp.
BJ U/S	2	15-Aug-2013	MA	Include	6530.3-2	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius (Euorthocladius)* sp.
BJ U/S	2	15-Aug-2013	MA	Include	6530.3-2	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ U/S	2	15-Aug-2013	MA	Include	6530.3-2	0.288	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
BJ U/S	3	15-Aug-2013	MA	Include	6530.3-3	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ U/S	3	15-Aug-2013	MA	Include	6530.3-3	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Tubificidae			Tubificidae
BJ U/S	3	15-Aug-2013	MA	Include	6530.3-3	0.288	100%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
BJ U/S	3	15-Aug-2013	MA	Include	6530.3-3	0.288	100%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota* sp.
BJ U/S	3	15-Aug-2013	MA	Include	6530.3-3	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
BJ U/S	3	15-Aug-2013	MA	Include	6530.3-3	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius* sp.
BJ U/S	3	15-Aug-2013	MA	Include	6530.3-3	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius (Euorthocladius)* sp.
BJ U/S	3	15-Aug-2013	MA	Include	6530.3-3	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ U/S	3	15-Aug-2013	MA	Include	6530.3-3	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae		Diamesinae
BJ U/S	3	15-Aug-2013	MA	Include	6530.3-3	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
BJ U/S	3	15-Aug-2013	MA	Include	6530.3-3	0.288	100%	Nematoda	Nematoda						Nematoda
BJ U/S	4	15-Aug-2013	MA	Include	6530.3-4	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ U/S	4	15-Aug-2013	MA	Include	6530.3-4	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Tubificidae			Tubificidae
BJ U/S	4	15-Aug-2013	MA	Include	6530.3-4	0.288	100%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota* sp.
BJ U/S	4	15-Aug-2013	MA	Include	6530.3-4	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
BJ U/S	4	15-Aug-2013	MA	Include	6530.3-4	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius* sp.
BJ U/S	4	15-Aug-2013	MA	Include	6530.3-4	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius (Euorthocladius)* sp.
BJ U/S	4	15-Aug-2013	MA	Include	6530.3-4	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ U/S	5	15-Aug-2013	MA	Include	6530.3-5	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ U/S	5	15-Aug-2013	MA	Include	6530.3-5	0.288	100%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
BJ U/S	5	15-Aug-2013	MA	Include	6530.3-5	0.288	100%	Arachnida	Arthropoda	Arachnida					Acari
BJ U/S	5	15-Aug-2013	MA	Include	6530.3-5	0.288	100%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
BJ U/S	5	15-Aug-2013	MA	Include	6530.3-5	0.288	100%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota* sp.
BJ U/S	5	15-Aug-2013	MA	Include	6530.3-5	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
BJ U/S	5	15-Aug-2013	MA	Include	6530.3-5	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius sp.*
BJ U/S	5	15-Aug-2013	MA	Include	6530.3-5	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius (Euorthocladius)* sp.
BJ U/S	5	15-Aug-2013	MA	Include	6530.3-5	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parakiefferiella*	*Parakiefferiella* sp.
BJ U/S	5	15-Aug-2013	MA	Include	6530.3-5	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa* sp.
BJ U/S	5	15-Aug-2013	MA	Include	6530.3-5	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
BJ U/S of CC	1	7-Sep-2012	MA	Include	6204.4-7	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ U/S of CC	1	7-Sep-2012	MA	Include	6204.4-7	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae		*Nais*	*Nais* sp.
BJ U/S of CC	1	7-Sep-2012	MA	Include	6204.4-7	0.288	100%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
BJ U/S of CC	1	7-Sep-2012	MA	Include	6204.4-7	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius* sp.
BJ U/S of CC	1	7-Sep-2012	MA	Include	6204.4-7	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
BJ U/S	1	15-Aug-2013			ok	ok			2	6.9	68510
BJ U/S	1	15-Aug-2013			Exclude	Exclude			2	6.9	85258
BJ U/S	1	15-Aug-2013			Exclude	Exclude			2	6.9	88530
BJ U/S	1	15-Aug-2013			ok	ok			7	24.3	121027
BJ U/S	1	15-Aug-2013			ok	ok	6		19	66.0	128355
BJ U/S	1	15-Aug-2013			ok	ok			9	31.3	128670
BJ U/S	1	15-Aug-2013		gr.	ok	ok	1		1	3.5	
BJ U/S	1	15-Aug-2013			ok	ok			74	256.9	568520
BJ U/S	1	15-Aug-2013			ok	ok			4	13.9	128874
BJ U/S	1	15-Aug-2013			ok	ok			1	3.5	129011
BJ U/S	1	15-Aug-2013	immature		ok	Exclude			1	3.5	128457
BJ U/S	1	15-Aug-2013			Exclude	Exclude			1	3.5	59490
BJ U/S	1	15-Aug-2013	immature		ok	Exclude			2	6.9	102517
BJ U/S	2	15-Aug-2013			ok	ok			35	121.5	68510
BJ U/S	2	15-Aug-2013			ok	ok			3	10.4	121027
BJ U/S	2	15-Aug-2013			ok	ok	2		9	31.3	128355
BJ U/S	2	15-Aug-2013			ok	ok			7	24.3	128670
BJ U/S	2	15-Aug-2013			ok	ok			24	83.3	568520
BJ U/S	2	15-Aug-2013			ok	ok			2	6.9	128874
BJ U/S	2	15-Aug-2013	immature		ok	Exclude			1	3.5	102517
BJ U/S	3	15-Aug-2013			ok	ok			19	66.0	68510
BJ U/S	3	15-Aug-2013		w/ cap setae sp.	ok	ok			2	6.9	68585
BJ U/S	3	15-Aug-2013			ok	ok			1	3.5	83034
BJ U/S	3	15-Aug-2013			ok	ok			11	38.2	121027
BJ U/S	3	15-Aug-2013			ok	ok	1		26	90.3	128355
BJ U/S	3	15-Aug-2013			ok	ok			16	55.6	128670
BJ U/S	3	15-Aug-2013			ok	ok			67	232.6	568520
BJ U/S	3	15-Aug-2013			ok	ok			10	34.7	128874
BJ U/S	3	15-Aug-2013	damaged		ok	Exclude	2		2	6.9	128341
BJ U/S	3	15-Aug-2013	immature		ok	Exclude			5	17.4	128457
BJ U/S	3	15-Aug-2013			Exclude	Exclude			2	6.9	59490
BJ U/S	4	15-Aug-2013			ok	ok			32	111.1	68510
BJ U/S	4	15-Aug-2013		w/ cap setae sp.	ok	ok			2	6.9	68585
BJ U/S	4	15-Aug-2013			ok	ok			4	13.9	121027
BJ U/S	4	15-Aug-2013			ok	ok	1		5	17.4	128355
BJ U/S	4	15-Aug-2013			ok	ok			9	31.3	128670
BJ U/S	4	15-Aug-2013			ok	ok			12	41.7	568520
BJ U/S	4	15-Aug-2013			ok	ok			2	6.9	128874
BJ U/S	5	15-Aug-2013			ok	ok			43	149.3	68510
BJ U/S	5	15-Aug-2013			ok	ok			4	13.9	83034
BJ U/S	5	15-Aug-2013	immature		ok	Exclude			1	3.5	82754
BJ U/S	5	15-Aug-2013			Exclude	Exclude			5	17.4	88530
BJ U/S	5	15-Aug-2013			ok	ok			6	20.8	121027
BJ U/S	5	15-Aug-2013			ok	ok			6	20.8	128355
BJ U/S	5	15-Aug-2013			ok	ok			18	62.5	128670
BJ U/S	5	15-Aug-2013			ok	ok			46	159.7	568520
BJ U/S	5	15-Aug-2013			ok	ok			1	3.5	128968
BJ U/S	5	15-Aug-2013			ok	ok			1	3.5	128416
BJ U/S	5	15-Aug-2013	immature		ok	Exclude			1	3.5	128457
BJ U/S of CC	1	7-Sep-2012			ok	ok			1	3.5	
BJ U/S of CC	1	7-Sep-2012			ok	ok			1	3.5	
BJ U/S of CC	1	7-Sep-2012			Exclude	Exclude			11	38.2	
BJ U/S of CC	1	7-Sep-2012			ok	ok			3	10.4	
BJ U/S of CC	1	7-Sep-2012			ok	ok			1	3.5	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
BJ U/S of CC	2	7-Sep-2012	MA	Include	6204.4-8	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ U/S of CC	2	7-Sep-2012	MA	Include	6204.4-8	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae		*Nais*	*Nais* sp.
BJ U/S of CC	2	7-Sep-2012	MA	Include	6204.4-8	0.288	100%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
BJ U/S of CC	2	7-Sep-2012	MA	Include	6204.4-8	0.288	100%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota* sp.
BJ U/S of CC	2	7-Sep-2012	MA	Include	6204.4-8	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius* sp.
BJ U/S of CC	2	7-Sep-2012	MA	Include	6204.4-8	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
BJ U/S of CC	2	7-Sep-2012	MA	Include	6204.4-8	0.288	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
BJ U/S of CC	3	7-Sep-2012	MA	Include	6204.4-9	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ U/S of CC	3	7-Sep-2012	MA	Include	6204.4-9	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae		*Nais*	*Nais* sp.
BJ U/S of CC	3	7-Sep-2012	MA	Include	6204.4-9	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae		*Nais*	*Nais* sp.
BJ U/S of CC	3	7-Sep-2012	MA	Include	6204.4-9	0.288	100%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
BJ U/S of CC	3	7-Sep-2012	MA	Include	6204.4-9	0.288	100%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
BJ U/S of CC	3	7-Sep-2012	MA	Include	6204.4-9	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius* sp.
BJ U/S of CC	3	7-Sep-2012	MA	Include	6204.4-9	0.288	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
BJ Inter	1	7-Sep-2012	MA	Exclude	6204.4-4	0.288	100%	Diptera	Arthropoda	Insecta	Diptera				Diptera
BJ Inter	2	7-Sep-2012	MA	Exclude	6204.4-5	0.288	100%	Diptera	Arthropoda	Insecta	Diptera				Diptera
BJ Inter	2	7-Sep-2012	MA	Exclude	6204.4-5	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
BJ Inter	2	7-Sep-2012	MA	Exclude	6204.4-5	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ Inter	3	7-Sep-2012	MA	Exclude	6204.4-6	0.288	100%	Hymenoptera	Arthropoda	Insecta	Hymenoptera				Hymenoptera
Adit	1	19-Aug-2011	MA	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
Adit	1	19-Aug-2011	MA	Exclude		0.288		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
Adit	1	19-Aug-2011	MA	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
Adit	1	19-Aug-2011	MA	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius*
Adit	1	19-Aug-2011	MA	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
Adit	2	19-Aug-2011	MA	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
Adit	2	19-Aug-2011	MA	Exclude		0.288		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
Adit	2	19-Aug-2011	MA	Exclude		0.288		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
Adit	2	19-Aug-2011	MA	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
Adit	2	19-Aug-2011	MA	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
Adit	2	19-Aug-2011	MA	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius*
Adit	2	19-Aug-2011	MA	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Metriocnemus*	*Metriocnemus*
Adit	2	19-Aug-2011	MA	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
Adit	2	19-Aug-2011	MA	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
Adit	3	19-Aug-2011	MA	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
Adit	3	19-Aug-2011	MA	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Naidinae		Naidinae
Adit	3	19-Aug-2011	MA	Exclude		0.288		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
Adit	3	19-Aug-2011	MA	Exclude		0.288		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
Adit	3	19-Aug-2011	MA	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
Adit	3	19-Aug-2011	MA	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
Adit	3	19-Aug-2011	MA	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
Adit	3	19-Aug-2011	MA	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius*
Adit	3	19-Aug-2011	MA	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Metriocnemus*	*Metriocnemus*
Adit	3	19-Aug-2011	MA	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
Adit	3	19-Aug-2011	MA	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlidae			Perlidae
Adit	3	19-Aug-2011	MA	Exclude		0.288		Terrestrial							Terrestrial
Adit	4	19-Aug-2011	MA	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
Adit	4	19-Aug-2011	MA	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Naidinae		Naidinae
Adit	4	19-Aug-2011	MA	Exclude		0.288		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
Adit	4	19-Aug-2011	MA	Exclude		0.288		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
Adit	4	19-Aug-2011	MA	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
Adit	4	19-Aug-2011	MA	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius*
Adit	4	19-Aug-2011	MA	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia/Psilometriocnemus*	*Platysmittia/Psilometriocnemus*
Adit	4	19-Aug-2011	MA	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
Adit	4	19-Aug-2011	MA	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
BJ U/S of CC	2	7-Sep-2012			ok	ok			4	13.9	
BJ U/S of CC	2	7-Sep-2012			ok	ok			3	10.4	
BJ U/S of CC	2	7-Sep-2012			Exclude	Exclude			41	142.4	
BJ U/S of CC	2	7-Sep-2012			ok	ok			1	3.5	
BJ U/S of CC	2	7-Sep-2012			ok	ok			2	6.9	
BJ U/S of CC	2	7-Sep-2012			ok	ok			1	3.5	
BJ U/S of CC	2	7-Sep-2012			ok	ok			1	3.5	
BJ U/S of CC	3	7-Sep-2012			ok	ok			15	52.1	
BJ U/S of CC	3	7-Sep-2012		w/ cap setae	ok	ok			3	10.4	
BJ U/S of CC	3	7-Sep-2012			ok	ok			1	3.5	
BJ U/S of CC	3	7-Sep-2012			ok	ok			1	3.5	
BJ U/S of CC	3	7-Sep-2012			Exclude	Exclude			39	135.4	
BJ U/S of CC	3	7-Sep-2012			ok	ok			5	17.4	
BJ U/S of CC	3	7-Sep-2012			ok	ok			1	3.5	
BJ Inter	1	7-Sep-2012			ok	Exclude			1	3.5	
BJ Inter	2	7-Sep-2012			ok	Exclude			1	3.5	
BJ Inter	2	7-Sep-2012			ok	ok			1	3.5	
BJ Inter	2	7-Sep-2012			ok	ok			1	3.5	
BJ Inter	3	7-Sep-2012			Exclude	Exclude			1	3.5	
Adit	1	19-Aug-2011			ok	ok			6	20.8	
Adit	1	19-Aug-2011			Exclude	Exclude			24	83.3	
Adit	1	19-Aug-2011			ok	ok			16	55.6	
Adit	1	19-Aug-2011			ok	ok			10	34.7	
Adit	1	19-Aug-2011			ok	ok			1	3.5	
Adit	2	19-Aug-2011			ok	ok			3	10.4	
Adit	2	19-Aug-2011			Exclude	Exclude			26	90.3	
Adit	2	19-Aug-2011			Exclude	Exclude			1	3.5	
Adit	2	19-Aug-2011			ok	ok			1	3.5	
Adit	2	19-Aug-2011			ok	ok			4	13.9	
Adit	2	19-Aug-2011			ok	ok			6	20.8	
Adit	2	19-Aug-2011			ok	ok			1	3.5	
Adit	2	19-Aug-2011			ok	ok	pupa		1	3.5	
Adit	2	19-Aug-2011			ok	ok			2	6.9	
Adit	3	19-Aug-2011			ok	ok			7	24.3	
Adit	3	19-Aug-2011			ok	ok			2	6.9	
Adit	3	19-Aug-2011			Exclude	Exclude			9	31.3	
Adit	3	19-Aug-2011			Exclude	Exclude			2	6.9	
Adit	3	19-Aug-2011			ok	ok			1	3.5	
Adit	3	19-Aug-2011			ok	ok			222	770.8	
Adit	3	19-Aug-2011			ok	ok			1	3.5	
Adit	3	19-Aug-2011			ok	ok			56	194.4	
Adit	3	19-Aug-2011			ok	ok			1	3.5	
Adit	3	19-Aug-2011			ok	ok	pupa		12	41.7	
Adit	3	19-Aug-2011	immature/damaged		ok	Exclude			2	6.9	
Adit	3	19-Aug-2011			Exclude	Exclude			1	3.5	
Adit	4	19-Aug-2011			ok	ok			14	48.6	
Adit	4	19-Aug-2011			ok	ok			3	10.4	
Adit	4	19-Aug-2011			Exclude	Exclude			41	142.4	
Adit	4	19-Aug-2011			Exclude	Exclude			1	3.5	
Adit	4	19-Aug-2011			ok	ok			32	111.1	
Adit	4	19-Aug-2011			ok	ok			26	90.3	
Adit	4	19-Aug-2011			ok	ok			1	3.5	
Adit	4	19-Aug-2011			ok	ok	pupa		7	24.3	
Adit	4	19-Aug-2011			ok	ok			2	6.9	

Notes:
MA = Mine Site Area and Down
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FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
Adit	4	19-Aug-2011	MA	Exclude		0.288		Terrestrial							Terrestrial
Adit	5	19-Aug-2011	MA	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
Adit	5	19-Aug-2011	MA	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Naidinae		Naidinae
Adit	5	19-Aug-2011	MA	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Tubificinae		Tubificinae
Adit	5	19-Aug-2011	MA	Exclude		0.288		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
Adit	5	19-Aug-2011	MA	Exclude		0.288		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
Adit	5	19-Aug-2011	MA	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Rhabdomastix*	*Rhabdomastix*
Adit	5	19-Aug-2011	MA	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
Adit	5	19-Aug-2011	MA	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius*
Adit	5	19-Aug-2011	MA	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
Adit	5	19-Aug-2011	MA	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
Adit	5	19-Aug-2011	MA	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlidae			Perlidae
Adit	5	19-Aug-2011	MA	Exclude		0.288		Terrestrial							Terrestrial
BJ2	1	19-Aug-2011	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ2	1	19-Aug-2011	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Naidinae		Naidinae
BJ2	1	19-Aug-2011	MA	Include		0.288		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
BJ2	1	19-Aug-2011	MA	Include		0.288		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
BJ2	1	19-Aug-2011	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius*
BJ2	1	19-Aug-2011	MA	Include		0.288		Nematoda	Nematoda						Nematoda
BJ2	1	19-Aug-2011	MA	Include		0.288		Ostracoda	Arthropoda	Ostracoda					Ostracoda
BJ2	2	19-Aug-2011	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ2	2	19-Aug-2011	MA	Include		0.288		Bathynellacea	Arthropoda	Malacostraca	Bathynellacea	Bathynellidae		*Bathynella*	*Bathynella*
BJ2	2	19-Aug-2011	MA	Include		0.288		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
BJ2	2	19-Aug-2011	MA	Include		0.288		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
BJ2	2	19-Aug-2011	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
BJ2	2	19-Aug-2011	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
BJ2	2	19-Aug-2011	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius*
BJ2	2	19-Aug-2011	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Leuctridae			Leuctridae
BJ2	3	19-Aug-2011	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ2	3	19-Aug-2011	MA	Include		0.288		Bathynellacea	Arthropoda	Malacostraca	Bathynellacea	Bathynellidae		*Bathynella*	*Bathynella*
BJ2	3	19-Aug-2011	MA	Include		0.288		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
BJ2	3	19-Aug-2011	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
BJ2	3	19-Aug-2011	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
BJ2	3	19-Aug-2011	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
BJ2	3	19-Aug-2011	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius*
BJ2	3	19-Aug-2011	MA	Include		0.288		Nematoda	Nematoda						Nematoda
BJ2	4	19-Aug-2011	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ2	4	19-Aug-2011	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Naidinae		Naidinae
BJ2	4	19-Aug-2011	MA	Include		0.288		Bathynellacea	Arthropoda	Malacostraca	Bathynellacea	Bathynellidae		*Bathynella*	*Bathynella*
BJ2	4	19-Aug-2011	MA	Include		0.288		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
BJ2	4	19-Aug-2011	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
BJ2	4	19-Aug-2011	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
BJ2	4	19-Aug-2011	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius*
BJ2	4	19-Aug-2011	MA	Include		0.288		Nematoda	Nematoda						Nematoda
BJ2	5	19-Aug-2011	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ2	5	19-Aug-2011	MA	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
BJ2	5	19-Aug-2011	MA	Include		0.288		Bathynellacea	Arthropoda	Malacostraca	Bathynellacea	Bathynellidae		*Bathynella*	*Bathynella*
BJ2	5	19-Aug-2011	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
BJ2	5	19-Aug-2011	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
BJ2	5	19-Aug-2011	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius*
BJ2	5	19-Aug-2011	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Pseudosmittia*	*Pseudosmittia*
BJ2	5	19-Aug-2011	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
BJ2	5	19-Aug-2011	MA	Include		0.288		Nematoda	Nematoda						Nematoda
BJ2	1	7-Sep-2012	MA	Include	6204.4-1	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
Adit	4	19-Aug-2011			Exclude	Exclude			1	3.5	
Adit	5	19-Aug-2011			ok	ok			56	194.4	
Adit	5	19-Aug-2011			ok	ok			16	55.6	
Adit	5	19-Aug-2011			ok	ok			1	3.5	
Adit	5	19-Aug-2011			Exclude	Exclude			124	430.6	
Adit	5	19-Aug-2011			Exclude	Exclude			28	97.2	
Adit	5	19-Aug-2011			ok	ok			1	3.5	
Adit	5	19-Aug-2011			ok	ok			61	211.8	
Adit	5	19-Aug-2011			ok	ok			74	256.9	
Adit	5	19-Aug-2011			ok	ok	pupa		42	145.8	
Adit	5	19-Aug-2011			ok	ok			4	13.9	
Adit	5	19-Aug-2011	immature/damaged		ok	Exclude			9	31.3	
Adit	5	19-Aug-2011			Exclude	Exclude			1	3.5	
BJ2	1	19-Aug-2011			ok	ok			8	27.8	
BJ2	1	19-Aug-2011			ok	ok			1	3.5	
BJ2	1	19-Aug-2011			Exclude	Exclude			60	208.3	
BJ2	1	19-Aug-2011			Exclude	Exclude			3	10.4	
BJ2	1	19-Aug-2011			ok	ok			2	6.9	
BJ2	1	19-Aug-2011			Exclude	Exclude			1	3.5	
BJ2	1	19-Aug-2011			Exclude	Exclude			1	3.5	
BJ2	2	19-Aug-2011			ok	ok			15	52.1	
BJ2	2	19-Aug-2011			ok	ok			6	20.8	
BJ2	2	19-Aug-2011			Exclude	Exclude			3	10.4	
BJ2	2	19-Aug-2011			Exclude	Exclude			5	17.4	
BJ2	2	19-Aug-2011			ok	ok			19	66.0	
BJ2	2	19-Aug-2011			ok	ok			4	13.9	
BJ2	2	19-Aug-2011			ok	ok			3	10.4	
BJ2	2	19-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
BJ2	3	19-Aug-2011			ok	ok			19	66.0	
BJ2	3	19-Aug-2011			ok	ok			4	13.9	
BJ2	3	19-Aug-2011			Exclude	Exclude			5	17.4	
BJ2	3	19-Aug-2011			ok	ok			5	17.4	
BJ2	3	19-Aug-2011			ok	ok			4	13.9	
BJ2	3	19-Aug-2011			ok	ok			1	3.5	
BJ2	3	19-Aug-2011			ok	ok			3	10.4	
BJ2	3	19-Aug-2011			Exclude	Exclude			1	3.5	
BJ2	4	19-Aug-2011			ok	ok			16	55.6	
BJ2	4	19-Aug-2011			ok	ok			1	3.5	
BJ2	4	19-Aug-2011			ok	ok			1	3.5	
BJ2	4	19-Aug-2011			Exclude	Exclude			1	3.5	
BJ2	4	19-Aug-2011			ok	ok			3	10.4	
BJ2	4	19-Aug-2011			ok	ok			6	20.8	
BJ2	4	19-Aug-2011			ok	ok			5	17.4	
BJ2	4	19-Aug-2011			Exclude	Exclude			2	6.9	
BJ2	5	19-Aug-2011			ok	ok			35	121.5	
BJ2	5	19-Aug-2011			ok	Exclude			1	3.5	
BJ2	5	19-Aug-2011			ok	ok			7	24.3	
BJ2	5	19-Aug-2011			ok	ok			7	24.3	
BJ2	5	19-Aug-2011			ok	ok			6	20.8	
BJ2	5	19-Aug-2011			ok	ok			11	38.2	
BJ2	5	19-Aug-2011			ok	ok			1	3.5	
BJ2	5	19-Aug-2011			ok	ok	pupa		1	3.5	
BJ2	5	19-Aug-2011			Exclude	Exclude			2	6.9	
BJ2	1	7-Sep-2012			ok	ok			20	69.4	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
BJ2	1	7-Sep-2012	MA	Include	6204.4-1	0.288	100%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes* sp.
BJ2	1	7-Sep-2012	MA	Include	6204.4-1	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
BJ2	1	7-Sep-2012	MA	Include	6204.4-1	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ2	2	7-Sep-2012	MA	Include	6204.4-2	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ2	2	7-Sep-2012	MA	Include	6204.4-2	0.288	100%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes* sp.
BJ2	2	7-Sep-2012	MA	Include	6204.4-2	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ2	3	7-Sep-2012	MA	Include	6204.4-3	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ2	3	7-Sep-2012	MA	Include	6204.4-3	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius* sp.
BJ2	1	14-Aug-2013	MA	Include	6530.3-21	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae		Diamesinae
BJ2	1	14-Aug-2013	MA	Include	6530.3-21	0.288	100%	Nematoda	Nematoda						Nematoda
BJ2	1	14-Aug-2013	MA	Include	6530.3-21	0.288	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys* sp.
BJ2	1	14-Aug-2013	MA	Include	6530.3-21	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ2	1	14-Aug-2013	MA	Include	6530.3-21	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
BJ2	1	14-Aug-2013	MA	Include	6530.3-21	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius (Euorthocladius)* sp.
BJ2	1	14-Aug-2013	MA	Include	6530.3-21	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ2	1	14-Aug-2013	MA	Include	6530.3-21	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pagastia*	*Pagastia* sp.
BJ2	1	14-Aug-2013	MA	Include	6530.3-21	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa* sp.
BJ2	2	14-Aug-2013	MA	Include	6530.3-22	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ2	2	14-Aug-2013	MA	Include	6530.3-22	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Chaetocladius*	*Chaetocladius* sp.
BJ2	2	14-Aug-2013	MA	Include	6530.3-22	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
BJ2	2	14-Aug-2013	MA	Include	6530.3-22	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius (Euorthocladius)* sp.
BJ2	2	14-Aug-2013	MA	Include	6530.3-22	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ2	3	14-Aug-2013	MA	Include	6530.3-23	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ2	3	14-Aug-2013	MA	Include	6530.3-23	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae		*Nais*	*Nais* sp.
BJ2	3	14-Aug-2013	MA	Include	6530.3-23	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
BJ2	3	14-Aug-2013	MA	Include	6530.3-23	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ2	3	14-Aug-2013	MA	Include	6530.3-23	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
BJ2	3	14-Aug-2013	MA	Include	6530.3-23	0.288	100%	Nematoda	Nematoda						Nematoda
BJ2	3	14-Aug-2013	MA	Include	6530.3-23	0.288	100%	Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila verrula*
BJ2	4	14-Aug-2013	MA	Include	6530.3-24	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ2	4	14-Aug-2013	MA	Include	6530.3-24	0.288	100%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
BJ2	4	14-Aug-2013	MA	Include	6530.3-24	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
BJ2	4	14-Aug-2013	MA	Include	6530.3-24	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius (Euorthocladius)* sp.
BJ2	4	14-Aug-2013	MA	Include	6530.3-24	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ2	5	14-Aug-2013	MA	Include	6530.3-25	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ2	5	14-Aug-2013	MA	Include	6530.3-25	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae		*Nais*	*Nais* sp.
BJ2	5	14-Aug-2013	MA	Include	6530.3-25	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
BJ2	5	14-Aug-2013	MA	Include	6530.3-25	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius (Euorthocladius)* sp.
BJ2	5	14-Aug-2013	MA	Include	6530.3-25	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius*
BJ2	5	14-Aug-2013	MA	Include	6530.3-25	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ2	5	14-Aug-2013	MA	Include	6530.3-25	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa* sp.
BJ2	5	14-Aug-2013	MA	Include	6530.3-25	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Rheocricotopus*	*Rheocricotopus* sp.
BJ2	5	14-Aug-2013	MA	Include	6530.3-25	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia bavarica*
BJ2	5	14-Aug-2013	MA	Include	6530.3-25	0.288	100%	Nematoda	Nematoda						Nematoda
BJ2	5	14-Aug-2013	MA	Include	6530.3-25	0.288	100%	Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila verrula*
BJ3	1	7-Aug-2013	MA	Include	6530.3-6	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ3	1	7-Aug-2013	MA	Include	6530.3-6	0.288	100%	Diptera	Arthropoda	Insecta	Diptera	Empididae			Empididae
BJ3	1	7-Aug-2013	MA	Include	6530.3-6	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
BJ3	1	7-Aug-2013	MA	Include	6530.3-6	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ3	1	7-Aug-2013	MA	Include	6530.3-6	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
BJ3	1	7-Aug-2013	MA	Include	6530.3-6	0.288	100%	Nematoda	Nematoda						Nematoda
BJ3	2	7-Aug-2013	MA	Include	6530.3-7	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ3	2	7-Aug-2013	MA	Include	6530.3-7	0.288	100%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
BJ3	2	7-Aug-2013	MA	Include	6530.3-7	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
BJ2	1	7-Sep-2012			ok	ok			2	6.9	
BJ2	1	7-Sep-2012			ok	ok			1	3.5	
BJ2	1	7-Sep-2012			ok	ok			4	13.9	
BJ2	2	7-Sep-2012			ok	ok			5	17.4	
BJ2	2	7-Sep-2012			ok	ok			1	3.5	
BJ2	2	7-Sep-2012			ok	ok			2	6.9	
BJ2	3	7-Sep-2012			ok	ok			14	48.6	
BJ2	3	7-Sep-2012			ok	ok			2	6.9	
BJ2	1	14-Aug-2013	damaged		ok	Exclude			1	3.5	128341
BJ2	1	14-Aug-2013			Exclude	Exclude			1	3.5	59490
BJ2	1	14-Aug-2013			ok	ok			1	3.5	103110
BJ2	1	14-Aug-2013			ok	ok			5	17.4	68510
BJ2	1	14-Aug-2013			ok	ok			11	38.2	128355
BJ2	1	14-Aug-2013			ok	ok			1	3.5	568520
BJ2	1	14-Aug-2013			ok	ok			11	38.2	128874
BJ2	1	14-Aug-2013			ok	ok			1	3.5	128401
BJ2	1	14-Aug-2013			ok	ok			1	3.5	128416
BJ2	2	14-Aug-2013			ok	ok			4	13.9	68510
BJ2	2	14-Aug-2013			ok	ok			1	3.5	128520
BJ2	2	14-Aug-2013			ok	ok			41	142.4	128355
BJ2	2	14-Aug-2013			ok	ok			1	3.5	568520
BJ2	2	14-Aug-2013			ok	ok			8	27.8	128874
BJ2	3	14-Aug-2013			ok	ok			42	145.8	68510
BJ2	3	14-Aug-2013			ok	ok			3	10.4	68946
BJ2	3	14-Aug-2013			ok	ok			15	52.1	128355
BJ2	3	14-Aug-2013			ok	ok			3	10.4	128874
BJ2	3	14-Aug-2013	immature		ok	Exclude			3	10.4	128457
BJ2	3	14-Aug-2013			Exclude	Exclude			4	13.9	59490
BJ2	3	14-Aug-2013		gr.	ok	ok			1	3.5	
BJ2	4	14-Aug-2013			ok	ok			28	97.2	68510
BJ2	4	14-Aug-2013			ok	ok			1	3.5	83034
BJ2	4	14-Aug-2013			ok	ok			17	59.0	128355
BJ2	4	14-Aug-2013			ok	ok			1	3.5	568520
BJ2	4	14-Aug-2013			ok	ok			2	6.9	128874
BJ2	5	14-Aug-2013			ok	ok			63	218.8	68510
BJ2	5	14-Aug-2013			ok	ok			1	3.5	68946
BJ2	5	14-Aug-2013			ok	ok	4		31	107.6	128355
BJ2	5	14-Aug-2013			ok	ok			2	6.9	568520
BJ2	5	14-Aug-2013		Orthocladius Complex	ok	ok			1	3.5	
BJ2	5	14-Aug-2013			ok	ok			10	34.7	128874
BJ2	5	14-Aug-2013			ok	ok			1	3.5	128416
BJ2	5	14-Aug-2013			ok	ok			1	3.5	129086
BJ2	5	14-Aug-2013		gr.	ok	ok			1	3.5	
BJ2	5	14-Aug-2013			Exclude	Exclude			2	6.9	59490
BJ2	5	14-Aug-2013		gr.	ok	ok			1	3.5	
BJ3	1	7-Aug-2013			ok	ok			1	3.5	68510
BJ3	1	7-Aug-2013	uncertain		ok	Exclude			1	3.5	135830
BJ3	1	7-Aug-2013			ok	ok	16		60	208.3	128355
BJ3	1	7-Aug-2013			ok	ok			2	6.9	128874
BJ3	1	7-Aug-2013			Exclude	Exclude		3	3	10.4	127917
BJ3	1	7-Aug-2013			Exclude	Exclude			1	3.5	59490
BJ3	2	7-Aug-2013			ok	ok			7	24.3	68510
BJ3	2	7-Aug-2013			Exclude	Exclude			1	3.5	88530
BJ3	2	7-Aug-2013			ok	ok	10		50	173.6	128355

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
BJ3	2	7-Aug-2013	MA	Include	6530.3-7	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ3	2	7-Aug-2013	MA	Include	6530.3-7	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
BJ3	2	7-Aug-2013	MA	Include	6530.3-7	0.288	100%	Nematoda	Nematoda						Nematoda
BJ3	3	7-Aug-2013	MA	Include	6530.3-8	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ3	3	7-Aug-2013	MA	Include	6530.3-8	0.288	100%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
BJ3	3	7-Aug-2013	MA	Include	6530.3-8	0.288	100%	Diptera	Arthropoda	Insecta	Diptera	Empididae			Empididae
BJ3	3	7-Aug-2013	MA	Include	6530.3-8	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
BJ3	3	7-Aug-2013	MA	Include	6530.3-8	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae		Diamesinae
BJ3	3	7-Aug-2013	MA	Include	6530.3-8	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
BJ3	3	7-Aug-2013	MA	Include	6530.3-8	0.288	100%	Nematoda	Nematoda						Nematoda
BJ3	4	7-Aug-2013	MA	Include	6530.3-9	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ3	4	7-Aug-2013	MA	Include	6530.3-9	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae		*Nais*	*Nais* sp.
BJ3	4	7-Aug-2013	MA	Include	6530.3-9	0.288	100%	Diptera	Arthropoda	Insecta	Diptera	Empididae			Empididae
BJ3	4	7-Aug-2013	MA	Include	6530.3-9	0.288	100%	Diptera	Arthropoda	Insecta	Diptera	Simuliidae			Simuliidae
BJ3	4	7-Aug-2013	MA	Include	6530.3-9	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
BJ3	4	7-Aug-2013	MA	Include	6530.3-9	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius*
BJ3	4	7-Aug-2013	MA	Include	6530.3-9	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae		Diamesinae
BJ3	4	7-Aug-2013	MA	Include	6530.3-9	0.288	100%	Nematoda	Nematoda						Nematoda
BJ3	5	7-Aug-2013	MA	Include	6530.3-10	0.288	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ3	5	7-Aug-2013	MA	Include	6530.3-10	0.288	100%	Diptera	Arthropoda	Insecta	Diptera	Empididae			Empididae
BJ3	5	7-Aug-2013	MA	Include	6530.3-10	0.288	100%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Antocha*	*Antocha* sp.
BJ3	5	7-Aug-2013	MA	Include	6530.3-10	0.288	100%	Diptera	Arthropoda	Insecta	Diptera				Diptera
BJ3	5	7-Aug-2013	MA	Include	6530.3-10	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
BJ3	5	7-Aug-2013	MA	Include	6530.3-10	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius*
BJ3	5	7-Aug-2013	MA	Include	6530.3-10	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ3	5	7-Aug-2013	MA	Include	6530.3-10	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tokunagaia*	*Tokunagaia* sp.
BJ3	5	7-Aug-2013	MA	Include	6530.3-10	0.288	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae		Diamesinae
BJ3	5	7-Aug-2013	MA	Include	6530.3-10	0.288	100%	Nematoda	Nematoda						Nematoda
BJ3	5	7-Aug-2013	MA	Include	6530.3-10	0.288	100%	Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila verrula*
SC0	1	8-Aug-2013	MA	Include	6530.3-11	0.288									
SC0	2	8-Aug-2013	MA	Include	6530.3-12	0.288									
SC0	3	8-Aug-2013	MA	Include	6530.3-13	0.288									
SC0	4	8-Aug-2013	MA	Include	6530.3-14	0.288	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
SC0	5	8-Aug-2013	MA	Include	6530.3-15	0.288									
SC1	1	19-Aug-2008	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
SC1	1	19-Aug-2008	MA	Include		0.288		Collembola	Arthropoda	Collembola					Collembola
SC1	1	19-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
SC1	1	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC1	1	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC1	1	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
SC1	1	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Smittia*	*Smittia*
SC1	1	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
SC1	1	19-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
SC1	1	19-Aug-2008	MA	Include		0.288		Terrestrial							Terrestrial
SC1	2	19-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
SC1	2	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC1	2	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC1	2	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
SC1	2	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
SC1	2	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus celer*
SC1	2	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
SC1	2	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
SC1	2	19-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
SC1	2	19-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
BJ3	2	7-Aug-2013			ok	ok			1	3.5	128874
BJ3	2	7-Aug-2013			Exclude	Exclude		3	3	10.4	127917
BJ3	2	7-Aug-2013			Exclude	Exclude			1	3.5	59490
BJ3	3	7-Aug-2013			ok	ok			2	6.9	68510
BJ3	3	7-Aug-2013			Exclude	Exclude		1	1	3.5	88530
BJ3	3	7-Aug-2013	uncertain		ok	Exclude			2	6.9	135830
BJ3	3	7-Aug-2013			ok	ok	9		38	131.9	128355
BJ3	3	7-Aug-2013	damaged		ok	Exclude	3		3	10.4	128341
BJ3	3	7-Aug-2013			Exclude	Exclude		1	1	3.5	127917
BJ3	3	7-Aug-2013			Exclude	Exclude			5	17.4	59490
BJ3	4	7-Aug-2013			ok	ok			3	10.4	68510
BJ3	4	7-Aug-2013			ok	ok			2	6.9	68946
BJ3	4	7-Aug-2013	uncertain		ok	Exclude			1	3.5	135830
BJ3	4	7-Aug-2013	damaged		ok	Exclude	1		1	3.5	126640
BJ3	4	7-Aug-2013			ok	ok	22		82	284.7	128355
BJ3	4	7-Aug-2013		Orthocladius Complex	ok	ok			1	3.5	
BJ3	4	7-Aug-2013			ok	ok	2		2	6.9	128341
BJ3	4	7-Aug-2013			Exclude	Exclude			3	10.4	59490
BJ3	5	7-Aug-2013			ok	ok			4	13.9	68510
BJ3	5	7-Aug-2013	uncertain		ok	Exclude			1	3.5	135830
BJ3	5	7-Aug-2013			ok	ok			1	3.5	119656
BJ3	5	7-Aug-2013			Exclude	Exclude		1	1	3.5	118831
BJ3	5	7-Aug-2013			ok	ok	17		44	152.8	128355
BJ3	5	7-Aug-2013		Orthocladius Complex	ok	ok			1	3.5	
BJ3	5	7-Aug-2013			ok	ok			3	10.4	128874
BJ3	5	7-Aug-2013			ok	ok			1	3.5	129194
BJ3	5	7-Aug-2013	damaged		ok	Exclude	2		2	6.9	128341
BJ3	5	7-Aug-2013			Exclude	Exclude			3	10.4	59490
BJ3	5	7-Aug-2013		gr.	ok	ok			1	3.5	
SC0	1	8-Aug-2013			ok	ok			0	0.0	
SC0	2	8-Aug-2013			ok	ok			0	0.0	
SC0	3	8-Aug-2013			ok	ok			0	0.0	
SC0	4	8-Aug-2013	immature		ok	Exclude			1	3.5	102517
SC0	5	8-Aug-2013			ok	ok			0	0.0	
SC1	1	19-Aug-2008			ok	ok			1	3.5	
SC1	1	19-Aug-2008			Exclude	Exclude			1	3.5	
SC1	1	19-Aug-2008			ok	ok			3	10.4	
SC1	1	19-Aug-2008			ok	ok			7	24.3	
SC1	1	19-Aug-2008			ok	ok			71	246.5	
SC1	1	19-Aug-2008		cf.	ok	ok			4	13.9	
SC1	1	19-Aug-2008			ok	ok			1	3.5	
SC1	1	19-Aug-2008			ok	ok			1	3.5	
SC1	1	19-Aug-2008			ok	ok			3	10.4	
SC1	1	19-Aug-2008			Exclude	Exclude			1	3.5	
SC1	2	19-Aug-2008			ok	ok			1	3.5	
SC1	2	19-Aug-2008			ok	ok			13	45.1	
SC1	2	19-Aug-2008			ok	ok			79	274.3	
SC1	2	19-Aug-2008		cf.	ok	ok			17	59.0	
SC1	2	19-Aug-2008			ok	ok	pupa		3	10.4	
SC1	2	19-Aug-2008			ok	ok			1	3.5	
SC1	2	19-Aug-2008			ok	ok			1	3.5	
SC1	2	19-Aug-2008			ok	ok			1	3.5	
SC1	2	19-Aug-2008			ok	ok			4	13.9	
SC1	2	19-Aug-2008			ok	ok			3	10.4	

Notes:
MA = Mine Site Area and Down
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R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
SC1	3	19-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
SC1	3	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC1	3	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC1	3	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
SC1	3	19-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
SC1	4	19-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
SC1	4	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC1	4	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC1	4	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
SC1	4	19-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
SC1	4	19-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
SC1	4	19-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
SC1	5	19-Aug-2008	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
SC1	5	19-Aug-2008	MA	Include		0.288		Coleoptera	Arthropoda	Insecta	Coleoptera	Hydraenidae		*Hydraena*	*Hydraena*
SC1	5	19-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Ephydridae			Ephydridae
SC1	5	19-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
SC1	5	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC1	5	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC1	5	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
SC1	5	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
SC1	5	19-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
SC1	5	19-Aug-2008	MA	Include		0.288		Terrestrial							Terrestrial
SC1	1	1-Aug-2009	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
SC1	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
SC1	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC1	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC1	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius*
SC1	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parakiefferiella*	*Parakiefferiella*
SC1	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
SC1	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Rheocricotopus*	*Rheocricotopus*
SC1	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
SC1	1	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
SC1	1	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
SC1	1	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
SC1	1	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
SC1	1	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
SC1	1	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
SC1	1	1-Aug-2009	MA	Include		0.288		Terrestrial							Terrestrial
SC1	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC1	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC1	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
SC1	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
SC1	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
SC1	2	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
SC1	2	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
SC1	2	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
SC1	3	1-Aug-2009	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Lumbriculida	Lumbriculidae			Lumbriculidae
SC1	3	1-Aug-2009	MA	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
SC1	3	1-Aug-2009	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
SC1	3	1-Aug-2009	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
SC1	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC1	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC1	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
SC1	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
SC1	3	19-Aug-2008			ok	ok			3	10.4	
SC1	3	19-Aug-2008			ok	ok			4	13.9	
SC1	3	19-Aug-2008			ok	ok			22	76.4	
SC1	3	19-Aug-2008		cf.	ok	ok			12	41.7	
SC1	3	19-Aug-2008			ok	ok			1	3.5	
SC1	4	19-Aug-2008			ok	ok			2	6.9	
SC1	4	19-Aug-2008			ok	ok			1	3.5	
SC1	4	19-Aug-2008			ok	ok			15	52.1	
SC1	4	19-Aug-2008		cf.	ok	ok			2	6.9	
SC1	4	19-Aug-2008			ok	ok			1	3.5	
SC1	4	19-Aug-2008			ok	ok			3	10.4	
SC1	4	19-Aug-2008			ok	ok			1	3.5	
SC1	5	19-Aug-2008			ok	ok			1	3.5	
SC1	5	19-Aug-2008			ok	ok			1	3.5	
SC1	5	19-Aug-2008			ok	ok			2	6.9	
SC1	5	19-Aug-2008			ok	ok			3	10.4	
SC1	5	19-Aug-2008			ok	ok			1	3.5	
SC1	5	19-Aug-2008			ok	ok			22	76.4	
SC1	5	19-Aug-2008		cf.	ok	ok			1	3.5	
SC1	5	19-Aug-2008			ok	ok			1	3.5	
SC1	5	19-Aug-2008			ok	ok			1	3.5	
SC1	5	19-Aug-2008			Exclude	Exclude			1	3.5	
SC1	1	1-Aug-2009			ok	ok			1	3.5	
SC1	1	1-Aug-2009			ok	ok			1	3.5	
SC1	1	1-Aug-2009			ok	ok			9	31.3	
SC1	1	1-Aug-2009			ok	ok			34	118.1	
SC1	1	1-Aug-2009			ok	ok			1	3.5	
SC1	1	1-Aug-2009			ok	ok			1	3.5	
SC1	1	1-Aug-2009		cf.	ok	ok			3	10.4	
SC1	1	1-Aug-2009			ok	ok			1	3.5	
SC1	1	1-Aug-2009			ok	ok	pupa		2	6.9	
SC1	1	1-Aug-2009			ok	ok			1	3.5	
SC1	1	1-Aug-2009			ok	ok			1	3.5	
SC1	1	1-Aug-2009	damaged		ok	Exclude			1	3.5	
SC1	1	1-Aug-2009			ok	ok			1	3.5	
SC1	1	1-Aug-2009			ok	ok			1	3.5	
SC1	1	1-Aug-2009			ok	ok			9	31.3	
SC1	1	1-Aug-2009			Exclude	Exclude			1	3.5	
SC1	2	1-Aug-2009			ok	ok			12	41.7	
SC1	2	1-Aug-2009			ok	ok			19	66.0	
SC1	2	1-Aug-2009			ok	ok			1	3.5	
SC1	2	1-Aug-2009	damaged		ok	Exclude			1	3.5	
SC1	2	1-Aug-2009			ok	ok	pupa		6	20.8	
SC1	2	1-Aug-2009			ok	ok			1	3.5	
SC1	2	1-Aug-2009			ok	ok			1	3.5	
SC1	2	1-Aug-2009			ok	ok			12	41.7	
SC1	3	1-Aug-2009			ok	ok			5	17.4	
SC1	3	1-Aug-2009			ok	Exclude			4	13.9	
SC1	3	1-Aug-2009			ok	ok			4	13.9	
SC1	3	1-Aug-2009			ok	ok			7	24.3	
SC1	3	1-Aug-2009			ok	ok			145	503.5	
SC1	3	1-Aug-2009			ok	ok			147	510.4	
SC1	3	1-Aug-2009		cf.	ok	ok			32	111.1	
SC1	3	1-Aug-2009			ok	ok			1	3.5	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
SC1	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
SC1	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
SC1	3	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
SC1	3	1-Aug-2009	MA	Include		0.288		Nematoda	Nematoda						Nematoda
SC1	3	1-Aug-2009	MA	Include		0.288		Ostracoda	Arthropoda	Ostracoda					Ostracoda
SC1	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
SC1	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
SC1	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
SC1	4	1-Aug-2009	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
SC1	4	1-Aug-2009	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Ephydridae			Ephydridae
SC1	4	1-Aug-2009	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
SC1	4	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC1	4	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC1	4	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
SC1	4	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa*
SC1	4	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
SC1	4	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
SC1	4	1-Aug-2009	MA	Include		0.288		Terrestrial							Terrestrial
SC1	5	1-Aug-2009	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Empididae		*Clinocera*	*Clinocera*
SC1	5	1-Aug-2009	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
SC1	5	1-Aug-2009	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
SC1	5	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC1	5	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC1	5	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parorthocladius*	*Parorthocladius*
SC1	5	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
SC1	5	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
SC1	5	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
SC1	5	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
SC1	5	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
SC1	5	1-Aug-2009	MA	Include		0.288		Nematoda	Nematoda						Nematoda
SC1	5	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
SC1	5	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
SC1	5	1-Aug-2009	MA	Include		0.288		Terrestrial							Terrestrial
SC2	1	18-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC2	1	18-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Pseudosmittia*	*Pseudosmittia*
SC2	1	18-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
SC2	1	18-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
SC2	1	18-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
SC2	1	18-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
SC2	1	18-Aug-2008	MA	Include		0.288		Terrestrial							Terrestrial
SC2	2	18-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Simuliidae		*Helodon*	*Helodon*
SC2	2	18-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC2	2	18-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
SC2	2	18-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae			Perlodidae
SC2	3	18-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC2	3	18-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC2	3	18-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Pseudosmittia*	*Pseudosmittia*
SC2	3	18-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
SC2	3	18-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
SC2	3	18-Aug-2008	MA	Include		0.288		Nematoda	Nematoda						Nematoda
SC2	3	18-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
SC2	4	18-Aug-2008	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
SC2	4	18-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC2	4	18-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
SC1	3	1-Aug-2009	damaged		ok	Exclude			16	55.6	
SC1	3	1-Aug-2009			ok	ok	pupa		35	121.5	
SC1	3	1-Aug-2009			ok	ok			3	10.4	
SC1	3	1-Aug-2009			Exclude	Exclude			4	13.9	
SC1	3	1-Aug-2009			Exclude	Exclude			4	13.9	
SC1	3	1-Aug-2009			ok	ok			8	27.8	
SC1	3	1-Aug-2009			ok	ok			3	10.4	
SC1	3	1-Aug-2009			ok	ok			4	13.9	
SC1	4	1-Aug-2009			ok	ok			8	27.8	
SC1	4	1-Aug-2009			ok	ok			1	3.5	
SC1	4	1-Aug-2009			ok	ok			17	59.0	
SC1	4	1-Aug-2009			ok	ok			89	309.0	
SC1	4	1-Aug-2009			ok	ok			310	1,076.4	
SC1	4	1-Aug-2009		cf.	ok	ok			16	55.6	
SC1	4	1-Aug-2009			ok	ok			2	6.9	
SC1	4	1-Aug-2009			ok	ok	pupa		21	72.9	
SC1	4	1-Aug-2009			ok	ok			1	3.5	
SC1	4	1-Aug-2009			Exclude	Exclude			8	27.8	
SC1	5	1-Aug-2009			ok	ok			1	3.5	
SC1	5	1-Aug-2009			ok	ok			8	27.8	
SC1	5	1-Aug-2009			ok	ok			9	31.3	
SC1	5	1-Aug-2009			ok	ok			254	881.9	
SC1	5	1-Aug-2009			ok	ok			66	229.2	
SC1	5	1-Aug-2009			ok	ok			8	27.8	
SC1	5	1-Aug-2009		cf.	ok	ok			24	83.3	
SC1	5	1-Aug-2009	damaged		ok	Exclude			8	27.8	
SC1	5	1-Aug-2009			ok	ok	pupa		106	368.1	
SC1	5	1-Aug-2009			ok	ok			1	3.5	
SC1	5	1-Aug-2009			ok	ok			2	6.9	
SC1	5	1-Aug-2009			Exclude	Exclude			33	114.6	
SC1	5	1-Aug-2009			ok	ok			1	3.5	
SC1	5	1-Aug-2009			ok	ok			2	6.9	
SC1	5	1-Aug-2009			Exclude	Exclude			1	3.5	
SC2	1	18-Aug-2008			ok	ok			4	13.9	
SC2	1	18-Aug-2008			ok	ok			1	3.5	
SC2	1	18-Aug-2008	damaged		ok	Exclude			1	3.5	
SC2	1	18-Aug-2008			ok	ok			2	6.9	
SC2	1	18-Aug-2008			ok	ok			1	3.5	
SC2	1	18-Aug-2008			ok	ok			5	17.4	
SC2	1	18-Aug-2008			Exclude	Exclude			1	3.5	
SC2	2	18-Aug-2008			ok	ok			1	3.5	
SC2	2	18-Aug-2008			ok	ok			2	6.9	
SC2	2	18-Aug-2008			ok	ok			1	3.5	
SC2	2	18-Aug-2008	damaged		ok	Exclude			1	3.5	
SC2	3	18-Aug-2008			ok	ok			1	3.5	
SC2	3	18-Aug-2008			ok	ok			2	6.9	
SC2	3	18-Aug-2008			ok	ok			1	3.5	
SC2	3	18-Aug-2008			ok	ok	pupa		1	3.5	
SC2	3	18-Aug-2008			ok	ok			1	3.5	
SC2	3	18-Aug-2008			Exclude	Exclude			1	3.5	
SC2	3	18-Aug-2008			ok	ok			1	3.5	
SC2	4	18-Aug-2008			ok	ok			1	3.5	
SC2	4	18-Aug-2008			ok	ok			1	3.5	
SC2	4	18-Aug-2008			ok	ok			1	3.5	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
SC2	5	18-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC2	5	18-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
SC2	1	1-Aug-2009	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Empididae			Genus 1
SC2	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC2	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC2	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pagastia*	*Pagastia*
SC2	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
SC2	1	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
SC2	1	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
SC2	1	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
SC2	2	1-Aug-2009	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
SC2	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC2	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Paraphaenocladius*	*Paraphaenocladius*
SC2	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Pseudosmittia*	*Pseudosmittia*
SC2	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
SC2	2	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
SC2	2	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
SC2	2	1-Aug-2009	MA	Include		0.288		Terrestrial							Terrestrial
SC2	3	1-Aug-2009	MA	Include		0.288		Collembola	Arthropoda	Collembola					Collembola
SC2	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC2	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC2	3	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
SC2	3	1-Aug-2009	MA	Include		0.288		Nematoda	Nematoda						Nematoda
SC2	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
SC2	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
SC2	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
SC2	3	1-Aug-2009	MA	Include		0.288		Terrestrial							Terrestrial
SC2	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
SC2	3	1-Aug-2009	MA	Include		0.288		Terrestrial							Terrestrial
SC2	4	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC2	4	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
SC2	4	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
SC2	4	1-Aug-2009	MA	Include		0.288		Terrestrial							Terrestrial
SC2	5	1-Aug-2009	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Empididae		*Oreogeton*	*Oreogeton*
SC2	5	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC2	5	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC2	5	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
SC3	1	19-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Simuliidae		*Helodon*	*Helodon*
SC3	1	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC3	1	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC3	1	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
SC3	1	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
SC3	1	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
SC3	1	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
SC3	1	19-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
SC3	1	19-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
SC3	2	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC3	2	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC3	2	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
SC3	2	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
SC3	2	19-Aug-2008	MA	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Hydropsychidae		*Parapsyche*	*Parapsyche*
SC3	3	19-Aug-2008	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
SC3	3	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC3	3	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC3	3	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
SC3	3	19-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae			Perlodidae

