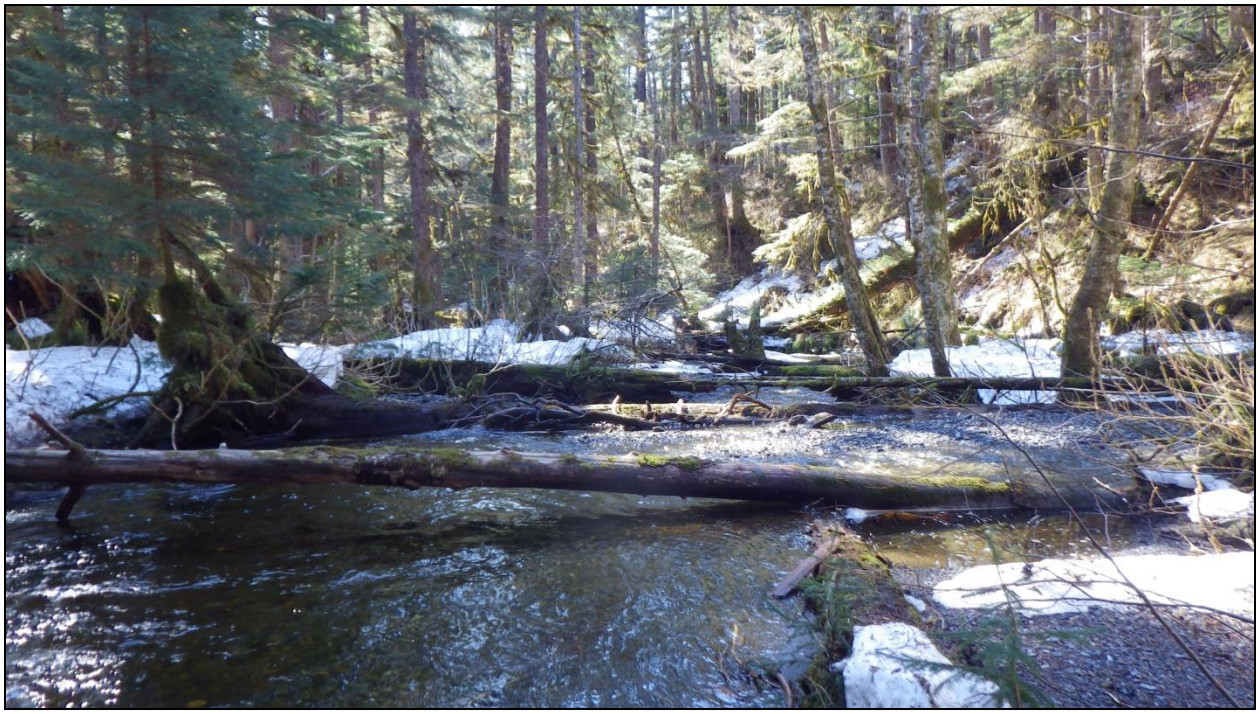
Technical Report No. 15-02

Aquatic Studies at Kensington Gold Mine, 2014

by

Katrina M. Kanouse

with Southeast Region Habitat Staff



February 2015

Alaska Department of Fish and Game **Division of Habitat**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	E
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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by

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February 2015

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Cover: Lower Slate Creek during benthic macroinvertebrate sampling in April 2014.

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ACKNOWLEDGEMENTS

The Alaska Department of Fish and Game thanks Coeur Alaska Inc. for contracting the Division of Habitat to perform the aquatic studies at the Kensington Gold Mine. Coeur Alaska Inc. Environmental staff, Kevin Eppers and Pete Strow, provided logistical support, East Fork Slate Creek discharge data, and water quality data.

Division of Habitat biologists who assisted with this year's report include Benjamin Brewster, Gordon Willson-Naranjo, Tess Quinn, Richard Hoffman, Greg Albrecht, Nicole Legere, Matthew Kern, and Johnny Zutz. The draft report was reviewed by Division of Habitat Southeast Regional Supervisor Jackie Timothy and Commercial Fisheries Division Publication Specialist Amy Carroll, and Commercial Fisheries Division Biometrician Kray Van Kirk performed the fish population power analysis. Thank you all for your contribution.

EXECUTIVE SUMMARY

The Alaska Department of Fish and Game (ADF&G) completes the aquatic resource monitoring the U.S. Forest Service (USFS) and Alaska Department of Environmental Conservation (ADEC) require for Coeur Alaska, Inc.'s (Coeur) Kensington Gold Mine. This partnership provides ADF&G the opportunity to gather and review data throughout the year, and help identify, assess, and resolve issues at the Kensington Gold Mine as they arise.

The 2014 summer was the wettest on record for Juneau, and overall, 2014 was the seventh warmest year on record (Richard Lam, Meteorologist, National Weather Service, personal communication).

The July 2014 mean periphyton density at each sampling site was lower than most previous years, especially in East Fork Slate Creek.[a] Though not required, we also sampled periphyton in Lower Slate and East Fork Slate Creeks in February, April, and October to observe variability throughout the year, and continue monitoring for changes that may occur from the tailing treatment facility (TTF) upstream. Periphyton biomass in Lower Slate Creek fluctuated seasonally, as in previous years, while biomass in East Fork Slate Creek remained low all year.[b]

Since August 2011, Coeur staff sampled surface waters monthly for ammonia, chlorophyll, nitrate, organic carbon, phosphorus, potassium, and sulfur in and around the TTF to investigate the cause of algal blooms in the TTF. Sample sites included the TTF, upstream of the TTF at the outlet of Upper Slate Lake[c] (USL), the TTF water treatment plant effluent, and downstream of the outfall 002 effluent discharge in East Fork Slate Creek. In the TTF during 2014, chlorophyll *a* and phosphorus concentrations were lower than in previous years. Ammonia, nitrate, potassium, and sulfur concentrations in the effluent continued to be greater than background USL concentrations, while organic carbon concentrations were usually greatest in USL. ADEC requires an effluent limit for ammonia and concentrations have not exceeded the limit.

We sampled benthic macroinvertebrates at a new sample site in Lower Slate Creek for the second year in a row where riffle habitats appear to be better suited for sampling than at established Sample Point 1. At the new site, we observed about half the number of benthic macroinvertebrates compared to the Sample Point 1 both years, though a greater proportion of sensitive aquatic insects.[d] Compared to the 2013 sample results, in 2014 we observed fewer mayflies and a change in sensitive aquatic insect taxa dominance from mayflies to stoneflies at both sites. We also observed fewer mayflies in West Fork Slate Creek. We will sample both Lower Slate Creek sites again in 2015.

Benthic macroinvertebrates were less abundant and diverse in East Fork Slate Creek than the previous three years, with the same low proportion of sensitive aquatic insects observed in 2013. Because the number of sensitive aquatic insects did not increase between years, we did

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[a] Ben Brewster, Habitat Biologist, ADF&G Habitat Division, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Habitat Division. Memorandum: Kensington Gold Mine Periphyton Trip Report; dated 2/12/15.

[b] (1) Ben Brewster, Habitat Biologist, ADF&G Habitat Division, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Habitat Division. Memorandum: Kensington Gold Mine February Sampling Trip Report; dated 4/8/14. (2) Ben Brewster, Habitat Biologist, ADF&G Habitat Division, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Habitat Division. Memorandum: Kensington Gold Mine April Periphyton Trip Report; dated 10/3/14.

[c] Coeur's water quality monitoring station MLA.

[d] Ben Brewster, Habitat Biologist, ADF&G Habitat Division, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Habitat Division. Memorandum: 2014 Kensington Gold Mine Benthic Macroinvertebrate Trip Report; dated 12/24/14.

not sample a second time in East Fork Slate Creek as we recommended in the previous annual report. Instead, we sampled Lower Slate Creek Sample Point 1 in the fall to detect changes that could occur downstream, and observed fewer chironomids compared to the spring samples, similar to the 2013 results. We also observed this trend among Sherman Creek samples collected in spring and fall 2014. The difference in numbers of chironomids between seasons may be due to emergence timing after spring sampling and larval size smaller than our sampler net during fall.

We observed a change in the spring Lower Sherman Creek benthic macroinvertebrate community at both sample sites. The spring samples contained the lowest proportion of sensitive aquatic insects and the greatest proportion of chironomids since sampling began in 2006 (Flory 2007). We sampled Sample Point 1 again in November and found more sensitive aquatic insects and fewer chironomids than in the spring samples. The November sampling was part of a collaborative investigation of a white substance on the Sherman Creek stream bed downstream of outfall 001. Beginning during the 2013/2014 winter, Coeur reported periodic presence of the white substance, which became more persistent in fall 2014. With Coeur and ADEC staff, we investigated the extent of the white substance and sampled benthic macroinvertebrates upstream and downstream of outfall 001. We found fewer insects and a lower proportion of sensitive insects among the samples collected downstream of outfall 001 compared to samples collected upstream. With Coeur and ADEC, we will continue to monitor Sherman Creek in 2015. Habitat biologists continued to observe a white substance on the East Fork and Lower Slate Creek stream beds during 2014.

The 2014 Upper Slate Creek Dolly Varden char *Salvelinus malma* population estimate was similar to population estimates from 2011 and 2013.[e] For the second year in a row, we did not capture fish during our East Fork Slate Creek resident fish survey, however, habitat biologists captured Dolly Varden char in the plunge pool at the outlet of the diversion pipeline on four occasions.[f] We again recommend ADEC discontinue the East Fork Slate Creek resident fish population surveys as the studies do not provide reliable information to assess stream health or determine if TTF operations impact resident fish populations downstream. Further studies in Upper Slate Creek are not necessary as 10 years of surveys provide sufficient baseline information for TTF reclamation. If ADEC discontinues these studies, we would recommend continuing opportunistic fish presence monitoring in East Fork Slate Creek each year.

In 2014, we observed the fewest numbers of adult pink salmon *Oncorhynchus gorbuscha* in Slate, Johnson, and Sherman Creeks since we began surveying in 2011,[g] which mirrors the return trend observed throughout most of northern southeast Alaska (Randy Bachman, Commercial Fisheries Area Management Biologist, ADF&G, Haines, personal communication). In Johnson Creek, we observed two pulses of returning adult coho salmon *O. kitsutch*, in early and late October, and the greatest number of adult coho salmon in four years. Adult salmon returns depend on marine survival rates and other factors we cannot quantify. Therefore, we cannot use the data to determine if Kensington Gold Mine construction and operations impact adult salmon populations. We again recommend the USFS and the Berners

[e] Ben Brewster, Habitat Biologist, ADF&G Habitat Division, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Habitat Division. Memorandum: 2014 Kensington Gold Mine Resident Fish Trip Report; dated 1/20/15.

[f] Gordon Willson-Naranjo, Habitat Biologist, ADF&G Habitat Division, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Habitat Division. Memorandum: Kensington Gold Mine TTF and Slate Creek Trapping; dated 11/7/14.

[g] Ben Brewster, Habitat Biologist, ADF&G Habitat Division, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Habitat Division. Memorandum: 2014 Kensington Gold Mine Adult Salmon Count Report; dated 1/20/15.

Bay working group discontinue the spawning salmon escapement survey requirement for all species.

The geometric mean particle size of pink salmon spawning substrate in Lower Slate Creek has increased several millimeters at both sample sites since 2011.[h] Most sediment metals, arsenic, and selenium concentrations in Slate, Johnson, and Sherman Creeks were similar to or less than concentrations observed since 2011.[i] Concentrations among the Slate Creek samples were greatest in East Fork Slate Creek, except aluminum and chromium, which were greatest in Upper Slate Creek. Cadmium and zinc concentrations in East Fork Slate Creek were similar to the 2013 concentrations, and remain above the NOAA guidelines for freshwater sediments (Buchman 2008; MacDonald et al. 2000). Arsenic, copper, and nickel concentrations at all sample sites, including upstream reference sites, were generally above the NOAA guidelines each year since sampling began in 2005 (Flory 2006–2011), five years prior to mining.

We continued the TTF Environmental Monitoring Plan studies in 2014. We retrieved benthic macroinvertebrate sample trays from Upper Slate Lake in June[j] and October and collected water column data in March[k] and August.[l] Coeur staff continued sampling tailings for geochemical analyses. We issued a trip report[m] summarizing the 2014 data, and we will complete the studies in 2015.

[h] Ben Brewster, Habitat Biologist, ADF&G Habitat Division, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Habitat Division. Memorandum: Kensington Gold Mine Slate Creek Spawning Substrate; dated 1/7/15.

[i] Ben Brewster, Habitat Biologist, ADF&G Habitat Division, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Habitat Division. Memorandum: 2014 Kensington Gold Mine Sediment Sampling Trip Report; dated 1/7/15.

[j] Matthew Kern, Habitat Biologist, ADF&G Habitat Division, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Habitat Division. Memorandum: Stream No. 115-20-10030 KGM TTF EMP Tray Pull 2; dated 8/27/14.

[k] Ben Brewster, Habitat Biologist, ADF&G Habitat Division, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Habitat Division. Memorandum: Kensington Gold Mine Upper Slate Lake Trip Report; dated 4/8/14.

[l] Ben Brewster, Habitat Biologist, ADF&G Habitat Division, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Habitat Division. Memorandum: 2014 Kensington Gold Mine Upper Slate Lake Trip Report; dated 1/20/15.

[m] Gordon Willson-Naranjo, Habitat Biologist, ADF&G Habitat Division, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Habitat Division. Memorandum: Kensington Gold Mine 2014 TTF EMP Studies; dated 2/12/15.

INTRODUCTION

The Kensington Gold Mine is located near Berners Bay in southeast Alaska; about 72 km north of Juneau by air and about 56 km south of Haines by air (Figure 1). The site, where mining began near the end of the 19th century, is within the City and Borough of Juneau and the Tongass National Forest (Tetra Tech Inc. et al. 2004a, b). The mine is owned and operated by Coeur Alaska, Inc., a wholly owned subsidiary of Coeur Mining, Inc., Chicago, Illinois.

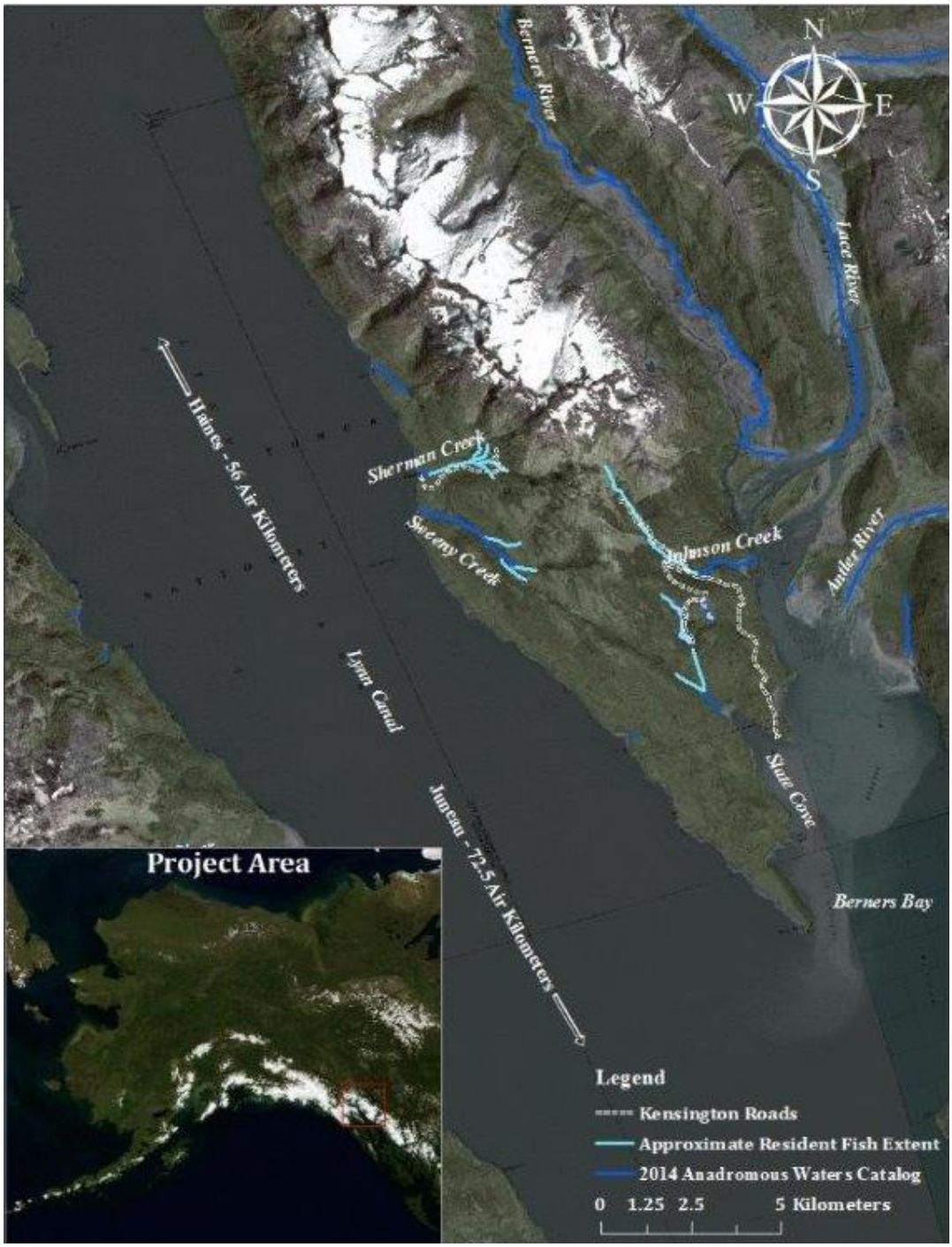

Figure 1.–Kensington Gold Mine area map.

Coeur connected the Kensington and Jualin adits in July 2007, making travel through the ore body between the Johnson and Sherman Creek drainages possible. The mine began production on June 24, 2010 and produces gold concentrate that is exported for processing. Tailings are disposed as slurry from the mill through a pipeline into the TTF. Mine infrastructure is located in three drainages that support resident and anadromous fish; the TTF in the Slate Creek drainage, the camp and mill facilities in the Johnson Creek drainage, and the mine water treatment facility in the Sherman Creek drainage.

Contractors gathered aquatic data for the Kensington Gold Mine from the late 1980s through 2005 which provided a basis for Division of Habitat permit decisions, Coeur's USFS approved 2005 Plan of Operations monitoring requirements (Coeur 2005), the Environmental Protection Agency (EPA) National Pollutant Elimination Discharge System (NPDES) Permit No. AK-005057-1 (Timothy and Kanouse 2012, Appendix A), and the DEC Alaska Pollutant Elimination System (APDES) Permit No. AK0050571 (Timothy and Kanouse 2012, Appendix A). Contractor reports include Archipelago Marine Research Ltd. (1991), Dames and Moore (1991), Earthworks Technology, Inc. (2002), EVS Environment Consultants (2000), Flory (1998, 1999, 2000, 2001a, 2001b, 2002, 2004), HDR Alaska, Inc. (2003), Kline (2003) Kline Environmental Research, LLC (2001, 2003, 2005), Konopacky Environmental (1992a, 1992b, 1993a, 1993b, 1993c, 1995, 1996a, 1996b, 1996c, 1996d), Pentec Environmental (1990, 1991), and Steffen Robertson and Kirsten Consulting Engineers and Scientists (1997). Monitoring reports include Flory (2006, 2007, 2008, 2009a, 2009b, 2009c, 2009d, 2011) and Timothy and Kanouse (2012, 2013, 2014).

The Division of Habitat began the aquatic studies for the Kensington Gold Mine in Slate, Johnson, and Sherman Creeks in 2011. The APDES Permit requires periphyton, benthic macroinvertebrate, resident fish and sediment sampling. We assess stream health using estimates of periphyton density and community composition, benthic macroinvertebrate density and community composition, sediment metals concentrations, sediment toxicity, and pink salmon spawning substrate quality. The Division of Habitat also completes resident Dolly Varden char abundance and condition studies required by the APDES Permit, adult salmon counts required by Coeur's USFS approved Plan of Operations (2005), and the tailings habitability studies required by the Division of Habitat and the USFS in the Tailings Treatment Facility Environmental Monitoring Plan (TPEC 2014).

PURPOSE

The purpose of this technical report is to summarize our 2014 aquatic study data and document the condition of biological communities and sediments in the Slate, Johnson, and Sherman Creek drainages near mine development and operations. This report satisfies the aquatic study requirements of Coeur's USFS approved Plan of Operations (2005) and ADEC APDES Permit AK0050571.

STUDY AREA

In 2014, we sampled the stream reaches listed in Table 1.

Table 1.–2014 aquatic studies sampling locations.

Slate Creek	Johnson Creek	Sherman Creek
Lower Slate Creek	Lower Johnson Creek	Lower Sherman Creek
West Fork Slate Creek	Upper Johnson Creek	Middle Sherman Creek
East Fork Slate Creek		
Upper Slate Creek		

Note: Studies in the TTF and Middle Sherman Creek were not required.

Slate Creek Drainage

Slate Creek drains a 10.5 km^2 watershed (Coeur 2005) into Slate Cove on the northwest side of Berners Bay. Two waterfalls about 1 km upstream of the mouth prevent anadromous fish passage to the West and East Forks. There are two lakes in this drainage; Lower Slate and Upper Slate Lakes, both upstream of East Fork Slate Creek. Coeur operates the TTF in Lower Slate Lake and discharges TTF water treatment plant effluent via outfall 002 in East Fork Slate Creek. West Fork Slate Creek and Upper Slate Creek are upstream of mine influence. Many of the plants and animals that inhabit lakes differ from those that inhabit rivers, so results of samples taken downstream of lakes will differ from those of West Fork Slate and Upper Slate Creeks, Johnson Creek, and Sherman Creek where lakes are not present.

The Catalog of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes (Catalog; Johnson and Daigneault 2013) lists Lower Slate Creek (Stream No. 115-20-10030) providing habitat for chum salmon *O. keta*, coho salmon, and pink salmon, and eulachon *Thaleichthys pacificus* (Figure 2). Dolly Varden char and cutthroat trout *O. clarkii* are also present downstream of the waterfalls. Upstream of the waterfalls, Dolly Varden char are present in the West (Figure 3) and East Forks (Figure 4), Upper Slate Lake, and Upper Slate Creek (Figure 5)—a tributary to Upper Slate Lake.

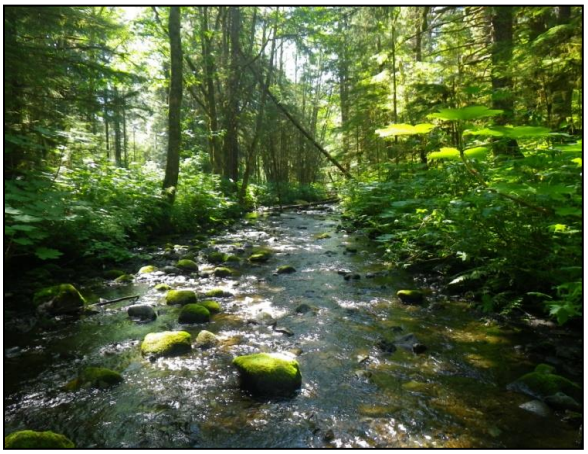

Figure 2.–Lower Slate Creek.

Figure 3.–West Fork Slate Creek.

Figure 4.–East Fork Slate Creek.

Figure 5.–Upper Slate Creek.

Johnson Creek Drainage

Johnson Creek drains a 14.6 km^2 watershed (Coeur 2005) to the north side of Berners Bay. A waterfall about 1.5 km upstream of the mouth prevents anadromous fish passage to the middle and upper reaches. Middle Johnson Creek is the reach between the Lower Johnson Creek waterfall barrier and Jualin Road Bridge 2, and Upper Johnson Creek is the reach between Jualin Road Bridge 2 and the headwaters. At Upper Johnson Creek, an infiltration gallery near the mill bench withdraws water to support the camp, and the Jualin adit waste rock pile and upper camp facilities are adjacent.

The Catalog (Johnson and Daigneault 2013) lists Lower Johnson Creek (Stream No. 115-20-10070) providing habitat for chum, coho, and pink salmon (Figure 6). Dolly Varden char and cutthroat trout are also present downstream of the waterfall. Upstream of the waterfalls, Dolly Varden char are present in the middle and upper reaches.

Figure 6.–Lower Johnson Creek.

Sherman Creek Drainage

Sherman Creek drains a 10.84 km^2 watershed (Coeur 2005) to the east shore of Lynn Canal. A waterfall about 360 m upstream of the mouth prevents anadromous fish passage to the middle and upper reaches. Middle Sherman Creek is the reach between the Lower Sherman Creek waterfall barrier and the Comet Road bridge, and Upper Sherman Creek is the reach between the Comet Road bridge and the headwaters. South Fork Sherman Creek drains to Middle Sherman Creek upstream of the Ophir Creek confluence. At Middle Sherman Creek, the mine water treatment plant discharges via outfall 001, the Kensington adit waste rock pile is adjacent to Ophir Creek, and bridges and culverts along the Comet Road cross tributaries that drain to the middle reach. Upper Sherman Creek is upstream of mine influence.

The Catalog (Johnson and Daigneault 2013) lists Sherman Creek (Stream No. 115-31-10330) providing habitat for pink and chum salmon (Figure 7). Dolly Varden char are present in the lower, middle, and upper reaches of Sherman Creek.

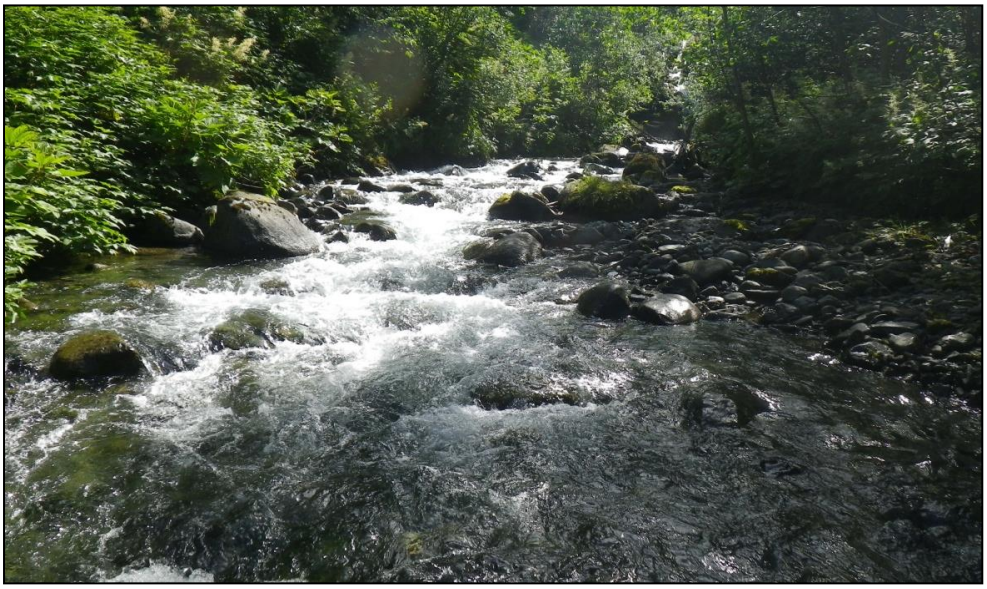

Figure 7.–Lower Sherman Creek.

AQUATIC STUDIES

We complete the Kensington Gold Mine aquatic studies at the frequency specified in Coeur's USFS approved Plan of Operations (2005) and ADEC APDES Permit AK0050571 (Table 2). Figures 8–10 illustrate stream reaches and sampling locations for the aquatic studies we completed in 2014, and Table 3 lists the latitude and longitude of each sampling site.

Table 2.–Aquatic studies required by the APDES Permit and Plan of Operations.

Location	Description	Aquatic Study	Frequency
Lower Slate Creek	1 km anadromous fish reach between the stream mouth in Berners Bay and a 25 m barrier waterfall.	Periphyton density and composition	1/year
		Benthic macroinvertebrate density and composition	1/year
		Adult salmon counts	Annually
		Spawning substrate quality	1/year
		Sediment metals concentrations and toxicity	1/year
East Fork Slate Creek	1 km of riffles and cascades downstream of the TTF to the 25 m waterfall in Lower Slate Creek.	Periphyton density and composition	1/year
		Benthic macroinvertebrate density and composition	1/year
		Resident fish population and condition	1/year
		Sediment metals concentrations and toxicity	1/year
West Fork Slate Creek	Reference stream, a tributary to Lower Slate Creek and upstream of mine influence.	Periphyton density and composition	1/year
		Benthic macroinvertebrate density and composition	1/year
Upper Slate Creek	Reference stream, a tributary to Upper Slate Lake and upstream upstream of mine influence.	Periphyton density and composition	1/year
		Benthic macroinvertebrate density and composition	1/year
		Resident fish population and condition	1/year
		Sediment metals concentrations and toxicity	1/year
Lower Johnson Creek	1.5 km anadromous fish reach between the stream mouth in Berners Bay and a 30 m barrier waterfall.	Adult salmon counts	Annually
		Sediment metals concentrations and toxicity	1/year
Upper Johnson Creek	Upstream of Bridge #2 to the headwaters, adjacent to the upper camp and mill bench.	Benthic macroinvertebrate density and composition	1/year
Lower Sherman Creek	360 m anadromous fish reach between the stream mouth in Lynn Canal and a 15 m barrier waterfall.	Periphyton density and composition	1/year
		Benthic macroinvertebrate density and composition	1/year
		Adult salmon counts	Annually
		Sediment metals concentrations and toxicity	1/year

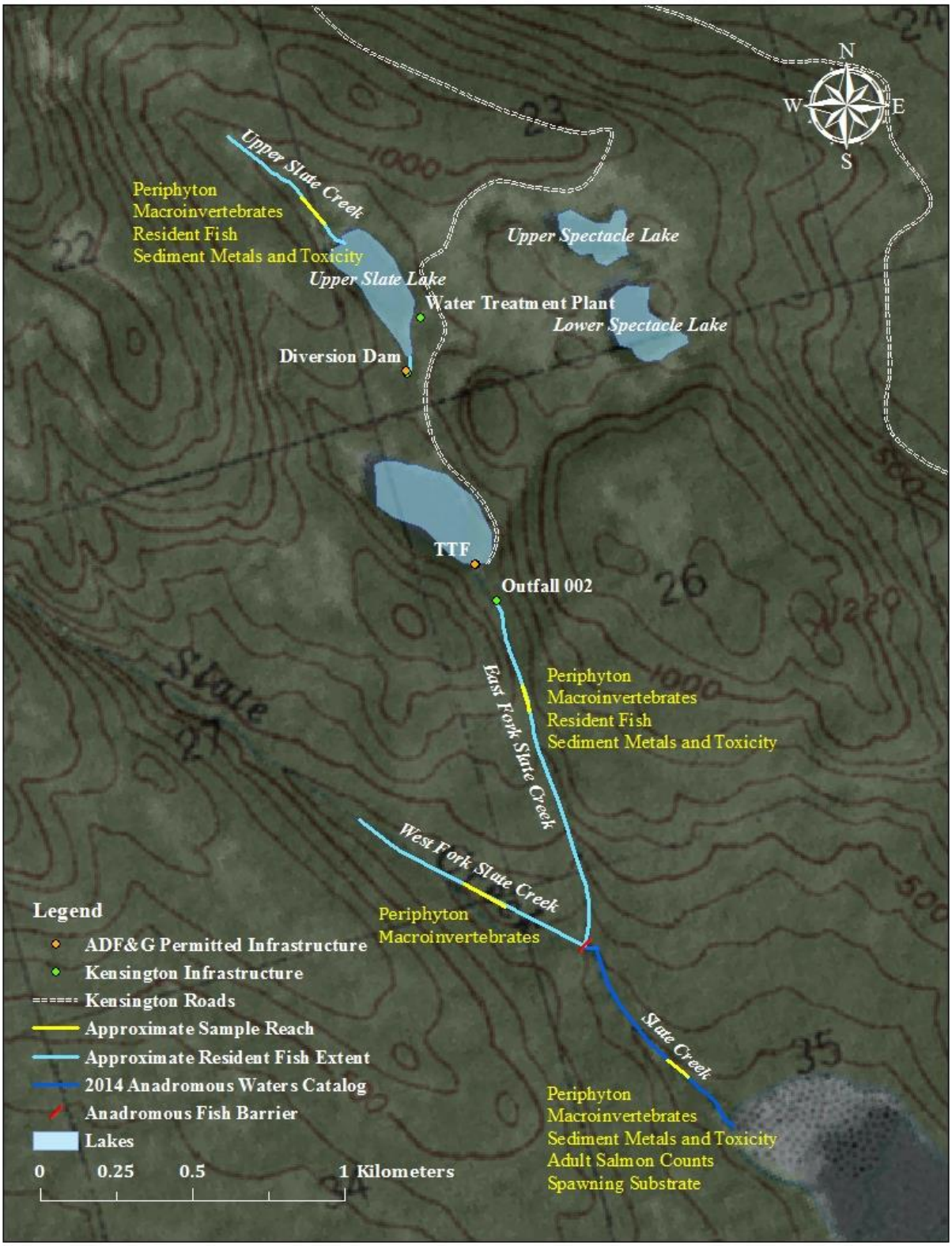

Figure 8.–Slate Creek aquatic studies.

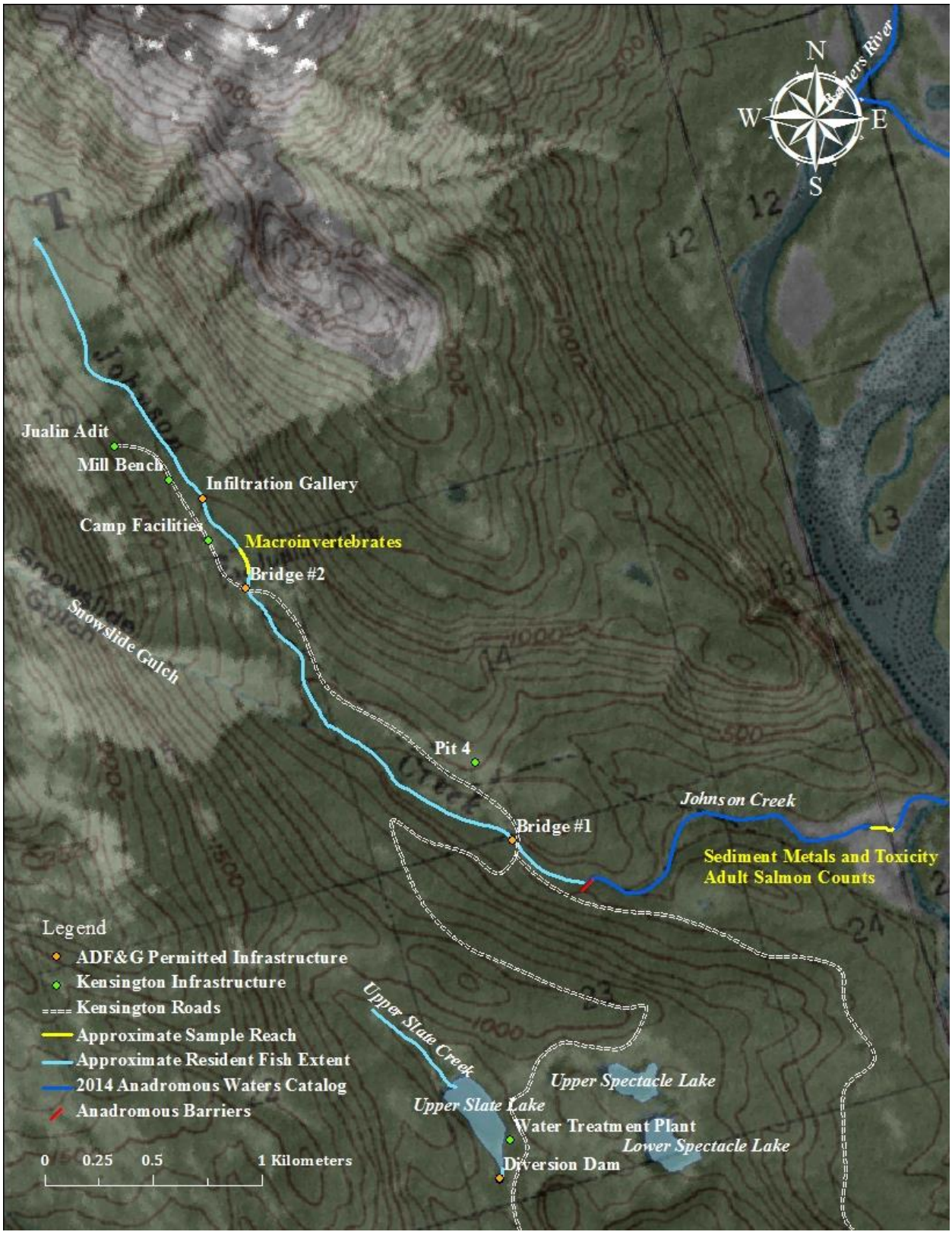

Figure 9.–Johnson Creek aquatic studies.

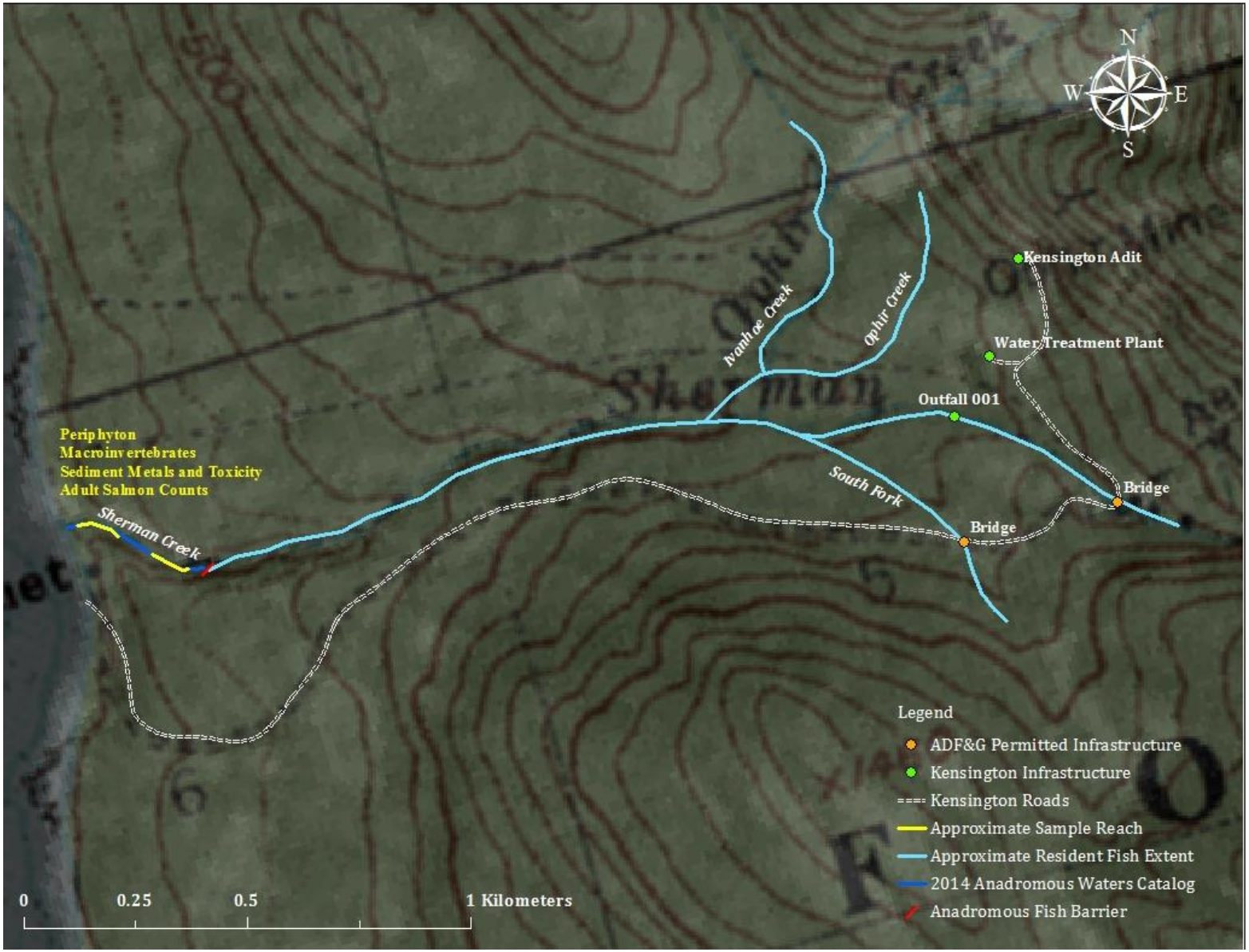

Figure 10.–Sherman Creek aquatic studies.

Table 3.–Latitude and longitude of the 2014 sample sites.

Location	Sample Site	Latitude	Longitude
Lower Slate Creek	Periphyton	58.7900°N	135.0343°W
	Benthic Macroinvertebrates Sample Point 1	58.7901°N	135.0342°W
	Benthic Macroinvertebrates Sample Point 2	58.7919°N	135.0359°W
	Adult Salmon Counts	Table 4	
	Spawning Substrate Sample Point 1	58.7905°N	135.0345°W
	Spawning Substrate Sample Point 2	58.7916°N	135.0356°W
	Sediment Metals and Toxicity	58.7920°N	135.0360°W
West Fork Slate Creek	Periphyton	58.7992°N	135.0460°W
	Benthic Macroinvertebrates	58.7995°N	135.0459°W
East Fork Slate Creek	Periphyton	58.8046°N	135.0382°W
	Benthic Macroinvertebrates	58.8045°N	135.0381°W
	Resident Fish	58.8040°N	135.0382°W
	Sediment Metals and Toxicity	58.8053°N	135.0383°W
Upper Slate Creek	Periphyton	58.8191°N	135.0416°W
	Benthic Macroinvertebrates	58.8189°N	135.0415°W
	Resident Fish	58.8199°N	135.0425°W
	Sediment Metals and Toxicity	58.8189°N	135.0416°W
Lower Johnson Creek	Adult Salmon Counts	Table 5	
	Sediment Metals and Toxicity	58.8235°N	135.0048°W
Upper Johnson Creek	Benthic Macroinvertebrates	58.8407°N	135.0450°W
Lower Sherman Creek	Periphyton Sample Point 1	58.8687°N	135.1414°W
	Periphyton Sample Point 2	58.8672°N	135.1376°W
	Benthic Macroinvertebrates Sample Point 1	58.8688°N	135.1412°W
	Benthic Macroinvertebrates Sample Point 2	58.8674°N	135.1381°W
	Adult Salmon Counts	Table 6	
	Sediment Metals and Toxicity	58.8687°N	135.1413°W

Source: World Geodetic System (WGS) 84 datum.