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
SC2	5	18-Aug-2008			ok	ok			2	6.9	
SC2	5	18-Aug-2008		cf.	ok	ok			1	3.5	
SC2	1	1-Aug-2009		Possible new genus and speci	ok	ok			1	3.5	
SC2	1	1-Aug-2009			ok	ok			2	6.9	
SC2	1	1-Aug-2009			ok	ok			7	24.3	
SC2	1	1-Aug-2009			ok	ok			2	6.9	
SC2	1	1-Aug-2009		cf.	ok	ok			1	3.5	
SC2	1	1-Aug-2009			ok	ok			1	3.5	
SC2	1	1-Aug-2009			ok	ok			2	6.9	
SC2	1	1-Aug-2009			ok	ok			1	3.5	
SC2	2	1-Aug-2009			ok	ok			1	3.5	
SC2	2	1-Aug-2009			ok	ok			7	24.3	
SC2	2	1-Aug-2009			ok	ok			1	3.5	
SC2	2	1-Aug-2009			ok	ok			1	3.5	
SC2	2	1-Aug-2009			ok	ok			1	3.5	
SC2	2	1-Aug-2009			ok	ok			1	3.5	
SC2	2	1-Aug-2009			ok	ok			1	3.5	
SC2	2	1-Aug-2009			Exclude	Exclude			2	6.9	
SC2	3	1-Aug-2009			Exclude	Exclude			1	3.5	
SC2	3	1-Aug-2009			ok	ok			1	3.5	
SC2	3	1-Aug-2009			ok	ok			2	6.9	
SC2	3	1-Aug-2009			ok	ok			1	3.5	
SC2	3	1-Aug-2009			Exclude	Exclude			1	3.5	
SC2	3	1-Aug-2009			ok	ok			1	3.5	
SC2	3	1-Aug-2009			ok	ok			2	6.9	
SC2	3	1-Aug-2009			ok	ok			6	20.8	
SC2	3	1-Aug-2009			Exclude	Exclude			5	17.4	
SC2	3	1-Aug-2009			ok	ok			6	20.8	
SC2	3	1-Aug-2009			Exclude	Exclude			5	17.4	
SC2	4	1-Aug-2009			ok	ok			1	3.5	
SC2	4	1-Aug-2009			ok	ok			1	3.5	
SC2	4	1-Aug-2009			ok	ok			1	3.5	
SC2	4	1-Aug-2009			Exclude	Exclude			1	3.5	
SC2	5	1-Aug-2009			ok	ok			1	3.5	
SC2	5	1-Aug-2009			ok	ok			1	3.5	
SC2	5	1-Aug-2009			ok	ok			1	3.5	
SC2	5	1-Aug-2009			ok	ok			2	6.9	
SC3	1	19-Aug-2008			ok	ok			1	3.5	
SC3	1	19-Aug-2008			ok	ok			1	3.5	
SC3	1	19-Aug-2008			ok	ok			18	62.5	
SC3	1	19-Aug-2008			ok	ok			3	10.4	
SC3	1	19-Aug-2008			ok	ok	pupa		1	3.5	
SC3	1	19-Aug-2008			ok	ok			1	3.5	
SC3	1	19-Aug-2008			ok	ok			2	6.9	
SC3	1	19-Aug-2008			ok	ok			1	3.5	
SC3	1	19-Aug-2008			ok	ok			1	3.5	
SC3	2	19-Aug-2008			ok	ok			1	3.5	
SC3	2	19-Aug-2008			ok	ok			10	34.7	
SC3	2	19-Aug-2008			ok	ok			1	3.5	
SC3	2	19-Aug-2008			ok	ok			1	3.5	
SC3	2	19-Aug-2008			ok	ok			1	3.5	
SC3	3	19-Aug-2008			ok	ok			2	6.9	
SC3	3	19-Aug-2008			ok	ok			4	13.9	
SC3	3	19-Aug-2008			ok	ok			10	34.7	
SC3	3	19-Aug-2008		cf.	ok	ok			1	3.5	
SC3	3	19-Aug-2008	damaged		ok	Exclude			1	3.5	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
SC3	4	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC3	4	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
SC3	4	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
SC3	4	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
SC3	4	19-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae			Perlodidae
SC3	4	19-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
SC3	5	19-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Forcipomyiinae	*Forcipomyia*	*Forcipomyia*
SC3	5	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC3	5	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC3	5	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
SC3	5	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Pseudosmittia*	*Pseudosmittia*
SC3	5	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
SC3	5	19-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae			Perlodidae
SC3	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC3	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC3	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC3	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
SC3	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC3	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
SC3	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
SC3	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
SC3	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
SC3	3	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
SC3	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Sweltsa*	*Sweltsa*
SC3	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
SC3	4	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
SC3	4	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
SC3	5	1-Aug-2009	MA	Include		0.288									
UR1A	1	17-Aug-2008	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
UR1A	1	17-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
UR1A	1	17-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
UR1A	1	17-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
UR1A	1	17-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parorthocladius*	*Parorthocladius*
UR1A	1	17-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
UR1A	1	17-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
UR1A	1	17-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR1A	1	17-Aug-2008	MA	Include		0.288		Terrestrial							Terrestrial
UR1A	2	17-Aug-2008	MA	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
UR1A	2	17-Aug-2008	MA	Include		0.288		Coleoptera	Arthropoda	Insecta	Coleoptera	Hydraenidae		*Hydraena*	*Hydraena*
UR1A	2	17-Aug-2008	MA	Include		0.288		Collembola	Arthropoda	Collembola					Collembola
UR1A	2	17-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Empididae			Empididae
UR1A	2	17-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Erioptera*	*Erioptera*
UR1A	2	17-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Rhabdomastix*	*Rhabdomastix*
UR1A	2	17-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
UR1A	2	17-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
UR1A	2	17-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
UR1A	2	17-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
UR1A	2	17-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
UR1A	2	17-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
UR1A	2	17-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
UR1A	2	17-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus sparsatus*
UR1A	2	17-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR1A	2	17-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
UR1A	2	17-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
SC3	4	19-Aug-2008			ok	ok			12	41.7	
SC3	4	19-Aug-2008		cf.	ok	ok			1	3.5	
SC3	4	19-Aug-2008			ok	ok			1	3.5	
SC3	4	19-Aug-2008			ok	ok			1	3.5	
SC3	4	19-Aug-2008	damaged		ok	Exclude			1	3.5	
SC3	4	19-Aug-2008			ok	ok			1	3.5	
SC3	5	19-Aug-2008			ok	ok			1	3.5	
SC3	5	19-Aug-2008			ok	ok			4	13.9	
SC3	5	19-Aug-2008			ok	ok			5	17.4	
SC3	5	19-Aug-2008		cf.	ok	ok			3	10.4	
SC3	5	19-Aug-2008			ok	ok			1	3.5	
SC3	5	19-Aug-2008			ok	ok	pupa		1	3.5	
SC3	5	19-Aug-2008	damaged		ok	Exclude			2	6.9	
SC3	1	1-Aug-2009			ok	ok			4	13.9	
SC3	2	1-Aug-2009			ok	ok			1	3.5	
SC3	2	1-Aug-2009			ok	ok			4	13.9	
SC3	2	1-Aug-2009			ok	ok			1	3.5	
SC3	3	1-Aug-2009			ok	ok			2	6.9	
SC3	3	1-Aug-2009			ok	ok			2	6.9	
SC3	3	1-Aug-2009			ok	ok			1	3.5	
SC3	3	1-Aug-2009			ok	ok			1	3.5	
SC3	3	1-Aug-2009			ok	ok	pupa		1	3.5	
SC3	3	1-Aug-2009			ok	ok			1	3.5	
SC3	3	1-Aug-2009			ok	ok			1	3.5	
SC3	3	1-Aug-2009			ok	ok			1	3.5	
SC3	4	1-Aug-2009			ok	ok			1	3.5	
SC3	4	1-Aug-2009			ok	ok			1	3.5	
SC3	5	1-Aug-2009			ok	ok			0	0.0	
UR1A	1	17-Aug-2008			ok	ok			1	3.5	
UR1A	1	17-Aug-2008			ok	ok			5	17.4	
UR1A	1	17-Aug-2008			ok	ok			4	13.9	
UR1A	1	17-Aug-2008			ok	ok			3	10.4	
UR1A	1	17-Aug-2008			ok	ok			2	6.9	
UR1A	1	17-Aug-2008		cf.	ok	ok			4	13.9	
UR1A	1	17-Aug-2008			ok	ok			3	10.4	
UR1A	1	17-Aug-2008			ok	ok			3	10.4	
UR1A	1	17-Aug-2008			Exclude	Exclude			1	3.5	
UR1A	2	17-Aug-2008			ok	Exclude			1	3.5	
UR1A	2	17-Aug-2008			ok	ok			1	3.5	
UR1A	2	17-Aug-2008			Exclude	Exclude			3	10.4	
UR1A	2	17-Aug-2008			ok	ok	pupa		1	3.5	
UR1A	2	17-Aug-2008			ok	ok			1	3.5	
UR1A	2	17-Aug-2008			ok	ok			1	3.5	
UR1A	2	17-Aug-2008			ok	ok			1	3.5	
UR1A	2	17-Aug-2008			ok	ok			7	24.3	
UR1A	2	17-Aug-2008			ok	ok			1	3.5	
UR1A	2	17-Aug-2008			ok	ok			3	10.4	
UR1A	2	17-Aug-2008		cf.	ok	ok			3	10.4	
UR1A	2	17-Aug-2008	damaged		ok	Exclude			1	3.5	
UR1A	2	17-Aug-2008			ok	ok			3	10.4	
UR1A	2	17-Aug-2008			ok	ok			1	3.5	
UR1A	2	17-Aug-2008			ok	ok			8	27.8	
UR1A	2	17-Aug-2008			ok	ok			1	3.5	
UR1A	2	17-Aug-2008			ok	ok			2	6.9	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
UR1A	2	17-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
UR1A	2	17-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
UR1A	2	17-Aug-2008	MA	Include		0.288		Terrestrial							Terrestrial
UR1A	2	17-Aug-2008	MA	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
UR1A	3	17-Aug-2008	MA	Include		0.288		Collembola	Arthropoda	Collembola					Collembola
UR1A	3	17-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Hexatoma/Limnophila*	*Hexatoma/Limnophila*
UR1A	3	17-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Rhabdomastix*	*Rhabdomastix*
UR1A	3	17-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Rhabdomastix*	*Rhabdomastix*
UR1A	3	17-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
UR1A	3	17-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
UR1A	3	17-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
UR1A	3	17-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR1A	3	17-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
UR1A	3	17-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Isoperla*	*Isoperla*
UR1A	3	17-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
UR1A	3	17-Aug-2008	MA	Include		0.288		Terrestrial							Terrestrial
UR1A	4	17-Aug-2008	MA	Include		0.288		Collembola	Arthropoda	Collembola					Collembola
UR1A	4	17-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Rhabdomastix*	*Rhabdomastix*
UR1A	4	17-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
UR1A	4	17-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius*
UR1A	4	17-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
UR1A	4	17-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR1A	4	17-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
UR1A	4	17-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
UR1A	5	17-Aug-2008	MA	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
UR1A	5	17-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Erioptera*	*Erioptera*
UR1A	5	17-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Rhabdomastix*	*Rhabdomastix*
UR1A	5	17-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
UR1A	5	17-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Zalutschia*	*Zalutschia*
UR1A	5	17-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
UR1A	5	17-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR1A	5	17-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
UR1A	5	17-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
UR1A	5	17-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
UR1A	5	17-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae			Perlodidae
UR1A	1	1-Aug-2009	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
UR1A	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
UR1A	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
UR1A	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Tanytarsus*	*Tanytarsus*
UR1A	1	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
UR1A	1	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR1A	1	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
UR1A	1	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
UR1A	1	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
UR1A	1	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
UR1A	1	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
UR1A	1	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
UR1A	1	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
UR1A	1	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
UR1A	1	1-Aug-2009	MA	Include		0.288		Terrestrial							Terrestrial
UR1A	2	1-Aug-2009	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
UR1A	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
UR1A	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
UR1A	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
UR1A	2	17-Aug-2008			ok	ok			1	3.5	
UR1A	2	17-Aug-2008			ok	ok			2	6.9	
UR1A	2	17-Aug-2008			Exclude	Exclude			1	3.5	
UR1A	2	17-Aug-2008			ok	ok			1	3.5	
UR1A	3	17-Aug-2008			Exclude	Exclude			6	20.8	
UR1A	3	17-Aug-2008			ok	ok			1	3.5	
UR1A	3	17-Aug-2008			ok	ok			3	10.4	
UR1A	3	17-Aug-2008			ok	ok	pupa		1	3.5	
UR1A	3	17-Aug-2008			ok	ok			5	17.4	
UR1A	3	17-Aug-2008			ok	ok			7	24.3	
UR1A	3	17-Aug-2008		cf.	ok	ok			4	13.9	
UR1A	3	17-Aug-2008			ok	ok			6	20.8	
UR1A	3	17-Aug-2008			ok	ok			1	3.5	
UR1A	3	17-Aug-2008			ok	ok			1	3.5	
UR1A	3	17-Aug-2008			ok	ok			1	3.5	
UR1A	3	17-Aug-2008			Exclude	Exclude			1	3.5	
UR1A	4	17-Aug-2008			Exclude	Exclude			1	3.5	
UR1A	4	17-Aug-2008			ok	ok			4	13.9	
UR1A	4	17-Aug-2008			ok	ok			2	6.9	
UR1A	4	17-Aug-2008			ok	ok			1	3.5	
UR1A	4	17-Aug-2008		cf.	ok	ok			1	3.5	
UR1A	4	17-Aug-2008			ok	ok			5	17.4	
UR1A	4	17-Aug-2008			ok	ok			1	3.5	
UR1A	4	17-Aug-2008			ok	ok			1	3.5	
UR1A	5	17-Aug-2008			ok	Exclude			1	3.5	
UR1A	5	17-Aug-2008			ok	ok			1	3.5	
UR1A	5	17-Aug-2008			ok	ok			5	17.4	
UR1A	5	17-Aug-2008			ok	ok			1	3.5	
UR1A	5	17-Aug-2008			ok	ok			5	17.4	
UR1A	5	17-Aug-2008			ok	ok			1	3.5	
UR1A	5	17-Aug-2008			ok	ok			1	3.5	
UR1A	5	17-Aug-2008			ok	ok	pupa		1	3.5	
UR1A	5	17-Aug-2008			ok	ok			1	3.5	
UR1A	5	17-Aug-2008			ok	ok			1	3.5	
UR1A	5	17-Aug-2008			ok	ok			2	6.9	
UR1A	5	17-Aug-2008			ok	ok			1	3.5	
UR1A	5	17-Aug-2008	damaged		ok	Exclude			1	3.5	
UR1A	1	1-Aug-2009			ok	ok			1	3.5	
UR1A	1	1-Aug-2009			ok	ok			1	3.5	
UR1A	1	1-Aug-2009		cf.	ok	ok			8	27.8	
UR1A	1	1-Aug-2009			ok	ok			1	3.5	
UR1A	1	1-Aug-2009			ok	ok			2	6.9	
UR1A	1	1-Aug-2009			ok	ok			7	24.3	
UR1A	1	1-Aug-2009			ok	ok			2	6.9	
UR1A	1	1-Aug-2009			ok	ok			1	3.5	
UR1A	1	1-Aug-2009			ok	ok			29	100.7	
UR1A	1	1-Aug-2009			ok	ok			10	34.7	
UR1A	1	1-Aug-2009	damaged		ok	Exclude			12	41.7	
UR1A	1	1-Aug-2009			ok	ok			1	3.5	
UR1A	1	1-Aug-2009			ok	ok			3	10.4	
UR1A	1	1-Aug-2009			ok	ok			17	59.0	
UR1A	1	1-Aug-2009			Exclude	Exclude			2	6.9	
UR1A	2	1-Aug-2009			ok	ok			1	3.5	
UR1A	2	1-Aug-2009			ok	ok			1	3.5	
UR1A	2	1-Aug-2009			ok	ok			2	6.9	
UR1A	2	1-Aug-2009		cf.	ok	ok			18	62.5	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
UR1A	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
UR1A	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
UR1A	2	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
UR1A	2	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR1A	2	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
UR1A	2	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
UR1A	2	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
UR1A	2	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
UR1A	2	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
UR1A	2	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
UR1A	2	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
UR1A	2	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
UR1A	2	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
UR1A	2	1-Aug-2009	MA	Include		0.288		Terrestrial							Terrestrial
UR1A	2	1-Aug-2009	MA	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
UR1A	3	1-Aug-2009	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Simuliidae		*Helodon*	*Helodon onychodactylus*
UR1A	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heleniella*	*Heleniella*
UR1A	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
UR1A	3	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus similior*
UR1A	3	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
UR1A	3	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR1A	3	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
UR1A	3	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
UR1A	3	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
UR1A	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Sweltsa*	*Sweltsa*
UR1A	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
UR1A	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
UR1A	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
UR1A	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
UR1A	3	1-Aug-2009	MA	Include		0.288		Terrestrial							Terrestrial
UR1A	4	1-Aug-2009	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
UR1A	4	1-Aug-2009	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Empididae		*Clinocera*	*Clinocera*
UR1A	4	1-Aug-2009	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Rhabdomastix*	*Rhabdomastix*
UR1A	4	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
UR1A	4	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
UR1A	4	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
UR1A	4	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
UR1A	4	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
UR1A	4	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR1A	4	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
UR1A	4	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
UR1A	4	1-Aug-2009	MA	Include		0.288		Nematoda	Nematoda						Nematoda
UR1A	4	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
UR1A	4	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
UR1A	4	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Leuctridae			Leuctridae
UR1A	4	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
UR1A	4	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
UR1A	4	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
UR1A	4	1-Aug-2009	MA	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Lepidostomatidae		*Lepidostoma*	*Lepidostoma*
UR1A	5	1-Aug-2009	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Rhabdomastix*	*Rhabdomastix*
UR1A	5	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Corynoneura*	*Corynoneura*
UR1A	5	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
UR1A	5	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius*
UR1A	5	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
UR1A	2	1-Aug-2009			ok	ok			1	3.5	
UR1A	2	1-Aug-2009			ok	ok	pupa		1	3.5	
UR1A	2	1-Aug-2009			ok	ok			4	13.9	
UR1A	2	1-Aug-2009			ok	ok			17	59.0	
UR1A	2	1-Aug-2009			ok	ok			2	6.9	
UR1A	2	1-Aug-2009			ok	ok			2	6.9	
UR1A	2	1-Aug-2009			ok	ok			2	6.9	
UR1A	2	1-Aug-2009			ok	ok			26	90.3	
UR1A	2	1-Aug-2009			ok	ok			4	13.9	
UR1A	2	1-Aug-2009	damaged		ok	Exclude			5	17.4	
UR1A	2	1-Aug-2009			ok	ok			10	34.7	
UR1A	2	1-Aug-2009			ok	ok			2	6.9	
UR1A	2	1-Aug-2009			ok	ok			29	100.7	
UR1A	2	1-Aug-2009			Exclude	Exclude			1	3.5	
UR1A	2	1-Aug-2009			ok	ok			1	3.5	
UR1A	3	1-Aug-2009			ok	ok	pupa		1	3.5	
UR1A	3	1-Aug-2009			ok	ok			1	3.5	
UR1A	3	1-Aug-2009		cf.	ok	ok			4	13.9	
UR1A	3	1-Aug-2009			ok	ok			1	3.5	
UR1A	3	1-Aug-2009			ok	ok			1	3.5	
UR1A	3	1-Aug-2009			ok	ok			14	48.6	
UR1A	3	1-Aug-2009			ok	ok			3	10.4	
UR1A	3	1-Aug-2009			ok	ok			1	3.5	
UR1A	3	1-Aug-2009			ok	ok			11	38.2	
UR1A	3	1-Aug-2009			ok	ok			3	10.4	
UR1A	3	1-Aug-2009	damaged		ok	Exclude			2	6.9	
UR1A	3	1-Aug-2009			ok	ok			5	17.4	
UR1A	3	1-Aug-2009			ok	ok			3	10.4	
UR1A	3	1-Aug-2009			ok	ok			37	128.5	
UR1A	3	1-Aug-2009			Exclude	Exclude			1	3.5	
UR1A	4	1-Aug-2009			ok	ok			1	3.5	
UR1A	4	1-Aug-2009			ok	ok			1	3.5	
UR1A	4	1-Aug-2009			ok	ok			2	6.9	
UR1A	4	1-Aug-2009			ok	ok			1	3.5	
UR1A	4	1-Aug-2009		cf.	ok	ok			9	31.3	
UR1A	4	1-Aug-2009			ok	ok			2	6.9	
UR1A	4	1-Aug-2009			ok	ok	pupa		1	3.5	
UR1A	4	1-Aug-2009			ok	ok			3	10.4	
UR1A	4	1-Aug-2009			ok	ok			21	72.9	
UR1A	4	1-Aug-2009			ok	ok			2	6.9	
UR1A	4	1-Aug-2009			ok	ok			31	107.6	
UR1A	4	1-Aug-2009			Exclude	Exclude			1	3.5	
UR1A	4	1-Aug-2009			ok	ok			6	20.8	
UR1A	4	1-Aug-2009	damaged		ok	Exclude			4	13.9	
UR1A	4	1-Aug-2009	damaged		ok	Exclude			2	6.9	
UR1A	4	1-Aug-2009			ok	ok			4	13.9	
UR1A	4	1-Aug-2009			ok	ok			3	10.4	
UR1A	4	1-Aug-2009			ok	ok			24	83.3	
UR1A	4	1-Aug-2009			ok	ok			1	3.5	
UR1A	5	1-Aug-2009			ok	ok			4	13.9	
UR1A	5	1-Aug-2009			ok	ok			1	3.5	
UR1A	5	1-Aug-2009			ok	ok			2	6.9	
UR1A	5	1-Aug-2009			ok	ok			1	3.5	
UR1A	5	1-Aug-2009		cf.	ok	ok			19	66.0	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
UR1A	5	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Rheocricotopus*	*Rheocricotopus*
UR1A	5	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
UR1A	5	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR1A	5	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
UR1A	5	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
UR1A	5	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
UR1A	5	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
UR1A	5	1-Aug-2009	MA	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
UR1A	5	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
UR1A	5	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
UR1A	5	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Leuctridae			Leuctridae
UR1A	5	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
UR1A	5	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
UR1A	5	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
UR1	1	19-Aug-2008	MA	Include		0.288		Collembola	Arthropoda	Collembola					Collembola
UR1	1	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
UR1	1	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
UR1	1	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
UR1	1	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
UR1	1	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
UR1	1	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR1	1	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
UR1	1	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
UR1	1	19-Aug-2008	MA	Include		0.288		Nematoda	Nematoda						Nematoda
UR1	2	19-Aug-2008	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
UR1	2	19-Aug-2008	MA	Include		0.288		Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
UR1	2	19-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Erioptera*	*Erioptera*
UR1	2	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
UR1	2	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
UR1	2	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius*
UR1	2	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
UR1	2	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
UR1	2	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR1	2	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
UR1	3	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius*
UR1	4	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
UR1	4	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
UR1	4	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
UR1	4	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR1	4	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
UR1	4	19-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
UR1	5	19-Aug-2008	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
UR1	5	19-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Blephariceridae		*Bibiocephala*	*Bibiocephala grandis*
UR1	5	19-Aug-2008	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
UR1	5	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
UR1	5	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
UR1	5	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
UR1	5	19-Aug-2008	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
UR1	5	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR1	5	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
UR1	5	19-Aug-2008	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
UR1	5	19-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
UR1	5	19-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
UR1	5	19-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae			Perlodidae

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
UR1A	5	1-Aug-2009			ok	ok			1	3.5	
UR1A	5	1-Aug-2009			ok	ok			3	10.4	
UR1A	5	1-Aug-2009			ok	ok			8	27.8	
UR1A	5	1-Aug-2009			ok	ok			9	31.3	
UR1A	5	1-Aug-2009			ok	ok			7	24.3	
UR1A	5	1-Aug-2009			ok	ok			6	20.8	
UR1A	5	1-Aug-2009	damaged		ok	Exclude			2	6.9	
UR1A	5	1-Aug-2009			Exclude	Exclude			1	3.5	
UR1A	5	1-Aug-2009			ok	ok			1	3.5	
UR1A	5	1-Aug-2009	damaged		ok	Exclude			7	24.3	
UR1A	5	1-Aug-2009	damaged		ok	Exclude			1	3.5	
UR1A	5	1-Aug-2009			ok	ok			3	10.4	
UR1A	5	1-Aug-2009			ok	ok			4	13.9	
UR1A	5	1-Aug-2009			ok	ok			46	159.7	
UR1	1	19-Aug-2008			Exclude	Exclude			1	3.5	
UR1	1	19-Aug-2008			ok	ok			1	3.5	
UR1	1	19-Aug-2008			ok	ok			6	20.8	
UR1	1	19-Aug-2008		cf.	ok	ok			2	6.9	
UR1	1	19-Aug-2008			ok	ok	pupa		1	3.5	
UR1	1	19-Aug-2008			ok	ok			1	3.5	
UR1	1	19-Aug-2008			ok	ok			3	10.4	
UR1	1	19-Aug-2008			ok	ok			2	6.9	
UR1	1	19-Aug-2008			ok	ok			2	6.9	
UR1	1	19-Aug-2008			Exclude	Exclude			1	3.5	
UR1	2	19-Aug-2008			ok	ok			1	3.5	
UR1	2	19-Aug-2008			Exclude	Exclude			1	3.5	
UR1	2	19-Aug-2008			ok	ok			1	3.5	
UR1	2	19-Aug-2008			Exclude	Exclude			1	3.5	
UR1	2	19-Aug-2008			ok	ok			1	3.5	
UR1	2	19-Aug-2008			ok	ok			5	17.4	
UR1	2	19-Aug-2008			ok	ok			2	6.9	
UR1	2	19-Aug-2008			ok	ok			3	10.4	
UR1	2	19-Aug-2008		cf.	ok	ok			9	31.3	
UR1	2	19-Aug-2008			ok	ok			9	31.3	
UR1	2	19-Aug-2008			ok	ok			1	3.5	
UR1	3	19-Aug-2008			ok	ok			5	17.4	
UR1	4	19-Aug-2008			ok	ok			6	20.8	
UR1	4	19-Aug-2008			ok	ok			1	3.5	
UR1	4	19-Aug-2008			ok	ok			1	3.5	
UR1	4	19-Aug-2008			ok	ok			1	3.5	
UR1	4	19-Aug-2008			ok	ok			1	3.5	
UR1	4	19-Aug-2008			ok	ok			1	3.5	
UR1	5	19-Aug-2008			ok	ok			1	3.5	
UR1	5	19-Aug-2008			ok	ok	pupa		1	3.5	
UR1	5	19-Aug-2008			ok	ok			1	3.5	
UR1	5	19-Aug-2008			ok	ok			6	20.8	
UR1	5	19-Aug-2008			ok	ok			31	107.6	
UR1	5	19-Aug-2008			ok	ok			5	17.4	
UR1	5	19-Aug-2008		cf.	ok	ok			10	34.7	
UR1	5	19-Aug-2008			ok	ok			11	38.2	
UR1	5	19-Aug-2008			ok	ok			1	3.5	
UR1	5	19-Aug-2008			ok	ok			1	3.5	
UR1	5	19-Aug-2008			ok	ok			1	3.5	
UR1	5	19-Aug-2008			ok	ok			1	3.5	
UR1	5	19-Aug-2008	damaged		ok	Exclude			2	6.9	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
UR1	5	19-Aug-2008	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
UR1	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
UR1	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
UR1	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Larsia*	*Larsia*
UR1	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
UR1	1	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR1	1	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
UR1	1	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
UR1	1	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
UR1	1	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
UR1	2	1-Aug-2009	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
UR1	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
UR1	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
UR1	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
UR1	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pagastia*	*Pagastia*
UR1	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
UR1	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
UR1	2	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
UR1	2	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR1	2	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
UR1	2	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
UR1	2	1-Aug-2009	MA	Include		0.288		Nematoda	Nematoda						Nematoda
UR1	2	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
UR1	2	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
UR1	2	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
UR1	2	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
UR1	2	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
UR1	2	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
UR1	2	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
UR1	2	1-Aug-2009	MA	Include		0.288		Terrestrial							Terrestrial
UR1	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
UR1	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
UR1	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
UR1	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
UR1	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
UR1	3	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR1	3	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
UR1	3	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
UR1	3	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
UR1	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
UR1	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
UR1	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
UR1	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
UR1	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
UR1	4	1-Aug-2009	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
UR1	4	1-Aug-2009	MA	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
UR1	4	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
UR1	4	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR1	4	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
UR1	4	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
UR1	4	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
UR1	4	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae			Leptophlebiidae
UR1	4	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
UR1	4	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
UR1	4	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
UR1	5	1-Aug-2009	MA	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
UR1	5	19-Aug-2008			ok	ok			4	13.9	
UR1	1	1-Aug-2009			ok	ok			2	6.9	
UR1	1	1-Aug-2009			ok	ok			1	3.5	
UR1	1	1-Aug-2009			ok	ok			1	3.5	
UR1	1	1-Aug-2009		cf.	ok	ok			2	6.9	
UR1	1	1-Aug-2009			ok	ok			12	41.7	
UR1	1	1-Aug-2009			ok	ok			1	3.5	
UR1	1	1-Aug-2009	damaged		ok	Exclude			3	10.4	
UR1	1	1-Aug-2009			ok	ok			1	3.5	
UR1	1	1-Aug-2009			ok	ok			3	10.4	
UR1	2	1-Aug-2009			ok	ok			1	3.5	
UR1	2	1-Aug-2009			ok	ok			2	6.9	
UR1	2	1-Aug-2009			ok	ok			2	6.9	
UR1	2	1-Aug-2009			ok	ok			2	6.9	
UR1	2	1-Aug-2009			ok	ok			1	3.5	
UR1	2	1-Aug-2009		cf.	ok	ok			3	10.4	
UR1	2	1-Aug-2009			ok	ok			2	6.9	
UR1	2	1-Aug-2009			ok	ok			1	3.5	
UR1	2	1-Aug-2009			ok	ok			28	97.2	
UR1	2	1-Aug-2009			ok	ok			1	3.5	
UR1	2	1-Aug-2009			ok	ok			3	10.4	
UR1	2	1-Aug-2009			Exclude	Exclude			1	3.5	
UR1	2	1-Aug-2009			ok	ok			1	3.5	
UR1	2	1-Aug-2009	damaged		ok	Exclude			6	20.8	
UR1	2	1-Aug-2009			ok	ok			1	3.5	
UR1	2	1-Aug-2009			ok	ok			7	24.3	
UR1	2	1-Aug-2009			ok	ok			11	38.2	
UR1	2	1-Aug-2009			Exclude	Exclude			2	6.9	
UR1	3	1-Aug-2009			ok	ok			1	3.5	
UR1	3	1-Aug-2009			ok	ok			1	3.5	
UR1	3	1-Aug-2009			ok	ok			4	13.9	
UR1	3	1-Aug-2009			ok	ok			1	3.5	
UR1	3	1-Aug-2009	damaged		ok	Exclude			1	3.5	
UR1	3	1-Aug-2009			ok	ok			29	100.7	
UR1	3	1-Aug-2009			ok	ok			1	3.5	
UR1	3	1-Aug-2009			ok	ok			2	6.9	
UR1	3	1-Aug-2009			ok	ok			6	20.8	
UR1	3	1-Aug-2009			ok	ok			2	6.9	
UR1	3	1-Aug-2009	damaged		ok	Exclude			1	3.5	
UR1	3	1-Aug-2009			ok	ok			3	10.4	
UR1	3	1-Aug-2009			ok	ok			5	17.4	
UR1	3	1-Aug-2009			ok	ok			6	20.8	
UR1	4	1-Aug-2009			ok	ok			1	3.5	
UR1	4	1-Aug-2009			ok	Exclude			2	6.9	
UR1	4	1-Aug-2009		cf.	ok	ok			2	6.9	
UR1	4	1-Aug-2009			ok	ok			10	34.7	
UR1	4	1-Aug-2009			ok	ok			1	3.5	
UR1	4	1-Aug-2009			ok	ok			2	6.9	
UR1	4	1-Aug-2009			ok	ok			6	20.8	
UR1	4	1-Aug-2009	damaged		ok	Exclude			1	3.5	
UR1	4	1-Aug-2009			ok	ok			5	17.4	
UR1	4	1-Aug-2009			ok	ok			3	10.4	
UR1	4	1-Aug-2009			ok	ok			23	79.9	
UR1	5	1-Aug-2009			ok	ok			1	3.5	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
UR1	5	1-Aug-2009	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Rhabdomastix*	*Rhabdomastix*
UR1	5	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
UR1	5	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
UR1	5	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
UR1	5	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR1	5	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
UR1	5	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
UR1	5	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
UR1	5	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
UR1	5	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
UR1	5	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
UR1	5	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
UR2	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
UR2	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
UR2	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
UR2	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
UR2	1	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
UR2	1	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR2	1	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
UR2	1	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
UR2	1	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
UR2	1	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
UR2	1	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
UR2	1	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
UR2	1	1-Aug-2009	MA	Include		0.288		Terrestrial							Terrestrial
UR2	2	1-Aug-2009	MA	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Rhabdomastix*	*Rhabdomastix*
UR2	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
UR2	2	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
UR2	2	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR2	2	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
UR2	2	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
UR2	2	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
UR2	2	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
UR2	2	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
UR2	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
UR2	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parakiefferiella*	*Parakiefferiella*
UR2	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parorthocladius*	*Parorthocladius*
UR2	3	1-Aug-2009	MA	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
UR2	3	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
UR2	3	1-Aug-2009	MA	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
UR2	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
UR2	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Skwala*	*Skwala*
UR2	3	1-Aug-2009	MA	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae		*Nais*	*Nais* sp.
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Aturidae			Aturidae
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Arachnida	Arthropoda	Arachnida		Sperchontidae		*Sperchon*	*Sperchon* sp.
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Arachnida	Arthropoda	Arachnida					Acari
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Bezzia/Palpomyia*	*Bezzia/Palpomyia* sp.
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Corynoneura*	*Corynoneura* sp.
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus*	*Cricotopus* sp.
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
UR1	5	1-Aug-2009			ok	ok			1	3.5	
UR1	5	1-Aug-2009			ok	ok			1	3.5	
UR1	5	1-Aug-2009		cf.	ok	ok			1	3.5	
UR1	5	1-Aug-2009	damaged		ok	Exclude			1	3.5	
UR1	5	1-Aug-2009			ok	ok			16	55.6	
UR1	5	1-Aug-2009			ok	ok			1	3.5	
UR1	5	1-Aug-2009			ok	ok			3	10.4	
UR1	5	1-Aug-2009			ok	ok			1	3.5	
UR1	5	1-Aug-2009			ok	ok			2	6.9	
UR1	5	1-Aug-2009	damaged		ok	Exclude			2	6.9	
UR1	5	1-Aug-2009			ok	ok			1	3.5	
UR1	5	1-Aug-2009			ok	ok			41	142.4	
UR2	1	1-Aug-2009			ok	ok			1	3.5	
UR2	1	1-Aug-2009		cf.	ok	ok			75	260.4	
UR2	1	1-Aug-2009			ok	ok			1	3.5	
UR2	1	1-Aug-2009	damaged		ok	Exclude			2	6.9	
UR2	1	1-Aug-2009			ok	ok	pupa		2	6.9	
UR2	1	1-Aug-2009			ok	ok			15	52.1	
UR2	1	1-Aug-2009			ok	ok			32	111.1	
UR2	1	1-Aug-2009			ok	ok			1	3.5	
UR2	1	1-Aug-2009	damaged		ok	Exclude			13	45.1	
UR2	1	1-Aug-2009			ok	ok			1	3.5	
UR2	1	1-Aug-2009			ok	ok			5	17.4	
UR2	1	1-Aug-2009			ok	ok			5	17.4	
UR2	1	1-Aug-2009			Exclude	Exclude			2	6.9	
UR2	2	1-Aug-2009			ok	ok			1	3.5	
UR2	2	1-Aug-2009		cf.	ok	ok			6	20.8	
UR2	2	1-Aug-2009			ok	ok	pupa		1	3.5	
UR2	2	1-Aug-2009			ok	ok			3	10.4	
UR2	2	1-Aug-2009			ok	ok			1	3.5	
UR2	2	1-Aug-2009			ok	ok			27	93.8	
UR2	2	1-Aug-2009			ok	ok			2	6.9	
UR2	2	1-Aug-2009	damaged		ok	Exclude			17	59.0	
UR2	2	1-Aug-2009			ok	ok			1	3.5	
UR2	3	1-Aug-2009			ok	ok			2	6.9	
UR2	3	1-Aug-2009			ok	ok			2	6.9	
UR2	3	1-Aug-2009			ok	ok			1	3.5	
UR2	3	1-Aug-2009		cf.	ok	ok			5	17.4	
UR2	3	1-Aug-2009			ok	ok			5	17.4	
UR2	3	1-Aug-2009			ok	ok			4	13.9	
UR2	3	1-Aug-2009	damaged		ok	Exclude			1	3.5	
UR2	3	1-Aug-2009			ok	ok			2	6.9	
UR2	3	1-Aug-2009			ok	ok			4	13.9	
Divide OF	1	12-Aug-2013			ok	ok			34	566.7	68510
Divide OF	1	12-Aug-2013			ok	ok			35	583.3	68946
Divide OF	1	12-Aug-2013			ok	ok			2	33.3	82973
Divide OF	1	12-Aug-2013			ok	ok			8	133.3	83034
Divide OF	1	12-Aug-2013			ok	ok			2	33.3	83006
Divide OF	1	12-Aug-2013	immature/uncertain		ok	Exclude			2	33.3	82754
Divide OF	1	12-Aug-2013			Exclude	Exclude			9	150.0	88530
Divide OF	1	12-Aug-2013			ok	ok			1	16.7	
Divide OF	1	12-Aug-2013			ok	ok			1	16.7	128563
Divide OF	1	12-Aug-2013			ok	ok			3	50.0	128575
Divide OF	1	12-Aug-2013			ok	ok			76	1,266.7	128874

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pagastia*	*Pagastia* sp.
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Thienemanniella*	*Thienemanniella* sp.
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tokunagaia*	*Tokunagaia* sp.
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis* sp.
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena* sp.
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Nematoda	Nematoda						Nematoda
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis* sp.
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila alberta*
Divide OF	1	12-Aug-2013	FF	Exclude	6530.3-16	0.288	21%	Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila verrula*
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae		*Nais*	*Nais* sp.
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Aturidae			Aturidae
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Feltriidae		*Feltria*	*Feltria* sp.
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Arachnida	Arthropoda	Arachnida		Sperchontidae		*Sperchon*	*Sperchon* sp.
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Arachnida	Arthropoda	Arachnida					Acari
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Bezzia/Palpomyia*	*Bezzia/Palpomyia* sp.
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pagastia*	*Pagastia* sp.
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Thienemanniella*	*Thienemanniella* sp.
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Thienemanniella*	*Thienemanniella* sp.
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis* sp.
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena* sp.
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Nematoda	Nematoda						Nematoda
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis* sp.
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Sweltsa*	*Sweltsa* sp.
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys* sp.
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae			Perlodidae
Divide OF	2	12-Aug-2013	FF	Exclude	6530.3-17	0.288	54%	Trichoptera	Arthropoda	Insecta	Trichoptera	Limnephilidae			Limnephilidae
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae		*Nais*	*Nais* sp.
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Aturidae			Aturidae
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Arachnida	Arthropoda	Arachnida					Acari
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Bezzia/Palpomyia*	*Bezzia/Palpomyia* sp.
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota* sp.
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Cladotanytarsus*	*Cladotanytarsus* sp.
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pagastia*	*Pagastia* sp.
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa* sp.
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Tanytarsus*	*Tanytarsus* sp.
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Thienemanniella*	*Thienemanniella* sp.
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia bavarica*
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
Divide OF	1	12-Aug-2013			ok	ok			8	133.3	128401
Divide OF	1	12-Aug-2013			ok	ok	1		6	100.0	129182
Divide OF	1	12-Aug-2013			ok	ok			1	16.7	129194
Divide OF	1	12-Aug-2013	immature		ok	Exclude			4	66.7	128457
Divide OF	1	12-Aug-2013			Exclude	Exclude		1	1	16.7	127917
Divide OF	1	12-Aug-2013			ok	ok			2	33.3	100996
Divide OF	1	12-Aug-2013	immature		ok	Exclude			1	16.7	100800
Divide OF	1	12-Aug-2013			ok	ok			2	33.3	100572
Divide OF	1	12-Aug-2013			Exclude	Exclude			71	1,183.3	59490
Divide OF	1	12-Aug-2013			Exclude	Exclude			3	50.0	84195
Divide OF	1	12-Aug-2013			Exclude	Exclude			2	33.3	54510
Divide OF	1	12-Aug-2013	immature		ok	Exclude			12	200.0	102517
Divide OF	1	12-Aug-2013		gr.	ok	ok			1	16.7	
Divide OF	1	12-Aug-2013		gr.	ok	ok			2	33.3	
Divide OF	2	12-Aug-2013			ok	ok			21	134.6	68510
Divide OF	2	12-Aug-2013			ok	ok			51	326.9	68946
Divide OF	2	12-Aug-2013	uncertain		ok	Exclude			9	57.7	82973
Divide OF	2	12-Aug-2013			ok	ok			1	6.4	83314
Divide OF	2	12-Aug-2013			ok	ok			14	89.7	83034
Divide OF	2	12-Aug-2013			ok	ok			1	6.4	83006
Divide OF	2	12-Aug-2013	immature		ok	Exclude			2	12.8	82754
Divide OF	2	12-Aug-2013			Exclude	Exclude			10	64.1	88530
Divide OF	2	12-Aug-2013			ok	ok			3	19.2	
Divide OF	2	12-Aug-2013			ok	ok			85	544.9	128874
Divide OF	2	12-Aug-2013			ok	ok			8	51.3	128401
Divide OF	2	12-Aug-2013			ok	ok			1	6.4	129182
Divide OF	2	12-Aug-2013			Exclude	Exclude		1	1	6.4	127917
Divide OF	2	12-Aug-2013			ok	ok			2	12.8	100996
Divide OF	2	12-Aug-2013	immature		ok	Exclude			1	6.4	100800
Divide OF	2	12-Aug-2013			ok	ok			7	44.9	100572
Divide OF	2	12-Aug-2013			Exclude	Exclude			41	262.8	59490
Divide OF	2	12-Aug-2013			Exclude	Exclude			5	32.1	84195
Divide OF	2	12-Aug-2013			Exclude	Exclude			2	12.8	54510
Divide OF	2	12-Aug-2013			ok	ok			1	6.4	103273
Divide OF	2	12-Aug-2013	immature		ok	Exclude			16	102.6	102517
Divide OF	2	12-Aug-2013			ok	ok			2	12.8	103110
Divide OF	2	12-Aug-2013	immature		ok	Exclude			1	6.4	102994
Divide OF	2	12-Aug-2013	immature		ok	Exclude			1	6.4	115933
Divide OF	3	12-Aug-2013			ok	ok			38	1,074.2	68510
Divide OF	3	12-Aug-2013			ok	ok			43	1,215.5	68946
Divide OF	3	12-Aug-2013			ok	ok			3	84.8	82973
Divide OF	3	12-Aug-2013			ok	ok			18	508.8	83034
Divide OF	3	12-Aug-2013	immature		ok	Exclude			1	28.3	82754
Divide OF	3	12-Aug-2013			Exclude	Exclude			2	56.5	88530
Divide OF	3	12-Aug-2013			ok	ok			5	141.3	
Divide OF	3	12-Aug-2013			ok	ok			2	56.5	121027
Divide OF	3	12-Aug-2013			ok	ok			1	28.3	129873
Divide OF	3	12-Aug-2013			ok	ok			98	2,770.3	128874
Divide OF	3	12-Aug-2013			ok	ok			2	56.5	128401
Divide OF	3	12-Aug-2013			ok	ok			1	28.3	128416
Divide OF	3	12-Aug-2013			ok	ok			1	28.3	129978
Divide OF	3	12-Aug-2013			ok	ok			4	113.1	129182
Divide OF	3	12-Aug-2013		gr.	ok	ok			1	28.3	
Divide OF	3	12-Aug-2013			ok	ok			8	226.1	128457

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena* sp.
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Nematoda	Nematoda						Nematoda
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis* sp.
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
Divide OF	3	12-Aug-2013	FF	Exclude	6530.3-18	0.288	12%	Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae			Perlodidae
Divide OF	4	12-Aug-2013	FF	Exclude	6530.3-19	0.288	10%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
Divide OF	4	12-Aug-2013	FF	Exclude	6530.3-19	0.288	10%	Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae		*Nais*	*Nais* sp.
Divide OF	4	12-Aug-2013	FF	Exclude	6530.3-19	0.288	10%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Aturidae			Aturidae
Divide OF	4	12-Aug-2013	FF	Exclude	6530.3-19	0.288	10%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
Divide OF	4	12-Aug-2013	FF	Exclude	6530.3-19	0.288	10%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
Divide OF	4	12-Aug-2013	FF	Exclude	6530.3-19	0.288	10%	Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Bezzia/Palpomyia*	*Bezzia/Palpomyia* sp.
Divide OF	4	12-Aug-2013	FF	Exclude	6530.3-19	0.288	10%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
Divide OF	4	12-Aug-2013	FF	Exclude	6530.3-19	0.288	10%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pagastia*	*Pagastia* sp.
Divide OF	4	12-Aug-2013	FF	Exclude	6530.3-19	0.288	10%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa* sp.
Divide OF	4	12-Aug-2013	FF	Exclude	6530.3-19	0.288	10%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Thienemanniella*	*Thienemanniella* sp.
Divide OF	4	12-Aug-2013	FF	Exclude	6530.3-19	0.288	10%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
Divide OF	4	12-Aug-2013	FF	Exclude	6530.3-19	0.288	10%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus sp.*
Divide OF	4	12-Aug-2013	FF	Exclude	6530.3-19	0.288	10%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena* sp.
Divide OF	4	12-Aug-2013	FF	Exclude	6530.3-19	0.288	10%	Nematoda	Nematoda						Nematoda
Divide OF	4	12-Aug-2013	FF	Exclude	6530.3-19	0.288	10%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
Divide OF	4	12-Aug-2013	FF	Exclude	6530.3-19	0.288	10%	Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis* sp.
Divide OF	4	12-Aug-2013	FF	Exclude	6530.3-19	0.288	10%	Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Sweltsa*	*Sweltsa* sp.
Divide OF	4	12-Aug-2013	FF	Exclude	6530.3-19	0.288	10%	Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
Divide OF	4	12-Aug-2013	FF	Exclude	6530.3-19	0.288	10%	Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae			Perlodidae
Divide OF	4	12-Aug-2013	FF	Exclude	6530.3-19	0.288	10%	Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila verrula*
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae		*Nais*	*Nais* sp.
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Aturidae			Aturidae
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Arachnida	Arthropoda	Arachnida					Acari
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Bezzia/Palpomyia*	*Bezzia/Palpomyia* sp.
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius*
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pagastia*	*Pagastia* sp.
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Rheocricotopus*	*Rheocricotopus* sp.
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Thienemanniella*	*Thienemanniella* sp.
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tokunagaia*	*Tokunagaia* sp.
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena* sp.
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Nematoda	Nematoda						Nematoda
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis* sp.
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae			Perlodidae
Divide OF	5	12-Aug-2013	FF	Exclude	6530.3-20	0.288	13%	Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila verrula*
BR1	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
BR1	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
BR1	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Hydrobaenus*	*Hydrobaenus*
BR1	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Paracladius*	*Paracladius*
BR1	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parorthocladius*	*Parorthocladius*
BR1	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
Divide OF	3	12-Aug-2013			ok	ok			4	113.1	100996
Divide OF	3	12-Aug-2013			ok	ok			1	28.3	100572
Divide OF	3	12-Aug-2013			Exclude	Exclude			56	1,583.0	59490
Divide OF	3	12-Aug-2013			Exclude	Exclude			8	226.1	84195
Divide OF	3	12-Aug-2013			Exclude	Exclude			4	113.1	54510
Divide OF	3	12-Aug-2013	immature		ok	Exclude			4	113.1	102517
Divide OF	3	12-Aug-2013	immature		ok	Exclude			2	56.5	102994
Divide OF	4	12-Aug-2013			ok	ok			14	466.7	68510
Divide OF	4	12-Aug-2013			ok	ok			47	1,566.7	68946
Divide OF	4	12-Aug-2013	uncertain		ok	Exclude			1	33.3	82973
Divide OF	4	12-Aug-2013			ok	ok			10	333.3	83034
Divide OF	4	12-Aug-2013			Exclude	Exclude			2	66.7	88530
Divide OF	4	12-Aug-2013			ok	ok			2	66.7	
Divide OF	4	12-Aug-2013			ok	ok			109	3,633.3	128874
Divide OF	4	12-Aug-2013			ok	ok			1	33.3	128401
Divide OF	4	12-Aug-2013			ok	ok			1	33.3	128416
Divide OF	4	12-Aug-2013			ok	ok			2	66.7	129182
Divide OF	4	12-Aug-2013	immature/damaged		ok	Exclude	1		11	366.7	128457
Divide OF	4	12-Aug-2013			ok	ok			3	100.0	100996
Divide OF	4	12-Aug-2013			ok	ok			2	66.7	100572
Divide OF	4	12-Aug-2013			Exclude	Exclude			39	1,300.0	59490
Divide OF	4	12-Aug-2013			Exclude	Exclude			2	66.7	84195
Divide OF	4	12-Aug-2013			Exclude	Exclude			7	233.3	54510
Divide OF	4	12-Aug-2013			ok	ok			2	66.7	103273
Divide OF	4	12-Aug-2013	immature		ok	Exclude			13	433.3	102517
Divide OF	4	12-Aug-2013	immature		ok	Exclude			3	100.0	102994
Divide OF	4	12-Aug-2013		gr.	ok	ok			5	166.7	
Divide OF	5	12-Aug-2013			ok	ok			57	1,583.3	68510
Divide OF	5	12-Aug-2013			ok	ok			2	55.6	68946
Divide OF	5	12-Aug-2013			ok	ok			2	55.6	82973
Divide OF	5	12-Aug-2013			ok	ok			7	194.4	83034
Divide OF	5	12-Aug-2013	immature		ok	Exclude			2	55.6	82754
Divide OF	5	12-Aug-2013			Exclude	Exclude			3	83.3	88530
Divide OF	5	12-Aug-2013			ok	ok			2	55.6	
Divide OF	5	12-Aug-2013		Orthocladius Complex	ok	ok			1	27.8	
Divide OF	5	12-Aug-2013			ok	ok			96	2,666.7	128874
Divide OF	5	12-Aug-2013			ok	ok			5	138.9	128401
Divide OF	5	12-Aug-2013			ok	ok			1	27.8	129086
Divide OF	5	12-Aug-2013			ok	ok			1	27.8	129182
Divide OF	5	12-Aug-2013			ok	ok			2	55.6	129194
Divide OF	5	12-Aug-2013			ok	ok			11	305.6	128457
Divide OF	5	12-Aug-2013			ok	ok			1	27.8	100572
Divide OF	5	12-Aug-2013			Exclude	Exclude			68	1,888.9	59490
Divide OF	5	12-Aug-2013			Exclude	Exclude			3	83.3	84195
Divide OF	5	12-Aug-2013			Exclude	Exclude			5	138.9	54510
Divide OF	5	12-Aug-2013	immature		ok	Exclude			7	194.4	102517
Divide OF	5	12-Aug-2013	immature		ok	Exclude			1	27.8	102994
Divide OF	5	12-Aug-2013		gr.	ok	ok			4	111.1	
BR1	1	1-Aug-2010			ok	ok			1	3.5	
BR1	1	1-Aug-2010			ok	ok			1	3.5	
BR1	1	1-Aug-2010			ok	ok			1	3.5	
BR1	1	1-Aug-2010			ok	ok			1	3.5	
BR1	1	1-Aug-2010			ok	ok			1	3.5	
BR1	1	1-Aug-2010			ok	ok			1	3.5	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
BR1	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
BR1	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
BR1	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus inopinatus*
BR1	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
BR1	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
BR1	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
BR1	1	1-Aug-2010	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
BR1	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
BR1	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
BR1	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
BR1	2	1-Aug-2010	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BR1	2	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Empididae		*Hemerodromia*	*Hemerodromia*
BR1	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
BR1	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
BR1	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Hydrobaenus*	*Hydrobaenus*
BR1	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
BR1	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa*
BR1	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
BR1	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
BR1	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
BR1	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
BR1	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
BR1	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
BR1	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
BR1	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
BR1	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
BR1	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parorthocladius*	*Parorthocladius*
BR1	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
BR1	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
BR1	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
BR1	3	1-Aug-2010	AP	Include		0.288		Ostracoda	Arthropoda	Ostracoda					Ostracoda
BR1	3	1-Aug-2010	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
BR1	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
BR1	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
BR1	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
BR1	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
BR1	4	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Culicoides*	*Culicoides*
BR1	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
BR1	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
BR1	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
BR1	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
BR1	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
BR1	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
BR1	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus inopinatus*
BR1	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
BR1	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
BR1	4	1-Aug-2010	AP	Include		0.288		Terrestrial							Terrestrial
BR1	5	1-Aug-2010	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BR1	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
BR1	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
BR1	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
BR1	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parametriocnemus*	*Parametriocnemus*
BR1	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
BR1	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
BR1	1	1-Aug-2010			ok	ok			2	6.9	
BR1	1	1-Aug-2010	immature/damaged		ok	Exclude			2	6.9	
BR1	1	1-Aug-2010			ok	ok			1	3.5	
BR1	1	1-Aug-2010			ok	ok			1	3.5	
BR1	1	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
BR1	1	1-Aug-2010			ok	ok			2	6.9	
BR1	1	1-Aug-2010			Exclude	Exclude			2	6.9	
BR1	1	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
BR1	1	1-Aug-2010			ok	ok			1	3.5	
BR1	1	1-Aug-2010	immature/damaged		ok	Exclude			3	10.4	
BR1	2	1-Aug-2010			ok	ok			2	6.9	
BR1	2	1-Aug-2010			ok	ok			1	3.5	
BR1	2	1-Aug-2010			ok	ok			1	3.5	
BR1	2	1-Aug-2010			ok	ok			1	3.5	
BR1	2	1-Aug-2010			ok	ok			1	3.5	
BR1	2	1-Aug-2010			ok	ok			1	3.5	
BR1	2	1-Aug-2010			ok	ok			1	3.5	
BR1	2	1-Aug-2010			ok	ok			1	3.5	
BR1	2	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
BR1	2	1-Aug-2010			ok	ok			1	3.5	
BR1	2	1-Aug-2010			ok	ok			3	10.4	
BR1	2	1-Aug-2010			ok	ok			2	6.9	
BR1	2	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
BR1	3	1-Aug-2010			ok	ok			1	3.5	
BR1	3	1-Aug-2010			ok	ok			4	13.9	
BR1	3	1-Aug-2010			ok	ok			1	3.5	
BR1	3	1-Aug-2010			ok	ok			1	3.5	
BR1	3	1-Aug-2010			ok	ok			2	6.9	
BR1	3	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
BR1	3	1-Aug-2010			ok	ok			24.3		
BR1	3	1-Aug-2010			Exclude	Exclude			1	3.5	
BR1	3	1-Aug-2010			Exclude	Exclude			1	3.5	
BR1	3	1-Aug-2010			ok	ok			1	3.5	
BR1	3	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
BR1	3	1-Aug-2010			ok	ok			4	13.9	
BR1	3	1-Aug-2010	immature/damaged		ok	Exclude			2	6.9	
BR1	4	1-Aug-2010			ok	ok			1	3.5	
BR1	4	1-Aug-2010			ok	ok			2	6.9	
BR1	4	1-Aug-2010			ok	ok			13	45.1	
BR1	4	1-Aug-2010			ok	ok			1	3.5	
BR1	4	1-Aug-2010			ok	ok			1	3.5	
BR1	4	1-Aug-2010			ok	ok			3	10.4	
BR1	4	1-Aug-2010	immature/damaged		ok	Exclude			7	24.3	
BR1	4	1-Aug-2010			ok	ok			1	3.5	
BR1	4	1-Aug-2010			ok	ok			4	13.9	
BR1	4	1-Aug-2010			ok	ok			1	3.5	
BR1	4	1-Aug-2010			Exclude	Exclude			1	3.5	
BR1	5	1-Aug-2010			ok	ok			2	6.9	
BR1	5	1-Aug-2010			ok	ok			9	31.3	
BR1	5	1-Aug-2010			ok	ok			10	34.7	
BR1	5	1-Aug-2010			ok	ok			1	3.5	
BR1	5	1-Aug-2010			ok	ok			1	3.5	
BR1	5	1-Aug-2010			ok	ok			10	34.7	
BR1	5	1-Aug-2010			ok	ok			5	17.4	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
BR1	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
BR1	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus inopinatus*
BR1	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
BR1	5	1-Aug-2010	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
BR1	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
BR1	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
BR1	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
BR1	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
BR1	5	1-Aug-2010	AP	Include		0.288		Terrestrial							Terrestrial
BR2	1	1-Aug-2010	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BR2	1	1-Aug-2010	AP	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
BR2	1	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
BR2	1	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Hexatoma/Limnophila*	*Hexatoma/Limnophila*
BR2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
BR2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cardiocladius*	*Cardiocladius*
BR2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
BR2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
BR2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parorthocladius*	*Parorthocladius*
BR2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
BR2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Thienemanniella*	*Thienemanniella*
BR2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
BR2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
BR2	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
BR2	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
BR2	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
BR2	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
BR2	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
BR2	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
BR2	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
BR2	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
BR2	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada haysi/oregonensis*
BR2	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
BR2	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
BR2	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
BR2	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
BR2	1	1-Aug-2010	AP	Include		0.288		Terrestrial							Terrestrial
BR2	2	1-Aug-2010	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BR2	2	1-Aug-2010	AP	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
BR2	2	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Empididae		*Oreogeton*	*Oreogeton*
BR2	2	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Empididae			Empididae
BR2	2	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
BR2	2	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
BR2	2	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Hexatoma/Limnophila*	*Hexatoma/Limnophila*
BR2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cardiocladius*	*Cardiocladius*
BR2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
BR2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
BR2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
BR2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pagastia*	*Pagastia*
BR2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parametriocnemus*	*Parametriocnemus*
BR2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parorthocladius*	*Parorthocladius*
BR2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
BR2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
BR2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
BR2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Acentrella*	*Acentrella*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
BR1	5	1-Aug-2010	immature/damaged		ok	Exclude			5	17.4	
BR1	5	1-Aug-2010			ok	ok			2	6.9	
BR1	5	1-Aug-2010			ok	ok			4	13.9	
BR1	5	1-Aug-2010			Exclude	Exclude			2	6.9	
BR1	5	1-Aug-2010	immature/damaged		ok	Exclude			2	6.9	
BR1	5	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
BR1	5	1-Aug-2010			ok	ok			2	6.9	
BR1	5	1-Aug-2010	immature/damaged		ok	Exclude			4	13.9	
BR1	5	1-Aug-2010			Exclude	Exclude			1	3.5	
BR2	1	1-Aug-2010			ok	ok			7	24.3	
BR2	1	1-Aug-2010			ok	Exclude			3	10.4	
BR2	1	1-Aug-2010			ok	ok			2	6.9	
BR2	1	1-Aug-2010			ok	ok			1	3.5	
BR2	1	1-Aug-2010			ok	ok			1	3.5	
BR2	1	1-Aug-2010			ok	ok			1	3.5	
BR2	1	1-Aug-2010			ok	ok			4	13.9	
BR2	1	1-Aug-2010			ok	ok			2	6.9	
BR2	1	1-Aug-2010			ok	ok			3	10.4	
BR2	1	1-Aug-2010			ok	ok			3	10.4	
BR2	1	1-Aug-2010			ok	ok			1	3.5	
BR2	1	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
BR2	1	1-Aug-2010			ok	ok	pupa		1	3.5	
BR2	1	1-Aug-2010			ok	ok			18	62.5	
BR2	1	1-Aug-2010	immature/damaged		ok	Exclude			3	10.4	
BR2	1	1-Aug-2010			ok	ok			12	41.7	
BR2	1	1-Aug-2010			ok	ok			3	10.4	
BR2	1	1-Aug-2010			ok	ok			5	17.4	
BR2	1	1-Aug-2010			ok	ok			3	10.4	
BR2	1	1-Aug-2010			ok	ok			5	17.4	
BR2	1	1-Aug-2010	immature/damaged		ok	Exclude			3	10.4	
BR2	1	1-Aug-2010			ok	ok			2	6.9	
BR2	1	1-Aug-2010	immature/damaged		ok	Exclude			5	17.4	
BR2	1	1-Aug-2010			ok	ok			1	3.5	
BR2	1	1-Aug-2010	immature/damaged		ok	Exclude			92	319.4	
BR2	1	1-Aug-2010			ok	ok			3	10.4	
BR2	1	1-Aug-2010			ok	ok			58	201.4	
BR2	1	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
BR2	1	1-Aug-2010			Exclude	Exclude			2	6.9	
BR2	2	1-Aug-2010			ok	ok			6	20.8	
BR2	2	1-Aug-2010			ok	Exclude			7	24.3	
BR2	2	1-Aug-2010			ok	ok			1	3.5	
BR2	2	1-Aug-2010			ok	ok	pupa		1	3.5	
BR2	2	1-Aug-2010			ok	ok			2	6.9	
BR2	2	1-Aug-2010			ok	ok			1	3.5	
BR2	2	1-Aug-2010			ok	ok			1	3.5	
BR2	2	1-Aug-2010			ok	ok			2	6.9	
BR2	2	1-Aug-2010			ok	ok			7	24.3	
BR2	2	1-Aug-2010			ok	ok			6	20.8	
BR2	2	1-Aug-2010			ok	ok			14	48.6	
BR2	2	1-Aug-2010			ok	ok			2	6.9	
BR2	2	1-Aug-2010			ok	ok			1	3.5	
BR2	2	1-Aug-2010			ok	ok			3	10.4	
BR2	2	1-Aug-2010			ok	ok			9	31.3	
BR2	2	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
BR2	2	1-Aug-2010			ok	ok	pupa		2	6.9	
BR2	2	1-Aug-2010			ok	ok			1	3.5	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
BR2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
BR2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella coloradensis*
BR2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
BR2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
BR2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
BR2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
BR2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
BR2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
BR2	2	1-Aug-2010	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
BR2	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
BR2	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
BR2	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada haysi/oregonensis*
BR2	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
BR2	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
BR2	3	1-Aug-2010	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BR2	3	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
BR2	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
BR2	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
BR2	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
BR2	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
BR2	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella coloradensis*
BR2	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
BR2	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
BR2	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
BR2	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
BR2	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
BR2	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
BR2	3	1-Aug-2010	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
BR2	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
BR2	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
BR2	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
BR2	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
BR2	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
BR2	4	1-Aug-2010	AP	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
BR2	4	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Empididae		*Proclinopyga*	*Proclinopyga*
BR2	4	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
BR2	4	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Rhabdomastix*	*Rhabdomastix*
BR2	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cardiocladius*	*Cardiocladius*
BR2	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
BR2	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
BR2	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parorthocladius*	*Parorthocladius*
BR2	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
BR2	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
BR2	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
BR2	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Acentrella*	*Acentrella*
BR2	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
BR2	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella coloradensis*
BR2	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
BR2	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
BR2	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
BR2	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
BR2	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
BR2	4	1-Aug-2010	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
BR2	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
BR2	2	1-Aug-2010			ok	ok			2	6.9	
BR2	2	1-Aug-2010			ok	ok			6	20.8	
BR2	2	1-Aug-2010			ok	ok			25	86.8	
BR2	2	1-Aug-2010	immature/damaged		ok	Exclude			2	6.9	
BR2	2	1-Aug-2010			ok	ok			2	6.9	
BR2	2	1-Aug-2010			ok	ok			11	38.2	
BR2	2	1-Aug-2010			ok	ok			4	13.9	
BR2	2	1-Aug-2010	immature/damaged		ok	Exclude			2	6.9	
BR2	2	1-Aug-2010			Exclude	Exclude			2	6.9	
BR2	2	1-Aug-2010			ok	ok			6	20.8	
BR2	2	1-Aug-2010	immature/damaged		ok	Exclude			5	17.4	
BR2	2	1-Aug-2010			ok	ok			4	13.9	
BR2	2	1-Aug-2010	immature/damaged		ok	Exclude			84	291.7	
BR2	2	1-Aug-2010			ok	ok			60	208.3	
BR2	3	1-Aug-2010			ok	ok			2	6.9	
BR2	3	1-Aug-2010			ok	ok			1	3.5	
BR2	3	1-Aug-2010			ok	ok			4	13.9	
BR2	3	1-Aug-2010			ok	ok			8	27.8	
BR2	3	1-Aug-2010			ok	ok			2	6.9	
BR2	3	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
BR2	3	1-Aug-2010			ok	ok			2	6.9	
BR2	3	1-Aug-2010			ok	ok			1	3.5	
BR2	3	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
BR2	3	1-Aug-2010			ok	ok			1	3.5	
BR2	3	1-Aug-2010			ok	ok			1	3.5	
BR2	3	1-Aug-2010			ok	ok			3	10.4	
BR2	3	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
BR2	3	1-Aug-2010			ok	ok			3	10.4	
BR2	3	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
BR2	3	1-Aug-2010			Exclude	Exclude			1	3.5	
BR2	3	1-Aug-2010			ok	ok			1	3.5	
BR2	3	1-Aug-2010	immature/damaged		ok	Exclude			10	34.7	
BR2	3	1-Aug-2010	immature/damaged		ok	Exclude			6	20.8	
BR2	3	1-Aug-2010			ok	ok			1	3.5	
BR2	3	1-Aug-2010			ok	ok			2	6.9	
BR2	4	1-Aug-2010			ok	Exclude			3	10.4	
BR2	4	1-Aug-2010	uncertain		ok	Exclude			1	3.5	
BR2	4	1-Aug-2010			ok	ok			2	6.9	
BR2	4	1-Aug-2010			ok	ok			2	6.9	
BR2	4	1-Aug-2010			ok	ok			15	52.1	
BR2	4	1-Aug-2010			ok	ok			10	34.7	
BR2	4	1-Aug-2010			ok	ok			6	20.8	
BR2	4	1-Aug-2010			ok	ok			3	10.4	
BR2	4	1-Aug-2010			ok	ok			3	10.4	
BR2	4	1-Aug-2010	immature/damaged		ok	Exclude			6	20.8	
BR2	4	1-Aug-2010			ok	ok	pupa		2	6.9	
BR2	4	1-Aug-2010			ok	ok			1	3.5	
BR2	4	1-Aug-2010			ok	ok			8	27.8	
BR2	4	1-Aug-2010			ok	ok			2	6.9	
BR2	4	1-Aug-2010			ok	ok			13	45.1	
BR2	4	1-Aug-2010			ok	ok			8	27.8	
BR2	4	1-Aug-2010			ok	ok			7	24.3	
BR2	4	1-Aug-2010			ok	ok			2	6.9	
BR2	4	1-Aug-2010	immature/damaged		ok	Exclude			3	10.4	
BR2	4	1-Aug-2010			Exclude	Exclude			1	3.5	
BR2	4	1-Aug-2010			ok	ok			3	10.4	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
BR2	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
BR2	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada haysi/oregonensis*
BR2	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
BR2	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Isoperla*	*Isoperla*
BR2	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
BR2	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
BR2	4	1-Aug-2010	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Limnephilidae			Limnephilidae
BR2	4	1-Aug-2010	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
BR2	5	1-Aug-2010	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BR2	5	1-Aug-2010	AP	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
BR2	5	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
BR2	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cardiocladius*	*Cardiocladius*
BR2	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Corynoneura*	*Corynoneura*
BR2	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
BR2	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
BR2	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
BR2	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
BR2	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parorthocladius*	*Parorthocladius*
BR2	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
BR2	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
BR2	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae		Chironomini
BR2	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
BR2	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella coloradensis*
BR2	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
BR2	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
BR2	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
BR2	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
BR2	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
BR2	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
BR2	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada haysi/oregonensis*
BR2	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
BR2	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
BR2	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
BR2	5	1-Aug-2010	AP	Include		0.288		Terrestrial							Terrestrial
BR2	5	1-Aug-2010	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
ST1	1	1-Aug-2010	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae			Naididae
ST1	1	1-Aug-2010	AP	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
ST1	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Corynoneura*	*Corynoneura*
ST1	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
ST1	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius*
ST1	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
ST1	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Hydrobaenus*	*Hydrobaenus*
ST1	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
ST1	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa*
ST1	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
ST1	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus celer*
ST1	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus inopinatus*
ST1	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae			Ameletidae
ST1	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
ST1	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella coloradensis*
ST1	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
ST1	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
ST1	1	1-Aug-2010	AP	Include		0.288		Ostracoda	Arthropoda	Ostracoda					Ostracoda
ST1	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada haysi/oregonensis*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
BR2	4	1-Aug-2010	immature/damaged		ok	Exclude			12	41.7	
BR2	4	1-Aug-2010			ok	ok			4	13.9	
BR2	4	1-Aug-2010	immature/damaged		ok	Exclude			82	284.7	
BR2	4	1-Aug-2010			ok	ok			1	3.5	
BR2	4	1-Aug-2010			ok	ok			1	3.5	
BR2	4	1-Aug-2010			ok	ok			66	229.2	
BR2	4	1-Aug-2010	immature/damaged		ok	Exclude			2	6.9	
BR2	4	1-Aug-2010			ok	ok			2	6.9	
BR2	5	1-Aug-2010			ok	ok			2	6.9	
BR2	5	1-Aug-2010			ok	Exclude			2	6.9	
BR2	5	1-Aug-2010			ok	ok			2	6.9	
BR2	5	1-Aug-2010			ok	ok			5	17.4	
BR2	5	1-Aug-2010			ok	ok			1	3.5	
BR2	5	1-Aug-2010			ok	ok			5	17.4	
BR2	5	1-Aug-2010			ok	ok			2	6.9	
BR2	5	1-Aug-2010			ok	ok			9	31.3	
BR2	5	1-Aug-2010			ok	ok			1	3.5	
BR2	5	1-Aug-2010			ok	ok			1	3.5	
BR2	5	1-Aug-2010			ok	ok			1	3.5	
BR2	5	1-Aug-2010			ok	ok			1	3.5	
BR2	5	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
BR2	5	1-Aug-2010	immature/damaged		ok	Exclude			12	41.7	
BR2	5	1-Aug-2010			ok	ok			5	17.4	
BR2	5	1-Aug-2010			ok	ok			10	34.7	
BR2	5	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
BR2	5	1-Aug-2010			ok	ok			3	10.4	
BR2	5	1-Aug-2010			ok	ok			4	13.9	
BR2	5	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
BR2	5	1-Aug-2010			ok	ok			2	6.9	
BR2	5	1-Aug-2010			ok	ok			4	13.9	
BR2	5	1-Aug-2010	immature/damaged		ok	Exclude			119	413.2	
BR2	5	1-Aug-2010			ok	ok			109	378.5	
BR2	5	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
BR2	5	1-Aug-2010			Exclude	Exclude			2	6.9	
BR2	5	1-Aug-2010			ok	ok			1	3.5	
ST1	1	1-Aug-2010			ok	ok			48	166.7	
ST1	1	1-Aug-2010			ok	Exclude			13	45.1	
ST1	1	1-Aug-2010			ok	ok			1	3.5	
ST1	1	1-Aug-2010			ok	ok			9	31.3	
ST1	1	1-Aug-2010			ok	ok			9	31.3	
ST1	1	1-Aug-2010			ok	ok			18	62.5	
ST1	1	1-Aug-2010			ok	ok			8	27.8	
ST1	1	1-Aug-2010			ok	ok			888	3,083.3	
ST1	1	1-Aug-2010			ok	ok			9	31.3	
ST1	1	1-Aug-2010			ok	ok	pupa		8	27.8	
ST1	1	1-Aug-2010			ok	ok			1	3.5	
ST1	1	1-Aug-2010			ok	ok			97	336.8	
ST1	1	1-Aug-2010	immature/damaged		ok	Exclude			168	583.3	
ST1	1	1-Aug-2010			ok	ok			226	784.7	
ST1	1	1-Aug-2010			ok	ok			1	3.5	
ST1	1	1-Aug-2010	immature/damaged		ok	Exclude			8	27.8	
ST1	1	1-Aug-2010	immature/damaged		ok	Exclude			16	55.6	
ST1	1	1-Aug-2010			Exclude	Exclude			16	55.6	
ST1	1	1-Aug-2010			ok	ok			2	6.9	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
ST1	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
ST1	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
ST1	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae			Perlodidae
ST1	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
ST1	1	1-Aug-2010	AP	Include		0.288		Terrestrial							Terrestrial
ST1	2	1-Aug-2010	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
ST1	2	1-Aug-2010	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae			Naididae
ST1	2	1-Aug-2010	AP	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
ST1	2	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
ST1	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
ST1	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
ST1	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Polypedilum*	*Polypedilum*
ST1	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa*
ST1	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
ST1	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus inopinatus*
ST1	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae			Ameletidae
ST1	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
ST1	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella coloradensis*
ST1	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
ST1	2	1-Aug-2010	AP	Include		0.288		Ostracoda	Arthropoda	Ostracoda					Ostracoda
ST1	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
ST1	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
ST1	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
ST1	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
ST1	2	1-Aug-2010	AP	Include		0.288		Terrestrial							Terrestrial
ST1	3	1-Aug-2010	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
ST1	3	1-Aug-2010	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae			Naididae
ST1	3	1-Aug-2010	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Tubificidae			Tubificidae
ST1	3	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Dasyheleinae	*Dasyhelea*	*Dasyhelea*
ST1	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
ST1	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Hydrobaenus*	*Hydrobaenus*
ST1	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
ST1	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pagastia*	*Pagastia*
ST1	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa*
ST1	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Thienemanniella*	*Thienemanniella*
ST1	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
ST1	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus inopinatus*
ST1	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae			Ameletidae
ST1	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
ST1	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
ST1	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
ST1	3	1-Aug-2010	AP	Include		0.288		Ostracoda	Arthropoda	Ostracoda					Ostracoda
ST1	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
ST1	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
ST1	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
ST1	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
ST1	3	1-Aug-2010	AP	Include		0.288		Terrestrial							Terrestrial
ST1	4	1-Aug-2010	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae			Naididae
ST1	4	1-Aug-2010	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Tubificidae			Tubificidae
ST1	4	1-Aug-2010	AP	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
ST1	4	1-Aug-2010	AP	Include		0.288		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
ST1	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius*
ST1	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
ST1	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Hydrobaenus*	*Hydrobaenus*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
ST1	1	1-Aug-2010	immature/damaged		ok	Exclude			24	83.3	
ST1	1	1-Aug-2010			ok	ok			2	6.9	
ST1	1	1-Aug-2010	immature/damaged		ok	Exclude			24	83.3	
ST1	1	1-Aug-2010			ok	ok			16	55.6	
ST1	1	1-Aug-2010			Exclude	Exclude			19	66.0	
ST1	2	1-Aug-2010			ok	ok			8	27.8	
ST1	2	1-Aug-2010			ok	ok			16	55.6	
ST1	2	1-Aug-2010			ok	Exclude			1	3.5	
ST1	2	1-Aug-2010			ok	ok			1	3.5	
ST1	2	1-Aug-2010			ok	ok			32	111.1	
ST1	2	1-Aug-2010			ok	ok			424	1,472.2	
ST1	2	1-Aug-2010			ok	ok			8	27.8	
ST1	2	1-Aug-2010			ok	ok			16	55.6	
ST1	2	1-Aug-2010	immature/damaged		ok	Exclude			16	55.6	
ST1	2	1-Aug-2010			ok	ok			33	114.6	
ST1	2	1-Aug-2010	immature/damaged		ok	Exclude			48	166.7	
ST1	2	1-Aug-2010			ok	ok			228	791.7	
ST1	2	1-Aug-2010			ok	ok			1	3.5	
ST1	2	1-Aug-2010	immature/damaged		ok	Exclude			48	166.7	
ST1	2	1-Aug-2010			Exclude	Exclude			8	27.8	
ST1	2	1-Aug-2010			ok	ok			40	138.9	
ST1	2	1-Aug-2010	immature/damaged		ok	Exclude			48	166.7	
ST1	2	1-Aug-2010			ok	ok			3	10.4	
ST1	2	1-Aug-2010	immature/damaged		ok	Exclude			24	83.3	
ST1	2	1-Aug-2010			Exclude	Exclude			9	31.3	
ST1	3	1-Aug-2010			ok	ok			8	27.8	
ST1	3	1-Aug-2010			ok	ok			8	27.8	
ST1	3	1-Aug-2010			ok	ok			8	27.8	
ST1	3	1-Aug-2010			ok	ok			1	3.5	
ST1	3	1-Aug-2010			ok	ok			1	3.5	
ST1	3	1-Aug-2010			ok	ok			17	59.0	
ST1	3	1-Aug-2010			ok	ok			8	27.8	
ST1	3	1-Aug-2010			ok	ok			400	1,388.9	
ST1	3	1-Aug-2010			ok	ok			8	27.8	
ST1	3	1-Aug-2010			ok	ok			10	34.7	
ST1	3	1-Aug-2010			ok	ok			8	27.8	
ST1	3	1-Aug-2010			ok	ok	pupa		8	27.8	
ST1	3	1-Aug-2010			ok	ok			16	55.6	
ST1	3	1-Aug-2010	immature/damaged		ok	Exclude			32	111.1	
ST1	3	1-Aug-2010			ok	ok			183	635.4	
ST1	3	1-Aug-2010			ok	ok			8	27.8	
ST1	3	1-Aug-2010	immature/damaged		ok	Exclude			8	27.8	
ST1	3	1-Aug-2010			Exclude	Exclude			16	55.6	
ST1	3	1-Aug-2010			ok	ok			32	111.1	
ST1	3	1-Aug-2010	immature/damaged		ok	Exclude			56	194.4	
ST1	3	1-Aug-2010			ok	ok			1	3.5	
ST1	3	1-Aug-2010	immature/damaged		ok	Exclude			8	27.8	
ST1	3	1-Aug-2010			Exclude	Exclude			16	55.6	
ST1	4	1-Aug-2010			ok	ok			48	166.7	
ST1	4	1-Aug-2010			ok	ok			1	3.5	
ST1	4	1-Aug-2010			ok	Exclude			1	3.5	
ST1	4	1-Aug-2010			Exclude	Exclude			8	27.8	
ST1	4	1-Aug-2010			ok	ok			18	62.5	
ST1	4	1-Aug-2010			ok	ok			8	27.8	
ST1	4	1-Aug-2010			ok	ok			1	3.5	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
ST1	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
ST1	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa*
ST1	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus celer*
ST1	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus inopinatus*
ST1	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae			Ameletidae
ST1	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
ST1	4	1-Aug-2010	AP	Include		0.288		Ostracoda	Arthropoda	Ostracoda					Ostracoda
ST1	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Isoperla*	*Isoperla*
ST1	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
ST1	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
ST1	4	1-Aug-2010	AP	Include		0.288		Terrestrial							Terrestrial
ST1	5	1-Aug-2010	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
ST1	5	1-Aug-2010	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Tubificidae			Tubificidae
ST1	5	1-Aug-2010	AP	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
ST1	5	1-Aug-2010	AP	Include		0.288		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
ST1	5	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Empididae		*Chelifera*	*Chelifera*
ST1	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cardiocladius*	*Cardiocladius*
ST1	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Corynoneura*	*Corynoneura*
ST1	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius*
ST1	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
ST1	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Hydrobaenus*	*Hydrobaenus*
ST1	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
ST1	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa*
ST1	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Thienemanniella*	*Thienemanniella*
ST1	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus celer*
ST1	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus inopinatus*
ST1	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae			Ameletidae
ST1	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
ST1	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
ST1	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
ST1	5	1-Aug-2010	AP	Include		0.288		Ostracoda	Arthropoda	Ostracoda					Ostracoda
ST1	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
ST1	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada haysi/oregonensis*
ST1	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
ST1	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Isoperla*	*Isoperla*
ST1	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
ST1	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
ST1	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
ST1	5	1-Aug-2010	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
ST2	1	1-Aug-2010	AP	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
ST2	1	1-Aug-2010	AP	Include		0.288		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
ST2	1	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Empididae		*Hemerodromia*	*Hemerodromia*
ST2	1	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
ST2	1	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
ST2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cardiocladius*	*Cardiocladius*
ST2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
ST2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
ST2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
ST2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius lignicola*
ST2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pagastia*	*Pagastia*
ST2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parametriocnemus*	*Parametriocnemus*
ST2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parorthocladius*	*Parorthocladius*
ST2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
ST2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
ST1	4	1-Aug-2010			ok	ok			704	2,444.4	
ST1	4	1-Aug-2010			ok	ok			5	17.4	
ST1	4	1-Aug-2010			ok	ok			1	3.5	
ST1	4	1-Aug-2010			ok	ok			25	86.8	
ST1	4	1-Aug-2010	immature/damaged		ok	Exclude			24	83.3	
ST1	4	1-Aug-2010			ok	ok			73	253.5	
ST1	4	1-Aug-2010			Exclude	Exclude			16	55.6	
ST1	4	1-Aug-2010			ok	ok			1	3.5	
ST1	4	1-Aug-2010			ok	ok			8	27.8	
ST1	4	1-Aug-2010	immature/damaged		ok	Exclude			8	27.8	
ST1	4	1-Aug-2010			Exclude	Exclude			1	3.5	
ST1	5	1-Aug-2010			ok	ok			9	31.3	
ST1	5	1-Aug-2010			ok	ok			1	3.5	
ST1	5	1-Aug-2010			ok	Exclude			10	34.7	
ST1	5	1-Aug-2010			Exclude	Exclude			8	27.8	
ST1	5	1-Aug-2010			ok	ok			1	3.5	
ST1	5	1-Aug-2010			ok	ok			8	27.8	
ST1	5	1-Aug-2010			ok	ok			8	27.8	
ST1	5	1-Aug-2010			ok	ok			58	201.4	
ST1	5	1-Aug-2010			ok	ok			8	27.8	
ST1	5	1-Aug-2010			ok	ok			1	3.5	
ST1	5	1-Aug-2010			ok	ok			872	3,027.8	
ST1	5	1-Aug-2010			ok	ok			11	38.2	
ST1	5	1-Aug-2010			ok	ok			16	55.6	
ST1	5	1-Aug-2010			ok	ok			20	69.4	
ST1	5	1-Aug-2010			ok	ok			50	173.6	
ST1	5	1-Aug-2010	immature/damaged		ok	Exclude			224	777.8	
ST1	5	1-Aug-2010			ok	ok			147	510.4	
ST1	5	1-Aug-2010	immature/damaged		ok	Exclude			8	27.8	
ST1	5	1-Aug-2010	immature/damaged		ok	Exclude			8	27.8	
ST1	5	1-Aug-2010			Exclude	Exclude			40	138.9	
ST1	5	1-Aug-2010			ok	ok			41	142.4	
ST1	5	1-Aug-2010			ok	ok			1	3.5	
ST1	5	1-Aug-2010	immature/damaged		ok	Exclude			8	27.8	
ST1	5	1-Aug-2010			ok	ok			1	3.5	
ST1	5	1-Aug-2010			ok	ok			1	3.5	
ST1	5	1-Aug-2010			ok	ok			64	222.2	
ST1	5	1-Aug-2010	immature/damaged		ok	Exclude			32	111.1	
ST1	5	1-Aug-2010			ok	ok			1	3.5	
ST2	1	1-Aug-2010			ok	Exclude			4	13.9	
ST2	1	1-Aug-2010			Exclude	Exclude			2	6.9	
ST2	1	1-Aug-2010			ok	ok			1	3.5	
ST2	1	1-Aug-2010			ok	ok			1	3.5	
ST2	1	1-Aug-2010			ok	ok			1	3.5	
ST2	1	1-Aug-2010			ok	ok			3	10.4	
ST2	1	1-Aug-2010			ok	ok			3	10.4	
ST2	1	1-Aug-2010			ok	ok			31	107.6	
ST2	1	1-Aug-2010			ok	ok			3	10.4	
ST2	1	1-Aug-2010			ok	ok			1	3.5	
ST2	1	1-Aug-2010			ok	ok			1	3.5	
ST2	1	1-Aug-2010			ok	ok			1	3.5	
ST2	1	1-Aug-2010			ok	ok			1	3.5	
ST2	1	1-Aug-2010			ok	ok			14	48.6	
ST2	1	1-Aug-2010			ok	ok			17	59.0	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
ST2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
ST2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
ST2	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus inopinatus*
ST2	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
ST2	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella coloradensis*
ST2	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
ST2	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
ST2	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
ST2	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
ST2	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
ST2	1	1-Aug-2010	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
ST2	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
ST2	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
ST2	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada haysi/oregonensis*
ST2	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
ST2	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Isoperla*	*Isoperla*
ST2	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
ST2	1	1-Aug-2010	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
ST2	2	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Hexatoma/Limnophila*	*Hexatoma/Limnophila*
ST2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
ST2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
ST2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parorthocladius*	*Parorthocladius*
ST2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
ST2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa*
ST2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
ST2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus inopinatus*
ST2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
ST2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus inopinatus*
ST2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
ST2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella coloradensis*
ST2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
ST2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
ST2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
ST2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
ST2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
ST2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
ST2	2	1-Aug-2010	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
ST2	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
ST2	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
ST2	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada haysi/oregonensis*
ST2	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
ST2	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
ST2	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
ST2	2	1-Aug-2010	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Limnephilidae			Limnephilidae
ST2	2	1-Aug-2010	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
ST2	3	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Hexatoma/Limnophila*	*Hexatoma/Limnophila*
ST2	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
ST2	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pagastia*	*Pagastia*
ST2	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus inopinatus*
ST2	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
ST2	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella coloradensis*
ST2	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
ST2	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
ST2	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
ST2	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
ST2	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
ST2	1	1-Aug-2010	immature/damaged		ok	Exclude			9	31.3	
ST2	1	1-Aug-2010			ok	ok	pupa		2	6.9	
ST2	1	1-Aug-2010			ok	ok			1	3.5	
ST2	1	1-Aug-2010			ok	ok			12	41.7	
ST2	1	1-Aug-2010			ok	ok			1	3.5	
ST2	1	1-Aug-2010			ok	ok			7	24.3	
ST2	1	1-Aug-2010	immature/damaged		ok	Exclude			2	6.9	
ST2	1	1-Aug-2010			ok	ok			11	38.2	
ST2	1	1-Aug-2010			ok	ok			7	24.3	
ST2	1	1-Aug-2010	immature/damaged		ok	Exclude			5	17.4	
ST2	1	1-Aug-2010			Exclude	Exclude			23	79.9	
ST2	1	1-Aug-2010			ok	ok			1	3.5	
ST2	1	1-Aug-2010	immature/damaged		ok	Exclude			8	27.8	
ST2	1	1-Aug-2010			ok	ok			35	121.5	
ST2	1	1-Aug-2010	immature/damaged		ok	Exclude			93	322.9	
ST2	1	1-Aug-2010			ok	ok			4	13.9	
ST2	1	1-Aug-2010			ok	ok			31	107.6	
ST2	1	1-Aug-2010			ok	ok			1	3.5	
ST2	2	1-Aug-2010			ok	ok			1	3.5	
ST2	2	1-Aug-2010			ok	ok			2	6.9	
ST2	2	1-Aug-2010			ok	ok			3	10.4	
ST2	2	1-Aug-2010			ok	ok			1	3.5	
ST2	2	1-Aug-2010			ok	ok			2	6.9	
ST2	2	1-Aug-2010			ok	ok			1	3.5	
ST2	2	1-Aug-2010			ok	ok	pupa		1	3.5	
ST2	2	1-Aug-2010			ok	ok			2	6.9	
ST2	2	1-Aug-2010			ok	ok			5	17.4	
ST2	2	1-Aug-2010			ok	ok			1	3.5	
ST2	2	1-Aug-2010			ok	ok			10	34.7	
ST2	2	1-Aug-2010	immature/damaged		ok	Exclude			2	6.9	
ST2	2	1-Aug-2010			ok	ok			3	10.4	
ST2	2	1-Aug-2010			ok	ok			13	45.1	
ST2	2	1-Aug-2010			ok	ok			6	20.8	
ST2	2	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
ST2	2	1-Aug-2010			Exclude	Exclude			5	17.4	
ST2	2	1-Aug-2010			ok	ok			3	10.4	
ST2	2	1-Aug-2010	immature/damaged		ok	Exclude			19	66.0	
ST2	2	1-Aug-2010			ok	ok			2	6.9	
ST2	2	1-Aug-2010	immature/damaged		ok	Exclude			36	125.0	
ST2	2	1-Aug-2010			ok	ok			31	107.6	
ST2	2	1-Aug-2010	immature/damaged		ok	Exclude			4	13.9	
ST2	2	1-Aug-2010	immature/damaged		ok	Exclude			3	10.4	
ST2	2	1-Aug-2010			ok	ok			1	3.5	
ST2	3	1-Aug-2010			ok	ok			1	3.5	
ST2	3	1-Aug-2010			ok	ok			1	3.5	
ST2	3	1-Aug-2010			ok	ok			1	3.5	
ST2	3	1-Aug-2010			ok	ok			1	3.5	
ST2	3	1-Aug-2010			ok	ok			4	13.9	
ST2	3	1-Aug-2010			ok	ok			1	3.5	
ST2	3	1-Aug-2010			ok	ok			9	31.3	
ST2	3	1-Aug-2010	immature/damaged		ok	Exclude			3	10.4	
ST2	3	1-Aug-2010			ok	ok			1	3.5	
ST2	3	1-Aug-2010			ok	ok			9	31.3	
ST2	3	1-Aug-2010			ok	ok			12	41.7	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
ST2	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
ST2	3	1-Aug-2010	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
ST2	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
ST2	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
ST2	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada haysi/oregonensis*
ST2	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
ST2	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
ST2	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
ST2	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
ST2	3	1-Aug-2010	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Limnephilidae			Limnephilidae
ST2	3	1-Aug-2010	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
ST2	4	1-Aug-2010	AP	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
ST2	4	1-Aug-2010	AP	Include		0.288		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
ST2	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cardiocladius*	*Cardiocladius*
ST2	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
ST2	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
ST2	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius lignicola*
ST2	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parakiefferiella*	*Parakiefferiella*
ST2	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
ST2	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
ST2	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
ST2	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
ST2	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
ST2	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
ST2	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
ST2	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
ST2	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
ST2	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
ST2	4	1-Aug-2010	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
ST2	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
ST2	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
ST2	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada haysi/oregonensis*
ST2	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
ST2	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
ST2	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
ST2	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
ST2	4	1-Aug-2010	AP	Exclude		0.288		Terrestrial							Terrestrial
ST2	4	1-Aug-2010	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Limnephilidae			Limnephilidae
ST2	5	1-Aug-2010	AP	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
ST2	5	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
ST2	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
ST2	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
ST2	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
ST2	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
ST2	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
ST2	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
ST2	5	1-Aug-2010	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
ST2	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
ST2	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
ST2	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada haysi/oregonensis*
ST2	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
ST2	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
ST2	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
ST2	5	1-Aug-2010	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Limnephilidae			Limnephilidae

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
ST2	3	1-Aug-2010	immature/damaged		ok	Exclude			7	24.3	
ST2	3	1-Aug-2010			Exclude	Exclude			8	27.8	
ST2	3	1-Aug-2010			ok	ok			4	13.9	
ST2	3	1-Aug-2010	immature/damaged		ok	Exclude			27	93.8	
ST2	3	1-Aug-2010			ok	ok			14	48.6	
ST2	3	1-Aug-2010	immature/damaged		ok	Exclude			32	111.1	
ST2	3	1-Aug-2010			ok	ok			1	3.5	
ST2	3	1-Aug-2010			ok	ok			24	83.3	
ST2	3	1-Aug-2010	immature/damaged		ok	Exclude			6	20.8	
ST2	3	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
ST2	3	1-Aug-2010			ok	ok			1	3.5	
ST2	4	1-Aug-2010			ok	Exclude			3	10.4	
ST2	4	1-Aug-2010			Exclude	Exclude			1	3.5	
ST2	4	1-Aug-2010			ok	ok			1	3.5	
ST2	4	1-Aug-2010			ok	ok			8	27.8	
ST2	4	1-Aug-2010			ok	ok			3	10.4	
ST2	4	1-Aug-2010			ok	ok			1	3.5	
ST2	4	1-Aug-2010			ok	ok			1	3.5	
ST2	4	1-Aug-2010			ok	ok			1	3.5	
ST2	4	1-Aug-2010			ok	ok			1	3.5	
ST2	4	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
ST2	4	1-Aug-2010			ok	ok			6	20.8	
ST2	4	1-Aug-2010			ok	ok			5	17.4	
ST2	4	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
ST2	4	1-Aug-2010			ok	ok			1	3.5	
ST2	4	1-Aug-2010			ok	ok			19	66.0	
ST2	4	1-Aug-2010			ok	ok			8	27.8	
ST2	4	1-Aug-2010			Exclude	Exclude			6	20.8	
ST2	4	1-Aug-2010			ok	ok			3	10.4	
ST2	4	1-Aug-2010	immature/damaged		ok	Exclude			21	72.9	
ST2	4	1-Aug-2010			ok	ok			8	27.8	
ST2	4	1-Aug-2010	immature/damaged		ok	Exclude			35	121.5	
ST2	4	1-Aug-2010			ok	ok			3	10.4	
ST2	4	1-Aug-2010			ok	ok			60	208.3	
ST2	4	1-Aug-2010	immature/damaged		ok	Exclude			5	17.4	
ST2	4	1-Aug-2010			Exclude	Exclude			1	3.5	
ST2	4	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
ST2	5	1-Aug-2010			ok	Exclude			3	10.4	
ST2	5	1-Aug-2010			ok	ok			1	3.5	
ST2	5	1-Aug-2010			ok	ok			1	3.5	
ST2	5	1-Aug-2010			ok	ok			1	3.5	
ST2	5	1-Aug-2010			ok	ok			1	3.5	
ST2	5	1-Aug-2010			ok	ok			1	3.5	
ST2	5	1-Aug-2010			ok	ok			6	20.8	
ST2	5	1-Aug-2010	immature/damaged		ok	Exclude			4	13.9	
ST2	5	1-Aug-2010			Exclude	Exclude			4	13.9	
ST2	5	1-Aug-2010			ok	ok			1	3.5	
ST2	5	1-Aug-2010	immature/damaged		ok	Exclude			14	48.6	
ST2	5	1-Aug-2010			ok	ok			2	6.9	
ST2	5	1-Aug-2010	immature/damaged		ok	Exclude			9	31.3	
ST2	5	1-Aug-2010			ok	ok			20	69.4	
ST2	5	1-Aug-2010	immature/damaged		ok	Exclude			5	17.4	
ST2	5	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
TC2	1	1-Aug-2010	AP	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
TC2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
TC2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
TC2	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
TC2	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
TC2	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
TC2	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
TC2	1	1-Aug-2010	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
TC2	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
TC2	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
TC2	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
TC2	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
TC2	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
TC2	1	1-Aug-2010	AP	Include		0.288		Terrestrial							Terrestrial
TC2	1	1-Aug-2010	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Limnephilidae			Limnephilidae
TC2	2	1-Aug-2010	AP	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
TC2	2	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
TC2	2	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Hexatoma/Limnophila*	*Hexatoma/Limnophila*
TC2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
TC2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
TC2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
TC2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
TC2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
TC2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
TC2	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
TC2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
TC2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
TC2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
TC2	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
TC2	2	1-Aug-2010	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
TC2	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
TC2	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
TC2	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada haysi/oregonensis*
TC2	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
TC2	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
TC2	2	1-Aug-2010	AP	Include		0.288		Terrestrial							Terrestrial
TC2	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
TC2	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
TC2	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
TC2	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parametriocnemus*	*Parametriocnemus*
TC2	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
TC2	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
TC2	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
TC2	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
TC2	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
TC2	3	1-Aug-2010	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
TC2	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
TC2	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
TC2	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
TC2	4	1-Aug-2010	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
TC2	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
TC2	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
TC2	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parorthocladius*	*Parorthocladius*
TC2	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
TC2	1	1-Aug-2010			ok	Exclude			1	3.5	
TC2	1	1-Aug-2010			ok	ok			2	6.9	
TC2	1	1-Aug-2010			ok	ok			3	10.4	
TC2	1	1-Aug-2010			ok	ok			5	17.4	
TC2	1	1-Aug-2010			ok	ok			2	6.9	
TC2	1	1-Aug-2010			ok	ok			1	3.5	
TC2	1	1-Aug-2010			ok	ok			1	3.5	
TC2	1	1-Aug-2010			Exclude	Exclude			2	6.9	
TC2	1	1-Aug-2010			ok	ok			5	17.4	
TC2	1	1-Aug-2010	immature/damaged		ok	Exclude			15	52.1	
TC2	1	1-Aug-2010			ok	ok			1	3.5	
TC2	1	1-Aug-2010			ok	ok			5	17.4	
TC2	1	1-Aug-2010	immature/damaged		ok	Exclude			3	10.4	
TC2	1	1-Aug-2010			Exclude	Exclude			1	3.5	
TC2	1	1-Aug-2010	immature/damaged		ok	Exclude			2	6.9	
TC2	2	1-Aug-2010			ok	Exclude			2	6.9	
TC2	2	1-Aug-2010			ok	ok			1	3.5	
TC2	2	1-Aug-2010			ok	ok			1	3.5	
TC2	2	1-Aug-2010			ok	ok			1	3.5	
TC2	2	1-Aug-2010			ok	ok			13	45.1	
TC2	2	1-Aug-2010			ok	ok			1	3.5	
TC2	2	1-Aug-2010			ok	ok			1	3.5	
TC2	2	1-Aug-2010			ok	ok			1	3.5	
TC2	2	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
TC2	2	1-Aug-2010			ok	ok	pupa		1	3.5	
TC2	2	1-Aug-2010			ok	ok			1	3.5	
TC2	2	1-Aug-2010			ok	ok			1	3.5	
TC2	2	1-Aug-2010			ok	ok			1	3.5	
TC2	2	1-Aug-2010			ok	ok			4	13.9	
TC2	2	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
TC2	2	1-Aug-2010			Exclude	Exclude			2	6.9	
TC2	2	1-Aug-2010			ok	ok			2	6.9	
TC2	2	1-Aug-2010	immature/damaged		ok	Exclude			16	55.6	
TC2	2	1-Aug-2010			ok	ok			3	10.4	
TC2	2	1-Aug-2010	immature/damaged		ok	Exclude			3	10.4	
TC2	2	1-Aug-2010			ok	ok			1	3.5	
TC2	2	1-Aug-2010			Exclude	Exclude			2	6.9	
TC2	3	1-Aug-2010			ok	ok			1	3.5	
TC2	3	1-Aug-2010			ok	ok			17	59.0	
TC2	3	1-Aug-2010			ok	ok			1	3.5	
TC2	3	1-Aug-2010			ok	ok			1	3.5	
TC2	3	1-Aug-2010			ok	ok			1	3.5	
TC2	3	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
TC2	3	1-Aug-2010			ok	ok			1	3.5	
TC2	3	1-Aug-2010			ok	ok			1	3.5	
TC2	3	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
TC2	3	1-Aug-2010			Exclude	Exclude			1	3.5	
TC2	3	1-Aug-2010			ok	ok			1	3.5	
TC2	3	1-Aug-2010	immature/damaged		ok	Exclude			2	6.9	
TC2	3	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
TC2	4	1-Aug-2010			ok	ok			1	3.5	
TC2	4	1-Aug-2010			ok	ok			3	10.4	
TC2	4	1-Aug-2010			ok	ok			10	34.7	
TC2	4	1-Aug-2010			ok	ok			1	3.5	
TC2	4	1-Aug-2010			ok	ok			5	17.4	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
TC2	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
TC2	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
TC2	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
TC2	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
TC2	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
TC2	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada haysi/oregonensis*
TC2	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
TC2	4	1-Aug-2010	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
TC2	5	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
TC2	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
TC2	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
TC2	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
TC2	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
TC2	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
TC2	5	1-Aug-2010	AP	Include		0.288		Terrestrial							Terrestrial
TC3	1	1-Aug-2010	AP	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
TC3	1	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
TC3	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
TC3	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
TC3	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
TC3	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pagastia*	*Pagastia*
TC3	1	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
TC3	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus inopinatus*
TC3	1	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
TC3	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
TC3	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
TC3	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada haysi/oregonensis*
TC3	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
TC3	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada haysi/oregonensis*
TC3	1	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
TC3	2	1-Aug-2010	AP	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
TC3	2	1-Aug-2010	AP	Include		0.288		Cladocera	Arthropoda	Branchiopoda	Diplostraca	Chydoridae			Chydoridae
TC3	2	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Bezzia*	*Bezzia*
TC3	2	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
TC3	2	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
TC3	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
TC3	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
TC3	2	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
TC3	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
TC3	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
TC3	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
TC3	2	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
TC3	2	1-Aug-2010	AP	Include		0.288		Terrestrial							Terrestrial
TC3	3	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Blephariceridae		*Philorus*	*Philorus*
TC3	3	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
TC3	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
TC3	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
TC3	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pagastia*	*Pagastia*
TC3	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
TC3	3	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
TC3	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
TC3	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
TC3	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
TC3	3	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
TC3	3	1-Aug-2010	AP	Include		0.288		Ostracoda	Arthropoda	Ostracoda					Ostracoda
TC3	3	1-Aug-2010	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
TC2	4	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
TC2	4	1-Aug-2010			ok	ok			9	31.3	
TC2	4	1-Aug-2010			ok	ok			4	13.9	
TC2	4	1-Aug-2010			ok	ok			6	20.8	
TC2	4	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
TC2	4	1-Aug-2010			ok	ok			5	17.4	
TC2	4	1-Aug-2010	immature/damaged		ok	Exclude			16	55.6	
TC2	4	1-Aug-2010			ok	ok			3	10.4	
TC2	5	1-Aug-2010			ok	ok			1	3.5	
TC2	5	1-Aug-2010			ok	ok			2	6.9	
TC2	5	1-Aug-2010			ok	ok			3	10.4	
TC2	5	1-Aug-2010			ok	ok			1	3.5	
TC2	5	1-Aug-2010			ok	ok			2	6.9	
TC2	5	1-Aug-2010	immature/damaged		ok	Exclude			2	6.9	
TC2	5	1-Aug-2010			Exclude	Exclude			1	3.5	
TC3	1	1-Aug-2010			ok	Exclude			1	3.5	
TC3	1	1-Aug-2010			ok	ok			3	10.4	
TC3	1	1-Aug-2010			ok	ok			1	3.5	
TC3	1	1-Aug-2010			ok	ok			1	3.5	
TC3	1	1-Aug-2010			ok	ok			3	10.4	
TC3	1	1-Aug-2010			ok	ok			1	3.5	
TC3	1	1-Aug-2010			ok	ok			2	6.9	
TC3	1	1-Aug-2010			ok	ok			1	3.5	
TC3	1	1-Aug-2010			ok	ok			1	3.5	
TC3	1	1-Aug-2010			ok	ok			1	3.5	
TC3	1	1-Aug-2010	immature/damaged		ok	Exclude			4	13.9	
TC3	1	1-Aug-2010			ok	ok			3	10.4	
TC3	1	1-Aug-2010	immature/damaged		ok	Exclude			3	10.4	
TC3	2	1-Aug-2010			ok	Exclude			2	6.9	
TC3	2	1-Aug-2010			Exclude	Exclude			1	3.5	
TC3	2	1-Aug-2010			ok	ok			1	3.5	
TC3	2	1-Aug-2010			ok	ok			2	6.9	
TC3	2	1-Aug-2010			ok	ok			3	10.4	
TC3	2	1-Aug-2010			ok	ok			1	3.5	
TC3	2	1-Aug-2010			ok	ok			1	3.5	
TC3	2	1-Aug-2010			ok	ok			1	3.5	
TC3	2	1-Aug-2010			ok	ok			3	10.4	
TC3	2	1-Aug-2010	immature/damaged		ok	Exclude			6	20.8	
TC3	2	1-Aug-2010			ok	ok			3	10.4	
TC3	2	1-Aug-2010	immature/damaged		ok	Exclude			3	10.4	
TC3	2	1-Aug-2010			Exclude	Exclude			1	3.5	
TC3	3	1-Aug-2010	uncertain		ok	Exclude			2	6.9	
TC3	3	1-Aug-2010			ok	ok			3	10.4	
TC3	3	1-Aug-2010			ok	ok			1	3.5	
TC3	3	1-Aug-2010			ok	ok			1	3.5	
TC3	3	1-Aug-2010			ok	ok			1	3.5	
TC3	3	1-Aug-2010			ok	ok			16	55.6	
TC3	3	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
TC3	3	1-Aug-2010			ok	ok			2	6.9	
TC3	3	1-Aug-2010			ok	ok			1	3.5	
TC3	3	1-Aug-2010			ok	ok			1	3.5	
TC3	3	1-Aug-2010			ok	ok			2	6.9	
TC3	3	1-Aug-2010			Exclude	Exclude			1	3.5	
TC3	3	1-Aug-2010			Exclude	Exclude			1	3.5	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
TC3	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
TC3	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
TC3	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada haysi/oregonensis*
TC3	3	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
TC3	4	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
TC3	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
TC3	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
TC3	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
TC3	4	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
TC3	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
TC3	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
TC3	4	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
TC3	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
TC3	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada haysi/oregonensis*
TC3	4	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
TC3	4	1-Aug-2010	AP	Include		0.288		Terrestrial							Terrestrial
TC3	5	1-Aug-2010	AP	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
TC3	5	1-Aug-2010	AP	Include		0.288		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
TC3	5	1-Aug-2010	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
TC3	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
TC3	5	1-Aug-2010	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
TC3	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
TC3	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
TC3	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
TC3	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
TC3	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
TC3	5	1-Aug-2010	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
TC3	5	1-Aug-2010	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
TC3	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
TC3	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
TC3	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
TC3	5	1-Aug-2010	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
TD1	1	1-Aug-2010	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
TD1	1	1-Aug-2010	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
TD1	1	1-Aug-2010	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
TD1	1	1-Aug-2010	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
TD1	1	1-Aug-2010	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
TD1	1	1-Aug-2010	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
TD1	1	1-Aug-2010	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
TD1	1	1-Aug-2010	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada haysi/oregonensis*
TD1	1	1-Aug-2010	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
TD1	1	1-Aug-2010	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
TD1	1	1-Aug-2010	FF	Exclude		0.288		Terrestrial							Terrestrial
TD1	2	1-Aug-2010	FF	Exclude		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
TD1	2	1-Aug-2010	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
TD1	2	1-Aug-2010	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
TD1	2	1-Aug-2010	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
TD1	2	1-Aug-2010	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
TD1	2	1-Aug-2010	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
TD1	2	1-Aug-2010	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
TD1	2	1-Aug-2010	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
TD1	2	1-Aug-2010	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
TD1	2	1-Aug-2010	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
TD1	3	1-Aug-2010	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
TC3	3	1-Aug-2010			ok	ok			2	6.9	
TC3	3	1-Aug-2010	immature/damaged		ok	Exclude			11	38.2	
TC3	3	1-Aug-2010			ok	ok			1	3.5	
TC3	3	1-Aug-2010			ok	ok			1	3.5	
TC3	4	1-Aug-2010			ok	ok			2	6.9	
TC3	4	1-Aug-2010			ok	ok			2	6.9	
TC3	4	1-Aug-2010			ok	ok			3	10.4	
TC3	4	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
TC3	4	1-Aug-2010			ok	ok	pupa		1	3.5	
TC3	4	1-Aug-2010			ok	ok			3	10.4	
TC3	4	1-Aug-2010			ok	ok			1	3.5	
TC3	4	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
TC3	4	1-Aug-2010	immature/damaged		ok	Exclude			6	20.8	
TC3	4	1-Aug-2010			ok	ok			3	10.4	
TC3	4	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
TC3	4	1-Aug-2010			Exclude	Exclude			1	3.5	
TC3	5	1-Aug-2010			ok	Exclude			3	10.4	
TC3	5	1-Aug-2010			Exclude	Exclude			1	3.5	
TC3	5	1-Aug-2010			ok	ok			7	24.3	
TC3	5	1-Aug-2010			ok	ok			13	45.1	
TC3	5	1-Aug-2010	immature/damaged		ok	Exclude			3	10.4	
TC3	5	1-Aug-2010			ok	ok			7	24.3	
TC3	5	1-Aug-2010			ok	ok			1	3.5	
TC3	5	1-Aug-2010			ok	ok			1	3.5	
TC3	5	1-Aug-2010			ok	ok			1	3.5	
TC3	5	1-Aug-2010			ok	ok			1	3.5	
TC3	5	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
TC3	5	1-Aug-2010			ok	ok			1	3.5	
TC3	5	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
TC3	5	1-Aug-2010			Exclude	Exclude			3	10.4	
TC3	5	1-Aug-2010			ok	ok			3	10.4	
TC3	5	1-Aug-2010	immature/damaged		ok	Exclude			10	34.7	
TC3	5	1-Aug-2010			ok	ok			2	6.9	
TC3	5	1-Aug-2010			ok	ok			8	27.8	
TD1	1	1-Aug-2010			ok	ok			4	13.9	
TD1	1	1-Aug-2010			ok	ok			5	17.4	
TD1	1	1-Aug-2010			ok	ok			1	3.5	
TD1	1	1-Aug-2010			ok	ok	pupa		1	3.5	
TD1	1	1-Aug-2010			ok	ok			1	3.5	
TD1	1	1-Aug-2010			ok	ok			5	17.4	
TD1	1	1-Aug-2010	immature/damaged		ok	Exclude			3	10.4	
TD1	1	1-Aug-2010			ok	ok			1	3.5	
TD1	1	1-Aug-2010			ok	ok			2	6.9	
TD1	1	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
TD1	1	1-Aug-2010			Exclude	Exclude			3	10.4	
TD1	2	1-Aug-2010			ok	Exclude			1	3.5	
TD1	2	1-Aug-2010			ok	ok			3	10.4	
TD1	2	1-Aug-2010			ok	ok			16	55.6	
TD1	2	1-Aug-2010	immature/damaged		ok	Exclude			2	6.9	
TD1	2	1-Aug-2010			ok	ok			1	3.5	
TD1	2	1-Aug-2010			ok	ok			1	3.5	
TD1	2	1-Aug-2010	immature/damaged		ok	Exclude			4	13.9	
TD1	2	1-Aug-2010			ok	ok			2	6.9	
TD1	2	1-Aug-2010			ok	ok			5	17.4	
TD1	2	1-Aug-2010	immature/damaged		ok	Exclude			1	3.5	
TD1	3	1-Aug-2010			ok	ok			2	6.9	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
TD1	3	1-Aug-2010	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
TD1	3	1-Aug-2010	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
TD1	3	1-Aug-2010	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
TD1	3	1-Aug-2010	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
TD1	3	1-Aug-2010	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
TD1	3	1-Aug-2010	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
TD1	3	1-Aug-2010	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
TD1	3	1-Aug-2010	FF	Exclude		0.288		Terrestrial							Terrestrial
TD1	4	1-Aug-2010	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Podonominae	*Boreochlus*	*Boreochlus*
TD1	4	1-Aug-2010	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
TD1	4	1-Aug-2010	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia*	*Platysmittia*
TD1	4	1-Aug-2010	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
TD1	4	1-Aug-2010	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
TD1	4	1-Aug-2010	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
TD1	5	1-Aug-2010	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
TD1	5	1-Aug-2010	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
TD1	5	1-Aug-2010	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
TD1	5	1-Aug-2010	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parorthocladius*	*Parorthocladius*
TD1	5	1-Aug-2010	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
TD1	5	1-Aug-2010	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
TD1	5	1-Aug-2010	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
TD1	5	1-Aug-2010	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
WC2	1	21-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Naidinae		Naidinae
WC2	1	21-Aug-2011	FF	Exclude		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
WC2	1	21-Aug-2011	FF	Exclude		0.288		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium/Sphaerium*	*Pisidium/Sphaerium*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Cladocera	Arthropoda	Branchiopoda	Diplostraca	Chydoridae			Chydoridae
WC2	1	21-Aug-2011	FF	Exclude		0.288		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
WC2	1	21-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Bezzia*	*Bezzia*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Simuliidae		*Helodon*	*Helodon*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parametriocnemus*	*Parametriocnemus*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Stempellinella*	*Stempellinella*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Thienemannimyia*	*Thienemannimyia*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
WC2	1	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
WC2	1	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae		*Paraleptophlebia*	*Paraleptophlebia*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Ostracoda	Arthropoda	Ostracoda					Ostracoda
WC2	1	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Sweltsa*	*Sweltsa*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
WC2	1	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
WC2	1	21-Aug-2011	FF	Exclude		0.288		Terrestrial							Terrestrial
WC2	1	21-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Apataniidae		*Apatania*	*Apatania*
WC2	1	21-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
TD1	3	1-Aug-2010			ok	ok			4	13.9	
TD1	3	1-Aug-2010			ok	ok			2	6.9	
TD1	3	1-Aug-2010			ok	ok			1	3.5	
TD1	3	1-Aug-2010			ok	ok			1	3.5	
TD1	3	1-Aug-2010			ok	ok			1	3.5	
TD1	3	1-Aug-2010	immature/damaged		ok	Exclude			2	6.9	
TD1	3	1-Aug-2010			ok	ok			1	3.5	
TD1	3	1-Aug-2010			Exclude	Exclude			1	3.5	
TD1	4	1-Aug-2010			ok	ok			1	3.5	
TD1	4	1-Aug-2010			ok	ok			3	10.4	
TD1	4	1-Aug-2010			ok	ok			2	6.9	
TD1	4	1-Aug-2010			ok	ok			3	10.4	
TD1	4	1-Aug-2010			ok	ok			1	3.5	
TD1	4	1-Aug-2010	immature/damaged		ok	Exclude			10	34.7	
TD1	5	1-Aug-2010			ok	ok			1	3.5	
TD1	5	1-Aug-2010			ok	ok			4	13.9	
TD1	5	1-Aug-2010			ok	ok			1	3.5	
TD1	5	1-Aug-2010			ok	ok			1	3.5	
TD1	5	1-Aug-2010			ok	ok			3	10.4	
TD1	5	1-Aug-2010			ok	ok			1	3.5	
TD1	5	1-Aug-2010	immature/damaged		ok	Exclude			4	13.9	
TD1	5	1-Aug-2010			ok	ok			1	3.5	
WC2	1	21-Aug-2011			ok	ok			2	6.9	
WC2	1	21-Aug-2011			ok	ok			8	27.8	
WC2	1	21-Aug-2011			ok	Exclude			24	83.3	
WC2	1	21-Aug-2011			ok	ok			8	27.8	
WC2	1	21-Aug-2011	immature/damaged		Exclude	Exclude			8	27.8	
WC2	1	21-Aug-2011	immature/damaged		Exclude	Exclude			8	27.8	
WC2	1	21-Aug-2011			Exclude	Exclude			792	2,750.0	
WC2	1	21-Aug-2011			ok	ok			17	59.0	
WC2	1	21-Aug-2011			ok	ok			1	3.5	
WC2	1	21-Aug-2011			ok	ok			1	3.5	
WC2	1	21-Aug-2011			ok	ok			2	6.9	
WC2	1	21-Aug-2011			ok	ok			1	3.5	
WC2	1	21-Aug-2011			ok	ok			192	666.7	
WC2	1	21-Aug-2011			ok	ok			8	27.8	
WC2	1	21-Aug-2011			ok	ok			24	83.3	
WC2	1	21-Aug-2011		group	ok	ok			14	48.6	
WC2	1	21-Aug-2011			ok	ok			8	27.8	
WC2	1	21-Aug-2011			ok	ok	pupa		9	31.3	
WC2	1	21-Aug-2011			ok	ok			1	3.5	
WC2	1	21-Aug-2011			ok	ok			23	79.9	
WC2	1	21-Aug-2011			ok	ok			9	31.3	
WC2	1	21-Aug-2011			ok	ok			10	34.7	
WC2	1	21-Aug-2011			ok	ok			17	59.0	
WC2	1	21-Aug-2011	immature/damaged		ok	Exclude			24	83.3	
WC2	1	21-Aug-2011			ok	ok			31	107.6	
WC2	1	21-Aug-2011			Exclude	Exclude			8	27.8	
WC2	1	21-Aug-2011			ok	ok			3	10.4	
WC2	1	21-Aug-2011	immature/damaged		ok	Exclude			8	27.8	
WC2	1	21-Aug-2011			ok	ok			58	201.4	
WC2	1	21-Aug-2011	immature/damaged		ok	Exclude			8	27.8	
WC2	1	21-Aug-2011			Exclude	Exclude			4	13.9	
WC2	1	21-Aug-2011			ok	ok			1	3.5	
WC2	1	21-Aug-2011			ok	ok			13	45.1	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
WC2	2	21-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
WC2	2	21-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Naidinae		Naidinae
WC2	2	21-Aug-2011	FF	Exclude		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
WC2	2	21-Aug-2011	FF	Exclude		0.288		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium/Sphaerium*	*Pisidium/Sphaerium*
WC2	2	21-Aug-2011	FF	Exclude		0.288		Cladocera	Arthropoda	Branchiopoda	Diplostraca	Sididae		*Sida*	*Sida crystallina*
WC2	2	21-Aug-2011	FF	Exclude		0.288		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
WC2	2	21-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Bezzia*	*Bezzia*
WC2	2	21-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes*
WC2	2	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
WC2	2	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
WC2	2	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Thienemannimyia*	*Thienemannimyia*
WC2	2	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
WC2	2	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
WC2	2	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
WC2	2	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
WC2	2	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae		*Paraleptophlebia*	*Paraleptophlebia*
WC2	2	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Sweltsa*	*Sweltsa*
WC2	2	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
WC2	2	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Leuctridae		*Paraleuctra*	*Paraleuctra*
WC2	2	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
WC2	2	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlidae			Perlidae
WC2	2	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
WC2	2	21-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Apataniidae		*Apatania*	*Apatania*
WC2	2	21-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
WC2	2	21-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera				Trichoptera
WC2	3	21-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
WC2	3	21-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Naidinae		Naidinae
WC2	3	21-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Tubificinae		Tubificinae
WC2	3	21-Aug-2011	FF	Exclude		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
WC2	3	21-Aug-2011	FF	Exclude		0.288		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium/Sphaerium*	*Pisidium/Sphaerium*
WC2	3	21-Aug-2011	FF	Exclude		0.288		Cnidaria	Cnidaria	Hydrozoa	Anthoathecatae	Hydridae		*Hydra*	*Hydra*
WC2	3	21-Aug-2011	FF	Exclude		0.288		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
WC2	3	21-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Bezzia*	*Bezzia*
WC2	3	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
WC2	3	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Corynoneura*	*Corynoneura*
WC2	3	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius*
WC2	3	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
WC2	3	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Thienemannimyia*	*Thienemannimyia*
WC2	3	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
WC2	3	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
WC2	3	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
WC2	3	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
WC2	3	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
WC2	3	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
WC2	3	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
WC2	3	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae		*Paraleptophlebia*	*Paraleptophlebia*
WC2	3	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Sweltsa*	*Sweltsa*
WC2	3	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
WC2	3	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Leuctridae		*Paraleuctra*	*Paraleuctra*
WC2	3	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
WC2	3	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Isoperla*	*Isoperla*
WC2	3	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
WC2	3	21-Aug-2011	FF	Exclude		0.288		Terrestrial							Terrestrial
WC2	3	21-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
WC2	2	21-Aug-2011			ok	ok			24	83.3	
WC2	2	21-Aug-2011			ok	ok			24	83.3	
WC2	2	21-Aug-2011			ok	Exclude			32	111.1	
WC2	2	21-Aug-2011			ok	ok			8	27.8	
WC2	2	21-Aug-2011			Exclude	Exclude			8	27.8	
WC2	2	21-Aug-2011			Exclude	Exclude			336	1,166.7	
WC2	2	21-Aug-2011			ok	ok			19	66.0	
WC2	2	21-Aug-2011			ok	ok			1	3.5	
WC2	2	21-Aug-2011			ok	ok			1	3.5	
WC2	2	21-Aug-2011			ok	ok			237	822.9	
WC2	2	21-Aug-2011		group	ok	ok			12	41.7	
WC2	2	21-Aug-2011			ok	ok			12	41.7	
WC2	2	21-Aug-2011			ok	ok			5	17.4	
WC2	2	21-Aug-2011			ok	ok			3	10.4	
WC2	2	21-Aug-2011			ok	ok			3	10.4	
WC2	2	21-Aug-2011			ok	ok			42	145.8	
WC2	2	21-Aug-2011			ok	ok			13	45.1	
WC2	2	21-Aug-2011	immature/damaged		ok	Exclude			15	52.1	
WC2	2	21-Aug-2011			ok	ok			27	93.8	
WC2	2	21-Aug-2011			ok	ok			123	427.1	
WC2	2	21-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
WC2	2	21-Aug-2011	immature/damaged		ok	Exclude			16	55.6	
WC2	2	21-Aug-2011			ok	ok			1	3.5	
WC2	2	21-Aug-2011			ok	ok			6	20.8	
WC2	2	21-Aug-2011			ok	Exclude	pupa		1	3.5	
WC2	3	21-Aug-2011			ok	ok			1	3.5	
WC2	3	21-Aug-2011			ok	ok			16	55.6	
WC2	3	21-Aug-2011			ok	ok			2	6.9	
WC2	3	21-Aug-2011			ok	Exclude			67	232.6	
WC2	3	21-Aug-2011			ok	ok			26	90.3	
WC2	3	21-Aug-2011			Exclude	Exclude			3	10.4	
WC2	3	21-Aug-2011			Exclude	Exclude			480	1,666.7	
WC2	3	21-Aug-2011			ok	ok			26	90.3	
WC2	3	21-Aug-2011			ok	ok			17	59.0	
WC2	3	21-Aug-2011			ok	ok			8	27.8	
WC2	3	21-Aug-2011			ok	ok			1	3.5	
WC2	3	21-Aug-2011			ok	ok			72	250.0	
WC2	3	21-Aug-2011		group	ok	ok			9	31.3	
WC2	3	21-Aug-2011			ok	ok	pupa		1	3.5	
WC2	3	21-Aug-2011			ok	ok			1	3.5	
WC2	3	21-Aug-2011			ok	ok			21	72.9	
WC2	3	21-Aug-2011			ok	ok			5	17.4	
WC2	3	21-Aug-2011			ok	ok			4	13.9	
WC2	3	21-Aug-2011			ok	ok			2	6.9	
WC2	3	21-Aug-2011	immature/damaged		ok	Exclude			24	83.3	
WC2	3	21-Aug-2011			ok	ok			48	166.7	
WC2	3	21-Aug-2011			ok	ok			5	17.4	
WC2	3	21-Aug-2011	immature/damaged		ok	Exclude			63	218.8	
WC2	3	21-Aug-2011			ok	ok			35	121.5	
WC2	3	21-Aug-2011			ok	ok			91	316.0	
WC2	3	21-Aug-2011			ok	ok			1	3.5	
WC2	3	21-Aug-2011	immature/damaged		ok	Exclude			8	27.8	
WC2	3	21-Aug-2011			Exclude	Exclude			1	3.5	
WC2	3	21-Aug-2011			ok	ok			5	17.4	