Table 4.–Lower Slate Creek reach markers.

Location	Latitude	Longitude
100 m	58.7884°N	135.0324°W
200 m	58.7893°N	135.0337°W
300 m	58.7905°N	135.0349°W
400 m	58.7915°N	135.0359°W
500 m	58.7920°N	135.0366°W
600 m	58.7933°N	135.0375°W
700 m	58.7936°N	135.0379°W
800 m	58.7944°N	135.0384°W
900 m	58.7952°N	135.0386°W
Falls	58.7964°N	135.0389°W

Table 5.–Lower Johnson Creek reach markers.

Location	Latitude	Longitude
Lace	58.8215°N	135.0010°W
Mouth	58.8236°N	134.9987°W
Trap	58.8235°N	135.0007°W
#4	58.8236°N	135.0039°W
#7	58.8243°N	135.0072°W
#10	58.8254°N	135.0109°W
Power House	58.8259°N	135.0148°W
Log Falls	58.8256°N	135.0169°W
#15	58.8255°N	135.0194°W
Falls	58.8240°N	135.0260°W

Table 6.–Lower Sherman Creek reach markers.

Location	Latitude	Longitude
50 m	58.8687°N	135.1415°W
100 m	58.8687°N	134.1408°W
150 m	58.8684°N	135.1401°W
200 m	58.8682°N	135.1394°W
250 m	58.8679°N	135.1388°W
300 m	58.8674°N	135.1376°W
350 m	58.8671°N	135.1368°W
Falls	58.8670°N	135.1367°W

MONITORING SCHEDULE

Table 7 presents the dates we collected data in 2014.

Table 7.–2014 Aquatic studies sampling schedule.

Aquatic Study	Lower Slate	East Fork Slate	West Fork Slate	Upper Slate	Lower Johnson	Upper Johnson	Lower Sherman	Middle Sherman
Periphyton	2/19/2014						7/28/2014 (2)	
	4/30/2014	4/28/2014						
	7/30/2014	7/30/2014	7/30/2014	7/30/2014				
	10/7/2014	10/7/2014						
Benthic Macroinvertebrates	2/19/2014							
	4/30/2014 (2)	4/28/2014	4/30/2014	4/28/2014		4/29/2014	4/29/2014 (2)	
	10/6/2014						11/20/2014	11/20/2014 (2)
Resident Fish		8/20/2014		8/19/2014				
Adult Salmon Counts	7/21/2014–11/4/2014				7/22/2014–11/11/2014		7/21/2014–9/15/2014	
Spawning Substrate	7/1/2014 (2)							
Sediment Metals	7/28/2014	7/30/2014		7/30/2014	7/30/2014		7/28/2014	
Sediment Toxicity	7/28/2014	6/30/2014		7/30/2014	7/30/2014		6/30/2014	

*Note: C*ells highlighted in grey indicate sampling was not required per the APDES Permit or Plan of Operations, and the number in parenthesis was the number of sites sampled..

METHODS

We used the methods described in Timothy and Kanouse (2014), and footnote differences in the *Results* section. Sample data are in Appendix A–F.

We occasionally review data sets to ensure accuracy and report corrections in the document and appendices. The most recent technical report presents the current data sets and should be used to analyze data from previous years. In this report, we adjusted the 2011–2013 periphyton data by excluding chlorophylls *b* and *c* data when chlorophyll *a* was not detected, and corrected the 2013 estimated detection limit from 0.06 to 0.24.

RESULTS

SLATE CREEK

Lower Slate Creek

Periphyton Density and Composition

The July 2014 mean chlorophyll *a* density was within the range observed since 2011 (Table 8). Chlorophyll *a* density for each sample collected is presented in Figure 11, and proportions of mean chlorophylls *a*, *b*, and *c* each year are presented in Figure 12.

Table 8.–Lower Slate Creek chlorophylls *a*, *b*, and *c* mean densities.

Sample Date	Chlorophyll *a* (mg/m^2)	Chlorophyll *b* (mg/m^2)	Chlorophyll *c* (mg/m^2)
July 29, 2011	5.65	0.43	0.26
July 25, 2012	2.31	0.05	0.18
July 31, 2013	12.59	0.00	1.64
July 30, 2014	3.97	0.85	0.30

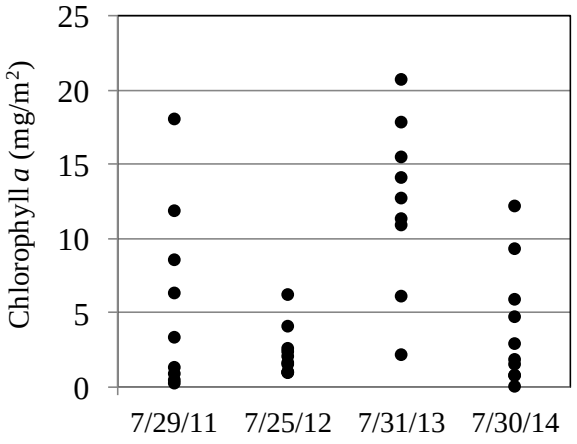

Figure 11.–Lower Slate Creek chlorophyll *a* sample densities.

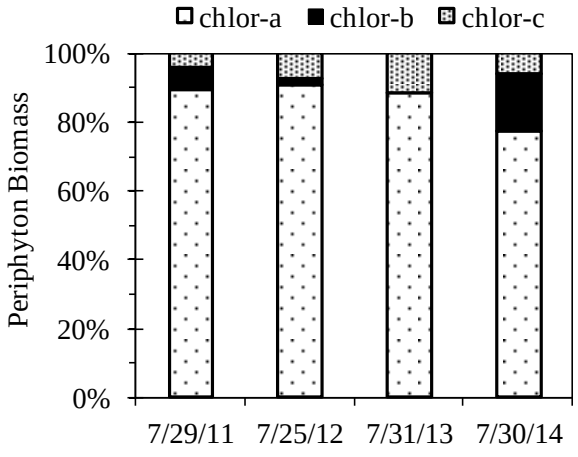

Figure 12.–Lower Slate Creek mean chlorophylls *a*, *b*, and *c* proportions.

Benthic Macroinvertebrate Density and Composition

Sample Point 1

Among the spring 2014 samples, we observed fewer EPT insects, a change in the EPT taxa dominance from mayflies to stoneflies, and more chironomids compared to the spring 2012 and 2013 results.[n] We identified 32 taxa and estimate benthic macroinvertebrate density at 4,136 insects/m^2, of which 19% were EPT insects (Figure 13).[o] The dominant taxon was Diptera: Chironomidae, representing 68% of samples.

[n] Numbers of EPT insects among samples collected in February and October 2014 were similar to the April 2014 results. We observed more chironomids in February than in October, which may be due to insect life stage during those seasons.

[o] Sample #1 contained nearly half of all benthic macroinvertebrates counted among the six samples, and about 90% of the those insects were chironomids. If we exclude sample #1 from the data set, benthic macroinvertebrate density would be 2,695 insects/m^2, of which 28% were EPT insects.

Sample Point 2

Similar to the spring 2014 sample results for Sample Point 1, we observed a change in the EPT taxa dominance from mayflies to stoneflies, and more chironomids compared to the spring 2013 results. We identified 31 taxa and estimate benthic macroinvertebrate density at 1,986 insects/m^2, of which 48% were EPT insects (Figure 13). The dominant taxa were Diptera: Chironomidae representing 33% of the samples, and Plecoptera: Sweltsa representing 19% of samples.

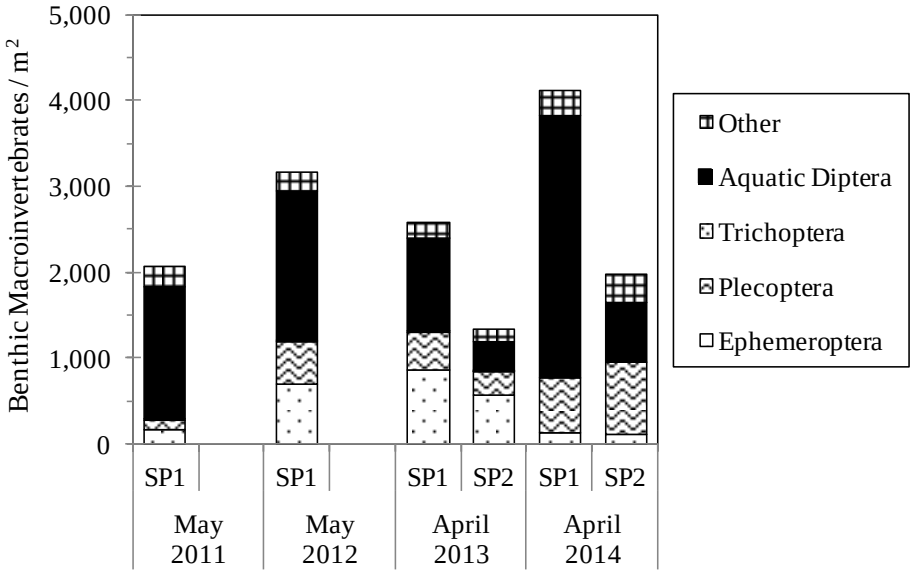

Figure 13.–Lower Slate Creek Sample Points 1 and 2 benthic macroinvertebrate densities and compositions.

Adult Salmon Counts

We counted 41 live adult pink salmon, 0 chum salmon, and 5 live coho salmon[p] during the 2014 spawning season. Figure 14 presents the adult pink salmon count for each survey, and Figure 15 presents the distribution of pink salmon. Table 9 presents the 2011–2014 adult salmon counts.

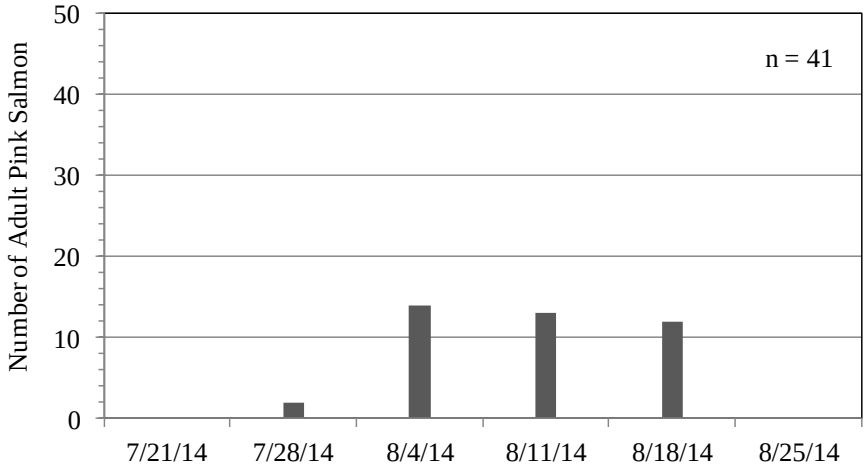

Figure 14.–2014 Lower Slate Creek weekly pink salmon counts.

[p] We did not survey during the weeks of September 29 or October 27 due to weather conditions that prevented visibility, therefore our series of counts was incomplete.

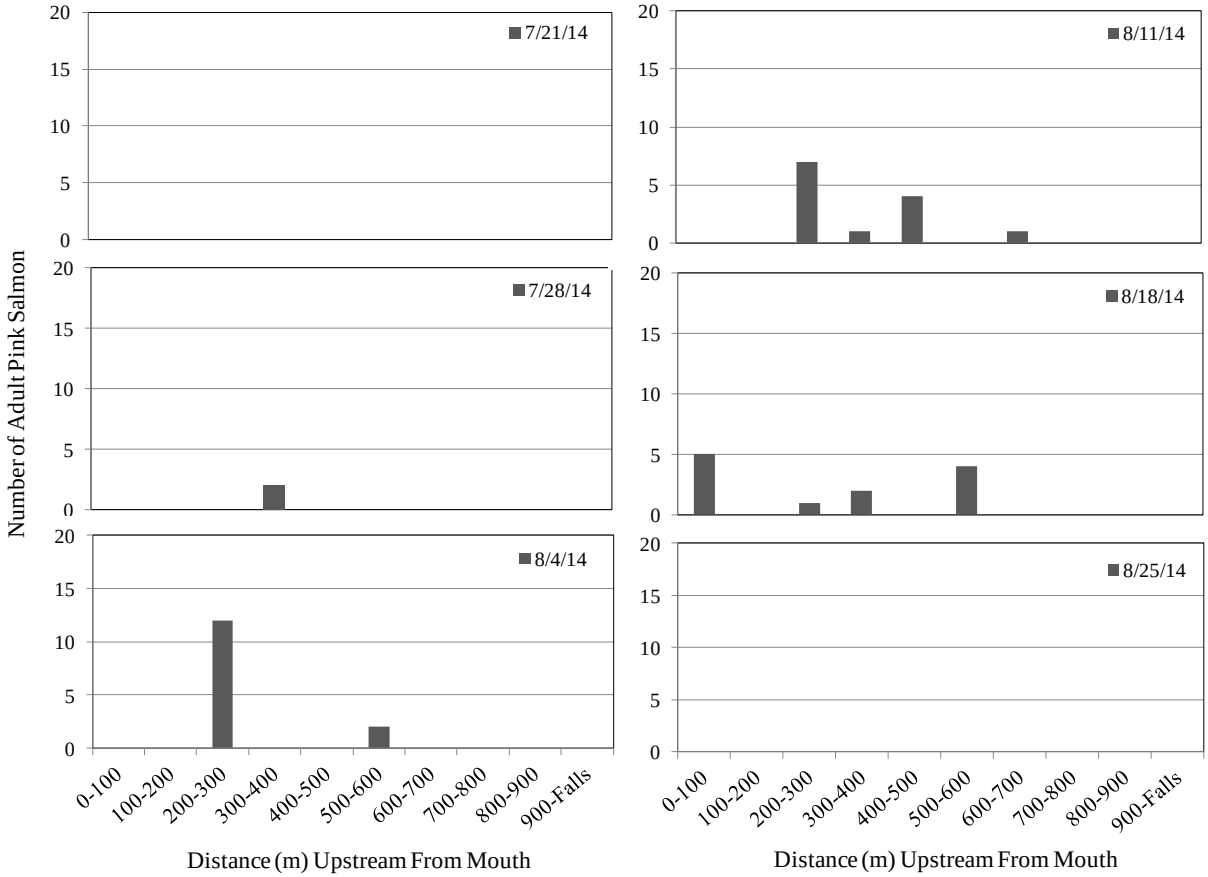

Figure 15.–2014 Lower Slate Creek weekly adult pink salmon distribution.

Table 9.–Lower Slate Creek adult salmon counts.

	2011	2012	2013	2014
Pink Salmon	6,275	7,272	3,337	41
Chum Salmon	61	1	1	0
Coho Salmon	0	0	26	5

Spawning Substrate Quality

Sample Point 1

The geometric mean particle size among samples collected at Sample Point 1 was 12.7 mm, within the range of sizes observed since 2011 (Table 10).[q]

Sample Point 2

The geometric mean particle size among samples collected at Sample Point 2 was 16.2 mm, the greatest observed since 2011 (Table 10). Geometric mean particle size at this site increased each year since 2011.

[q] We do not convert the 0.15 mm sieve contents from wet weight to dry weight as described in Timothy and Kanouse (2014).

Table 10.–Lower Slate Creek Sample Points 1 and 2 geometric mean particle sizes (mm).

	2011	2012	2013	2014
Sample Point 1	10.1	10.6	13.9	12.7
Sample Point 2	10.9	11.0	12.9	16.2

Sediment Metals Concentrations

The 2014 sediment metals, As, and Se concentrations (mg/kg) were similar to or less than concentrations observed 2011–2013.[r,s] Figure 16 presents the 2014 sample results, and Figure 17 presents the 2011–2014 data.

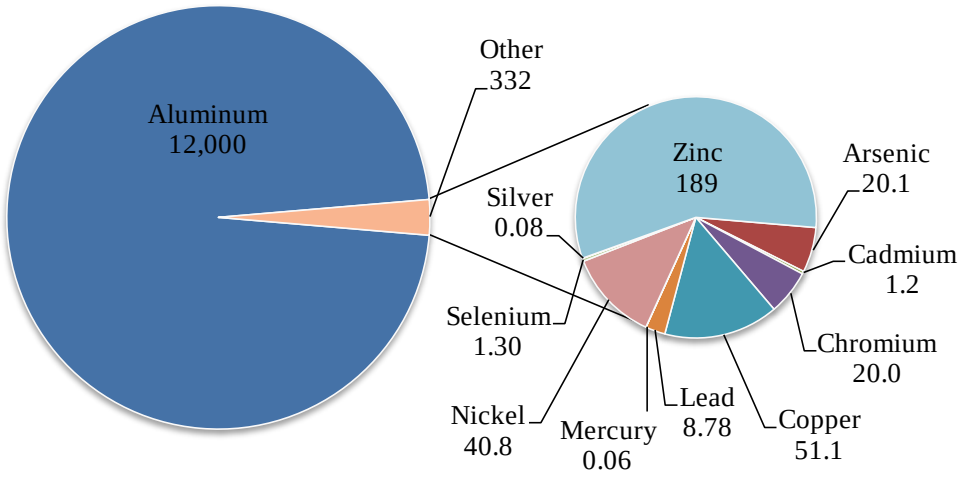

Figure 16.–2014 Lower Slate Creek sediment metals concentrations.

Sediment Toxicity

C. dilutus and *H. azteca* growth and survival on the Lower Slate Creek sediment sample were not significantly different than organism growth and survival on the control sediment.[t]

[r] ALS Environmental of Kelso, WA performed the 2014 bioassays, while AECOM Environmental Toxicology of Fort Collins, CO performed the 2011–2013 bioassays.

[s] We accidentally analyzed and reported acid volatile sulfide, instead of total sulfide, 2011–2013.

[t] CH2M Hill of Corvallis, OR performed the 2014 analyses and used sediment collected from Beaver Creek near Newport, Oregon as the control. AECOM Environmental Toxicology of Fort Collins, CO performed the 2011–2013 analyses using commercial grade sand and formulated sediment as the controls.

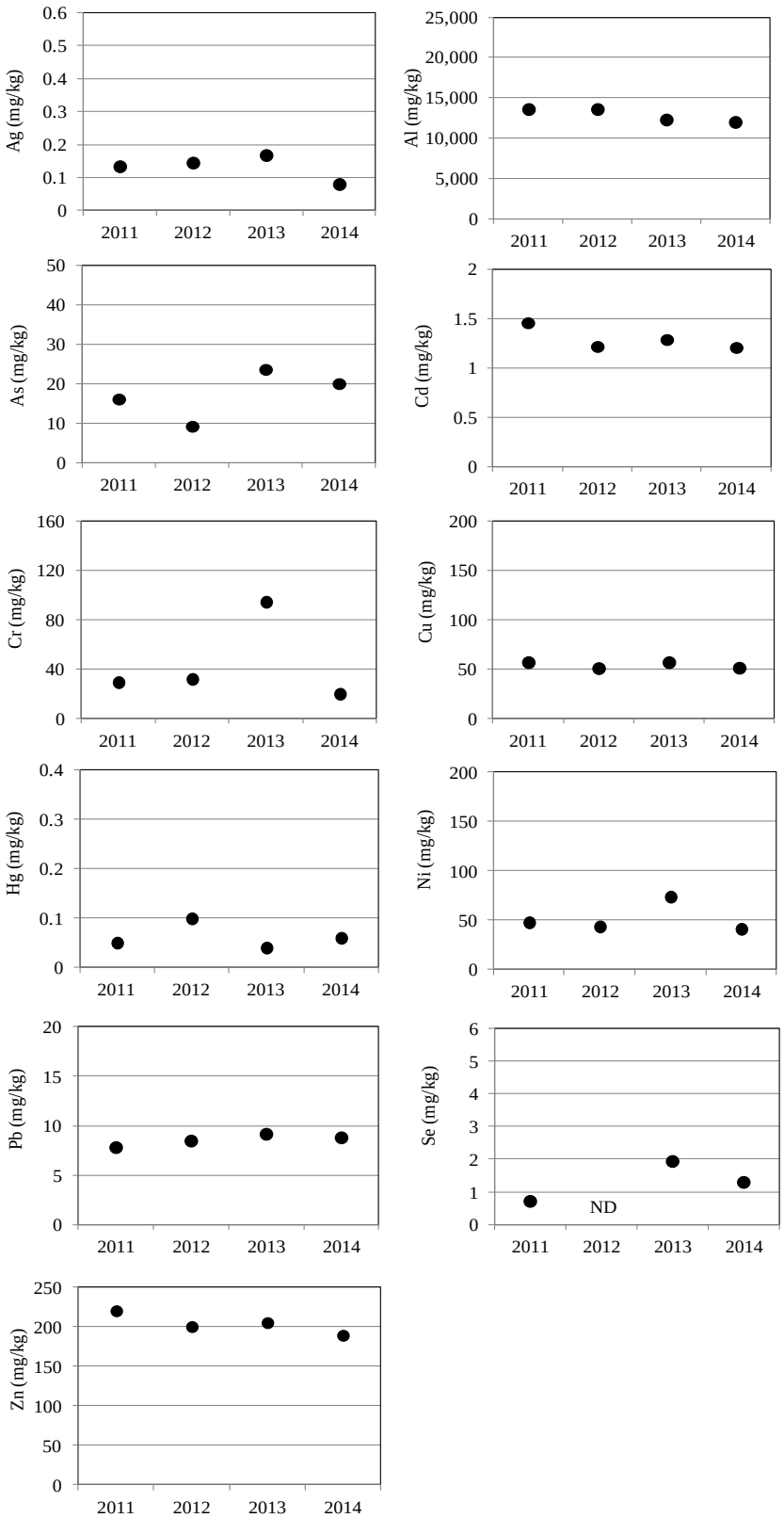

Figure 17.–Lower Slate Creek sediment metals concentrations.

West Fork Slate Creek

Periphyton Density and Composition

The July 2014 mean chlorophyll *a* density was within the range observed since 2011 (Table 11). Chlorophyll *a* density for each sample collected is presented in Figure 18, and proportions of mean chlorophylls *a*, *b*, and *c* each year are presented in Figure 19.

Table 11.–West Fork Slate Creek chlorophylls *a*, *b*, and *c* mean densities.

Sample Date	Chlorophyll *a* (mg/m^2)	Chlorophyll *b* (mg/m^2)	Chlorophyll *c* (mg/m^2)
July 29, 2011	3.92	0.00	0.27
July 25, 2012	1.01	0.00	0.10
July 31, 2013	4.22	0.00	0.61
July 30, 2014	0.77	0.00	0.06

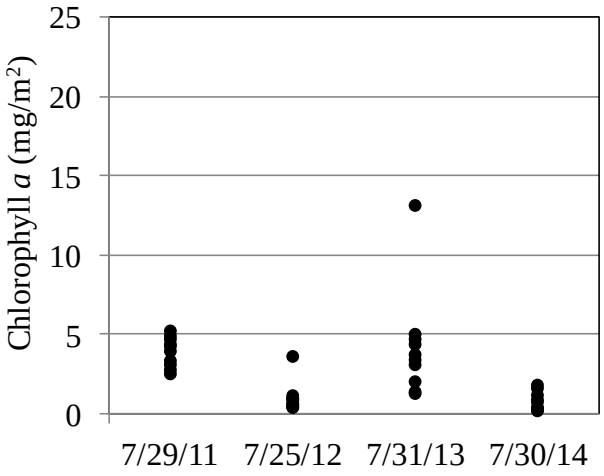

Figure 18.–West Fork Slate Creek chlorophyll *a* sample densities.

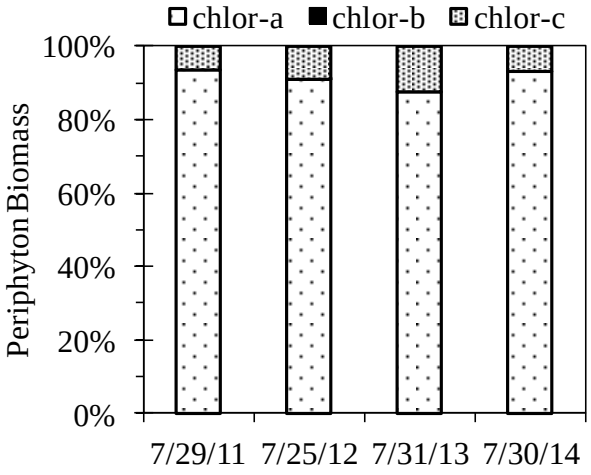

Figure 19.–West Fork Slate Creek mean chlorophylls *a*, *b*, and *c* proportions.

Benthic Macroinvertebrate Density and Composition

We observed fewer mayflies among the 2014 samples than in 2012 and 2013, a trend we also observed at Lower Slate Creek. We identified 29 taxa and estimate benthic macroinvertebrate density at 973 insects/m^2, of which 71% were EPT insects (Figure 20). The dominant taxa were Diptera: Chironomidae representing 22% of the samples, and Ephemeroptera: Baetis representing 17% of samples.

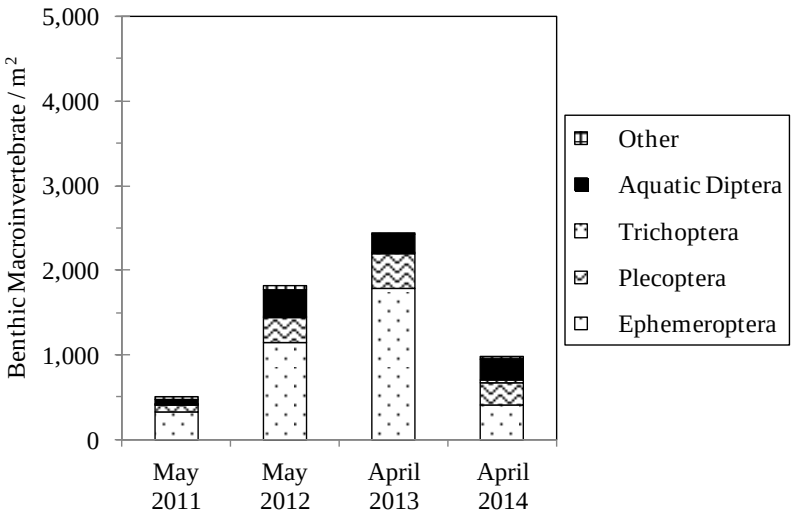

Figure 20.–West Fork Slate Creek benthic macroinvertebrate densities and compositions.

East Fork Slate Creek

East Fork Slate Creek discharge is dependent on Upper Slate Lake discharge, routed through the diversion pipeline around the TTF, and effluent discharge[u] from the TTF water treatment plant. East Fork Slate Creek mean daily discharge[v] during July was greater than we observed in previous years (Figure 21), and may have affected periphyton density prior to sampling.

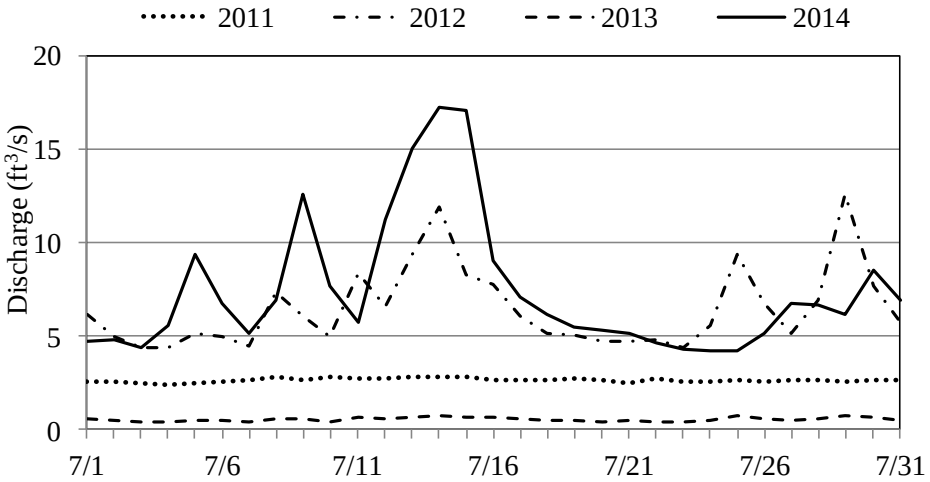

Figure 21.–East Fork Slate Creek discharge.

Note: Calculated using Parshall Flume discharge data and TTF WTP discharge data.

[u] The TTF water treatment plant began discharging to East Fork Slate Creek in December 2010.

[v] Calculated by combining the diversion pipeline Parshall Flume and TTF water treatment plant mean daily discharge data.

Periphyton Density and Composition

The July 2014 mean chlorophyll *a* density was the lowest observed since 2011 (Table 12). Chlorophyll *a* density for each sample collected is presented in Figure 22, and proportions of mean chlorophylls *a*, *b*, and *c* each year are presented in Figure 23.

Table 12.–East Fork Slate Creek chlorophylls *a*, *b*, and *c* mean densities.

Sample Date	Chlorophyll *a* (mg/m^2)	Chlorophyll *b* (mg/m^2)	Chlorophyll *c* (mg/m^2)
July 28, 2011	8.84	1.56	0.24
July 24, 2012	5.08	0.57	0.18
July 30, 2013	2.28	0.06	0.20
July 30, 2014	0.27	0.02	0.02

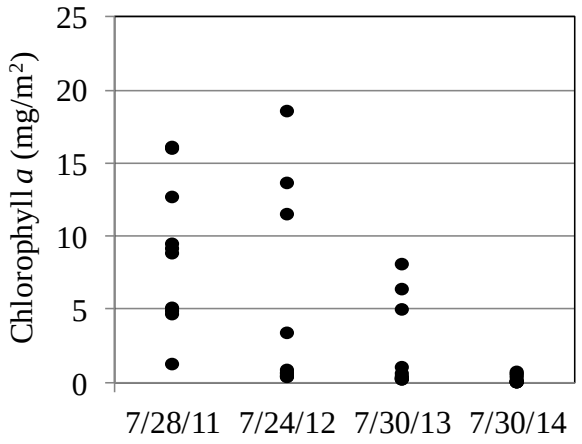

Figure 22.–East Fork Slate Creek chlorophyll *a* sample densities.

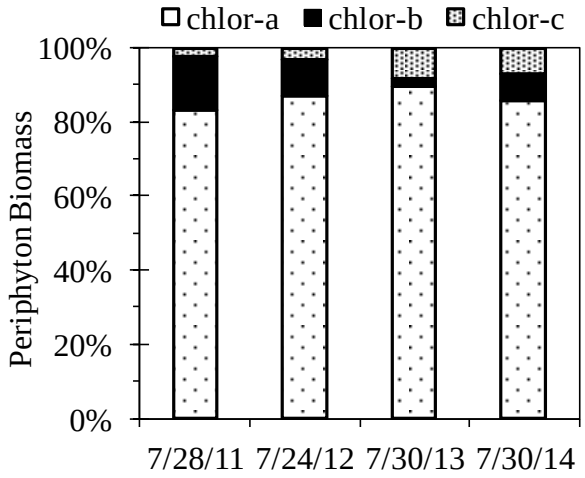

Figure 23.–East Fork Slate Creek mean chlorophylls *a*, *b*, and *c* proportions.

Benthic Macroinvertebrate Density and Composition

We observed the fewest number of insects among the spring 2014 samples compared to 2011–2013 data. We identified 24 taxa and estimate benthic macroinvertebrate density at 2,048 insects/m^2 (Figure 24) of which 2% were EPT insects—the same percentage observed in 2013. The dominant taxa were Diptera: Chironomidae representing 35% of the samples, and Bivalvia: Sphaeriidae (pea clams) representing 26% of samples.

Resident Fish Population and Condition

We did not capture fish during our East Fork Slate Creek survey, therefore the 2014 Dolly Varden char population estimate was 0 fish—the same as in 2013 (Figures 25, 26).[w] During sampling, stream flow was again variable due to maintenance at the TTF water treatment plant and the effluent accounted for about 30% of stream flow.

[w] As part of U.S. Fish and Wildlife Service Study # 11-741-14-083F, in 2014 we used AQUI-SE (10% eugenol) to anesthetize fish with dosages ranging 5–18 mg/L, not clove oil as described in Timothy and Kanouse (2014).

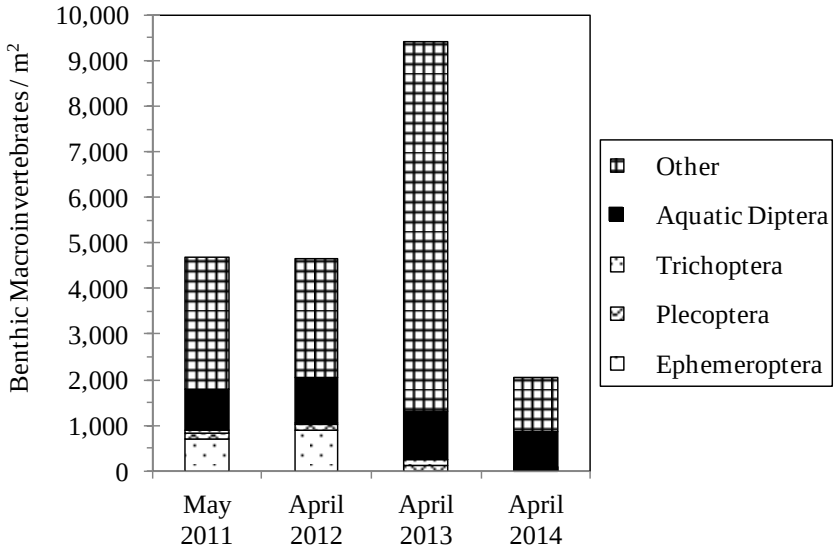

Figure 24.– East Fork Slate Creek benthic macroinvertebrate densities and compositions.

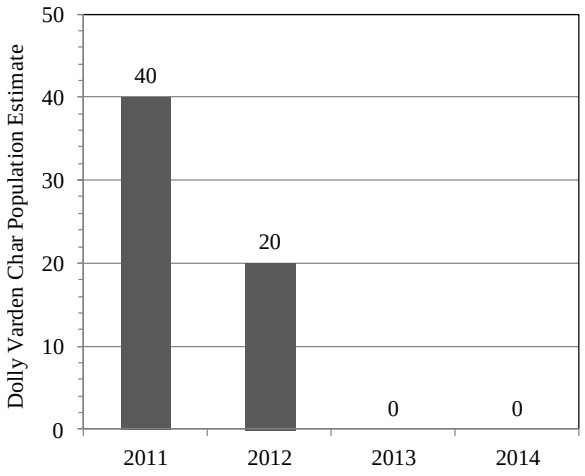

Figure 25.– East Fork Slate Creek resident fish population estimates.

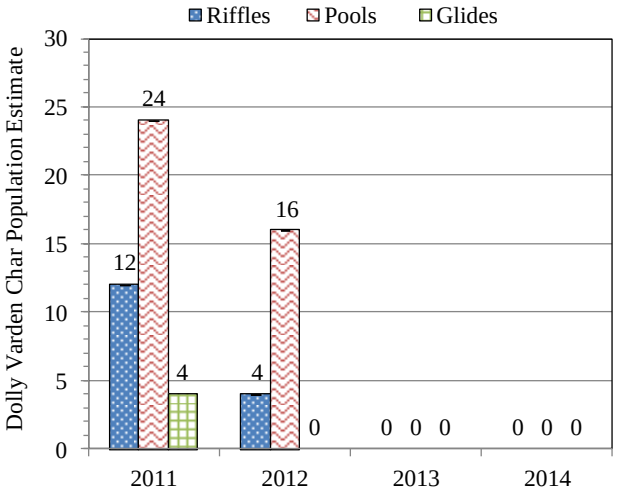

Figure 26.–East Fork Slate Creek resident fish population estimates by habitat type.

Sediment Metals Concentrations

The 2014 sediment metals, As, and Se concentrations (mg/kg) were similar to or less than concentrations observed 2011–2013. Figure 27 presents the 2014 sample results, and Figure 28 presents the 2011–2014 data.

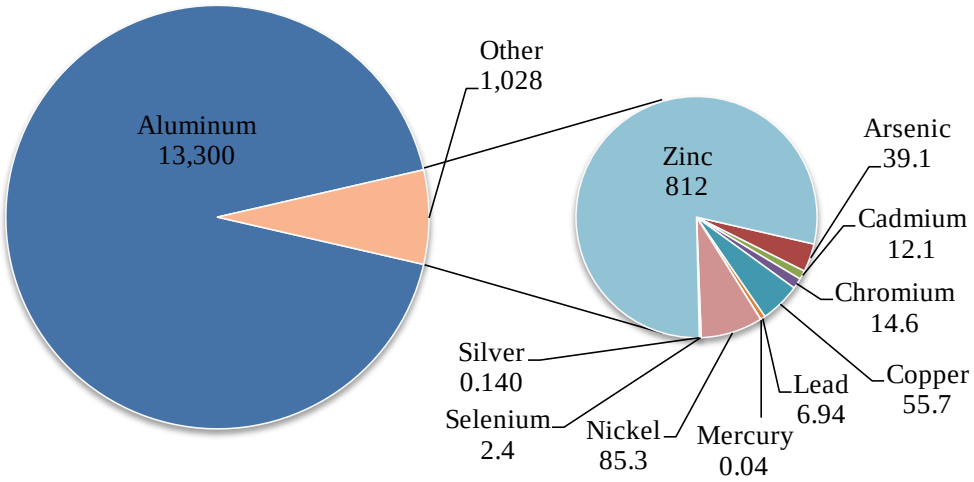

Figure 27.–2014 East Fork Slate Creek sediment metals concentrations.

Sediment Toxicity

C. dilutus and *H. azteca* growth and survival on the East Fork Slate Creek sediment sample were not significantly different than organism growth and survival on the control sediment.

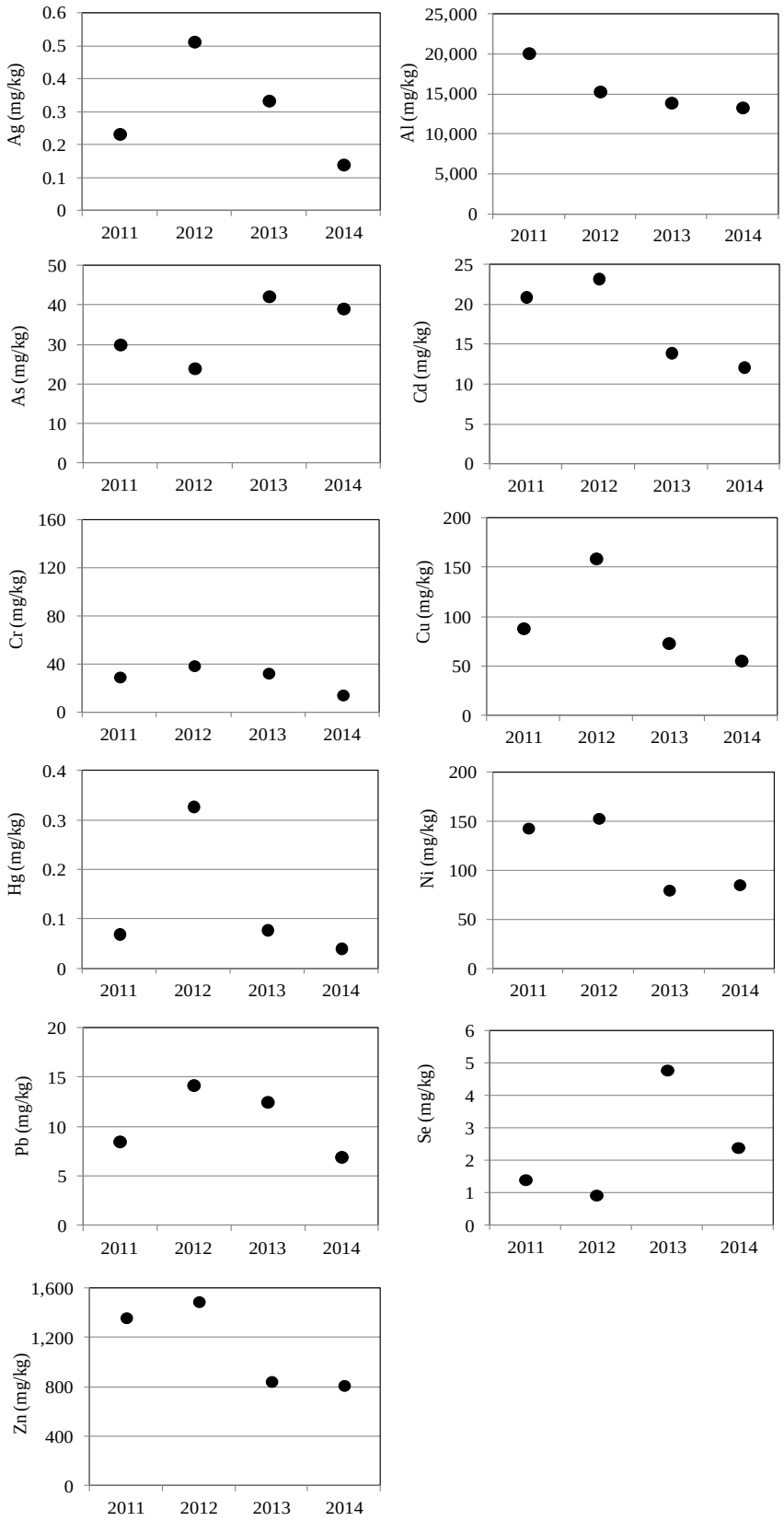

Figure 28.–East Fork Slate Creek sediment metals concentrations.

Upper Slate Creek

Periphyton Density and Composition

The July 2014 mean chlorophyll *a* density was within the range observed since 2011 (Table 13). Chlorophyll *a* density for each sample collected is presented in Figure 29, and proportions of mean chlorophylls *a*, *b*, and *c* each year are presented in Figure 30.

Table 13.–Upper Slate Creek chlorophylls *a*, *b*, and *c* mean densities.