Notes:
MA = Mine Site Area and Down
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R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
WC2	3	21-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera				Trichoptera
WC2	4	21-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
WC2	4	21-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Tubificinae		Tubificinae
WC2	4	21-Aug-2011	FF	Exclude		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
WC2	4	21-Aug-2011	FF	Exclude		0.288		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium/Sphaerium*	*Pisidium/Sphaerium*
WC2	4	21-Aug-2011	FF	Exclude		0.288		Cladocera	Arthropoda	Branchiopoda	Diplostraca	Chydoridae			Chydoridae
WC2	4	21-Aug-2011	FF	Exclude		0.288		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
WC2	4	21-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Bezzia*	*Bezzia*
WC2	4	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
WC2	4	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parametriocnemus*	*Parametriocnemus*
WC2	4	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Thienemannimyia*	*Thienemannimyia*
WC2	4	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
WC2	4	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
WC2	4	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
WC2	4	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
WC2	4	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
WC2	4	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae		*Paraleptophlebia*	*Paraleptophlebia*
WC2	4	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Sweltsa*	*Sweltsa*
WC2	4	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
WC2	4	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Leuctridae		*Paraleuctra*	*Paraleuctra*
WC2	4	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
WC2	4	21-Aug-2011	FF	Exclude		0.288		Terrestrial							Terrestrial
WC2	4	21-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Apataniidae		*Apatania*	*Apatania*
WC2	4	21-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Glossosomatidae		*Glossosoma*	*Glossosoma*
WC2	4	21-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
WC2	4	21-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera				Trichoptera
WC2	5	21-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
WC2	5	21-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera				Trichoptera
WC2	5	21-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
WC2	5	21-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Tubificinae		Tubificinae
WC2	5	21-Aug-2011	FF	Exclude		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
WC2	5	21-Aug-2011	FF	Exclude		0.288		Cladocera	Arthropoda	Branchiopoda	Diplostraca	Chydoridae			Chydoridae
WC2	5	21-Aug-2011	FF	Exclude		0.288		Cladocera	Arthropoda	Branchiopoda	Diplostraca	Daphniidae		*Ceriodaphnia*	*Ceriodaphnia*
WC2	5	21-Aug-2011	FF	Exclude		0.288		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
WC2	5	21-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Bezzia*	*Bezzia*
WC2	5	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
WC2	5	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
WC2	5	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Polypedilum*	*Polypedilum*
WC2	5	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Thienemannimyia*	*Thienemannimyia*
WC2	5	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae		Tanypodinae
WC2	5	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
WC2	5	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
WC2	5	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
WC2	5	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
WC2	5	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
WC2	5	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
WC2	5	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae		*Paraleptophlebia*	*Paraleptophlebia*
WC2	5	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
WC2	5	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Sweltsa*	*Sweltsa*
WC2	5	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
WC2	5	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Leuctridae		*Paraleuctra*	*Paraleuctra*
WC2	5	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
WC2	5	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
WC2	5	21-Aug-2011	FF	Exclude		0.288		Terrestrial							Terrestrial
WC2	5	21-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Apataniidae		*Apatania*	*Apatania*
WC2	5	21-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
WC2	3	21-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
WC2	4	21-Aug-2011			ok	ok			8	27.8	
WC2	4	21-Aug-2011			ok	ok			2	6.9	
WC2	4	21-Aug-2011			ok	Exclude			89	309.0	
WC2	4	21-Aug-2011			ok	ok			2	6.9	
WC2	4	21-Aug-2011	immature/damaged		Exclude	Exclude			8	27.8	
WC2	4	21-Aug-2011			Exclude	Exclude			584	2,027.8	
WC2	4	21-Aug-2011			ok	ok			1	3.5	
WC2	4	21-Aug-2011			ok	ok			32	111.1	
WC2	4	21-Aug-2011			ok	ok			8	27.8	
WC2	4	21-Aug-2011		group	ok	ok			13	45.1	
WC2	4	21-Aug-2011			ok	ok			1	3.5	
WC2	4	21-Aug-2011			ok	ok			40	138.9	
WC2	4	21-Aug-2011			ok	ok			4	13.9	
WC2	4	21-Aug-2011			ok	ok			2	6.9	
WC2	4	21-Aug-2011			ok	ok			6	20.8	
WC2	4	21-Aug-2011			ok	ok			40	138.9	
WC2	4	21-Aug-2011			ok	ok			8	27.8	
WC2	4	21-Aug-2011	immature/damaged		ok	Exclude			16	55.6	
WC2	4	21-Aug-2011			ok	ok			14	48.6	
WC2	4	21-Aug-2011			ok	ok			24	83.3	
WC2	4	21-Aug-2011			Exclude	Exclude			1	3.5	
WC2	4	21-Aug-2011			ok	ok			3	10.4	
WC2	4	21-Aug-2011			ok	ok			8	27.8	
WC2	4	21-Aug-2011			ok	ok			16	55.6	
WC2	4	21-Aug-2011			ok	Exclude	pupa		3	10.4	
WC2	5	21-Aug-2011			ok	ok			8	27.8	
WC2	4	21-Aug-2011			ok	Exclude	pupa		3	10.4	
WC2	5	21-Aug-2011			ok	ok			8	27.8	
WC2	5	21-Aug-2011			ok	ok			1	3.5	
WC2	5	21-Aug-2011			ok	Exclude			73	253.5	
WC2	5	21-Aug-2011	immature/damaged		Exclude	Exclude			8	27.8	
WC2	5	21-Aug-2011			Exclude	Exclude			8	27.8	
WC2	5	21-Aug-2011			Exclude	Exclude			80	277.8	
WC2	5	21-Aug-2011			ok	ok			33	114.6	
WC2	5	21-Aug-2011			ok	ok			12	41.7	
WC2	5	21-Aug-2011			ok	ok			97	336.8	
WC2	5	21-Aug-2011			ok	ok			8	27.8	
WC2	5	21-Aug-2011		group	ok	ok			3	10.4	
WC2	5	21-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
WC2	5	21-Aug-2011			ok	ok	pupa		1	3.5	
WC2	5	21-Aug-2011			ok	ok			2	6.9	
WC2	5	21-Aug-2011			ok	ok			6	20.8	
WC2	5	21-Aug-2011			ok	ok			6	20.8	
WC2	5	21-Aug-2011			ok	ok			3	10.4	
WC2	5	21-Aug-2011			ok	ok			1	3.5	
WC2	5	21-Aug-2011			ok	ok			107	371.5	
WC2	5	21-Aug-2011			ok	ok			8	27.8	
WC2	5	21-Aug-2011			ok	ok			18	62.5	
WC2	5	21-Aug-2011	immature/damaged		ok	Exclude			19	66.0	
WC2	5	21-Aug-2011			ok	ok			4	13.9	
WC2	5	21-Aug-2011			ok	ok			11	38.2	
WC2	5	21-Aug-2011	immature/damaged		ok	Exclude			8	27.8	
WC2	5	21-Aug-2011			Exclude	Exclude			4	13.9	
WC2	5	21-Aug-2011			ok	ok			1	3.5	
WC2	5	21-Aug-2011			ok	ok			7	24.3	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
WC5	1	21-Aug-2011	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
WC5	1	21-Aug-2011	AP	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
WC5	1	21-Aug-2011	AP	Include		0.288		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
WC5	1	21-Aug-2011	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Empididae		*Clinocera*	*Clinocera*
WC5	1	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Corynoneura*	*Corynoneura*
WC5	1	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra/Tanytarsus*	*Micropsectra/Tanytarsus*
WC5	1	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Thienemannimyia*	*Thienemannimyia*
WC5	1	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae		Tanypodinae
WC5	1	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
WC5	1	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
WC5	1	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
WC5	1	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
WC5	1	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
WC5	1	21-Aug-2011	AP	Include		0.288		Nematoda	Nematoda						Nematoda
WC5	1	21-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
WC5	1	21-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
WC5	1	21-Aug-2011	AP	Include		0.288		Terrestrial							Terrestrial
WC5	1	21-Aug-2011	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
WC5	2	21-Aug-2011	AP	Include		0.288		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
WC5	2	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Podonominae	*Boreochlus*	*Boreochlus*
WC5	2	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
WC5	2	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
WC5	2	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Polypedilum*	*Polypedilum*
WC5	2	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Rheocricotopus*	*Rheocricotopus*
WC5	2	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
WC5	2	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
WC5	2	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
WC5	2	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
WC5	2	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
WC5	2	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
WC5	2	21-Aug-2011	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
WC5	2	21-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
WC5	2	21-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
WC5	2	21-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Visoka*	*Visoka cataractae*
WC5	2	21-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
WC5	2	21-Aug-2011	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera				Trichoptera
WC5	3	21-Aug-2011	AP	Include		0.288		Collembola	Arthropoda	Collembola		Isotomidae			Isotomidae
WC5	3	21-Aug-2011	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Empididae		*Oreogeton*	*Oreogeton*
WC5	3	21-Aug-2011	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Simuliidae		*Helodon*	*Helodon*
WC5	3	21-Aug-2011	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
WC5	3	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Podonominae	*Boreochlus*	*Boreochlus*
WC5	3	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
WC5	3	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
WC5	3	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Rheocricotopus*	*Rheocricotopus*
WC5	3	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Stempellinella*	*Stempellinella*
WC5	3	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
WC5	3	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
WC5	3	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
WC5	3	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
WC5	3	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
WC5	3	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
WC5	3	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
WC5	3	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
WC5	3	21-Aug-2011	AP	Include		0.288		Nematoda	Nematoda						Nematoda

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
WC5	1	21-Aug-2011			ok	ok			5	17.4	
WC5	1	21-Aug-2011			ok	Exclude			4	13.9	
WC5	1	21-Aug-2011			Exclude	Exclude			6	20.8	
WC5	1	21-Aug-2011			ok	ok			1	3.5	
WC5	1	21-Aug-2011			ok	ok			1	3.5	
WC5	1	21-Aug-2011			ok	ok			1	3.5	
WC5	1	21-Aug-2011		group	ok	ok			1	3.5	
WC5	1	21-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
WC5	1	21-Aug-2011			ok	ok			3	10.4	
WC5	1	21-Aug-2011			ok	ok			1	3.5	
WC5	1	21-Aug-2011			ok	ok			3	10.4	
WC5	1	21-Aug-2011			ok	ok			17	59.0	
WC5	1	21-Aug-2011	immature/damaged		ok	Exclude			3	10.4	
WC5	1	21-Aug-2011			Exclude	Exclude			2	6.9	
WC5	1	21-Aug-2011			ok	ok			1	3.5	
WC5	1	21-Aug-2011			ok	ok			35	121.5	
WC5	1	21-Aug-2011			Exclude	Exclude			4	13.9	
WC5	1	21-Aug-2011			ok	ok			1	3.5	
WC5	2	21-Aug-2011			Exclude	Exclude			1	3.5	
WC5	2	21-Aug-2011			ok	ok			1	3.5	
WC5	2	21-Aug-2011			ok	ok			1	3.5	
WC5	2	21-Aug-2011			ok	ok			2	6.9	
WC5	2	21-Aug-2011			ok	ok			1	3.5	
WC5	2	21-Aug-2011			ok	ok			1	3.5	
WC5	2	21-Aug-2011			ok	ok			1	3.5	
WC5	2	21-Aug-2011			ok	ok			1	3.5	
WC5	2	21-Aug-2011	immature/damaged		ok	Exclude			2	6.9	
WC5	2	21-Aug-2011			ok	ok			1	3.5	
WC5	2	21-Aug-2011	immature/damaged		ok	Exclude			2	6.9	
WC5	2	21-Aug-2011			ok	ok			5	17.4	
WC5	2	21-Aug-2011			ok	ok			18	62.5	
WC5	2	21-Aug-2011	immature/damaged		ok	Exclude			4	13.9	
WC5	2	21-Aug-2011			Exclude	Exclude			1	3.5	
WC5	2	21-Aug-2011			ok	ok			1	3.5	
WC5	2	21-Aug-2011	immature/damaged		ok	Exclude			3	10.4	
WC5	2	21-Aug-2011			ok	ok			1	3.5	
WC5	2	21-Aug-2011			ok	ok			23	79.9	
WC5	2	21-Aug-2011			ok	Exclude	pupa		1	3.5	
WC5	3	21-Aug-2011			Exclude	Exclude			1	3.5	
WC5	3	21-Aug-2011			ok	ok			1	3.5	
WC5	3	21-Aug-2011			ok	ok			1	3.5	
WC5	3	21-Aug-2011			ok	ok			1	3.5	
WC5	3	21-Aug-2011			ok	ok			1	3.5	
WC5	3	21-Aug-2011			ok	ok			1	3.5	
WC5	3	21-Aug-2011			ok	ok			1	3.5	
WC5	3	21-Aug-2011			ok	ok			4	13.9	
WC5	3	21-Aug-2011			ok	ok			1	3.5	
WC5	3	21-Aug-2011			ok	ok			2	6.9	
WC5	3	21-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
WC5	3	21-Aug-2011			ok	ok	pupa		5	17.4	
WC5	3	21-Aug-2011			ok	ok			6	20.8	
WC5	3	21-Aug-2011			ok	ok			1	3.5	
WC5	3	21-Aug-2011			ok	ok			11	38.2	
WC5	3	21-Aug-2011			ok	ok			17	59.0	
WC5	3	21-Aug-2011	immature/damaged		ok	Exclude			11	38.2	
WC5	3	21-Aug-2011			Exclude	Exclude			6	20.8	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
WC5	3	21-Aug-2011	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
WC5	3	21-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
WC5	3	21-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
WC5	3	21-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
WC5	3	21-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
WC5	3	21-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
WC5	3	21-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
WC5	3	21-Aug-2011	AP	Include		0.288		Terrestrial							Terrestrial
WC5	3	21-Aug-2011	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Limnephilidae			Limnephilidae
WC5	3	21-Aug-2011	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
WC5	4	21-Aug-2011	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
WC5	4	21-Aug-2011	AP	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
WC5	4	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
WC5	4	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
WC5	4	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Rheocricotopus*	*Rheocricotopus*
WC5	4	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
WC5	4	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
WC5	4	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
WC5	4	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
WC5	4	21-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
WC5	4	21-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
WC5	4	21-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
WC5	4	21-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
WC5	4	21-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
WC5	5	21-Aug-2011	AP	Include		0.288		Collembola	Arthropoda	Collembola		Isotomidae			Isotomidae
WC5	5	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
WC5	5	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
WC5	5	21-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
WC5	5	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
WC5	5	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
WC5	5	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
WC5	5	21-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
WC5	5	21-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
WC5	5	21-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
WC5	5	21-Aug-2011	AP	Include		0.288		Terrestrial							Terrestrial
WC1	1	20-Aug-2011	AP	Include		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
WC1	1	20-Aug-2011	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Bezzia*	*Bezzia*
WC1	1	20-Aug-2011	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Empididae		*Oreogeton*	*Oreogeton*
WC1	1	20-Aug-2011	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Rhabdomastix*	*Rhabdomastix*
WC1	1	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
WC1	1	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
WC1	1	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
WC1	1	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Rheocricotopus*	*Rheocricotopus*
WC1	1	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Stempellinella*	*Stempellinella*
WC1	1	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
WC1	1	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
WC1	1	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
WC1	1	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
WC1	1	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
WC1	1	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella coloradensis*
WC1	1	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
WC1	1	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
WC1	1	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
WC1	1	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
WC5	3	21-Aug-2011			Exclude	Exclude			4	13.9	
WC5	3	21-Aug-2011			ok	ok			12	41.7	
WC5	3	21-Aug-2011			ok	ok			2	6.9	
WC5	3	21-Aug-2011	immature/damaged		ok	Exclude			7	24.3	
WC5	3	21-Aug-2011			ok	ok			3	10.4	
WC5	3	21-Aug-2011			ok	ok			50	173.6	
WC5	3	21-Aug-2011	immature/damaged		ok	Exclude			7	24.3	
WC5	3	21-Aug-2011			Exclude	Exclude			5	17.4	
WC5	3	21-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
WC5	3	21-Aug-2011			ok	ok			1	3.5	
WC5	4	21-Aug-2011			ok	ok			2	6.9	
WC5	4	21-Aug-2011			ok	Exclude			1	3.5	
WC5	4	21-Aug-2011			ok	ok			2	6.9	
WC5	4	21-Aug-2011			ok	ok			1	3.5	
WC5	4	21-Aug-2011			ok	ok			2	6.9	
WC5	4	21-Aug-2011			ok	ok	pupa		2	6.9	
WC5	4	21-Aug-2011			ok	ok			2	6.9	
WC5	4	21-Aug-2011			ok	ok			9	31.3	
WC5	4	21-Aug-2011	immature/damaged		ok	Exclude			2	6.9	
WC5	4	21-Aug-2011			ok	ok			1	3.5	
WC5	4	21-Aug-2011			ok	ok			4	13.9	
WC5	4	21-Aug-2011	immature/damaged		ok	Exclude			6	20.8	
WC5	4	21-Aug-2011			ok	ok			12	41.7	
WC5	4	21-Aug-2011	immature/damaged		ok	Exclude			3	10.4	
WC5	5	21-Aug-2011			Exclude	Exclude			1	3.5	
WC5	5	21-Aug-2011			ok	ok			1	3.5	
WC5	5	21-Aug-2011			ok	ok			1	3.5	
WC5	5	21-Aug-2011			ok	ok	pupa		1	3.5	
WC5	5	21-Aug-2011			ok	ok			1	3.5	
WC5	5	21-Aug-2011			ok	ok			1	3.5	
WC5	5	21-Aug-2011			ok	ok			1	3.5	
WC5	5	21-Aug-2011	immature/damaged		ok	Exclude			2	6.9	
WC5	5	21-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
WC5	5	21-Aug-2011			ok	ok			13	45.1	
WC5	5	21-Aug-2011			Exclude	Exclude			4	13.9	
WC1	1	20-Aug-2011			ok	Exclude			8	27.8	
WC1	1	20-Aug-2011			ok	ok			1	3.5	
WC1	1	20-Aug-2011			ok	ok			1	3.5	
WC1	1	20-Aug-2011			ok	ok			4	13.9	
WC1	1	20-Aug-2011			ok	ok			9	31.3	
WC1	1	20-Aug-2011			ok	ok			51	177.1	
WC1	1	20-Aug-2011			ok	ok			9	31.3	
WC1	1	20-Aug-2011			ok	ok			16	55.6	
WC1	1	20-Aug-2011			ok	ok			8	27.8	
WC1	1	20-Aug-2011			ok	ok			118	409.7	
WC1	1	20-Aug-2011	immature/damaged		ok	Exclude			8	27.8	
WC1	1	20-Aug-2011			ok	ok	pupa		51	177.1	
WC1	1	20-Aug-2011			ok	ok			8	27.8	
WC1	1	20-Aug-2011			ok	ok			8	27.8	
WC1	1	20-Aug-2011			ok	ok			6	20.8	
WC1	1	20-Aug-2011			ok	ok			1	3.5	
WC1	1	20-Aug-2011	immature/damaged		ok	Exclude			8	27.8	
WC1	1	20-Aug-2011			ok	ok			19	66.0	
WC1	1	20-Aug-2011			ok	ok			56	194.4	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
WC1	1	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
WC1	1	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
WC1	1	20-Aug-2011	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
WC1	1	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
WC1	1	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
WC1	1	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Sweltsa*	*Sweltsa*
WC1	1	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
WC1	1	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Leuctridae		*Despaxia*	*Despaxia augusta*
WC1	1	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Leuctridae		*Paraleuctra*	*Paraleuctra*
WC1	1	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
WC1	1	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
WC1	1	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
WC1	1	20-Aug-2011	AP	Include		0.288		Terrestrial							Terrestrial
WC1	1	20-Aug-2011	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera				Trichoptera
WC1	2	20-Aug-2011	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Rhabdomastix*	*Rhabdomastix*
WC1	2	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
WC1	2	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
WC1	2	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
WC1	2	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
WC1	2	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parorthocladius*	*Parorthocladius*
WC1	2	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa*
WC1	2	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
WC1	2	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
WC1	2	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
WC1	2	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
WC1	2	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
WC1	2	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella coloradensis*
WC1	2	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
WC1	2	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
WC1	2	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
WC1	2	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
WC1	2	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
WC1	2	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
WC1	2	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
WC1	2	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Sweltsa*	*Sweltsa*
WC1	2	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
WC1	2	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Leuctridae		*Paraleuctra*	*Paraleuctra*
WC1	2	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
WC1	2	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
WC1	2	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
WC1	2	20-Aug-2011	AP	Include		0.288		Terrestrial							Terrestrial
WC1	2	20-Aug-2011	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Limnephilidae			Limnephilidae
WC1	2	20-Aug-2011	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
WC1	3	20-Aug-2011	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
WC1	3	20-Aug-2011	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Tubificinae		Tubificinae
WC1	3	20-Aug-2011	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Empididae		*Oreogeton*	*Oreogeton*
WC1	3	20-Aug-2011	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
WC1	3	20-Aug-2011	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Rhabdomastix*	*Rhabdomastix*
WC1	3	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
WC1	3	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
WC1	3	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
WC1	3	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
WC1	3	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Hydrobaenus*	*Hydrobaenus*
WC1	3	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
WC1	1	20-Aug-2011			ok	ok			332	1,152.8	
WC1	1	20-Aug-2011	immature/damaged		ok	Exclude			64	222.2	
WC1	1	20-Aug-2011			Exclude	Exclude			2	6.9	
WC1	1	20-Aug-2011			ok	ok			98	340.3	
WC1	1	20-Aug-2011			ok	ok			48	166.7	
WC1	1	20-Aug-2011			ok	ok			4	13.9	
WC1	1	20-Aug-2011	immature/damaged		ok	Exclude			27	93.8	
WC1	1	20-Aug-2011			ok	ok			2	6.9	
WC1	1	20-Aug-2011			ok	ok			3	10.4	
WC1	1	20-Aug-2011			ok	ok			27	93.8	
WC1	1	20-Aug-2011			ok	ok			7	24.3	
WC1	1	20-Aug-2011			ok	ok			132	458.3	
WC1	1	20-Aug-2011			Exclude	Exclude			9	31.3	
WC1	1	20-Aug-2011			ok	Exclude	pupa		2	6.9	
WC1	2	20-Aug-2011			ok	ok			2	6.9	
WC1	2	20-Aug-2011			ok	ok			1	3.5	
WC1	2	20-Aug-2011			ok	ok			209	725.7	
WC1	2	20-Aug-2011			ok	ok			25	86.8	
WC1	2	20-Aug-2011			ok	ok			8	27.8	
WC1	2	20-Aug-2011			ok	ok			8	27.8	
WC1	2	20-Aug-2011			ok	ok			1	3.5	
WC1	2	20-Aug-2011			ok	ok			83	288.2	
WC1	2	20-Aug-2011	immature/damaged		ok	Exclude			8	27.8	
WC1	2	20-Aug-2011			ok	ok	pupa		58	201.4	
WC1	2	20-Aug-2011			ok	ok			48	166.7	
WC1	2	20-Aug-2011			ok	ok			97	336.8	
WC1	2	20-Aug-2011			ok	ok			2	6.9	
WC1	2	20-Aug-2011	immature/damaged		ok	Exclude			48	166.7	
WC1	2	20-Aug-2011			ok	ok			7	24.3	
WC1	2	20-Aug-2011			ok	ok			84	291.7	
WC1	2	20-Aug-2011			ok	ok			371	1,288.2	
WC1	2	20-Aug-2011	immature/damaged		ok	Exclude			56	194.4	
WC1	2	20-Aug-2011			ok	ok			79	274.3	
WC1	2	20-Aug-2011			ok	ok			19	66.0	
WC1	2	20-Aug-2011			ok	ok			1	3.5	
WC1	2	20-Aug-2011	immature/damaged		ok	Exclude			14	48.6	
WC1	2	20-Aug-2011			ok	ok			1	3.5	
WC1	2	20-Aug-2011			ok	ok			50	173.6	
WC1	2	20-Aug-2011			ok	ok			2	6.9	
WC1	2	20-Aug-2011			ok	ok			58	201.4	
WC1	2	20-Aug-2011			Exclude	Exclude			9	31.3	
WC1	2	20-Aug-2011	immature/damaged		ok	Exclude			8	27.8	
WC1	2	20-Aug-2011			ok	ok			1	3.5	
WC1	3	20-Aug-2011			ok	ok			8	27.8	
WC1	3	20-Aug-2011			ok	ok			1	3.5	
WC1	3	20-Aug-2011			ok	ok			1	3.5	
WC1	3	20-Aug-2011			ok	ok			8	27.8	
WC1	3	20-Aug-2011			ok	ok			2	6.9	
WC1	3	20-Aug-2011			ok	ok			10	34.7	
WC1	3	20-Aug-2011			ok	ok			81	281.3	
WC1	3	20-Aug-2011			ok	ok			81	281.3	
WC1	3	20-Aug-2011			ok	ok			16	55.6	
WC1	3	20-Aug-2011			ok	ok			1	3.5	
WC1	3	20-Aug-2011			ok	ok			16	55.6	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
WC1	3	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa*
WC1	3	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Rheocricotopus*	*Rheocricotopus*
WC1	3	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Stempellinella*	*Stempellinella*
WC1	3	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Thienemannimyia*	*Thienemannimyia*
WC1	3	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
WC1	3	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
WC1	3	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae		Tanypodinae
WC1	3	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
WC1	3	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
WC1	3	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
WC1	3	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella coloradensis*
WC1	3	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
WC1	3	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
WC1	3	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
WC1	3	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
WC1	3	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
WC1	3	20-Aug-2011	AP	Include		0.288		Nematoda	Nematoda						Nematoda
WC1	3	20-Aug-2011	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
WC1	3	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
WC1	3	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
WC1	3	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Sweltsa*	*Sweltsa*
WC1	3	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
WC1	3	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Leuctridae		*Despaxia*	*Despaxia augusta*
WC1	3	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
WC1	3	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
WC1	3	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
WC1	3	20-Aug-2011	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
WC1	3	20-Aug-2011	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera				Trichoptera
WC1	4	20-Aug-2011	AP	Include		0.288		Annelida	Annelida	Oligochaeta	Lumbriculida	Lumbriculidae			Lumbriculidae
WC1	4	20-Aug-2011	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
WC1	4	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
WC1	4	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
WC1	4	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
WC1	4	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
WC1	4	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia/Psilometriocnemus*	*Platysmittia/Psilometriocnemus*
WC1	4	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Stempellinella*	*Stempellinella*
WC1	4	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
WC1	4	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
WC1	4	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
WC1	4	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
WC1	4	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
WC1	4	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
WC1	4	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
WC1	4	20-Aug-2011	AP	Include		0.288		Nematoda	Nematoda						Nematoda
WC1	4	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
WC1	4	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
WC1	4	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Sweltsa*	*Sweltsa*
WC1	4	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Leuctridae		*Paraleuctra*	*Paraleuctra*
WC1	4	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
WC1	4	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
WC1	4	20-Aug-2011	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
WC1	5	20-Aug-2011	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Simuliidae		*Helodon*	*Helodon*
WC1	5	20-Aug-2011	AP	Include		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Rhabdomastix*	*Rhabdomastix*
WC1	5	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
WC1	3	20-Aug-2011			ok	ok			2	6.9	
WC1	3	20-Aug-2011			ok	ok			24	83.3	
WC1	3	20-Aug-2011			ok	ok			24	83.3	
WC1	3	20-Aug-2011		group	ok	ok			8	27.8	
WC1	3	20-Aug-2011			ok	ok			165	572.9	
WC1	3	20-Aug-2011	immature/damaged		ok	Exclude			8	27.8	
WC1	3	20-Aug-2011	immature/damaged		ok	Exclude			9	31.3	
WC1	3	20-Aug-2011			ok	ok	pupa		59	204.9	
WC1	3	20-Aug-2011			ok	ok			88	305.6	
WC1	3	20-Aug-2011			ok	ok			40	138.9	
WC1	3	20-Aug-2011			ok	ok			7	24.3	
WC1	3	20-Aug-2011			ok	ok			1	3.5	
WC1	3	20-Aug-2011			ok	ok			4	13.9	
WC1	3	20-Aug-2011			ok	ok			86	298.6	
WC1	3	20-Aug-2011			ok	ok			199	691.0	
WC1	3	20-Aug-2011	immature/damaged		ok	Exclude			8	27.8	
WC1	3	20-Aug-2011			Exclude	Exclude			8	27.8	
WC1	3	20-Aug-2011			Exclude	Exclude			20	69.4	
WC1	3	20-Aug-2011			ok	ok			37	128.5	
WC1	3	20-Aug-2011			ok	ok			25	86.8	
WC1	3	20-Aug-2011			ok	ok			1	3.5	
WC1	3	20-Aug-2011	immature/damaged		ok	Exclude			6	20.8	
WC1	3	20-Aug-2011			ok	ok			1	3.5	
WC1	3	20-Aug-2011			ok	ok			72	250.0	
WC1	3	20-Aug-2011			ok	ok			5	17.4	
WC1	3	20-Aug-2011			ok	ok			140	486.1	
WC1	3	20-Aug-2011			ok	ok			1	3.5	
WC1	3	20-Aug-2011			ok	Exclude	pupa		2	6.9	
WC1	4	20-Aug-2011			ok	ok			2	6.9	
WC1	4	20-Aug-2011			ok	ok			1	3.5	
WC1	4	20-Aug-2011			ok	ok			10	34.7	
WC1	4	20-Aug-2011			ok	ok			9	31.3	
WC1	4	20-Aug-2011			ok	ok			1	3.5	
WC1	4	20-Aug-2011			ok	ok			1	3.5	
WC1	4	20-Aug-2011			ok	ok			1	3.5	
WC1	4	20-Aug-2011			ok	ok			3	10.4	
WC1	4	20-Aug-2011			ok	ok			21	72.9	
WC1	4	20-Aug-2011			ok	ok	pupa		5	17.4	
WC1	4	20-Aug-2011			ok	ok			3	10.4	
WC1	4	20-Aug-2011	immature/damaged		ok	Exclude			4	13.9	
WC1	4	20-Aug-2011			ok	ok			12	41.7	
WC1	4	20-Aug-2011			ok	ok			27	93.8	
WC1	4	20-Aug-2011	immature/damaged		ok	Exclude			2	6.9	
WC1	4	20-Aug-2011			Exclude	Exclude			1	3.5	
WC1	4	20-Aug-2011			ok	ok			3	10.4	
WC1	4	20-Aug-2011			ok	ok			5	17.4	
WC1	4	20-Aug-2011			ok	ok			1	3.5	
WC1	4	20-Aug-2011			ok	ok			1	3.5	
WC1	4	20-Aug-2011			ok	ok			2	6.9	
WC1	4	20-Aug-2011			ok	ok			24	83.3	
WC1	4	20-Aug-2011			ok	ok			2	6.9	
WC1	5	20-Aug-2011			ok	ok			1	3.5	
WC1	5	20-Aug-2011			ok	ok			1	3.5	
WC1	5	20-Aug-2011			ok	ok			3	10.4	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
WC1	5	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
WC1	5	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
WC1	5	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Krenosmittia*	*Krenosmittia*
WC1	5	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parorthocladius*	*Parorthocladius*
WC1	5	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia/Psilometriocnemus*	*Platysmittia/Psilometriocnemus*
WC1	5	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Stempellinella*	*Stempellinella*
WC1	5	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
WC1	5	20-Aug-2011	AP	Include		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
WC1	5	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
WC1	5	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
WC1	5	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella coloradensis*
WC1	5	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
WC1	5	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
WC1	5	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
WC1	5	20-Aug-2011	AP	Include		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
WC1	5	20-Aug-2011	AP	Include		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
WC1	5	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
WC1	5	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
WC1	5	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Sweltsa*	*Sweltsa*
WC1	5	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
WC1	5	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Leuctridae		*Paraleuctra*	*Paraleuctra*
WC1	5	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
WC1	5	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
WC1	5	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
WC1	5	20-Aug-2011	AP	Include		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
WC1	5	20-Aug-2011	AP	Include		0.288		Terrestrial							Terrestrial
WC1	5	20-Aug-2011	AP	Include		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Tubificinae		Tubificinae
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Cladocera	Arthropoda	Branchiopoda	Diplostraca	Bosminidae		*Bosmina*	*Bosmina*
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Cladocera	Arthropoda	Branchiopoda	Diplostraca	Chydoridae			Chydoridae
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Collembola	Arthropoda	Collembola		Isotomidae			Isotomidae
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Hydrobaenus*	*Hydrobaenus*
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Krenosmittia*	*Krenosmittia*
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parorthocladius*	*Parorthocladius*
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Psectrocladius*	*Psectrocladius*
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae		Tanypodinae
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
WC1	5	20-Aug-2011			ok	ok			276	958.3	
WC1	5	20-Aug-2011			ok	ok			194	673.6	
WC1	5	20-Aug-2011			ok	ok			24	83.3	
WC1	5	20-Aug-2011			ok	ok			16	55.6	
WC1	5	20-Aug-2011			ok	ok			8	27.8	
WC1	5	20-Aug-2011			ok	ok			24	83.3	
WC1	5	20-Aug-2011			ok	ok			62	215.3	
WC1	5	20-Aug-2011			ok	ok	pupa		84	291.7	
WC1	5	20-Aug-2011			ok	ok			32	111.1	
WC1	5	20-Aug-2011			ok	ok			37	128.5	
WC1	5	20-Aug-2011			ok	ok			5	17.4	
WC1	5	20-Aug-2011	immature/damaged		ok	Exclude			32	111.1	
WC1	5	20-Aug-2011			ok	ok			9	31.3	
WC1	5	20-Aug-2011			ok	ok			107	371.5	
WC1	5	20-Aug-2011			ok	ok			226	784.7	
WC1	5	20-Aug-2011			Exclude	Exclude			3	10.4	
WC1	5	20-Aug-2011			ok	ok			66	229.2	
WC1	5	20-Aug-2011			ok	ok			32	111.1	
WC1	5	20-Aug-2011			ok	ok			1	3.5	
WC1	5	20-Aug-2011	immature/damaged		ok	Exclude			3	10.4	
WC1	5	20-Aug-2011			ok	ok			1	3.5	
WC1	5	20-Aug-2011			ok	ok			60	208.3	
WC1	5	20-Aug-2011			ok	ok			4	13.9	
WC1	5	20-Aug-2011			ok	ok			51	177.1	
WC1	5	20-Aug-2011	immature/damaged		ok	Exclude			8	27.8	
WC1	5	20-Aug-2011			Exclude	Exclude			16	55.6	
WC1	5	20-Aug-2011			ok	ok			3	10.4	
BIR1	1	20-Aug-2011			ok	ok			1	3.5	
BIR1	1	20-Aug-2011			ok	ok			1	3.5	
BIR1	1	20-Aug-2011			ok	Exclude			2	6.9	
BIR1	1	20-Aug-2011			Exclude	Exclude			1	3.5	
BIR1	1	20-Aug-2011	immature/damaged		Exclude	Exclude			2	6.9	
BIR1	1	20-Aug-2011			Exclude	Exclude			1	3.5	
BIR1	1	20-Aug-2011			ok	ok			67	232.6	
BIR1	1	20-Aug-2011			ok	ok			1	3.5	
BIR1	1	20-Aug-2011			ok	ok			1	3.5	
BIR1	1	20-Aug-2011			ok	ok			1	3.5	
BIR1	1	20-Aug-2011			ok	ok			1	3.5	
BIR1	1	20-Aug-2011			ok	ok			4	13.9	
BIR1	1	20-Aug-2011			ok	ok			1	3.5	
BIR1	1	20-Aug-2011			ok	ok			12	41.7	
BIR1	1	20-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
BIR1	1	20-Aug-2011			ok	ok	pupa		9	31.3	
BIR1	1	20-Aug-2011			ok	ok			6	20.8	
BIR1	1	20-Aug-2011			ok	ok			13	45.1	
BIR1	1	20-Aug-2011			ok	ok			1	3.5	
BIR1	1	20-Aug-2011	immature/damaged		ok	Exclude			5	17.4	
BIR1	1	20-Aug-2011			ok	ok			5	17.4	
BIR1	1	20-Aug-2011			ok	ok			38	131.9	
BIR1	1	20-Aug-2011			ok	ok			32	111.1	
BIR1	1	20-Aug-2011	immature/damaged		ok	Exclude			23	79.9	
BIR1	1	20-Aug-2011			ok	ok			11	38.2	
BIR1	1	20-Aug-2011			ok	ok			7	24.3	
BIR1	1	20-Aug-2011			ok	ok			7	24.3	
BIR1	1	20-Aug-2011	immature/damaged		ok	Exclude			4	13.9	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlidae			Perlidae
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
BIR1	1	20-Aug-2011	FF	Exclude		0.288		Terrestrial							Terrestrial
BIR1	2	20-Aug-2011	FF	Exclude		0.288		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
BIR1	2	20-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
BIR1	2	20-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
BIR1	2	20-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
BIR1	2	20-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
BIR1	2	20-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
BIR1	2	20-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
BIR1	2	20-Aug-2011	FF	Exclude		0.288		Platyhelminthes	Platyhelminthes	Trepaxonemata	Neoophora	Planariidae		*Polycelis*	*Polycelis coronata*
BIR1	2	20-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
BIR1	2	20-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
BIR1	2	20-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
BIR1	2	20-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
BIR1	2	20-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlidae			Perlidae
BIR1	2	20-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Isoperla*	*Isoperla*
BIR1	2	20-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
BIR1	2	20-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
BIR1	2	20-Aug-2011	FF	Exclude		0.288		Terrestrial							Terrestrial
BIR1	3	20-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota*
BIR1	3	20-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Rhabdomastix*	*Rhabdomastix*
BIR1	3	20-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
BIR1	3	20-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
BIR1	3	20-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
BIR1	4	20-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BIR1	4	20-Aug-2011	FF	Exclude		0.288		Cladocera	Arthropoda	Branchiopoda	Diplostraca	Daphniidae		*Ceriodaphnia*	*Ceriodaphnia*
BIR1	4	20-Aug-2011	FF	Exclude		0.288		Collembola	Arthropoda	Collembola		Isotomidae			Isotomidae
BIR1	4	20-Aug-2011	FF	Exclude		0.288		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
BIR1	4	20-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Hydrobaenus*	*Hydrobaenus*
BIR1	4	20-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Psectrocladius*	*Psectrocladius*
BIR1	4	20-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
BIR1	4	20-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
BIR1	4	20-Aug-2011	FF	Exclude		0.288		Ostracoda	Arthropoda	Ostracoda					Ostracoda
BIR1	4	20-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
BIR1	4	20-Aug-2011	FF	Exclude		0.288		Terrestrial							Terrestrial
BIR1	5	20-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BIR1	5	20-Aug-2011	FF	Exclude		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
BIR1	5	20-Aug-2011	FF	Exclude		0.288		Cladocera	Arthropoda	Branchiopoda	Diplostraca	Chydoridae			Chydoridae
BIR1	5	20-Aug-2011	FF	Exclude		0.288		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
BIR1	5	20-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
BIR1	5	20-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia/Psilometriocnemus*	*Platysmittia/Psilometriocnemus*
BIR1	5	20-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
BIR1	5	20-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
BIR1	5	20-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
BIR1	5	20-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlidae			Perlidae
BIR2	1	21-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Tubificinae		Tubificinae
BIR2	1	21-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Blephariceridae		*Blepharicera*	*Blepharicera*
BIR2	1	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
BIR2	1	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Hydrobaenus*	*Hydrobaenus*
BIR2	1	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Prodiamesinae	*Monodiamesa*	*Monodiamesa*
BIR2	1	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
BIR2	1	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
BIR1	1	20-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
BIR1	1	20-Aug-2011			ok	ok			1	3.5	
BIR1	1	20-Aug-2011			ok	ok			24	83.3	
BIR1	1	20-Aug-2011			Exclude	Exclude			8	27.8	
BIR1	2	20-Aug-2011			Exclude	Exclude			1	3.5	
BIR1	2	20-Aug-2011			ok	ok			6	20.8	
BIR1	2	20-Aug-2011			ok	ok			2	6.9	
BIR1	2	20-Aug-2011			ok	ok			2	6.9	
BIR1	2	20-Aug-2011			ok	ok			3	10.4	
BIR1	2	20-Aug-2011			ok	ok			4	13.9	
BIR1	2	20-Aug-2011	immature/damaged		ok	Exclude			3	10.4	
BIR1	2	20-Aug-2011			Exclude	Exclude			1	3.5	
BIR1	2	20-Aug-2011			ok	ok			3	10.4	
BIR1	2	20-Aug-2011			ok	ok			1	3.5	
BIR1	2	20-Aug-2011			ok	ok			1	3.5	
BIR1	2	20-Aug-2011	immature/damaged		ok	Exclude			3	10.4	
BIR1	2	20-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
BIR1	2	20-Aug-2011			ok	ok			1	3.5	
BIR1	2	20-Aug-2011			ok	ok			5	17.4	
BIR1	2	20-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
BIR1	2	20-Aug-2011			Exclude	Exclude			3	10.4	
BIR1	3	20-Aug-2011			ok	ok			1	3.5	
BIR1	3	20-Aug-2011			ok	ok			2	6.9	
BIR1	3	20-Aug-2011			ok	ok			1	3.5	
BIR1	3	20-Aug-2011			ok	ok	pupa		1	3.5	
BIR1	3	20-Aug-2011			ok	ok			2	6.9	
BIR1	4	20-Aug-2011			ok	ok			1	3.5	
BIR1	4	20-Aug-2011			ok	ok			1	3.5	
BIR1	4	20-Aug-2011			Exclude	Exclude			1	3.5	
BIR1	4	20-Aug-2011			Exclude	Exclude			1	3.5	
BIR1	4	20-Aug-2011			Exclude	Exclude			1	3.5	
BIR1	4	20-Aug-2011			ok	ok			1	3.5	
BIR1	4	20-Aug-2011			ok	ok			2	6.9	
BIR1	4	20-Aug-2011			ok	ok	pupa		3	10.4	
BIR1	4	20-Aug-2011			ok	ok			1	3.5	
BIR1	4	20-Aug-2011			Exclude	Exclude			1	3.5	
BIR1	4	20-Aug-2011			ok	ok			2	6.9	
BIR1	4	20-Aug-2011			Exclude	Exclude			4	13.9	
BIR1	5	20-Aug-2011			ok	ok			2	6.9	
BIR1	5	20-Aug-2011			ok	Exclude			1	3.5	
BIR1	5	20-Aug-2011	immature/damaged		Exclude	Exclude			1	3.5	
BIR1	5	20-Aug-2011			Exclude	Exclude			2	6.9	
BIR1	5	20-Aug-2011			ok	ok			2	6.9	
BIR1	5	20-Aug-2011			ok	ok			1	3.5	
BIR1	5	20-Aug-2011			ok	ok	pupa		1	3.5	
BIR1	5	20-Aug-2011			ok	ok			2	6.9	
BIR1	5	20-Aug-2011			ok	ok			1	3.5	
BIR1	5	20-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
BIR2	1	21-Aug-2011			ok	ok			1	3.5	
BIR2	1	21-Aug-2011			ok	ok			1	3.5	
BIR2	1	21-Aug-2011			ok	ok			2	6.9	
BIR2	1	21-Aug-2011			ok	ok			1	3.5	
BIR2	1	21-Aug-2011			ok	ok			1	3.5	
BIR2	1	21-Aug-2011			ok	ok			1	3.5	
BIR2	1	21-Aug-2011	immature/damaged		ok	Exclude			4	13.9	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
BIR2	1	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
BIR2	1	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
BIR2	1	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
BIR2	1	21-Aug-2011	FF	Exclude		0.288		Nematoda	Nematoda						Nematoda
BIR2	1	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
BIR2	1	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
BIR2	1	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
BIR2	1	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
BIR2	1	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
BIR2	2	21-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Blephariceridae		*Blepharicera*	*Blepharicera*
BIR2	2	21-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae			Tipulidae
BIR2	2	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
BIR2	2	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
BIR2	2	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parametriocnemus*	*Parametriocnemus*
BIR2	2	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
BIR2	2	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
BIR2	2	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Ephemerella*	*Ephemerella*
BIR2	2	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
BIR2	2	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
BIR2	2	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
BIR2	2	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
BIR2	2	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada*
BIR2	2	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
BIR2	3	21-Aug-2011	FF	Exclude		0.288		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
BIR2	3	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
BIR2	3	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
BIR2	3	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
BIR2	3	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
BIR2	3	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Ephemerella*	*Ephemerella*
BIR2	3	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
BIR2	3	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
BIR2	3	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
BIR2	3	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Isoperla*	*Isoperla*
BIR2	3	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
BIR2	3	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
BIR2	3	21-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
BIR2	4	21-Aug-2011	FF	Exclude		0.288		Cladocera	Arthropoda	Branchiopoda	Diplostraca	Daphniidae		*Ceriodaphnia*	*Ceriodaphnia*
BIR2	4	21-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Blephariceridae		*Blepharicera*	*Blepharicera*
BIR2	4	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
BIR2	4	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
BIR2	4	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
BIR2	4	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
BIR2	4	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia/Psilometriocnemus*	*Platysmittia/Psilometriocnemus*
BIR2	4	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
BIR2	4	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
BIR2	4	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
BIR2	4	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
BIR2	4	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
BIR2	4	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
BIR2	4	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
BIR2	4	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
BIR2	4	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
BIR2	4	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
BIR2	4	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
BIR2	1	21-Aug-2011			ok	ok			1	3.5	
BIR2	1	21-Aug-2011			ok	ok			1	3.5	
BIR2	1	21-Aug-2011			ok	ok			24	83.3	
BIR2	1	21-Aug-2011			Exclude	Exclude			4	13.9	
BIR2	1	21-Aug-2011			ok	ok			4	13.9	
BIR2	1	21-Aug-2011			ok	ok			3	10.4	
BIR2	1	21-Aug-2011	immature/damaged		ok	Exclude			7	24.3	
BIR2	1	21-Aug-2011			ok	ok			1	3.5	
BIR2	1	21-Aug-2011			ok	ok			1	3.5	
BIR2	2	21-Aug-2011			ok	ok			3	10.4	
BIR2	2	21-Aug-2011	immature/damaged		ok	Exclude			4	13.9	
BIR2	2	21-Aug-2011			ok	ok			6	20.8	
BIR2	2	21-Aug-2011			ok	ok			1	3.5	
BIR2	2	21-Aug-2011			ok	ok			4	13.9	
BIR2	2	21-Aug-2011			ok	ok			4	13.9	
BIR2	2	21-Aug-2011			ok	ok			1	3.5	
BIR2	2	21-Aug-2011			ok	ok			4	13.9	
BIR2	2	21-Aug-2011			ok	ok			2	6.9	
BIR2	2	21-Aug-2011			ok	ok			2	6.9	
BIR2	2	21-Aug-2011			ok	ok			56	194.4	
BIR2	2	21-Aug-2011			ok	ok			4	13.9	
BIR2	2	21-Aug-2011			ok	ok			4	13.9	
BIR2	2	21-Aug-2011			ok	ok			1	3.5	
BIR2	3	21-Aug-2011			Exclude	Exclude			4	13.9	
BIR2	3	21-Aug-2011			ok	ok			4	13.9	
BIR2	3	21-Aug-2011			ok	ok			5	17.4	
BIR2	3	21-Aug-2011			ok	ok			1	3.5	
BIR2	3	21-Aug-2011			ok	ok			2	6.9	
BIR2	3	21-Aug-2011			ok	ok			5	17.4	
BIR2	3	21-Aug-2011			ok	ok			1	3.5	
BIR2	3	21-Aug-2011			ok	ok			18	62.5	
BIR2	3	21-Aug-2011			ok	ok			1	3.5	
BIR2	3	21-Aug-2011			ok	ok			1	3.5	
BIR2	3	21-Aug-2011			ok	ok			2	6.9	
BIR2	3	21-Aug-2011	immature/damaged		ok	Exclude			4	13.9	
BIR2	3	21-Aug-2011			ok	ok			1	3.5	
BIR2	4	21-Aug-2011			Exclude	Exclude			2	6.9	
BIR2	4	21-Aug-2011			ok	ok			2	6.9	
BIR2	4	21-Aug-2011			ok	ok			15	52.1	
BIR2	4	21-Aug-2011			ok	ok			6	20.8	
BIR2	4	21-Aug-2011			ok	ok			4	13.9	
BIR2	4	21-Aug-2011			ok	ok			2	6.9	
BIR2	4	21-Aug-2011			ok	ok			6	20.8	
BIR2	4	21-Aug-2011			ok	ok			3	10.4	
BIR2	4	21-Aug-2011			ok	ok			3	10.4	
BIR2	4	21-Aug-2011			ok	ok			1	3.5	
BIR2	4	21-Aug-2011			ok	ok			28	97.2	
BIR2	4	21-Aug-2011	immature/damaged		ok	Exclude			2	6.9	
BIR2	4	21-Aug-2011			ok	ok			5	17.4	
BIR2	4	21-Aug-2011			ok	ok			1	3.5	
BIR2	4	21-Aug-2011	immature/damaged		ok	Exclude			4	13.9	
BIR2	4	21-Aug-2011			ok	ok			1	3.5	
BIR2	4	21-Aug-2011			ok	ok			8	27.8	
BIR2	4	21-Aug-2011	immature/damaged		ok	Exclude			6	20.8	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
BIR2	4	21-Aug-2011	FF	Exclude		0.288		Terrestrial							Terrestrial
BIR2	4	21-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Hydropsychidae		*Parapsyche*	*Parapsyche*
BIR2	5	21-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BIR2	5	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa*
BIR2	5	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia/Psilometriocnemus*	*Platysmittia/Psilometriocnemus*
BIR2	5	21-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
BIR2	5	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
BIR2	5	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
BIR2	5	21-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
BIR2	5	21-Aug-2011	FF	Exclude		0.288		Nematoda	Nematoda						Nematoda
BIR2	5	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
BIR2	5	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia*
BIR2	5	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
BIR2	5	21-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys*
MC1	1	22-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
MC1	1	22-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Lumbricidae			Lumbricidae
MC1	1	22-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Naidinae		Naidinae
MC1	1	22-Aug-2011	FF	Exclude		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
MC1	1	22-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Bezzia*	*Bezzia*
MC1	1	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
MC1	1	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Corynoneura*	*Corynoneura*
MC1	1	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
MC1	1	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parakiefferiella*	*Parakiefferiella*
MC1	1	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parorthocladius*	*Parorthocladius*
MC1	1	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Polypedilum*	*Polypedilum*
MC1	1	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa*
MC1	1	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
MC1	1	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae		Chironominae
MC1	1	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
MC1	1	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus validus*
MC1	1	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
MC1	1	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
MC1	1	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae		*Paraleptophlebia*	*Paraleptophlebia*
MC1	1	22-Aug-2011	FF	Exclude		0.288		Gastropoda	Mollusca	Gastropoda	Basommatophora	Planorbidae		*Gyraulus*	*Gyraulus*
MC1	1	22-Aug-2011	FF	Exclude		0.288		Nematoda	Nematoda						Nematoda
MC1	1	22-Aug-2011	FF	Exclude		0.288		Ostracoda	Arthropoda	Ostracoda					Ostracoda
MC1	1	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
MC1	1	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Sweltsa*	*Sweltsa*
MC1	1	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
MC1	1	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Visoka*	*Visoka cataractae*
MC1	1	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
MC1	1	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
MC1	1	22-Aug-2011	FF	Exclude		0.288		Terrestrial							Terrestrial
MC1	1	22-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Apataniidae		*Apatania*	*Apatania*
MC1	1	22-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
MC1	2	22-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
MC1	2	22-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Naidinae		Naidinae
MC1	2	22-Aug-2011	FF	Exclude		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
MC1	2	22-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Bezzia*	*Bezzia*
MC1	2	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
MC1	2	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Corynoneura*	*Corynoneura*
MC1	2	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
MC1	2	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
MC1	2	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parorthocladius*	*Parorthocladius*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
BIR2	4	21-Aug-2011			Exclude	Exclude			2	6.9	
BIR2	4	21-Aug-2011			ok	ok			2	6.9	
BIR2	5	21-Aug-2011			ok	ok			2	6.9	
BIR2	5	21-Aug-2011			ok	ok			3	10.4	
BIR2	5	21-Aug-2011			ok	ok			4	13.9	
BIR2	5	21-Aug-2011			ok	ok			2	6.9	
BIR2	5	21-Aug-2011	immature/damaged		ok	Exclude			2	6.9	
BIR2	5	21-Aug-2011			ok	ok			1	3.5	
BIR2	5	21-Aug-2011			ok	ok			6	20.8	
BIR2	5	21-Aug-2011			Exclude	Exclude			2	6.9	
BIR2	5	21-Aug-2011			ok	ok			2	6.9	
BIR2	5	21-Aug-2011			ok	ok			1	3.5	
BIR2	5	21-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
BIR2	5	21-Aug-2011			ok	ok			2	6.9	
MC1	1	22-Aug-2011			ok	ok			25	86.8	
MC1	1	22-Aug-2011			ok	ok			2	6.9	
MC1	1	22-Aug-2011			ok	ok			14	48.6	
MC1	1	22-Aug-2011			ok	Exclude			10	34.7	
MC1	1	22-Aug-2011			ok	ok			5	17.4	
MC1	1	22-Aug-2011			ok	ok			23	79.9	
MC1	1	22-Aug-2011			ok	ok			22	76.4	
MC1	1	22-Aug-2011			ok	ok			20	69.4	
MC1	1	22-Aug-2011			ok	ok			2	6.9	
MC1	1	22-Aug-2011			ok	ok			2	6.9	
MC1	1	22-Aug-2011			ok	ok			2	6.9	
MC1	1	22-Aug-2011			ok	ok			1	3.5	
MC1	1	22-Aug-2011			ok	ok			39	135.4	
MC1	1	22-Aug-2011	immature/damaged		ok	Exclude			2	6.9	
MC1	1	22-Aug-2011			ok	ok	pupa		8	27.8	
MC1	1	22-Aug-2011			ok	ok			1	3.5	
MC1	1	22-Aug-2011			ok	ok			2	6.9	
MC1	1	22-Aug-2011	immature/damaged		ok	Exclude			2	6.9	
MC1	1	22-Aug-2011			ok	ok			5	17.4	
MC1	1	22-Aug-2011			ok	ok			1	3.5	
MC1	1	22-Aug-2011			Exclude	Exclude			4	13.9	
MC1	1	22-Aug-2011			Exclude	Exclude			4	13.9	
MC1	1	22-Aug-2011			ok	ok			2	6.9	
MC1	1	22-Aug-2011			ok	ok			19	66.0	
MC1	1	22-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
MC1	1	22-Aug-2011			ok	ok			2	6.9	
MC1	1	22-Aug-2011	immature/damaged		ok	Exclude			2	6.9	
MC1	1	22-Aug-2011			ok	ok			1	3.5	
MC1	1	22-Aug-2011			Exclude	Exclude			4	13.9	
MC1	1	22-Aug-2011			ok	ok			1	3.5	
MC1	1	22-Aug-2011			ok	ok			1	3.5	
MC1	2	22-Aug-2011			ok	ok			19	66.0	
MC1	2	22-Aug-2011			ok	ok			38	131.9	
MC1	2	22-Aug-2011			ok	Exclude			3	10.4	
MC1	2	22-Aug-2011			ok	ok			2	6.9	
MC1	2	22-Aug-2011			ok	ok			13	45.1	
MC1	2	22-Aug-2011			ok	ok			13	45.1	
MC1	2	22-Aug-2011			ok	ok			10	34.7	
MC1	2	22-Aug-2011			ok	ok			23	79.9	
MC1	2	22-Aug-2011			ok	ok			1	3.5	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
MC1	2	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia/Psilometriocnemus*	*Platysmittia/Psilometriocnemus*
MC1	2	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Polypedilum*	*Polypedilum*
MC1	2	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Stempellinella*	*Stempellinella*
MC1	2	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
MC1	2	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae		Chironominae
MC1	2	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
MC1	2	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus validus*
MC1	2	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
MC1	2	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
MC1	2	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae		*Paraleptophlebia*	*Paraleptophlebia*
MC1	2	22-Aug-2011	FF	Exclude		0.288		Ostracoda	Arthropoda	Ostracoda					Ostracoda
MC1	2	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
MC1	2	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Sweltsa*	*Sweltsa*
MC1	2	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
MC1	2	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Leuctridae		*Paraleuctra*	*Paraleuctra*
MC1	2	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
MC1	2	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema*
MC1	2	22-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
MC1	3	22-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Lumbricidae			Lumbricidae
MC1	3	22-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Naidinae		Naidinae
MC1	3	22-Aug-2011	FF	Exclude		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
MC1	3	22-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Bezzia*	*Bezzia*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Culicoides*	*Culicoides*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Empididae		*Clinocera*	*Clinocera*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Pedicia*	*Pedicia immaculata*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Tipula*	*Tipula*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Corynoneura*	*Corynoneura*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Paraphaenocladius*	*Paraphaenocladius*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia/Psilometriocnemus*	*Platysmittia/Psilometriocnemus*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Rheocricotopus*	*Rheocricotopus*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Rheosmittia*	*Rheosmittia*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Thienemannimyia*	*Thienemannimyia*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae		Chironominae
MC1	3	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
MC1	3	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus validus*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Heptagenia*	*Heptagenia*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae		*Paraleptophlebia*	*Paraleptophlebia*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Nematoda	Nematoda						Nematoda
MC1	3	22-Aug-2011	FF	Exclude		0.288		Ostracoda	Arthropoda	Ostracoda					Ostracoda
MC1	3	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Sweltsa*	*Sweltsa*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
MC1	3	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Leuctridae		*Despaxia*	*Despaxia augusta*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Visoka*	*Visoka cataractae*
MC1	3	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
MC1	3	22-Aug-2011	FF	Exclude		0.288		Terrestrial							Terrestrial
MC1	3	22-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Limnephilidae			Limnephilidae
MC1	3	22-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera				Trichoptera

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
MC1	2	22-Aug-2011			ok	ok			1	3.5	
MC1	2	22-Aug-2011			ok	ok			1	3.5	
MC1	2	22-Aug-2011			ok	ok			1	3.5	
MC1	2	22-Aug-2011			ok	ok			20	69.4	
MC1	2	22-Aug-2011	immature/damaged		ok	Exclude			2	6.9	
MC1	2	22-Aug-2011			ok	ok	pupa		6	20.8	
MC1	2	22-Aug-2011			ok	ok			2	6.9	
MC1	2	22-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
MC1	2	22-Aug-2011			ok	ok			2	6.9	
MC1	2	22-Aug-2011			ok	ok			9	31.3	
MC1	2	22-Aug-2011			Exclude	Exclude			6	20.8	
MC1	2	22-Aug-2011			ok	ok			5	17.4	
MC1	2	22-Aug-2011			ok	ok			7	24.3	
MC1	2	22-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
MC1	2	22-Aug-2011			ok	ok			1	3.5	
MC1	2	22-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
MC1	2	22-Aug-2011			ok	ok			2	6.9	
MC1	2	22-Aug-2011			ok	ok			1	3.5	
MC1	3	22-Aug-2011			ok	ok			56	194.4	
MC1	3	22-Aug-2011			ok	ok			1	3.5	
MC1	3	22-Aug-2011			ok	ok			60	208.3	
MC1	3	22-Aug-2011			ok	Exclude			6	20.8	
MC1	3	22-Aug-2011			ok	ok			1	3.5	
MC1	3	22-Aug-2011			ok	ok			2	6.9	
MC1	3	22-Aug-2011			ok	ok			2	6.9	
MC1	3	22-Aug-2011			ok	ok			1	3.5	
MC1	3	22-Aug-2011			ok	ok			1	3.5	
MC1	3	22-Aug-2011		group	ok	ok			10	34.7	
MC1	3	22-Aug-2011			ok	ok			7	24.3	
MC1	3	22-Aug-2011	immature/damaged		ok	Exclude			2	6.9	
MC1	3	22-Aug-2011			ok	ok	pupa		6	20.8	
MC1	3	22-Aug-2011			ok	ok			12	41.7	
MC1	3	22-Aug-2011			ok	ok			1	3.5	
MC1	3	22-Aug-2011			ok	ok			2	6.9	
MC1	3	22-Aug-2011			ok	ok			1	3.5	
MC1	3	22-Aug-2011			ok	ok			12	41.7	
MC1	3	22-Aug-2011			Exclude	Exclude			42	145.8	
MC1	3	22-Aug-2011			Exclude	Exclude			4	13.9	
MC1	3	22-Aug-2011			ok	ok			20	69.4	
MC1	3	22-Aug-2011	immature/damaged		ok	Exclude			5	17.4	
MC1	3	22-Aug-2011			ok	ok			1	3.5	
MC1	3	22-Aug-2011			ok	ok			1	3.5	
MC1	3	22-Aug-2011	immature/damaged		ok	Exclude			2	6.9	
MC1	3	22-Aug-2011			Exclude	Exclude			2	6.9	
MC1	3	22-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
MC1	3	22-Aug-2011	immature/damaged		ok	Exclude			4	13.9	

Notes:
MA = Mine Site Area and Down
AP = Ancillary Project Infrastru
FF = Far-field (outside of Regiona
R = Potential Reference

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
MC1	4	22-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
MC1	4	22-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Naidinae		Naidinae
MC1	4	22-Aug-2011	FF	Exclude		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
MC1	4	22-Aug-2011	FF	Exclude		0.288		Collembola	Arthropoda	Collembola		Isotomidae			Isotomidae
MC1	4	22-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Bezzia*	*Bezzia*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Culicoides*	*Culicoides*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Corynoneura*	*Corynoneura*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pagastia*	*Pagastia*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parorthocladius*	*Parorthocladius*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Pseudosmittia*	*Pseudosmittia*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Rheocricotopus*	*Rheocricotopus*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Stempellinella*	*Stempellinella*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Thienemannimyia*	*Thienemannimyia*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae		Tanytarsini
MC1	4	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
MC1	4	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
MC1	4	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus validus*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
MC1	4	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
MC1	4	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae		*Paraleptophlebia*	*Paraleptophlebia*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Nematoda	Nematoda						Nematoda
MC1	4	22-Aug-2011	FF	Exclude		0.288		Ostracoda	Arthropoda	Ostracoda					Ostracoda
MC1	4	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
MC1	4	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Sweltsa*	*Sweltsa*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
MC1	4	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Visoka*	*Visoka cataractae*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
MC1	4	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlidae			Perlidae
MC1	4	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
MC1	4	22-Aug-2011	FF	Exclude		0.288		Terrestrial							Terrestrial
MC1	4	22-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
MC1	4	22-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera				Trichoptera
MC1	5	22-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
MC1	5	22-Aug-2011	FF	Exclude		0.288		Annelida	Annelida	Oligochaeta	Haplotaxida	Lumbricidae			Lumbricidae
MC1	5	22-Aug-2011	FF	Exclude		0.288		Arachnida	Arthropoda	Arachnida					Hydracarina
MC1	5	22-Aug-2011	FF	Exclude		0.288		Collembola	Arthropoda	Collembola		Isotomidae			Isotomidae
MC1	5	22-Aug-2011	FF	Exclude		0.288		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Bezzia*	*Bezzia*
MC1	5	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
MC1	5	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Corynoneura*	*Corynoneura*
MC1	5	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus/Orthocladius*	*Cricotopus/Orthocladius*
MC1	5	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
MC1	5	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Paraphaenocladius*	*Paraphaenocladius*
MC1	5	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Platysmittia/Psilometriocnemus*	*Platysmittia/Psilometriocnemus*
MC1	5	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Thienemannimyia*	*Thienemannimyia*
MC1	5	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia*

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
MC1	4	22-Aug-2011			ok	ok			22	76.4	
MC1	4	22-Aug-2011			ok	ok			8	27.8	
MC1	4	22-Aug-2011			ok	Exclude			39	135.4	
MC1	4	22-Aug-2011			Exclude	Exclude			5	17.4	
MC1	4	22-Aug-2011			ok	ok			2	6.9	
MC1	4	22-Aug-2011			ok	ok			1	3.5	
MC1	4	22-Aug-2011			ok	ok			4	13.9	
MC1	4	22-Aug-2011			ok	ok			10	34.7	
MC1	4	22-Aug-2011			ok	ok			25	86.8	
MC1	4	22-Aug-2011			ok	ok			2	6.9	
MC1	4	22-Aug-2011			ok	ok			17	59.0	
MC1	4	22-Aug-2011			ok	ok			1	3.5	
MC1	4	22-Aug-2011			ok	ok			2	6.9	
MC1	4	22-Aug-2011			ok	ok			2	6.9	
MC1	4	22-Aug-2011			ok	ok			2	6.9	
MC1	4	22-Aug-2011			ok	ok			3	10.4	
MC1	4	22-Aug-2011		group	ok	ok			12	41.7	
MC1	4	22-Aug-2011			ok	ok			10	34.7	
MC1	4	22-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
MC1	4	22-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
MC1	4	22-Aug-2011			ok	ok	pupa		7	24.3	
MC1	4	22-Aug-2011			ok	ok			1	3.5	
MC1	4	22-Aug-2011			ok	ok			3	10.4	
MC1	4	22-Aug-2011	immature/damaged		ok	Exclude			4	13.9	
MC1	4	22-Aug-2011			ok	ok			1	3.5	
MC1	4	22-Aug-2011			ok	ok			1	3.5	
MC1	4	22-Aug-2011			ok	ok			2	6.9	
MC1	4	22-Aug-2011			ok	ok			1	3.5	
MC1	4	22-Aug-2011			ok	ok			2	6.9	
MC1	4	22-Aug-2011	immature/damaged		ok	Exclude			19	66.0	
MC1	4	22-Aug-2011			ok	ok			2	6.9	
MC1	4	22-Aug-2011			Exclude	Exclude			4	13.9	
MC1	4	22-Aug-2011			Exclude	Exclude			2	6.9	
MC1	4	22-Aug-2011			ok	ok			8	27.8	
MC1	4	22-Aug-2011			ok	ok			26	90.3	
MC1	4	22-Aug-2011	immature/damaged		ok	Exclude			9	31.3	
MC1	4	22-Aug-2011			ok	ok			2	6.9	
MC1	4	22-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
MC1	4	22-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
MC1	4	22-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
MC1	4	22-Aug-2011			Exclude	Exclude			5	17.4	
MC1	4	22-Aug-2011			ok	ok			3	10.4	
MC1	4	22-Aug-2011	immature/damaged		ok	Exclude			9	31.3	
MC1	5	22-Aug-2011			ok	ok			3	10.4	
MC1	5	22-Aug-2011			ok	ok			2	6.9	
MC1	5	22-Aug-2011			ok	Exclude			39	135.4	
MC1	5	22-Aug-2011			Exclude	Exclude			2	6.9	
MC1	5	22-Aug-2011			ok	ok			2	6.9	
MC1	5	22-Aug-2011			ok	ok			10	34.7	
MC1	5	22-Aug-2011			ok	ok			6	20.8	
MC1	5	22-Aug-2011			ok	ok			46	159.7	
MC1	5	22-Aug-2011			ok	ok			31	107.6	
MC1	5	22-Aug-2011			ok	ok			4	13.9	
MC1	5	22-Aug-2011			ok	ok			2	6.9	
MC1	5	22-Aug-2011		group	ok	ok			23	79.9	
MC1	5	22-Aug-2011			ok	ok			8	27.8	

Notes:
MA = Mine Site Area and Down
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Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Area	Exclude / Include	Lab Sample ID	Collection Area (m^2)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
MC1	5	22-Aug-2011	FF	Exclude		0.288		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
MC1	5	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus validus*
MC1	5	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis*
MC1	5	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
MC1	5	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerellidae
MC1	5	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula*
MC1	5	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena*
MC1	5	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			Heptageniidae
MC1	5	22-Aug-2011	FF	Exclude		0.288		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae		*Paraleptophlebia*	*Paraleptophlebia*
MC1	5	22-Aug-2011	FF	Exclude		0.288		Ostracoda	Arthropoda	Ostracoda					Ostracoda
MC1	5	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Capniidae			Capniidae
MC1	5	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Sweltsa*	*Sweltsa*
MC1	5	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
MC1	5	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Leuctridae		*Paraleuctra*	*Paraleuctra*
MC1	5	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Visoka*	*Visoka cataractae*
MC1	5	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera	Perlidae			Perlidae
MC1	5	22-Aug-2011	FF	Exclude		0.288		Plecoptera	Arthropoda	Insecta	Plecoptera				Plecoptera
MC1	5	22-Aug-2011	FF	Exclude		0.288		Terrestrial							Terrestrial
MC1	5	22-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Glossosomatidae		*Glossosoma*	*Glossosoma*
MC1	5	22-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Limnephilidae			Limnephilidae
MC1	5	22-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila*
MC1	5	22-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera				Trichoptera
MC1	5	22-Aug-2011	FF	Exclude		0.288		Trichoptera	Arthropoda	Insecta	Trichoptera				Trichoptera

Appendix 6.1-1. Benthic Invertebrate Taxa and Abundance in Streams (250 µm Hess Sampler), 2008 to 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/ m^2)	ITIS Serial Number
MC1	5	22-Aug-2011			ok	ok	pupa		14	48.6	
MC1	5	22-Aug-2011			ok	ok			7	24.3	
MC1	5	22-Aug-2011			ok	ok			2	6.9	
MC1	5	22-Aug-2011			ok	ok			7	24.3	
MC1	5	22-Aug-2011	immature/damaged		ok	Exclude			6	20.8	
MC1	5	22-Aug-2011			ok	ok			1	3.5	
MC1	5	22-Aug-2011			ok	ok			4	13.9	
MC1	5	22-Aug-2011	immature/damaged		ok	Exclude			6	20.8	
MC1	5	22-Aug-2011			ok	ok			18	62.5	
MC1	5	22-Aug-2011			Exclude	Exclude			2	6.9	
MC1	5	22-Aug-2011			ok	ok			2	6.9	
MC1	5	22-Aug-2011			ok	ok			40	138.9	
MC1	5	22-Aug-2011	immature/damaged		ok	Exclude			16	55.6	
MC1	5	22-Aug-2011			ok	ok			3	10.4	
MC1	5	22-Aug-2011			ok	ok			1	3.5	
MC1	5	22-Aug-2011	immature/damaged		ok	Exclude			4	13.9	
MC1	5	22-Aug-2011	immature/damaged		ok	Exclude			2	6.9	
MC1	5	22-Aug-2011			Exclude	Exclude			2	6.9	
MC1	5	22-Aug-2011			ok	ok			6	20.8	
MC1	5	22-Aug-2011	immature/damaged		ok	Exclude			1	3.5	
MC1	5	22-Aug-2011			ok	ok			1	3.5	
MC1	5	22-Aug-2011	immature/damaged		ok	Exclude			2	6.9	
MC1	5	22-Aug-2011			ok	Exclude	pupa		3	10.4	

Notes:
MA = Mine Site Area and Down
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R = Potential Reference

Appendix 6.1-2. Benthic Invertebrate Taxa and Abundance in Streams (400µm CABIN Kick-Net), 2013

Site	Replicate	Date	Area	Include / Exclude	Lab Sample ID	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
BJ U/S	1	15-Aug-2013	MA	Include	6530.4-3	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ U/S	1	15-Aug-2013	MA	Include	6530.4-3	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Tubificidae			Tubificidae
BJ U/S	1	15-Aug-2013	MA	Include	6530.4-3	100%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
BJ U/S	1	15-Aug-2013	MA	Include	6530.4-3	100%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota* sp.
BJ U/S	1	15-Aug-2013	MA	Include	6530.4-3	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
BJ U/S	1	15-Aug-2013	MA	Include	6530.4-3	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius* sp.
BJ U/S	1	15-Aug-2013	MA	Include	6530.4-3	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius (Euorthocladius) rivicola*
BJ U/S	1	15-Aug-2013	MA	Include	6530.4-3	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius (Euorthocladius)* sp.
BJ U/S	1	15-Aug-2013	MA	Include	6530.4-3	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ U/S	1	15-Aug-2013	MA	Include	6530.4-3	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa* sp.
BJ U/S	1	15-Aug-2013	MA	Include	6530.4-3	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
BJ2	1	14-Aug-2013	MA	Include	6530.4-2	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ2	1	14-Aug-2013	MA	Include	6530.4-2	100%	Coleoptera	Arthropoda	Insecta	Coleoptera	Dytiscidae	Hydroporinae		Hydroporinae
BJ2	1	14-Aug-2013	MA	Include	6530.4-2	100%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes* sp.
BJ2	1	14-Aug-2013	MA	Include	6530.4-2	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus*	*Cricotopus* sp.
BJ2	1	14-Aug-2013	MA	Include	6530.4-2	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
BJ2	1	14-Aug-2013	MA	Include	6530.4-2	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius (Euorthocladius)* sp.
BJ2	1	14-Aug-2013	MA	Include	6530.4-2	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ2	1	14-Aug-2013	MA	Include	6530.4-2	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa* sp.
BJ2	1	14-Aug-2013	MA	Include	6530.4-2	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tokunagaia*	*Tokunagaia* sp.
BJ2	1	14-Aug-2013	MA	Include	6530.4-2	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae			Perlodidae
BJ2	1	14-Aug-2013	MA	Include	6530.4-2	100%	Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila verrula*
SC2	1	5-Sep-2013	MA	Include	6538.02-4	100%	Diptera	Arthropoda	Insecta	Diptera	Empididae		*Clinocera*	*Clinocera sp.*
SC2	1	5-Sep-2013	MA	Include	6538.02-4	100%	Diptera	Arthropoda	Insecta	Diptera	Syrphidae			Syrphidae
SC2	1	5-Sep-2013	MA	Include	6538.02-4	100%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes* sp.
SC2	1	5-Sep-2013	MA	Include	6538.02-4	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Chaetocladius*	*Chaetocladius* sp.
SC2	1	5-Sep-2013	MA	Include	6538.02-4	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
SC2	1	5-Sep-2013	MA	Include	6538.02-4	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius*
SC2	1	5-Sep-2013	MA	Include	6538.02-4	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius (Euorthocladius)* sp.
SC2	1	5-Sep-2013	MA	Include	6538.02-4	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tokunagaia*	*Tokunagaia* sp.
SC2	1	5-Sep-2013	MA	Include	6538.02-4	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
SC2	1	5-Sep-2013	MA	Include	6538.02-4	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis* sp.
SC2	1	5-Sep-2013	MA	Include	6538.02-4	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis bicaudatus*
SC2	1	5-Sep-2013	MA	Include	6538.02-4	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus grandis/permagnus*
SC2	1	5-Sep-2013	MA	Include	6538.02-4	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena* sp.
SC2	1	5-Sep-2013	MA	Include	6538.02-4	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada oregonensis*
SC2	1	5-Sep-2013	MA	Include	6538.02-4	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys* sp.
SC2	1	5-Sep-2013	MA	Include	6538.02-4	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae			Taeniopterygidae
SC2	1	5-Sep-2013	MA	Include	6538.02-4	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae		*Taenionema*	*Taenionema* sp.
SC3	1	4-Sep-2013	MA	Include	6538.02-5	100%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes* sp.
SC3	1	4-Sep-2013	MA	Include	6538.02-5	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Chaetocladius*	*Chaetocladius* sp.
SC3	1	4-Sep-2013	MA	Include	6538.02-5	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
SC3	1	4-Sep-2013	MA	Include	6538.02-5	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella gracei*
SC3	1	4-Sep-2013	MA	Include	6538.02-5	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis bicaudatus*
SC3	1	4-Sep-2013	MA	Include	6538.02-5	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus grandis/permagnus*
SC3	1	4-Sep-2013	MA	Include	6538.02-5	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena* sp.
SC3	1	4-Sep-2013	MA	Include	6538.02-5	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
SC3	1	4-Sep-2013	MA	Include	6538.02-5	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada oregonensis*
SC3	1	4-Sep-2013	MA	Include	6538.02-5	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys* sp.
SC3	1	4-Sep-2013	MA	Include	6538.02-5	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae			Taeniopterygidae
SC3	1	4-Sep-2013	MA	Include	6538.02-5	100%	Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila hyalinata*

Notes: MA = Mine Site Area and Downstream Receiving Environment; R = Potential Reference

Appendix 6.1-2. Benthic Invertebrate Taxa and Abundance in Streams (400µm CABIN Kick-Net), 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	(Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/3 min kick)	ITIS Serial Number
BJ U/S	1	15-Aug-2013			ok	ok			4	4.0	68510
BJ U/S	1	15-Aug-2013		w/ cap setae sp.	ok	ok			7	7.0	68585
BJ U/S	1	15-Aug-2013			ok	ok		16	16	16.0	83034
BJ U/S	1	15-Aug-2013			ok	ok			19	19.0	121027
BJ U/S	1	15-Aug-2013			ok	ok	11		64	64.0	128355
BJ U/S	1	15-Aug-2013			ok	ok			3	3.0	128670
BJ U/S	1	15-Aug-2013		group	ok	ok	4		4	4.0	
BJ U/S	1	15-Aug-2013			ok	ok			91	91.0	568520
BJ U/S	1	15-Aug-2013			ok	ok	2		27	27.0	128874
BJ U/S	1	15-Aug-2013			ok	ok			1	1.0	128416
BJ U/S	1	15-Aug-2013			ok	ok			9	9.0	100996
BJ2	1	14-Aug-2013			ok	ok			227	227.0	68510
BJ2	1	14-Aug-2013	immature		ok	Exclude			1	1.0	
BJ2	1	14-Aug-2013			ok	ok			1	1.0	120722
BJ2	1	14-Aug-2013			ok	ok			2	2.0	128575
BJ2	1	14-Aug-2013			ok	ok	2		41	41.0	128355
BJ2	1	14-Aug-2013			ok	ok			3	3.0	568520
BJ2	1	14-Aug-2013			ok	ok	1		18	18.0	128874
BJ2	1	14-Aug-2013			ok	ok			2	2.0	128416
BJ2	1	14-Aug-2013			ok	ok			1	1.0	129194
BJ2	1	14-Aug-2013	immature		ok	Exclude			1	1.0	102994
BJ2	1	14-Aug-2013		group	ok	ok			1	1.0	
SC2	1	5-Sep-2013			ok	ok			1	1.0	135849
SC2	1	5-Sep-2013			ok	ok			1	1.0	139621
SC2	1	5-Sep-2013			ok	ok			1	1.0	120722
SC2	1	5-Sep-2013			ok	ok			1	1.0	128520
SC2	1	5-Sep-2013			ok	ok	17		160	160.0	128355
SC2	1	5-Sep-2013		Complex	ok	ok			2	2.0	
SC2	1	5-Sep-2013			ok	ok			3	3.0	568520
SC2	1	5-Sep-2013			ok	ok			1	1.0	129194
SC2	1	5-Sep-2013			ok	ok			1	1.0	100996
SC2	1	5-Sep-2013	damaged		ok	Exclude			6	6.0	100800
SC2	1	5-Sep-2013			ok	ok			18	18.0	100823
SC2	1	5-Sep-2013			ok	ok			2	2.0	100635
SC2	1	5-Sep-2013			ok	ok			2	2.0	100572
SC2	1	5-Sep-2013		gr.	ok	ok			51	51.0	
SC2	1	5-Sep-2013			ok	ok			6	6.0	103110
SC2	1	5-Sep-2013	immature		ok	Exclude			137	137.0	102788
SC2	1	5-Sep-2013			ok	ok			1	1.0	102519
SC3	1	4-Sep-2013			ok	ok			6	6.0	120722
SC3	1	4-Sep-2013			ok	ok			6	6.0	128520
SC3	1	4-Sep-2013			ok	ok	7		102	102.0	128355
SC3	1	4-Sep-2013		gr.	ok	ok	1		1	1.0	
SC3	1	4-Sep-2013			ok	ok			6	6.0	100823
SC3	1	4-Sep-2013			ok	ok			3	3.0	100635
SC3	1	4-Sep-2013			ok	ok			4	4.0	100572
SC3	1	4-Sep-2013	immature		ok	Exclude			1	1.0	103202
SC3	1	4-Sep-2013		gr.	ok	ok			2	2.0	
SC3	1	4-Sep-2013			ok	ok			9	9.0	103110
SC3	1	4-Sep-2013			ok	ok			114	114.0	102788
SC3	1	4-Sep-2013		gr.	ok	ok			1	1.0	

Notes: MA = Mine Site Area and Downstream Receiving Environment; R = Potential Reference

Appendix 6.1-2. Benthic Invertebrate Taxa and Abundance in Streams (400µm CABIN Kick-Net), 2013

Site	Replicate	Date	Area	Include / Exclude	Lab Sample ID	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Arachnida	Arthropoda	Arachnida		Sperchontidae		*Sperchon*	*Sperchon* sp.
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Diptera	Arthropoda	Insecta	Diptera	Simuliidae		*Helodon*	*Helodon* sp.
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Chaetocladius*	*Chaetocladius* sp.
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella gracei*
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis* sp.
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis bicaudatus*
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Caudatella*	*Caudatella* sp.
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae		*Drunella*	*Drunella doddsii*
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula* sp.
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus* sp.
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Epeorus*	*Epeorus grandis/permagnus*
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena* sp.
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae		*Zapada*	*Zapada oregonensis*
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys* sp.
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae			Taeniopterygidae
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Trichoptera	Arthropoda	Insecta	Trichoptera	Limnephilidae			Limnephilidae
UR1	1	3-Sep-2013	MA	Include	6538.02-12	100%	Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila hyalinata*
UR2	1	2-Sep-2013	MA	Include	6538.02-13	100%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
UR2	1	2-Sep-2013	MA	Include	6538.02-13	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Chaetocladius*	*Chaetocladius* sp.
UR2	1	2-Sep-2013	MA	Include	6538.02-13	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
UR2	1	2-Sep-2013	MA	Include	6538.02-13	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella brevicalcar*
UR2	1	2-Sep-2013	MA	Include	6538.02-13	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius (Euorthocladius)* sp.
UR2	1	2-Sep-2013	MA	Include	6538.02-13	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parametriocnemus*	*Parametriocnemus* sp.
UR2	1	2-Sep-2013	MA	Include	6538.02-13	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
UR2	1	2-Sep-2013	MA	Include	6538.02-13	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis* sp.
UR2	1	2-Sep-2013	MA	Include	6538.02-13	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis bicaudatus*
UR2	1	2-Sep-2013	MA	Include	6538.02-13	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Cinygmula*	*Cinygmula* sp.
UR2	1	2-Sep-2013	MA	Include	6538.02-13	100%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena* sp.
UR2	1	2-Sep-2013	MA	Include	6538.02-13	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae			Chloroperlidae
UR2	1	2-Sep-2013	MA	Include	6538.02-13	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Suwallia*	*Suwallia* sp.
UR2	1	2-Sep-2013	MA	Include	6538.02-13	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae			Perlodidae
UR2	1	2-Sep-2013	MA	Include	6538.02-13	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Isoperla*	*Isoperla* sp.
UR2	1	2-Sep-2013	MA	Include	6538.02-13	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae		*Megarcys*	*Megarcys* sp.
UR2	1	2-Sep-2013	MA	Include	6538.02-13	100%	Plecoptera	Arthropoda	Insecta	Plecoptera	Taeniopterygidae			Taeniopterygidae
UR2	1	2-Sep-2013	MA	Include	6538.02-13	100%	Trichoptera	Arthropoda	Insecta	Trichoptera	Limnephilidae			Limnephilidae
UR2	1	2-Sep-2013	MA	Include	6538.02-13	100%	Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila hyalinata*
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Bezzia/Palpomyia*	*Bezzia/Palpomyia* sp.
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Cricotopus*	*Cricotopus* sp.
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius* sp.
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius*
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pagastia*	*Pagastia* sp.
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Podonominae	*Parochlus*	*Parochlus* sp.
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Procladius*	*Procladius* sp.
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa* sp.

Notes: MA = Mine Site Area and Downstream Receiving Environment; R = Potential Reference

Appendix 6.1-2. Benthic Invertebrate Taxa and Abundance in Streams (400µm CABIN Kick-Net), 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	(Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/3 min kick)	ITIS Serial Number
UR1	1	3-Sep-2013			ok	ok			1	1.0	83006
UR1	1	3-Sep-2013			ok	ok			1	1.0	
UR1	1	3-Sep-2013			ok	ok			3	3.0	128520
UR1	1	3-Sep-2013			ok	ok	28		129	129.0	128355
UR1	1	3-Sep-2013		gr.	ok	ok	1		1	1.0	
UR1	1	3-Sep-2013			ok	ok			1	1.0	128874
UR1	1	3-Sep-2013	immature/		ok	Exclude			41	41.0	100800
UR1	1	3-Sep-2013			ok	ok			34	34.0	100823
UR1	1	3-Sep-2013	immature		ok	Exclude			1	1.0	101347
UR1	1	3-Sep-2013			ok	ok			1	1.0	698494
UR1	1	3-Sep-2013			ok	ok			24	24.0	100557
UR1	1	3-Sep-2013	damaged		ok	Exclude			1	1.0	100626
UR1	1	3-Sep-2013			ok	ok			1	1.0	100635
UR1	1	3-Sep-2013			ok	ok			19	19.0	100572
UR1	1	3-Sep-2013	immature		ok	Exclude			2	2.0	103202
UR1	1	3-Sep-2013	damaged		ok	Exclude			1	1.0	102517
UR1	1	3-Sep-2013		gr.	ok	ok			3	3.0	
UR1	1	3-Sep-2013			ok	ok			37	37.0	103110
UR1	1	3-Sep-2013			ok	ok			55	55.0	102788
UR1	1	3-Sep-2013	immature		ok	Exclude			2	2.0	115933
UR1	1	3-Sep-2013		gr.	ok	ok			2	2.0	
UR2	1	2-Sep-2013			ok	ok			1	1.0	83034
UR2	1	2-Sep-2013			ok	ok			15	15.0	128520
UR2	1	2-Sep-2013			ok	ok	2		53	53.0	128355
UR2	1	2-Sep-2013		gr.	ok	ok	1		2	2.0	
UR2	1	2-Sep-2013			ok	ok			1	1.0	568520
UR2	1	2-Sep-2013		gr.	ok	ok	1		2	2.0	
UR2	1	2-Sep-2013			ok	ok			1	1.0	568520
UR2	1	2-Sep-2013			ok	ok			1	1.0	128978
UR2	1	2-Sep-2013			ok	ok			1	1.0	100996
UR2	1	2-Sep-2013	damaged		ok	Exclude			5	5.0	100800
UR2	1	2-Sep-2013			ok	ok			4	4.0	100823
UR2	1	2-Sep-2013			ok	ok			2	2.0	100557
UR2	1	2-Sep-2013			ok	ok			23	23.0	100572
UR2	1	2-Sep-2013	immature		ok	Exclude			7	7.0	103202
UR2	1	2-Sep-2013			ok	ok			3	3.0	103254
UR2	1	2-Sep-2013	immature		ok	Exclude			4	4.0	102994
UR2	1	2-Sep-2013			ok	ok			3	3.0	102995
UR2	1	2-Sep-2013			ok	ok			9	9.0	103110
UR2	1	2-Sep-2013			ok	ok			25	25.0	102788
UR2	1	2-Sep-2013	immature		ok	Exclude			3	3.0	115933
UR2	1	2-Sep-2013		gr.	ok	ok			1	1.0	
Divide OF	1	11-Aug-2013			ok	ok			8	24.2	68510
Divide OF	1	11-Aug-2013			ok	ok			31	93.9	83034
Divide OF	1	11-Aug-2013			ok	ok			1	3.0	
Divide OF	1	11-Aug-2013			ok	ok			1	3.0	128575
Divide OF	1	11-Aug-2013			ok	ok			1	3.0	128670
Divide OF	1	11-Aug-2013		Orthocladius	ok	ok			1	3.0	
Divide OF	1	11-Aug-2013			ok	ok	3		50	151.5	128874
Divide OF	1	11-Aug-2013			ok	ok			69	209.1	128401
Divide OF	1	11-Aug-2013			ok	ok			1	3.0	127987
Divide OF	1	11-Aug-2013			ok	ok	1		1	3.0	128277
Divide OF	1	11-Aug-2013			ok	ok			1	3.0	128416

Notes: MA = Mine Site Area and Downstream Receiving Environment; R = Potential Reference

Appendix 6.1-2. Benthic Invertebrate Taxa and Abundance in Streams (400µm CABIN Kick-Net), 2013

Site	Replicate	Date	Area	Include / Exclude	Lab Sample ID	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tokunagaia*	*Tokunagaia* sp.
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia bavarica*
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Ameletidae		*Ameletus*	*Ameletus* sp.
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis* sp.
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Baetis*	*Baetis bicaudatus*
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		*Rhithrogena*	*Rhithrogena* sp.
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Plecoptera	Arthropoda	Insecta	Plecoptera	Chloroperlidae		*Sweltsa*	*Sweltsa* sp.
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Plecoptera	Arthropoda	Insecta	Plecoptera	Nemouridae			Nemouridae
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Plecoptera	Arthropoda	Insecta	Plecoptera	Perlodidae			Perlodidae
Divide OF	1	11-Aug-2013	R	Exclude	6530.4-1	33%	Trichoptera	Arthropoda	Insecta	Trichoptera	Rhyacophilidae		*Rhyacophila*	*Rhyacophila verrula*

Notes: MA = Mine Site Area and Downstream Receiving Environment; R = Potential Reference

Appendix 6.1-2. Benthic Invertebrate Taxa and Abundance in Streams (400µm CABIN Kick-Net), 2013

Site	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	(Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/3 min kick)	ITIS Serial Number
Divide OF	1	11-Aug-2013			ok	ok			7	21.2	129194
Divide OF	1	11-Aug-2013		group	ok	ok			5	15.2	
Divide OF	1	11-Aug-2013			ok	ok			1	3.0	100996
Divide OF	1	11-Aug-2013	damaged		ok	Exclude			8	24.2	100800
Divide OF	1	11-Aug-2013			ok	ok			8	24.2	100823
Divide OF	1	11-Aug-2013			ok	ok			119	360.6	100572
Divide OF	1	11-Aug-2013			ok	ok			1	3.0	103273
Divide OF	1	11-Aug-2013	damaged		ok	Exclude			4	12.1	102517
Divide OF	1	11-Aug-2013	immature		ok	Exclude			9	27.3	102994
Divide OF	1	11-Aug-2013		group	ok	ok	1		8	24.2	

Notes: MA = Mine Site Area and Downstream Receiving Environment; R = Potential Reference

Appendix 6.1-3. Benthic Invertebrate Taxa and Abundance in Lakes (Ekman Sampler), 2008 to 2013

Site	Depth	Replicate	Date	Exclude / Include	Area	Lab Sample ID	Area (m²)	Mesh Size (µm)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
BJ		1	8-Sep-2012	Include	MA	6204.1-4	0.0675	250	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ		1	8-Sep-2012	Include	MA	6204.1-4	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
BJ		1	8-Sep-2012	Include	MA	6204.1-4	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra* sp.
BJ		1	8-Sep-2012	Include	MA	6204.1-4	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ		1	8-Sep-2012	Include	MA	6204.1-4	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Paracladius*	*Paracladius* sp.
BJ		1	8-Sep-2012	Include	MA	6204.1-4	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
BJ		1	8-Sep-2012	Include	MA	6204.1-4	0.0675	250	100%	Nematoda	Nematoda						Nematoda
BJ		2	8-Sep-2012	Include	MA	6204.1-5	0.0675	250	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ		2	8-Sep-2012	Include	MA	6204.1-5	0.0675	250	100%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
BJ		2	8-Sep-2012	Include	MA	6204.1-5	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
BJ		2	8-Sep-2012	Include	MA	6204.1-5	0.0675	250	100%	Nematoda	Nematoda						Nematoda
BJ		3	8-Sep-2012	Include	MA	6204.1-6	0.0225	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
BJ		1	9-Aug-2013	Include	MA	6530.2-1	0.0675	250	100%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
BJ		1	9-Aug-2013	Include	MA	6530.2-1	0.0675	250	100%	Arachnida	Arthropoda	Arachnida					Acari
BJ		1	9-Aug-2013	Include	MA	6530.2-1	0.0675	250	100%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
BJ		1	9-Aug-2013	Include	MA	6530.2-1	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
BJ		1	9-Aug-2013	Include	MA	6530.2-1	0.0675	250	100%	Nematoda	Nematoda						Nematoda
BJ		1	9-Aug-2013	Include	MA	6530.2-1	0.0675	250	100%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
BJ		2	9-Aug-2013	Include	MA	6530.2-2	0.0675	250	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ		2	9-Aug-2013	Include	MA	6530.2-2	0.0675	250	100%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
BJ		2	9-Aug-2013	Include	MA	6530.2-2	0.0675	250	100%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
BJ		2	9-Aug-2013	Include	MA	6530.2-2	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
BJ		2	9-Aug-2013	Include	MA	6530.2-2	0.0675	250	100%	Nematoda	Nematoda						Nematoda
BJ		3	9-Aug-2013	Include	MA	6530.2-3	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
BJ		3	9-Aug-2013	Include	MA	6530.2-3	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Paracladius*	*Paracladius* sp.
BJ		3	9-Aug-2013	Include	MA	6530.2-3	0.0675	250	100%	Nematoda	Nematoda						Nematoda
BJ		3	9-Aug-2013	Include	MA	6530.2-3	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Paracladius*	*Paracladius* sp.
BJ		3	9-Aug-2013	Include	MA	6530.2-3	0.0675	250	100%	Nematoda	Nematoda						Nematoda
BJ		4	9-Aug-2013	Include	MA	6530.2-4	0.0675	250	100%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
BJ		4	9-Aug-2013	Include	MA	6530.2-4	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
BJ		4	9-Aug-2013	Include	MA	6530.2-4	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Paracladius*	*Paracladius* sp.
BJ		4	9-Aug-2013	Include	MA	6530.2-4	0.0675	250	100%	Nematoda	Nematoda						Nematoda
BJ		4	9-Aug-2013	Include	MA	6530.2-4	0.0675	250	100%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
BJ		5	9-Aug-2013	Include	MA	6530.2-5	0.0675	250	100%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
BJ		5	9-Aug-2013	Include	MA	6530.2-5	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
BJ		5	9-Aug-2013	Include	MA	6530.2-5	0.0675	250	100%	Nematoda	Nematoda						Nematoda
BJ Shallow		1	8-Sep-2012	Include	MA	6204.1-1	0.0675	250	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ Shallow		1	8-Sep-2012	Include	MA	6204.1-1	0.0675	250	100%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
BJ Shallow		1	8-Sep-2012	Include	MA	6204.1-1	0.0675	250	100%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota* sp.
BJ Shallow		1	8-Sep-2012	Include	MA	6204.1-1	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
BJ Shallow		1	8-Sep-2012	Include	MA	6204.1-1	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra* sp.
BJ Shallow		1	8-Sep-2012	Include	MA	6204.1-1	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ Shallow		1	8-Sep-2012	Include	MA	6204.1-1	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Paracladius*	*Paracladius* sp.
BJ Shallow		1	8-Sep-2012	Include	MA	6204.1-1	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
BJ Shallow		1	8-Sep-2012	Include	MA	6204.1-1	0.0675	250	100%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
BJ Shallow		2	8-Sep-2012	Include	MA	6204.1-2	0.0675	250	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ Shallow		2	8-Sep-2012	Include	MA	6204.1-2	0.0675	250	100%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota* sp.
BJ Shallow		2	8-Sep-2012	Include	MA	6204.1-2	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
BJ Shallow		2	8-Sep-2012	Include	MA	6204.1-2	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ Shallow		2	8-Sep-2012	Include	MA	6204.1-2	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Paracladius*	*Paracladius* sp.
BJ Shallow		2	8-Sep-2012	Include	MA	6204.1-2	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae		Tanytarsini
BJ Shallow		2	8-Sep-2012	Include	MA	6204.1-2	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
BJ Shallow		2	8-Sep-2012	Include	MA	6204.1-2	0.0675	250	100%	Nematoda	Nematoda						Nematoda