Sample Date	Chlorophyll *a* (mg/m^2)	Chlorophyll *b* (mg/m^2)	Chlorophyll *c* (mg/m^2)
July 29, 2011	0.87	0.00	0.05
July 24, 2012	1.26	0.00	0.07
July 30, 2013	2.13	0.00	0.13
July 30, 2014	1.09	0.00	0.06

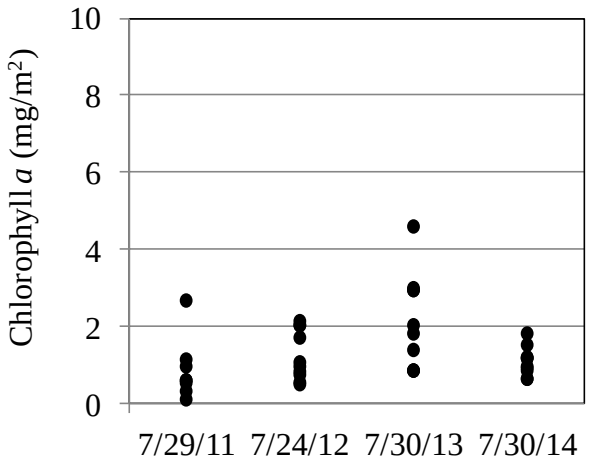

Figure 29.–Upper Slate Creek chlorophyll *a* sample densities.

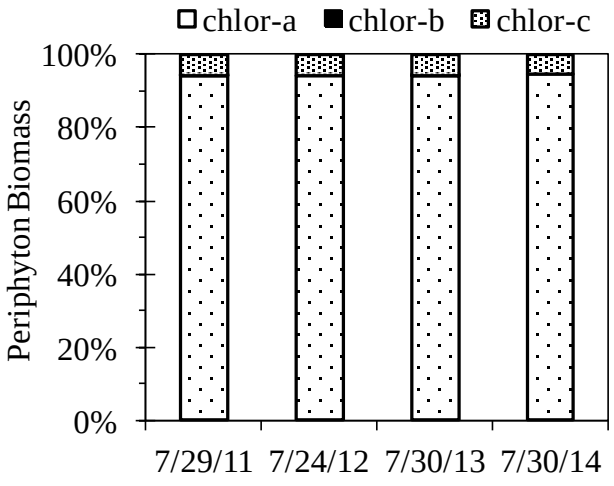

Figure 30.–Upper Slate Creek mean chlorophylls *a*, *b*, and *c* proportions.

Benthic Macroinvertebrate Density and Composition

We observed the greatest density of benthic macroinvertebrates among the spring 2014 samples compared to 2011–2013 data. We identified 36 taxa and estimate benthic macroinvertebrate density at 3,125 insects/m^2, of which 63% were EPT insects (Figure 31). The dominant taxa were Diptera: Chironomidae representing 28% of the samples, and Plecoptera: Despaxia representing 14% of the samples.

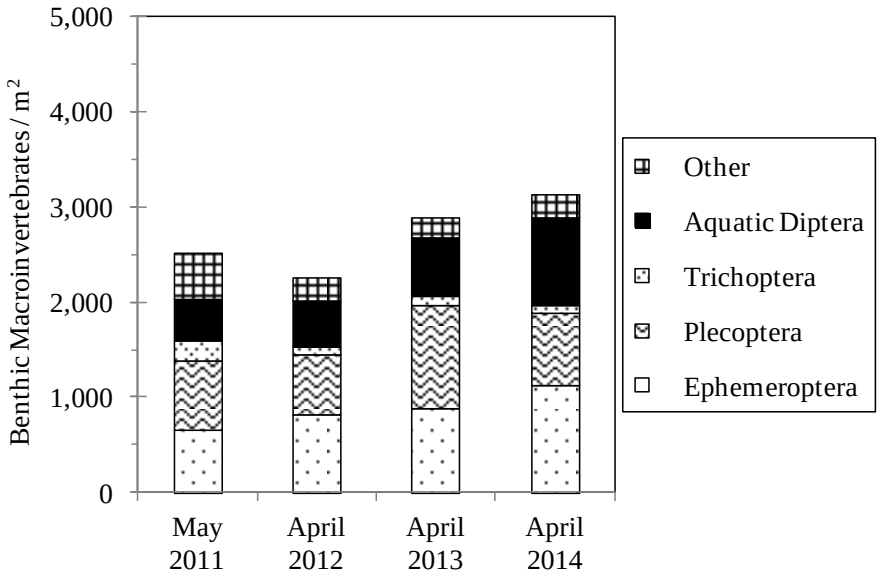

Figure 31.–Upper Slate Creek benthic macroinvertebrate density and composition.

Resident Fish Population and Condition

The 2014 Dolly Varden char population estimate was 108 ± 32 fish, similar to the 2011 and 2013 estimates and significantly less than the 2012 estimate (Figure 32). We captured more Dolly Varden char in pools than in riffles or glides (Figure 33), and captured fish represented several age classes, both similar to previous years. Mean fish condition was 0.99 g/mm^3.

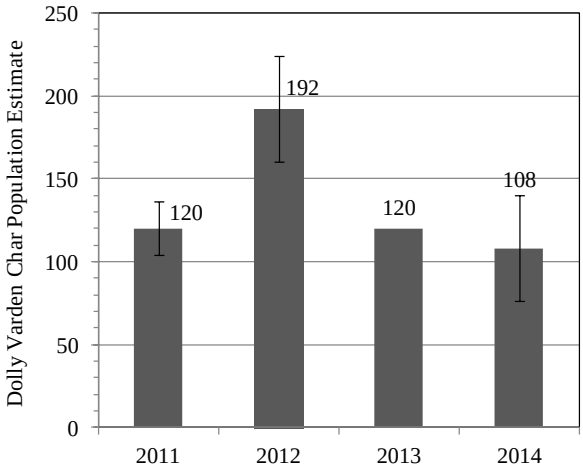

Figure 32.–Upper Slate Creek resident fish population estimates.

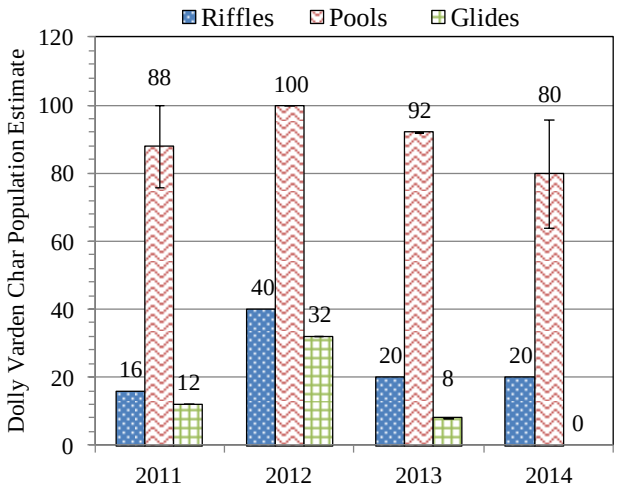

Figure 33.–Upper Slate Creek resident fish population estimates by habitat types.

Sediment Metals Concentrations

The 2014 sediment metals and Se concentrations (mg/kg) were similar to or less than concentrations observed 2011–2013, and As concentration was greater than all years. Figure 34 presents the 2014 sample results, and Figure 35 presents the 2011–2014 data.

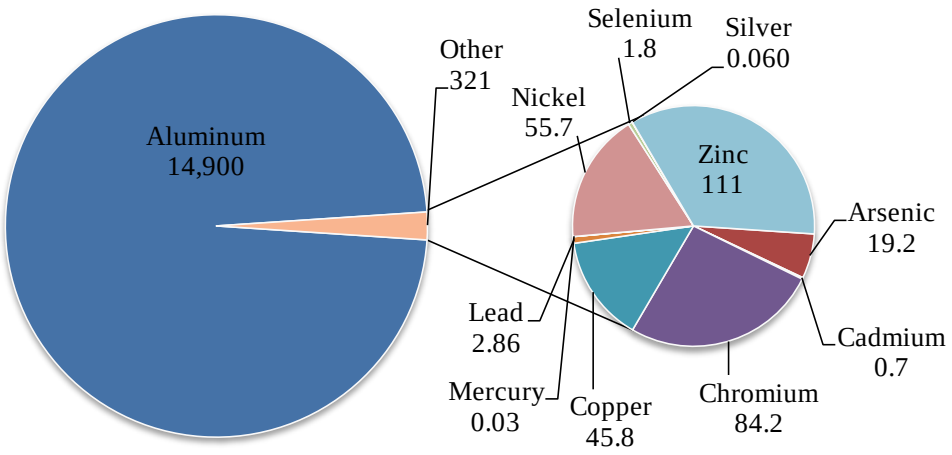

Figure 34.–2014 Upper Slate Creek sediment metals concentrations.

Sediment Toxicity

C. dilutus and *H. azteca* growth and survival on the Upper Slate Creek sediment sample were not significantly different than organism growth and survival on the control sediment.

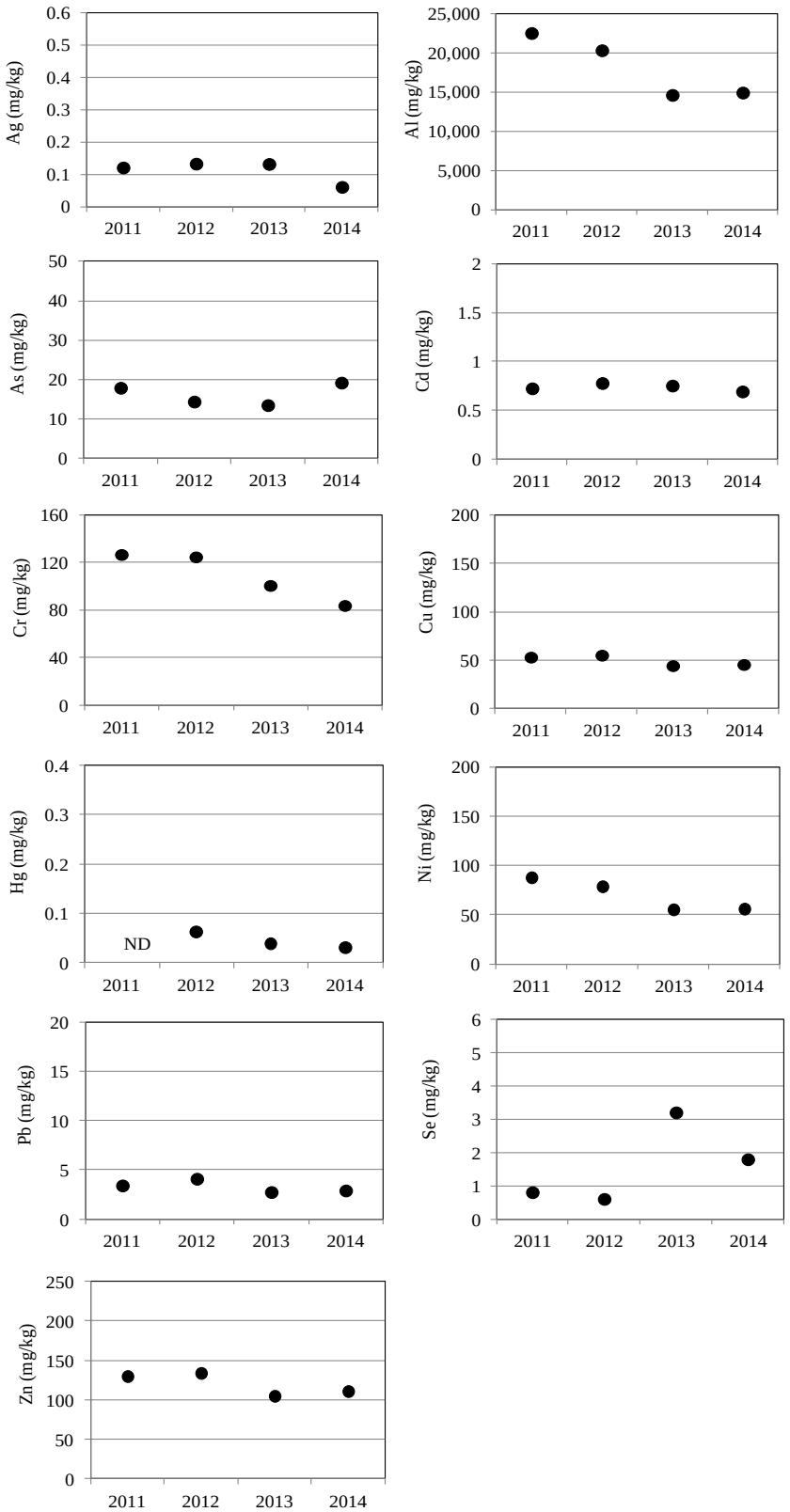

Figure 35.–Upper Slate Creek sediment metals concentrations.

JOHNSON CREEK

Lower Johnson Creek

Adult Salmon Counts

We counted 471 live adult pink salmon, 6 live chum salmon, and 107 live coho salmon[x] during the 2014 spawning season. Figure 36 presents the adult pink salmon count for each survey,[y] and Figure 37 presents the distribution of pink salmon. Table 14 presents the 2011–2014 adult salmon counts.

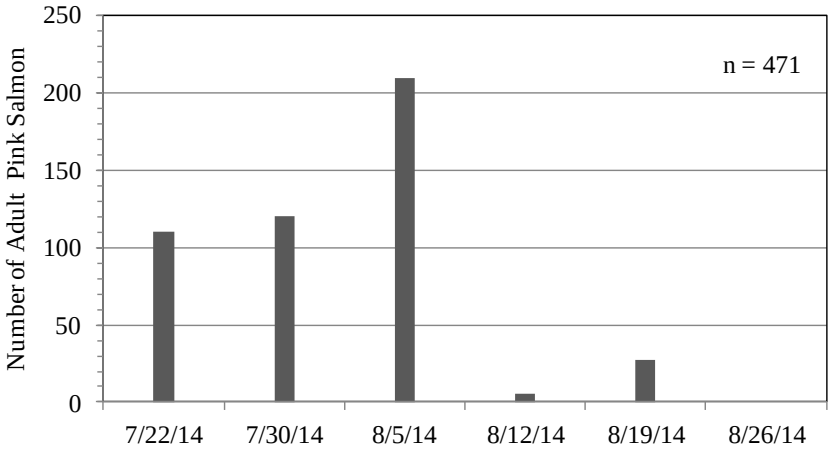

Figure 36.–2014 Lower Johnson Creek weekly pink salmon counts.

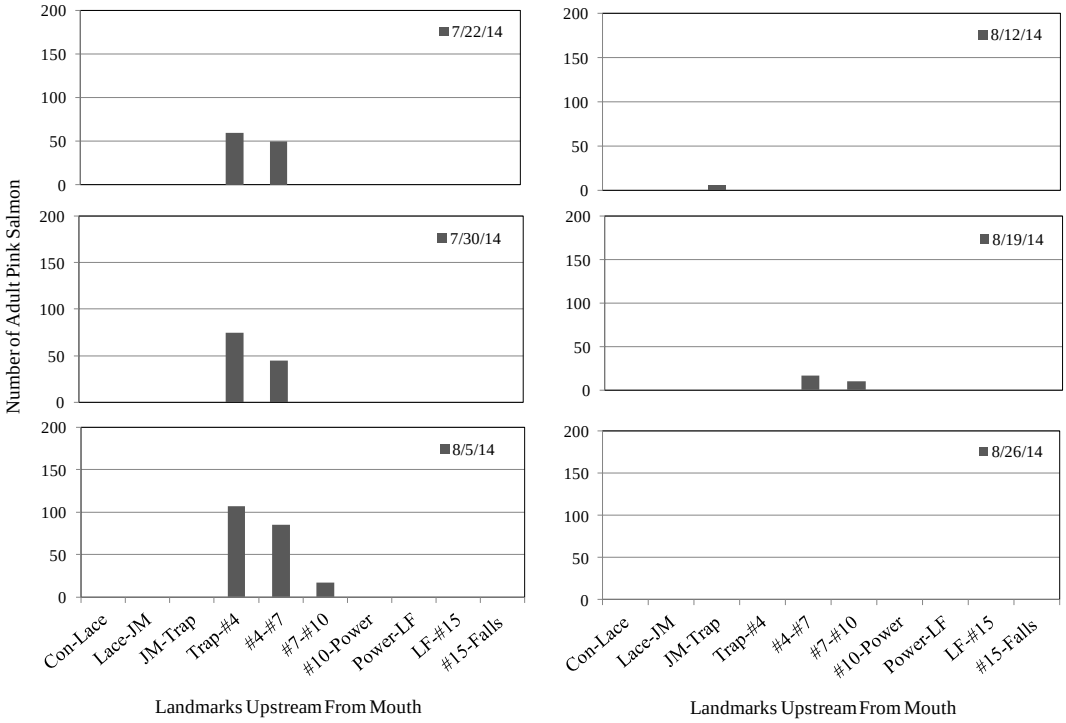

Figure 37.–2014 Lower Johnson Creek weekly adult pink salmon distribution.

[x] We did not survey during the week of September 29 due to weather conditions that prevented visibility, therefore our series of counts was incomplete.

[y] Our 2014 average aerial survey underestimation for pink salmon was a factor of 1.5.

Table 14.–Lower Johnson Creek adult salmon counts.

	2011	2012	2013	2014
Pink Salmon	44,181	12,533	20,451	471
Chum Salmon	52	248	40	6
Coho Salmon	33	90	64	107

Sediment Metals Concentrations

The 2014 sediment metals and As concentrations (mg/kg) were similar to or less than concentrations observed 2011–2013, except Pb concentration was greater. Se was not detected for the fourth year in a row. Figure 38 presents the 2014 sample results, and Figure 39 presents the 2011–2014 data.

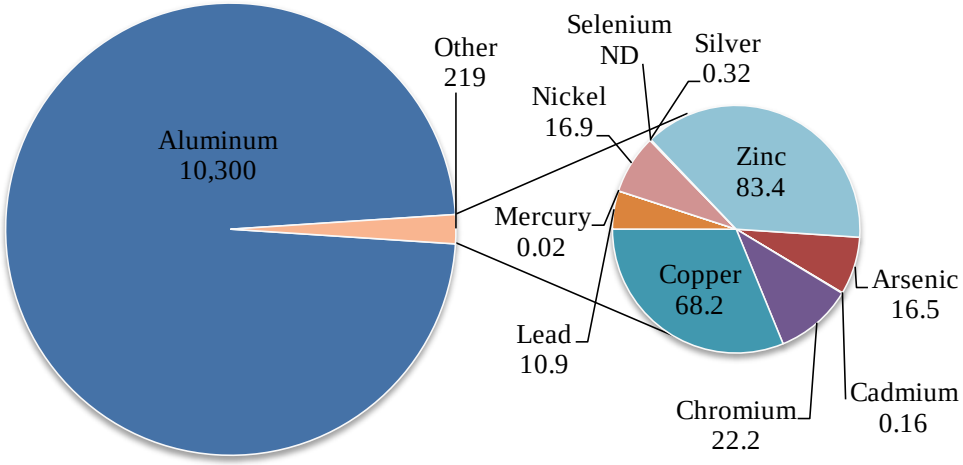

Figure 38.–2014 Lower Johnson Creek sediment metals concentrations.

Sediment Toxicity

C. dilutus growth and survival on the Lower Johnson Creek sediment sample was not significantly different than growth and survival on the control sediment. *H. azteca* growth on the Lower Johnson Creek sediment sample was significantly less than growth on the control sediment, while survival was not significantly different.

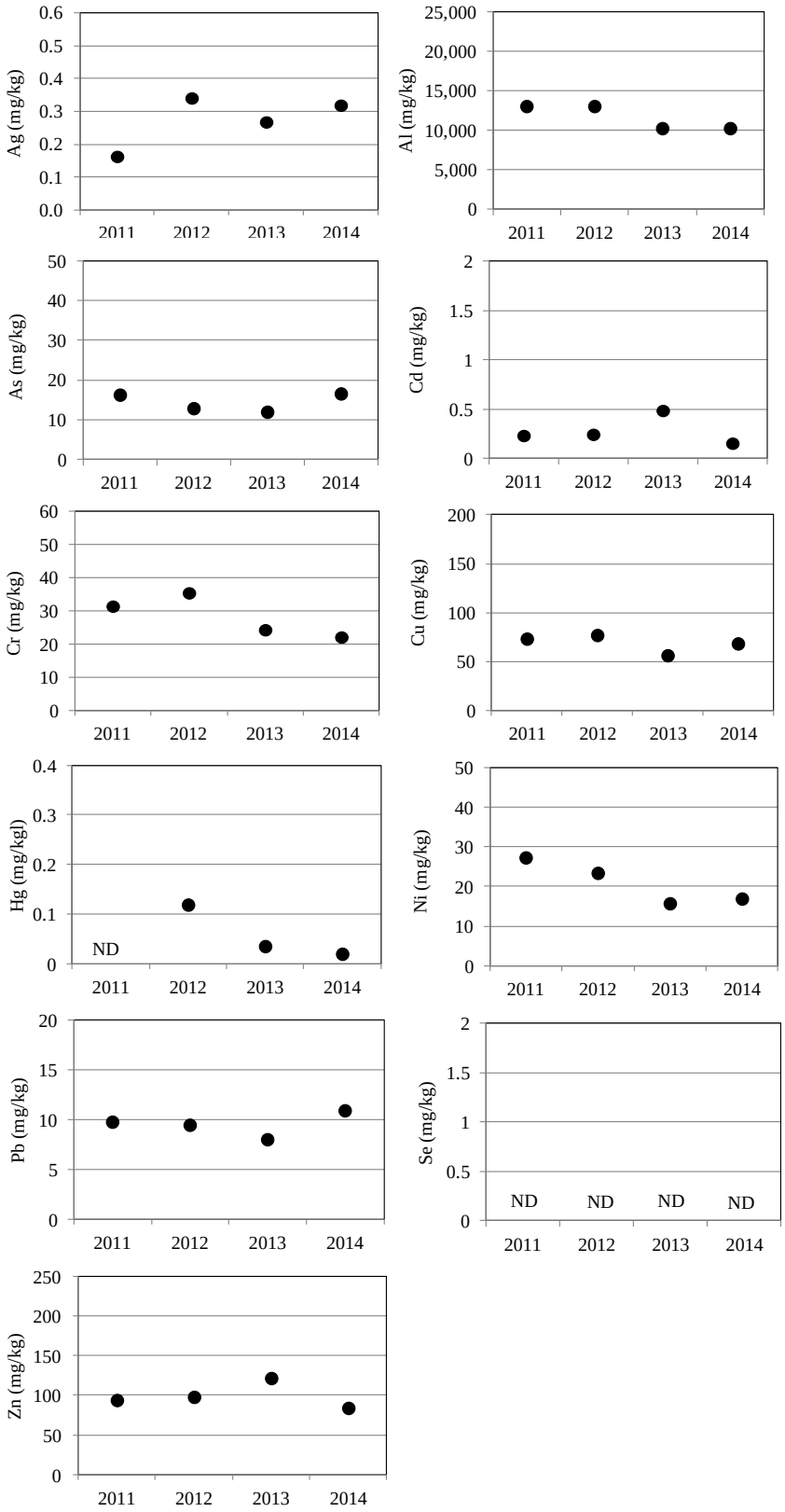

Figure 39.–Lower Johnson Creek sediment metals concentrations.

Upper Johnson Creek

Benthic Macroinvertebrate Density and Composition

We observed a lower density of benthic macroinvertebrates and the greatest percent EPT among the 2014 samples, compared to 2011–2013 data. We identified 32 taxa and estimate benthic macroinvertebrate density at 2,658 insects/m^2, of which 69% were EPT insects (Figure 40). The dominant taxa were Ephemeroptera: Baetis representing 41% of the samples, and Diptera: Chironomidae representing 26% of the samples.

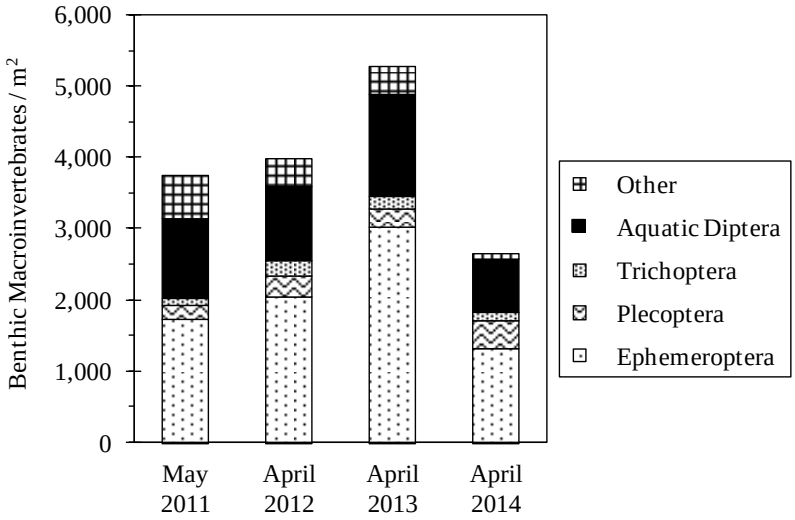

Figure 40.–Upper Johnson Creek benthic macroinvertebrate densities and compositions.

SHERMAN CREEK

Lower Sherman Creek

Periphyton Density and Composition

Sample Point 1

The July 2014 mean chlorophyll *a* density was the lowest observed since 2011 (Table 15). Chlorophyll *a* density for each sample collected is presented in Figure 41, and proportions of mean chlorophylls *a*, *b*, and *c* each year are presented in Figure 42.

Table 15.–Lower Sherman Creek Sample Point 1 chlorophylls *a*, *b*, and *c* mean densities.

Sample Date	Chlorophyll *a* (mg/m^2)	Chlorophyll *b* (mg/m^2)	Chlorophyll *c* (mg/m^2)
July 28, 2011	7.60	0.69	0.49
July 26, 2012	2.54	0.93	0.08
July 29, 2013	3.70	0.00	0.51
July 28, 2014	1.34	0.00	0.18

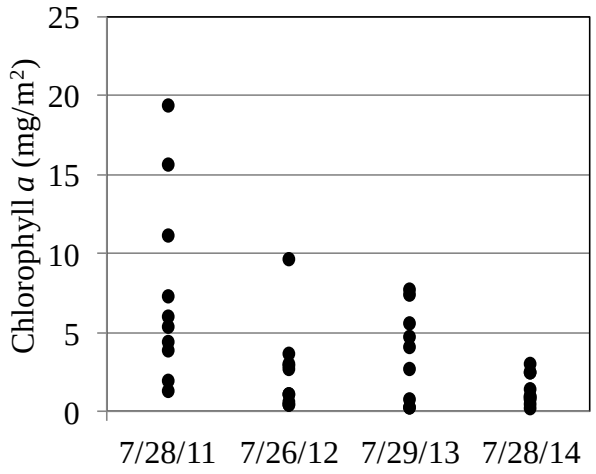

Figure 41.–Lower Sherman Creek Sample Point 1 mean chlorophylls *a*, *b*, and *c* proportions.

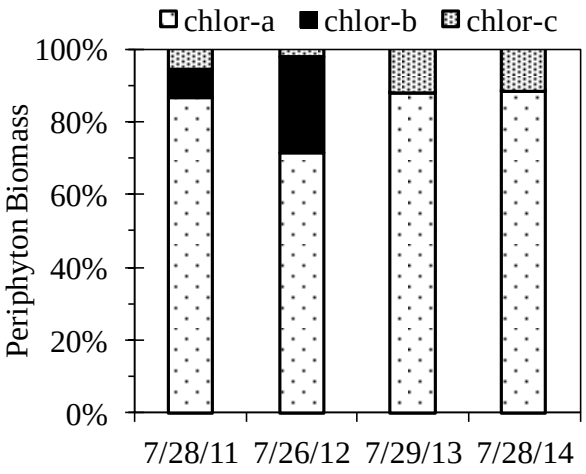

Figure 42.–Lower Sherman Creek Sample Point 1 chlorophyll *a* mean densities.

Sample Point 2

The July 2014 mean chlorophyll *a* density was within the range observed since 2011 (Table 16). Chlorophyll *a* density for each sample collected is presented in Figure 43, and proportions of mean chlorophylls *a*, *b*, and *c* each year are presented in Figure 44.

Table 16.–Lower Sherman Creek Sample Point 2 chlorophylls *a*, *b*, and *c* mean densities.

Sample Date	Chlorophyll *a* (mg/m^2)	Chlorophyll *b* (mg/m^2)	Chlorophyll *c* (mg/m^2)
July 28, 2011	5.61	0.02	0.32
July 26, 2012	0.67	0.01	0.09
July 29, 2013	2.87	0.00	0.33
July 28, 2014	1.32	0.00	0.11

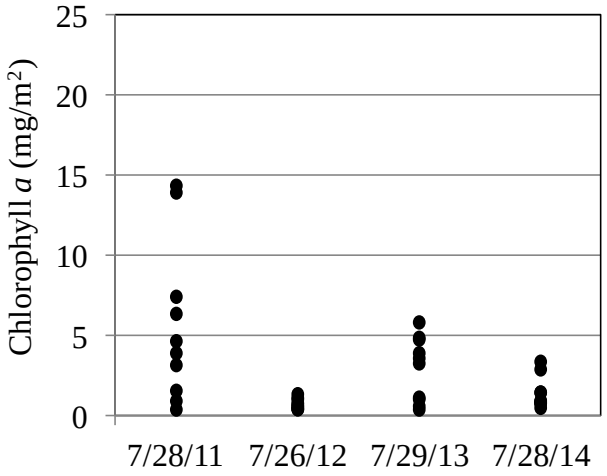

Figure 43.–Lower Sherman Creek Sample Point 2 chlorophyll *a* mean densities.

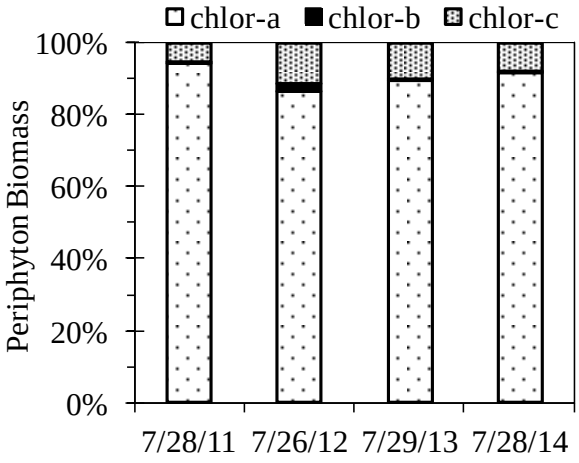

Figure 44.–Lower Sherman Creek Sample Point 2 mean chlorophylls *a, b*, and *c* proportions.

Benthic Macroinvertebrate Density and Composition

Sample Point 1

We observed fewer mayflies and more non-EPT insects among the spring 2014 samples compared to 2011–2013 data, resulting in a reduced percent EPT and a change in taxa dominance.[z] We identified 30 taxa and estimate benthic macroinvertebrate density at 3,023 insects/m^2, of which 14% were EPT insects (Figure 45). The dominant taxa were Annelida: Oligochaeta representing 41% of the samples, and Diptera: Chironomidae representing 33% of the samples.

Sample Point 2

Similar to the spring 2014 Sample Point 1 data and to a greater degree, we observed fewer EPT insects among the spring 2014 samples compared to 2011–2013 data. We identified 28 taxa and estimate benthic macroinvertebrate density at 1,185 insects/m^2, of which 12% were EPT insects (Figure 45). The dominant taxa were Diptera: Chironomidae representing 48% of the samples, and Annelida: Oligochaeta representing 29% of the samples.

[z] We sampled Sample Point 1 again in November 2014 and observed twice as many EPT insects and less than half the number of chironomids compared to the April 2014 results.

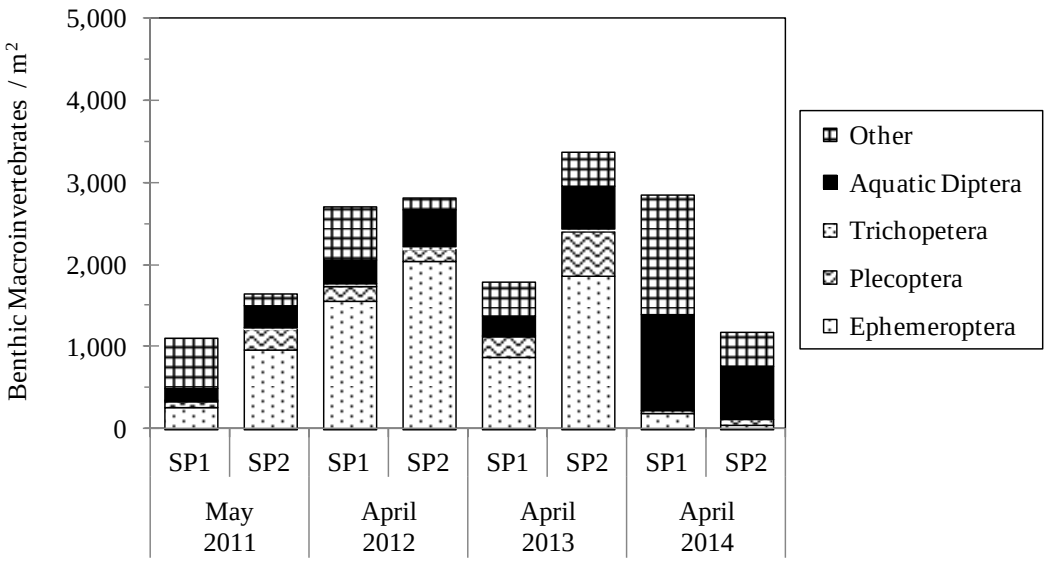

Figure 45.–Lower Sherman Creek Sample Points 1 and 2 benthic macroinvertebrate densities and compositions.

Adult Salmon Counts

We counted 70 live adult pink salmon, and 0 chum salmon during the 2014 spawning season. Coho salmon do not use Sherman Creek so we did not survey later in the year. Figure 46 presents the adult pink salmon count for each survey, and Figure 47 presents the distribution of pink salmon. Table 17 presents the 2011–2014 adult salmon counts.

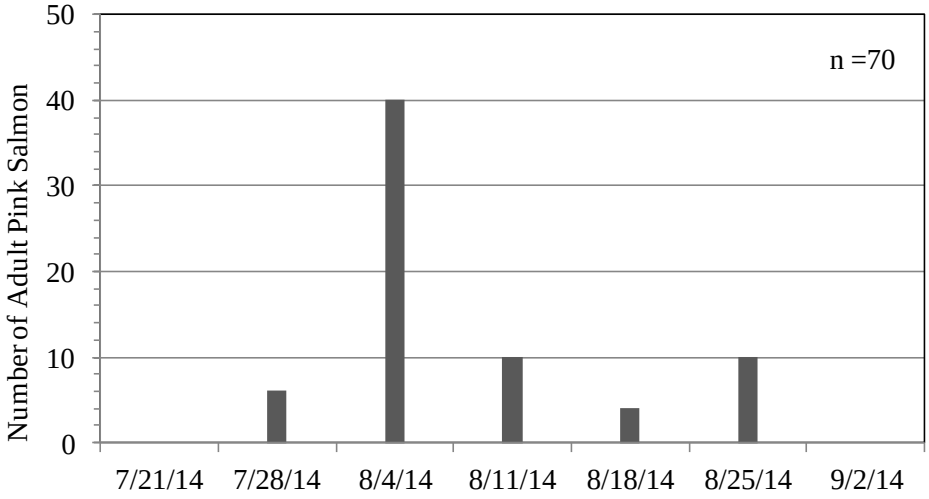

Figure 46.–2014 Lower Sherman Creek weekly adult pink salmon counts.

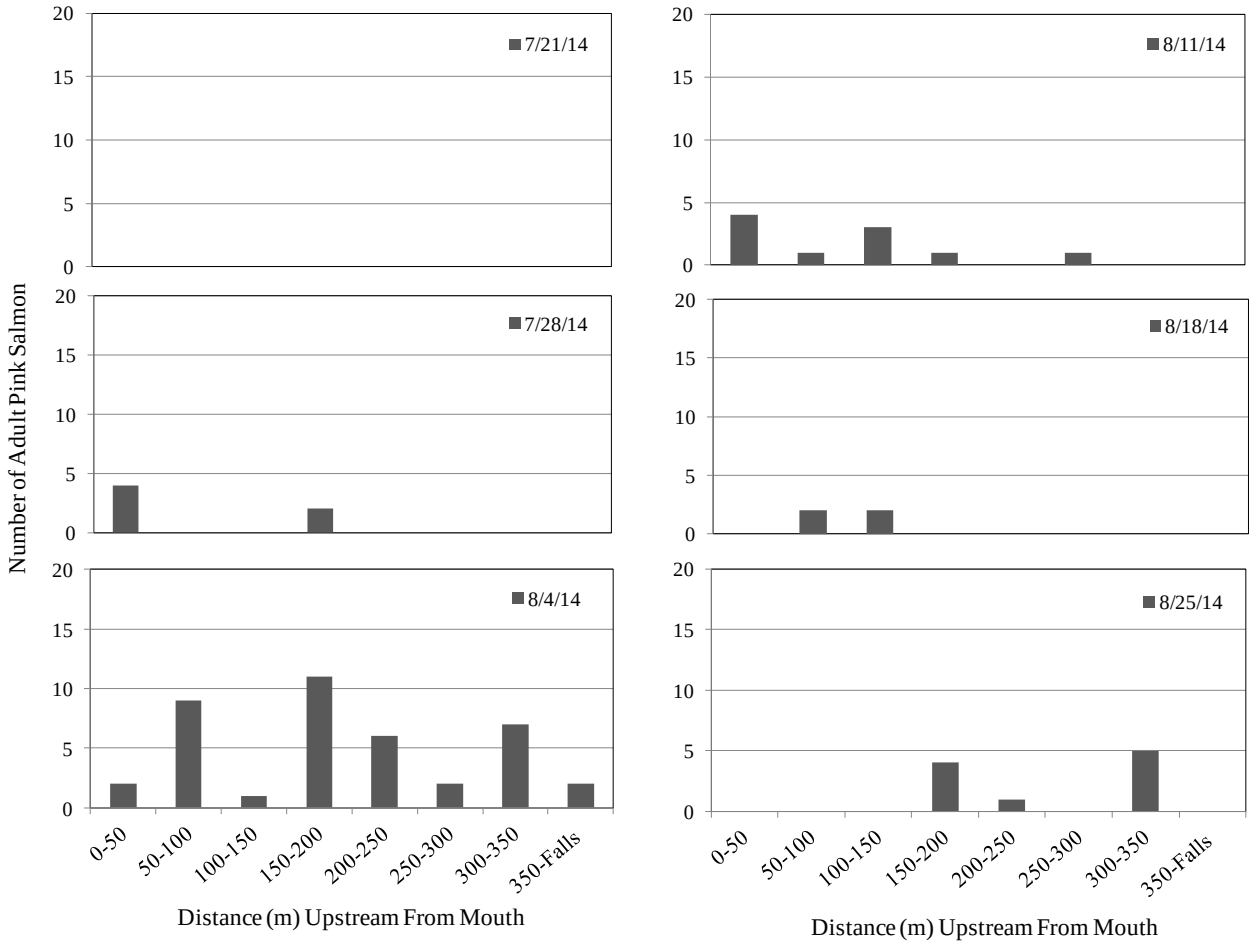

Figure 47.–2014 Lower Sherman Creek weekly adult pink salmon distribution.

Table 17.–Lower Sherman Creek adult salmon counts.

	2011	2012	2013	2014
Pink Salmon	4,624	1,608	4,981	70
Chum Salmon	0	0	12	0

Sediment Metals Concentrations

The 2014 sediment metals, As, and Se concentrations were similar to or less than concentrations observed 2011–2013. Figure 48 presents the 2014 sample results, and Figure 49 presents the 2011–2014 data.

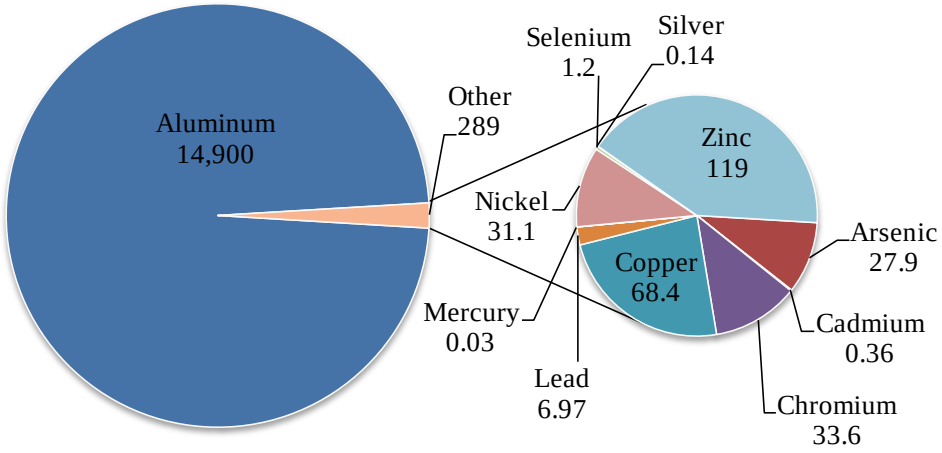

Figure 48.–2014 Lower Sherman Creek sediment metals concentrations.

Sediment Toxicity

C. dilutus and *H. azteca* growth and survival on the 2014 Lower Sherman Creek sediment sample were not significantly different than organism growth and survival on the control sediment.

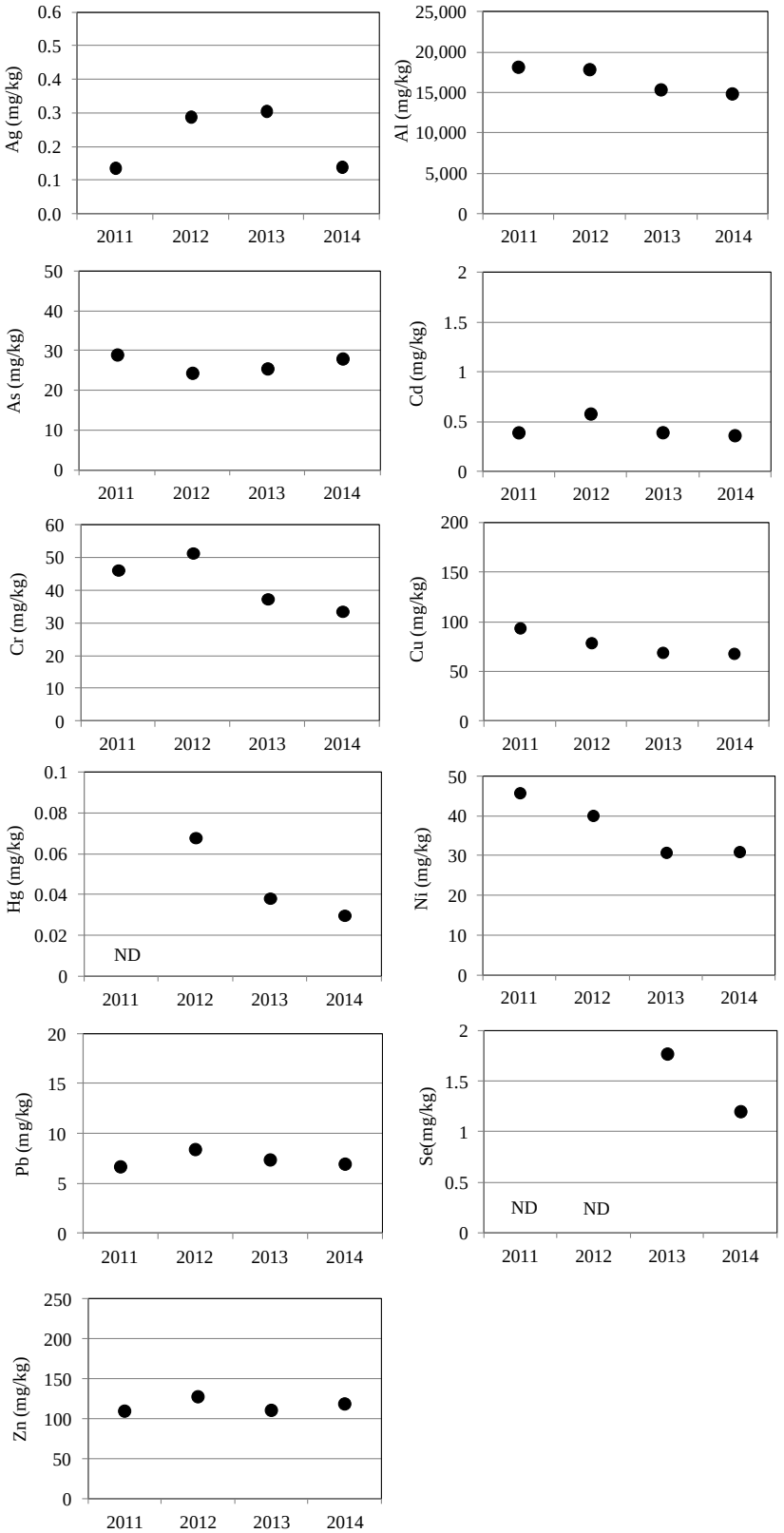

Figure 49.–Lower Sherman Creek sediment metals concentrations.

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[aa] This publication is actually the resident fish survey report.

[bb] This publication is actually the invertebrate tissue analysis.

[cc] Actually published February 2010.

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APPENDIX A: PERIPHYTON DATA

Appendix A1.–Lower Slate Creek chlorophylls *a*, *b*, and *c* densities, 2011–2014.

	July 2011			October 2011			February 2012			April 2012		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*
	0.21	0.05	0.00	6.41	0.00	0.87	2.56	0.01	0.16	0.56	0.00	0.06
	1.28	0.02	0.11	11.85	1.30	0.99	2.46	0.00	0.21	0.46	0.00	0.07
	0.85	0.01	0.07	2.99	0.15	0.13	-	-	-	0.85	0.00	0.10
	3.31	0.08	0.25	2.10	0.00	0.21	2.14	0.04	0.14	0.50	0.00	0.13
	11.85	3.11	0.30	5.23	0.03	0.63	-	-	-	1.32	0.00	0.25
	18.05	0.42	0.91	1.50	0.00	0.18	0.41	0.04	0.04	2.15	0.00	0.20
	-	0.13	0.00	0.32	0.00	0.00	0.90	0.11	0.05	0.41	0.00	0.00
	0.43	0.05	0.00	8.22	0.25	0.77	2.23	0.10	0.10	1.60	0.16	0.13
	8.54	0.39	0.58	2.24	0.00	0.23	3.10	0.00	0.30	1.07	0.00	0.11
	6.30	0.03	0.38	5.87	0.00	0.85	0.07	0.03	0.05	0.69	0.00	0.07
mean	5.65	0.43	0.26	4.67	0.17	0.48	1.73	0.04	0.13	0.96	0.02	0.11
max	18.05	3.11	0.91	11.85	1.30	0.99	3.10	0.11	0.30	2.15	0.16	0.25
min	0.21	0.01	0.00	0.32	0.00	0.00	0.07	0.00	0.04	0.41	0.00	0.00

	July 2012			October 2012			February 2013			April 2013		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*
	1.60	0.13	0.07	0.96	0.00	0.08	1.28	0.00	0.05	0.55	0.00	0.02
	4.06	0.00	0.39	2.03	0.00	0.21	**0.24**	-	-	**0.24**	-	-
	2.03	0.00	0.18	0.75	0.00	0.05	1.06	0.00	0.09	7.80	0.00	1.47
	0.96	0.00	0.04	**0.34**	-	-	1.92	0.00	0.19	**0.24**	-	-
	2.56	0.04	0.22	1.92	0.00	0.20	0.82	0.08	0.00	1.50	0.12	0.03
	0.92	0.00	0.01	1.42	0.00	0.24	0.41	0.00	0.00	**0.24**	-	-
	1.49	0.13	0.13	4.06	0.00	0.33	4.81	0.00	0.29	0.64	0.00	0.01
	2.35	0.12	0.19	0.96	0.00	0.00	1.71	0.00	0.05	**0.24**	-	-
	6.19	0.05	0.54	**0.34**	-	-	5.02	0.00	0.39	0.53	0.00	0.00
	0.96	0.00	0.06	**0.34**	-	-	0.43	0.00	0.07	1.28	0.00	0.10
mean	2.31	0.05	0.18	1.31	0.00	0.16	1.77	0.01	0.13	1.33	0.02	0.27
max	6.19	0.13	0.54	4.06	0.00	0.33	5.02	0.08	0.39	7.80	0.12	1.47
min	0.92	0.00	0.01	0.34	0.00	0.00	0.24	0.00	0.00	0.24	0.00	0.00

	July 2013			October 2013			February 2014			April 2014		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*
	14.10	0.00	1.56	0.85	0.00	0.09	**0.24**	-	-	0.75	0.00	0.02
	20.72	0.00	3.11	1.28	0.00	0.20	**0.24**	-	-	3.63	0.00	0.43
	10.89	0.00	1.01	1.92	0.00	0.26	**0.24**	-	-	0.96	0.06	0.13
	17.84	0.00	2.66	10.57	0.00	1.43	**0.24**	-	-	2.14	0.00	0.34
	2.14	0.00	0.24	10.47	0.00	1.31	**0.24**	-	-	0.43	0.04	0.04
	6.09	0.00	0.95	2.03	0.00	0.33	**0.24**	-	-	**0.24**	-	-
	15.49	0.00	1.99	0.32	0.00	0.03	**0.24**	-	-	**0.24**	-	-
	12.71	0.00	1.58	0.96	0.00	0.09	**0.24**	-	-	**0.24**	-	-
	11.32	0.00	1.87	10.89	0.00	1.96	**0.24**	-	-	3.84	0.00	0.34
	14.63	0.00	1.46	**0.24**	-	-	**0.24**	-	-	0.64	0.00	0.07
mean	12.59	0.00	1.64	3.95	0.00	0.63	0.24	-	-	1.31	0.01	0.20
max	20.72	0.00	3.11	10.89	0.00	1.96	0.24	-	-	3.84	0.06	0.43
min	2.14	0.00	0.24	0.24	0.00	0.03	0.24	-	-	0.24	0.00	0.02

	July 2014			October 2014		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*
	0.00	0.00	0.00	1.60	0.00	0.23
	9.29	3.22	0.48	2.35	0.00	0.31
	1.50	0.00	0.23	3.42	0.36	0.17
	12.18	5.27	0.38	9.08	0.00	1.24
	0.75	0.00	0.05	**0.05**	-	-
	4.70	0.00	0.67	0.00	1.60	1.33
	2.88	0.00	0.49	0.11	0.01	0.05
	1.82	0.00	0.15	0.43	0.00	0.06
	0.73	0.00	0.07	6.62	0.00	0.74
	5.87	0.00	0.51	0.32	0.00	0.08
mean	3.97	0.85	0.30	3.95	0.00	0.63
max	12.18	5.27	0.67	10.89	0.00	1.96
min	0.00	0.00	0.00	0.24	0.00	0.03

Note: Bolded values are the spectrophotometer estimated detection limit, chlorophyll *a* not detected.

Appendix A2.–West Fork Creek chlorophylls *a*, *b*, and *c* densities, 2011–2014.

	July 2011			July 2012			July 2013			July 2014		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*
	2.52	0.00	0.19	1.15	0.00	0.04	4.70	0.00	0.74	0.32	0.00	0.01
	4.70	0.00	0.43	0.41	0.00	0.08	1.39	0.00	0.16	0.19	0.00	0.00
	2.78	0.00	0.26	0.53	0.00	0.02	13.14	0.00	2.19	0.75	0.00	0.05
	3.35	0.00	0.04	0.64	0.00	0.16	4.38	0.00	0.47	0.88	0.00	0.00
	4.27	0.00	0.25	3.62	0.00	0.24	1.28	0.00	0.11	1.60	0.00	0.19
	4.91	0.00	0.42	0.85	0.00	0.14	3.10	0.00	0.50	0.23	0.00	0.03
	3.95	0.00	0.27	0.96	0.01	0.07	3.74	0.00	0.53	0.41	0.00	0.00
	3.10	0.00	0.25	0.41	0.00	0.08	2.03	0.00	0.33	0.33	0.00	0.02
	4.38	0.00	0.39	0.60	0.00	0.12	5.02	0.00	0.67	1.17	0.00	0.13
	5.23	0.00	0.20	0.96	0.00	0.06	3.40	0.00	0.36	1.82	0.00	0.15
mean	3.92	0.00	0.27	1.01	0.00	0.10	4.22	0.00	0.61	0.77	0.00	0.06
max	5.23	0.00	0.43	3.62	0.01	0.24	13.14	0.00	2.19	1.82	0.00	0.19
min	2.52	0.00	0.04	0.41	0.00	0.02	1.28	0.00	0.11	0.19	0.00	0.00

Appendix A3.–East Fork Creek chlorophylls *a*, *b*, and *c* densities, 2011–2014.

	July 2011			October 2011			February 2012			May 2012		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*
	9.51	2.16	0.24	18.90	7.97	1.11	0.53	0.00	0.00	7.80	0.74	0.34
	9.18	0.02	0.20	10.68	1.30	0.36	0.96	0.11	0.00	**0.34**	-	-
	1.28	0.03	0.00	2.99	0.79	0.12	1.34	0.37	0.09	5.23	0.00	0.16
	5.13	1.15	0.11	6.73	1.88	0.64	-	0.03	0.00	4.81	1.56	0.19
	16.02	0.18	0.44	22.53	5.43	0.99	1.07	0.09	0.00	7.48	0.00	0.50
	8.86	1.94	0.70	-	-	-	0.50	0.08	0.00	1.33	0.00	0.08
	4.70	0.70	0.13	-	-	-	6.41	2.04	0.09	2.78	0.00	0.09
	16.13	5.35	0.28	-	-	-	**0.07**	-	-	4.59	0.00	0.33
	4.91	0.49	0.12	-	-	-	5.55	1.44	0.19	4.59	0.00	0.17
	12.71	3.59	0.15	-	-	-	1.92	0.14	0.07	9.72	0.00	0.47
mean	8.84	1.56	0.24	12.37	3.47	0.64	2.04	0.48	0.05	4.87	0.26	0.26
max	16.13	5.35	0.70	22.53	7.97	1.11	6.41	2.04	0.19	9.72	1.56	0.50
min	1.28	0.02	0.00	2.99	0.79	0.12	0.07	0.00	0.00	0.34	0.00	0.08

	July 2012			October 2012			February 2013			April 2013		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*
	11.53	3.24	0.28	0.60	0.00	0.02	0.53	0.02	0.09	2.03	0.07	0.05
	0.41	0.04	0.04	0.73	0.00	0.07	**0.24**	-	-	3.84	0.00	0.19
	0.88	0.00	0.05	**0.34**	-	-	3.31	0.59	0.15	2.88	0.00	0.24
	0.50	0.00	0.03	1.50	0.00	0.16	0.50	0.00	0.03	2.03	0.00	0.10
	3.42	0.00	0.11	0.85	0.00	0.03	1.60	0.00	0.16	**0.24**	-	-
	0.64	0.08	0.05	0.64	0.00	0.07	**0.24**	-	-	1.82	0.00	0.02
	18.58	0.00	0.66	0.75	0.00	0.02	5.34	0.77	0.23	0.96	0.00	0.06
	13.67	2.32	0.57	1.34	0.00	0.02	1.92	0.28	0.00	1.07	0.00	0.06
	0.69	0.00	0.00	0.41	0.00	0.08	2.67	0.38	0.08	**0.24**	-	-
	0.43	0.00	0.00	0.64	0.00	0.07	**0.24**	-	-	1.92	0.00	0.15
mean	5.08	0.57	0.18	0.78	0.00	0.06	1.66	0.29	0.11	1.70	0.01	0.11
max	18.58	3.24	0.66	1.50	0.00	0.16	5.34	0.77	0.23	3.84	0.07	0.24
min	0.41	0.00	0.00	0.34	0.00	0.02	0.24	0.00	0.00	0.24	0.00	0.02

	July 2013			October 2013			April 2014			July 2014		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*
	8.12	0.00	0.67	3.95	0.93	0.07	**0.24**	-	-	0.14	0.00	0.00
	0.24	-	-	0.43	0.26	0.05	0.64	0.13	0.05	0.64	0.00	0.07
	1.07	0.03	0.07	0.32	0.04	0.04	**0.24**	-	-	0.05	0.04	0.00
	0.32	0.07	0.00	0.32	0.14	0.02	0.96	0.30	0.08	0.75	0.14	0.10
	0.64	0.10	0.00	**0.24**	-	-	0.32	0.06	0.05	0.05	0.00	0.00
	5.02	0.16	0.35	1.17	0.00	0.14	**0.24**	-	-	0.37	0.00	0.00
	0.43	0.00	0.03	0.75	0.26	0.00	0.32	0.01	0.00	**0.05**	-	-
	6.41	0.11	0.50	0.32	0.14	0.02	**0.24**	-	-	0.11	0.00	0.00
	0.32	0.00	0.00	2.24	0.38	0.06	**0.24**	-	-	0.53	0.00	0.01
	0.24	-	-	0.43	0.14	0.02	0.43	0.32	0.15	**0.05**	-	-
mean	2.28	0.06	0.20	1.02	0.25	0.05	0.39	0.16	0.07	0.27	0.02	0.02
max	8.12	0.16	0.67	3.95	0.93	0.14	0.96	0.32	0.15	0.75	0.14	0.10
min	0.24	0.00	0.00	0.24	0.00	0.00	0.24	0.01	0.00	0.05	0.00	0.00

	October 2014		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*
	0.32	0.00	0.00
	0.21	0.00	0.03
	0.09	0.00	0.00
	0.05	-	-
	0.05	-	-
	0.75	0.00	0.09
	0.11	0.02	0.00
	0.14	0.00	0.00
	0.64	0.04	0.04
	0.53	0.30	0.05
mean	0.29	0.05	0.03
max	0.75	0.30	0.09
min	0.05	0.00	0.00

Note: Bolded values are the spectrophotometer estimated detection limit, chlorophyll *a* not detected.

Appendix A4.–Upper Slate Creek chlorophylls *a*, *b*, and *c* densities, 2011–2014.

	July 2011			October 2011			February 2012			April 2012		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*
	-	0.00	0.00	6.62	0.00	0.25	0.32	0.00	0.02	0.96	0.00	0.10
	0.32	0.00	0.04	0.46	0.00	0.02	0.75	0.00	0.06	0.53	0.00	0.01
	0.96	0.01	0.07	0.75	0.00	0.05	0.33	0.00	0.02	0.83	0.00	0.05
	0.11	0.00	0.00	0.53	0.00	0.04	1.14	0.00	0.01	**0.34**	-	-
	2.67	0.00	0.26	0.55	0.00	0.02	**0.07**	-	-	**0.34**	-	-
	-	0.00	0.00	1.47	0.00	0.03	1.15	0.00	0.04	0.45	0.01	0.04
	0.60	0.00	0.12	0.14	0.01	0.05	1.71	0.00	0.10	**0.34**	-	-
	1.14	0.00	0.01	-	0.00	0.15	0.21	0.00	0.03	0.60	0.00	0.02
	0.53	0.00	0.00	0.64	0.00	0.11	**0.07**	-	-	**0.34**	-	-
	0.60	0.00	0.02	-	-	-	0.64	0.00	0.01	2.24	0.00	0.15
mean	0.87	0.00	0.05	1.40	0.00	0.08	0.64	0.00	0.04	0.70	0.00	0.06
max	2.67	0.01	0.26	6.62	0.01	0.25	1.71	0.00	0.10	2.24	0.01	0.15
min	0.11	0.00	0.00	0.14	0.00	0.02	0.07	0.00	0.01	0.34	0.00	0.01

	July 2012			October 2012			February 2013			April 2013		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*
	2.03	0.00	0.14	**0.34**	-	-	1.24	0.00	0.03	0.64	0.00	0.00
	0.96	0.00	0.09	0.70	0.00	0.00	0.53	0.04	0.09	0.64	0.00	0.00
	0.75	0.00	0.00	0.84	0.00	0.00	2.14	0.00	0.07	0.85	0.00	0.01
	0.50	0.00	0.03	0.96	0.00	0.10	0.50	0.00	0.03	0.53	0.00	0.02
	2.03	0.00	0.14	2.67	0.00	0.23	0.79	0.00	0.09	1.17	0.00	0.13
	1.07	0.00	0.14	0.37	0.00	0.11	1.06	0.00	0.09	0.53	0.00	0.02
	0.55	0.00	0.02	0.32	0.00	0.01	**0.24**	-	-	0.21	0.00	0.00
	1.71	0.00	0.06	0.96	0.00	0.00	0.32	0.06	0.05	0.32	0.00	0.02
	2.14	0.00	0.12	**0.34**	-	-	0.69	0.00	0.00	-	-	-
	0.83	0.00	0.00	**0.34**	-	-	1.39	0.00	0.00	0.96	0.00	0.27
mean	1.26	0.00	0.07	0.78	0.00	0.06	0.89	0.01	0.05	0.65	0.00	0.05
max	2.14	0.00	0.14	2.67	0.00	0.23	2.14	0.06	0.09	1.17	0.00	0.27
min	0.50	0.00	0.00	0.32	0.00	0.00	0.24	0.00	0.00	0.21	0.00	0.00

	July 2013			October 2013			July 2014		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*
	1.82	0.00	0.27	1.50	0.00	0.04	0.92	0.00	0.11
	0.85	0.01	0.07	2.14	0.00	0.12	1.20	0.00	0.07
	2.94	0.00	0.13	0.85	0.00	0.05	1.52	0.00	0.06
	1.39	0.00	0.12	2.78	0.00	0.14	1.82	0.00	0.15
	2.99	0.00	0.11	0.85	0.00	0.04	0.85	0.00	0.00
	4.59	0.00	0.20	2.14	0.00	0.10	0.64	0.00	0.01
	0.85	0.00	0.01	1.71	0.00	0.12	1.17	0.00	0.07
	2.03	0.00	0.20	1.71	0.00	0.10	0.96	0.00	0.00
	0.85	0.00	0.00	**0.24**	-	-	0.64	0.00	0.01
	2.94	0.00	0.20	**0.24**	-	-	1.17	0.00	0.12
mean	2.13	0.00	0.13	1.42	0.00	0.09	1.09	0.00	0.06
max	4.59	0.01	0.27	2.78	0.00	0.14	1.82	0.00	0.15
min	0.85	0.00	0.00	0.24	0.00	0.04	0.64	0.00	0.00

Note: Bolded values are the spectrophotometer estimated detection limit, chlorophyll *a* not detected.

Appendix A5.–Lower Sherman Creek Sample Point 1 chlorophylls *a*, *b*, and *c* densities, 2011–2014.

	July 2011			July 2012			July 2013			July 2014		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*
	1.28	0.00	0.05	1.07	0.00	0.14	4.06	0.00	0.38	2.46	0.00	0.30
	5.34	0.00	0.36	2.88	0.87	0.16	5.55	0.00	0.73	0.74	0.00	0.10
	5.98	0.00	0.54	0.41	0.04	0.04	**0.24**	-	-	0.19	0.00	0.00
	3.84	0.10	0.48	2.67	1.27	0.00	4.70	0.00	0.55	0.92	0.00	0.14
	15.59	3.98	0.17	0.60	0.00	0.12	7.69	0.00	0.89	0.83	0.00	0.15
	11.11	2.64	0.28	1.07	0.00	0.11	7.37	0.00	0.62	2.99	0.00	0.47
	19.33	0.00	1.65	3.63	1.56	0.03	**0.24**	-	-	1.39	0.00	0.17
	7.26	0.00	0.74	9.61	4.12	0.08	2.67	0.00	0.35	2.46	0.00	0.25
	1.92	0.04	0.19	2.99	1.43	0.02	0.75	0.03	0.08	0.45	0.01	0.04
	4.38	0.17	0.44	0.43	0.00	0.06	-	-	-	0.96	0.00	0.16
mean	7.60	0.69	0.49	2.54	0.93	0.08	3.70	0.00	0.51	1.34	0.00	0.18
max	19.33	3.98	1.65	9.61	4.12	0.16	7.69	0.03	0.89	2.99	0.01	0.47
min	1.28	0.00	0.05	0.41	0.00	0.00	0.24	0.00	0.08	0.19	0.00	0.00

Note: Bolded values are the spectrophotometer estimated detection limit, chlorophyll *a* not detected.

Appendix A6.–Lower Sherman Creek Sample Point 2 chlorophylls *a*, *b*, and *c* densities, 2011–2014.

	July 2011			July 2012			July 2013			July 2014		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*
	3.10	0.00	0.26	1.05	0.04	0.12	1.07	0.00	0.14	0.74	0.00	0.10
	6.30	0.19	0.62	0.64	0.00	0.11	3.84	0.00	0.34	1.38	0.00	0.18
	4.59	0.00	0.38	0.73	0.00	0.07	0.96	0.00	0.15	2.83	0.00	0.15
	0.32	0.00	0.00	0.50	0.07	0.10	4.81	0.00	0.49	3.31	0.00	0.31
	13.88	0.00	0.54	**0.34**	-	-	5.77	0.00	0.78	0.75	0.00	0.06
	7.37	0.00	0.46	0.51	0.00	0.06	0.32	0.02	0.10	0.85	0.03	0.08
	1.50	0.00	0.09	0.96	0.00	0.16	4.70	0.00	0.44	0.85	0.00	0.01
	14.31	0.00	0.59	0.37	0.00	0.00	3.52	0.00	0.35	1.39	0.00	0.16
	0.85	0.00	0.01	1.28	0.00	0.09	0.53	0.00	0.02	0.43	0.01	0.04
	3.84	0.00	0.25	**0.34**	-	-	3.20	0.00	0.44	0.69	0.00	0.07
mean	5.61	0.02	0.32	0.67	0.01	0.09	2.87	0.00	0.33	1.32	0.00	0.11
max	14.31	0.19	0.62	1.28	0.07	0.16	5.77	0.02	0.78	3.31	0.03	0.31
min	0.32	0.00	0.00	0.34	0.00	0.00	0.32	0.00	0.02	0.43	0.00	0.01

Note: Bolded values are the spectrophotometer estimated detection limit, chlorophyll *a* not detected.

APPENDIX B: BENTHIC MACROINVERTEBRATE DATA

Appendix B1.–Lower Slate Creek Sample Point 1 benthic macroinvertebrate data, 2011–2014.

	May 2011	May 2012	Apr 2013	Feb 2014	Apr 2014	Oct 2014
Total Aquatic Insect Taxa Counted	29	32	27	29	32	30
Total Ephemeroptera	85	387	400	67	73	66
Total Plecoptera	70	274	203	436	352	330
Total Trichoptera	2	8	6	8	17	7
Total Aquatic Diptera	862	975	503	1,360	1,711	273
Total Other	129	116	88	128	155	208
% Ephemeroptera	7.4%	22%	33%	3.4%	3.2%	7.5%
% Plecoptera	6.1%	16%	17%	22%	15%	37%
% Trichoptera	0.2%	0.5%	0.5%	0.4%	0.7%	0.8%
% Aquatic Diptera	75%	55%	42%	68%	74%	31%
% Other	11%	6.6%	7.3%	6.4%	6.7%	24%
% EPT	14%	38%	51%	26%	19%	46%
% Chironomidae	72%	53%	35%	64%	68%	25%
Shannon Diversity Score (H)	0.51	0.69	0.85	0.66	0.64	0.88
Evenness Score (E)	0.48	0.58	0.70	0.53	0.52	0.73
Total Aquatic Insects Counted	1,148	1,760	1,200	1,999	2,308	884
Total Terrestrial Insects Counted	0	4	0	0	1	5
Total Insects Counted	1,148	1,764	1,200	1,999	2,309	889
% Sample Aquatic	100%	99.8%	100%	100%	99.96%	99.4%
% Sample Terrestrial	0%	0.2%	0%	0%	0.04%	0.6%
Total Sample Area (m^2)	0.558	0.558	0.465	0.558	0.558	0.558
Mean # Aquatic Insects / Sample	191	293	240	333	385	147
1 StDev	97	172	51	172	334	72
Estimated Mean # Aquatic Insects / m^2	2,057	3,154	2,581	3,582	4,136	1,584
1 StDev	1,046	1,849	551	1,845	3,592	775
Juvenile Fish	1	0	0	0	1	0

Appendix B2.–Lower Slate Creek Sample Point 2 benthic macroinvertebrate data, 2011–2014.

	Apr 2013	Apr 2014
Total Aquatic Insect Taxa Counted	24	31
Total Ephemeroptera	311	58
Total Plecoptera	156	466
Total Trichoptera	4	7
Total Aquatic Diptera	189	396
Total Other	84	181
% Ephemeroptera	42%	5%
% Plecoptera	21%	42%
% Trichoptera	0.5%	0.6%
% Aquatic Diptera	25%	36%
% Other	11%	16%
% EPT	63%	48%
% Chironomidae	22%	33%
Shannon Diversity Score (H)	0.93	0.72
Evenness Score (E)	0.78	0.62
Total Aquatic Insects Counted	744	1,108
Total Terrestrial Insects Counted	2	7
Total Insects Counted	746	1,115
% Sample Aquatic	99.7%	99.4%
% Sample Terrestrial	0.3%	0.6%
Sample Area (m^2)	0.558	0.558
Mean # Aquatic Insects / Sample	124	185
1 StDev	43	72
Estimated Mean # Aquatic Insects / m^2	1,333	1,986
1 StDev	460	773
Juvenile Fish	0	1

Appendix B3.–West Fork Slate Creek benthic macroinvertebrate data, 2011–2014.

	May 2011	May 2012	Apr 2013	Apr 2014
Total Aquatic Insect Taxa Counted	21	31	28	29
Total Ephemeroptera	181	634	991	223
Total Plecoptera	41	166	233	150
Total Trichoptera	3	11	10	15
Total Aquatic Diptera	35	175	118	136
Total Other	20	29	13	19
% Ephemeroptera	65%	63%	73%	41%
% Plecoptera	15%	16%	17%	28%
% Trichoptera	1.1%	1.1%	0.7%	2.8%
% Aquatic Diptera	13%	17%	8.6%	25%
% Other	7.1%	2.9%	1.0%	3.5%
% EPT	80%	80%	90%	71%
% Chironomidae	10%	15%	7.2%	22%
Shannon Diversity Score (H)	0.63	0.84	0.73	0.91
Evenness Score (E)	0.78	0.71	0.61	0.79
Total Aquatic Insects Counted	280	1,015	1,365	543
Total Terrestrial Insects Counted	2	0	0	0
Total Insects Counted	282	1,015	1,365	543
% Sample Aquatic	99%	100%	100%	100%
% Sample Terrestrial	1%	0%	0%	0%
Total Sample Area (m^2)	0.558	0.558	0.558	0.558
Mean # Aquatic Insects / Sample	47	169	228	91
1 StDev	38	94	72	45
Estimated Mean # Aquatic Insects / m^2	502	1,819	2,446	973
1 StDev	410	1,009	777	482
Juvenile Fish	0	0	0	0

Appendix B4.–East Fork Slate Creek benthic macroinvertebrate data, 2011–2014.

	May 2011	Apr 2012	Apr 2013	Apr 2014
Total Aquatic Insect Taxa Counted	27	33	33	24
Total Ephemeroptera	387	490	19	9
Total Plecoptera	70	73	45	10
Total Trichoptera	28	23	66	3
Total Aquatic Diptera	507	547	598	454
Total Other	1,624	1,451	4,521	667
% Ephemeroptera	15%	19%	0.4%	0.8%
% Plecoptera	2.7%	2.8%	0.9%	0.9%
% Trichoptera	1.1%	0.9%	1.3%	0.3%
% Aquatic Diptera	19%	21%	11%	40%
% Other	62%	56%	86%	58%
% EPT	19%	23%	2.5%	1.9%
% Chironomidae	17%	15%	9.6%	35%
Shannon Diversity Score (H)	0.64	0.78	0.57	0.70
Evenness Score (E)	0.54	0.61	0.47	0.63
Total Aquatic Insects Counted	2,616	2,585	5,249	1,143
Total Terrestrial Insects Counted	3	1	0	0
Total Insects Counted	2,619	2,586	5,249	1,143
% Sample Aquatic	99.9%	99.96%	100%	100%
% Sample Terrestrial	0.1%	0.04%	0%	0%
Total Sample Area (m^2)	0.558	0.558	0.558	0.558
Mean # Aquatic Insects / Sample	436	431	875	191
1 StDev	101	123	356	89
Estimated Mean # Aquatic Insects / m^2	4,688	4,633	9,407	2,048
1 StDev	1,081	1,325	3,830	952
Juvenile Fish	0	0	0	0

Appendix B5.–Upper Slate Creek benthic macroinvertebrate data, 2011–2014.

	May 2011	Apr 2012	Apr 2013	Apr 2014
Total Aquatic Insect Taxa Counted	33	39	34	36
Total Ephemeroptera	368	454	492	622
Total Plecoptera	401	349	604	429
Total Trichoptera	116	48	55	44
Total Aquatic Diptera	248	273	338	518
Total Other	275	135	118	131
% Ephemeroptera	26%	36%	31%	36%
% Plecoptera	29%	28%	38%	25%
% Trichoptera	8.2%	3.8%	3.4%	2.5%
% Aquatic Diptera	18%	22%	21%	30%
% Other	20%	11%	7.3%	7.5%
% EPT	63%	68%	72%	63%
% Chironomidae	15%	20%	19%	28%
Shannon Diversity Score (H)	0.97	1.04	1.02	1.03
Evenness Score (E)	0.76	0.79	0.78	0.76
Total Aquatic Insects Counted	1,408	1,259	1,607	1,744
Total Terrestrial Insects Counted	1	0	0	1
Total Insects Counted	1,409	1,259	1,607	1,745
% Sample Aquatic	99.9%	100%	100%	99.9%
% Sample Terrestrial	0.1%	0%	0%	0.1%
Total Sample Area (m^2)	0.558	0.558	0.558	0.558
Mean # Aquatic Insects / Sample	235	210	268	291
1 StDev	109	123	98	61
Estimated Mean # Aquatic Insects / m^2	2,523	2,256	2,880	3,125
1 StDev	1,173	1,321	1,049	660
Juvenile Fish	0	0	0	0

Appendix B6.–Upper Johnson Creek benthic macroinvertebrate data, 2011–2014.

	May 2011	Apr 2012	Apr 2013	Apr 2014
Total Aquatic Insect Taxa Counted	24	28	34	32
Total Ephemeroptera	962	1,139	1,680	740
Total Plecoptera	114	163	147	217
Total Trichoptera	59	118	95	68
Total Aquatic Diptera	619	586	799	407
Total Other	330	208	217	51
% Ephemeroptera	46%	51%	57%	50%
% Plecoptera	5.5%	7.4%	5.0%	15%
% Trichoptera	2.8%	5.3%	3.2%	4.6%
% Aq. Diptera	30%	27%	27%	27%
% Other	16%	9.4%	7.4%	3.4%
% EPT	55%	64%	65%	69%
% Chironomidae	29%	26%	27%	26%
Shannon Diversity Score (H)	0.76	0.81	0.74	0.74
Evenness Score (E)	0.66	0.68	0.59	0.59
Total Aquatic Insects Counted	2,084	2,214	2,938	1,483
Total Terrestrial Insects Counted	1	1	1	4
Total Insects Counted	2,085	2,215	2,939	1,487
% Sample Aquatic	99.95%	99.95%	99.97%	99.7%
% Sample Terrestrial	0.05%	0.05%	0.03%	0.3%
Total Sample Area (m^2)	0.558	0.558	0.558	0.558
Mean # Aquatic Insects / Sample	347	369	490	247
1 StDev	178	214	234	188
Estimated Mean # Aquatic Insects / m^2	3,735	3,968	5,265	2,658
1 StDev	1,918	2,305	2,512	2,017
Juvenile Fish	0	0	0	0

Appendix B7.–Lower Sherman Creek Sample Point 1 benthic macroinvertebrate data, 2011–2014.

	May 2011	Apr 2012	May 2013	Apr 2014
Total Aquatic Insect Taxa Counted	26	31	28	30
Total Ephemeroptera	157	876	499	114
Total Plecoptera	36	103	135	97
Total Trichoptera	7.0	14	6	18
Total Aquatic Diptera	89	160	131	648
Total Other	335	372	231	810
% Ephemeroptera	25%	58%	50%	6.8%
% Plecoptera	5.8%	6.8%	13%	5.7%
% Trichoptera	1.1%	0.9%	0.6%	1.1%
% Aquatic Diptera	14%	11%	13%	38%
% Other	54%	24%	23%	48%
% EPT	32%	66%	64%	14%
% Chironomidae	6%	8%	12%	33%
Shannon Diversity Score (H)	0.76	0.74	0.85	0.71
Evenness Score (E)	0.71	0.62	0.71	0.57
Total Aquatic Insects Counted	624	1,525	1,002	1,687
Total Terrestrial Insects Counted	1	0	14	1
Total Insects Counted	625	1,525	1,016	1,688
% Sample Aquatic	99.8%	100%	99%	99.9%
% Sample Terrestrial	0.2%	0%	1%	0.1%
Total Sample Area (m^2)	0.558	0.558	0.558	0.558
Mean # Aquatic Insects / Sample	104	254	167	281
1 StDev	93	131	23	87
Estimated Mean # Aquatic Insects / m^2	1,118	2,733	1,796	3,023
1 StDev	1,000	1,410	247	936
Juvenile Fish	10	12	0	8

Appendix B3.–Lower Sherman Creek Sample Point 2 benthic macroinvertebrate data, 2011–2014.

	May 2011	Apr 2012	May 2013	Apr 2014
Total Aquatic Insect Taxa Counted	30	36	39	28
Total Ephemeroptera	548	1,143	1,049	31
Total Plecoptera	137	77	299	40
Total Trichoptera	14	26	18	7
Total Aquatic Diptera	143	254	289	354
Total Other	79	75	234	229
% Ephemeroptera	60%	73%	56%	4.7%
% Plecoptera	15%	4.9%	16%	6.1%
% Trichoptera	1.5%	1.7%	1.0%	1.1%
% Aquatic Diptera	16%	16%	15%	54%
% Other	8.6%	4.8%	12%	35%
% EPT	76%	79%	72%	12%
% Chironomidae	11%	15%	14%	48%
Shannon Diversity Score (H)	0.93	0.70	0.84	0.70
Evenness Score (E)	0.76	0.57	0.65	0.62
Total Aquatic Insects Counted	921	1,573	1,889	661
Total Terrestrial Insects Counted	1	2	18	1
Total Insects Counted	922	1,575	1,907	662
% Sample Aquatic	99.9%	99.9%	99.1%	99.8%
% Sample Terrestrial	0.1%	0.1%	0.9%	0.2%
Total Sample Area (m^2)	0.558	0.558	0.558	0.558
Mean # Aquatic Insects / Sample	154	263	315	110
1 StDev	86	109	137	72
Estimated Mean # Aquatic Insects / m^2	1,651	2,823	3,385	1,185
1 StDev	927	1,174	1,471	769
Juvenile Fish	0	0	14	0

APPENDIX C: RESIDENT FISH DATA

Appendix C1.–East Fork Slate Creek and Upper Slate Creek resident fish capture data and population estimates by reach, 2011–2014.

Site	Year	Species	FL (mm)	Number of Fish Captured				MLE	95% CI	Precision	Power
				Set 1	Set 2	Set 3	Total				
East Fork Slate Creek	2011	DV	105-140	6	2	2	10	40	---	n/a	---
	2012	DV	165-175	2	1	2	5	20	---	n/a	n/a
	2013	DV	---	0	0	0	0	0	---	---	---
	2014	DV	---	0	0	0	0	0	---	---	---
Upper Slate Creek	2011	DV	35-145	14	12	2	28	120	104-136	13%	---
	2012	DV	60-164	23	14	6	43	192	160-224	17%	0.44
	2013	DV	35-190	21	7	2	30	120	120-120	---	---
	2014	DV	55-160	13	4	6	23	108	76-140	30%	0.03

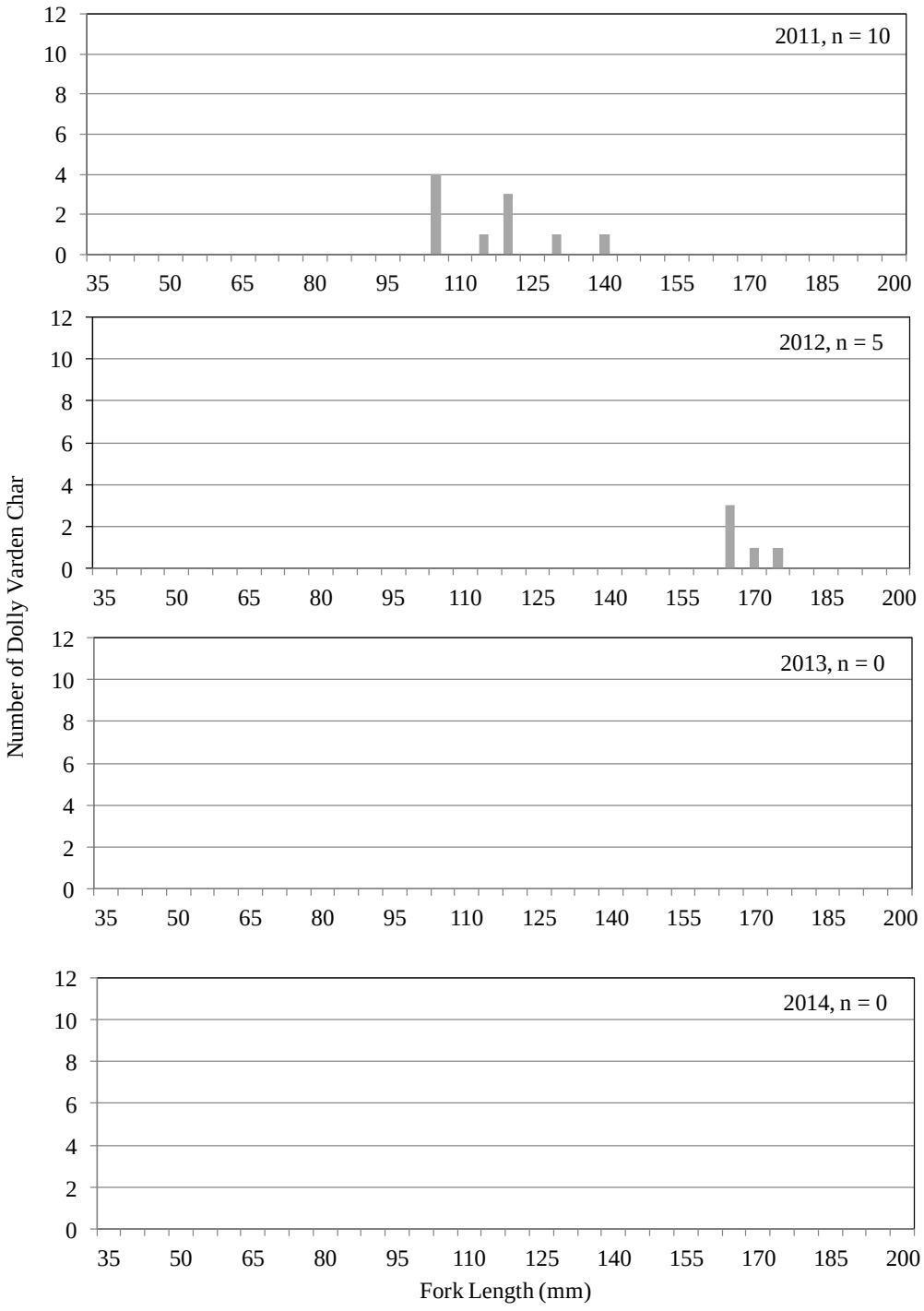
Appendix C2.–East Fork Slate Creek and Upper Slate Creek resident fish capture data and population estimates by habitat type, 2011–2014.