Notes: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area); R = Potential Reference

Appendix 6.1-3. Benthic Invertebrate Taxa and Abundance in Lakes (Ekman Sampler), 2008 to 2013

Site	Depth	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/m^2)	Notes	ITIS Serial Number
BJ		1	8-Sep-2012			ok	ok			1	14.8		
BJ		1	8-Sep-2012		gr.	ok	ok			20	296.3		
BJ		1	8-Sep-2012			ok	ok			1	14.8		
BJ		1	8-Sep-2012			ok	ok			1	14.8		
BJ		1	8-Sep-2012			ok	ok			1	14.8		
BJ		1	8-Sep-2012			ok	ok			3	44.4		
BJ		1	8-Sep-2012			Exclude	Exclude			3	44.4		
BJ		2	8-Sep-2012			ok	ok			1	14.8		
BJ		2	8-Sep-2012			ok	ok			1	14.8		
BJ		2	8-Sep-2012		gr.	ok	ok			21	311.1		
BJ		2	8-Sep-2012			Exclude	Exclude			7	103.7		
BJ		3	8-Sep-2012		gr.	ok	ok			5	222.0	Only one grab.	
BJ		1	9-Aug-2013			ok	ok			1	14.8		83034
BJ		1	9-Aug-2013	immature		ok	Exclude			1	14.8		82754
BJ		1	9-Aug-2013			Exclude	Exclude			1	14.8		88530
BJ		1	9-Aug-2013		gr.	ok	ok			2	29.6		
BJ		1	9-Aug-2013			Exclude	Exclude			4	59.3		59490
BJ		1	9-Aug-2013			Exclude	Exclude			1	14.8		84195
BJ		2	9-Aug-2013			ok	ok			1	14.8		68510
BJ		2	9-Aug-2013			ok	ok			1	14.8		83034
BJ		2	9-Aug-2013			Exclude	Exclude			3	44.4		88530
BJ		2	9-Aug-2013		gr.	ok	ok			1	14.8		
BJ		2	9-Aug-2013			Exclude	Exclude			8	118.5		59490
BJ		3	9-Aug-2013		gr.	ok	ok			2	29.6		
BJ		3	9-Aug-2013			ok	ok			2	29.6		128956
BJ		3	9-Aug-2013			Exclude	Exclude			5	74.1		59490
BJ		3	9-Aug-2013			Exclude	Exclude			5	74.1		59490
BJ		4	9-Aug-2013			Exclude	Exclude			1	14.8		88530
BJ		4	9-Aug-2013		gr.	ok	ok			1	14.8		
BJ		4	9-Aug-2013			ok	ok			3	44.4		128956
BJ		4	9-Aug-2013			Exclude	Exclude			5	74.1		59490
BJ		4	9-Aug-2013			Exclude	Exclude			2	29.6		84195
BJ		5	9-Aug-2013			Exclude	Exclude			2	29.6		88530
BJ		5	9-Aug-2013		gr.	ok	ok			1	14.8		
BJ		5	9-Aug-2013			Exclude	Exclude			2	29.6		59490
BJ Shallow		1	8-Sep-2012			ok	ok			2	29.6		
BJ Shallow		1	8-Sep-2012			ok	ok			6	88.9		
BJ Shallow		1	8-Sep-2012			ok	ok			2	29.6		
BJ Shallow		1	8-Sep-2012		gr.	ok	ok			27	400.0		
BJ Shallow		1	8-Sep-2012			ok	ok			2	29.6		
BJ Shallow		1	8-Sep-2012			ok	ok			13	192.6		
BJ Shallow		1	8-Sep-2012			ok	ok			5	74.1		
BJ Shallow		1	8-Sep-2012			ok	ok			27	400.0		
BJ Shallow		1	8-Sep-2012			Exclude	Exclude			48	711.1		
BJ Shallow		2	8-Sep-2012			ok	ok			1	14.8		
BJ Shallow		2	8-Sep-2012			ok	ok			1	14.8		
BJ Shallow		2	8-Sep-2012		gr.	ok	ok			18	266.7		
BJ Shallow		2	8-Sep-2012			ok	ok			4	59.3		
BJ Shallow		2	8-Sep-2012			ok	ok			13	192.6		
BJ Shallow		2	8-Sep-2012			ok	ok			2	29.6		
BJ Shallow		2	8-Sep-2012			ok	ok			17	251.9		
BJ Shallow		2	8-Sep-2012			Exclude	Exclude			2	29.6		

Notes: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area); R = Potential Reference

Appendix 6.1-3. Benthic Invertebrate Taxa and Abundance in Lakes (Ekman Sampler), 2008 to 2013

Site	Depth	Replicate	Date	Exclude / Include	Area	Lab Sample ID	Area (m²)	Mesh Size (µm)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
BJ Shallow		2	8-Sep-2012	Include	MA	6204.1-2	0.0675	250	100%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
BJ Shallow		3	8-Sep-2012	Include	MA	6204.1-3	0.0675	250	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ Shallow		3	8-Sep-2012	Include	MA	6204.1-3	0.0675	250	100%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
BJ Shallow		3	8-Sep-2012	Include	MA	6204.1-3	0.0675	250	100%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Dicranota*	*Dicranota* sp.
BJ Shallow		3	8-Sep-2012	Include	MA	6204.1-3	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Diplocladius*	*Diplocladius* sp.
BJ Shallow		3	8-Sep-2012	Include	MA	6204.1-3	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
BJ Shallow		3	8-Sep-2012	Include	MA	6204.1-3	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ Shallow		3	8-Sep-2012	Include	MA	6204.1-3	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Paracladius*	*Paracladius* sp.
BJ Shallow		3	8-Sep-2012	Include	MA	6204.1-3	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
BJ Shallow		3	8-Sep-2012	Include	MA	6204.1-3	0.0675	250	100%	Nematoda	Nematoda						Nematoda
BJ Shallow		3	8-Sep-2012	Include	MA	6204.1-3	0.0675	250	100%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
BJ Shallow		1	10-Aug-2013	Include	MA	6530.2-6	0.0675	250	100%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
BJ Shallow		1	10-Aug-2013	Include	MA	6530.2-6	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
BJ Shallow		1	10-Aug-2013	Include	MA	6530.2-6	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Paracladius*	*Paracladius* sp.
BJ Shallow		1	10-Aug-2013	Include	MA	6530.2-6	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
BJ Shallow		1	10-Aug-2013	Include	MA	6530.2-6	0.0675	250	100%	Nematoda	Nematoda						Nematoda
BJ Shallow		1	10-Aug-2013	Include	MA	6530.2-6	0.0675	250	100%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
BJ Shallow		2	10-Aug-2013	Include	MA	6530.2-7	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
BJ Shallow		2	10-Aug-2013	Include	MA	6530.2-7	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Paracladius*	*Paracladius* sp.
BJ Shallow		2	10-Aug-2013	Include	MA	6530.2-7	0.0675	250	100%	Nematoda	Nematoda						Nematoda
BJ Shallow		2	10-Aug-2013	Include	MA	6530.2-7	0.0675	250	100%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
BJ Shallow		3	10-Aug-2013	Include	MA	6530.2-8	0.0675	250	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ Shallow		3	10-Aug-2013	Include	MA	6530.2-8	0.0675	250	100%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
BJ Shallow		3	10-Aug-2013	Include	MA	6530.2-8	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
BJ Shallow		3	10-Aug-2013	Include	MA	6530.2-8	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Paracladius*	*Paracladius* sp.
BJ Shallow		3	10-Aug-2013	Include	MA	6530.2-8	0.0675	250	100%	Nematoda	Nematoda						Nematoda
BJ Shallow		3	10-Aug-2013	Include	MA	6530.2-8	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Paracladius*	*Paracladius* sp.
BJ Shallow		3	10-Aug-2013	Include	MA	6530.2-8	0.0675	250	100%	Nematoda	Nematoda						Nematoda
BJ Shallow		3	10-Aug-2013	Include	MA	6530.2-8	0.0675	250	100%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
BJ Shallow		4	10-Aug-2013	Include	MA	6530.2-9	0.0675	250	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
BJ Shallow		4	10-Aug-2013	Include	MA	6530.2-9	0.0675	250	100%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
BJ Shallow		4	10-Aug-2013	Include	MA	6530.2-9	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
BJ Shallow		4	10-Aug-2013	Include	MA	6530.2-9	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius* sp.
BJ Shallow		4	10-Aug-2013	Include	MA	6530.2-9	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Paracladius*	*Paracladius* sp.
BJ Shallow		4	10-Aug-2013	Include	MA	6530.2-9	0.0675	250	100%	Nematoda	Nematoda						Nematoda
BJ Shallow		4	10-Aug-2013	Include	MA	6530.2-9	0.0675	250	100%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
BJ Shallow		5	10-Aug-2013	Include	MA	6530.2-10	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
BJ Shallow		5	10-Aug-2013	Include	MA	6530.2-10	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Paracladius*	*Paracladius* sp.
BJ Shallow		5	10-Aug-2013	Include	MA	6530.2-10	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parakiefferiella*	*Parakiefferiella* sp.
BJ Shallow		5	10-Aug-2013	Include	MA	6530.2-10	0.0675	250	100%	Nematoda	Nematoda						Nematoda
BJ Shallow		5	10-Aug-2013	Include	MA	6530.2-10	0.0675	250	100%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
SUL	Deep	1	22-Aug-2008	Include	MA			250									
SUL	Mid	1	22-Aug-2008	Include	MA			250		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	Pseudodiamesa
SUL	Deep	1	1-Aug-2009	Include	MA			250		Collembola	Arthropoda	Collembola					Collembola
SUL	Deep	2	1-Aug-2009	Include	MA			250		Collembola	Arthropoda	Collembola					Collembola
SUL	Deep	2	1-Aug-2009	Include	MA			250		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Eukiefferiella*	*Eukiefferiella*
SUL	Deep	2	1-Aug-2009	Include	MA			250		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parakiefferiella*	*Parakiefferiella*
SUL	Mid	1	1-Aug-2009	Include	MA			250									
SUL	Mid	2	1-Aug-2009	Include	MA			250									
SUL	Shallow	1	1-Aug-2009	Include	MA			250		Collembola	Arthropoda	Collembola					Collembola
SUL	Shallow	1	1-Aug-2009	Include	MA			250		Diptera	Arthropoda	Insecta	Diptera	Empididae		*Oreogeton*	Oreogeton
SUL	Shallow	1	1-Aug-2009	Include	MA			250		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia*
SUL	Shallow	1	1-Aug-2009	Include	MA			250		Terrestrial							Terrestrial

Notes: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area); R = Potential Reference

Appendix 6.1-3. Benthic Invertebrate Taxa and Abundance in Lakes (Ekman Sampler), 2008 to 2013

Site	Depth	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/m^2)	Notes	ITIS Serial Number
BJ Shallow		2	8-Sep-2012			Exclude	Exclude			24	355.6		
BJ Shallow		3	8-Sep-2012			ok	ok			4	59.3		
BJ Shallow		3	8-Sep-2012			ok	ok			2	29.6		
BJ Shallow		3	8-Sep-2012			ok	ok			2	29.6		
BJ Shallow		3	8-Sep-2012			ok	ok			1	14.8		
BJ Shallow		3	8-Sep-2012		gr.	ok	ok			23	340.7		
BJ Shallow		3	8-Sep-2012			ok	ok			13	192.6		
BJ Shallow		3	8-Sep-2012			ok	ok			3	44.4		
BJ Shallow		3	8-Sep-2012			ok	ok			37	548.1		
BJ Shallow		3	8-Sep-2012			Exclude	Exclude			3	44.4		
BJ Shallow		3	8-Sep-2012			Exclude	Exclude			24	355.6		
BJ Shallow		1	10-Aug-2013			Exclude	Exclude			1	14.8		88530
BJ Shallow		1	10-Aug-2013		gr.	ok	ok			13	192.6		
BJ Shallow		1	10-Aug-2013			ok	ok			7	103.7		128956
BJ Shallow		1	10-Aug-2013	damaged		ok	Exclude	1		1	14.8		128457
BJ Shallow		1	10-Aug-2013			Exclude	Exclude			14	207.4		59490
BJ Shallow		1	10-Aug-2013			Exclude	Exclude			29	429.6		84195
BJ Shallow		2	10-Aug-2013		gr.	ok	ok			5	74.1		
BJ Shallow		2	10-Aug-2013			ok	ok			3	44.4		128956
BJ Shallow		2	10-Aug-2013			Exclude	Exclude			7	103.7		59490
BJ Shallow		2	10-Aug-2013			Exclude	Exclude			55	814.8		84195
BJ Shallow		3	10-Aug-2013			ok	ok			1	14.8		68510
BJ Shallow		3	10-Aug-2013			ok	ok			1	14.8		83034
BJ Shallow		3	10-Aug-2013		gr.	ok	ok			1	14.8		
BJ Shallow		3	10-Aug-2013			ok	ok			2	29.6		128956
BJ Shallow		3	10-Aug-2013			Exclude	Exclude			1	14.8		59490
BJ Shallow		3	10-Aug-2013			Exclude	Exclude			239	3,540.7		84195
BJ Shallow		4	10-Aug-2013			ok	ok			1	14.8		68510
BJ Shallow		4	10-Aug-2013			ok	ok			1	14.8		83034
BJ Shallow		4	10-Aug-2013		gr.	ok	ok			6	88.9		
BJ Shallow		4	10-Aug-2013			ok	ok			1	14.8		128874
BJ Shallow		4	10-Aug-2013			ok	ok			2	29.6		128956
BJ Shallow		4	10-Aug-2013			Exclude	Exclude			1	14.8		59490
BJ Shallow		4	10-Aug-2013			Exclude	Exclude			20	296.3		84195
BJ Shallow		5	10-Aug-2013		gr.	ok	ok			6	88.9		
BJ Shallow		5	10-Aug-2013			ok	ok			4	59.3		128956
BJ Shallow		5	10-Aug-2013			ok	ok			2	29.6		128968
BJ Shallow		5	10-Aug-2013			Exclude	Exclude			5	74.1		59490
BJ Shallow		5	10-Aug-2013			Exclude	Exclude			12	177.8		84195
SUL	Deep	1	22-Aug-2008			ok	ok			0	0.0	No organisms found.	
SUL	Mid	1	22-Aug-2008			ok	ok			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
SUL	Deep	1	1-Aug-2009			Exclude	Exclude			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
SUL	Deep	2	1-Aug-2009			Exclude	Exclude			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
SUL	Deep	2	1-Aug-2009			ok	ok			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
SUL	Deep	2	1-Aug-2009			ok	ok			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
SUL	Mid	1	1-Aug-2009			ok	ok			0	0.0	No organisms found.	
SUL	Mid	2	1-Aug-2009			ok	ok			0	0.0	No organisms found.	
SUL	Shallow	1	1-Aug-2009			Exclude	Exclude			10	148.1	Assumed area of 0.0675m^2. Text stated composite of 3.	
SUL	Shallow	1	1-Aug-2009			ok	ok			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
SUL	Shallow	1	1-Aug-2009			ok	ok			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
SUL	Shallow	1	1-Aug-2009			Exclude	Exclude			10	148.1	Assumed area of 0.0675m^2. Text stated composite of 3.	

Notes: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area); R = Potential Reference

Appendix 6.1-3. Benthic Invertebrate Taxa and Abundance in Lakes (Ekman Sampler), 2008 to 2013

Site	Depth	Replicate	Date	Exclude / Include	Area	Lab Sample ID	Area (m²)	Mesh Size (µm)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
SUL	Shallow	2	1-Aug-2009	Include	MA			250		Collembola	Arthropoda	Collembola					Collembola
SUL	Shallow	2	1-Aug-2009	Include	MA			250		Diptera	Arthropoda	Insecta	Diptera	Tipulidae			Tipulidae
SUL	Shallow	2	1-Aug-2009	Include	MA			250		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Gymnometriocnemus*	*Gymnometriocnemus*
SUL	Shallow	2	1-Aug-2009	Include	MA			250		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Procladius*	*Procladius*
SUL		1	10-Aug-2013	Include	MA	6530.2-11	0.0675	250	100%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Ormosia*	*Ormosia* sp.
SUL		1	10-Aug-2013	Include	MA	6530.2-11	0.0675	250	100%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae			Tipulidae
SUL		1	10-Aug-2013	Include	MA	6530.2-11	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Chaetocladius*	*Chaetocladius* sp.
SUL		1	10-Aug-2013	Include	MA	6530.2-11	0.0675	250	100%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
SUL		2	10-Aug-2013	Include	MA	6530.2-12	0.0675	250	100%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
SUL		3	10-Aug-2013	Include	MA	6530.2-13	0.0675	250									
SUL		4	10-Aug-2013	Include	MA	6530.2-14	0.0675	250	100%	Arachnida	Arthropoda	Arachnida					Oribatei
SUL		5	10-Aug-2013	Include	MA	6530.2-15	0.0675	250	100%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
Divide Lake		1	11-Aug-2013	Exclude	R	6530.2-16	0.0675	250	100%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
Divide Lake		1	11-Aug-2013	Exclude	R	6530.2-16	0.0675	250	100%	Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium*	*Pisidium* sp.
Divide Lake		1	11-Aug-2013	Exclude	R	6530.2-16	0.0675	250	100%	Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae			Sphaeriidae
Divide Lake		1	11-Aug-2013	Exclude	R	6530.2-16	0.0675	250	100%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
Divide Lake		1	11-Aug-2013	Exclude	R	6530.2-16	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
Divide Lake		1	11-Aug-2013	Exclude	R	6530.2-16	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Mesocricotopus*	*Mesocricotopus* sp.
Divide Lake		1	11-Aug-2013	Exclude	R	6530.2-16	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra* sp.
Divide Lake		1	11-Aug-2013	Exclude	R	6530.2-16	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parakiefferiella*	*Parakiefferiella* sp.
Divide Lake		1	11-Aug-2013	Exclude	R	6530.2-16	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Procladius*	*Procladius* sp.
Divide Lake		1	11-Aug-2013	Exclude	R	6530.2-16	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Protanypus*	*Protanypus* sp.
Divide Lake		1	11-Aug-2013	Exclude	R	6530.2-16	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Tanytarsus*	*Tanytarsus* sp.
Divide Lake		1	11-Aug-2013	Exclude	R	6530.2-16	0.0675	250	100%	Nematoda	Nematoda						Nematoda
Divide Lake		1	11-Aug-2013	Exclude	R	6530.2-16	0.0675	250	100%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
Divide Lake		2	11-Aug-2013	Exclude	R	6530.2-17	0.0675	250	100%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
Divide Lake		2	11-Aug-2013	Exclude	R	6530.2-17	0.0675	250	100%	Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae			Sphaeriidae
Divide Lake		2	11-Aug-2013	Exclude	R	6530.2-17	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
Divide Lake		2	11-Aug-2013	Exclude	R	6530.2-17	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Mesocricotopus*	*Mesocricotopus* sp.
Divide Lake		2	11-Aug-2013	Exclude	R	6530.2-17	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Procladius*	*Procladius* sp.
Divide Lake		2	11-Aug-2013	Exclude	R	6530.2-17	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Protanypus*	*Protanypus* sp.
Divide Lake		2	11-Aug-2013	Exclude	R	6530.2-17	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Tanytarsus*	*Tanytarsus* sp.
Divide Lake		2	11-Aug-2013	Exclude	R	6530.2-17	0.0675	250	100%	Nematoda	Nematoda						Nematoda
Divide Lake		2	11-Aug-2013	Exclude	R	6530.2-17	0.0675	250	100%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
Divide Lake		3	11-Aug-2013	Exclude	R	6530.2-18	0.0675	250	94%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
Divide Lake		3	11-Aug-2013	Exclude	R	6530.2-18	0.0675	250	94%	Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium*	*Pisidium* sp.
Divide Lake		3	11-Aug-2013	Exclude	R	6530.2-18	0.0675	250	94%	Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae			Sphaeriidae
Divide Lake		3	11-Aug-2013	Exclude	R	6530.2-18	0.0675	250	94%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
Divide Lake		3	11-Aug-2013	Exclude	R	6530.2-18	0.0675	250	94%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Mesocricotopus*	*Mesocricotopus* sp.
Divide Lake		3	11-Aug-2013	Exclude	R	6530.2-18	0.0675	250	94%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Procladius*	*Procladius* sp.
Divide Lake		3	11-Aug-2013	Exclude	R	6530.2-18	0.0675	250	94%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Tanytarsus*	*Tanytarsus* sp.
Divide Lake		3	11-Aug-2013	Exclude	R	6530.2-18	0.0675	250	94%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
Divide Lake		3	11-Aug-2013	Exclude	R	6530.2-18	0.0675	250	94%	Nematoda	Nematoda						Nematoda
Divide Lake		3	11-Aug-2013	Exclude	R	6530.2-18	0.0675	250	94%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
Divide Lake		4	11-Aug-2013	Exclude	R	6530.2-19	0.0675	250	100%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Arrenuridae		*Arrenurus*	*Arrenurus* sp.
Divide Lake		4	11-Aug-2013	Exclude	R	6530.2-19	0.0675	250	100%	Arachnida	Arthropoda	Arachnida	Trombidiformes	Lebertiidae		*Lebertia*	*Lebertia* sp.
Divide Lake		4	11-Aug-2013	Exclude	R	6530.2-19	0.0675	250	100%	Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae			Sphaeriidae
Divide Lake		4	11-Aug-2013	Exclude	R	6530.2-19	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
Divide Lake		4	11-Aug-2013	Exclude	R	6530.2-19	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Mesocricotopus*	*Mesocricotopus* sp.
Divide Lake		4	11-Aug-2013	Exclude	R	6530.2-19	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra* sp.
Divide Lake		4	11-Aug-2013	Exclude	R	6530.2-19	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Procladius*	*Procladius* sp.

Notes: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area); R = Potential Reference

Appendix 6.1-3. Benthic Invertebrate Taxa and Abundance in Lakes (Ekman Sampler), 2008 to 2013

Site	Depth	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/m^2)	Notes	ITIS Serial Number
SUL	Shallow	2	1-Aug-2009			Exclude	Exclude			16	237.0	Assumed area of 0.0675m^2. Text stated composite of 3.	
SUL	Shallow	2	1-Aug-2009	damaged		ok	Exclude			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
SUL	Shallow	2	1-Aug-2009			ok	ok			8	118.5	Assumed area of 0.0675m^2. Text stated composite of 3.	
SUL	Shallow	2	1-Aug-2009			ok	ok			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
SUL		1	10-Aug-2013			ok	ok			1	14.8		120830
SUL		1	10-Aug-2013			ok	ok	1		1	14.8		118840
SUL		1	10-Aug-2013			ok	ok			1	14.8		128520
SUL		1	10-Aug-2013			Exclude	Exclude			2	29.6		84195
SUL		2	10-Aug-2013			Exclude	Exclude			1	14.8		84195
SUL		3	10-Aug-2013			ok	ok			0	0.0	No organisms found.	
SUL		4	10-Aug-2013			ok	Exclude			1	14.8		83544
SUL		5	10-Aug-2013			Exclude	Exclude			1	14.8		88530
Divide Lake		1	11-Aug-2013			ok	ok			6	88.9		83034
Divide Lake		1	11-Aug-2013			ok	ok			2	29.6		81400
Divide Lake		1	11-Aug-2013	immature		ok	Exclude			1	14.8		112737
Divide Lake		1	11-Aug-2013			Exclude	Exclude			2	29.6		88530
Divide Lake		1	11-Aug-2013		gr.	ok	ok			106	1,570.4		
Divide Lake		1	11-Aug-2013			ok	ok			76	1,125.9		128815
Divide Lake		1	11-Aug-2013			ok	ok			13	192.6		129890
Divide Lake		1	11-Aug-2013			ok	ok			1	14.8		128968
Divide Lake		1	11-Aug-2013			ok	ok			14	207.4		128277
Divide Lake		1	11-Aug-2013			ok	ok			1	14.8		128431
Divide Lake		1	11-Aug-2013			ok	ok			4	59.3		129978
Divide Lake		1	11-Aug-2013			Exclude	Exclude			14	207.4		59490
Divide Lake		1	11-Aug-2013			Exclude	Exclude			79	1,170.4		84195
Divide Lake		2	11-Aug-2013			ok	ok			3	44.4		83034
Divide Lake		2	11-Aug-2013	immature		ok	Exclude			1	14.8		112737
Divide Lake		2	11-Aug-2013		gr.	ok	ok			21	311.1		
Divide Lake		2	11-Aug-2013			ok	ok			25	370.4		128815
Divide Lake		2	11-Aug-2013			ok	ok			14	207.4		128277
Divide Lake		2	11-Aug-2013			ok	ok			1	14.8		128431
Divide Lake		2	11-Aug-2013			ok	ok			1	14.8		129978
Divide Lake		2	11-Aug-2013			Exclude	Exclude			3	44.4		59490
Divide Lake		2	11-Aug-2013			Exclude	Exclude			26	385.2		84195
Divide Lake		3	11-Aug-2013			ok	ok			1	15.8		83034
Divide Lake		3	11-Aug-2013			ok	ok			2	31.6		81400
Divide Lake		3	11-Aug-2013	immature		ok	Exclude			3	47.4		112737
Divide Lake		3	11-Aug-2013		gr.	ok	ok			113	1,785.7		
Divide Lake		3	11-Aug-2013			ok	ok	1		49	774.3		128815
Divide Lake		3	11-Aug-2013			ok	ok			12	189.6		128277
Divide Lake		3	11-Aug-2013			ok	ok			3	47.4		129978
Divide Lake		3	11-Aug-2013			Exclude	Exclude		1	1	15.8		127917
Divide Lake		3	11-Aug-2013			Exclude	Exclude			16	252.8		59490
Divide Lake		3	11-Aug-2013			Exclude	Exclude			120	1,896.3		84195
Divide Lake		4	11-Aug-2013			ok	ok			1	14.8		82862
Divide Lake		4	11-Aug-2013			ok	ok			1	14.8		83034
Divide Lake		4	11-Aug-2013	immature		ok	Exclude			1	14.8		112737
Divide Lake		4	11-Aug-2013		gr.	ok	ok			87	1,288.9		
Divide Lake		4	11-Aug-2013			ok	ok			20	296.3		128815
Divide Lake		4	11-Aug-2013			ok	ok			2	29.6		129890
Divide Lake		4	11-Aug-2013			ok	ok			11	163.0		128277

Notes: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area); R = Potential Reference

Appendix 6.1-3. Benthic Invertebrate Taxa and Abundance in Lakes (Ekman Sampler), 2008 to 2013

Site	Depth	Replicate	Date	Exclude / Include	Area	Lab Sample ID	Area (m²)	Mesh Size (µm)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
Divide Lake		4	11-Aug-2013	Exclude	R	6530.2-19	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Tanytarsus*	*Tanytarsus* sp.
Divide Lake		4	11-Aug-2013	Exclude	R	6530.2-19	0.0675	250	100%	Nematoda	Nematoda						Nematoda
Divide Lake		4	11-Aug-2013	Exclude	R	6530.2-19	0.0675	250	100%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
Divide Lake		5	11-Aug-2013	Exclude	R	6530.2-20	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Procladius*	*Procladius* sp.
Divide Lake		5	11-Aug-2013	Exclude	R	6530.2-20	0.0675	250	100%	Nematoda	Nematoda						Nematoda
KL		1	12-Aug-2013	Include	AP	6530.2-21	0.0675	250	100%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
KL		1	12-Aug-2013	Include	AP	6530.2-21	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
KL		1	12-Aug-2013	Include	AP	6530.2-21	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
KL		1	12-Aug-2013	Include	AP	6530.2-21	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Mesocricotopus*	*Mesocricotopus* sp.
KL		1	12-Aug-2013	Include	AP	6530.2-21	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Orthocladius*	*Orthocladius (Euorthocladius)* sp.
KL		1	12-Aug-2013	Include	AP	6530.2-21	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa* sp.
KL		1	12-Aug-2013	Include	AP	6530.2-21	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Sergentia*	*Sergentia* sp.
KL		1	12-Aug-2013	Include	AP	6530.2-21	0.0675	250	100%	Hemiptera	Arthropoda	Insecta	Hemiptera				Hemiptera
KL		1	12-Aug-2013	Include	AP	6530.2-21	0.0675	250	100%	Nematoda	Nematoda						Nematoda
KL		1	12-Aug-2013	Include	AP	6530.2-21	0.0675	250	100%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
KL		1	12-Aug-2013	Include	AP	6530.2-21	0.0675	250	100%	Platyhelminthes	Platyhelminthes						Turbellaria
KL		1	12-Aug-2013	Include	AP	6530.2-21	0.0675	250	100%	Thysanoptera	Arthropoda	Insecta	Thysanoptera				Thysanoptera
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Diptera	Arthropoda	Insecta	Diptera	Empididae		*Clinocera*	*Clinocera sp.*
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes* sp.
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Diptera	Arthropoda	Insecta	Diptera				Diptera
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia* sp.
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Chaetocladius*	*Chaetocladius* sp.
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius marcidus*
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius marcidus*
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra* sp.
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parametriocnemus*	*Parametriocnemus* sp.
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa* sp.
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Pseudosmittia*	*Pseudosmittia* sp.
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia bavarica*
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Hemiptera	Arthropoda	Insecta	Hemiptera				Hemiptera
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Nematoda	Nematoda						Nematoda
KL		2	12-Aug-2013	Include	AP	6530.2-22	0.0675	250	100%	Thysanoptera	Arthropoda	Insecta	Thysanoptera				Thysanoptera
KL		3	12-Aug-2013	Include	AP	6530.2-23	0.0675	250	100%	Diptera	Arthropoda	Insecta	Diptera				Diptera
KL		3	12-Aug-2013	Include	AP	6530.2-23	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Chaetocladius*	*Chaetocladius* sp.
KL		3	12-Aug-2013	Include	AP	6530.2-23	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
KL		3	12-Aug-2013	Include	AP	6530.2-23	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
KL		3	12-Aug-2013	Include	AP	6530.2-23	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Tanytarsus*	*Tanytarsus* sp.
KL		3	12-Aug-2013	Include	AP	6530.2-23	0.0675	250	100%	Hemiptera	Arthropoda	Insecta	Hemiptera				Hemiptera
KL		3	12-Aug-2013	Include	AP	6530.2-23	0.0675	250	100%	Nematoda	Nematoda						Nematoda
KL		4	12-Aug-2013	Include	AP	6530.2-24	0.0675	250	100%	Diptera	Arthropoda	Insecta	Diptera	Tipulidae		*Gonomyodes*	*Gonomyodes* sp.
KL		4	12-Aug-2013	Include	AP	6530.2-24	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
KL		4	12-Aug-2013	Include	AP	6530.2-24	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Krenosmittia*	*Krenosmittia* sp.
KL		4	12-Aug-2013	Include	AP	6530.2-24	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa* sp.
KL		4	12-Aug-2013	Include	AP	6530.2-24	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Rheocricotopus*	*Rheocricotopus* sp.
KL		4	12-Aug-2013	Include	AP	6530.2-24	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Sergentia*	*Sergentia* sp.
KL		4	12-Aug-2013	Include	AP	6530.2-24	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia bavarica*
KL		4	12-Aug-2013	Include	AP	6530.2-24	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae

Notes: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area); R = Potential Reference

Appendix 6.1-3. Benthic Invertebrate Taxa and Abundance in Lakes (Ekman Sampler), 2008 to 2013

Site	Depth	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/m^2)	Notes	ITIS Serial Number
Divide Lake		4	11-Aug-2013			ok	ok			1	14.8		129978
Divide Lake		4	11-Aug-2013			Exclude	Exclude			11	163.0		59490
Divide Lake		4	11-Aug-2013			Exclude	Exclude			110	1,629.6		84195
Divide Lake		5	11-Aug-2013			ok	ok			1	14.8		128277
Divide Lake		5	11-Aug-2013			Exclude	Exclude			6	88.9		59490
KL		1	12-Aug-2013			Exclude	Exclude			1	14.8		88530
KL		1	12-Aug-2013			ok	ok			5	74.1		128355
KL		1	12-Aug-2013		gr.	ok	ok			5	74.1		
KL		1	12-Aug-2013			ok	ok			3	44.4		128815
KL		1	12-Aug-2013			ok	ok			3	44.4		568520
KL		1	12-Aug-2013			ok	ok			1	14.8		128416
KL		1	12-Aug-2013			ok	ok			1	14.8		129739
KL		1	12-Aug-2013			ok	Exclude			3	44.4		103359
KL		1	12-Aug-2013			Exclude	Exclude			13	192.6		59490
KL		1	12-Aug-2013			Exclude	Exclude			1	14.8		84195
KL		1	12-Aug-2013			Exclude	Exclude			1	14.8		53964
KL		1	12-Aug-2013			Exclude	Exclude			1	14.8		103348
KL		2	12-Aug-2013			ok	ok			1	14.8		68510
KL		2	12-Aug-2013			Exclude	Exclude			1	14.8		88530
KL		2	12-Aug-2013			ok	ok			1	14.8		135849
KL		2	12-Aug-2013			ok	ok			1	14.8		120722
KL		2	12-Aug-2013	uncertain		ok	Exclude			1	14.8		118831
KL		2	12-Aug-2013			ok	ok			1	14.8		128477
KL		2	12-Aug-2013			ok	ok			2	29.6		128520
KL		2	12-Aug-2013			ok	ok			14	207.4		128355
KL		2	12-Aug-2013		gr.	ok	ok			1	14.8		
KL		2	12-Aug-2013		gr.	ok	ok			3	44.4		
KL		2	12-Aug-2013			ok	ok			1	14.8		129890
KL		2	12-Aug-2013			ok	ok			2	29.6		128978
KL		2	12-Aug-2013			ok	ok			3	44.4		128416
KL		2	12-Aug-2013			ok	ok			1	14.8		129071
KL		2	12-Aug-2013		gr.	ok	ok			2	29.6		
KL		2	12-Aug-2013			ok	ok		1	1	14.8		128457
KL		2	12-Aug-2013			ok	Exclude			2	29.6		103359
KL		2	12-Aug-2013			Exclude	Exclude			15	222.2		59490
KL		2	12-Aug-2013			Exclude	Exclude			1	14.8		103348
KL		3	12-Aug-2013	uncertain		ok	Exclude			1	14.8		118831
KL		3	12-Aug-2013			ok	ok			1	14.8		128520
KL		3	12-Aug-2013			ok	ok			6	88.9		128355
KL		3	12-Aug-2013		gr.	ok	ok			2	29.6		
KL		3	12-Aug-2013			ok	ok			1	14.8		129978
KL		3	12-Aug-2013			ok	Exclude			1	14.8		103359
KL		3	12-Aug-2013			Exclude	Exclude			8	118.5		59490
KL		4	12-Aug-2013			ok	ok			1	14.8		120722
KL		4	12-Aug-2013			ok	ok			1	14.8		128355
KL		4	12-Aug-2013			ok	ok			1	14.8		128771
KL		4	12-Aug-2013			ok	ok			1	14.8		128416
KL		4	12-Aug-2013			ok	ok			1	14.8		129086
KL		4	12-Aug-2013			ok	ok			1	14.8		129739
KL		4	12-Aug-2013		gr.	ok	ok			1	14.8		
KL		4	12-Aug-2013	damaged		ok	Exclude		1	1	14.8		128457

Notes: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area); R = Potential Reference

Appendix 6.1-3. Benthic Invertebrate Taxa and Abundance in Lakes (Ekman Sampler), 2008 to 2013

Site	Depth	Replicate	Date	Exclude / Include	Area	Lab Sample ID	Area (m²)	Mesh Size (µm)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
KL		4	12-Aug-2013	Include	AP	6530.2-24	0.0675	250	100%	Hemiptera	Arthropoda	Insecta	Hemiptera				Hemiptera
KL		4	12-Aug-2013	Include	AP	6530.2-24	0.0675	250	100%	Nematoda	Nematoda						Nematoda
KL		4	12-Aug-2013	Include	AP	6530.2-24	0.0675	250	100%	Ostracoda	Arthropoda	Ostracoda					Ostracoda
KL		5	12-Aug-2013	Include	AP	6530.2-25	0.0675	250	100%	Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
KL		5	12-Aug-2013	Include	AP	6530.2-25	0.0675	250	100%	Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
KL		5	12-Aug-2013	Include	AP	6530.2-25	0.0675	250	100%	Diptera	Arthropoda	Insecta	Diptera				Diptera
KL		5	12-Aug-2013	Include	AP	6530.2-25	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Brillia*	*Brillia* sp.
KL		5	12-Aug-2013	Include	AP	6530.2-25	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Chaetocladius*	*Chaetocladius* sp.
KL		5	12-Aug-2013	Include	AP	6530.2-25	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Diamesa*	*Diamesa* sp.
KL		5	12-Aug-2013	Include	AP	6530.2-25	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius subpilosus*
KL		5	12-Aug-2013	Include	AP	6530.2-25	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Limnophyes*	*Limnophyes* sp.
KL		5	12-Aug-2013	Include	AP	6530.2-25	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Paracladopelma*	*Paracladopelma* sp.
KL		5	12-Aug-2013	Include	AP	6530.2-25	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Parametriocnemus*	*Parametriocnemus* sp.
KL		5	12-Aug-2013	Include	AP	6530.2-25	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Rheocricotopus*	*Rheocricotopus* sp.
KL		5	12-Aug-2013	Include	AP	6530.2-25	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Tvetenia*	*Tvetenia bavarica*
KL		5	12-Aug-2013	Include	AP	6530.2-25	0.0675	250	100%	Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladiinae
KL		5	12-Aug-2013	Include	AP	6530.2-25	0.0675	250	100%	Hemiptera	Arthropoda	Insecta	Hemiptera				Hemiptera
KL		5	12-Aug-2013	Include	AP	6530.2-25	0.0675	250	100%	Hymenoptera	Arthropoda	Insecta	Hymenoptera				Hymenoptera
KL		5	12-Aug-2013	Include	AP	6530.2-25	0.0675	250	100%	Nematoda	Nematoda						Nematoda
TL1	Deep	1	1-Aug-2009	Include	AP			250		Cladocera	Arthropoda	Branchiopoda	Diplostraca	Daphnidae		*Daphnia*	*Daphnia*
TL1	Deep	1	1-Aug-2009	Include	AP			250		Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
TL1	Deep	1	1-Aug-2009	Include	AP			250		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius*
TL1	Deep	2	1-Aug-2009	Include	AP			250		Cladocera	Arthropoda	Branchiopoda	Diplostraca	Daphnidae		*Daphnia*	*Daphnia*
TL1	Deep	2	1-Aug-2009	Include	AP			250		Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
TL1	Mid	1	1-Aug-2009	Include	AP			250		Nematoda	Nematoda						Nematoda
TL1	Mid	1	1-Aug-2009	Include	AP			250		Annelida	Annelida	Oligochaeta	Haplotaxida	Tubificidae			Tubificidae
TL1	Mid	1	1-Aug-2009	Include	AP			250		Nematoda	Nematoda						Nematoda
TL1	Mid	1	1-Aug-2009	Include	AP			250		Annelida	Annelida	Oligochaeta	Haplotaxida	Tubificidae			Tubificidae
TL1	Mid	1	1-Aug-2009	Include	AP			250		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium*	*Pisidium*
TL1	Mid	1	1-Aug-2009	Include	AP			250		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium/Sphaerium*	*Pisidium/Sphaerium*
TL1	Mid	1	1-Aug-2009	Include	AP			250		Ostracoda	Arthropoda	Ostracoda					Ostracoda
TL1	Mid	1	1-Aug-2009	Include	AP			250		Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
TL1	Mid	1	1-Aug-2009	Include	AP			250		Copepoda	Arthropoda	Maxillopoda	Harpacticoida				Harpacticoida
TL1	Mid	1	1-Aug-2009	Include	AP			250		Diptera	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Chironomus*	*Chironomus*
TL1	Mid	1	1-Aug-2009	Include	AP			250		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Sergentia*	*Sergentia*
TL1	Mid	1	1-Aug-2009	Include	AP			250		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Procladius*	*Procladius*
TL1	Mid	2	1-Aug-2009	Include	AP			250		Nematoda	Nematoda						Nematoda
TL1	Mid	2	1-Aug-2009	Include	AP			250		Annelida	Annelida	Oligochaeta	Haplotaxida	Tubificidae			Tubificidae
TL1	Mid	2	1-Aug-2009	Include	AP			250		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium*	*Pisidium*
TL1	Mid	2	1-Aug-2009	Include	AP			250		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium/Sphaerium*	*Pisidium/Sphaerium*
TL1	Mid	2	1-Aug-2009	Include	AP			250		Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
TL1	Mid	2	1-Aug-2009	Include	AP			250		Diptera	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Chironomus*	*Chironomus*
TL1	Mid	2	1-Aug-2009	Include	AP			250		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Sergentia*	*Sergentia*
TL1	Mid	2	1-Aug-2009	Include	AP			250		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Procladius*	*Procladius*
TL1	Shallow	1	1-Aug-2009	Include	AP			250		Annelida	Annelida	Oligochaeta	Lumbriculida	Lumbriculidae			Lumbriculidae
TL1	Shallow	1	1-Aug-2009	Include	AP			250		Annelida	Annelida	Oligochaeta	Haplotaxida	Tubificidae			Tubificidae
TL1	Shallow	1	1-Aug-2009	Include	AP			250		Annelida	Annelida	Hirudinea	Rhynchobdellida	Glossiphoniidae		*Helobdella*	*Helobdella stagnalis*
TL1	Shallow	1	1-Aug-2009	Include	AP			250		Gastropoda	Mollusca	Gastropoda	Basommatophora	Planorbidae		*Gyraulus*	*Gyraulus*
TL1	Shallow	1	1-Aug-2009	Include	AP			250		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium*	*Pisidium*
TL1	Shallow	1	1-Aug-2009	Include	AP			250		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium/Sphaerium*	*Pisidium/Sphaerium*
TL1	Shallow	1	1-Aug-2009	Include	AP			250		Ostracoda	Arthropoda	Ostracoda					Ostracoda
TL1	Shallow	1	1-Aug-2009	Include	AP			250		Copepoda	Arthropoda	Maxillopoda	Cyclopoida				Cyclopoida
TL1	Shallow	1	1-Aug-2009	Include	AP			250		Amphipoda	Arthropoda	Malacostraca	Amphipoda	Gammaridae		*Gammarus*	*Gammarus lacustris*

Notes: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area); R = Potential Reference

Appendix 6.1-3. Benthic Invertebrate Taxa and Abundance in Lakes (Ekman Sampler), 2008 to 2013

Site	Depth	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/m^2)	Notes	ITIS Serial Number
KL		4	12-Aug-2013			ok	Exclude			2	29.6		103359
KL		4	12-Aug-2013			Exclude	Exclude			4	59.3		59490
KL		4	12-Aug-2013			Exclude	Exclude			1	14.8		84195
KL		5	12-Aug-2013			ok	ok			1	14.8		68510
KL		5	12-Aug-2013			Exclude	Exclude			1	14.8		88530
KL		5	12-Aug-2013	uncertain		ok	Exclude			1	14.8		118831
KL		5	12-Aug-2013			ok	ok			1	14.8		128477
KL		5	12-Aug-2013			ok	ok			1	14.8		128520
KL		5	12-Aug-2013			ok	ok			8	118.5		128355
KL		5	12-Aug-2013		gr.	ok	ok			1	14.8		
KL		5	12-Aug-2013			ok	ok			1	14.8		128776
KL		5	12-Aug-2013			ok	ok			1	14.8		129597
KL		5	12-Aug-2013			ok	ok			1	14.8		128978
KL		5	12-Aug-2013			ok	ok			1	14.8		129086
KL		5	12-Aug-2013		gr.	ok	ok			1	14.8		
KL		5	12-Aug-2013	damaged		ok	Exclude	1		1	14.8		128457
KL		5	12-Aug-2013			ok	Exclude			8	118.5		103359
KL		5	12-Aug-2013			Exclude	Exclude		1	1	14.8		152741
KL		5	12-Aug-2013			Exclude	Exclude			13	192.6		59490
TL1	Deep	1	1-Aug-2009			Exclude	Exclude			1	14.8	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Deep	1	1-Aug-2009			Exclude	Exclude			5,063	75,007.4	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Deep	1	1-Aug-2009			ok	ok			4	59.3	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Deep	2	1-Aug-2009			Exclude	Exclude			1	14.8	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Deep	2	1-Aug-2009			Exclude	Exclude			5,572	82,548.1	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Mid	1	1-Aug-2009			Exclude	Exclude			2	29.6	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Mid	1	1-Aug-2009			ok	ok			37	548.1	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Mid	1	1-Aug-2009			Exclude	Exclude			2	29.6	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Mid	1	1-Aug-2009			ok	ok			37	548.1	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Mid	1	1-Aug-2009			ok	ok			23	340.7	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Mid	1	1-Aug-2009			ok	ok			14	207.4	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Mid	1	1-Aug-2009			Exclude	Exclude			1	14.8	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Mid	1	1-Aug-2009			Exclude	Exclude			7	103.7	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Mid	1	1-Aug-2009			Exclude	Exclude			5	74.1	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Mid	1	1-Aug-2009			ok	ok			20	296.3	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Mid	1	1-Aug-2009			ok	ok			21	311.1	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Mid	1	1-Aug-2009			ok	ok			1	14.8	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Mid	2	1-Aug-2009			Exclude	Exclude			5	74.1	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Mid	2	1-Aug-2009			ok	ok			145	2,148.1	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Mid	2	1-Aug-2009			ok	ok			38	563.0	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Mid	2	1-Aug-2009			ok	ok			67	992.6	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Mid	2	1-Aug-2009			Exclude	Exclude			5	74.1	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Mid	2	1-Aug-2009			ok	ok			22	325.9	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Mid	2	1-Aug-2009			ok	ok			62	918.5	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Mid	2	1-Aug-2009			ok	ok			3	44.4	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	1	1-Aug-2009			ok	ok			3	44.4	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	1	1-Aug-2009			ok	ok			11	163.0	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	1	1-Aug-2009			ok	ok			2	29.6	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	1	1-Aug-2009			ok	ok			1	14.8	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	1	1-Aug-2009			ok	ok			16	237.0	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	1	1-Aug-2009			ok	ok			45	666.7	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	1	1-Aug-2009			Exclude	Exclude			104	1,540.7	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	1	1-Aug-2009			Exclude	Exclude			24	355.6	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	1	1-Aug-2009			ok	ok			34	503.7	Assumed area of 0.0675m2. Text stated composite of 3	

Notes: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area); R = Potential Reference

Appendix 6.1-3. Benthic Invertebrate Taxa and Abundance in Lakes (Ekman Sampler), 2008 to 2013

Site	Depth	Replicate	Date	Exclude / Include	Area	Lab Sample ID	Area (m²)	Mesh Size (µm)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
TL1	Shallow	1	1-Aug-2009	Include	AP			250		Amphipoda	Arthropoda	Malacostraca	Amphipoda	Hyalellidae		*Hyalella*	*Hyalella azteca*
TL1	Shallow	1	1-Aug-2009	Include	AP			250		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Endochironomus*	*Endochironomus*
TL1	Shallow	1	1-Aug-2009	Include	AP			250		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius*
TL1	Shallow	1	1-Aug-2009	Include	AP			250		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Procladius*	*Procladius*
TL1	Shallow	1	1-Aug-2009	Include	AP			250		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Prodiamesinae	*Odontomesa*	*Odontomesa*
TL1	Shallow	2	1-Aug-2009	Include	AP			250		Annelida	Annelida	Oligochaeta	Haplotaxida	Tubificidae			Tubificidae
TL1	Shallow	2	1-Aug-2009	Include	AP			250		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium*	*Pisidium*
TL1	Shallow	2	1-Aug-2009	Include	AP			250		Ostracoda	Arthropoda	Ostracoda					Ostracoda
TL1	Shallow	2	1-Aug-2009	Include	AP			250		Amphipoda	Arthropoda	Malacostraca	Amphipoda	Gammaridae		*Gammarus*	*Gammarus lacustris*
TL1	Shallow	2	1-Aug-2009	Include	AP			250		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Endochironomus*	*Endochironomus*
TL1	Shallow	2	1-Aug-2009	Include	AP			250		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Microtendipes*	*Microtendipes*
TL1	Shallow	2	1-Aug-2009	Include	AP			250		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Sergentia*	*Sergentia*
TL1	Shallow	2	1-Aug-2009	Include	AP			250		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
TL1	Shallow	2	1-Aug-2009	Include	AP			250		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Prodiamesinae	*Odontomesa*	*Odontomesa*
TL1		1	1-Aug-2010	Include	AP			500		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
TL1		1	1-Aug-2010	Include	AP			500		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
TL1		2	1-Aug-2010	Include	AP			500		Arachnida	Arthropoda	Arachnida					Hydracarina
TL1		2	1-Aug-2010	Include	AP			500		Cladocera	Arthropoda	Branchiopoda	Diplostraca	Daphniidae		*Daphnia*	*Daphnia*
TL1		2	1-Aug-2010	Include	AP			500		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
TL1		3	1-Aug-2010	Include	AP			500		Annelida	Annelida	Oligochaeta	Haplotaxida	Tubificidae			Tubificidae
TL1		3	1-Aug-2010	Include	AP			500		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
TL1		3	1-Aug-2010	Include	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Chironomus*	*Chironomus*
WL1		1	1-Aug-2010	Exclude	AP			500		Annelida	Annelida	Oligochaeta	Haplotaxida	Tubificidae			Tubificidae
WL1		1	1-Aug-2010	Exclude	AP			500		Arachnida	Arthropoda	Arachnida					Hydracarina
WL1		1	1-Aug-2010	Exclude	AP			500		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium*	*Pisidium*
WL1		1	1-Aug-2010	Exclude	AP			500		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
WL1		1	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Chironomus*	*Chironomus*
WL1		1	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Polypedilum*	*Polypedilum*
WL1		1	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Procladius*	*Procladius*
WL1		1	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Diamesinae	*Pseudodiamesa*	*Pseudodiamesa*
WL1		1	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Stictochironomus*	*Stictochironomus*
WL1		1	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Tanytarsus*	*Tanytarsus*
WL1		1	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
WL1		1	1-Aug-2010	Exclude	AP			500		Ostracoda	Arthropoda	Ostracoda					Ostracoda
WL1		2	1-Aug-2010	Exclude	AP			500		Annelida	Annelida	Oligochaeta	Haplotaxida	Tubificidae			Tubificidae
WL1		2	1-Aug-2010	Exclude	AP			500		Arachnida	Arthropoda	Arachnida					Hydracarina
WL1		2	1-Aug-2010	Exclude	AP			500		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
WL1		2	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Chironomus*	*Chironomus*
WL1		2	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Heterotrissocladius*	*Heterotrissocladius*
WL1		2	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Polypedilum*	*Polypedilum*
WL1		2	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Procladius*	*Procladius*
WL1		2	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Sergentia*	*Sergentia*
WL1		2	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Stictochironomus*	*Stictochironomus*
WL1		2	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Tanytarsus*	*Tanytarsus*
WL1		2	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
WL1		3	1-Aug-2010	Exclude	AP			500		Annelida	Annelida	Oligochaeta	Haplotaxida	Tubificidae			Tubificidae
WL1		3	1-Aug-2010	Exclude	AP			500		Arachnida	Arthropoda	Arachnida					Hydracarina
WL1		3	1-Aug-2010	Exclude	AP			500		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium*	*Pisidium*
WL1		3	1-Aug-2010	Exclude	AP			500		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
WL1		3	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Chironomus*	*Chironomus*
WL1		3	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Polypedilum*	*Polypedilum*

Notes: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area); R = Potential Reference

Appendix 6.1-3. Benthic Invertebrate Taxa and Abundance in Lakes (Ekman Sampler), 2008 to 2013

Site	Depth	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/m^2)	Notes	ITIS Serial Number
TL1	Shallow	1	1-Aug-2009			ok	ok			1	14.8	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	1	1-Aug-2009			ok	ok			9	133.3	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	1	1-Aug-2009			ok	ok			3	44.4	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	1	1-Aug-2009			ok	ok			3	44.4	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	1	1-Aug-2009			ok	ok			1	14.8	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	2	1-Aug-2009			ok	ok			2	29.6	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	2	1-Aug-2009			ok	ok			7	103.7	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	2	1-Aug-2009			Exclude	Exclude			88	1,303.7	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	2	1-Aug-2009			ok	ok			61	903.7	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	2	1-Aug-2009			ok	ok			8	118.5	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	2	1-Aug-2009			ok	ok			1	14.8	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	2	1-Aug-2009			ok	ok			8	118.5	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	2	1-Aug-2009			ok	ok			10	148.1	Assumed area of 0.0675m2. Text stated composite of 3	
TL1	Shallow	2	1-Aug-2009			ok	ok			8	118.5	Assumed area of 0.0675m2. Text stated composite of 3	
TL1		1	1-Aug-2010			Exclude	Exclude			2	29.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
TL1		1	1-Aug-2010			Exclude	Exclude			543	8,044.4	Assumed area of 0.0675m^2. Text stated composite of 3.	
TL1		2	1-Aug-2010			ok	Exclude			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
TL1		2	1-Aug-2010			Exclude	Exclude			9	133.3	Assumed area of 0.0675m^2. Text stated composite of 3.	
TL1		2	1-Aug-2010			Exclude	Exclude			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
TL1		3	1-Aug-2010			ok	ok			2	29.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
TL1		3	1-Aug-2010			Exclude	Exclude			60	888.9	Assumed area of 0.0675m^2. Text stated composite of 3.	
TL1		3	1-Aug-2010			ok	ok			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		1	1-Aug-2010			ok	ok			34	503.7	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		1	1-Aug-2010			ok	Exclude			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		1	1-Aug-2010			ok	ok			3	44.4	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		1	1-Aug-2010			Exclude	Exclude			3	44.4	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		1	1-Aug-2010			ok	ok			325	4,814.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		1	1-Aug-2010			ok	ok			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		1	1-Aug-2010			ok	ok			74	1,096.3	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		1	1-Aug-2010			ok	ok			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		1	1-Aug-2010			ok	ok			21	311.1	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		1	1-Aug-2010			ok	ok			61	903.7	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		1	1-Aug-2010			ok	ok	pupa		1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		1	1-Aug-2010			Exclude	Exclude			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		2	1-Aug-2010			ok	ok			12	177.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		2	1-Aug-2010			ok	Exclude			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		2	1-Aug-2010			Exclude	Exclude			2	29.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		2	1-Aug-2010			ok	ok			251	3,718.5	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		2	1-Aug-2010			ok	ok			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		2	1-Aug-2010			ok	ok			2	29.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		2	1-Aug-2010			ok	ok			31	459.3	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		2	1-Aug-2010			ok	ok			34	503.7	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		2	1-Aug-2010			ok	ok			28	414.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		2	1-Aug-2010			ok	ok			105	1,555.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		2	1-Aug-2010			ok	ok	pupa		2	29.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		3	1-Aug-2010			ok	ok			19	281.5	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		3	1-Aug-2010			ok	Exclude			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		3	1-Aug-2010			ok	ok			8	118.5	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		3	1-Aug-2010			Exclude	Exclude			15	222.2	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		3	1-Aug-2010			ok	ok			387	5,733.3	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		3	1-Aug-2010			ok	ok			2	29.6	Assumed area of 0.0675m^2. Text stated composite of 3.	