Site	Year	Species	Habitat Type	Number of Fish Captured				MLE	95% CI
				Set 1	Set 2	Set 3	Total		
East Fork Slate Creek	2011	DV	Riffle	3	0	0	3	12	---
East Fork Slate Creek	2011	DV	Pool	3	1	2	6	24	---
East Fork Slate Creek	2011	DV	Glide	0	1	0	1	4	---
East Fork Slate Creek	2012	DV	Riffle	0	0	1	1	4	---
East Fork Slate Creek	2012	DV	Pool	2	1	1	4	16	---
East Fork Slate Creek	2012	DV	Glide	0	0	0	0	0	---
East Fork Slate Creek	2013	DV	Riffle	0	0	0	0	0	---
East Fork Slate Creek	2013	DV	Pool	0	0	0	0	0	---
East Fork Slate Creek	2013	DV	Glide	0	0	0	0	0	---
East Fork Slate Creek	2014	DV	Riffle	0	0	0	0	0	---
East Fork Slate Creek	2014	DV	Pool	0	0	0	0	0	---
East Fork Slate Creek	2014	DV	Glide	0	0	0	0	0	---
Upper Slate Creek	2011	DV	Riffle	2	2	0	4	16	---
Upper Slate Creek	2011	DV	Pool	11	9	1	22	88	76-100
Upper Slate Creek	2011	DV	Glide	1	1	1	3	12	---
Upper Slate Creek	2012	DV	Riffle	2	4	4	10	40	---
Upper Slate Creek	2012	DV	Pool	20	3	2	25	100	100-100
Upper Slate Creek	2012	DV	Glide	1	7	0	8	32	---
Upper Slate Creek	2013	DV	Riffle	4	1	0	5	20	---
Upper Slate Creek	2013	DV	Pool	17	5	1	23	92	92-92
Upper Slate Creek	2013	DV	Glide	0	1	1	2	8	---
Upper Slate Creek	2014	DV	Riffle	3	0	2	5	20	---
Upper Slate Creek	2014	DV	Pool	10	4	4	18	80	64-96
Upper Slate Creek	2014	DV	Glide	0	0	0	0	0	---

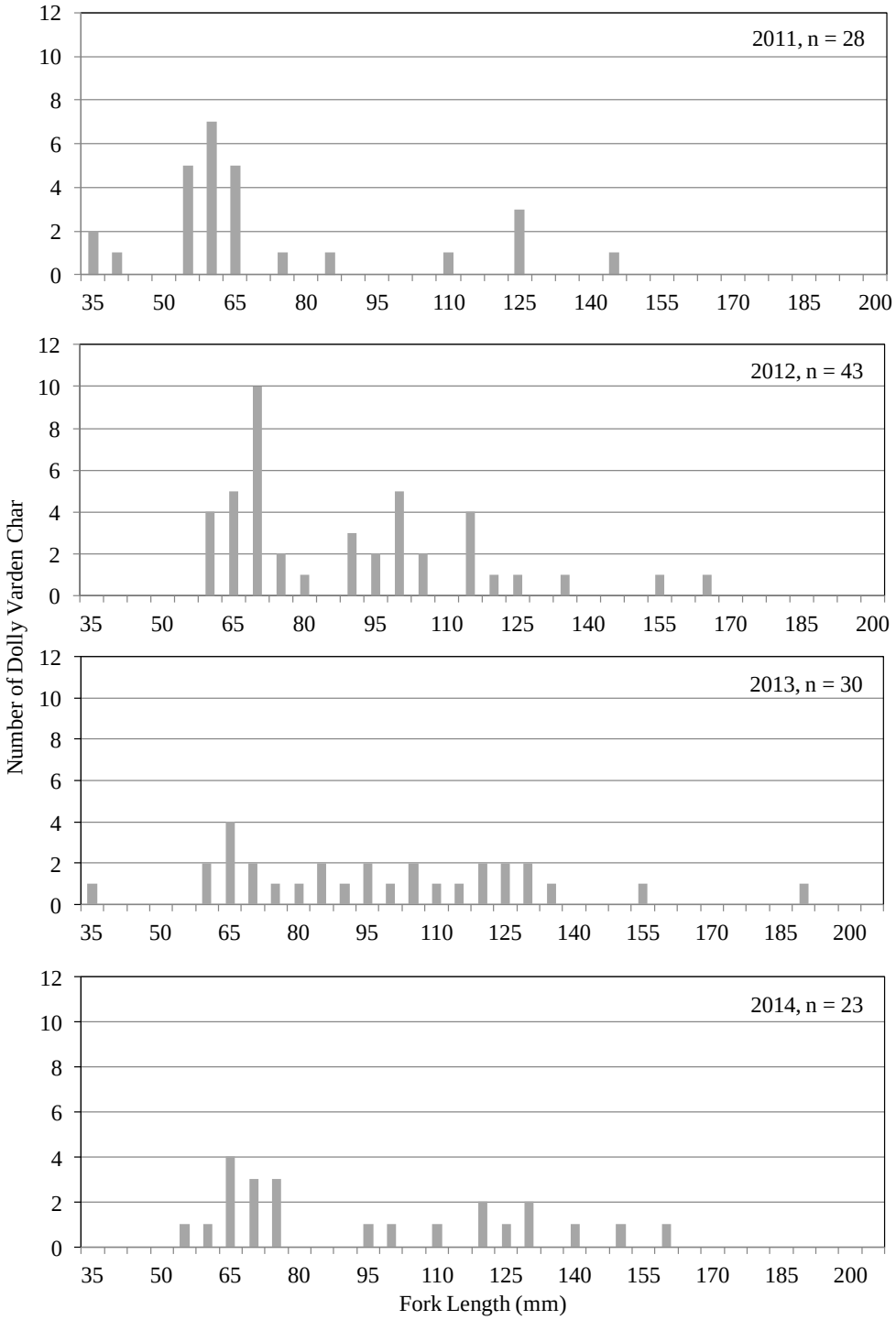
Appendix C3.–2014 Upper Slate Creek captured fish length, weight, and condition data.

Pass #	Species	FL (mm)	Weight (g)	Condition (g/mm^3)
1	DV	130	21.9	1.00
1	DV	150	32.7	0.97
1	DV	140	27.5	1.00
1	DV	130	21.7	0.99
1	DV	118	15.3	0.93
1	DV	118	16.3	0.99
1	DV	160	35.4	0.86
1	DV	70	3.7	1.08
1	DV	100	9.7	0.97
1	DV	68	2.9	0.92
1	DV	73	3.7	0.95
1	DV	62	2.4	1.01
1	DV	69	2.9	0.88
2	DV	123	19.5	1.05
2	DV	110	14.6	1.10
2	DV	92	8.1	1.04
2	DV	72	4.3	1.15
3	DV	75	3.6	0.85
3	DV	65	2.5	0.91
3	DV	55	2.1	1.26
3	DV	65	2.6	0.95
3	DV	64	2.5	0.95
3	DV	60	2.1	0.97
		Mean Fish Condition =		0.99

Appendix C4.–Length frequency diagrams of Dolly Varden char captured in East Fork Slate Creek, 2011–2014.



Appendix C5.–Length frequency diagrams of Dolly Varden char captured in Upper Slate Creek, 2011–2014.



APPENDIX D: ADULT SALMON DATA

Appendix D1.–2014 Lower Slate Creek adult pink salmon counts by reach.

	7/21/2014 Pink Salmon Counts				7/28/2014 Pink Salmon Counts				8/4/2014 Pink Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
0-100m	0	0	0	0	0	0	0	0	0	0	0	0
100-200m	0	0	0	0	0	0	0	0	0	0	0	0
200-300m	0	0	0	0	0	0	0	0	12	13	12	0
300-400m	0	0	0	0	2	2	2	0	0	0	0	0
400-500m	0	0	0	0	0	0	0	0	0	0	0	0
500-600m	0	0	0	0	0	0	0	0	2	2	2	0
600-700m	0	0	0	0	0	0	0	0	0	0	0	0
700-800m	0	0	0	0	0	0	0	0	0	0	0	0
800-900m	0	0	0	0	0	0	0	0	0	0	0	0
900-Falls	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0
Total	**0**	**0**	**0**	**0**	**2**	**2**	**2**	**0**	**14**	**15**	**14**	**0**

	8/11/2014 Pink Salmon Counts				8/18/2014 Pink Salmon Counts				8/25/2014 Pink Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
0-100m	0	0	0	0	5	5	5	0	0	0	0	0
100-200m	0	0	0	0	0	0	0	0	0	0	0	0
200-300m	7	8	7	0	1	1	1	0	0	0	0	0
300-400m	1	1	1	1	2	2	2	0	0	0	0	0
400-500m	4	5	4	0	0	0	0	0	0	0	0	0
500-600m	0	0	0	0	4	4	4	0	0	0	0	0
600-700m	1	1	1	0	0	0	0	0	0	0	0	0
700-800m	0	0	0	0	0	0	0	0	0	0	0	0
800-900m	0	0	0	0	0	0	0	0	0	0	0	0
900-Falls	0	0	0	0	0	0	0	0	0	0	0	0
Total	**13**	**15**	**13**	**1**	**12**	**12**	**12**	**0**	**0**	**0**	**0**	**0**

Appendix D2.–2014 Lower Slate Creek adult coho salmon counts by reach.

	9/22/2014 Coho Salmon Counts				10/6/2014 Coho Salmon Counts				10/13/2014 Coho Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
0-100m	0	-	-	0	0	-	-	0	0	-	-	0
100-200m	0	-	-	0	0	-	-	0	0	-	-	0
200-300m	0	-	-	0	0	-	-	0	0	-	-	0
300-400m	0	-	-	0	0	-	-	0	1	-	-	0
400-500m	0	-	-	0	0	-	-	0	0	-	-	0
500-600m	0	-	-	0	1	-	-	0	0	-	-	0
600-700m	0	-	-	0	0	-	-	0	0	-	-	0
700-800m	0	-	-	0	0	-	-	0	1	-	-	0
800-900m	0	-	-	0	0	-	-	0	0	-	-	0
900-Falls	0	-	-	0	1	-	-	0	0	-	-	0
Total	**0**	**-**	**-**	**0**	**2**	**-**	**-**	**0**	**2**	**-**	**-**	**0**

	10/20/2014 Coho Salmon Counts				11/4/2014 Coho Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
0-100m	0	-	-	0	0	-	-	0
100-200m	0	-	-	0	0	-	-	0
200-300m	0	-	-	0	0	-	-	0
300-400m	0	-	-	0	0	-	-	0
400-500m	0	-	-	0	0	-	-	0
500-600m	0	-	-	0	0	-	-	0
600-700m	0	-	-	0	0	-	-	0
700-800m	0	-	-	0	0	-	-	0
800-900m	0	-	-	0	0	-	-	0
900-Falls	**1**	-	-	0	0	-	-	0
Total	**1**	**-**	**-**	**0**	**0**	**-**	**-**	**0**

Appendix D3.–2014 Lower Johnson Creek adult pink salmon counts by reach.

	7/22/2014 Pink Salmon Counts				7/30/2014 Pink Salmon Counts				8/5/2014 Pink Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
Con-Lace	0	0	0	0	1	0	0	0	1	0	0	0
Lace-JM	0	0	0	0	0	0	0	0	0	0	0	0
JM-Trap Site	0	0	0	0	0	0	0	0	0	0	0	0
Trap-Site #4	24	24	24	0	40	20	30	0	40	45	43	0
Site #4-Site #7	20	20	20	0	16	20	18	0	30	38	34	0
Site #7-Site #10	0	0	0	0	0	0	0	0	10	4	7	0
Site #10-PH	0	0	0	0	0	0	0	0	0	0	0	0
PH-LF	0	0	0	0	0	0	0	0	0	0	0	0
LF-Site #15	0	0	0	0	0	0	0	0	0	0	0	0
Site #15-Falls	0	0	0	0	0	0	0	0	0	0	0	0
Total	**44**	**44**	**44**	**0**	**57**	**40**	**48**	**0**	**81**	**87**	**84**	**0**

	8/12/2014 Pink Salmon Counts				8/19/2014 Pink Salmon Counts				8/26/2014 Pink Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
Con-Lace	0	0	0	0	0	0	0	0	0	0	0	0
Lace-JM	0	0	0	0	0	0	0	0	0	0	0	0
JM-Trap Site	2	2	2	0	0	0	0	0	0	0	0	0
Trap-Site #4	0	0	0	0	0	0	0	0	0	0	0	0
Site #4-Site #7	0	0	0	0	6	8	7	0	0	0	0	0
Site #7-Site #10	0	0	0	0	4	5	4	0	0	0	0	0
Site #10-PH	0	0	0	0	0	0	0	0	0	0	0	0
PH-LF	0	0	0	0	0	0	0	0	0	0	0	0
LF-Site #15	0	0	0	0	0	0	0	0	0	0	0	0
Site #15-Falls	0	0	0	0	0	0	0	0	0	0	0	0
Total	**2**	**2**	**2**	**0**	**10**	**13**	**11**	**0**	**0**	**0**	**0**	**0**

Appendix D4.–2014 Lower Johnson Creek adult chum salmon counts by reach.

	7/22/2014 Chum Salmon Counts				7/30/2014 Chum Salmon Counts				8/5/2014 Chum Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
Con-Lace	0	0	0	0	0	0	0	0	0	0	0	0
Lace-JM	0	0	0	0	0	0	0	0	0	0	0	0
JM-Trap Site	0	0	0	0	0	0	0	0	0	0	0	0
Trap-Site #4	1	1	1	0	1	1	1	0	0	0	0	0
Site #4-Site #7	0	0	0	0	0	0	0	0	1	1	1	1
Site #7-Site #10	0	0	0	0	0	0	0	0	0	0	0	0
Site #10-PH	0	0	0	0	0	0	0	0	0	0	0	0
PH-LF	0	0	0	0	0	0	0	0	0	0	0	0
LF-Site #15	0	0	0	0	0	0	0	0	0	0	0	0
Site #15-Falls	0	0	0	0	0	0	0	0	0	0	0	0
Total	**1**	**1**	**1**	**0**	**1**	**1**	**1**	**0**	**1**	**1**	**1**	**1**

	8/12/2014 Chum Salmon Counts				8/19/2014 Chum Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
Con-Lace	0	0	0	0	0	0	0	0
Lace-JM	0	0	0	0	0	0	0	0
JM-Trap Site	0	0	0	0	0	0	0	0
Trap-Site #4	0	0	0	0	0	0	0	0
Site #4-Site #7	0	0	0	0	0	0	0	0
Site #7-Site #10	0	0	0	0	0	0	0	0
Site #10-PH	0	0	0	0	0	0	0	0
PH-LF	0	0	0	0	0	0	0	0
LF-Site #15	0	0	0	0	0	0	0	0
Site #15-Falls	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Appendix D5.–2014 Lower Johnson Creek adult coho salmon counts by reach.

	9/22/2014 Coho Salmon Counts				10/6/2014 Coho Salmon Counts				10/13/2014 Coho Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
Con-Lace	0	-	-	0	0	-	-	0	0	-	-	0
Lace-JM	0	-	-	0	0	-	-	0	0	-	-	0
JM-Trap Site	0	-	-	0	0	-	-	0	0	-	-	0
Trap-Site #4	2	-	-	0	2	-	-	0	0	-	-	0
Site #4-Site #7	0	-	-	0	4	-	-	0	0	-	-	0
Site #7-Site #10	0	-	-	0	0	-	-	0	4	-	-	0
Site #10-PH	0	-	-	0	5	-	-	0	5	-	-	0
PH-LF	0	-	-	0	1	-	-	0	1	-	-	0
LF-Site #15	0	-	-	0	0	-	-	0	1	-	-	0
Site #15-Falls	0	-	-	0	0	-	-	0	0	-	-	0
Total	**2**	**-**	**-**	**0**	**12**	**-**	**-**	**0**	**11**	**-**	**-**	**0**

	10/20/2014 Coho Salmon Counts				10/29/2014 Coho Salmon Counts				11/4/2014 Coho Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
Con-Lace	0	-	-	0	0	-	-	0	0	-	-	0
Lace-JM	0	-	-	0	0	-	-	0	0	-	-	0
JM-Trap Site	0	-	-	0	42	-	-	0	0	-	-	0
Trap-Site #4	1	-	-	0	1	-	-	0	0	-	-	0
Site #4-Site #7	0	-	-	0	4	-	-	0	0	-	-	0
Site #7-Site #10	8	-	-	0	0	-	-	0	0	-	-	0
Site #10-PH	5	-	-	0	7	-	-	0	1	-	-	0
PH-LF	0	-	-	0	0	-	-	0	0	-	-	0
LF-Site #15	0	-	-	0	0	-	-	0	0	-	-	0
Site #15-Falls	0	-	-	0	1	-	-	0	0	-	-	0
Total	**14**	**-**	**-**	**0**	**55**	**-**	**-**	**0**	**1**	**-**	**-**	**0**

	11/11/2014 Coho Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
Con-Lace	0	-	-	0
Lace-JM	0	-	-	0
JM-Trap Site	10	-	-	0
Trap-Site #4	0	-	-	0
Site #4-Site #7	0	-	-	0
Site #7-Site #10	2	-	-	0
Site #10-PH	0	-	-	0
PH-LF	0	-	-	0
LF-Site #15	0	-	-	0
Site #15-Falls	0	-	-	0
Total	**12**	**-**	**-**	**0**

Appendix D6.–2014 Lower Sherman Creek adult pink salmon counts by reach.

	7/21/2014 Pink Salmon Counts				7/28/2014 Pink Salmon Counts				8/4/2014/2013 Pink Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
0-50m	0	0	0	0	5	3	4	0	2	2	2	0
50-100m	0	0	0	0	0	0	0	0	10	8	9	0
100-150m	0	0	0	0	0	0	0	0	2	1	1	0
150-200m	0	0	0	0	2	3	2	0	15	6	11	1
200-250m	0	0	0	0	0	0	0	0	4	9	6	0
250-300m	0	0	0	0	0	0	0	0	1	2	2	1
300-350m	0	0	0	0	0	0	0	0	7	7	7	0
350-Falls	0	0	0	0	0	0	0	0	1	3	2	0
Total	**0**	**0**	**0**	**0**	**7**	**6**	**6**	**0**	**42**	**38**	**40**	**2**

	8/11/2014 Pink Salmon Counts				8/18/2014 Pink Salmon Counts				8/25/2014 Pink Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
0-50m	4	4	4	0	0	0	0	0	0	0	0	0
50-100m	2	0	1	0	2	2	2	0	0	0	0	0
100-150m	3	3	3	0	2	2	2	0	0	0	0	0
150-200m	1	1	1	1	0	0	0	0	6	2	4	0
200-250m	0	0	0	0	0	0	0	0	1	1	1	0
250-300m	1	1	1	0	0	0	0	0	0	0	0	0
300-350m	0	0	0	0	0	0	0	0	5	5	5	0
350-Falls	0	0	0	0	0	0	0	0	0	0	0	0
Total	**11**	**9**	**10**	**1**	**4**	**4**	**4**	**0**	**12**	**8**	**10**	**0**

	9/2/2014 Pink Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
0-50m	0	0	0	0
50-100m	0	0	0	0
100-150m	0	0	0	0
150-200m	0	0	0	0
200-250m	0	0	0	0
250-300m	0	0	0	0
300-350m	0	0	0	0
350-Falls	0	0	0	0
Total	**0**	**0**	**0**	**0**

Appendix D7.–Lower Slate Creek adult pink salmon counts by statistical week, 2011–2014.

Stat Week	2011	2012	2013	2014
29	--	0	0	0
30	--	0	7	0
31	0	364	66	2
32	371	1106	604	14
33	765	3152	864	13
34	1396	2331	1199	12
35	1649	318	472	0
36	1816	1	97	---
37	232	0	27	---
38	46	---	1	---
39	0	---	---	---

Appendix D8.–Lower Johnson Creek adult pink salmon counts by statistical week, 2011–2014.

Stat Week	2011	2012	2013	2014
29	--	0	147	--
30	2	182	499	110
31	448	1026	5623	120
32	4725	1882	3639	209
33	9623	4244	4680	5
34	13159	4538	3890	27
35	3374	494	1360	0
36	9728	150	372	0
37	1673	17	241	---
38	1088	0	0	---
39	361	---	---	---

Appendix D9.–Lower Sherman Creek adult pink salmon counts by statistical week, 2011–2014.

Stat Week	2011	2012	2013	2014
29	--	0	2	--
30	1	2	164	0
31	301	9	860	6
32	774	97	979	40
33	1051	285	765	10
34	399	521	549	4
35	159	521	785	10
36	873	145	624	0
37	418	25	232	---
38	612	3	21	---
39	36	---	---	---

APPENDIX E: SPAWNING SUBSTRATE DATA

Appendix E1.–Lower Slate Creek Sample Point 1 spawning substrate data, 2011–2014.

Sample	Sample	Sample	Volume (mL/L) Retained Each Sieve (mm)									
Date	Number	Depth (cm)	101.6	50.8	25.4	12.7	6.35	1.68	0.42	0.15	Imhoff	GMPS
08/17/11	1	18.5	0	0	470	260	360	425	225	20	22	9.47
08/17/11	2	20	0	70	460	250	200	280	100	25	8	13.82
08/17/11	3	18.5	0	280	240	210	290	440	100	70	20.5	11.86
08/17/11	4	22.5	0	0	350	350	175	1425	525	55	68	5.07
07/09/12	1	20	1050	140	140	280	190	395	95	15	24	10.35
07/09/12	2	20	0	0	200	225	140	325	140	15	24	8.00
07/09/12	3	21	0	515	310	225	250	580	240	27	65	12.53
07/09/12	4	20	0	570	510	260	290	750	415	53	54	11.61
07/02/13	1	22.5	0	400	460	430	320	365	145	25	66	15.08
07/02/13	2	20	0	150	400	250	245	515	225	36	53	9.59
07/02/13	3	17.5	0	800	325	320	255	445	205	25	60	17.76
07/02/13	4	20	0	275	565	385	245	495	250	19	28	13.31
07/01/14	1	20	600	420	375	225	235	320	165	22	57	15.19
07/01/14	2	17.5	0	50	350	300	175	225	25	7.5	41	13.72
07/01/14	3	20	0	100	510	465	275	420	250	38	52	10.74
07/01/14	4	20	400	275	260	220	225	375	225	19	51	10.98

GMPS = geometric mean particle size.

Appendix E2.–Lower Slate Creek Sample Point 2 spawning substrate data, 2011–2014.

Sample Date	Sample Number	Sample Depth (cm)	Volume (mL/L) Retained Each Sieve (mm)								Imhoff	GMPS
			101.6	50.8	25.4	12.7	6.35	1.68	0.42	0.15		
08/17/11	1	20	0	130	305	200	205	350	200	20	11.5	10.74
08/17/11	2	22.5	0	120	320	405	335	740	415	85	53	7.12
08/17/11	3	22.5	0	400	350	295	290	540	200	40	17.5	13.18
08/17/11	4	21	0	100	450	580	320	390	160	15	28	12.56
07/09/12	1	20	0	250	380	270	260	475	195	23	46.5	11.56
07/09/12	2	20	600	75	395	295	180	375	135	15	18.5	11.82
07/09/12	3	20	0	450	340	370	340	590	295	30	18	12.5
07/09/12	4	19	0	0	320	460	285	545	300	28	16.5	8.13
07/02/13	1	20	0	310	490	440	505	640	410	35	107.5	9.53
07/02/13	2	22.5	0	420	270	240	215	560	150	34	42	12.87
07/02/13	3	18.75	0	550	885	375	290	570	290	45	107.8	14.79
07/02/13	4	21.25	0	785	230	340	240	580	330	30	46.5	14.58
07/01/14	1	22.5	0	1225	450	495	305	760	300	12	110	17.47
07/01/14	2	20	0	450	250	250	200	300	100	11	65	16.25
07/01/14	3	20	0	850	480	200	175	490	175	30	106	18.15
07/01/14	4	17.5	0	150	350	200	225	300	120	15	20	12.97

GMPS = geometric mean particle size.

APPENDIX F: SEDIMENT METALS CONCENTRATION DATA AND TOXICITY LAB REPORTS

Appendix F1.–Stream sediment sample compositions, 2011–2014.

		Particle Size Data									
Sample Site	Sample Date	% Sand	% Silt	% Clay	% Course material (> 2 mm)	Texture	% Total Solids	% Total Volatile Solids	Acid Volatile Sulfide (µmoles/g)	Total Sulfide (mg/kg)	% Total Organic Carbon
Lower Slate Creek	10/03/11	94.0	4.0	2.0	0.4	sand	78.00	3.38	<0.55	---	2.04
Lower Slate Creek	07/03/12	98.0	ND	2.0	0.1	sand	79.22	3.37	0.99	---	1.67
Lower Slate Creek	07/02/13	96.0	2.0	2.0	<0.05	sand	74.57	1.63	1.84	---	1.67
Lower Slate Creek	07/28/14	91.8	3.8	2.3	0.9	sand	75.3	3.28	---	<1.3	0.58
East Fork Slate Creek	10/03/11	86.0	4.0	10.0	1.7	loamy sand	60.17	7.81	<0.55	---	11.00
East Fork Slate Creek	07/10/12	26.0	34.0	40.0	ND	clay	23.72	28.54	1.10	---	16.70
East Fork Slate Creek	07/01/13	82.0	12.0	6.0	<0.05	loamy Sand	43.66	13.30	5.20	---	18.30
East Fork Slate Creek	07/30/14	75.0	21.1	3.8	0.1	loamy Sand	65.5	6.21	---	<1.5	1.84
Upper Slate Creek	10/06/11	94.0	2.0	4.0	ND	sand	72.10	4.12	1.39	---	5.46
Upper Slate Creek	07/02/12	98.0	ND	2.0	0.3	sand	79.58	2.90	1.35	---	3.74
Upper Slate Creek	07/01/13	96.0	ND	4.0	0.2	sand	74.21	2.73	<1.40	---	5.50
Upper Slate Creek	07/30/14	87.5	8.2	4.3	0.0	sand	72.4	3.88	---	<1.4	0.87
Lower Johnson Creek	10/03/11	96.0	2.0	2.0	ND	sand	74.28	2.01	<0.55	---	0.89
Lower Johnson Creek	07/02/12	92.0	ND	8.0	ND	sand	77.67	2.55	1.05	---	1.19
Lower Johnson Creek	07/01/13	96.0	2.0	2.0	0.3	sand	73.21	0.90	<1.40	---	1.08
Lower Johnson Creek	07/30/14	91.4	4.8	2.9	0.2	sand	73.7	1.93	---	<1.4	0.26
Lower Sherman Creek	10/04/11	96.0	2.0	2.0	0.1	sand	73.15	2.75	1.50	---	0.54
Lower Sherman Creek	07/03/12	96.0	ND	4.0	0.1	sand	78.55	3.05	<0.55	---	0.82
Lower Sherman Creek	07/01/13	96.0	2.0	2.0	0.6	sand	75.66	0.75	<1.40	---	0.61
Lower Sherman Creek	07/28/14	89.9	6.5	3.4	0.3	sand	76.7	2.50	---	<1.3	0.35

ND = not detected at the method detection limit.

Appendix F2.–Stream sediment sample metals, arsenic, and selenium concentrations, 2011–2014.

		Analytical Data (mg/kg dry weight)										
Sample Site	Sample Date	Ag	Al	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
Lower Slate Creek	10/03/11	0.134	13,600	16.2	1.46	29.4	56.7	0.0502	47.4	7.79	0.720	220
Lower Slate Creek	07/03/12	0.145	13,600	9.31	1.22	32.0	50.7	0.0994	43.2	8.45	<0.170	200
Lower Slate Creek	07/02/13	0.168	12,300	23.7	1.29	94.5	56.7	0.0402	73.4	9.14	1.94	205
Lower Slate Creek	07/28/14	0.08	12,000	20.1	1.21	20.0	51.1	0.06	40.8	8.78	1.3	189
East Fork Slate Creek	10/03/11	0.233	20,100	30.0	20.9	29.5	88.4	0.0692	143	8.50	1.41	1,360
East Fork Slate Creek	07/10/12	0.513	15,300	24.0	23.2	38.9	159.0	0.3270	153	14.2	0.934	1,490
East Fork Slate Creek	07/01/13	0.334	13,900	42.2	13.9	32.7	73.4	0.0774	79.8	12.5	4.79	844
East Fork Slate Creek	07/30/14	0.14	13,300	39.1	12.1	14.6	55.7	0.04	85.3	6.94	2.4	812
Upper Slate Creek	10/06/11	0.120	22,500	17.9	0.722	127	53.4	<0.0489	87.5	3.37	0.809	130
Upper Slate Creek	07/02/12	0.132	20,300	14.4	0.776	125	55.4	0.0625	78.4	4.05	0.606	134
Upper Slate Creek	07/01/13	0.131	14,600	13.5	0.750	101	44.6	<0.0380	55.0	2.70	3.21	105
Upper Slate Creek	07/30/14	0.06	14,900	19.2	0.69	84.2	45.8	0.03	55.7	2.86	1.8	111
Lower Johnson Creek	10/03/11	0.164	13,100	16.2	0.238	31.5	73.1	<0.0386	27.3	9.76	<0.181	93.3
Lower Johnson Creek	07/02/12	0.342	13,100	12.8	0.250	35.5	76.8	0.1190	23.4	9.45	<0.167	97.3
Lower Johnson Creek	07/01/13	0.269	10,300	11.9	0.492	24.4	56.1	<0.0354	15.7	8.00	<0.163	121
Lower Johnson Creek	07/30/14	0.32	10,300	16.5	0.16	22.2	68.2	0.02	16.9	10.9	<0.5	83.4
Lower Sherman Creek	10/04/11	0.137	18,200	28.9	0.389	46.2	94.0	<0.0455	45.9	6.70	<0.178	110
Lower Sherman Creek	07/03/12	0.289	17,900	24.3	0.578	51.4	79.1	0.0681	40.2	8.43	<0.174	128
Lower Sherman Creek	07/01/13	0.306	15,400	25.4	0.390	37.4	69.4	<0.0384	30.9	7.39	1.77	111
Lower Sherman Creek	07/28/14	0.14	14,900	27.9	0.36	33.6	68.4	0.03	31.1	6.97	1.2	119

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September 9, 2014

Analytical Report for Service Request No: K1408279
Revised Service Request No: K1408279.01

Kate Kanouse
Alaska Department of Fish and Game
Division of Habitat/ Billy Ray Center
1008 F Street
P.O. Box 110024
Juneau, AK 99801

RE: Kensington Gold Mine

Dear Kate:

Enclosed is the revised report for the samples submitted to our laboratory on August 07, 2014. For your reference, these analyses have been assigned our service request number K1408279.

On September 4, 2014 Ben Brewster with Alaska Department of Fish and Game requested that arsenic be reported for this data.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3363. You may also contact me via Email at Lisa.Domenighini@alsglobal.com.

Respectfully submitted,

ALS Group USA Corp. dba ALS Environmental

Lisa A Domenighini

Lisa Domenighini
Project Manager

LD/aj

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
Idaho DHW	http://www.healthandwelfare.idaho.gov/Health/Labs/CertificationDrinkingWaterLabs/tabid/1833/Default.aspx	-
ISO 17025	http://www.pjlabs.com/	L14-50
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Michigan DEQ	http://www.michigan.gov/deq/0,1607,7-135-3307_4131_4156---,00.html	9949
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wisconsin DNR	http://dnr.wi.gov/	998386840
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

ALS ENVIRONMENTAL

Client:	Alaska Department of Fish and Game	**Service Request No.:**	K1408279
Project:	Kensington Gold Mine	**Date Received:**	08/07/14
Sample Matrix:	Sediment		

Case Narrative

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), and Matrix/Duplicate Matrix Spike (MS/DMS).

Sample Receipt

Five sediment samples were received for analysis at ALS Environmental on 08/07/14. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4ºC upon receipt at the laboratory.

General Chemistry Parameters

Total Sulfide by PSEP:
All samples were received past holding time. The analysis was performed as soon as possible after receipt by the laboratory. The data was flagged to indicate the holding time violation.

The Relative Percent Difference (RPD) criterion for the replicate analysis in sample Batch QC was not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

No other anomalies associated with the analysis of these samples were observed.

Total Metals

Matrix Spike Recovery Exceptions:
The control criteria for matrix spike recovery of Aluminum, Copper, and Zinc for the Batch QC sample were not applicable. The analyte concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery.

No other anomalies associated with the analysis of these samples were observed.

Approved by Lisa A Domenighini

ALS Environmental

CHAIN OF CUSTODY
50984

001

SR# K1408227

COC Set 1 of 1

COC# 50984

1317 South 13th Ave, Kelso, WA 98626 Phone (360) 577-7222 / 800-695-7222 / FAX (360) 636-1068
www.alsglobal.com

Project Name: Lower Slate Creek Project Number:

Project Manager: Kate Kavanaugh

Company: Coeur Alaska

Address: Bill Ray Center 1008 F Street, Juneau AK

Phone #: 907-465-4290 email: Kate.Kavanaugh@coeurak.com

Sampler Signature: Benjamin Brewster

Sampler Printed Name: Benjamin Brewster

CLIENT SAMPLE ID	LABID	SAMPLING Date	SAMPLING Time	Matrix	NUMBER OF CONTAINERS	7D PSEP Sulfide / PSEP Sulfide	14D PSEP TOC / PSEP TOC T	28D 7471B / Hg	180D 200.8 / Metals T	180D ASTM D422 / Part Size	365D 160.4 Modified / TVS	999D TS-MET / Total Solids	1	2	3	4	5	Remarks
1. Lower Slate Creek		7/28/14	1400		3	X	X	X	X	X	X	X						
2. East Fork Slate Creek		7/30/14	1500		3	X	X	X	X	X	X	X						
3. Upper Slate Creek		7/29/14	1700		3	X	X	X	X	X	X	X						
4. Lower Johnson Creek		7/30/14	0900		3	X	X	X	X	X	X	X						
5. Lower Sherman Creek		7/28/14	1000		3	X	X	X	X	X	X	X						
6.																		
7.																		
8.																		
9.																		
10.																		

Report Requirements

- X I. Routine Report: Method Blank, Surrogate, as required
- X II. Report Dup., MS, MSD as required
- ___ III. CLP Like Summary (no raw data)
- ___ IV. Data Validation Report
- ___ V. EDD

Invoice Information

P.O.# Coeur Alaska

Bill To: Coeur Alaska
3031 Clinton Dr Ste 202
Juneau, AK 99801

Turnaround Requirements

___ 24 hr. ___ 48 hr.
___ 5 Day
X Standard

Requested Report Date

Circle which metals are to be analyzed

Total Metals: (Al) As Sb Ba Be B Ca (Cd) Co (Cr) (Cu) Fe (Pb) Mg Mn Mo (Ni) K (Ag) Na (Se) Sr Tl Sn V (Zn) (Hg)

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Special Instructions/Comments:

*Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other_____(Circle One)

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature: Benjamin Brewster	Signature:	Signature	Signature	Signature	Signature
Printed Name: ADFG	Printed Name: AES	Printed Name	Printed Name	Printed Name	Printed Name
Firm: 8/5/14 0900	Firm: 8/7/14 0930	Firm	Firm	Firm	Firm
Date/Time	Date/Time	Date/Time	Date/Time	Date/Time	Date/Time

PC

Cooler Receipt and Preservation Form

Client / Project: COEUR Service Request K14 08279

Received: 8/7/14 Opened: 8/7/14 By: [illegible] Unloaded: 8/7/14 By: [illegible]

1. Samples were received via? *Mail* (*Fed Ex*) *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) (*Cooler*) *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA (Y) N If yes, how many and where? 2 FRONT
   If present, were custody seals intact? (Y) N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
1.9	1.6	5.5	5.2	-0.3	338	50984	806172525319	

4. Packing material: *Inserts* *Baggies* (*Bubble Wrap*) (*Gel Packs*) *Wet Ice* *Dry Ice* *Sleeves* _____
5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
6. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA Y N
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
12. Was C12/Res negative? _ (NA) Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1408279
Project:	Kensington Gold Mine	**Date Collected:**	07/28/14 - 07/30/14
Sample Matrix:	Sediment	**Date Received:**	08/7/14
Analysis Method:	160.4 Modified	**Units:**	Percent
Prep Method:	None	**Basis:**	Dry, per Method

Solids, Total Volatile

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
Lower Slate Creek	K1408279-001	**3.28**	0.010	1	08/12/14 14:18	
East Fork Slate Creek	K1408279-002	**6.21**	0.010	1	08/12/14 14:18	
Upper Slate Creek	K1408279-003	**3.88**	0.010	1	08/12/14 14:18	
Lower Johnson Creek	K1408279-004	**1.93**	0.010	1	08/12/14 14:18	
Lower Sherman Creek	K1408279-005	**2.50**	0.010	1	08/12/14 14:18	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1408279
Project	Kensington Gold Mine	**Date Collected:**	07/28/14
Sample Matrix:	Sediment	**Date Received:**	08/07/14
		Date Analyzed:	08/12/14

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Lower Slate Creek	**Units:**	Percent
Lab Code:	K1408279-001	**Basis:**	Dry, per Method

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1408279-001DUP Result	Average	RPD	RPD Limit
Solids, Total Volatile	160.4 Modified	0.010	3.28	3.15	3.22	4	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1408279
Project:	Kensington Gold Mine	**Date Collected:**	7/28/2014
Sample Matrix:	Sediment	**Date Received:**	8/7/2014
		Date Analyzed:	8/14/2014

Particle Size Determination
ASTM D422

Sample Name: Lower Slate Creek
Lab Code: K1408279-001

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	99.97
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	99.97
Gravel, Medium	**No.4 (4.75 mm)**	0.3672	99.56
Gravel, Fine	**No.10 (2.00 mm)**	0.4138	99.11
Sand, Very Coarse	**No.20 (0.850 mm)**	20.9142	75.90
Sand, Coarse	**No.40 (0.425 mm)**	27.7525	45.11
Sand, Medium	**No.60 (0.250 mm)**	18.7736	24.28
Sand, Fine	**No.140 (0.106 mm)**	14.5610	8.13
Sand, Very Fine	**No.200 (0.0750 mm)**	1.0761	6.93

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	7.32
0.005 mm	3.52
0.001 mm	1.25

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1408279
Project:	Kensington Gold Mine	**Date Collected:**	7/30/2014
Sample Matrix:	Sediment	**Date Received:**	8/7/2014
		Date Analyzed:	8/14/2014

Particle Size Determination
ASTM D422

Sample Name: East Fork Slate Creek
Lab Code: K1408279-002

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	100.00
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	100.00
Gravel, Medium	**No.4 (4.75 mm)**	0.0000	100.00
Gravel, Fine	**No.10 (2.00 mm)**	0.0416	99.95
Sand, Very Coarse	**No.20 (0.850 mm)**	20.2276	75.58
Sand, Coarse	**No.40 (0.425 mm)**	22.3249	48.69
Sand, Medium	**No.60 (0.250 mm)**	9.2395	37.56
Sand, Fine	**No.140 (0.106 mm)**	9.5411	26.06
Sand, Very Fine	**No.200 (0.0750 mm)**	1.6566	24.07

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	24.91
0.005 mm	3.80
0.001 mm	0.00

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1408279
Project:	Kensington Gold Mine	**Date Collected:**	7/30/2014
Sample Matrix:	Sediment	**Date Received:**	8/7/2014
		Date Analyzed:	8/14/2014

Particle Size Determination
ASTM D422

Sample Name: Upper Slate Creek
Lab Code: K1408279-003

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	100.00
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	100.00
Gravel, Medium	**No.4 (4.75 mm)**	0.0000	100.00
Gravel, Fine	**No.10 (2.00 mm)**	0.0283	99.97
Sand, Very Coarse	**No.20 (0.850 mm)**	27.3396	70.40
Sand, Coarse	**No.40 (0.425 mm)**	33.5632	34.10
Sand, Medium	**No.60 (0.250 mm)**	13.4412	19.56
Sand, Fine	**No.140 (0.106 mm)**	6.0379	13.03
Sand, Very Fine	**No.200 (0.0750 mm)**	0.9464	12.01

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	12.46
0.005 mm	4.29
0.001 mm	0.00

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1408279
Project:	Kensington Gold Mine	**Date Collected:**	7/30/2014
Sample Matrix:	Sediment	**Date Received:**	8/7/2014
		Date Analyzed:	8/14/2014

Particle Size Determination
ASTM D422

Sample Name: Lower Johnson Creek
Lab Code: K1408279-004

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	100.00
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	100.00
Gravel, Medium	**No.4 (4.75 mm)**	0.0000	100.00
Gravel, Fine	**No.10 (2.00 mm)**	0.1348	99.84
Sand, Very Coarse	**No.20 (0.850 mm)**	11.9151	85.95
Sand, Coarse	**No.40 (0.425 mm)**	33.9209	46.42
Sand, Medium	**No.60 (0.250 mm)**	21.0380	21.89
Sand, Fine	**No.140 (0.106 mm)**	10.4614	9.70
Sand, Very Fine	**No.200 (0.0750 mm)**	0.9891	8.55

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	8.41
0.005 mm	3.60
0.001 mm	0.73

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1408279
Project:	Kensington Gold Mine	**Date Collected:**	7/28/2014
Sample Matrix:	Sediment	**Date Received:**	8/7/2014
		Date Analyzed:	8/14/2014

Particle Size Determination
ASTM D422

Sample Name: Lower Sherman Creek
Lab Code: K1408279-005

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	99.99
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	99.99
Gravel, Medium	**No.4 (4.75 mm)**	0.1831	99.79
Gravel, Fine	**No.10 (2.00 mm)**	0.1014	99.68
Sand, Very Coarse	**No.20 (0.850 mm)**	13.6110	84.73
Sand, Coarse	**No.40 (0.425 mm)**	26.9791	55.10
Sand, Medium	**No.60 (0.250 mm)**	21.1438	31.88
Sand, Fine	**No.140 (0.106 mm)**	17.2296	12.96
Sand, Very Fine	**No.200 (0.0750 mm)**	2.2787	10.45

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	9.82
0.005 mm	3.35
0.001 mm	0.00

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1408279
Project:	Kensington Gold Mine	**Date Collected:**	7/28/2014
Sample Matrix:	Sediment	**Date Received:**	8/7/2014
		Date Analyzed:	8/14/2014

Particle Size Determination
ASTM D422

Sample Name: Lower Sherman Creek
Lab Code: K1408279-005 DUP

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	100.00
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	100.00
Gravel, Medium	**No.4 (4.75 mm)**	0.0000	100.00
Gravel, Fine	**No.10 (2.00 mm)**	0.0870	99.91
Sand, Very Coarse	**No.20 (0.850 mm)**	15.8381	83.76
Sand, Coarse	**No.40 (0.425 mm)**	35.4458	47.63
Sand, Medium	**No.60 (0.250 mm)**	19.6328	27.61
Sand, Fine	**No.140 (0.106 mm)**	14.2315	13.11
Sand, Very Fine	**No.200 (0.0750 mm)**	1.6328	11.44

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	10.66
0.005 mm	4.55
0.001 mm	0.91

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1408279
Project:	Kensington Gold Mine	**Date Collected:**	07/28/14 - 07/30/14
Sample Matrix:	Sediment	**Date Received:**	08/7/14
Analysis Method:	PSEP Sulfide	**Units:**	mg/Kg
Prep Method:	Method	**Basis:**	Dry

Sulfide, Total

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Lower Slate Creek	K1408279-001	ND U	1.3	1	08/12/14 22:23	8/12/14	*
East Fork Slate Creek	K1408279-002	ND U	1.5	1	08/12/14 22:23	8/12/14	*
Upper Slate Creek	K1408279-003	ND U	1.4	1	08/12/14 22:23	8/12/14	*
Lower Johnson Creek	K1408279-004	ND U	1.4	1	08/12/14 22:23	8/12/14	*
Lower Sherman Creek	K1408279-005	ND U	1.3	1	08/12/14 22:23	8/12/14	*
Method Blank	K1408279-MB	ND U	1.0	1	08/12/14 22:23	8/12/14	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1408279
Project	Kensington Gold Mine	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA
		Date Analyzed:	08/12/14

Replicate Sample Summary

General Chemistry Parameters

Sample Name:	Batch QC	**Units:**	mg/Kg
Lab Code:	K1408306-001	**Basis:**	Dry

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1408306-001DUP Result	Average	RPD	RPD Limit
Sulfide, Total	PSEP Sulfide	2.3	9.5	4.5	7.02	72 *	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1408279
Project:	Kensington Gold Mine	**Date Collected:**	N/A
Sample Matrix:	Sediment	**Date Received:**	N/A
		Date Analyzed:	08/12/14
		Date Extracted:	08/12/14

Duplicate Matrix Spike Summary
Sulfide, Total

Sample Name:	Batch QC	**Units:**	mg/Kg
Lab Code:	K1408306-001	**Basis:**	Dry
Analysis Method:	PSEP Sulfide		
Prep Method:	Method		

		Matrix Spike			Duplicate Matrix Spike					
		K1408306-001MS			K1408306-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Sulfide, Total	9.5	1370	1470	93	1190	1490	79	28-175	15	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	Alaska Department of Fish and Game	**Service Request:**	K1408279
Project:	Kensington Gold Mine	**Date Analyzed:**	08/12/14
Sample Matrix:	Sediment	**Date Extracted:**	08/12/14

Lab Control Sample Summary
Sulfide, Total

Analysis Method:	PSEP Sulfide	**Units:**	mg/Kg
Prep Method:	Method	**Basis:**	Dry
		Analysis Lot:	406290

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1408279-LCS	318	350	90	39-166

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1408279
Project:	Kensington Gold Mine	**Date Collected:**	07/28/14 - 07/30/14
Sample Matrix:	Sediment	**Date Received:**	08/7/14
Analysis Method:	PSEP TOC	**Units:**	Percent
Prep Method:	ALS SOP	**Basis:**	Dry, per Method

Carbon, Total Organic (TOC)

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Lower Slate Creek	K1408279-001	**0.577**	0.050	1	08/11/14 16:00	8/11/14	
East Fork Slate Creek	K1408279-002	**1.84**	0.050	1	08/11/14 16:00	8/11/14	
Upper Slate Creek	K1408279-003	**0.868**	0.050	1	08/11/14 16:00	8/11/14	
Lower Johnson Creek	K1408279-004	**0.263**	0.050	1	08/11/14 16:00	8/11/14	
Lower Sherman Creek	K1408279-005	**0.354**	0.050	1	08/11/14 16:00	8/11/14	
Method Blank	K1408279-MB	ND	0.050	1	08/11/14 16:00	8/11/14	U

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1408279
Project	Kensington Gold Mine	**Date Collected:**	07/28/14
Sample Matrix:	Sediment	**Date Received:**	08/07/14
		Date Analyzed:	08/11/14

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Lower Slate Creek	**Units:**	Percent
Lab Code:	K1408279-001	**Basis:**	Dry, per Method

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1408279-001DUP Result	Average	RPD	RPD Limit
Carbon, Total Organic (TOC)	PSEP TOC	0.050	0.577	0.577	0.577	<1	27

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1408279
Project:	Kensington Gold Mine	**Date Collected:**	07/28/14
Sample Matrix:	Sediment	**Date Received:**	08/07/14
		Date Analyzed:	08/11/14
		Date Extracted:	08/11/14

Duplicate Matrix Spike Summary
Carbon, Total Organic (TOC)

Sample Name:	Lower Slate Creek	**Units:**	Percent
Lab Code:	K1408279-001	**Basis:**	Dry, per Method
Analysis Method:	PSEP TOC		
Prep Method:	ALS SOP		

		Matrix Spike			**Duplicate Matrix Spike**					
		K1408279-001MS			K1408279-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Carbon, Total Organic (TOC)	0.577	3.53	3.06	97	3.44	2.90	99	69-123	2	27

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	Alaska Department of Fish and Game	**Service Request:**	K1408279
Project:	Kensington Gold Mine	**Date Analyzed:**	08/11/14
Sample Matrix:	Sediment	**Date Extracted:**	08/11/14

Lab Control Sample Summary
Carbon, Total Organic (TOC)

Analysis Method:	PSEP TOC	**Units:**	Percent
Prep Method:	ALS SOP	**Basis:**	Dry, per Method
		Analysis Lot:	408058

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1408279-LCS	0.254	0.275	93	74-118

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1408279
Project:	Kensington Gold Mine	**Date Collected:**	07/28/14 - 07/30/14
Sample Matrix:	Sediment	**Date Received:**	08/7/14
Analysis Method:	160.3 Modified	**Units:**	Percent
Prep Method:	None	**Basis:**	As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
Lower Slate Creek	K1408279-001	**75.3**	-	1	08/12/14 14:18	
East Fork Slate Creek	K1408279-002	**65.5**	-	1	08/12/14 14:18	
Upper Slate Creek	K1408279-003	**72.4**	-	1	08/12/14 14:18	
Lower Johnson Creek	K1408279-004	**73.7**	-	1	08/12/14 14:18	
Lower Sherman Creek	K1408279-005	**76.7**	-	1	08/12/14 14:18	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1408279
Project	Kensington Gold Mine	**Date Collected:**	07/28/14
Sample Matrix:	Sediment	**Date Received:**	08/07/14
		Date Analyzed:	08/12/14

Replicate Sample Summary
Total Solids

Sample Name:	Lower Slate Creek	**Units:**	Percent
Lab Code:	K1408279-001	**Basis:**	As Received

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample KQ1409482-01 Result	Average	RPD	RPD Limit
Solids, Total	160.3 Modified	-	75.3	75.4	75.4	<1	10

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Metals
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INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga
Service Request: K1408279
Project No.: NA
Date Collected: 07/28/14
Project Name: Kensington Gold Mine
Date Received: 08/07/14
Matrix: SEDIMENT
Units: mg/Kg
Basis: DRY

Sample Name: Lower Slate Creek
Lab Code: K1408279-001

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	103	500.0	08/15/14	08/19/14	12000		
Arsenic	200.8	0.3	5.0	08/15/14	08/19/14	20.1		
Cadmium	200.8	0.01	5.0	08/15/14	08/19/14	1.21		
Chromium	200.8	0.1	5.0	08/15/14	08/19/14	20.0		
Copper	200.8	0.1	5.0	08/15/14	08/19/14	51.1		
Lead	200.8	0.03	5.0	08/15/14	08/19/14	8.78		
Mercury	7471B	0.02	1.0	08/13/14	08/14/14	0.06		
Nickel	200.8	0.1	5.0	08/15/14	08/19/14	40.8		
Selenium	200.8	0.5	5.0	08/15/14	08/19/14	1.3		
Silver	200.8	0.01	5.0	08/15/14	08/19/14	0.08		
Zinc	200.8	0.3	5.0	08/15/14	08/19/14	189		

% Solids: 75.3

Comments:

REVISED
9:04 am, Sep 10, 2014

Metals

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INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga
Service Request: K1408279
Project No.: NA
Date Collected: 07/30/14
Project Name: Kensington Gold Mine
Date Received: 08/07/14
Matrix: SEDIMENT
Units: mg/Kg
Basis: DRY

Sample Name: East Fork Slate Creek
Lab Code: K1408279-002

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	102	500.0	08/15/14	08/19/14	13300		
Arsenic	200.8	0.3	5.0	08/15/14	08/19/14	39.1		
Cadmium	200.8	0.01	5.0	08/15/14	08/19/14	12.1		
Chromium	200.8	0.1	5.0	08/15/14	08/19/14	14.6		
Copper	200.8	0.1	5.0	08/15/14	08/19/14	55.7		
Lead	200.8	0.03	5.0	08/15/14	08/19/14	6.94		
Mercury	7471B	0.02	1.0	08/13/14	08/14/14	0.04		
Nickel	200.8	0.1	5.0	08/15/14	08/19/14	85.3		
Selenium	200.8	0.5	5.0	08/15/14	08/19/14	2.4		
Silver	200.8	0.01	5.0	08/15/14	08/19/14	0.14		
Zinc	200.8	25.4	500.0	08/15/14	08/19/14	812		

% Solids: 65.5

Comments:

Metals

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INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga
Service Request: K1408279
Project No.: NA
Date Collected: 07/30/14
Project Name: Kensington Gold Mine
Date Received: 08/07/14
Matrix: SEDIMENT
Units: mg/Kg
Basis: DRY

Sample Name: Upper Slate Creek
Lab Code: K1408279-003

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	91.8	500.0	08/15/14	08/19/14	14900		
Arsenic	200.8	0.2	5.0	08/15/14	08/19/14	19.2		
Cadmium	200.8	0.01	5.0	08/15/14	08/19/14	0.69		
Chromium	200.8	0.1	5.0	08/15/14	08/19/14	84.2		
Copper	200.8	0.0	5.0	08/15/14	08/19/14	45.8		
Lead	200.8	0.02	5.0	08/15/14	08/19/14	2.86		
Mercury	7471B	0.02	1.0	08/13/14	08/14/14	0.03		
Nickel	200.8	0.1	5.0	08/15/14	08/19/14	55.7		
Selenium	200.8	0.5	5.0	08/15/14	08/19/14	1.8		
Silver	200.8	0.01	5.0	08/15/14	08/19/14	0.06		
Zinc	200.8	0.2	5.0	08/15/14	08/19/14	111		

% Solids: 72.4

Comments:

Metals
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga
Service Request: K1408279
Project No.: NA
Date Collected: 07/30/14
Project Name: Kensington Gold Mine
Date Received: 08/07/14
Matrix: SEDIMENT
Units: mg/Kg
Basis: DRY

Sample Name: Lower Johnson Creek
Lab Code: K1408279-004

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	97.6	500.0	08/15/14	08/19/14	10300		
Arsenic	200.8	0.2	5.0	08/15/14	08/19/14	16.5		
Cadmium	200.8	0.01	5.0	08/15/14	08/19/14	0.16		
Chromium	200.8	0.1	5.0	08/15/14	08/19/14	22.2		
Copper	200.8	0.0	5.0	08/15/14	08/19/14	68.2		
Lead	200.8	0.02	5.0	08/15/14	08/19/14	10.9		
Mercury	7471B	0.02	1.0	08/13/14	08/14/14	0.02		
Nickel	200.8	0.1	5.0	08/15/14	08/19/14	16.9		
Selenium	200.8	0.5	5.0	08/15/14	08/19/14	0.5	U	
Silver	200.8	0.01	5.0	08/15/14	08/19/14	0.32		
Zinc	200.8	0.2	5.0	08/15/14	08/19/14	83.4		

% Solids: 73.7

Comments:

Metals
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga
Service Request: K1408279
Project No.: NA
Date Collected: 07/28/14
Project Name: Kensington Gold Mine
Date Received: 08/07/14
Matrix: SEDIMENT
Units: mg/Kg
Basis: DRY

Sample Name: Lower Sherman Creek
Lab Code: K1408279-005

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	101	500.0	08/15/14	08/19/14	14900		
Arsenic	200.8	0.3	5.0	08/15/14	08/19/14	27.9		
Cadmium	200.8	0.01	5.0	08/15/14	08/19/14	0.36		
Chromium	200.8	0.1	5.0	08/15/14	08/19/14	33.6		
Copper	200.8	0.1	5.0	08/15/14	08/19/14	68.4		
Lead	200.8	0.03	5.0	08/15/14	08/19/14	6.97		
Mercury	7471B	0.02	1.0	08/13/14	08/14/14	0.03		
Nickel	200.8	0.1	5.0	08/15/14	08/19/14	31.1		
Selenium	200.8	0.5	5.0	08/15/14	08/19/14	1.2		
Silver	200.8	0.01	5.0	08/15/14	08/19/14	0.14		
Zinc	200.8	0.3	5.0	08/15/14	08/19/14	119		

% Solids: 76.7

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga
Service Request: K1408279
Project No.: NA
Date Collected:
Project Name: Kensington Gold Mine
Date Received:
Matrix: SEDIMENT
Units: mg/Kg
Basis: DRY

Sample Name: Method Blank
Lab Code: K1408279-MB

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	200.8	2.0	5.0	08/15/14	08/19/14	2.0	U	
Arsenic	200.8	0.5	5.0	08/15/14	08/19/14	0.5	U	
Cadmium	200.8	0.02	5.0	08/15/14	08/19/14	0.02	U	
Chromium	200.8	0.2	5.0	08/15/14	08/19/14	0.2	U	
Copper	200.8	0.1	5.0	08/15/14	08/19/14	0.1	U	
Lead	200.8	0.05	5.0	08/15/14	08/19/14	0.05	U	
Mercury	7471B	0.02	1.0	08/13/14	08/14/14	0.02	U	
Nickel	200.8	0.2	5.0	08/15/14	08/19/14	0.2	U	
Selenium	200.8	1.0	5.0	08/15/14	08/19/14	1.0	U	
Silver	200.8	0.02	5.0	08/15/14	08/19/14	0.02	U	
Zinc	200.8	0.5	5.0	08/15/14	08/19/14	0.5	U	

% Solids: 100.0

Comments:

Metals

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SPIKE SAMPLE RECOVERY

Client:	Alaska Department of Fish and Ga	**Service Request:**	K1408279
Project No.:	NA	**Units:**	MG/KG
Project Name:	Kensington Gold Mine	**Basis:**	DRY
Matrix:	SEDIMENT	**% Solids:**	38.8

Sample Name: **Batch QC1S** **Lab Code:** **K1408247-001S**

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Mercury	80 - 120	0.83		0.07		0.88	86.4		7471B

An empty field in the Control Limit column indicates the control limit is not applicable

Metals

- 5A -

SPIKE SAMPLE RECOVERY

Client: Alaska Department of Fish and Ga **Service Request:** K1408279

Project No.: NA **Units:** MG/KG

Project Name: Kensington Gold Mine **Basis:** DRY

Matrix: SLUDGE **% Solids:** 17.8

Sample Name: Batch QC2S **Lab Code:** K1408377-001S

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Aluminum		6131.6		5288.3		754.1	111.8		200.8
Arsenic	70 - 130	202.1		6.7		188.5	103.7		200.8
Cadmium	70 - 130	21.60		1.86		18.9	104.4		200.8
Chromium	70 - 130	99.7		20.2		75.4	105.4		200.8
Copper		1094.5		987.6		94.3	113.4		200.8
Lead	70 - 130	225.17		27.70		188.5	104.8		200.8
Nickel	70 - 130	225.2		20.3		188.5	108.7		200.8
Selenium	70 - 130	205.0		5.2		188.5	106.0		200.8
Silver	70 - 130	22.05		2.50		18.9	103.4		200.8
Zinc		1074.8		884.1		188.5	101.2		200.8

An empty field in the Control Limit column indicates the control limit is not applicable

Metals

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DUPLICATES

Client:	Alaska Department of Fish and Ga	**Service Request:**	K1408279
Project No.:	NA	**Units:**	MG/KG
Project Name:	Kensington Gold Mine	**Basis:**	DRY
Matrix:	SEDIMENT	**% Solids:**	38.8

Sample Name: Batch QC1D **Lab Code:** K1408247-001D

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Mercury		0.07		0.07		0.0		7471B

An empty field in the Control Limit column indicates the control limit is not applicable.

Metals

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DUPLICATES

Client:	Alaska Department of Fish and Ga	**Service Request:**	K1408279
Project No.:	NA	**Units:**	MG/KG
Project Name:	Kensington Gold Mine	**Basis:**	DRY
Matrix:	SLUDGE	**% Solids:**	17.8

Sample Name: Batch QC2D **Lab Code:** K1408377-001D

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Aluminum	30	5288.3		5171.4		2.2		200.8
Arsenic	30	6.7		6.9		2.9		200.8
Cadmium	30	1.86		1.90		2.1		200.8
Chromium	30	20.2		20.5		1.5		200.8
Copper	30	987.6		985.9		0.2		200.8
Lead	30	27.70		27.95		0.9		200.8
Nickel	30	20.3		20.9		2.9		200.8
Selenium		5.2		5.3		1.9		200.8
Silver	30	2.50		2.51		0.4		200.8
Zinc	30	884.1		878.1		0.7		200.8

An empty field in the Control Limit column indicates the control limit is not applicable.

Metals

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LABORATORY CONTROL SAMPLE

Client: Alaska Department of Fish and Ga **Service Request:** K1408279

Project No.: NA

Project Name: Kensington Gold Mine

Aqueous LCS Source: **Solid LCS Source:** **ERA D080-540**

Analyte	Aqueous (ug/L)			Solid (mg/kg)				
	True	Found	%R	True	Found	C	Limits	%R
Aluminum				8840	6890.0		42 158	77.9
Arsenic				100	108.0		69 131	108.4
Cadmium				182	196.0		74 126	107.7
Chromium				136	143.0		70 130	105.1
Copper				102	106.0		74 126	103.9
Lead				115	127.0		72 129	110.4
Mercury				19.9	18.7		51 148	94.0
Nickel				153	160.0		73 126	104.6
Selenium				150	167.0		67 133	111.3
Silver				40	46.0		66 134	113.9
Zinc				161	169.0		81 119	105.0

BIOASSAY REPORT
CHRONIC DEFINITIVE SEDIMENT BIOASSAYS CONDUCTED
August 19 through 29, 2014

Prepared for

ALASKA DEPARTMENT OF FISH AND GAME
JUNEAU, ALASKA

Prepared by

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NELAC #OR100022

Report Date: September 18, 2014
Lab I.D. No. B3151

CONTENTS

INTRODUCTION

CH2M HILL conducted 10 day chronic definitive sediment bioassays from August 19 through 29, 2014, on samples provided by the Alaska Department of Fish and Game, Juneau, Alaska on behalf of the Kensington Gold Mine. The tests were conducted using the freshwater amphipod (*Hyallela azteca*) and the freshwater chironomid (*Chironomus tentans*).

SUMMARY OF TEST RESULTS

Exhibit 1 provides a summary of the final test results.

EXHIBIT 1
Summary of Chronic Test Results

Sample ID	Species	NOEC (%)	LOEC (%)
Lower Sherman Creek	*H. azteca*	100%	> 100%
Lower Sherman Creek	*C. tentans*	100%	> 100%
East Fork Slate Creek	*H. azteca*	100%	> 100%
East Fork Slate Creek	*C. tentans*	100%	> 100%
Lower Johnson Creek	*H. azteca*	< 100%	100%
Lower Johnson Creek	*C. tentans*	100%	> 100%
Lower Slate Creek	*H. azteca*	100%	> 100%
Lower Slate Creek	*C. tentans*	100%	> 100%
Upper Slate Creek	*H. azteca*	100%	> 100%
Upper Slate Creek	*C. tentans*	100%	> 100%

Note: acronyms are as defined below Exhibit 2.

More detailed information is provided in the Chronic Results and Data Interpretation sections.

ACRONYM DEFINITIONS (from EPA guidance):

NOEC = No Observed Effect Concentration: The highest test concentration that causes no observable adverse effects on the test organisms (i.e. no statistically significant reduction from the control).

LOEC = Low Observed Effect Concentration: The lowest test concentration that does cause an observable adverse effect on the test organisms (i.e. is statistically significant reduction from the control).

METHODS AND MATERIALS

TEST METHODS

The tests were performed according to: *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates*, Second Edition, EPA 600/R-99/064 (EPA 2000).

DEVIATIONS FROM PROTOCOLS

Deviations from required procedures in the test methods:

- The *H. azteca* test requires "measureable growth" in the control organisms in order to meet Test Acceptability Criteria (TAC). Due to insufficient numbers of test organisms available, no weight calculations at test initiation were available. However, the organisms were noted, from visual observations, to have grown significantly during the test duration.

Deviations from recommended procedures in the test methods:

- None noted.

TEST ORGANISMS

The amphipods were obtained from Chesapeake Cultures, Nayes, Virginia, were 8 days old, and acclimated for 6 days prior to test initiation. The chironomids for the test initiated were obtained from Aquatic Biosystems, Fort Collins, Colorado, were 2nd to 3rd instar aged, and acclimated for less than 1 day prior to test initiation. All organisms tested were fed and maintained during culturing, acclimation, and testing as prescribed by the EPA (2000). The test organisms appeared vigorous and in good condition prior to testing.

CONTROL SEDIMENT AND OVERLYING WATER

The dilution sediment used was field collected sediment from Beaver Creek, upstream of Yaquina bay, near the town of Newport, Oregon. The Beaver Creek sediment was press sieved to remove indigenous organisms. The dilution sediment was collected on August 16, 2014.

The overlying water used was reconstituted, moderately hard water with a total hardness of 80 to 100 mg/L as $CaCO_3$ and an alkalinity of 60 to 70 mg/L as $CaCO_3$.

TEST CONCENTRATIONS

The concentrations tested were 100 percent sediment with dilution sediment alone for the control. For the amphipod test, 10 organisms per chamber, with eight chambers per concentration for a total of 80 organisms per concentration were used. For the chironomid tests, 10 organisms per chamber, with four chambers per concentration for a total of 40 organisms per concentration were used.

SAMPLE COLLECTION

Five samples, labeled "Lower Sherman Creek", "East Fork Slate Creek", "Lower Johnson Creek", "Lower Slate Creek", and "Upper Slate Creek" were collected by Alaska Department of Fish and Game personnel on June 30, 2014, and transported to CH2M HILL's Corvallis Aquatic Toxicology Laboratory.

Please note there was significant breakage of the sample containers during shipment. Sufficient amounts of the "Lower Sherman Creek" and "East Fork Slate Creek" samples were available to perform the testing.

The "Lower Johnson Creek", "Lower Slate Creek", and "Upper Slate Creek" samples were recollected on July 28 or July 30, 2014. These arrived in good condition.

All samples were stored in the dark at 0 to 6°C until test solutions were prepared and tested. Chain of Custody for sample collection is provided in Appendix C.

All testing was performed within the EPA recommended 8 week holding time.

SAMPLE PREPARATION

One day prior to test initiation (Day -1), test chambers were prepared by placing 100 g of homogenized sediment into a 300 ml tall-form glass beaker and adding 175 ml of overlying water. Test chambers were then positioned within a waterbath following a random position template and allowed to settle overnight at test conditions (23 °C). All test chambers were prepared on August 18.

TEST INITIATION

On the Day 0, the overlying water in each test chamber was renewed by siphoning off approximately 150 ml of water and replacing it with fresh overlying water. Ten test organisms were then randomly selected and placed into each test chamber.

TEST SOLUTION RENEWAL

Once the test was initiated (i.e., when organisms were added), the overlying water was renewed twice daily at approximately 12 hours apart. The amphipod tests were fed 1.0 ml of YCT and the chironomid tests were fed 1.5 ml of a 4 g/L TetraMin® slurry following the evening renewal.

TEST TERMINATION

Test termination occurred after 10 days of exposure. Test vessels were removed from the water bath and the overlying water and sediment was searched to retrieve test organisms. The search may have involved pouring the contents of the test chambers into a large glass (Pyrex ®) pan which was then placed on a light box and the test organisms collected. The use of a #40 sieve (425 µm mesh) may also have been used with the contents of the sieve transferred to a glass pan for inspection.

The number of live organisms and dead organisms retrieved was recorded. Any organisms not retrieved from the test chamber were considered to have died during the testing period.

The live organisms were then transferred to reweighed aluminum tins for determination of the dry weight (*H. azteca*) or ash-free dry weight (*C. tentans*).

MONITORING OF BIOASSAYS

The overlying water in the sediment tests were monitored at initiation and termination for dissolved oxygen, pH, conductivity, total hardness, total alkalinity, ammonia, and temperature. During the tests, dissolved oxygen and temperature was monitored every 24 hours within the test chambers. In addition, temperature was monitored in the water bath continuously throughout the testing period. Survival was determined at test termination.

DATA ANALYSIS

The effects measured during the amphipod chronic test included survival over the 10-day exposure period. The effects measured during the chironomid Chronic test included survival over the 10-day exposure period. The statistical analyses performed were those outlined in *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates – Second Edition* (2000); EPA/600/R-99/064, using CETIS version 1.8.1.2. Homescadastic (equal variance) T-test was used to compare the survival data between the control and each sample treatment. When the assumptions of normality or homogeneity of variance necessary for homoscedastic T-test could not be met, heteroscedastic T-test or Wilcoxon Two-Sample Test was used to analyze the data. All statistics were analyzed at the p (alpha) = 0.05 level.

RESULTS AND DISCUSSION

The raw data sheets for all tests are presented in Appendix A.

CHRONIC BIOASSAYS

Table 1 summarizes the survival data for the amphipod test.

Table 1
Amphipod (*H. azteca*) Bioassay Data

Sample Concentration (%)	10 day % Survival	10 day Dry Weight (mg)
Control	93.8	0.110
Lower Sherman Creek	96.3	0.101
East Fork Slate Creek	95.0	0.101
Lower Johnson Creek	96.3	0.091 [a]
Lower Slate Creek	92.5	0.114
Upper Slate Creek	97.5	0.100

[a] Indicates a statistically significant reduction from control at p equal to 0.05 using Equal Variance t Two-Sample test.

The amphipod tests resulted in no statistically significant reduction in survival or growth for the "Lower Sherman Creek", "East Fork Slate Creek", "Lower Slate Creek", and "Upper Slate Creek" samples when compared to the control.

However, the test on the "Lower Johnson Creek" sample showed no statistically significant reduction in survival but a statistically significant reduction in growth when compared to the control.

Daily mean test temperatures remained at 23±1°C, and instantaneous temperatures remained at 23±3°C, for the tests. The dissolved oxygen levels in the tests remained above the EPA recommended minimum 2.5 mg/L throughout the test period.

The *H. azteca* test meets Test Acceptability Criteria (TAC) of a minimum 80 percent control survival and measureable growth. Unless referenced above, the tests proceeded without any noted deviations or interruptions that could have affected test results. The testing should be considered "valid".

Table 2 summarizes the survival data for the chironomid test initiated on August 14, 2014.

Table 1
Chironomid (*C. tentans*) Bioassay Data

Sample Concentration (%)	10 day % Survival	10 day Ash- Free Dry Weight (mg)
Control	72.5	0.639
Lower Sherman Creek	88.8	0.682
East Fork Slate Creek	87.5	0.740
Lower Johnson Creek	87.5	0.682
Lower Slate Creek	90.0	0.850
Upper Slate Creek	92.5	0.784

The chironomid tests resulted in no statistically significant reduction in survival or growth for the "Lower Sherman Creek", "East Fork Slate Creek", "Lower Johnson Creek", "Lower Slate Creek", and "Upper Slate Creek" samples when compared to the control.

Daily mean test temperatures remained at 23±1°C, and instantaneous temperatures remained at 23±3°C, for the tests. The dissolved oxygen levels in the tests remained above the EPA recommended minimum 2.5 mg/L throughout the test period.

The *C. tentans* test meets Test Acceptability Criteria (TAC) of a minimum 70 percent control survival and minimum Ash-free dry weight (AFDW) of 0.48 mg. Unless referenced above, the tests proceeded without any noted deviations or interruptions that could have affected test results. The testing should be considered "valid".

REFERENCE TOXICANT TESTS

Reference toxicant (reftox) testing is performed to document both initial and ongoing laboratory performance of the test method(s). While the health of the test organisms is primarily evaluated by the performance of the laboratory control, reftox test results also may be used to assess the health and sensitivity of the test organisms. Reftox test results within their respective cumulative summary (Cusum) chart limits are indicative of consistent laboratory performance and normal test organism sensitivity.

The results of the reftox tests indicate that the test organisms were within their respective cusum chart limits based on EPA guidelines. This demonstrates ongoing laboratory proficiency of the test methods and suggests normal test organism sensitivity in the associated client testing.

The data sheets for the reference toxicant tests conducted with potassium chloride are provided in Appendix B.

The LC_{50} values and Control Chart Limits are listed in Table 4 below.

Table 4
Reference Toxicant Tests

Species	LC_{50}	Control Chart
Hyalella azteca	0.369 (g/L)	0.310 to 0.451
Chironomus tentans	4.11 (g/L)	1.43 to 7.22

APPENDIX A

RAW DATA SHEETS

CH2M HILL TOXICITY TEST ORGANISM AND WATER QUALITY DATA

Client: Kensington | Test Initiation: Date 8/19/2014 | Test Termination: Date 8-29-14

Contact: | Technician KT, DW, Bm

Test Species/ID: *Hyallela azteca* / AMP #80

Sample Information								Test Species Information	ID# AMP 80	ID#	ID#	ID#
Sample ID Number	Field ID	Collected Date	Collected Time	Total Residual Chlorine (mg/l) As Received / As Dechlor.	Ammonia NH_3-N mg/l	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$					
B3151-01	Lower Sherman Creek	6/30/14	0700	- / -	See Titration and Ammonia sheet			Chronic				
B3151-02	East Fork Slate Creek	7/2/14	0700	- / -				Organism Age at Initiation	7 to 14 days			
B3151-03	Lower Jonhson Creek	7/30/14	0600	- / -	-	-	-		(1 day range)			
B3151-04	Lower Slate Creek	7/28/14	1400	- / -	-	-	-	Test Container Size	300 ml			
B3151-05	Upper Slate Creek	7/30/14	1700	- / -	-	-	-	Test Volume	100 ml sample, 175 ml overlying water			
				/				Feeding: Type	1 ml YCT			
				/				Amount	daily			
				/					-			
				/				Aeration: Began	None			
				/				Amount	—			
				/				Dilution Water ID#	see below			
				/				Acclimation Period	days			
				/				Test Location	# 7			
				/				Initial Size (mg/org)	NA - insufficient organisms available			

Dilution Water	ID#	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$	Initial pH
Dilution Sediment	4102	-	-	-
Recon MH (FHM)	4095	88	62	8.3
	4101	90	60	8.3
	4103	88	60	8.2
	4106	98	64	8.3

Comments: ☑ Indicates the following action was taken, (☐ Indicates action not taken):

* Test organisms @ DAY 10 were noticeably larger than the organisms at DAY 0. ie. they grew. Bm

Water Quality Meters Used/ID#

Dissolved Oxygen #13 EOL me 8/29/14 | pH #11 EOL me 8/29/14 | Conductivity #2

Hyallela RANDOMIZATION SHEET

Client: **Kensington** **Test Start Date:** 8/19/14

Laboratory ID:	Field ID:	Alternate ID / Dilutions:	Replicate ID:	Random Number	Test Chamber Number:
B3151-03	Lower Jonhson Creek		A	0.78882	54
B3151-05	Upper Slate Creek		A	0.78207	56
Sediment Control	Beaver Creek	Control	A	0.71242	60
B3151-04	Lower Slate Creek		A	0.46164	72
B3151-01	Lower Sherman Creek		A	0.38832	75
B3151-02	East Fork Slate Creek		A	0.19079	87
B3151-04	Lower Slate Creek		B	0.44720	73
B3151-01	Lower Sherman Creek		B	0.38827	76
Sediment Control	Beaver Creek	Control	B	0.34993	78
B3151-02	East Fork Slate Creek		B	0.32825	80
B3151-05	Upper Slate Creek		B	0.29932	81
B3151-03	Lower Jonhson Creek		B	0.13371	93
B3151-03	Lower Jonhson Creek		C	0.66810	61
B3151-01	Lower Sherman Creek		C	0.61218	64
Sediment Control	Beaver Creek	Control	C	0.48528	69
B3151-04	Lower Slate Creek		C	0.47414	71
B3151-02	East Fork Slate Creek		C	0.15998	90
B3151-05	Upper Slate Creek		C	0.04623	95
B3151-04	Lower Slate Creek		D	0.90335	50
Sediment Control	Beaver Creek	Control	D	0.78242	55
B3151-05	Upper Slate Creek		D	0.77642	57
B3151-02	East Fork Slate Creek		D	0.65780	63
B3151-01	Lower Sherman Creek		D	0.47545	70
B3151-03	Lower Jonhson Creek		D	0.25165	83
Sediment Control	Beaver Creek	Control	E	0.76409	58
B3151-01	Lower Sherman Creek		E	0.59312	65
B3151-02	East Fork Slate Creek		E	0.52040	68
B3151-04	Lower Slate Creek		E	0.24559	84
B3151-05	Upper Slate Creek		E	0.22618	85
B3151-03	Lower Jonhson Creek		E	0.13564	91
B3151-01	Lower Sherman Creek		F	0.89476	52
B3151-02	East Fork Slate Creek		F	0.66196	62
B3151-03	Lower Jonhson Creek		F	0.56023	66
B3151-05	Upper Slate Creek		F	0.54094	67
Sediment Control	Beaver Creek	Control	F	0.34933	79
B3151-04	Lower Slate Creek		F	0.18770	88
B3151-01	Lower Sherman Creek		G	0.89718	51
B3151-05	Upper Slate Creek		G	0.43141	74
B3151-04	Lower Slate Creek		G	0.28392	82
B3151-03	Lower Jonhson Creek		G	0.20763	86
B3151-02	East Fork Slate Creek		G	0.16905	89
Sediment Control	Beaver Creek	Control	G	0.11634	94
B3151-03	Lower Jonhson Creek		H	0.90406	49
B3151-04	Lower Slate Creek		H	0.85427	53
B3151-02	East Fork Slate Creek		H	0.72156	59
B3151-05	Upper Slate Creek		H	0.36310	77
Sediment Control	Beaver Creek	Control	H	0.13414	92
B3151-01	Lower Sherman Creek		H	0.01545	96
			z		
			z		
			z		
			z		

TITRATION AND AMMONIA DATA

Client: Kensington | Species ID# AMP 80

Sample Description: See Randomization Sheet. | Start Date 8/19/14

Laboratory ID	Hardness (mg/L as $CaCO_3$)		Alkalinity (mg/L as $CaCO_3$)		Ammonia (mg/L as NH_3-N)	
	Initial	Final	Initial	Final	Initial	Final
Sediment Control	77.2	107.7	53.7	73.39	0.164 ~~<0.1~~	0.47
B3151-01	91.6	116.7	64.3	73.1	<0.1	0.12
B3151-02	101.6	109.0	64.9	72.3	<0.1	<0.1
B3151-03	89.4	110.3	59.9	71.3	<0.1	0.20
B3151-04	93.8	112.8	64.5	73.6	<0.1	0.12
B3151-05	84.1	120.1	58.8	74.9	<0.1	0.26

Hyallela GROWTH DATA

Client Kensington Species ID# AMP

Lab ID: see randomization sheet batch number: B Start Date

Sample Description: Weights of Amphipods at test initiation (= number of replicates as the test, 10 *Hyallela* each)

Technician:		
Date:		
Balance Serial #:	50309851	50309851

Tin ID Number	Total Weight (mg) (after 60°C for 24 hr)	Tare Weight (mg) (after 60°C for 24 hr)	No. of Amphipods Surviving	No. of Amphipods in Tin
@ Initiation A			na	10
@ Initiation B			na	10
@ Initiation C			na	10
@ Initiation D			na	10
@ Initiation E			na	10
@ Initiation F			na	10
@ Initiation G			na	10
@ Initiation H			na	10

weigh to 0.01 mg

* insufficient healthy organisms available @ initiation for weight determination - BM 8/19/14

CH2MHILL

FRESHWATER TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Client: Kensington
Sample Description: See Randomization Sheet(s). Batch number: B3151
Test Species: Hyallela azteca ID#: AMP 80

Beginning, Date: 8-19-14 Time: 1245
Ending, Date: 8/29/14 Time: 0800

Test Initiation: Tech: Tech: KS Time: 1245

Test Termination: Tech: Tech: DW/MS/MC Time: 0800-

Beaker Number	Start Count 0	# alive found 10	# dead found 10	Comments:
49	10	10	0	
50	10	9	0	
51	10	10	0	
52	10	10	0	
53	10	8	0	
54	10	10	0	
55	10	10	0	
56	10	10	0	
57	10	10	0	
58	10	9	0	
59	10	10	0	
60	10	9	0	
61	10	10	0	
62	10	Dirty 9	0	
63	10	10	0	

Beaker Number	Start Count 0	# alive found 10	# dead found 10	Comments:
64	10	10	0	
65	10	10	0	
66	10	9	0	
67	10	10	0	
68	10	9	0	
69	10	9	0	
70	10	10	0	
71	10	9	0	
72	10	9	0	
73	10	10	~~10~~	MS Ro 6 8-29-14
74	10	9	~~9~~	MS Ro6
75	10	6	~~6~~	MS Ro6
76	10	9	1	
77	10	9	~~9~~ 0	MS Ro6
78	10	10	~~10~~ 0	MS Ro6

CH2M HILL

FRESHWATER TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Client: Kensington
Sample Description: See Randomization Sheet(s). Batch number: B 3151
Test Species: Hyallela azteca ID#: AMP 80

Beginning, Date: 8-19-14 Time: 1245
Ending, Date: 8-29-14 Time: 0800

Test Initiation: Tech: Tech: KJ Time: 1245
Test Termination: Tech: Tech: MS/MC Time: 0800

Beaker Number	Start Count 0	# alive found 10	# dead found 10	Comments:
79	10	10	~~10~~ 0	MS Aug 6
80	10	10	~~10~~ 0	
81	10	10	~~10~~ 0	
82	10	10	~~10~~ 0	
83	10	9	0	
84	10	9	0	
85	10	10	0	
86	10	10	0	
87	10	9	0	
88	10	10	0	
89	10	10	0	
90	10	9	0	
91	10	10	0	
92	10	9	0	
93	10	9	0	

Beaker Number	Start Count 0	# alive found 10	# dead found 10	Comments:
94	10	9	0	
95	10	10	0	
96	10	10	0	
97	10			
98	10			
99	10			
100	10			
101	10			
102	10			
103	10			
104	10			
105	10			
106	10			
107	10			
108	10			

CH2M HILL

FRESHWATER TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Client: Kensington

Sample Description: See Randomization Sheet. Batch Number B 3151

Test Species: Hyallela azteca

ID#: Amp

Amp 80

Beginning (Day 0), Date 8/19/14 Time 1245

Ending (Day 10), Date 8-29-14 Time 0800

Tech.	Day 0 KT	Day 1 DW	Day 2 MC/KT	Day 3 JDV	Day 4 MC	Day 5 DW	Day 6 BM	Day 7 MC/DW	Day 8 DW	Day 9 DW	Day 10 DW
Time	Day 0 1245	Day 1 0630	Day 2 0905	Day 3 0620	Day 4 0835	Day 5 0800	Day 6 0910	Day 7 0730	Day 8 0700	Day 9 0730	Day 10 0740
	Thaw 10 177	177	177	177	201	177	214	214	189	177	177
Tech. Day -1 BM	Day 0 BM	Day 1 DW	Day 2 JDV	Day 3 MC	Day 4 DW	Day 5 MC	Day 6 JDV/MC	Day 7 JDV/MC	Day 8 MC	Day 9 MC	Day 10
Time Day -1 0320	Day 0 1660	Day 1 1500	Day 2 1900	Day 3 1500	Day 4 1900	Day 5 1545	Day 6 1630	Day 7 1629	Day 8 1540	Day 9 1630	Day 10
Feeding: ✓ when done Day 0 ✓	Day 1 ✓	Day 2 ✓	Day 3 ✓	Day 4 ✓	Day 5 ✓	Day 6 1638 ✓	Day 7 ✓	Day 8 ✓	Day 9 ✓		

Beaker Number	Dissolved Oxygen (mg/l)											Temperature (°C)											pH		Conductivity (µmohs/cm)	
	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10	0	10	0	10
54	7.1	7.0	6.5	6.8	6.3	7.1	7.2	6.8	7.1	7.4	7.6	23.1	23.2	23.0	23.2	23.3	23.1	23.1	23.1	23.2	22.9	23.1	7.8	7.5	311	332
56	7.2	7.1	6.5	6.7	6.4	7.1	7.6	6.9	7.4	7.5	7.7	23.2	23.2	23.1	23.2	23.3	23.1	23.2	23.1	23.3	23.0	23.1	7.8	7.5	318	328
60	6.9	7.1	6.4	6.6	6.4	7.1	7.5	6.9	7.0	7.3	7.5	23.2	23.1	23.1	23.1	23.3	23.2	23.1	23.1	23.2	23.1	22.9	7.5	7.3	310	332
72	6.9	7.2	6.6	6.7	6.3	6.9	7.5	6.7	7.2	7.2	7.4	23.2	23.1	23.1	23.3	23.3	23.1	23.1	23.2	23.4	23.2	23.0	7.9	7.5	315	331
75	7.2	7.3	6.7	6.7	6.3	6.9	7.6	6.7	7.2	7.3	7.6	23.4	23.2	23.4	23.2	23.1	23.2	23.1	23.5	23.4	23.1	23.0	7.9	7.5	316	338
87	6.8	7.2	6.7	6.7	6.2	6.8	7.6	6.8	7.1	7.2	7.5	23.2	23.2	23.3	23.2	23.1	23.3	23.0	23.5	23.5	23.3	23.1	7.6	7.3	326	345

*8/25/14 beaker #79 had a stickler "worm" AB

*8/28/14 Beaker #92 had a mosquito like fly in it. AB

Hyallela GROWTH DATA

Client: Kensington | Tins Labeled As: KENS. HYAL.