Notes: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area); R = Potential Reference

Appendix 6.1-3. Benthic Invertebrate Taxa and Abundance in Lakes (Ekman Sampler), 2008 to 2013

Site	Depth	Replicate	Date	Exclude / Include	Area	Lab Sample ID	Area (m²)	Mesh Size (µm)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
WL1		3	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Procladius*	*Procladius*
WL1		3	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Stictochironomus*	*Stictochironomus*
WL1		3	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Tanytarsus*	*Tanytarsus*
WL1		3	1-Aug-2010	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae			Chironomidae
L1		1	23-Aug-2011	Exclude	AP			500		Amphipoda	Arthropoda	Malacostraca	Amphipoda	Gammaridae		*Gammarus*	*Gammarus lacustris*
L1		1	23-Aug-2011	Exclude	AP			500		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Tubificinae		Tubificinae
L1		1	23-Aug-2011	Exclude	AP			500		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium*	*Pisidium*
L1		1	23-Aug-2011	Exclude	AP			500		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium/Sphaerium*	*Pisidium/Sphaerium*
L1		1	23-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
L1		1	23-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Procladius*	*Procladius*
L1		1	23-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Stictochironomus*	*Stictochironomus*
L1		2	23-Aug-2011	Exclude	AP			500		Amphipoda	Arthropoda	Malacostraca	Amphipoda	Gammaridae		*Gammarus*	*Gammarus lacustris*
L1		2	23-Aug-2011	Exclude	AP			500		Amphipoda	Arthropoda	Malacostraca	Amphipoda	Hyalellidae		*Hyalella*	*Hyalella azteca*
L1		2	23-Aug-2011	Exclude	AP			500		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Tubificinae		Tubificinae
L1		2	23-Aug-2011	Exclude	AP			500		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium*	*Pisidium*
L1		2	23-Aug-2011	Exclude	AP			500		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium/Sphaerium*	*Pisidium/Sphaerium*
L1		2	23-Aug-2011	Exclude	AP			500		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Probezzia*	*Probezzia*
L1		2	23-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Procladius*	*Procladius*
L1		2	23-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Stictochironomus*	*Stictochironomus*
L1		2	23-Aug-2011	Exclude	AP			500		Nematoda	Nematoda						Nematoda
L1		3	23-Aug-2011	Exclude	AP			500		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Tubificinae		Tubificinae
L1		3	23-Aug-2011	Exclude	AP			500		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium/Sphaerium*	*Pisidium/Sphaerium*
L1		3	23-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Micropsectra*	*Micropsectra*
L1		3	23-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Procladius*	*Procladius*
L1		3	23-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Sergentia*	*Sergentia*
L2		1	24-Aug-2011	Exclude	AP			500		Annelida	Annelida	Hirudinea	Rhynchobdellida	Glossiphoniidae		*Helobdella*	*Helobdella stagnalis*
L2		1	24-Aug-2011	Exclude	AP			500		Annelida	Annelida	Oligochaeta	Lumbriculida	Lumbriculidae			Lumbriculidae
L2		1	24-Aug-2011	Exclude	AP			500		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium/Sphaerium*	*Pisidium/Sphaerium*
L2		1	24-Aug-2011	Exclude	AP			500		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Sphaerium*	*Sphaerium*
L2		1	24-Aug-2011	Exclude	AP			500		Cladocera	Arthropoda	Branchiopoda	Diplostraca	Macrothricidae			Macrothricidae
L2		1	24-Aug-2011	Exclude	AP			500		Copepoda	Arthropoda	Maxillopoda	Calanoida				Calanoida
L2		1	24-Aug-2011	Exclude	AP			500		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
L2		1	24-Aug-2011	Exclude	AP			500		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Probezzia*	*Probezzia*
L2		1	24-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Microtendipes*	*Microtendipes*
L2		1	24-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Pagastiella*	*Pagastiella*
L2		1	24-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Procladius*	*Procladius*
L2		1	24-Aug-2011	Exclude	AP			500		Gastropoda	Mollusca	Gastropoda	Heterostropha	Valvatidae		*Valvata*	*Valvata sincera*
L2		1	24-Aug-2011	Exclude	AP			500		Nematoda	Nematoda						Nematoda
L2		2	24-Aug-2011	Exclude	AP			500		Amphipoda	Arthropoda	Malacostraca	Amphipoda	Hyalellidae		*Hyalella*	*Hyalella azteca*
L2		2	24-Aug-2011	Exclude	AP			500		Annelida	Annelida	Hirudinea	Rhynchobdellida	Glossiphoniidae		*Glossiphonia*	*Glossiphonia complanata*
L2		2	24-Aug-2011	Exclude	AP			500		Annelida	Annelida	Hirudinea	Rhynchobdellida	Glossiphoniidae		*Helobdella*	*Helobdella stagnalis*
L2		2	24-Aug-2011	Exclude	AP			500		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Tubificinae		Tubificinae
L2		2	24-Aug-2011	Exclude	AP			500		Annelida	Annelida	Oligochaeta	Lumbriculida	Lumbriculidae			Lumbriculidae
L2		2	24-Aug-2011	Exclude	AP			500		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium*	*Pisidium*
L2		2	24-Aug-2011	Exclude	AP			500		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium/Sphaerium*	*Pisidium/Sphaerium*
L2		2	24-Aug-2011	Exclude	AP			500		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Sphaerium*	*Sphaerium*
L2		2	24-Aug-2011	Exclude	AP			500		Cladocera	Arthropoda	Branchiopoda	Diplostraca	Macrothricidae			Macrothricidae
L2		2	24-Aug-2011	Exclude	AP			500		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
L2		2	24-Aug-2011	Exclude	AP			500		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Bezzia*	*Bezzia*
L2		2	24-Aug-2011	Exclude	AP			500		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Probezzia*	*Probezzia*
L2		2	24-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Cladotanytarsus*	*Cladotanytarsus*

Notes: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area); R = Potential Reference

Appendix 6.1-3. Benthic Invertebrate Taxa and Abundance in Lakes (Ekman Sampler), 2008 to 2013

Site	Depth	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/m^2)	Notes	ITIS Serial Number
WL1		3	1-Aug-2010			ok	ok			81	1,200.0	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		3	1-Aug-2010			ok	ok			61	903.7	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		3	1-Aug-2010			ok	ok			103	1,525.9	Assumed area of 0.0675m^2. Text stated composite of 3.	
WL1		3	1-Aug-2010			ok	ok	pupa		1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		1	23-Aug-2011			ok	ok			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		1	23-Aug-2011			ok	ok			23	340.7	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		1	23-Aug-2011			ok	ok			7	103.7	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		1	23-Aug-2011			ok	ok			14	207.4	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		1	23-Aug-2011			ok	ok			8	118.5	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		1	23-Aug-2011			ok	ok			9	133.3	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		1	23-Aug-2011			ok	ok			13	192.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		2	23-Aug-2011			ok	ok			2	29.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		2	23-Aug-2011			ok	ok			35	518.5	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		2	23-Aug-2011			ok	ok			9	133.3	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		2	23-Aug-2011			ok	ok			14	207.4	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		2	23-Aug-2011			ok	ok			31	459.3	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		2	23-Aug-2011			ok	ok			2	29.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		2	23-Aug-2011			ok	ok			3	44.4	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		2	23-Aug-2011			ok	ok			2	29.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		2	23-Aug-2011			Exclude	Exclude			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		3	23-Aug-2011			ok	ok			2	29.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		3	23-Aug-2011			ok	ok			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		3	23-Aug-2011			ok	ok			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		3	23-Aug-2011			ok	ok			3	44.4	Assumed area of 0.0675m^2. Text stated composite of 3.	
L1		3	23-Aug-2011			ok	ok			37	548.1	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		1	24-Aug-2011			ok	ok			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		1	24-Aug-2011			ok	ok			2	29.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		1	24-Aug-2011			ok	ok			8	118.5	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		1	24-Aug-2011			ok	ok			5	74.1	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		1	24-Aug-2011			Exclude	Exclude			24	355.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		1	24-Aug-2011			Exclude	Exclude			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		1	24-Aug-2011			Exclude	Exclude			2	29.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		1	24-Aug-2011			ok	ok			8	118.5	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		1	24-Aug-2011			ok	ok			2	29.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		1	24-Aug-2011			ok	ok			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		1	24-Aug-2011			ok	ok			7	103.7	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		1	24-Aug-2011			ok	ok			3	44.4	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		1	24-Aug-2011			Exclude	Exclude			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			ok	ok			68	1,007.4	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			ok	ok			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			ok	ok			15	222.2	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			ok	ok			30	444.4	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			ok	ok			23	340.7	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			ok	ok			71	1,051.9	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			ok	ok			278	4,118.5	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			ok	ok			4	59.3	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			Exclude	Exclude			280	4,148.1	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			Exclude	Exclude			24	355.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			ok	ok			8	118.5	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			ok	ok			29	429.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			ok	ok			12	177.8	Assumed area of 0.0675m^2. Text stated composite of 3.	

Notes: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area); R = Potential Reference

Appendix 6.1-3. Benthic Invertebrate Taxa and Abundance in Lakes (Ekman Sampler), 2008 to 2013

Site	Depth	Replicate	Date	Exclude / Include	Area	Lab Sample ID	Area (m²)	Mesh Size (µm)	Percent Counted	Major Taxon	Phylum	Class	Order	Family	Subfamily	Genus	Taxon
L2		2	24-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Cryptochironomus*	*Cryptochironomus*
L2		2	24-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Dicrotendipes*	*Dicrotendipes*
L2		2	24-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Microtendipes*	*Microtendipes*
L2		2	24-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Pagastiella*	*Pagastiella*
L2		2	24-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Procladius*	*Procladius*
L2		2	24-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Tanytarsus*	*Tanytarsus*
L2		2	24-Aug-2011	Exclude	AP			500		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Baetidae		*Callibaetis*	*Callibaetis*
L2		2	24-Aug-2011	Exclude	AP			500		Gastropoda	Mollusca	Gastropoda	Heterostropha	Valvatidae		*Valvata*	*Valvata sincera*
L2		2	24-Aug-2011	Exclude	AP			500		Nematoda	Nematoda						Nematoda
L2		2	24-Aug-2011	Exclude	AP			500		Trichoptera	Arthropoda	Insecta	Trichoptera	Polycentropodidae		*Polycentropus*	*Polycentropus*
L2		3	24-Aug-2011	Exclude	AP			500		Amphipoda	Arthropoda	Malacostraca	Amphipoda	Hyalellidae		*Hyalella*	*Hyalella azteca*
L2		3	24-Aug-2011	Exclude	AP			500		Annelida	Annelida	Hirudinea	Rhynchobdellida	Glossiphoniidae		*Helobdella*	*Helobdella stagnalis*
L2		3	24-Aug-2011	Exclude	AP			500		Annelida	Annelida	Hirudinea	Rhynchobdellida	Piscicolidae		*Piscicola*	*Piscicola punctata*
L2		3	24-Aug-2011	Exclude	AP			500		Annelida	Annelida	Oligochaeta	Haplotaxida	Enchytraeidae			Enchytraeidae
L2		3	24-Aug-2011	Exclude	AP			500		Annelida	Annelida	Oligochaeta	Haplotaxida	Naididae	Tubificinae		Tubificinae
L2		3	24-Aug-2011	Exclude	AP			500		Annelida	Annelida	Oligochaeta	Lumbriculida	Lumbriculidae			Lumbriculidae
L2		3	24-Aug-2011	Exclude	AP			500		Arachnida	Arthropoda	Arachnida					Hydracarina
L2		3	24-Aug-2011	Exclude	AP			500		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium*	*Pisidium*
L2		3	24-Aug-2011	Exclude	AP			500		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Pisidium/Sphaerium*	*Pisidium/Sphaerium*
L2		3	24-Aug-2011	Exclude	AP			500		Bivalvia	Mollusca	Bivalvia	Veneroida	Pisidiidae		*Sphaerium*	*Sphaerium*
L2		3	24-Aug-2011	Exclude	AP			500		Cladocera	Arthropoda	Branchiopoda	Diplostraca	Macrothricidae			Macrothricidae
L2		3	24-Aug-2011	Exclude	AP			500		Copepoda	Arthropoda	Maxillopoda	Cyclopoida	Cyclopidae			Cyclopidae
L2		3	24-Aug-2011	Exclude	AP			500		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Bezzia*	*Bezzia*
L2		3	24-Aug-2011	Exclude	AP			500		Diptera	Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogoninae	*Probezzia*	*Probezzia*
L2		3	24-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Cladopelma*	*Cladopelma*
L2		3	24-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Cladotanytarsus*	*Cladotanytarsus*
L2		3	24-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Corynoneura*	*Corynoneura*
L2		3	24-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Endochironomus*	*Endochironomus*
L2		3	24-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Microtendipes*	*Microtendipes*
L2		3	24-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Pagastiella*	*Pagastiella*
L2		3	24-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	*Procladius*	*Procladius*
L2		3	24-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	*Psectrocladius*	*Psectrocladius*
L2		3	24-Aug-2011	Exclude	AP			500		Diptera - Chironomidae	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	*Tanytarsus*	*Tanytarsus*
L2		3	24-Aug-2011	Exclude	AP			500		Ephemeroptera	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae		*Paraleptophlebia*	*Paraleptophlebia*
L2		3	24-Aug-2011	Exclude	AP			500		Nematoda	Nematoda						Nematoda
L2		3	24-Aug-2011	Exclude	AP			500		Trichoptera	Arthropoda	Insecta	Trichoptera	Polycentropodidae		*Polycentropus*	*Polycentropus*

Notes: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area); R = Potential Reference

Appendix 6.1-3. Benthic Invertebrate Taxa and Abundance in Lakes (Ekman Sampler), 2008 to 2013

Site	Depth	Replicate	Date	Taxonomic Uncertainty	Taxonomic Notes	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Pupa	Adult	Raw Count	Density (organisms/m^2)	Notes	ITIS Serial Number
L2		2	24-Aug-2011			ok	ok			8	118.5	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			ok	ok			9	133.3	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			ok	ok			61	903.7	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			ok	ok			40	592.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			ok	ok			12	177.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			ok	ok			96	1,422.2	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			ok	ok			4	59.3	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			ok	ok			46	681.5	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			Exclude	Exclude			16	237.0	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		2	24-Aug-2011			ok	ok			5	74.1	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			97	1,437.0	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			14	207.4	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			8	118.5	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			19	281.5	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			14	207.4	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	Exclude			16	237.0	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			33	488.9	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			388	5,748.1	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			1	14.8	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			Exclude	Exclude			168	2,488.9	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			Exclude	Exclude			8	118.5	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			9	133.3	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			56	829.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			8	118.5	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			24	355.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			8	118.5	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			36	533.3	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			123	1,822.2	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			41	607.4	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			23	340.7	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			16	237.0	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			328	4,859.3	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			32	474.1	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			Exclude	Exclude			24	355.6	Assumed area of 0.0675m^2. Text stated composite of 3.	
L2		3	24-Aug-2011			ok	ok			2	29.6	Assumed area of 0.0675m^2. Text stated composite of 3.	

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Appendix 6.2-1. Zooplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Depth	Replicate	Date	Exclude / Include	Area	Lab Sample ID	Volume of Tow (m^3)	Volume Flow (m^3)	Mesh Size (µm)	Percent Counted	Major Taxon	Class	Order	Family	Genus	Species	Taxon
BJ	Deep	1	8-Sep-2012	Include	MA	6204.2-1	2.827	0.800	64	100%	Crustacea	Maxillopoda	Calanoida				Calanoida
BJ	Deep	1	8-Sep-2012	Include	MA	6204.2-1	2.827	0.800	64	100%	Crustacea	Maxillopoda					Copepoda
BJ	Deep	2	8-Sep-2012	Include	MA	6204.2-2	2.827	0.853	64	100%	Crustacea	Maxillopoda	Calanoida				Calanoida
BJ	Deep	2	8-Sep-2012	Include	MA	6204.2-2	2.827	0.853	64	100%	Crustacea	Maxillopoda					Copepoda
BJ	Deep	3	8-Sep-2012	Include	MA	6204.2-3	2.827	0.885	64	100%	Crustacea	Maxillopoda	Calanoida				Calanoida
BJ	Deep	3	8-Sep-2012	Include	MA	6204.2-3	2.827	0.885	64	100%	Crustacea	Maxillopoda					Copepoda
BJ		1	9-Aug-2013	Include	MA	6530.1-1	1.767	0.790	63	100%	Crustacea	Maxillopoda	Calanoida				Calanoida
BJ		1	9-Aug-2013	Include	MA	6530.1-1	1.767	0.790	63	100%	Crustacea	Maxillopoda					Copepoda
BJ		1	9-Aug-2013	Include	MA	6530.1-1	1.767	0.790	63	100%	Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
BJ		1	9-Aug-2013	Include	MA	6530.1-1	1.767	0.790	63	100%	Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Hesperodiaptomus*		*Hesperodiaptomus* sp.
BJ		1	9-Aug-2013	Include	MA	6530.1-1	1.767	0.790	63	100%	Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*		*Keratella hiemalis*
BJ		1	9-Aug-2013	Include	MA	6530.1-1	1.767	0.790	63	100%	Rotifera	Monogonta	Ploima	Brachionidae	*Notholca*		*Notholca squamula*
BJ		2	9-Aug-2013	Include	MA	6530.1-2	1.767	0.665	63	100%	Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Acanthocyclops*	*capillatus*	*Acanthocyclops capillatus*
BJ		2	9-Aug-2013	Include	MA	6530.1-2	1.767	0.665	63	100%	Crustacea	Maxillopoda	Calanoida				Calanoida
BJ		2	9-Aug-2013	Include	MA	6530.1-2	1.767	0.665	63	100%	Crustacea	Maxillopoda					Copepoda
BJ		2	9-Aug-2013	Include	MA	6530.1-2	1.767	0.665	63	100%	Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Hesperodiaptomus*		*Hesperodiaptomus* sp.
BJ		3	9-Aug-2013	Include	MA	6530.1-3	1.767	0.281	63	100%	Crustacea	Maxillopoda	Calanoida				Calanoida
BJ		3	9-Aug-2013	Include	MA	6530.1-3	1.767	0.281	63	100%	Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Hesperodiaptomus*		*Hesperodiaptomus* sp.
SUL	Deep	1	22-Aug-2008	Include	MA		0.148		118		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*bostoniensis*	*Kellicottia bostoniensis*
SUL	Deep	1	22-Aug-2008	Include	MA		0.148		118		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
SUL	Deep	1	16-Aug-2009	Include	MA		0.532		118		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
SUL	Deep	1	16-Aug-2009	Include	MA		0.532		118		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
SUL	Deep	1	16-Aug-2009	Include	MA		0.532		118		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*quadrata*	*Keratella quadrata*
SUL	Deep	2	16-Aug-2009	Include	MA		0.353		118		Crustacea	Maxillopoda	Calanoida				Calanoida
SUL	Deep	2	16-Aug-2009	Include	MA		0.353		118		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
SUL	Deep	2	16-Aug-2009	Include	MA		0.353		118		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*scutifer*	*Cyclops scutifer*
SUL	Deep	2	16-Aug-2009	Include	MA		0.353		118		Crustacea	Maxillopoda					Copepoda
SUL	Deep	2	16-Aug-2009	Include	MA		0.353		118		Protozoa	Lobosa	Arcellinida	Difflugiidae	*Difflugia*		*Difflugia* sp.
SUL	Deep	2	16-Aug-2009	Include	MA		0.353		118		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
SUL	Deep	2	16-Aug-2009	Include	MA		0.353		118		Rotifera	Monogonta	Flosculariaceae	Conochilidae	*Conochilus*	*unicornis*	*Conochilus unicornis*
SUL	Mid	1	22-Aug-2008	Include	MA		0.106		118		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
SUL	Mid	1	16-Aug-2009	Include	MA		0.182		118		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
SUL	Mid	1	16-Aug-2009	Include	MA		0.182		118		Crustacea	Maxillopoda	Harpacticoida				Harpacticoida
SUL	Mid	1	16-Aug-2009	Include	MA		0.182		118		Crustacea	Maxillopoda					Copepoda
SUL	Mid	1	16-Aug-2009	Include	MA		0.182		118		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
SUL	Mid	2	16-Aug-2009	Include	MA		0.140		118		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
SUL	Mid	2	16-Aug-2009	Include	MA		0.140		118		Crustacea	Maxillopoda					Copepoda
SUL	Mid	2	16-Aug-2009	Include	MA		0.140		118		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
SUL	Mid	2	16-Aug-2009	Include	MA		0.140		118		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*quadrata*	*Keratella quadrata*
SUL	Mid	2	16-Aug-2009	Include	MA		0.140		118		Rotifera	Monogonta	Flosculariaceae	Conochilidae	*Conochilus*	*unicornis*	*Conochilus unicornis*
SUL	Shallow	1	16-Aug-2009	Include	MA		0.061		118		Crustacea	Maxillopoda					Copepoda
SUL	Shallow	1	16-Aug-2009	Include	MA		0.061		118		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
SUL	Shallow	1	16-Aug-2009	Include	MA		0.061		118		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*quadrata*	*Keratella quadrata*
SUL	Shallow	2	16-Aug-2009	Include	MA		0.072		118		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
SUL	Shallow	2	16-Aug-2009	Include	MA		0.072		118		Crustacea	Maxillopoda					Copepoda
SUL	Shallow	2	16-Aug-2009	Include	MA		0.072		118		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
SUL	Shallow	2	16-Aug-2009	Include	MA		0.072		118		Rotifera	Monogonta	Flosculariaceae	Conochilidae	*Conochilus*	*unicornis*	*Conochilus unicornis*
SUL		1	10-Aug-2013	Include	MA	6530.1-4	1.414	0.479	63	100%	Rotifera	Eurotatoria					Bdelloidea
SUL		1	10-Aug-2013	Include	MA	6530.1-4	1.414	0.479	63	100%	Crustacea	Maxillopoda					Copepoda
SUL		1	10-Aug-2013	Include	MA	6530.1-4	1.414	0.479	63	100%	Rotifera	Monogonta	Ploima	Brachionidae	*Notholca*	*squamula*	*Notholca squamula*
SUL		2	10-Aug-2013	Include	MA	6530.1-5	1.414	1.031	63	100%	Rotifera	Eurotatoria					Bdelloidea

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Appendix 6.2-1. Zooplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Depth	Replicate	Date	Stage	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Raw Count	Density (organisms/m^3)
BJ	Deep	1	8-Sep-2012	copepodite	ok	exclude	126	44.6
BJ	Deep	1	8-Sep-2012	nauplius	exclude	exclude	3	1.1
BJ	Deep	2	8-Sep-2012	copepodite	ok	exclude	449	158.8
BJ	Deep	2	8-Sep-2012	nauplius	exclude	exclude	11	3.9
BJ	Deep	3	8-Sep-2012	copepodite	ok	exclude	419	148.2
BJ	Deep	3	8-Sep-2012	nauplius	exclude	exclude	10	3.5
BJ		1	9-Aug-2013	copepodite	ok	exclude	53	30.0
BJ		1	9-Aug-2013	nauplius	exclude	exclude	4	2.3
BJ		1	9-Aug-2013		ok	ok	1	0.6
BJ		1	9-Aug-2013		ok	ok	37	20.9
BJ		1	9-Aug-2013		ok	ok	1	0.6
BJ		1	9-Aug-2013		ok	ok	1	0.6
BJ		2	9-Aug-2013		ok	ok	1	0.6
BJ		2	9-Aug-2013	copepodite	ok	exclude	56	31.7
BJ		2	9-Aug-2013	nauplius	exclude	exclude	3	1.7
BJ		2	9-Aug-2013		ok	ok	28	15.8
BJ		3	9-Aug-2013	copepodite	ok	exclude	121	68.5
BJ		3	9-Aug-2013		ok	ok	41	23.2
SUL	Deep	1	22-Aug-2008		ok	ok	1	6.8
SUL	Deep	1	22-Aug-2008		ok	ok	10	67.5
SUL	Deep	1	16-Aug-2009	copepodite	ok	exclude		3.8
SUL	Deep	1	16-Aug-2009		ok	ok		16.9
SUL	Deep	1	16-Aug-2009		ok	ok		1.9
SUL	Deep	2	16-Aug-2009	copepodite	ok	exclude		2.8
SUL	Deep	2	16-Aug-2009	copepodite	ok	exclude		22.7
SUL	Deep	2	16-Aug-2009		ok	ok		2.8
SUL	Deep	2	16-Aug-2009	nauplius	exclude	exclude		11.3
SUL	Deep	2	16-Aug-2009		ok	ok		5.7
SUL	Deep	2	16-Aug-2009		ok	ok		34.0
SUL	Deep	2	16-Aug-2009		ok	ok		8.5
SUL	Mid	1	22-Aug-2008		ok	ok	5	47.0
SUL	Mid	1	16-Aug-2009	copepodite	ok	exclude		38.4
SUL	Mid	1	16-Aug-2009	copepodite	ok	exclude		5.5
SUL	Mid	1	16-Aug-2009	nauplius	exclude	exclude		21.9
SUL	Mid	1	16-Aug-2009		ok	ok		76.8
SUL	Mid	2	16-Aug-2009	copepodite	ok	exclude		14.2
SUL	Mid	2	16-Aug-2009	nauplius	exclude	exclude		49.8
SUL	Mid	2	16-Aug-2009		ok	ok		192.2
SUL	Mid	2	16-Aug-2009		ok	ok		14.2
SUL	Mid	2	16-Aug-2009		ok	ok		14.2
SUL	Shallow	1	16-Aug-2009	nauplius	exclude	exclude		32.9
SUL	Shallow	1	16-Aug-2009		ok	ok		148.1
SUL	Shallow	1	16-Aug-2009		ok	ok		16.5
SUL	Shallow	2	16-Aug-2009	copepodite	ok	exclude		41.6
SUL	Shallow	2	16-Aug-2009	nauplius	exclude	exclude		69.3
SUL	Shallow	2	16-Aug-2009		ok	ok		291.1
SUL	Shallow	2	16-Aug-2009		ok	ok		318.8
SUL		1	10-Aug-2013		ok	ok	1	0.7
SUL		1	10-Aug-2013	nauplius	exclude	exclude	2	1.4
SUL		1	10-Aug-2013		ok	ok	14	9.9
SUL		2	10-Aug-2013		ok	ok	3	2.1

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Appendix 6.2-1. Zooplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Depth	Replicate	Date	Exclude / Include	Area	Lab Sample ID	Volume of Tow (m^3)	Volume Flow (m^3)	Mesh Size (µm)	Percent Counted	Major Taxon	Class	Order	Family	Genus	Species	Taxon
SUL		2	10-Aug-2013	Include	MA	6530.1-5	1.414	1.031	63	100%	Rotifera	Monogonta	Ploima	Brachionidae	*Notholca*	*squamula*	*Notholca squamula*
SUL		3	10-Aug-2013	Include	MA	6530.1-6	1.414	0.917	63	100%	Rotifera	Eurotatoria					Bdelloidea
SUL		3	10-Aug-2013	Include	MA	6530.1-6	1.414	0.917	63	100%	Crustacea	Maxillopoda					Copepoda
SUL		3	10-Aug-2013	Include	MA	6530.1-6	1.414	0.917	63	100%	Rotifera	Monogonta	Ploima	Brachionidae	*Notholca*	*squamula*	*Notholca squamula*
Divide		1	11-Aug-2013	Exclude	R	6530.1-7	1.272	0.589	63	100%	Rotifera	Eurotatoria					Bdelloidea
Divide		1	11-Aug-2013	Exclude	R	6530.1-7	1.272	0.589	63	100%	Crustacea	Maxillopoda	Calanoida				Calanoida
Divide		1	11-Aug-2013	Exclude	R	6530.1-7	1.272	0.589	63	100%	Crustacea	Maxillopoda					Copepoda
Divide		1	11-Aug-2013	Exclude	R	6530.1-7	1.272	0.589	63	100%	Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
Divide		1	11-Aug-2013	Exclude	R	6530.1-7	1.272	0.589	63	100%	Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*strenuus*	*Cyclops strenuus*
Divide		1	11-Aug-2013	Exclude	R	6530.1-7	1.272	0.589	63	100%	Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*hiemalis*	*Keratella hiemalis*
Divide		1	11-Aug-2013	Exclude	R	6530.1-7	1.272	0.589	63	100%	Rotifera	Monogonta	Ploima	Lecanidae	*Monostyla*	*lunaris*	*Monostyla lunaris*
Divide		2	11-Aug-2013	Exclude	R	6530.1-8	1.272	0.589	63	100%	Rotifera	Eurotatoria					Bdelloidea
Divide		2	11-Aug-2013	Exclude	R	6530.1-8	1.272	0.589	63	100%	Crustacea	Maxillopoda	Calanoida				Calanoida
Divide		2	11-Aug-2013	Exclude	R	6530.1-8	1.272	0.589	63	100%	Crustacea	Maxillopoda					Copepoda
Divide		2	11-Aug-2013	Exclude	R	6530.1-8	1.272	0.589	63	100%	Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
Divide		2	11-Aug-2013	Exclude	R	6530.1-8	1.272	0.589	63	100%	Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*strenuus*	*Cyclops strenuus*
Divide		2	11-Aug-2013	Exclude	R	6530.1-8	1.272	0.589	63	100%	Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*hiemalis*	*Keratella hiemalis*
Divide		3	11-Aug-2013	Exclude	R	6530.1-9	1.272	0.568	63	100%	Arachnida	Arachnida					Acari
Divide		3	11-Aug-2013	Exclude	R	6530.1-9	1.272	0.568	63	100%	Rotifera	Eurotatoria					Bdelloidea
Divide		3	11-Aug-2013	Exclude	R	6530.1-9	1.272	0.568	63	100%	Rotifera	Eurotatoria	Collothecacea	Collothecidae	*Collotheca*		*Collotheca* sp.
Divide		3	11-Aug-2013	Exclude	R	6530.1-9	1.272	0.568	63	100%	Crustacea	Maxillopoda					Copepoda
Divide		3	11-Aug-2013	Exclude	R	6530.1-9	1.272	0.568	63	100%	Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
Divide		3	11-Aug-2013	Exclude	R	6530.1-9	1.272	0.568	63	100%	Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*strenuus*	*Cyclops strenuus*
Divide		3	11-Aug-2013	Exclude	R	6530.1-9	1.272	0.568	63	100%	Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*hiemalis*	*Keratella hiemalis*
KL		1	12-Aug-2013	Include	AP	6530.1-10	2.121	0.709	63	100%	Insecta	Insecta	Diptera	Chironomidae			Chironomidae
KL		1	12-Aug-2013	Include	AP	6530.1-10	2.121	0.709	63	100%	Crustacea	Maxillopoda					Copepoda
KL		1	12-Aug-2013	Include	AP	6530.1-10	2.121	0.709	63	100%	Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
KL		1	12-Aug-2013	Include	AP	6530.1-10	2.121	0.709	63	100%	Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
KL		2	12-Aug-2013	Include	AP	6530.1-11	2.121	0.665	63	100%	Insecta	Insecta	Diptera	Chironomidae			Chironomidae
KL		2	12-Aug-2013	Include	AP	6530.1-11	2.121	0.665	63	100%	Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
KL		3	12-Aug-2013	Include	AP	6530.1-12	2.121	0.439	63	100%	Rotifera	Eurotatoria					Bdelloidea
TL1	Deep	1	17-Aug-2009	Include	AP		0.666		118		Crustacea	Branchiopoda	Diplostraca	Daphnidae	*Daphnia*	*pulex*	*Daphnia pulex*
TL1	Deep	1	17-Aug-2009	Include	AP		0.666		118		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Acanthodiaptomus*	*denticornis*	*Acanthodiaptomus denticornis*
TL1	Deep	1	17-Aug-2009	Include	AP		0.666		118		Crustacea	Maxillopoda					Copepoda
TL1	Deep	1	17-Aug-2009	Include	AP		0.666		118		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
TL1	Deep	1	17-Aug-2009	Include	AP		0.666		118		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*scutifer*	*Cyclops scutifer*
TL1	Deep	1	17-Aug-2009	Include	AP		0.666		118		Crustacea	Maxillopoda	Calanoida	Diaptomidae			Diaptomidae
TL1	Deep	1	17-Aug-2009	Include	AP		0.666		118		Crustacea	Maxillopoda	Calanoida	Temoridae	*Heterocope*	*septentrionalis*	*Heterocope septentrionalis*
TL1	Deep	1	17-Aug-2009	Include	AP		0.666		118		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*cochlearis*	*Keratella cochlearis*
TL1	Deep	1	17-Aug-2009	Include	AP		0.666		118		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*quadrata*	*Keratella quadrata*
TL1	Deep	1	17-Aug-2009	Include	AP		0.666		118		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
TL1	Deep	1	17-Aug-2009	Include	AP		0.666		118		Rotifera	Monogonta	Flosculariaceae	Conochilidae	*Conochilus*	*unicornis*	*Conochilus unicornis*
TL1	Deep	2	17-Aug-2009	Include	AP		0.412		118		Crustacea	Branchiopoda	Diplostraca	Daphnidae	*Daphnia*	*pulex*	*Daphnia pulex*
TL1	Deep	2	17-Aug-2009	Include	AP		0.412		118		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Acanthodiaptomus*	*denticornis*	*Acanthodiaptomus denticornis*
TL1	Deep	2	17-Aug-2009	Include	AP		0.412		118		Crustacea	Maxillopoda					Copepoda
TL1	Deep	2	17-Aug-2009	Include	AP		0.412		118		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
TL1	Deep	2	17-Aug-2009	Include	AP		0.412		118		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*scutifer*	*Cyclops scutifer*
TL1	Deep	2	17-Aug-2009	Include	AP		0.412		118		Crustacea	Maxillopoda	Calanoida	Diaptomidae			Diaptomidae
TL1	Deep	2	17-Aug-2009	Include	AP		0.412		118		Crustacea	Maxillopoda	Calanoida	Temoridae	*Heterocope*	*septentrionalis*	*Heterocope septentrionalis*
TL1	Deep	2	17-Aug-2009	Include	AP		0.412		118		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*cochlearis*	*Keratella cochlearis*
TL1	Deep	2	17-Aug-2009	Include	AP		0.412		118		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*quadrata*	*Keratella quadrata*

Notes: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 6.2-1. Zooplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Depth	Replicate	Date	Stage	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Raw Count	Density (organisms/m^3)
SUL		2	10-Aug-2013		ok	ok	21	14.9
SUL		3	10-Aug-2013		ok	ok	5	3.5
SUL		3	10-Aug-2013	nauplius	exclude	exclude	1	0.7
SUL		3	10-Aug-2013		ok	ok	22	15.6
Divide		1	11-Aug-2013		ok	ok	1	0.8
Divide		1	11-Aug-2013	copepodite	ok	exclude	1	0.8
Divide		1	11-Aug-2013	nauplius	exclude	exclude	354	278.2
Divide		1	11-Aug-2013	copepodite	ok	exclude	254	199.6
Divide		1	11-Aug-2013		ok	ok	220	172.9
Divide		1	11-Aug-2013		ok	ok	26	20.4
Divide		1	11-Aug-2013		ok	ok	1	0.8
Divide		2	11-Aug-2013		ok	ok	1	0.8
Divide		2	11-Aug-2013	copepodite	ok	exclude	1	0.8
Divide		2	11-Aug-2013	nauplius	exclude	exclude	303	238.1
Divide		2	11-Aug-2013	copepodite	ok	exclude	231	181.6
Divide		2	11-Aug-2013		ok	ok	180	141.5
Divide		2	11-Aug-2013		ok	ok	17	13.4
Divide		3	11-Aug-2013		ok	ok	1	0.8
Divide		3	11-Aug-2013		ok	ok	2	1.6
Divide		3	11-Aug-2013		ok	ok	2	1.6
Divide		3	11-Aug-2013	nauplius	exclude	exclude	394	309.7
Divide		3	11-Aug-2013	copepodite	ok	exclude	264	207.5
Divide		3	11-Aug-2013		ok	ok	157	123.4
Divide		3	11-Aug-2013		ok	ok	34	26.7
KL		1	12-Aug-2013		ok	ok	1	0.5
KL		1	12-Aug-2013	nauplius	exclude	exclude	1	0.5
KL		1	12-Aug-2013		ok	ok	1	0.5
KL		1	12-Aug-2013	copepodite	ok	exclude	1	0.5
KL		2	12-Aug-2013		ok	ok	1	0.5
KL		2	12-Aug-2013	copepodite	ok	exclude	2	0.9
KL		3	12-Aug-2013		ok	ok	1	0.5
TL1	Deep	1	17-Aug-2009		ok	ok		4801.9
TL1	Deep	1	17-Aug-2009		ok	ok		192.1
TL1	Deep	1	17-Aug-2009	nauplius	exclude	exclude		58199.2
TL1	Deep	1	17-Aug-2009	copepodite	ok	exclude		12869.1
TL1	Deep	1	17-Aug-2009		ok	ok		1920.8
TL1	Deep	1	17-Aug-2009	copepodite	ok	exclude		1536.6
TL1	Deep	1	17-Aug-2009		ok	ok		96
TL1	Deep	1	17-Aug-2009		ok	ok		192.1
TL1	Deep	1	17-Aug-2009		ok	ok		1344.5
TL1	Deep	1	17-Aug-2009		ok	ok		45714.2
TL1	Deep	1	17-Aug-2009		ok	ok		384.2
TL1	Deep	2	17-Aug-2009		ok	ok		5903
TL1	Deep	2	17-Aug-2009		ok	ok		1242.7
TL1	Deep	2	17-Aug-2009	nauplius	exclude	exclude		165284.9
TL1	Deep	2	17-Aug-2009	copepodite	ok	exclude		32000.6
TL1	Deep	2	17-Aug-2009		ok	ok		6213.7
TL1	Deep	2	17-Aug-2009	copepodite	ok	exclude		8077.8
TL1	Deep	2	17-Aug-2009		ok	ok		310.7
TL1	Deep	2	17-Aug-2009		ok	ok		621.4
TL1	Deep	2	17-Aug-2009		ok	ok		2485.5

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Appendix 6.2-1. Zooplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Depth	Replicate	Date	Exclude / Include	Area	Lab Sample ID	Volume of Tow (m^3)	Volume Flow (m^3)	Mesh Size (µm)	Percent Counted	Major Taxon	Class	Order	Family	Genus	Species	Taxon
TL1	Deep	2	17-Aug-2009	Include	AP		0.412		118		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
TL1	Deep	2	17-Aug-2009	Include	AP		0.412		118		Rotifera	Monogonta	Flosculariaceae	Conochilidae	*Conochilus*	*unicornis*	*Conochilus unicornis*
TL1	Mid	1	17-Aug-2009	Include	AP		0.253		118		Crustacea	Branchiopoda	Diplostraca	Daphnidae	*Daphnia*	*pulex*	*Daphnia pulex*
TL1	Mid	1	17-Aug-2009	Include	AP		0.253		118		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Acanthodiaptomus*	*denticornis*	*Acanthodiaptomus denticornis*
TL1	Mid	1	17-Aug-2009	Include	AP		0.253		118		Crustacea	Maxillopoda					Copepoda
TL1	Mid	1	17-Aug-2009	Include	AP		0.253		118		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
TL1	Mid	1	17-Aug-2009	Include	AP		0.253		118		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*scutifer*	*Cyclops scutifer*
TL1	Mid	1	17-Aug-2009	Include	AP		0.253		118		Crustacea	Maxillopoda	Calanoida	Diaptomidae			Diaptomidae
TL1	Mid	1	17-Aug-2009	Include	AP		0.253		118		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*cochlearis*	*Keratella cochlearis*
TL1	Mid	1	17-Aug-2009	Include	AP		0.253		118		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
TL1	Mid	1	17-Aug-2009	Include	AP		0.253		118		Rotifera	Monogonta	Flosculariaceae	Conochilidae	*Conochilus*	*unicornis*	*Conochilus unicornis*
TL1	Mid	2	17-Aug-2009	Include	AP		0.262		118		Crustacea	Branchiopoda	Diplostraca	Daphnidae	*Daphnia*	*pulex*	*Daphnia pulex*
TL1	Mid	2	17-Aug-2009	Include	AP		0.262		118		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Acanthodiaptomus*	*denticornis*	*Acanthodiaptomus denticornis*
TL1	Mid	2	17-Aug-2009	Include	AP		0.262		118		Crustacea	Maxillopoda					Copepoda
TL1	Mid	2	17-Aug-2009	Include	AP		0.262		118		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
TL1	Mid	2	17-Aug-2009	Include	AP		0.262		118		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*scutifer*	*Cyclops scutifer*
TL1	Mid	2	17-Aug-2009	Include	AP		0.262		118		Crustacea	Maxillopoda	Calanoida	Diaptomidae			Diaptomidae
TL1	Mid	2	17-Aug-2009	Include	AP		0.262		118		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*cochlearis*	*Keratella cochlearis*
TL1	Mid	2	17-Aug-2009	Include	AP		0.262		118		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*quadrata*	*Keratella quadrata*
TL1	Mid	2	17-Aug-2009	Include	AP		0.262		118		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
TL1	Mid	2	17-Aug-2009	Include	AP		0.262		118		Rotifera	Monogonta	Flosculariaceae	Conochilidae	*Conochilus*	*unicornis*	*Conochilus unicornis*
TL1	Shallow	1	17-Aug-2009	Include	AP		0.171		118		Crustacea	Branchiopoda	Diplostraca	Daphnidae	*Daphnia*	*pulex*	*Daphnia pulex*
TL1	Shallow	1	17-Aug-2009	Include	AP		0.171		118		Crustacea	Branchiopoda	Diplostraca	Sididae	*Sida*	*crystallina*	*Sida crystallina*
TL1	Shallow	1	17-Aug-2009	Include	AP		0.171		118		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Acanthodiaptomus*	*denticornis*	*Acanthodiaptomus denticornis*
TL1	Shallow	1	17-Aug-2009	Include	AP		0.171		118		Crustacea	Maxillopoda					Copepoda
TL1	Shallow	1	17-Aug-2009	Include	AP		0.171		118		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
TL1	Shallow	1	17-Aug-2009	Include	AP		0.171		118		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*scutifer*	*Cyclops scutifer*
TL1	Shallow	1	17-Aug-2009	Include	AP		0.171		118		Crustacea	Maxillopoda	Calanoida	Diaptomidae			Diaptomidae
TL1	Shallow	1	17-Aug-2009	Include	AP		0.171		118		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*cochlearis*	*Keratella cochlearis*
TL1	Shallow	1	17-Aug-2009	Include	AP		0.171		118		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
TL1	Shallow	1	17-Aug-2009	Include	AP		0.171		118		Rotifera	Monogonta	Flosculariaceae	Conochilidae	*Conochilus*	*unicornis*	*Conochilus unicornis*
TL1	Shallow	2	17-Aug-2009	Include	AP		0.156		118		Crustacea	Branchiopoda	Diplostraca	Daphnidae	*Daphnia*	*pulex*	*Daphnia pulex*
TL1	Shallow	2	17-Aug-2009	Include	AP		0.156		118		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Acanthodiaptomus*	*denticornis*	*Acanthodiaptomus denticornis*
TL1	Shallow	2	17-Aug-2009	Include	AP		0.156		118		Crustacea	Maxillopoda					Copepoda
TL1	Shallow	2	17-Aug-2009	Include	AP		0.156		118		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
TL1	Shallow	2	17-Aug-2009	Include	AP		0.156		118		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*scutifer*	*Cyclops scutifer*
TL1	Shallow	2	17-Aug-2009	Include	AP		0.156		118		Crustacea	Maxillopoda	Calanoida	Diaptomidae			Diaptomidae
TL1	Shallow	2	17-Aug-2009	Include	AP		0.156		118		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*cochlearis*	*Keratella cochlearis*
TL1	Shallow	2	17-Aug-2009	Include	AP		0.156		118		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
TL1	Shallow	2	17-Aug-2009	Include	AP		0.156		118		Rotifera	Monogonta	Flosculariaceae	Conochilidae	*Conochilus*	*unicornis*	*Conochilus unicornis*
TL1		1	25-Aug-2010	Include	AP	100343	2.120		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Acanthodiaptomus*	*denticornis*	*Acanthodiaptomus denticornis*
TL1		1	25-Aug-2010	Include	AP	100343	2.120		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
TL1		1	25-Aug-2010	Include	AP	100343	2.120		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
TL1		1	25-Aug-2010	Include	AP	100343	2.120		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
TL1		1	25-Aug-2010	Include	AP	100343	2.120		120		Crustacea	Maxillopoda	Calanoida	Temoridae	*Heterocope*	*septentrionalis*	*Heterocope septentrionalis*
TL1		1	25-Aug-2010	Include	AP	100343	2.120		120		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
TL1		1	25-Aug-2010	Include	AP	100343	2.120		120		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
TL1		1	25-Aug-2010	Include	AP	100343	2.120		120		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*scutifer*	*Cyclops scutifer*
TL1		1	25-Aug-2010	Include	AP	100343	2.120		120		Crustacea	Branchiopoda	Diplostraca	Daphnidae	*Daphnia*	*middendorffiana*	*Daphnia middendorffiana*
TL1		1	25-Aug-2010	Include	AP	100343	2.120		120		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
TL1		1	25-Aug-2010	Include	AP	100343	2.120		120		Rotifera	Monogonta	Flosculariaceae	Conochilidae	*Conochilus*		*Conochilus* sp.