Lab ID: see randomization sheet | batch number: B3151 | Start Date: 8/19/2014

Sample Description:

Technician:	KJ	KJ
Date:	9/2/2014	8/15/2014
Balance Serial #:	B328543647	B328543647

Tin ID Number	Total Weight (mg) (after 60°C for 24 hr)	Tare Weight (mg) (after 60°C for 24 hr)	No. of Amphipods Surviving	No. of Amphipods in Tin
49	69.56	68.42		10
50	69.13	68.05		9
51	69.39	68.37		10
52	69.06	68.04		10
53	68.81	68.09		8
54	68.59	67.63		10
55	68.87	67.93		10
56	68.90	68.06		10
57	68.17	67.24		10
58	68.73	67.74		9
59	69.24	68.21		10
60	68.96	67.97		9
61	69.02	68.01		10
62	69.42	68.43		9
63	69.20	68.19		10
64	69.35	68.39		10
65	68.84	67.89		10
66	68.96	68.19		9
67	69.39	68.43		10
68	69.32	68.50		9
69	68.99	68.14		9
70	68.95	67.85		10
71	68.87	67.75		9
72	68.78	67.69		9
73	70.05	68.77		10
74	69.58	68.43		9
75	68.56	67.86		8
76	69.37	68.42		9
77	68.98	68.00		9
78	69.02	67.92		10

weigh to 0.01 mg

Hyallela GROWTH DATA

Client: Kensington | Tins Labeled As: KENS. HYAL

Lab ID: see randomization sheet | batch number: B3151 | Start Date: 8/19/2014

Sample Description:

Technician:	KJ	KJ
Date:	9/2/2014	8/15/2014
Balance Serial #:	B328543647	B328543647

Tin ID Number	Total Weight (mg) (after 60°C for 24 hr)	Tare Weight (mg) (after 60°C for 24 hr)	No. of Amphipods Surviving	No. of Amphipods in Tin
79	69.04	67.76		10
80	68.80	67.62		10
81	69.38	68.61		10
82	69.64	68.56		10
83	69.17	68.48		9
84	68.84	67.71		9
85	68.90	67.80		10
86	68.49	67.69		10
87	68.69	67.80		9
88	69.56	68.58		10
89	69.40	68.51		10
90	69.49	68.65		9
91	68.34	67.49		10
92	69.32	68.18		9
93	68.89	68.07		9
94	68.93	67.97		9
95	69.57	68.55		10
96	68.75	67.65		10

weigh to 0.01 mg

Hyallela GROWTH DATA

Client: Kensington | Tins Labeled As: KENS. HYAL

Lab ID: see randomization sheet | batch number: B3151 | Start Date: 8/14/14

Sample Description:

Technician:		KJ
Date:		8/15/2014
Balance Serial #:	B328543647	B328543647

Tin ID Number	Total Weight (mg) (after 60°C for 24 hr)	Tare Weight (mg) (after 60°C for 24 hr)	No. of Amphipods Surviving	No. of Amphipods in Tin
79		67.76	10	10
80		67.62	10	10
81		68.61	10	10
82		68.56	10	10
83		68.48	9	9
84		67.71	9	9
85		67.80	10	10
86		67.69	10	10
87		67.80	9	9
88		68.58	10	10
89		68.51	10	10
90		68.65	9	9
91		67.49	10	10
92		68.18	9	9
93		68.07	9	9
94		67.97	9	9
95		68.55	10	10
96		67.65	10	10

weigh to 0.01 mg

Hyallela GROWTH DATA

Client: Kensington | Tins Labeled As: KENS. HYAL.

Lab ID: see randomization sheet | batch number: B3151 | Start Date: 8/19/14

Sample Description:

Technician:		KJ
Date:		8/15/2014
Balance Serial #:	B328543647	B328543647

Tin ID Number	Total Weight (mg) (after 60°C for 24 hr)	Tare Weight (mg) (after 60°C for 24 hr)	No. of Amphipods Surviving	No. of Amphipods in Tin
49		68.42	10	10
50		68.05	9	9
51		68.37	10	10
52		68.04	10	10
53		68.09	8	8
54		67.63	10	10
55		67.93	10	10
56		68.06	10	10
57		67.24	10	10
58		67.74	9	9
59		68.21	10	10
60		67.97	9	9
61		68.01	10	10
62		68.43	9	9
63		68.19	10	10
64		68.39	10	10
65		67.89	10	10
66		68.19	9	9
67		68.43	10	10
68		68.50	9	9
69		68.14	9	9
70		67.85	10	10
71		67.75	9	9
72		67.69	9	9
73		68.77	10	10
74		68.43	9	9
75		67.86	8	8
76		68.42	10	9
77		68.00	9	9
78		67.92	10	10

weigh to 0.01 mg

CETIS Summary Report

Hyallela 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Batch ID:	02-7863-2507	**Test Type:**	Survival-Growth	**Analyst:**	
Start Date:	19 Aug-14 12:45	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	29 Aug-14 08:00	**Species:**	Hyalella azteca	**Brine:**	
Duration:	9d 19h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	

Sample ID:	14-5240-4181	**Code:**	B3151-01	**Client:**	
Sample Date:	30 Jun-14 07:00	**Material:**	Sediment	**Project:**	
Receive Date:	03 Jul-14	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	50d 6h	**Station:**			

Sample Note: Lower Sherman Creek

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
20-7230-1351	Mean Dry Weight-mg	100	>100	N/A	8.4%	1	Equal Variance t Two-Sample Test
14-4145-9417	Survival Rate	100	>100	N/A	5.83%	1	Wilcoxon Rank Sum Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
14-4145-9417	Survival Rate	Control Resp	0.9375	0.8 - NL	Yes	Passes Acceptability Criteria

Mean Dry Weight-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.11	0.1053	0.1147	0.094	0.128	0.004454	0.0126	11.46%	0.0%
100		8	0.101	0.09809	0.1039	0.0875	0.11	0.002765	0.00782	7.74%	8.15%

Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.9375	0.9182	0.9568	0.9	1	0.0183	0.05175	5.52%	0.0%
100		8	0.9625	0.9347	0.9903	0.8	1	0.02631	0.0744	7.73%	-2.67%

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.11	0.11	0.09444	0.094	0.11	0.128	0.1067	0.1267
100		0.0875	0.1056	0.096	0.11	0.095	0.102	0.102	0.11

Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.9	1	0.9	1	0.9	1	0.9	0.9
100		0.8	0.9	1	1	1	1	1	1

Hyallela 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Analysis ID:	14-4145-9417	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	02 Sep-14 16:51	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes
Batch ID:	02-7863-2507	**Test Type:**	Survival-Growth	**Analyst:**	
Start Date:	19 Aug-14 12:45	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	29 Aug-14 08:00	**Species:**	Hyalella azteca	**Brine:**	
Duration:	9d 19h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	14-5240-4181	**Code:**	B3151-01	**Client:**	
Sample Date:	30 Jun-14 07:00	**Material:**	Sediment	**Project:**	
Receive Date:	03 Jul-14	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	50d 6h	**Station:**			

Sample Note: Lower Sherman Creek

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Angular (Corrected)	0	C > T	Not Run	Sample passes survival rate endpoint	5.83%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	DF	Ties	P-Value	Decision(α:5%)
Dilution Water		100	77.5		14	2	0.8089	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.007526168	0.007526168	1	0.7423	0.4034	Non-Significant Effect
Error	0.1419432	0.0101388	14			
Total	0.1494694	0.01766497	15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.85	8.885	0.4355	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.837	0.8408	0.0088	Non-normal Distribution

Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.9375	0.9178	0.9572	0.9	1	0.0183	0.05175	5.52%	0.0%
100		8	0.9625	0.9342	0.9908	0.8	1	0.02631	0.0744	7.73%	-2.67%

Angular (Corrected) Transformed Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	1.31	1.278	1.342	1.249	1.412	0.02982	0.08435	6.44%	0.0%
100		8	1.354	1.31	1.397	1.107	1.412	0.04056	0.1147	8.48%	-3.31%

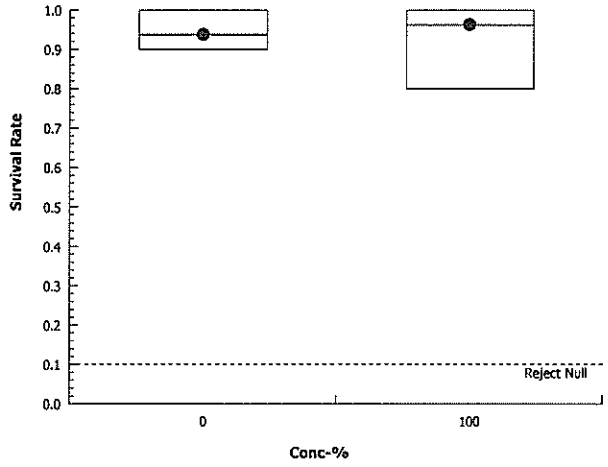
Hyallela 10-d Survival and Growth Sediment Test **CH2M HILL - ASL**

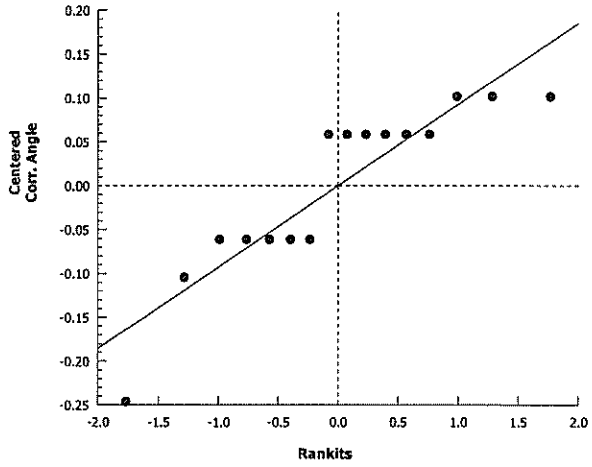
Analysis ID: 14-4145-9417 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.8.1
Analyzed: 02 Sep-14 16:51 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.9	1	0.9	1	0.9	1	0.9	0.9
100		0.8	0.9	1	1	1	1	1	1

Graphics





Hyallela 10-d Survival and Growth Sediment Test **CH2M HILL - ASL**

Analysis ID:	20-7230-1351	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	02-7863-2507	**Test Type:**	Survival-Growth	**Analyst:**	
Start Date:	19 Aug-14 12:45	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	29 Aug-14 08:00	**Species:**	Hyalella azteca	**Brine:**	
Duration:	9d 19h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	14-5240-4181	**Code:**	B3151-01	**Client:**	
Sample Date:	30 Jun-14 07:00	**Material:**	Sediment	**Project:**	
Receive Date:	03 Jul-14	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	50d 6h	**Station:**			

Sample Note: Lower Sherman Creek

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Untransformed	0	C > T	Not Run	Sample passes mean dry weight-mg endpoint	8.4%

Equal Variance t Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Dilution Water		100	1.71	1.761	14	0.009233	0.0546	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.000321516	0.000321516	1	2.925	0.1093	Non-Significant Effect
Error	0.001538865	0.0001099189	14			
Total	0.001860381	0.0004314349	15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.595	8.885	0.2315	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9505	0.8408	0.4979	Normal Distribution

Mean Dry Weight-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.11	0.1052	0.1148	0.094	0.128	0.004454	0.0126	11.46%	0.0%
100		8	0.101	0.09803	0.104	0.0875	0.11	0.002765	0.00782	7.74%	8.15%

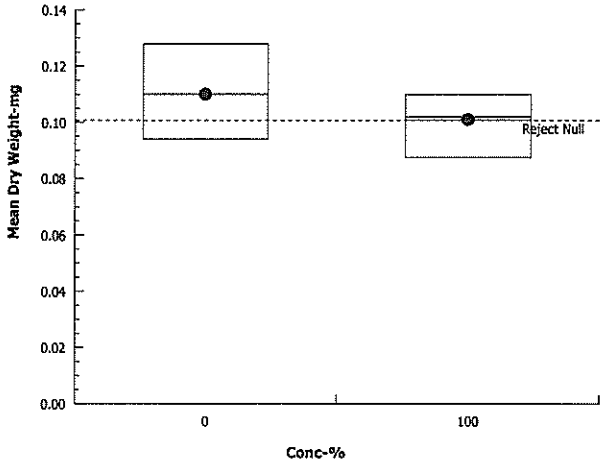
Hyallela 10-d Survival and Growth Sediment Test **CH2M HILL - ASL**

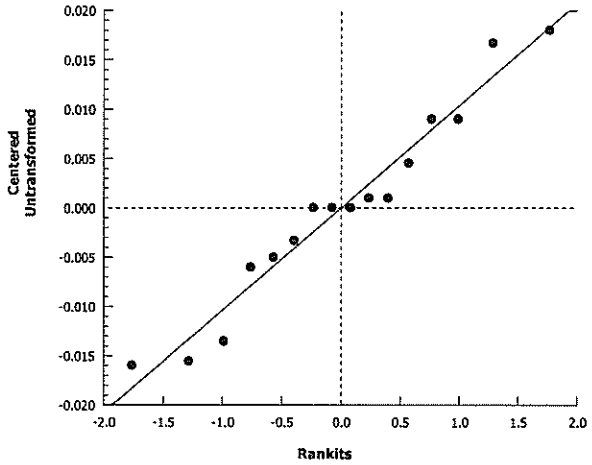
Analysis ID:	20-7230-1351	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.11	0.11	0.09444	0.094	0.11	0.128	0.1067	0.1267
100		0.0875	0.1056	0.096	0.11	0.095	0.102	0.102	0.11

Graphics





CETIS Summary Report

Hyallela 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Batch ID:	02-7863-2507	**Test Type:**	Survival-Growth	**Analyst:**	
Start Date:	19 Aug-14 12:45	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	29 Aug-14 08:00	**Species:**	Hyalella azteca	**Brine:**	
Duration:	9d 19h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	03-0055-2849	**Code:**	B3151-02	**Client:**	
Sample Date:	02 Jul-14 07:00	**Material:**	Sediment	**Project:**	
Receive Date:	03 Jul-14	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	48d 6h	**Station:**			

Sample Note: East Fork Slate Creek

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
05-4864-8735	Mean Dry Weight-mg	100	>100	N/A	9.05%	1	Equal Variance t Two-Sample Test
01-0910-1379	Survival Rate	100	>100	N/A	4.94%	1	Wilcoxon Rank Sum Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
01-0910-1379	Survival Rate	Control Resp	0.9375	0.8 - NL	Yes	Passes Acceptability Criteria

Mean Dry Weight-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.11	0.1053	0.1147	0.094	0.128	0.004454	0.0126	11.46%	0.0%
100		8	0.1005	0.09687	0.1042	0.089	0.118	0.003478	0.009837	9.78%	8.58%

Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.9375	0.9182	0.9568	0.9	1	0.0183	0.05175	5.52%	0.0%
100		8	0.95	0.93	0.97	0.9	1	0.0189	0.05345	5.63%	-1.33%

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.11	0.11	0.09444	0.094	0.11	0.128	0.1067	0.1267
100		0.09889	0.118	0.09333	0.101	0.09111	0.11	0.089	0.103

Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.9	1	0.9	1	0.9	1	0.9	0.9
100		0.9	1	0.9	1	0.9	0.9	1	1

Hyallela 10-d Survival and Growth Sediment Test **CH2M HILL - ASL**

Analysis ID:	01-0910-1379	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	02 Sep-14 16:54	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes
Batch ID:	02-7863-2507	**Test Type:**	Survival-Growth	**Analyst:**	
Start Date:	19 Aug-14 12:45	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	29 Aug-14 08:00	**Species:**	Hyalella azteca	**Brine:**	
Duration:	9d 19h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	03-0055-2849	**Code:**	B3151-02	**Client:**	
Sample Date:	02 Jul-14 07:00	**Material:**	Sediment	**Project:**	
Receive Date:	03 Jul-14	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	48d 6h	**Station:**			

Sample Note: East Fork Slate Creek

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Angular (Corrected)	0	C > T	Not Run	Sample passes survival rate endpoint	4.94%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	DF	Ties	P-Value	Decision(α:5%)
Dilution Water		100	72		14	2	0.6395	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001659958	0.001659958	1	0.2258	0.6420	Non-Significant Effect
Error	0.1029174	0.007351243	14			
Total	0.1045774	0.009011202	15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.067	8.885	0.9343	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.731	0.8408	0.0004	Non-normal Distribution

Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.9375	0.9178	0.9572	0.9	1	0.0183	0.05175	5.52%	0.0%
100		8	0.95	0.9297	0.9703	0.9	1	0.0189	0.05345	5.63%	-1.33%

Angular (Corrected) Transformed Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	1.31	1.278	1.342	1.249	1.412	0.02982	0.08435	6.44%	0.0%
100		8	1.331	1.297	1.364	1.249	1.412	0.0308	0.08711	6.55%	-1.56%

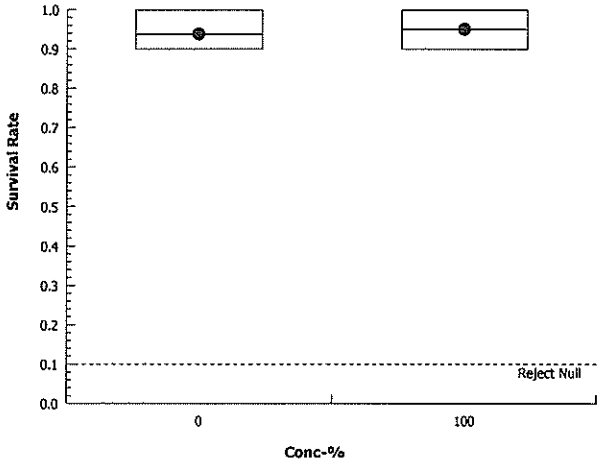
Hyallela 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

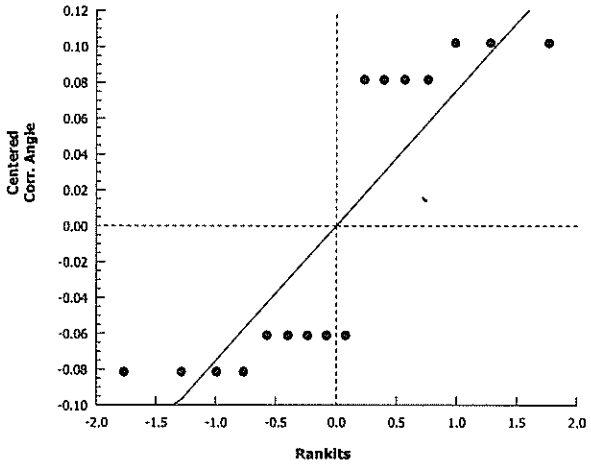
Analysis ID:	01-0910-1379	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	02 Sep-14 16:54	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.9	1	0.9	1	0.9	1	0.9	0.9
100		0.9	1	0.9	1	0.9	0.9	1	1

Graphics





Hyallela 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Analysis ID:	05-4864-8735	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	02-7863-2507	**Test Type:**	Survival-Growth	**Analyst:**	
Start Date:	19 Aug-14 12:45	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	29 Aug-14 08:00	**Species:**	Hyalella azteca	**Brine:**	
Duration:	9d 19h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	03-0055-2849	**Code:**	B3151-02	**Client:**	
Sample Date:	02 Jul-14 07:00	**Material:**	Sediment	**Project:**	
Receive Date:	03 Jul-14	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	48d 6h	**Station:**			

Sample Note: East Fork Slate Creek

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Untransformed	0	C > T	Not Run	Sample passes mean dry weight-mg endpoint	9.05%

Equal Variance t Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Dilution Water		100	1.669	1.761	14	0.009953	0.0587	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0003557552	0.0003557552	1	2.785	0.1173	Non-Significant Effect
Error	0.001788197	0.0001277284	14			
Total	0.002143952	0.0004834835	15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.64	8.885	0.5297	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9263	0.8408	0.2125	Normal Distribution

Mean Dry Weight-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.11	0.1052	0.1148	0.094	0.128	0.004454	0.0126	11.46%	0.0%
100		8	0.1005	0.0968	0.1043	0.089	0.118	0.003478	0.009837	9.78%	8.58%

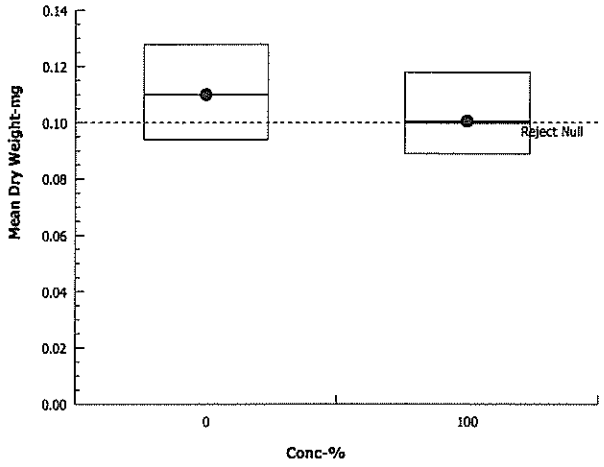
Hyallela 10-d Survival and Growth Sediment Test **CH2M HILL - ASL**

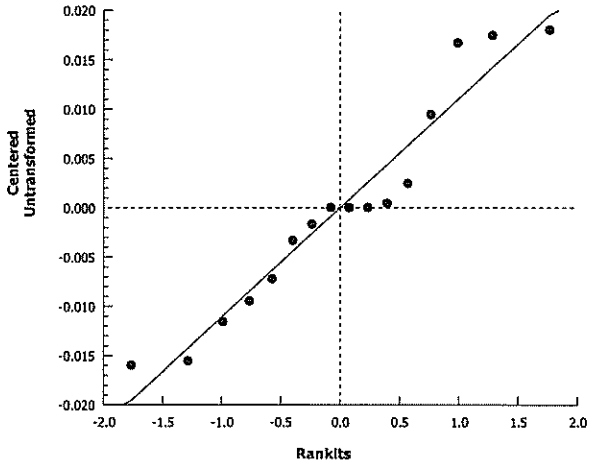
Analysis ID:	05-4864-8735	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.11	0.11	0.09444	0.094	0.11	0.128	0.1067	0.1267
100		0.09889	0.118	0.09333	0.101	0.09111	0.11	0.089	0.103

Graphics





CETIS Summary Report

Hyallela 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Batch ID:	02-7863-2507	**Test Type:**	Survival-Growth	**Analyst:**	
Start Date:	19 Aug-14 12:45	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	29 Aug-14 08:00	**Species:**	Hyalella azteca	**Brine:**	
Duration:	9d 19h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	17-7304-5180	**Code:**	B3151-03	**Client:**	
Sample Date:	30 Jul-14 09:00	**Material:**	Sediment	**Project:**	
Receive Date:	07 Aug-14 11:00	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	20d 4h	**Station:**			

Sample Note: Lower Johnson Creek

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
01-0811-1577	Mean Dry Weight-mg	<100	100	N/A	9.94%	>1	Equal Variance t Two-Sample Test
14-9681-2065	Survival Rate	100	>100	N/A	4.86%	1	Wilcoxon Rank Sum Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
14-9681-2065	Survival Rate	Control Resp	0.9375	0.8 - NL	Yes	Passes Acceptability Criteria

Mean Dry Weight-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.11	0.1053	0.1147	0.094	0.128	0.004454	0.0126	11.46%	0.0%
100		8	0.09117	0.0866	0.09573	0.07667	0.114	0.004322	0.01222	13.41%	17.1%

Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.9375	0.9182	0.9568	0.9	1	0.0183	0.05175	5.52%	0.0%
100		8	0.9625	0.9432	0.9818	0.9	1	0.0183	0.05175	5.38%	-2.67%

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.11	0.11	0.09444	0.094	0.11	0.128	0.1067	0.1267
100		0.096	0.09111	0.101	0.07667	0.085	0.08556	0.08	0.114

Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.9	1	0.9	1	0.9	1	0.9	0.9
100		1	0.9	1	0.9	1	0.9	1	1

Hyallela 10-d Survival and Growth Sediment Test **CH2M HILL - ASL**

Analysis ID:	14-9681-2065	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	02 Sep-14 16:55	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes
Batch ID:	02-7863-2507	**Test Type:**	Survival-Growth	**Analyst:**	
Start Date:	19 Aug-14 12:45	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	29 Aug-14 08:00	**Species:**	Hyalella azteca	**Brine:**	
Duration:	9d 19h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	17-7304-5180	**Code:**	B3151-03	**Client:**	
Sample Date:	30 Jul-14 09:00	**Material:**	Sediment	**Project:**	
Receive Date:	07 Aug-14 11:00	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	20d 4h	**Station:**			

Sample Note: Lower Johnson Creek

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Angular (Corrected)	0	C > T	Not Run	Sample passes survival rate endpoint	4.86%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	DF	Ties	P-Value	Decision(α:5%)
Dilution Water		100	76		14	2	0.7791	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.006639833	0.006639833	1	0.9333	0.3504	Non-Significant Effect
Error	0.09959749	0.007114107	14			
Total	0.1062373	0.01375394	15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1	8.885	1.0000	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8138	0.8408	0.0042	Non-normal Distribution

Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.9375	0.9178	0.9572	0.9	1	0.0183	0.05175	5.52%	0.0%
100		8	0.9625	0.9428	0.9822	0.9	1	0.0183	0.05175	5.38%	-2.67%

Angular (Corrected) Transformed Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	1.31	1.278	1.342	1.249	1.412	0.02982	0.08435	6.44%	0.0%
100		8	1.351	1.319	1.383	1.249	1.412	0.02982	0.08435	6.24%	-3.11%

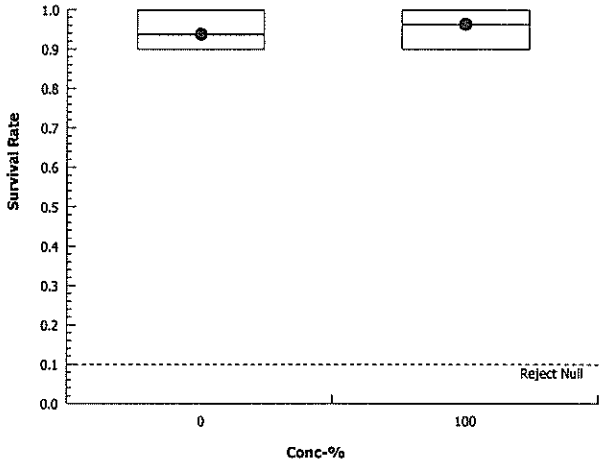
Hyallela 10-d Survival and Growth Sediment Test **CH2M HILL - ASL**

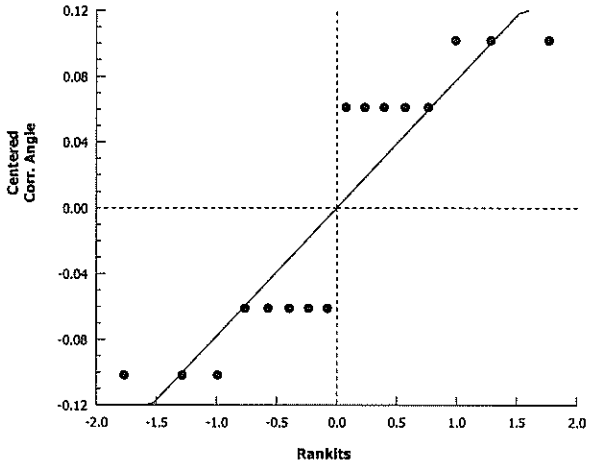
Analysis ID:	14-9681-2065	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	02 Sep-14 16:55	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.9	1	0.9	1	0.9	1	0.9	0.9
100		1	0.9	1	0.9	1	0.9	1	1

Graphics





Hyallela 10-d Survival and Growth Sediment Test **CH2M HILL - ASL**

Analysis ID:	01-0811-1577	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	02-7863-2507	**Test Type:**	Survival-Growth	**Analyst:**	
Start Date:	19 Aug-14 12:45	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	29 Aug-14 08:00	**Species:**	Hyalella azteca	**Brine:**	
Duration:	9d 19h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	17-7304-5180	**Code:**	B3151-03	**Client:**	
Sample Date:	30 Jul-14 09:00	**Material:**	Sediment	**Project:**	
Receive Date:	07 Aug-14 11:00	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	20d 4h	**Station:**			

Sample Note: Lower Johnson Creek

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Untransformed	0	C > T	Not Run	Sample fails mean dry weight-mg endpoint	9.94%

Equal Variance t Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Dilution Water		100*	3.03	1.761	14	0.01093	0.0045	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001414639	0.001414639	1	9.183	0.0090	Significant Effect
Error	0.002156745	0.0001540532	14			
Total	0.003571384	0.001568692	15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.062	8.885	0.9387	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9368	0.8408	0.3121	Normal Distribution

Mean Dry Weight-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.11	0.1052	0.1148	0.094	0.128	0.004454	0.0126	11.46%	0.0%
100		8	0.09117	0.08652	0.09582	0.07667	0.114	0.004322	0.01222	13.41%	17.1%

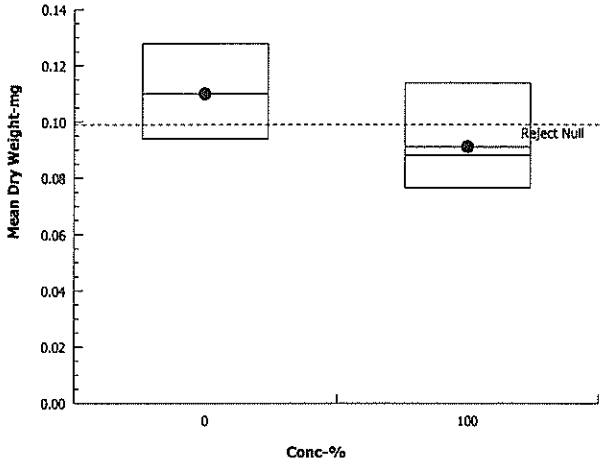
Hyallela 10-d Survival and Growth Sediment Test **CH2M HILL - ASL**

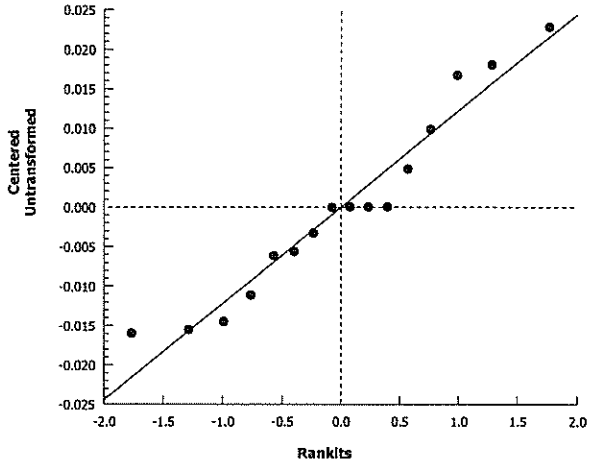
Analysis ID:	01-0811-1577	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.11	0.11	0.09444	0.094	0.11	0.128	0.1067	0.1267
100		0.096	0.09111	0.101	0.07667	0.085	0.08556	0.08	0.114

Graphics





CETIS Summary Report

Hyallela 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Batch ID:	02-7863-2507	**Test Type:**	Survival-Growth	**Analyst:**	
Start Date:	19 Aug-14 12:45	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	29 Aug-14 08:00	**Species:**	Hyalella azteca	**Brine:**	
Duration:	9d 19h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	

Sample ID:	17-1573-2640	**Code:**	B3151-04	**Client:**	
Sample Date:	28 Jul-14 14:00	**Material:**	Sediment	**Project:**	
Receive Date:	07 Aug-14 11:00	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	21d 23h	**Station:**			

Sample Note: Lower Slate Creek

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
01-5872-0768	Mean Dry Weight-mg	100	>100	N/A	10.7%	1	Equal Variance t Two-Sample Test
06-1798-4435	Survival Rate	100	>100	N/A	5.67%	1	Wilcoxon Rank Sum Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
06-1798-4435	Survival Rate	Control Resp	0.9375	0.8 - NL	Yes	Passes Acceptability Criteria

Mean Dry Weight-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.11	0.1053	0.1147	0.094	0.128	0.004454	0.0126	11.46%	0.0%
100		8	0.1144	0.1091	0.1197	0.09	0.128	0.004986	0.0141	12.33%	-4.02%

Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.9375	0.9182	0.9568	0.9	1	0.0183	0.05175	5.52%	0.0%
100		8	0.925	0.8986	0.9514	0.8	1	0.025	0.07071	7.64%	1.33%

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.11	0.11	0.09444	0.094	0.11	0.128	0.1067	0.1267
100		0.1211	0.128	0.1244	0.12	0.1256	0.098	0.108	0.09

Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.9	1	0.9	1	0.9	1	0.9	0.9
100		0.9	1	0.9	0.9	0.9	1	1	0.8

Hyallela 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Analysis ID:	06-1798-4435	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	02 Sep-14 16:57	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes
Batch ID:	02-7863-2507	**Test Type:**	Survival-Growth	**Analyst:**	
Start Date:	19 Aug-14 12:45	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	29 Aug-14 08:00	**Species:**	Hyalella azteca	**Brine:**	
Duration:	9d 19h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	17-1573-2640	**Code:**	B3151-04	**Client:**	
Sample Date:	28 Jul-14 14:00	**Material:**	Sediment	**Project:**	
Receive Date:	07 Aug-14 11:00	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	21d 23h	**Station:**			

Sample Note: Lower Slate Creek

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Angular (Corrected)	0	C > T	Not Run	Sample passes survival rate endpoint	5.67%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	DF	Ties	P-Value	Decision(α:5%)
Dilution Water		100	65.5		14	2	0.3992	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001258423	0.001258423	1	0.1309	0.7229	Non-Significant Effect
Error	0.1345592	0.00961137	14			
Total	0.1358176	0.01086979	15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.702	8.885	0.4996	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8128	0.8408	0.0041	Non-normal Distribution

Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.9375	0.9178	0.9572	0.9	1	0.0183	0.05175	5.52%	0.0%
100		8	0.925	0.8981	0.9519	0.8	1	0.025	0.07071	7.64%	1.33%

Angular (Corrected) Transformed Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	1.31	1.278	1.342	1.249	1.412	0.02982	0.08435	6.44%	0.0%
100		8	1.292	1.251	1.334	1.107	1.412	0.0389	0.11	8.51%	1.35%

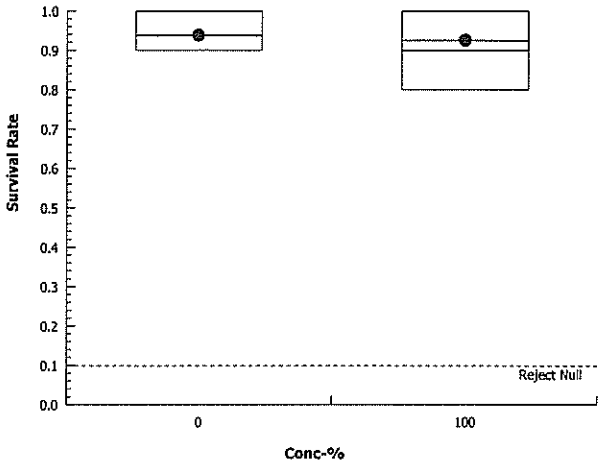
Hyallela 10-d Survival and Growth Sediment Test **CH2M HILL - ASL**

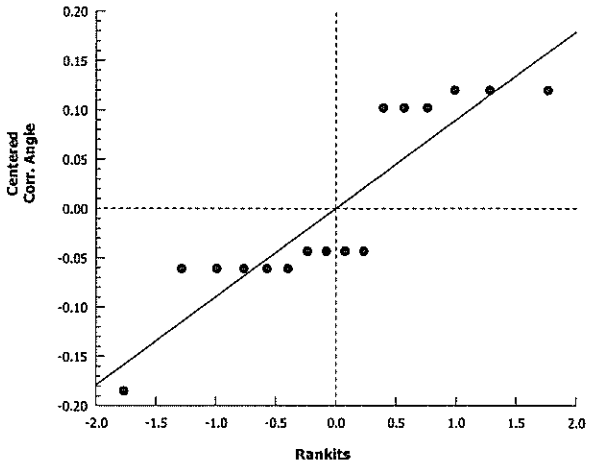
Analysis ID: 06-1798-4435 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.8.1
Analyzed: 02 Sep-14 16:57 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.9	1	0.9	1	0.9	1	0.9	0.9
100		0.9	1	0.9	0.9	0.9	1	1	0.8

Graphics





Hyallela 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Analysis ID:	01-5872-0768	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	02-7863-2507	**Test Type:**	Survival-Growth	**Analyst:**	
Start Date:	19 Aug-14 12:45	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	29 Aug-14 08:00	**Species:**	Hyalella azteca	**Brine:**	
Duration:	9d 19h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	17-1573-2640	**Code:**	B3151-04	**Client:**	
Sample Date:	28 Jul-14 14:00	**Material:**	Sediment	**Project:**	
Receive Date:	07 Aug-14 11:00	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	21d 23h	**Station:**			

Sample Note: Lower Slate Creek

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Untransformed	0	C > T	Not Run	Sample passes mean dry weight-mg endpoint	10.7%

Equal Variance t Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Dilution Water		100	-0.6606	1.761	14	0.01177	0.7402	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	7.802558E-05	7.802558E-05	1	0.4364	0.5196	Non-Significant Effect
Error	0.002502833	0.0001787738	14			
Total	0.002580859	0.0002567994	15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.253	8.885	0.7736	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9469	0.8408	0.4421	Normal Distribution

Mean Dry Weight-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.11	0.1052	0.1148	0.094	0.128	0.004454	0.0126	11.46%	0.0%
100		8	0.1144	0.109	0.1198	0.09	0.128	0.004986	0.0141	12.33%	-4.02%

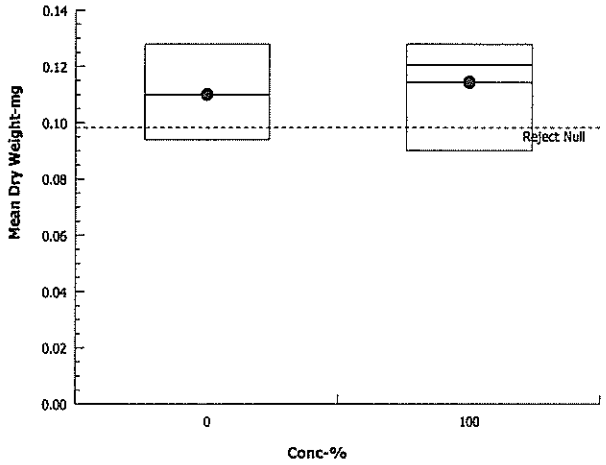
Hyallela 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

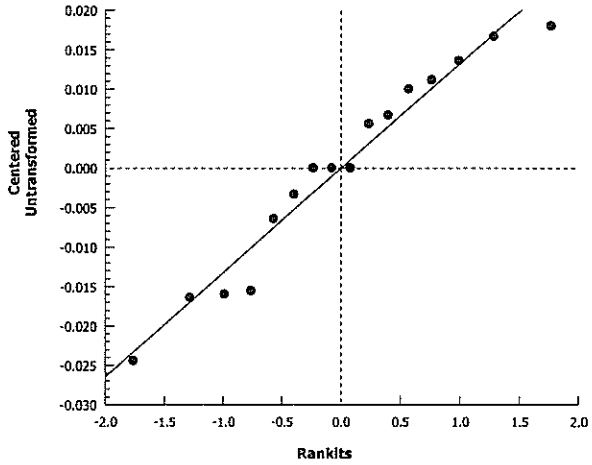
Analysis ID:	01-5872-0768	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.11	0.11	0.09444	0.094	0.11	0.128	0.1067	0.1267
100		0.1211	0.128	0.1244	0.12	0.1256	0.098	0.108	0.09

Graphics





CETIS Summary Report

Hyallela 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Batch ID:	02-7863-2507	**Test Type:**	Survival-Growth	**Analyst:**	
Start Date:	19 Aug-14 12:45	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	29 Aug-14 08:00	**Species:**	Hyalella azteca	**Brine:**	
Duration:	9d 19h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	19-8240-7616	**Code:**	B3151-05	**Client:**	
Sample Date:	30 Jul-14 17:00	**Material:**	Sediment	**Project:**	
Receive Date:	07 Aug-14 11:00	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	19d 20h	**Station:**			

Sample Note: Upper Slate Creek

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
14-9869-5376	Mean Dry Weight-mg	100	>100	N/A	11.6%	1	Equal Variance t Two-Sample Test
09-4852-1884	Survival Rate	100	>100	N/A	4.61%	1	Equal Variance t Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
09-4852-1884	Survival Rate	Control Resp	0.9375	0.8 - NL	Yes	Passes Acceptability Criteria

Mean Dry Weight-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.11	0.1053	0.1147	0.094	0.128	0.004454	0.0126	11.46%	0.0%
100		8	0.09983	0.09384	0.1058	0.077	0.1278	0.005676	0.01606	16.08%	9.22%

Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.9375	0.9182	0.9568	0.9	1	0.0183	0.05175	5.52%	0.0%
100		8	0.975	0.9577	0.9923	0.9	1	0.01637	0.04629	4.75%	-4.0%

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.11	0.11	0.09444	0.094	0.11	0.128	0.1067	0.1267
100		0.084	0.077	0.102	0.093	0.11	0.096	0.1278	0.1089

Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.9	1	0.9	1	0.9	1	0.9	0.9
100		1	1	1	1	1	1	0.9	0.9

Hyallela 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Analysis ID:	09-4852-1884	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	02 Sep-14 16:58	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	02-7863-2507	**Test Type:**	Survival-Growth	**Analyst:**	
Start Date:	19 Aug-14 12:45	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	29 Aug-14 08:00	**Species:**	Hyalella azteca	**Brine:**	
Duration:	9d 19h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	19-8240-7616	**Code:**	B3151-05	**Client:**	
Sample Date:	30 Jul-14 17:00	**Material:**	Sediment	**Project:**	
Receive Date:	07 Aug-14 11:00	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	19d 20h	**Station:**			

Sample Note: Upper Slate Creek

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Angular (Corrected)	0	C > T	Not Run	Sample passes survival rate endpoint	4.61%

Equal Variance t Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Dilution Water		100	-1.528	1.761	14	0.07047	0.9255	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01493962	0.01493962	1	2.333	0.1489	Non-Significant Effect
Error	0.08963774	0.006402696	14			
Total	0.1045774	0.02134232	15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.25	8.885	0.7760	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8678	0.8408	0.0252	Normal Distribution

Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.9375	0.9178	0.9572	0.9	1	0.0183	0.05175	5.52%	0.0%
100		8	0.975	0.9574	0.9926	0.9	1	0.01637	0.04629	4.75%	-4.0%

Angular (Corrected) Transformed Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	1.31	1.278	1.342	1.249	1.412	0.02982	0.08435	6.44%	0.0%
100		8	1.371	1.343	1.4	1.249	1.412	0.02667	0.07544	5.5%	-4.67%