Notes: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 6.2-1. Zooplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Depth	Replicate	Date	Stage	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Raw Count	Density (organisms/m^3)
TL1	Deep	2	17-Aug-2009		ok	ok		104390.4
TL1	Deep	2	17-Aug-2009		ok	ok		621.4
TL1	Mid	1	17-Aug-2009		ok	ok		6589.8
TL1	Mid	1	17-Aug-2009		ok	ok		506.9
TL1	Mid	1	17-Aug-2009	nauplius	exclude	exclude		91750.4
TL1	Mid	1	17-Aug-2009	copepodite	ok	exclude		19516
TL1	Mid	1	17-Aug-2009		ok	ok		5576
TL1	Mid	1	17-Aug-2009	copepodite	ok	exclude		3548.4
TL1	Mid	1	17-Aug-2009		ok	ok		253.5
TL1	Mid	1	17-Aug-2009		ok	ok		54492.7
TL1	Mid	1	17-Aug-2009		ok	ok		16728
TL1	Mid	2	17-Aug-2009		ok	ok		5618.2
TL1	Mid	2	17-Aug-2009		ok	ok		488.5
TL1	Mid	2	17-Aug-2009	nauplius	exclude	exclude		78899.6
TL1	Mid	2	17-Aug-2009	copepodite	ok	exclude		12213.6
TL1	Mid	2	17-Aug-2009		ok	ok		4885.4
TL1	Mid	2	17-Aug-2009	copepodite	ok	exclude		5129.7
TL1	Mid	2	17-Aug-2009		ok	ok		488.5
TL1	Mid	2	17-Aug-2009		ok	ok		1221.4
TL1	Mid	2	17-Aug-2009		ok	ok		42258.9
TL1	Mid	2	17-Aug-2009		ok	ok		23205.8
TL1	Shallow	1	17-Aug-2009		ok	ok		374.5
TL1	Shallow	1	17-Aug-2009		ok	ok		93.6
TL1	Shallow	1	17-Aug-2009		ok	ok		655.5
TL1	Shallow	1	17-Aug-2009	nauplius	exclude	exclude		19195.6
TL1	Shallow	1	17-Aug-2009	copepodite	ok	exclude		4401
TL1	Shallow	1	17-Aug-2009		ok	ok		1310.9
TL1	Shallow	1	17-Aug-2009	copepodite	ok	exclude		12079.2
TL1	Shallow	1	17-Aug-2009		ok	ok		93.6
TL1	Shallow	1	17-Aug-2009		ok	ok		27435.7
TL1	Shallow	1	17-Aug-2009		ok	ok		7678.3
TL1	Shallow	2	17-Aug-2009		ok	ok		1952.7
TL1	Shallow	2	17-Aug-2009		ok	ok		205.5
TL1	Shallow	2	17-Aug-2009	nauplius	exclude	exclude		27543.1
TL1	Shallow	2	17-Aug-2009	copepodite	ok	exclude		4624.8
TL1	Shallow	2	17-Aug-2009		ok	ok		822.2
TL1	Shallow	2	17-Aug-2009	copepodite	ok	exclude		13154.9
TL1	Shallow	2	17-Aug-2009		ok	ok		102.8
TL1	Shallow	2	17-Aug-2009		ok	ok		37512
TL1	Shallow	2	17-Aug-2009		ok	ok		18910.2
TL1		1	25-Aug-2010	adult	ok	ok	920	434.1
TL1		1	25-Aug-2010	III	ok	exclude	220	103.8
TL1		1	25-Aug-2010	IV	ok	exclude	250	118.0
TL1		1	25-Aug-2010	V	ok	exclude	1,100	519.0
TL1		1	25-Aug-2010	adult	ok	ok	620	292.5
TL1		1	25-Aug-2010	copepodite	ok	exclude	11,000	5,189.9
TL1		1	25-Aug-2010	nauplius	exclude	exclude	207,000	97,664.5
TL1		1	25-Aug-2010	adult	ok	ok	1,370	646.4
TL1		1	25-Aug-2010		ok	ok	2,800	1,321.1
TL1		1	25-Aug-2010		ok	ok	44,000	20,759.6
TL1		1	25-Aug-2010	colony	ok	ok	1,300	613.4

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Appendix 6.2-1. Zooplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Depth	Replicate	Date	Exclude / Include	Area	Lab Sample ID	Volume of Tow (m^3)	Volume Flow (m^3)	Mesh Size (µm)	Percent Counted	Major Taxon	Class	Order	Family	Genus	Species	Taxon
TL1		2	25-Aug-2010	Include	AP	100344	2.543		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Acanthodiaptomus*	*denticornis*	*Acanthodiaptomus denticornis*
TL1		2	25-Aug-2010	Include	AP	100344	2.543		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
TL1		2	25-Aug-2010	Include	AP	100344	2.543		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
TL1		2	25-Aug-2010	Include	AP	100344	2.543		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
TL1		2	25-Aug-2010	Include	AP	100344	2.543		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
TL1		2	25-Aug-2010	Include	AP	100344	2.543		120		Crustacea	Maxillopoda	Calanoida	Temoridae	*Heterocope*	*septentrionalis*	*Heterocope septentrionalis*
TL1		2	25-Aug-2010	Include	AP	100344	2.543		120		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
TL1		2	25-Aug-2010	Include	AP	100344	2.543		120		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
TL1		2	25-Aug-2010	Include	AP	100344	2.543		120		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*scutifer*	*Cyclops scutifer*
TL1		2	25-Aug-2010	Include	AP	100344	2.543		120		Crustacea	Branchiopoda	Diplostraca	Daphnidae	*Daphnia*	*middendorffiana*	*Daphnia middendorffiana*
TL1		2	25-Aug-2010	Include	AP	100344	2.543		120		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
TL1		2	25-Aug-2010	Include	AP	100344	2.543		120		Rotifera	Monogonta	Flosculariaceae	Conochilidae	*Conochilus*		*Conochilus* sp.
TL1		3	25-Aug-2010	Include	AP	100345	2.543		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Acanthodiaptomus*	*denticornis*	*Acanthodiaptomus denticornis*
TL1		3	25-Aug-2010	Include	AP	100345	2.543		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
TL1		3	25-Aug-2010	Include	AP	100345	2.543		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
TL1		3	25-Aug-2010	Include	AP	100345	2.543		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
TL1		3	25-Aug-2010	Include	AP	100345	2.543		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
TL1		3	25-Aug-2010	Include	AP	100345	2.543		120		Crustacea	Maxillopoda	Calanoida	Temoridae	*Heterocope*	*septentrionalis*	*Heterocope septentrionalis*
TL1		3	25-Aug-2010	Include	AP	100345	2.543		120		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
TL1		3	25-Aug-2010	Include	AP	100345	2.543		120		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
TL1		3	25-Aug-2010	Include	AP	100345	2.543		120		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*scutifer*	*Cyclops scutifer*
TL1		3	25-Aug-2010	Include	AP	100345	2.543		120		Crustacea	Branchiopoda	Diplostraca	Daphnidae	*Daphnia*	*middendorffiana*	*Daphnia middendorffiana*
TL1		3	25-Aug-2010	Include	AP	100345	2.543		120		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
TL1		3	25-Aug-2010	Include	AP	100345	2.543		120		Rotifera	Monogonta	Flosculariaceae	Conochilidae	*Conochilus*		*Conochilus* sp.
KL		3	12-Aug-2013	Include	AP	6530.1-12	2.121	0.439	63	100%	Crustacea	Maxillopoda					Copepoda
BL1		1	25-Aug-2010	Include	FF	100340	3.179		120		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
BL1		1	25-Aug-2010	Include	FF	100340	3.179		120		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
BL1		1	25-Aug-2010	Include	FF	100340	3.179		120		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*bicuspidatus*	*Cyclops bicuspidatus thomasi*
BL1		1	25-Aug-2010	Include	FF	100340	3.179		120		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*capillatus*	*Cyclops capillatus*
BL1		1	25-Aug-2010	Include	FF	100340	3.179		120		Crustacea	Branchiopoda	Diplostraca	Daphnidae	*Daphnia*	*middendorffiana*	*Daphnia middendorffiana*
BL1		1	25-Aug-2010	Include	FF	100340	3.179		120		Rotifera						Rotifera
BL1		1	25-Aug-2010	Include	FF	100340	3.179		120		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
BL1		1	25-Aug-2010	Include	FF	100340	3.179		120		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*cochlearis*	*Keratella cochlearis*
BL1		1	25-Aug-2010	Include	FF	100340	3.179		120		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*quadrata*	*Keratella quadrata*
BL1		2	25-Aug-2010	Include	FF	100341	1.060		120		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
BL1		2	25-Aug-2010	Include	FF	100341	1.060		120		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
BL1		2	25-Aug-2010	Include	FF	100341	1.060		120		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*bicuspidatus*	*Cyclops bicuspidatus thomasi*
BL1		2	25-Aug-2010	Include	FF	100341	1.060		120		Crustacea	Branchiopoda	Diplostraca	Bosminidae	*Bosmina*	*longirostris*	*Bosmina longirostris*
BL1		2	25-Aug-2010	Include	FF	100341	1.060		120		Rotifera						Rotifera
BL1		2	25-Aug-2010	Include	FF	100341	1.060		120		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*cochlearis*	*Keratella cochlearis*
BL1		2	25-Aug-2010	Include	FF	100341	1.060		120		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*quadrata*	*Keratella quadrata*
BL1		3	25-Aug-2010	Include	FF	100342	0.636		120		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
BL1		3	25-Aug-2010	Include	FF	100342	0.636		120		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
BL1		3	25-Aug-2010	Include	FF	100342	0.636		120		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*bicuspidatus*	*Cyclops bicuspidatus thomasi*
BL1		3	25-Aug-2010	Include	FF	100342	0.636		120		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*capillatus*	*Cyclops capillatus*
BL1		3	25-Aug-2010	Include	FF	100342	0.636		120		Crustacea	Branchiopoda	Diplostraca	Bosminidae	*Bosmina*	*longirostris*	*Bosmina longirostris*
BL1		3	25-Aug-2010	Include	FF	100342	0.636		120		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
BL1		3	25-Aug-2010	Include	FF	100342	0.636		120		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*cochlearis*	*Keratella cochlearis*
BL1		3	25-Aug-2010	Include	FF	100342	0.636		120		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*quadrata*	*Keratella quadrata*

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Appendix 6.2-1. Zooplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Depth	Replicate	Date	Stage	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Raw Count	Density (organisms/m^3)
TL1		2	25-Aug-2010	adult	ok	ok	720	283.1
TL1		2	25-Aug-2010	II	ok	exclude	20	7.9
TL1		2	25-Aug-2010	III	ok	exclude	20	7.9
TL1		2	25-Aug-2010	IV	ok	exclude	160	62.9
TL1		2	25-Aug-2010	V	ok	exclude	750	294.9
TL1		2	25-Aug-2010	adult	ok	ok	380	149.4
TL1		2	25-Aug-2010	copepodite	ok	exclude	6,300	2,477.0
TL1		2	25-Aug-2010	nauplius	exclude	exclude	194,000	76,275.9
TL1		2	25-Aug-2010	adult	ok	ok	1,160	456.1
TL1		2	25-Aug-2010		ok	ok	4,200	1,651.3
TL1		2	25-Aug-2010		ok	ok	50,000	19,658.7
TL1		2	25-Aug-2010	colony	ok	ok	1,060	416.8
TL1		3	25-Aug-2010	adult	ok	ok	850	334.2
TL1		3	25-Aug-2010	II	ok	exclude	30	11.8
TL1		3	25-Aug-2010	III	ok	exclude	120	47.2
TL1		3	25-Aug-2010	IV	ok	exclude	510	200.5
TL1		3	25-Aug-2010	V	ok	exclude	920	361.7
TL1		3	25-Aug-2010	adult	ok	ok	200	78.6
TL1		3	25-Aug-2010	copepodite	ok	exclude	7,100	2,791.5
TL1		3	25-Aug-2010	nauplius	exclude	exclude	177,000	69,591.9
TL1		3	25-Aug-2010	adult	ok	ok	710	279.2
TL1		3	25-Aug-2010		ok	ok	3,300	1,297.5
TL1		3	25-Aug-2010		ok	ok	36,000	14,154.3
TL1		3	25-Aug-2010	colony	ok	ok	130	51.1
KL		3	12-Aug-2013	nauplius	exclude	exclude	1	0.5
BL1		1	25-Aug-2010	copepodite	ok	exclude	28	8.8
BL1		1	25-Aug-2010	nauplius	exclude	exclude	3	0.9
BL1		1	25-Aug-2010	adult	ok	ok	36	11.3
BL1		1	25-Aug-2010	adult	ok	ok	1	0.3
BL1		1	25-Aug-2010		ok	ok	1	0.3
BL1		1	25-Aug-2010		ok	ok	1	0.3
BL1		1	25-Aug-2010		ok	ok	3	0.9
BL1		1	25-Aug-2010		ok	ok	27	8.5
BL1		1	25-Aug-2010		ok	ok	5	1.6
BL1		2	25-Aug-2010	copepodite	ok	exclude	6	5.7
BL1		2	25-Aug-2010	nauplius	exclude	exclude	2	1.9
BL1		2	25-Aug-2010	adult	ok	ok	26	24.5
BL1		2	25-Aug-2010		ok	ok	5	4.7
BL1		2	25-Aug-2010		ok	ok	1	0.9
BL1		2	25-Aug-2010		ok	ok	9	8.5
BL1		2	25-Aug-2010		ok	ok	3	2.8
BL1		3	25-Aug-2010	copepodite	ok	exclude	9	14.2
BL1		3	25-Aug-2010	nauplius	exclude	exclude	2	3.1
BL1		3	25-Aug-2010	adult	ok	ok	35	55.0
BL1		3	25-Aug-2010	adult	ok	ok	1	1.6
BL1		3	25-Aug-2010		ok	ok	1	1.6
BL1		3	25-Aug-2010		ok	ok	8	12.6
BL1		3	25-Aug-2010		ok	ok	1	1.6
BL1		3	25-Aug-2010		ok	ok	9	14.2

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Appendix 6.2-1. Zooplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Depth	Replicate	Date	Exclude / Include	Area	Lab Sample ID	Volume of Tow (m^3)	Volume Flow (m^3)	Mesh Size (µm)	Percent Counted	Major Taxon	Class	Order	Family	Genus	Species	Taxon
L1		1	23-Aug-2011	Exclude	FF	100267	1.060		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*	*pribilofensis*	*Leptodiaptomus pribilofensis*
L1		1	23-Aug-2011	Exclude	FF	100267	1.060		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L1		1	23-Aug-2011	Exclude	FF	100267	1.060		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L1		1	23-Aug-2011	Exclude	FF	100267	1.060		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L1		1	23-Aug-2011	Exclude	FF	100267	1.060		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L1		1	23-Aug-2011	Exclude	FF	100267	1.060		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L1		1	23-Aug-2011	Exclude	FF	100267	1.060		120		Crustacea	Maxillopoda	Calanoida	Temoridae	*Heterocope*	*septentrionalis*	*Heterocope septentrionalis*
L1		1	23-Aug-2011	Exclude	FF	100267	1.060		120		Crustacea	Maxillopoda	Calanoida				Calanoida
L1		1	23-Aug-2011	Exclude	FF	100267	1.060		120		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
L1		1	23-Aug-2011	Exclude	FF	100267	1.060		120		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*		*Cyclops* sp.
L1		1	23-Aug-2011	Exclude	FF	100267	1.060		120		Crustacea	Malacostraca	Amphipoda	Gammaridae	*Gammarus*	*lacustris*	*Gammarus lacustris*
L1		1	23-Aug-2011	Exclude	FF	100267	1.060		120		Insecta	Insecta	Diptera	Chaoboridae	*Chaoborus*		*Chaoborus* sp.
L1		1	23-Aug-2011	Exclude	FF	100267	1.060		120		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
L1		1	23-Aug-2011	Exclude	FF	100267	1.060		120		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*cochlearis*	*Keratella cochlearis*
L1		1	23-Aug-2011	Exclude	FF	100267	1.060		120		Rotifera	Monogonta	Flosculariaceae	Conochilidae	*Conochilus*		*Conochilus* sp.
L1		2	23-Aug-2011	Exclude	FF	100268	1.060		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*	*pribilofensis*	*Leptodiaptomus pribilofensis*
L1		2	23-Aug-2011	Exclude	FF	100268	1.060		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L1		2	23-Aug-2011	Exclude	FF	100268	1.060		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L1		2	23-Aug-2011	Exclude	FF	100268	1.060		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L1		2	23-Aug-2011	Exclude	FF	100268	1.060		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L1		2	23-Aug-2011	Exclude	FF	100268	1.060		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L1		2	23-Aug-2011	Exclude	FF	100268	1.060		120		Crustacea	Maxillopoda	Calanoida	Temoridae	*Heterocope*	*septentrionalis*	*Heterocope septentrionalis*
L1		2	23-Aug-2011	Exclude	FF	100268	1.060		120		Crustacea	Maxillopoda	Calanoida				Calanoida
L1		2	23-Aug-2011	Exclude	FF	100268	1.060		120		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
L1		2	23-Aug-2011	Exclude	FF	100268	1.060		120		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*scutifer*	*Cyclops scutifer*
L1		2	23-Aug-2011	Exclude	FF	100268	1.060		120		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*		*Cyclops* sp.
L1		2	23-Aug-2011	Exclude	FF	100268	1.060		120		Crustacea	Branchiopoda	Diplostraca	Holopediidae	*Holopedium*	*gibberum*	*Holopedium gibberum*
L1		2	23-Aug-2011	Exclude	FF	100268	1.060		120		Crustacea	Branchiopoda	Diplostraca	Sididae	*Sida*	*crystallina*	*Sida crystallina*
L1		2	23-Aug-2011	Exclude	FF	100268	1.060		120		Insecta	Insecta	Diptera	Chaoboridae	*Chaoborus*		*Chaoborus* sp.
L1		2	23-Aug-2011	Exclude	FF	100268	1.060		120		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
L1		2	23-Aug-2011	Exclude	FF	100268	1.060		120		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*cochlearis*	*Keratella cochlearis*
L1		2	23-Aug-2011	Exclude	FF	100268	1.060		120		Rotifera	Monogonta	Flosculariaceae	Conochilidae	*Conochilus*		*Conochilus* sp.
L1		3	23-Aug-2011	Exclude	FF	100269	1.060		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*	*pribilofensis*	*Leptodiaptomus pribilofensis*
L1		3	23-Aug-2011	Exclude	FF	100269	1.060		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L1		3	23-Aug-2011	Exclude	FF	100269	1.060		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L1		3	23-Aug-2011	Exclude	FF	100269	1.060		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L1		3	23-Aug-2011	Exclude	FF	100269	1.060		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L1		3	23-Aug-2011	Exclude	FF	100269	1.060		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L1		3	23-Aug-2011	Exclude	FF	100269	1.060		120		Crustacea	Maxillopoda	Calanoida	Temoridae	*Heterocope*	*septentrionalis*	*Heterocope septentrionalis*
L1		3	23-Aug-2011	Exclude	FF	100269	1.060		120		Crustacea	Maxillopoda	Calanoida				Calanoida
L1		3	23-Aug-2011	Exclude	FF	100269	1.060		120		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
L1		3	23-Aug-2011	Exclude	FF	100269	1.060		120		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*scutifer*	*Cyclops scutifer*
L1		3	23-Aug-2011	Exclude	FF	100269	1.060		120		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*		*Cyclops* sp.
L1		3	23-Aug-2011	Exclude	FF	100269	1.060		120		Insecta	Insecta	Diptera	Chaoboridae	*Chaoborus*		*Chaoborus* sp.
L1		3	23-Aug-2011	Exclude	FF	100269	1.060		120		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
L1		3	23-Aug-2011	Exclude	FF	100269	1.060		120		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*cochlearis*	*Keratella cochlearis*
L1		3	23-Aug-2011	Exclude	FF	100269	1.060		120		Rotifera	Monogonta	Flosculariaceae	Conochilidae	*Conochilus*		*Conochilus* sp.
L2		1	24-Aug-2011	Exclude	FF	100270	2.121		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*	*pribilofensis*	*Leptodiaptomus pribilofensis*
L2		1	24-Aug-2011	Exclude	FF	100270	2.121		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L2		1	24-Aug-2011	Exclude	FF	100270	2.121		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L2		1	24-Aug-2011	Exclude	FF	100270	2.121		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.

Notes: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 6.2-1. Zooplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Depth	Replicate	Date	Stage	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Raw Count	Density (organisms/m^3)
L1		1	23-Aug-2011	adult	ok	ok	3,100	2,923.7
L1		1	23-Aug-2011	I	ok	exclude	340	320.7
L1		1	23-Aug-2011	II	ok	exclude	530	499.9
L1		1	23-Aug-2011	III	ok	exclude	620	584.7
L1		1	23-Aug-2011	IV	ok	exclude	1,400	1,320.4
L1		1	23-Aug-2011	V	ok	exclude	1,900	1,792.0
L1		1	23-Aug-2011	adult	ok	ok	46	43.4
L1		1	23-Aug-2011	nauplius	exclude	exclude	600	565.9
L1		1	23-Aug-2011	nauplius	exclude	exclude	40	37.7
L1		1	23-Aug-2011	copepodite	ok	exclude	710	669.6
L1		1	23-Aug-2011		ok	ok	1	0.9
L1		1	23-Aug-2011	larva	ok	ok	40	37.7
L1		1	23-Aug-2011		ok	ok	2,900	2,735.1
L1		1	23-Aug-2011		ok	ok	300	282.9
L1		1	23-Aug-2011	colony	ok	ok	150	141.5
L1		2	23-Aug-2011	adult	ok	ok	5,900	5,564.5
L1		2	23-Aug-2011	I	ok	exclude	710	669.6
L1		2	23-Aug-2011	II	ok	exclude	1,700	1,603.3
L1		2	23-Aug-2011	III	ok	exclude	1,000	943.1
L1		2	23-Aug-2011	IV	ok	exclude	5,100	4,810.0
L1		2	23-Aug-2011	V	ok	exclude	4,000	3,772.6
L1		2	23-Aug-2011	adult	ok	ok	33	31.1
L1		2	23-Aug-2011	nauplius	exclude	exclude	410	386.7
L1		2	23-Aug-2011	nauplius	exclude	exclude	270	254.6
L1		2	23-Aug-2011	adult	ok	ok	20	18.9
L1		2	23-Aug-2011	copepodite	ok	exclude	660	622.5
L1		2	23-Aug-2011		ok	ok	1	0.9
L1		2	23-Aug-2011		ok	ok	1	0.9
L1		2	23-Aug-2011	larva	ok	ok	17	16.0
L1		2	23-Aug-2011		ok	ok	4,700	4,432.8
L1		2	23-Aug-2011		ok	ok	200	188.6
L1		2	23-Aug-2011	colony	ok	ok	43	40.6
L1		3	23-Aug-2011	adult	ok	ok	5,500	5,187.3
L1		3	23-Aug-2011	I	ok	exclude	900	848.8
L1		3	23-Aug-2011	II	ok	exclude	1,100	1,037.5
L1		3	23-Aug-2011	III	ok	exclude	1,200	1,131.8
L1		3	23-Aug-2011	IV	ok	exclude	2,800	2,640.8
L1		3	23-Aug-2011	V	ok	exclude	3,500	3,301.0
L1		3	23-Aug-2011	adult	ok	ok	44	41.5
L1		3	23-Aug-2011	nauplius	exclude	exclude	350	330.1
L1		3	23-Aug-2011	nauplius	exclude	exclude	110	103.7
L1		3	23-Aug-2011	adult	ok	ok	10	9.4
L1		3	23-Aug-2011	copepodite	ok	exclude	1,100	1,037.5
L1		3	23-Aug-2011	larva	ok	ok	51	48.1
L1		3	23-Aug-2011		ok	ok	2,200	2,074.9
L1		3	23-Aug-2011		ok	ok	300	282.9
L1		3	23-Aug-2011	colony	ok	ok	39	36.8
L2		1	24-Aug-2011	adult	ok	ok	3,500	1,650.5
L2		1	24-Aug-2011	I	ok	exclude	300	141.5
L2		1	24-Aug-2011	II	ok	exclude	100	47.2
L2		1	24-Aug-2011	III	ok	exclude	100	47.2

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Appendix 6.2-1. Zooplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Depth	Replicate	Date	Exclude / Include	Area	Lab Sample ID	Volume of Tow (m^3)	Volume Flow (m^3)	Mesh Size (µm)	Percent Counted	Major Taxon	Class	Order	Family	Genus	Species	Taxon
L2		1	24-Aug-2011	Exclude	FF	100270	2.121		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L2		1	24-Aug-2011	Exclude	FF	100270	2.121		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L2		1	24-Aug-2011	Exclude	FF	100270	2.121		120		Crustacea	Maxillopoda	Calanoida	Temoridae	*Heterocope*	*septentrionalis*	*Heterocope septentrionalis*
L2		1	24-Aug-2011	Exclude	FF	100270	2.121		120		Crustacea	Maxillopoda	Calanoida				Calanoida
L2		1	24-Aug-2011	Exclude	FF	100270	2.121		120		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
L2		1	24-Aug-2011	Exclude	FF	100270	2.121		120		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*scutifer*	*Cyclops scutifer*
L2		1	24-Aug-2011	Exclude	FF	100270	2.121		120		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*		*Cyclops* sp.
L2		1	24-Aug-2011	Exclude	FF	100270	2.121		120		Insecta	Insecta	Diptera	Chaoboridae	*Chaoborus*		*Chaoborus* sp.
L2		1	24-Aug-2011	Exclude	FF	100270	2.121		120		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
L2		1	24-Aug-2011	Exclude	FF	100270	2.121		120		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*cochlearis*	*Keratella cochlearis*
L2		1	24-Aug-2011	Exclude	FF	100270	2.121		120		Rotifera	Monogonta	Flosculariaceae	Conochilidae	*Conochilus*		*Conochilus* sp.
L2		2	24-Aug-2011	Exclude	FF	100271	2.121		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*	*pribilofensis*	*Leptodiaptomus pribilofensis*
L2		2	24-Aug-2011	Exclude	FF	100271	2.121		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L2		2	24-Aug-2011	Exclude	FF	100271	2.121		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L2		2	24-Aug-2011	Exclude	FF	100271	2.121		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L2		2	24-Aug-2011	Exclude	FF	100271	2.121		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L2		2	24-Aug-2011	Exclude	FF	100271	2.121		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L2		2	24-Aug-2011	Exclude	FF	100271	2.121		120		Crustacea	Maxillopoda	Calanoida	Temoridae	*Heterocope*	*septentrionalis*	*Heterocope septentrionalis*
L2		2	24-Aug-2011	Exclude	FF	100271	2.121		120		Crustacea	Maxillopoda	Calanoida				Calanoida
L2		2	24-Aug-2011	Exclude	FF	100271	2.121		120		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
L2		2	24-Aug-2011	Exclude	FF	100271	2.121		120		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*scutifer*	*Cyclops scutifer*
L2		2	24-Aug-2011	Exclude	FF	100271	2.121		120		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*		*Cyclops* sp.
L2		2	24-Aug-2011	Exclude	FF	100271	2.121		120		Crustacea	Branchiopoda	Diplostraca	Holopediidae	*Holopedium*	*gibberum*	*Holopedium gibberum*
L2		2	24-Aug-2011	Exclude	FF	100271	2.121		120		Insecta	Insecta	Diptera	Chaoboridae	*Chaoborus*		*Chaoborus* sp.
L2		2	24-Aug-2011	Exclude	FF	100271	2.121		120		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
L2		2	24-Aug-2011	Exclude	FF	100271	2.121		120		Rotifera	Monogonta	Ploima	Brachionidae	*Keratella*	*cochlearis*	*Keratella cochlearis*
L2		2	24-Aug-2011	Exclude	FF	100271	2.121		120		Rotifera	Monogonta	Flosculariaceae	Conochilidae	*Conochilus*		*Conochilus* sp.
L2		3	24-Aug-2011	Exclude	FF	100272	2.121		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*	*pribilofensis*	*Leptodiaptomus pribilofensis*
L2		3	24-Aug-2011	Exclude	FF	100272	2.121		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L2		3	24-Aug-2011	Exclude	FF	100272	2.121		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L2		3	24-Aug-2011	Exclude	FF	100272	2.121		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L2		3	24-Aug-2011	Exclude	FF	100272	2.121		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L2		3	24-Aug-2011	Exclude	FF	100272	2.121		120		Crustacea	Maxillopoda	Calanoida	Diaptomidae	*Leptodiaptomus*		*Leptodiaptomus* sp.
L2		3	24-Aug-2011	Exclude	FF	100272	2.121		120		Crustacea	Maxillopoda	Calanoida	Temoridae	*Heterocope*	*septentrionalis*	*Heterocope septentrionalis*
L2		3	24-Aug-2011	Exclude	FF	100272	2.121		120		Crustacea	Maxillopoda	Calanoida				Calanoida
L2		3	24-Aug-2011	Exclude	FF	100272	2.121		120		Crustacea	Maxillopoda	Cyclopoida				Cyclopoida
L2		3	24-Aug-2011	Exclude	FF	100272	2.121		120		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*	*scutifer*	*Cyclops scutifer*
L2		3	24-Aug-2011	Exclude	FF	100272	2.121		120		Crustacea	Maxillopoda	Cyclopoida	Cyclopidae	*Cyclops*		*Cyclops* sp.
L2		3	24-Aug-2011	Exclude	FF	100272	2.121		120		Crustacea	Branchiopoda	Diplostraca	Bosminidae	*Bosmina*	*longirostris*	*Bosmina longirostris*
L2		3	24-Aug-2011	Exclude	FF	100272	2.121		120		Insecta	Insecta	Diptera	Chaoboridae	*Chaoborus*		*Chaoborus* sp.
L2		3	24-Aug-2011	Exclude	FF	100272	2.121		120		Rotifera	Monogonta	Ploima	Brachionidae	*Kellicottia*	*longispina*	*Kellicottia longispina*
L2		3	24-Aug-2011	Exclude	FF	100272	2.121		120		Rotifera	Monogonta	Flosculariaceae	Conochilidae	*Conochilus*		*Conochilus* sp.

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Appendix 6.2-1. Zooplankton Taxa and Abundance in Lakes, 2008 to 2013

Site	Depth	Replicate	Date	Stage	Excluded (Taxa Type)	Excluded (Damaged or Taxa Type)	Raw Count	Density (organisms/m^3)
L2		1	24-Aug-2011	IV	ok	exclude	100	47.2
L2		1	24-Aug-2011	V	ok	exclude	8,400	3,961.2
L2		1	24-Aug-2011	adult	ok	ok	200	94.3
L2		1	24-Aug-2011	nauplius	exclude	exclude	2,500	1,178.9
L2		1	24-Aug-2011	nauplius	exclude	exclude	54,000	25,464.8
L2		1	24-Aug-2011	adult	ok	ok	110	51.9
L2		1	24-Aug-2011	copepodite	ok	exclude	3,600	1,697.7
L2		1	24-Aug-2011	larva	ok	ok	66	31.1
L2		1	24-Aug-2011		ok	ok	8,000	3,772.6
L2		1	24-Aug-2011		ok	ok	100	47.2
L2		1	24-Aug-2011	colony	ok	ok	600	282.9
L2		2	24-Aug-2011	adult	ok	ok	3,700	1,744.8
L2		2	24-Aug-2011	I	ok	exclude	10	4.7
L2		2	24-Aug-2011	II	ok	exclude	20	9.4
L2		2	24-Aug-2011	III	ok	exclude	10	4.7
L2		2	24-Aug-2011	IV	ok	exclude	40	18.9
L2		2	24-Aug-2011	V	ok	exclude	13,200	6,224.7
L2		2	24-Aug-2011	adult	ok	ok	340	160.3
L2		2	24-Aug-2011	nauplius	exclude	exclude	1,900	896.0
L2		2	24-Aug-2011	nauplius	exclude	exclude	45,000	21,220.7
L2		2	24-Aug-2011	adult	ok	ok	100	47.2
L2		2	24-Aug-2011	copepodite	ok	exclude	5,500	2,593.6
L2		2	24-Aug-2011		ok	ok	1	0.5
L2		2	24-Aug-2011	larva	ok	ok	60	28.3
L2		2	24-Aug-2011		ok	ok	1,500	707.4
L2		2	24-Aug-2011		ok	ok	200	94.3
L2		2	24-Aug-2011	colony	ok	ok	440	207.5
L2		3	24-Aug-2011	adult	ok	ok	2,500	1,178.9
L2		3	24-Aug-2011	I	ok	exclude	30	14.1
L2		3	24-Aug-2011	II	ok	exclude	50	23.6
L2		3	24-Aug-2011	III	ok	exclude	30	14.1
L2		3	24-Aug-2011	IV	ok	exclude	90	42.4
L2		3	24-Aug-2011	V	ok	exclude	9,700	4,574.2
L2		3	24-Aug-2011	adult	ok	ok	250	117.9
L2		3	24-Aug-2011	nauplius	exclude	exclude	1,400	660.2
L2		3	24-Aug-2011	nauplius	exclude	exclude	39,000	18,391.2
L2		3	24-Aug-2011	adult	ok	ok	100	47.2
L2		3	24-Aug-2011	copepodite	ok	exclude	3,800	1,792.0
L2		3	24-Aug-2011		ok	ok	10	4.7
L2		3	24-Aug-2011	larva	ok	ok	64	30.2
L2		3	24-Aug-2011		ok	ok	1,400	660.2
L2		3	24-Aug-2011	colony	ok	ok	300	141.5

Notes: MA = Mine Site Area and Downstream Receiving Environment; AP = Ancillary Project Infrastructure Areas; FF = Far-field (outside of Regional Study Area) ; R = Potential Reference

Appendix 6.3-1. Benthic Invertebrate Quality Control Report, 2008 to 2013

Year	Site	Replicate	% sorting efficiency
2008	SC1	3	[1-(0/(42+0))]*100 = 100%
	SC2	1	[1-(0/(15+0))]*100 = 100%
	UR1	5	[1-(1/(76+1))]*100 = 98.7%
			Average efficiency – 99.6%
2009	SC1	1	[1-(0/(68+0))]*100 = 100%
	SC3	3	[1-(0/(10+0))]*100 = 100%
	TL1 Mid	2	[1-(6/(347+6))]*100 = 98.3%
			Average efficiency – 99.4%
2010	TL1	3	[1-(0/(63+0))]*100 = 100
			Average efficiency – 100%
2011	L1	1	[1-(0/(75+0))]*100 = 100
	L2	1	[1-(0/(65+0))]*100 = 100
	WC2	1	[1-(17/(1337+17))]*100 = 98.8
	WC5	2	[1-(1/(68+1))]*100 = 98.6
	MC1	4	[1-(3/(280+3))]*100 = 98.9
			Average efficiency – 99.0%

Note: % sorting efficiency = [1-(# in QA/AC re-sort / (# sorted originally + # QA/QC resort))] 100*

Appendix 6.3-1. Benthic Invertebrate Quality Control Report, 2008 to 2013

Year	Site	Replicate	Lab Sample ID	Sampling Date	Sorter	Sort Date	Percent Subsampled	Primary Matrix	Estimated Pre-Rinse Volume (L)	Estimated Post-Rinse Volume (L)	QC Sorter	QC Date	Estimated Recovery (%)
2012	BJ Lake	1	6204.1-4	8-Sep-2012	Allie Pfeiffer	27-Dec-2012	100	Inorganic	0.03	0.01	Jennifer Bobier	27-Dec-2012	100
2012	BJ Lake	2	6204.1-5	9-Sep-2012	Allie Pfeiffer	27-Dec-2012	100	Inorganic	0.04	0.01	Jennifer Bobier	27-Dec-2012	100
2012	BJ Lake	3	6204.1-6	9-Sep-2012	Allie Pfeiffer	27-Dec-2012	100	Inorganic	0	0	Jennifer Bobier	28-Dec-2012	100
2012	BJ Lake Shallow	1	6204.1-1	8-Sep-2012	Jennifer Bobier	24-Dec-2012	100	Fine Organic	0.05	0	Zach Meier	27-Dec-2012	100
2012	BJ Lake Shallow	2	6204.1-2	8-Sep-2012	Jennifer Bobier	26-Dec-2012	100	Fine Organic	0.05	0	Zach Meier	27-Dec-2012	100
2012	BJ Lake Shallow	3	6204.1-3	8-Sep-2012	Allie Pfeiffer	26-Dec-2012	100	Inorganic	0.1	0.05	Jennifer Bobier	27-Dec-2012	100
2012	BJ U/S of CC	1	6204.4-7	7-Sep-2012	Nora Williams	28-Dec-2012	100	Inorganic	0.075	0.025	Jen Bobier	29-Dec-2012	100
2012	BJ U/S of CC	2	6204.4-8	7-Sep-2012	Amanda Thompson	28-Dec-2012	100	Fine Organic	0.05	0.005	Nora Williams	29-Dec-2012	100
2012	BJ U/S of CC	3	6204.4-9	7-Sep-2012	Amanda Thompson	28-Dec-2012	100	Fine Organic	0.025	0.002	Nora Williams	29-Dec-2012	100
2012	BJ Inter	1	6204.4-4	7-Sep-2012	Allie Pfeiffer	28-Dec-2012	100	Inorganic	0.35	0.04	Nora Williams	28-Dec-2012	100
2012	BJ Inter	2	6204.4-5	7-Sep-2012	Amanda Thompson	28-Dec-2012	100	Filamentous Algae	0.15	0.025	Nora Williams	29-Dec-2012	100
2012	BJ Inter	3	6204.4-6	7-Sep-2012	Nora Williams	28-Dec-2012	100	Inorganic	0.26	0.01	Jen Bobier	29-Dec-2012	100
2012	BJ2	1	6204.4-1	7-Sep-2012	Allie Pfeiffer	27-Dec-2012	100	Filamentous Algae	0.2	0.004	Nora Williams	28-Dec-2012	100
2012	BJ2	2	6204.4-2	7-Sep-2012	Allie Pfeiffer	28-Dec-2012	100	Inorganic	0.25	0.06	Nora Williams	28-Dec-2012	100
2012	BJ2	3	6204.4-3	7-Sep-2012	Allie Pfeiffer	28-Dec-2012	100	Filamentous Algae	0.15	0.04	Nora Williams	28-Dec-2012	100
2013	BJ U/S	N/A (CABIN)	6530.4-3	15-Aug-2013	Nora Williams	1-Nov-2013	100	Inorganic	0.6	0.05	Ben Alexander	4-Nov-2013	100
2013	BJ2	N/A (CABIN)	6530.4-2	14-Aug-2013	Nora Williams	1-Nov-2013	100	Filamentous Algae	0.6	0.05	Ben Alexander	3-Nov-2013	100
2013	Divide OF	N/A (CABIN)	6530.4-1	11-Aug-2013	Nora Williams	1-Nov-2013	33	Filamentous Algae	0.88	0.77	Ben Alexander	4-Nov-2013	98.73
2013	BJ Lake	1	6530.2-1	9-Aug-2012	Steven Little	5-Sep-2013	100	Coarse Organic	<0.01	<0.01	Nora Williams	5-Sep-2013	100
2013	BJ Lake	2	6530.2-2	9-Aug-2012	Steven Little	5-Sep-2013	100	Inorganic	<0.01	<0.01	Nora Williams	5-Sep-2013	100
2013	BJ Lake	3	6530.2-3	9-Aug-2012	Steven Little	5-Sep-2013	100	Inorganic	<0.01	<0.01	Ben Alexander	11-Sep-2013	100
2013	BJ Lake	4	6530.2-4	9-Aug-2012	Steven Little	5-Sep-2013	100	Inorganic	<0.01	<0.01	Ben Alexander	11-Sep-2013	100
2013	BJ Lake	5	6530.2-5	9-Aug-2012	Steven Little	6-Sep-2013	100	Inorganic	<0.01	<0.01	Ben Alexander	11-Sep-2013	100
2013	BJ Lake Shallow	1	6530.2-6	10-Aug-2013	Steven Little	6-Sep-2013	100	Inorganic	0.04	0.04	Ben Alexander	11-Sep-2013	100
2013	BJ Lake Shallow	2	6530.2-7	10-Aug-2013	Steven Little	6-Sep-2013	100	Inorganic	<0.01	<0.01	Ben Alexander	11-Sep-2013	100
2013	BJ Lake Shallow	3	6530.2-8	10-Aug-2013	Steven Little	8-Sep-2013	100	Inorganic	0.1	0.1	Ben Alexander	11-Sep-2013	100
2013	BJ Lake Shallow	4	6530.2-9	10-Aug-2013	Steven Little	8-Sep-2013	100	Inorganic	0.05	0.05	Ben Alexander	11-Sep-2013	100
2013	BJ Lake Shallow	5	6530.2-10	10-Aug-2013	Steven Little	9-Sep-2013	100	Inorganic	0.08	0.08	Ben Alexander	11-Sep-2013	100
2013	SUL Lake	1	6530.2-11	10-Aug-2013	Steven Little	9-Sep-2013	100	Coarse Organic	<0.01	<0.01	Ben Alexander	11-Sep-2013	100
2013	SUL Lake	2	6530.2-12	10-Aug-2013	Steven Little	9-Sep-2013	100	Coarse Organic	<0.01	<0.01	Ben Alexander	11-Sep-2013	100
2013	SUL Lake	3	6530.2-13	10-Aug-2013	Steven Little	10-Sep-2013	100	Coarse Organic	<0.01	<0.01	Ben Alexander	11-Sep-2013	100
2013	SUL Lake	4	6530.2-14	10-Aug-2013	Steven Little	10-Sep-2013	100	Coarse Organic	<0.01	<0.01	Ben Alexander	11-Sep-2013	100
2013	SUL Lake	5	6530.2-15	10-Aug-2013	Steven Little	10-Sep-2013	100	Fine Organic	<0.01	<0.01	Ben Alexander	11-Sep-2013	100
2013	Divide Lake	1	6530.2-16	11-Aug-2013	Steven Little	11-Sep-2013	100	Inorganic	0.05	0.03	Ben Alexander	11-Sep-2013	100
2013	Divide Lake	2	6530.2-17	11-Aug-2013	Steven Little	10-Sep-2013	100	Inorganic	0.05	<0.01	Ben Alexander	11-Sep-2013	100
2013	Divide Lake	3	6530.2-18	11-Aug-2013	Steven Little	11-Sep-2013	93.75	Inorganic	0.03	<0.01	Ben Alexander	11-Sep-2013	100
2013	Divide Lake	4	6530.2-19	11-Aug-2013	Steven Little	11-Sep-2013	100	Inorganic	0.03	<0.01	Ben Alexander	12-Sep-2013	100
2013	Divide Lake	5	6530.2-20	11-Aug-2013	Steven Little	11-Sep-2013	100	Inorganic	0.03	<0.01	Ben Alexander	12-Sep-2013	100
2013	KL	1	6530.2-21	12-Aug-2013	Steven Little	11-Sep-2013	100	Filamentous Algae	<0.01	<0.01	Ben Alexander	12-Sep-2013	100
2013	KL	2	6530.2-22	12-Aug-2013	Steven Little	11-Sep-2013	100	Filamentous Algae	0.02	0.02	Ben Alexander	12-Sep-2013	100
2013	KL	3	6530.2-23	12-Aug-2013	Steven Little	11-Sep-2013	100	Filamentous Algae	0.01	0.01	Ben Alexander	12-Sep-2013	100
2013	KL	4	6530.2-24	12-Aug-2013	Steven Little	12-Sep-2013	100	Filamentous Algae	<0.01	<0.01	Ben Alexander	12-Sep-2013	100
2013	KL	5	6530.2-25	12-Aug-2013	Steven Little	12-Sep-2013	100	Filamentous Algae	<0.01	<0.01	Ben Alexander	12-Sep-2013	100
2013	BJ U/S	1	6530.3-1	15-Aug-2013	Steven Little	12-Sep-2013	100	Inorganic	0.13	0.03	Ben Alexander	13-Sep-2013	100
2013	BJ U/S	2	6530.3-2	15-Aug-2013	Steven Little	12-Sep-2013	100	Inorganic	2	0.01	Ben Alexander	13-Sep-2013	100
2013	BJ U/S	3	6530.3-3	15-Aug-2013	Steven Little	12-Sep-2013	100	Inorganic	0.1	0.01	Ben Alexander	13-Sep-2013	100
2013	BJ U/S	4	6530.3-4	15-Aug-2013	Steven Little	12-Sep-2013	100	Inorganic	0.17	0.01	Ben Alexander	13-Sep-2013	100
2013	BJ U/S	5	6530.3-5	15-Aug-2013	Steven Little	12-Sep-2013	100	Inorganic	0.08	<0.01	Ben Alexander	13-Sep-2013	100
2013	BJ2	1	6530.3-21	14-Aug-2013	Steven Little	10-Oct-2013	100	Filamentous Algae	0.25	0.03	Nora Williams	14-Oct-2013	100

Appendix 6.3-1. Benthic Invertebrate Quality Control Report, 2008 to 2013

Year	Site	Replicate	Lab Sample ID	Sampling Date	Sorter	Sort Date	Percent Subsampled	Primary Matrix	Estimated Pre-Rinse Volume (L)	Estimated Post-Rinse Volume (L)	QC Sorter	QC Date	Estimated Recovery (%)
2013	BJ2	2	6530.3-22	14-Aug-2013	Steven Little	10-Oct-2013	100	Filamentous Algae	0.15	0.01	Nora Williams	14-Oct-2013	100
2013	BJ2	3	6530.3-23	14-Aug-2013	Steven Little	10-Oct-2013	100	Inorganic	0.2	<0.01	Nora Williams	14-Oct-2013	100
2013	BJ2	4	6530.3-24	14-Aug-2013	Steven Little	11-Oct-2013	100	Filamentous Algae	0.25	0.01	Nora Williams	14-Oct-2013	100
2013	BJ2	5	6530.3-25	14-Aug-2013	Steven Little	11-Oct-2013	100	Filamentous Algae	0.2	0.01	Nora Williams	14-Oct-2013	100
2013	BJ3	1	6530.3-6	7-Aug-2013	Steven Little	13-Sep-2013	100	Filamentous Algae	0.15	0.15	Ben Alexander	16-Sep-2013	100
2013	BJ3	2	6530.3-7	7-Aug-2013	Steven Little	13-Sep-2013	100	Filamentous Algae	0.17	0.05	Ben Alexander	16-Sep-2013	100
2013	BJ3	3	6530.3-8	7-Aug-2013	Steven Little	14-Sep-2013	100	Filamentous Algae	0.05	0.05	Ben Alexander	16-Sep-2013	100
2013	BJ3	4	6530.3-9	7-Aug-2013	Steven Little	14-Sep-2013	100	Filamentous Algae	0.08	0.05	Ben Alexander	16-Sep-2013	100
2013	BJ3	5	6530.3-10	7-Aug-2013	Steven Little	15-Sep-2013	100	Filamentous Algae	0.17	0.03	Ben Alexander	16-Sep-2013	100
2013	SC0	1	6530.3-11	8-Aug-2013	Steven Little	15-Sep-2013	100	Inorganic	0.6	<0.01	Ben Alexander	16-Sep-2013	100
2013	SC0	2	6530.3-12	8-Aug-2013	Steven Little	15-Sep-2013	100	Inorganic	1	<0.01	Ben Alexander	16-Sep-2013	100
2013	SC0	3	6530.3-13	8-Aug-2013	Steven Little	15-Sep-2013	100	Inorganic	1	<0.01	Ben Alexander	16-Sep-2013	100
2013	SC0	4	6530.3-14	8-Aug-2013	Steven Little	15-Sep-2013	100	Inorganic	0.6	<0.01	Ben Alexander	16-Sep-2013	100
2013	SC0	5	6530.3-15	8-Aug-2013	Steven Little	16-Sep-2013	100	Inorganic	1	<0.01	Ben Alexander	20-Sep-2013	100
2013	Divide OF	1	6530.3-16	12-Aug-2013	Steven Little	17-Sep-2013	20.83	Vegetation	0.15	0.1	Ben Alexander	20-Sep-2013	100
2013	Divide OF	2	6530.3-17	12-Aug-2013	Steven Little	18-Sep-2013	54.17	Vegetation	0.05	0.05	Ben Alexander	20-Sep-2013	100
2013	Divide OF	3	6530.3-18	12-Aug-2013	Steven Little	21-Sep-2013	12.28	Vegetation	0.4	0.2	Ben Alexander	21-Sep-2013	97.16
2013	Divide OF	4	6530.3-19	12-Aug-2013	Steven Little	10-Oct-2013	10.42	Vegetation	0.43	0.2	Nora Williams	14-Oct-2013	100
2013	Divide OF	5	6530.3-20	12-Aug-2013	Steven Little	12-Oct-2013	12.5	Vegetation	0.45	0.25	Nora Williams	14-Oct-2013	100

Appendix 6.3-2. Zooplankton Quality Control Report, 2008 to 2013

Site	Replicate	Date	Lab Sample ID	Orignial Taxonomist	Sort Date	Component	Taxon	AB	L	P	A	QC Taxonomist	AB	L	P	A	Difference
BJ	3	9-Aug-12	6530.1-3	Karen Schnake	14-Nov-13	Coarse Fraction	Calanoida - copepodites	121	121	0	0	Matthew Hill	133	133	0	0	-12
BJ	3	9-Aug-12	6530.1-3	Karen Schnake	14-Nov-13	Coarse Fraction	Hesperodiaptomus	41	41	0	0	Matthew Hill	29	29	0	0	12
Percent Similarity								**162**					**162**				**92.59%**
BJ	3	9-Aug-12	6530.1-3	Karen Schnake	14-Nov-13	Fine Fraction	Calanoida - copepodites	141	141	0	0	Matthew Hill	133	133	0	0	8
BJ	3	9-Aug-12	6530.1-3	Karen Schnake	14-Nov-13	Fine Fraction	Hesperodiaptomus	21	21	0	0	Matthew Hill	21	21	0	0	0
Percent Similarity								**162**					**154**				**99.33%**

Appendix 6.4-1. Zooplankton Reference Photographs, 2012

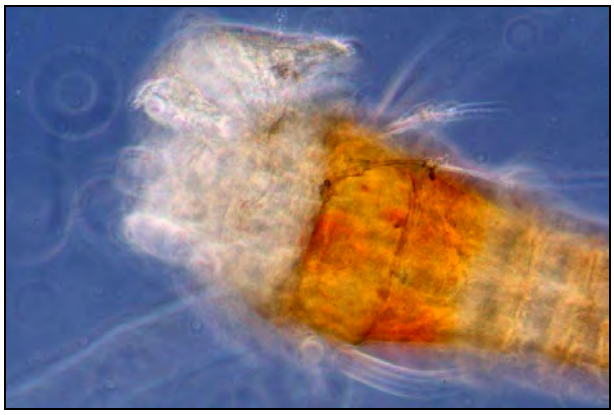
Reference photographs of abundant zooplankton are shown below with EcoAnalysts, Inc. sample ID.

Calanoida copepodite - 6204.2

Copepda nauplii - 6204.2

Appendix 6.4-2. Zooplankton Reference Photographs, 2013

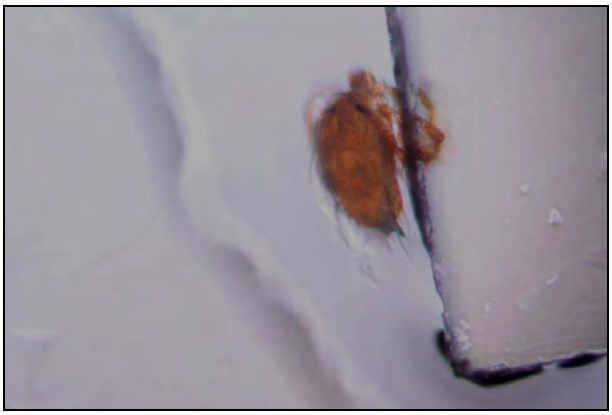
Reference photographs of abundant zooplankton are shown below.



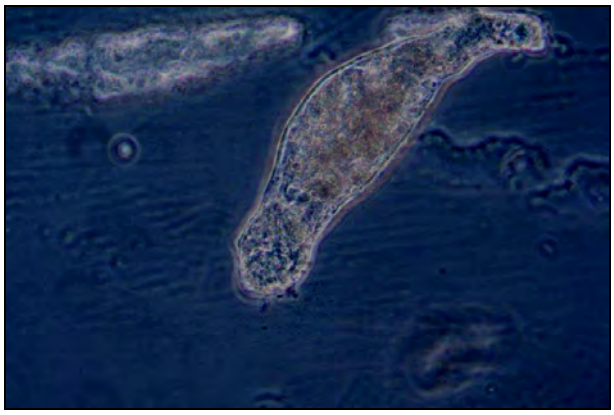
Acanthocyclops capillatus 5th leg

Acanthocyclops capillatus ant

Acanthocyclops capillatus caudal rami



Acari

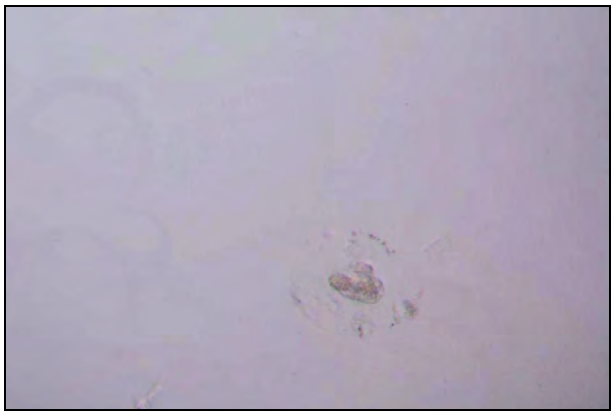


Bdelloidea trophi

Bdelloidea

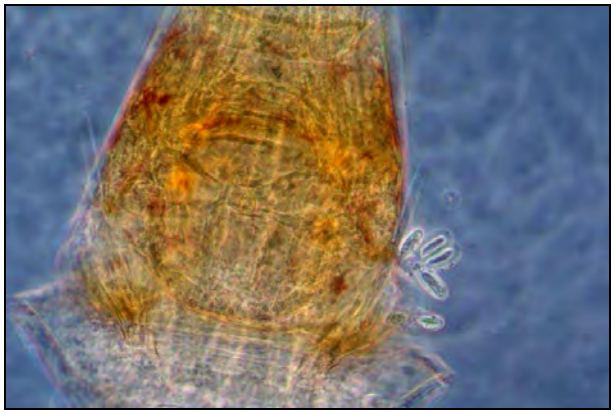
Calanoid copepodite

Chironomidae

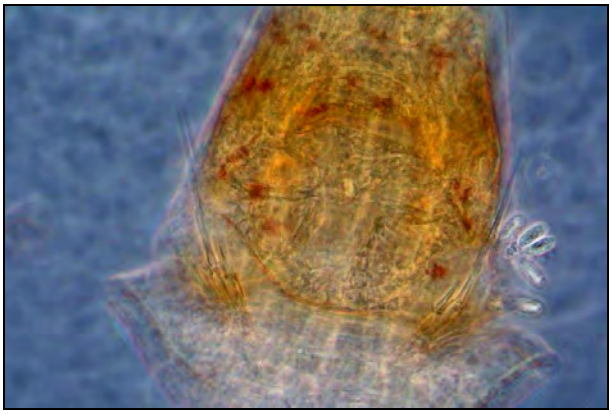


Collotheca sp.

Cyclopoida copepodite

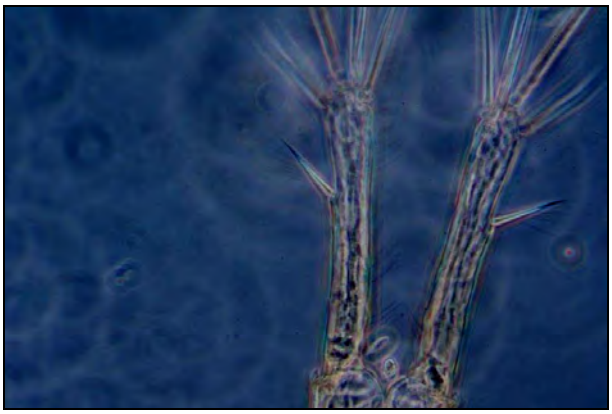


Cyclops strenuus 1st seg of 5th leg



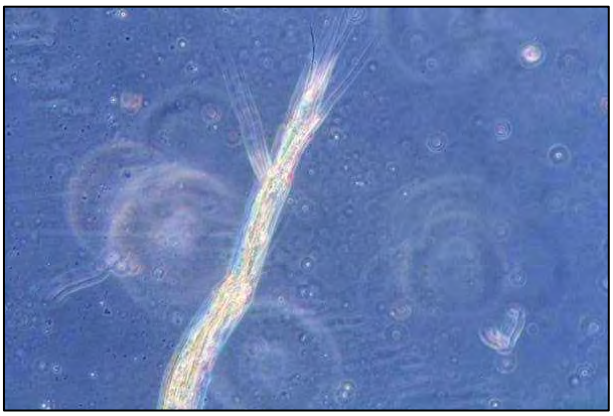
Cyclops strenuus 5th leg

Cyclops strenuus ant

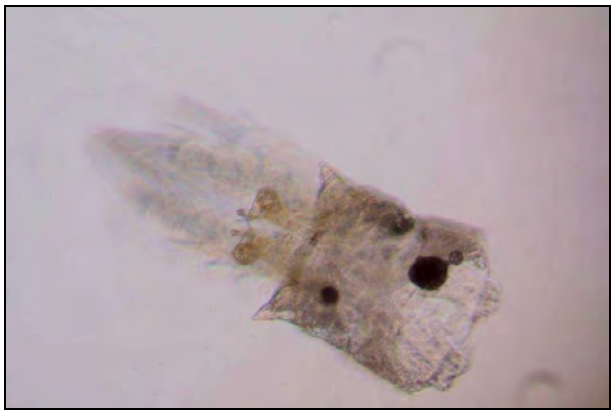


Cyclops strenuus caudal ramus

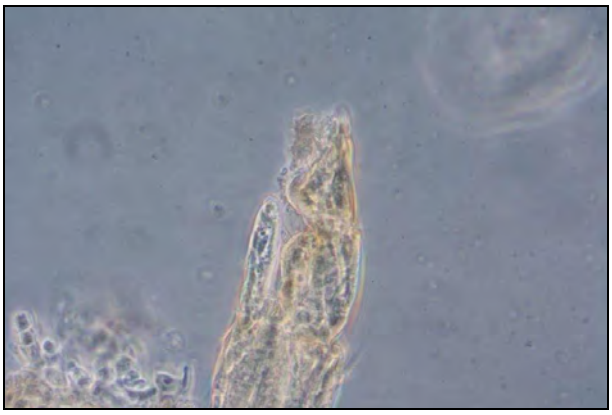
Hesperodiaptomus sp. 5th leg



Hesperodiaptomus sp. ant

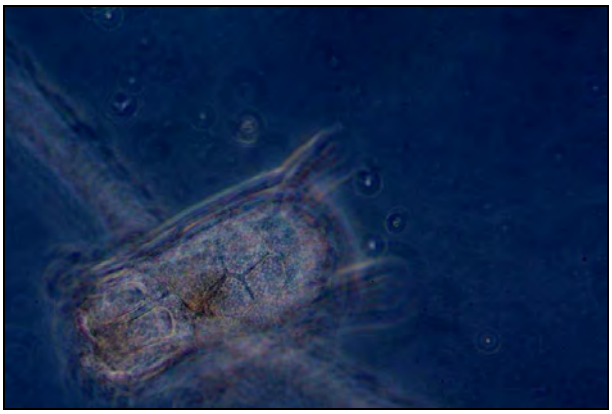


Hesperodiaptomus sp. female

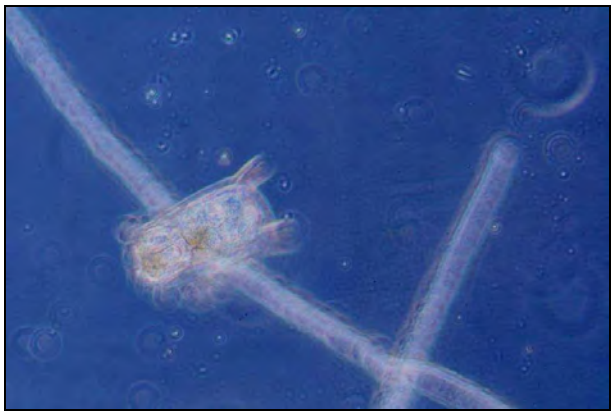


Hesperodiaptomus sp. left 5th leg

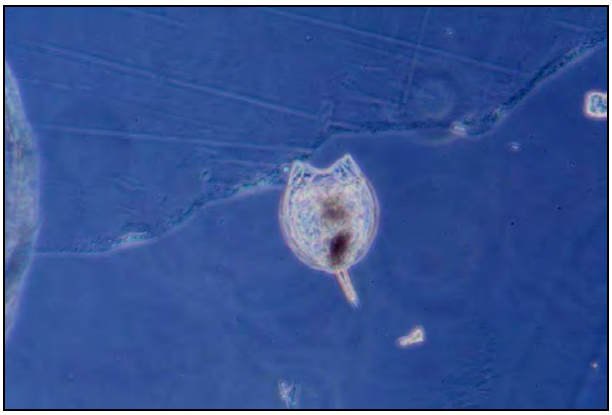
Hesperodiaptomus sp. r 5th leg



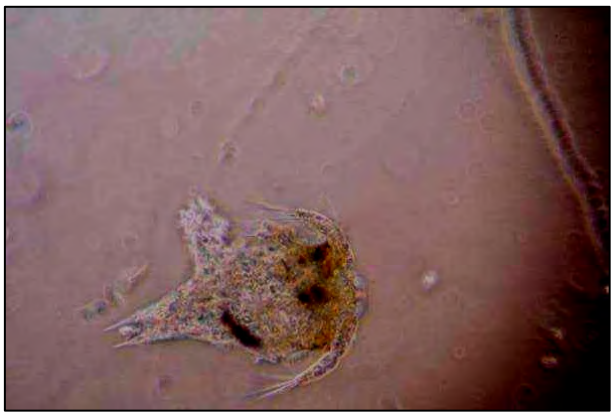
Keratella hiemalis



Keratella himalis



Monostyla lunaris



Nauplii

Notholca squamula