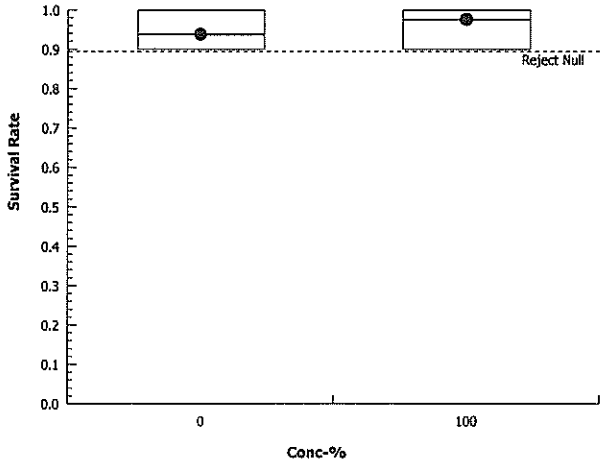
Hyallela 10-d Survival and Growth Sediment Test **CH2M HILL - ASL**

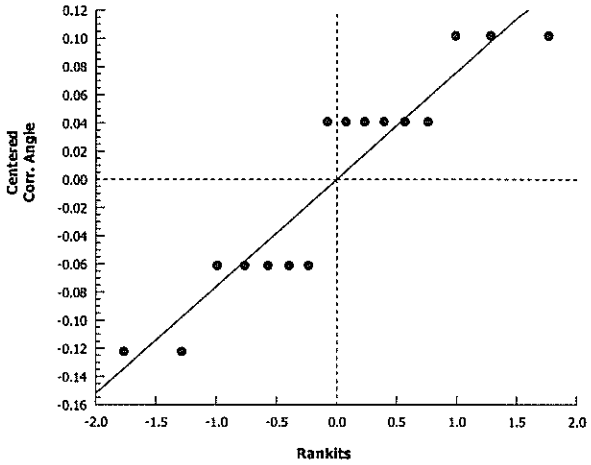
Analysis ID:	09-4852-1884	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	02 Sep-14 16:58	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.9	1	0.9	1	0.9	1	0.9	0.9
100		1	1	1	1	1	1	0.9	0.9

Graphics





Hyallela 10-d Survival and Growth Sediment Test **CH2M HILL - ASL**

Analysis ID:	14-9869-5376	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	02-7863-2507	**Test Type:**	Survival-Growth	**Analyst:**	
Start Date:	19 Aug-14 12:45	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	29 Aug-14 08:00	**Species:**	Hyalella azteca	**Brine:**	
Duration:	9d 19h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	19-8240-7616	**Code:**	B3151-05	**Client:**	
Sample Date:	30 Jul-14 17:00	**Material:**	Sediment	**Project:**	
Receive Date:	07 Aug-14 11:00	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	19d 20h	**Station:**			

Sample Note: Upper Slate Creek

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Untransformed	0	C > T	Not Run	Sample passes mean dry weight-mg endpoint	11.6%

Equal Variance t Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Dilution Water		100	1.405	1.761	14	0.01271	0.0909	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0004111877	0.0004111877	1	1.975	0.1818	Non-Significant Effect
Error	0.002915259	0.0002082328	14			
Total	0.003326447	0.0006194205	15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.624	8.885	0.5376	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9686	0.8408	0.8149	Normal Distribution

Mean Dry Weight-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.11	0.1052	0.1148	0.094	0.128	0.004454	0.0126	11.46%	0.0%
100		8	0.09983	0.09373	0.1059	0.077	0.1278	0.005676	0.01606	16.08%	9.22%

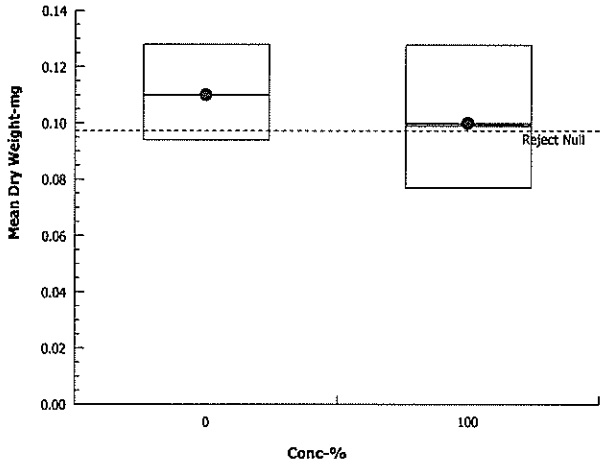
Hyallela 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

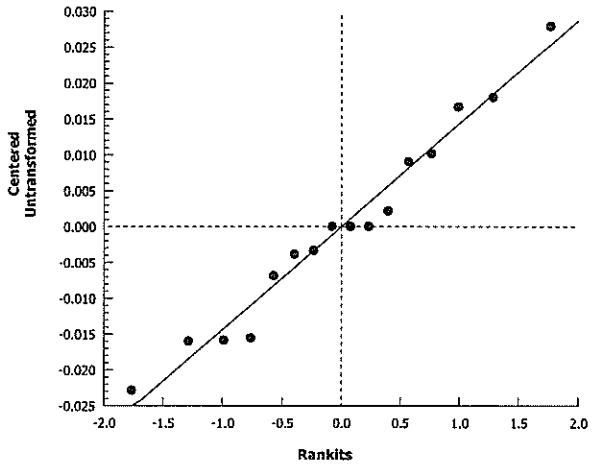
Analysis ID:	14-9869-5376	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.11	0.11	0.09444	0.094	0.11	0.128	0.1067	0.1267
100		0.084	0.077	0.102	0.093	0.11	0.096	0.1278	0.1089

Graphics





CH2M HILL TOXICITY TEST ORGANISM AND WATER QUALITY DATA

Client: Kensington Gold Mine — Test Initiation: Date 8/19/14 — Test Termination: Date 8/29/14

Contact: _____ — Technician: DW, Sm

Test Species/ID: _____ / _____ / _____ / _____

Sample Information

Sample ID Number	Field ID	Collected Date	Collected Time	Total Residual Chlorine (mg/l) As Received / As Dechlor.	Ammonia NH_3-N mg/l	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$
B3151-01	Lower Sherman Creek	8/3/14	0700	- / -	See Titration and Ammonia sheet		
B3151-02	East Fork Slate Creek	8/2/14 then 8/21/14	0700	- / -			
B3151-03	Lower Johnson Creek	7/31/14	0900	- / -	-	-	-
B3151-04	Lower Slate Creek	7/29/14	1400	- / -	-	-	-
B3151-05	Upper Slate Creek	7/30/14	1700	- / -	-	-	-
				/			
				/			
				/			
				/			
				/			
				/			
				/			
				/			

Test Species Information	ID# CHI 19	ID#	ID#	ID#
	Chronic			
Organism Age at Initiation	2nd to 3rd instar (~10 day old)			
Test Container Size	300 ml			
Test Volume	100 ml sample, 175 ml overlying water			
Feeding: Type	1.5 ml of a 4 g/L Tetrafin slurry daily			
Feeding: Amount	-			
Aeration: Began	none			
Aeration: Amount	—			
Dilution Water ID#	see below			
Acclimation Period	days			
Test Location	# 7			
Initial Size (mg/org)	NOT REQUIRED			

Dilution Water	ID#	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$	Initial pH
Dilution Sediment	4102	-	-	-
Recon MH (FHM)	4095	58	62	8.3
	4101	90	60	8.3
	4103	88	60	8.2
	4106	98	64	8.3

Comments: ☑ Indicates the following action was taken, (☐ Indicates action not taken):

Water Quality Meters Used/ID#

Dissolved Oxygen #23 pH #11 Conductivity #2

RDG MC 9/15/14

Chironomid RANDOMIZATION SHEET

Client: **Kensington Gold Mine** **Test Start Date:** 8/19/14

Laboratory ID:	Field ID:	Alternate ID / Dilutions:	Replicate ID:	Random Number	Test Chamber Number:
B3151-01	Lower Sherman Creek		A	0.92117	4
B3151-03	Lower Johnson Creek		A	0.71907	13
B3151-05	Upper Slate Creek		A	0.62524	18
B3151-04	Lower Slate Creek		A	0.51942	22
B3151-02	East Fork Slate Creek		A	0.04823	45
Sediment Control	Beaver Creek	Control	A	0.01989	48
B3151-04	Lower Slate Creek		B	0.93243	3
B3151-05	Upper Slate Creek		B	0.71210	14
B3151-03	Lower Johnson Creek		B	0.65510	17
Sediment Control	Beaver Creek	Control	B	0.42332	25
B3151-02	East Fork Slate Creek		B	0.22938	33
B3151-01	Lower Sherman Creek		B	0.06775	43
B3151-02	East Fork Slate Creek		C	0.86065	6
B3151-05	Upper Slate Creek		C	0.77573	9
Sediment Control	Beaver Creek	Control	C	0.45364	24
B3151-04	Lower Slate Creek		C	0.37166	27
B3151-03	Lower Johnson Creek		C	0.28149	32
B3151-01	Lower Sherman Creek		C	0.03509	47
B3151-03	Lower Johnson Creek		D	0.90258	5
B3151-04	Lower Slate Creek		D	0.59097	20
B3151-01	Lower Sherman Creek		D	0.22137	34
B3151-05	Upper Slate Creek		D	0.14045	38
B3151-02	East Fork Slate Creek		D	0.10711	40
Sediment Control	Beaver Creek	Control	D	0.08348	42
B3151-03	Lower Johnson Creek		E	0.97641	2
B3151-04	Lower Slate Creek		E	0.84820	7
B3151-01	Lower Sherman Creek		E	0.76789	10
B3151-02	East Fork Slate Creek		E	0.34211	28
B3151-05	Upper Slate Creek		E	0.10396	41
Sediment Control	Beaver Creek	Control	E	0.05331	44
B3151-02	East Fork Slate Creek		F	0.99566	1
B3151-01	Lower Sherman Creek		F	0.75479	11
B3151-05	Upper Slate Creek		F	0.67009	16
Sediment Control	Beaver Creek	Control	F	0.31801	29
B3151-04	Lower Slate Creek		F	0.12864	39
B3151-03	Lower Johnson Creek		F	0.03544	46
Sediment Control	Beaver Creek	Control	G	0.83808	8
B3151-05	Upper Slate Creek		G	0.55680	21
B3151-03	Lower Johnson Creek		G	0.46115	23
B3151-02	East Fork Slate Creek		G	0.37245	26
B3151-04	Lower Slate Creek		G	0.30101	30
B3151-01	Lower Sherman Creek		G	0.17411	37
B3151-04	Lower Slate Creek		H	0.75397	12
B3151-05	Upper Slate Creek		H	0.67795	15
B3151-02	East Fork Slate Creek		H	0.60476	19
B3151-03	Lower Johnson Creek		H	0.28912	31
B3151-01	Lower Sherman Creek		H	0.21370	35
Sediment Control	Beaver Creek	Control	H	0.19136	36
			z		
			z		
			z		
			z		

TITRATION AND AMMONIA DATA

Client: Kensington Gold Mine | Species ID# CHI 19

Sample Description: See Randomization Sheet. | Start Date 8/19/14

Laboratory ID	Hardness (mg/L as $CaCO_3$)		Alkalinity (mg/L as $CaCO_3$)		Ammonia (mg/L as NH_3-N)	
	Initial	Final	Initial	Final	Initial	Final
Sediment Control	77.2	109.3	53.7	72.9	0.16	0.69
B3151-01	91.6	120.4	64.3	78.5	<0.1	0.17
B3151-02	101.6	120.7	64.9	75.8	<0.1	0.28
B3151-03	89.4	114.0	59.9	74.5	<0.1	0.29
B3151-04	93.8	112.0	64.5	74.3	<0.1	0.11
B3151-05	84.1	114.7	58.8	76.4	<0.1	0.66

CH2M HILL

FRESHWATER TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Client: Kensington Gold Mine

Sample Description: See Randomization Sheet. Batch Number B 3151

Test Species: Chironomus tentans

ID#: ~~Amp~~ CH1 19

Beginning (Day 0), Date: 8/19/14 Time: 1245

Ending (Day 10), Date: 8/29/14 Time: 1200

Tech.	Day 0 Sm	Day 1 DW	Day 2 MC	Day 3 JP	Day 4 MC	Day 5 DW	Day 6 Sm	Day 7 MC	Day 8 DW	Day 9 DW	Day 10 DW
Time (Therm ID:)	Day 0 2221	Day 1 0630	Day 2 0900	Day 3 0620	Day 4 0835	Day 5 0800	Day 6 910	Day 7 0730	Day 8 0700	Day 9 0730	Day 10 0740
	Day 0 177	Day 1 179	Day 2 177	Day 3 177	Day 4 201	Day 5 177	Day 6 214	Day 7 219	Day 8 186	Day 9 177	Day 10 177
Tech.	Day -1 Sm	Day 0 2m	Day 1 [illegible]	Day 2 [illegible]	Day 3 MC	Day 4 DW	Day 5 MC	Day 6 JM/MC	Day 7 [illegible]	Day 8 MC	Day 9 [illegible]	Day 10
Time	Day -1 ~~1850~~	Day 0 1460	Day 1 1520	Day 2 1300	Day 3 1500	Day 4 1900	Day 5 1545	Day 6 1632	Day 7 1620	Day 8 1540	Day 9 1630	Day 10
Feeding: ✓ when done		Day 0 ✓	Day 1 ✓	Day 2 ✓	Day 3 ✓	Day 4 ✓	Day 5 ✓	Day 6 ✓	Day 7 ✓	Day 8 ~	Day 9 ✓	

Beaker Number	Dissolved Oxygen (mg/l)											Temperature (°C)											pH		Conductivity (µmohs/cm)	
	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10	0	10	0	10
4	7.1	6.6	6.5	6.6	5.4	7.1	7.3	6.8	6.9	7.5	7.4	22.9	22.6	23.0	23.9	22.9	22.8	22.8	22.9	22.7	22.5	22.8	7.9	7.3	304	346
13	7.1	6.5	5.7	6.0	5.3	6.9	7.2	6.6	6.6	7.1	7.3	22.8	22.7	22.8	23.1	23.0	22.8	22.8	22.9	22.9	22.7	22.8	7.8	7.3	295	344
18	7.2	6.4	5.7	6.0	5.4	6.6	7.1	6.5	6.6	6.7	7.2	22.8	22.8	22.7	23.0	22.9	22.9	22.9	22.9	22.9	22.8	22.7	7.6	7.2	290	340
22	7.2	6.4	5.6	6.1	5.5	6.5	7.0	6.2	6.4	6.5	7.1	22.8	22.8	23.1	23.0	23.0	22.8	22.8	22.9	23.0	22.7	22.8	7.7	7.3	302	340
45	7.0	6.2	5.7	6.1	5.3	6.4	7.0	6.1	6.0	6.7	6.9	23.0	23.0	23.1	22.9	23.3	23.0	22.9	23.0	23.0	22.9	22.8	7.4	7.2	291	351
48	6.8	6.1	5.8	6.0	5.2	6.4	6.8	6.0	6.0	6.2	7.0	22.9	22.9	22.8	22.8	23.1	22.9	22.9	23.1	23.1	22.9	22.8	7.6	7.3	327	332

CH2MHILL

FRESHWATER TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Client: Kensington Gold Mine
Sample Description: See Randomization Sheet(s). Batch number: B 3151
Test Species: Chironomus tentans ID#: ~~AMPCH1~~ 19

Beginning, Date: 8/19/14 Time: 1245
Ending, Date: 8/29/14 Time: 1200

Test Initiation: Tech: Tech: BM Time: 0821

Test Termination: Tech: Tech: BM MC JDL Time: 1200

Beaker Number	Start Count 0	# alive found 10	# dead found 10	Comments:
1	10	8	0	
2	10	9	0	
3	10	8	0	
4	10	9	0	
5	10	9	0	
6	10	9	0	
7	10	9	0	
8	10	9	0	
9	10	8 over 10 8/29	0	
10	10	9	0	Polygonous noted.
11	10	9	0	
12	10	10	0	
13	10	10	0	
14	10	9	0	
15	10	8	0	
16	10	9	0	
17	10	9	0	
18	10	9	0	
19	10	9	0	
20	10	8	0	
21	10	10	0	
22	10	9	0	
23	10	10	0	
24	10	10	0	
25	10	10	0	
26	10	9	0	BM ~~midges~~ midge native noted
27	10	9	0	
28	10	9	0	
29	10	9	0	
30	10	10	0	

FRESHWATER TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Client: Kensington Gold Mine
Sample Description: See Randomization Sheet(s). Batch number: B 3151
Test Species: Chironomus tentans ID#: ~~AMP CHI~~ 19

Beginning, Date: 2/19/14 Time: 1245
Ending, Date: 2/29/14 Time: 1200

Test Initiation: Tech: Tech: BM Time: 0826

Test Termination: Tech: Tech: BM/JDC/MC Time: 1200

Beaker Number	Start Count 0	# alive found 10	# dead found 10	Comments:
31	10	8	0	
32	10	8	0	
33	10	8	0	
34	10	10	0	
35	10	9	0	
36	10	8	0	
37	10	9	0	
38	10	9	0	
39	10	9	0	
40	10	10	0	
41	10	~~9~~ 10	0	
42	10	1	0	no babies
43	10	8	0	
44	10	10	0	
45	10	6	0	

Beaker Number	Start Count 0	# alive found 10	# dead found 10	Comments:
46	10	7	1	
47	10	8	0	
48	10	1	0	no babies
49	10			
50	10			
51	10			
52	10			
53	10			
54	10			
55	10			
56	10			
57	10			
58	10			
59	10			
60	10			

Hyallela GROWTH DATA

Client: Kensington Gold Mine Species ID#: ~~AMP~~ CHI #19

Lab ID: see randomization sheet batch number: B 3151 Start Date: 8/17/14

Sample Description: Weights of Chironomids at test initiation (= number of replicates as the test, 10 Midge each)

Technician:		
Date:		
Balance Serial #:	50309851	50309851

Tin ID Number	Total Weight (mg) (after 60°C for 24 hr)	Tare Weight (mg) (after 60°C for 24 hr)	No. of Amphipods Surviving	No. of Amphipods in Tin
@ Initiation A			na	10
@ Initiation B			na	10
@ Initiation C			na	10
@ Initiation D			na	10
@ Initiation E			na	10
@ Initiation F			na	10
@ Initiation G			na	10
@ Initiation H			na	10

weigh to 0.01 mg

* insufficient organisms available (<10) following test initiation for collection of initial wts. 8/19/14

From supplier: deposited on 8/7/14
Second instar on 8/17/14

Chironomus tentans GROWTH DATA

Client: Kensington Gold Mine | Tins Labeled As: KENS. CHIRO.

Lab ID: see randomization sheet | batch number: B3151 | Start Date: 8/19/2014

Sample Description:

Technician:	KJ	KJ
Date:	9/2/2104	8/15/2104
Balance Serial #:	B328543647	B328543647

Tin ID Number	Total Weight (mg) (after 60°C for 24 hr)	Tare Weight (mg) (after 60°C for 24 hr)	Total Ash Weight after 550°C for 2 hrs.	No. of Chironomids in Tin
1	78.09	68.95	71.34	8
2	77.42	68.03	70.81	9
3	78.45	67.56	71.59	8
4	80.48	67.99	73.45	9
5	80.53	67.81	73.42	9
6	78.61	67.68	71.04	9
7	81.51	68.49	74.41	9
8	77.81	67.36	70.61	9
9	80.44	68.50	72.56	10
10	78.65	67.20	71.79	9
11	80.00	67.19	73.03	9
12	80.93	68.32	73.39	10
13	81.51	68.74	74.57	10
14	80.00	68.25	72.88	9
15	79.60	68.16	72.17	8
16	81.01	68.18	73.03	9
17	81.58	68.54	75.96	9
18	80.34	67.87	72.03	9
19	80.95	68.17	73.25	9
20	80.66	67.37	72.23	8
21	80.21	67.57	72.36	10
22	83.64	68.88	74.63	9
23	81.02	67.72	73.61	10
24	82.13	67.32	72.50	10
25	80.61	68.17	75.39	10
26	77.48	67.92	72.06	9
27	82.94	68.88	73.37	9
28	81.61	68.92	74.98	9
29	80.26	67.65	70.73	9
30	83.18	68.57	72.40	10

weigh to 0.01 mg

Chironomus tentans GROWTH DATA

Client: Kensington Gold Mine | Tins Labeled As: KENS. CHIRO.

Lab ID: see randomization sheet batch number: B3151 | Start Date: 8/19/2014

Sample Description:

Technician:	KJ	KJ
Date:	9/2/2014	8/15/2014
Balance Serial #:	B328543647	B328543647

Tin ID Number	Total Weight (mg) (after 60°C for 24 hr)	Tare Weight (mg) (after 60°C for 24 hr)	Total Ash Weight	No. of Chironomids in Tin
31	79.63	69.06	72.84	8
32	77.49	67.25	70.57	8
33	78.80	68.07	71.00	8
34	79.20	67.81	72.21	10
35	79.56	68.51	73.74	9
36	79.87	68.26	72.08	8
37	78.52	67.54	71.96	9
38	80.06	68.99	72.30	9
39	80.70	68.01	71.97	9
40	80.90	68.07	72.30	10
41	79.50	67.11	71.11	10
42	70.16	68.25	68.75	1
43	79.86	67.96	72.33	8
44	81.46	68.36	72.89	10
45	80.38	67.99	71.65	8
46	79.41	67.74	72.28	7
47	80.74	67.95	73.97	8
48	70.41	67.98	68.62	1

weigh to 0.01 mg

Chironomus tentans GROWTH DATA

Client: Kensington Gold Mine Tins Labeled As: KENS. CHIRO.

Lab ID: see randomization sheet batch number: B3151 Start Date: 8/19/14

Sample Description:

Technician:		KJ
Date:		8/15/2104
Balance Serial #:	B328543647	B328543647

Tin ID Number	Total Weight (mg) (after 60°C for 24 hr)	Tare Weight (mg) (after 60°C for 24 hr)	No. of Chironomids Surviving	No. of Chironomids in Tin
1		68.95	8	8
2		68.03		9
3		67.56	8	8
4		67.99		9
5		67.81	9	9
6		67.68		9
7		68.49	9	9
8		67.36		9
9		68.50		10
10		67.20	9	9
11		67.19	9	9
12		68.32	10	10
13		68.74		10
14		68.25		9
15		68.16		8
16		68.18	9	9
17		68.54		9
18		67.87		9
19		68.17	9	9
20		67.37		8
21		67.57		10
22		68.88		9
23		67.72		10
24		67.32		10
25		68.17		10
26		67.92		9
27		68.88		9
28		68.92		9
29		67.65		9
30		68.57		10

weigh to 0.01 mg

Chironomus tentans GROWTH DATA

Client: Kensington Gold Mine Tins Labeled As: KENS. CHIRO.

Lab ID: see randomization sheet batch number: B3151 Start Date: 8/19/14

Sample Description:

Technician:		KJ
Date:		8/15/2014
Balance Serial #:	B328543647	B328543647

Tin ID Number	Total Weight (mg) (after 60°C for 24 hr)	Tare Weight (mg) (after 60°C for 24 hr)	No. of Chironomids Surviving	No. of Chironomids in Tin
31		69.06		8
32		67.25		8
33		68.07		8
34		67.81		10
35		68.51		9
36		68.26		8
37		67.54		9
38		68.99		9
39		68.01		9
40		68.07		10
41		67.11		10
42		68.25		1
43		67.96		8
44		68.36		10
45		67.99		8
46		67.74		7
47		67.95		8
48		67.98		1

weigh to 0.01 mg

CETIS Summary Report

Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Batch ID:	09-0601-4656	**Test Type:**	Survival-AF Growth	**Analyst:**	
Start Date:	19 Aug-14	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Aug-14	**Species:**	Chironomus tentans	**Brine:**	
Duration:	9d 0h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	14-5240-4181	**Code:**	B3151-01	**Client:**	
Sample Date:	30 Jun-14 07:00	**Material:**	Sediment	**Project:**	
Receive Date:	03 Jul-14	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	49d 17h	**Station:**			

Sample Note: Lower Sherman Creek

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
17-2565-6922	Mean AF Biomass-mg	100	>100	N/A	34.7%	1	Unequal Variance t Two-Sample Test
09-1965-8464	Survival Rate	100	>100	N/A	34.1%	1	Wilcoxon Rank Sum Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
09-1965-8464	Survival Rate	Control Resp	0.725	0.7 - NL	Yes	Passes Acceptability Criteria

Mean AF Biomass-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.6392	0.517	0.7615	0.141	0.963	0.1158	0.3274	51.22%	0.0%
100		8	0.6816	0.6634	0.6999	0.582	0.753	0.01728	0.04886	7.17%	-6.63%

Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.725	0.5787	0.8713	0.1	1	0.1386	0.3919	54.05%	0.0%
100		8	0.8875	0.8636	0.9114	0.8	1	0.02266	0.06409	7.22%	-22.41%

Mean AF Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.179	0.522	0.963	0.141	0.857	0.953	0.72	0.779
100		0.703	0.753	0.677	0.699	0.686	0.697	0.656	0.582

Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.1	1	1	0.1	1	0.9	0.9	0.8
100		0.9	0.8	0.8	1	0.9	0.9	0.9	0.9

Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Analysis ID:	09-1965-8464	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:52	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes
Batch ID:	09-0601-4656	**Test Type:**	Survival-AF Growth	**Analyst:**	
Start Date:	19 Aug-14	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Aug-14	**Species:**	Chironomus tentans	**Brine:**	
Duration:	9d 0h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	14-5240-4181	**Code:**	B3151-01	**Client:**	
Sample Date:	30 Jun-14 07:00	**Material:**	Sediment	**Project:**	
Receive Date:	03 Jul-14	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	49d 17h	**Station:**			

Sample Note: Lower Sherman Creek

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Angular (Corrected)	0	C > T	Not Run	Sample passes survival rate endpoint	34.1%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	DF	Ties	P-Value	Decision(α:5%)
Dilution Water		100	67.5		14	3	0.4796	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1201927	0.1201927	1	1.051	0.3226	Non-Significant Effect
Error	1.600471	0.1143194	14			
Total	1.720664	0.2345121	15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	23.62	8.885	0.0005	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8051	0.8408	0.0032	Non-normal Distribution

Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.725	0.5759	0.8741	0.1	1	0.1386	0.3919	54.05%	0.0%
100		8	0.8875	0.8631	0.9119	0.8	1	0.02266	0.06409	7.22%	-22.41%

Angular (Corrected) Transformed Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	1.061	0.8824	1.239	0.3218	1.412	0.1656	0.4684	44.16%	0.0%
100		8	1.234	1.197	1.271	1.107	1.412	0.03407	0.09637	7.81%	-16.34%

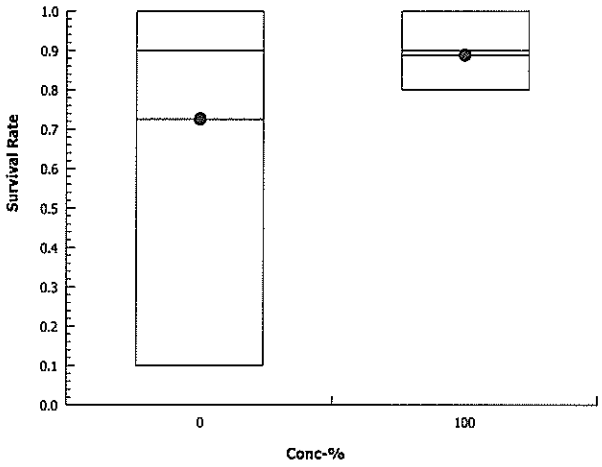
Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

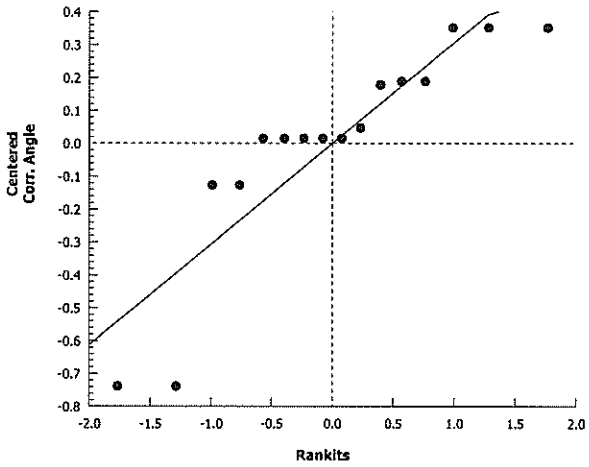
Analysis ID:	09-1965-8464	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:52	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.1	1	1	0.1	1	0.9	0.9	0.8
100		0.9	0.8	0.8	1	0.9	0.9	0.9	0.9

Graphics





Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Analysis ID:	17-2565-6922	**Endpoint:**	Mean AF Biomass-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:51	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	09-0601-4656	**Test Type:**	Survival-AF Growth	**Analyst:**	
Start Date:	19 Aug-14	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Aug-14	**Species:**	Chironomus tentans	**Brine:**	
Duration:	9d 0h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	14-5240-4181	**Code:**	B3151-01	**Client:**	
Sample Date:	30 Jun-14 07:00	**Material:**	Sediment	**Project:**	
Receive Date:	03 Jul-14	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	49d 17h	**Station:**			

Sample Note: Lower Sherman Creek

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Untransformed	0	C > T	Not Run	Sample passes mean af biomass-mg endpoint	34.7%

Unequal Variance t Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Dilution Water		100	-0.362	1.895	7	0.2218	0.6360	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.007182563	0.007182563	1	0.1311	0.7227	Non-Significant Effect
Error	0.7672607	0.05480433	14			
Total	0.7744432	0.06198689	15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	44.91	8.885	<0.0001	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8878	0.8408	0.0515	Normal Distribution

Mean AF Biomass-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.6392	0.5147	0.7638	0.141	0.963	0.1158	0.3274	51.22%	0.0%
100		8	0.6816	0.663	0.7002	0.582	0.753	0.01728	0.04886	7.17%	-6.63%

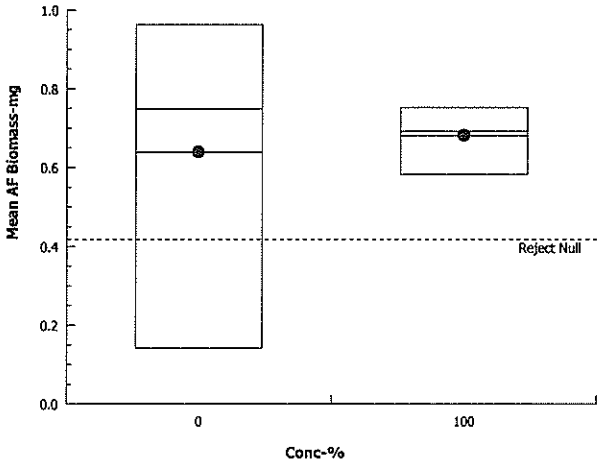
Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

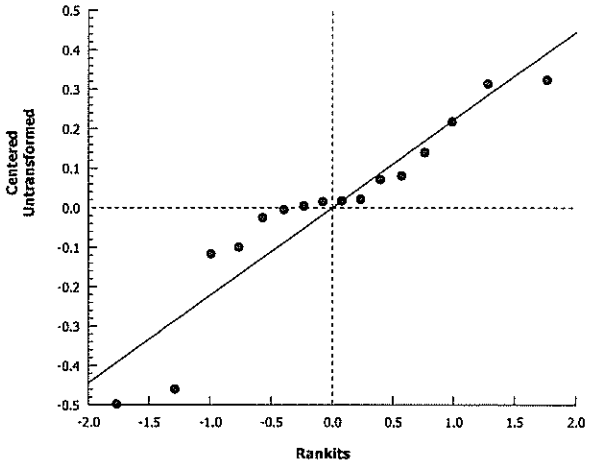
Analysis ID:	17-2565-6922	**Endpoint:**	Mean AF Biomass-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:51	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Mean AF Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.179	0.522	0.963	0.141	0.857	0.953	0.72	0.779
100		0.703	0.753	0.677	0.699	0.686	0.697	0.656	0.582

Graphics





CETIS Summary Report

Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Batch ID:	09-0601-4656	**Test Type:**	Survival-AF Growth	**Analyst:**	
Start Date:	19 Aug-14	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Aug-14	**Species:**	Chironomus tentans	**Brine:**	
Duration:	9d 0h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	03-0055-2849	**Code:**	B3151-02	**Client:**	
Sample Date:	02 Jul-14 07:00	**Material:**	Sediment	**Project:**	
Receive Date:	03 Jul-14	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	47d 17h	**Station:**			

Sample Note: East Fork Slate Creek

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
14-0267-3450	Mean AF Biomass-mg	100	>100	N/A	35.5%	1	Unequal Variance t Two-Sample Test
17-2925-8820	Survival Rate	100	>100	N/A	34.3%	1	Wilcoxon Rank Sum Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
17-2925-8820	Survival Rate	Control Resp	0.725	0.7 - NL	Yes	Passes Acceptability Criteria

Mean AF Biomass-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.6392	0.517	0.7615	0.141	0.963	0.1158	0.3274	51.22%	0.0%
100		8	0.74	0.699	0.781	0.542	0.873	0.03878	0.1097	14.82%	-15.76%

Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.725	0.5787	0.8713	0.1	1	0.1386	0.3919	54.05%	0.0%
100		8	0.875	0.8486	0.9014	0.8	1	0.025	0.07071	8.08%	-20.69%

Mean AF Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.179	0.522	0.963	0.141	0.857	0.953	0.72	0.779
100		0.873	0.78	0.757	0.86	0.663	0.675	0.542	0.77

Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.1	1	1	0.1	1	0.9	0.9	0.8
100		0.8	0.8	0.9	1	0.9	0.8	0.9	0.9

Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Analysis ID:	17-2925-8820	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:53	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes
Batch ID:	09-0601-4656	**Test Type:**	Survival-AF Growth	**Analyst:**	
Start Date:	19 Aug-14	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Aug-14	**Species:**	Chironomus tentans	**Brine:**	
Duration:	9d 0h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	03-0055-2849	**Code:**	B3151-02	**Client:**	
Sample Date:	02 Jul-14 07:00	**Material:**	Sediment	**Project:**	
Receive Date:	03 Jul-14	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	47d 17h	**Station:**			

Sample Note: East Fork Slate Creek

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Angular (Corrected)	0	C > T	Not Run	Sample passes survival rate endpoint	34.3%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	DF	Ties	P-Value	Decision(α:5%)
Dilution Water		100	66		14	3	0.4392	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0968541	0.0968541	1	0.8402	0.3749	Non-Significant Effect
Error	1.613803	0.1152717	14			
Total	1.710657	0.2121257	15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	19.6	8.885	0.0009	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8122	0.8408	0.0040	Non-normal Distribution

Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.725	0.5759	0.8741	0.1	1	0.1386	0.3919	54.05%	0.0%
100		8	0.875	0.8481	0.9019	0.8	1	0.025	0.07071	8.08%	-20.69%

Angular (Corrected) Transformed Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	1.061	0.8824	1.239	0.3218	1.412	0.1656	0.4684	44.16%	0.0%
100		8	1.216	1.176	1.256	1.107	1.412	0.0374	0.1058	8.7%	-14.67%

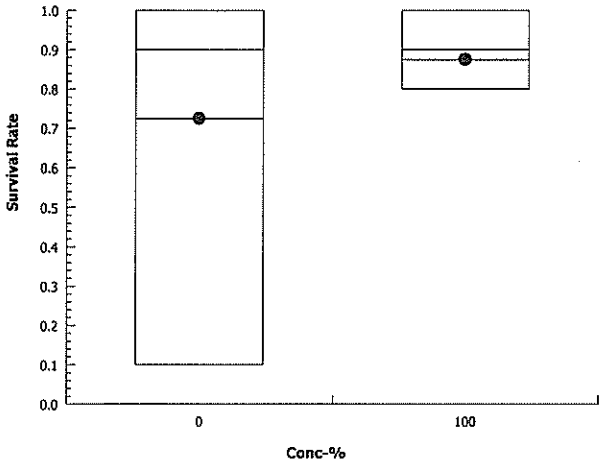
Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

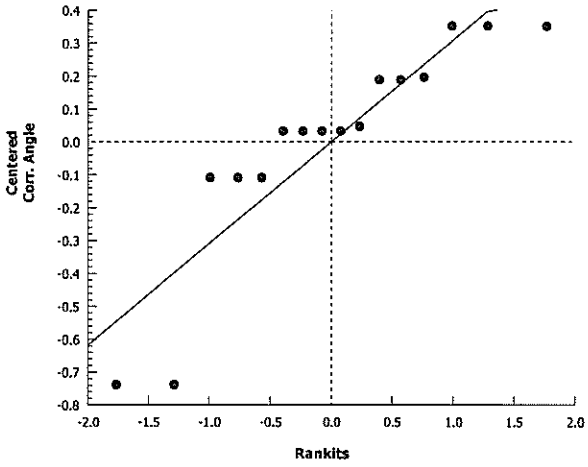
Analysis ID:	17-2925-8820	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:53	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.1	1	1	0.1	1	0.9	0.9	0.8
100		0.8	0.8	0.9	1	0.9	0.8	0.9	0.9

Graphics





Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Analysis ID:	14-0267-3450	**Endpoint:**	Mean AF Biomass-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:53	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	09-0601-4656	**Test Type:**	Survival-AF Growth	**Analyst:**	
Start Date:	19 Aug-14	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Aug-14	**Species:**	Chironomus tentans	**Brine:**	
Duration:	9d 0h	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	03-0055-2849	**Code:**	B3151-02	**Client:**	
Sample Date:	02 Jul-14 07:00	**Material:**	Sediment	**Project:**	
Receive Date:	03 Jul-14	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	47d 17h	**Station:**			

Sample Note: East Fork Slate Creek

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Untransformed	0	C > T	Not Run	Sample passes mean af biomass-mg endpoint	35.5%

Unequal Variance t Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Dilution Water		100	-0.8252	1.86	8	0.227	0.7834	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04060223	0.04060223	1	0.6809	0.4231	Non-Significant Effect
Error	0.8347844	0.05962745	14			
Total	0.8753866	0.1002297	15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	8.91	8.885	0.0099	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.9234	0.8408	0.1914	Normal Distribution

Mean AF Biomass-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.6392	0.5147	0.7638	0.141	0.963	0.1158	0.3274	51.22%	0.0%
100		8	0.74	0.6983	0.7817	0.542	0.873	0.03878	0.1097	14.82%	-15.76%

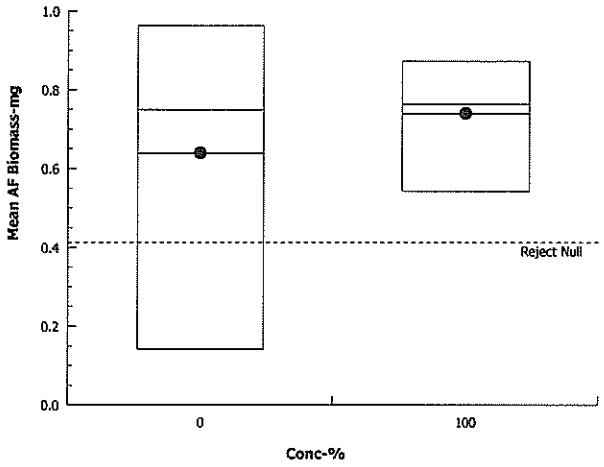
Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

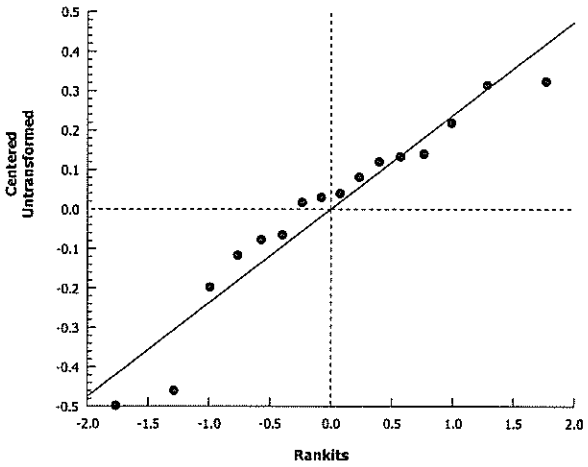
Analysis ID:	14-0267-3450	**Endpoint:**	Mean AF Biomass-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:53	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Mean AF Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.179	0.522	0.963	0.141	0.857	0.953	0.72	0.779
100		0.873	0.78	0.757	0.86	0.663	0.675	0.542	0.77

Graphics





CETIS Summary Report

Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Batch ID:	09-0601-4656	**Test Type:**	Survival-AF Growth	**Analyst:**	
Start Date:	19 Aug-14	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Aug-14	**Species:**	Chironomus tentans	**Brine:**	
Duration:	9d 0h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	17-7304-5180	**Code:**	B3151-03	**Client:**	
Sample Date:	30 Jul-14 09:00	**Material:**	Sediment	**Project:**	
Receive Date:	07 Aug-14 11:00	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	19d 15h	**Station:**			

Sample Note: Lower Johnson Creek

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
00-4010-6385	Mean AF Biomass-mg	100	>100	N/A	34.8%	1	Unequal Variance t Two-Sample Test
10-9498-4502	Survival Rate	100	>100	N/A	35.3%	1	Wilcoxon Rank Sum Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
10-9498-4502	Survival Rate	Control Resp	0.725	0.7 - NL	Yes	Passes Acceptability Criteria

Mean AF Biomass-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.6392	0.517	0.7615	0.141	0.963	0.1158	0.3274	51.22%	0.0%
100		8	0.6816	0.6615	0.7018	0.562	0.741	0.01907	0.05395	7.92%	-6.63%

Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.725	0.5787	0.8713	0.1	1	0.1386	0.3919	54.05%	0.0%
100		8	0.875	0.8363	0.9137	0.7	1	0.0366	0.1035	11.83%	-20.69%

Mean AF Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.179	0.522	0.963	0.141	0.857	0.953	0.72	0.779
100		0.694	0.562	0.692	0.711	0.661	0.713	0.741	0.679

Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.1	1	1	0.1	1	0.9	0.9	0.8
100		1	0.9	0.8	0.9	0.9	0.7	1	0.8

Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Analysis ID:	10-9498-4502	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:54	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes
Batch ID:	09-0601-4656	**Test Type:**	Survival-AF Growth	**Analyst:**	
Start Date:	19 Aug-14	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Aug-14	**Species:**	Chironomus tentans	**Brine:**	
Duration:	9d 0h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	17-7304-5180	**Code:**	B3151-03	**Client:**	
Sample Date:	30 Jul-14 09:00	**Material:**	Sediment	**Project:**	
Receive Date:	07 Aug-14 11:00	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	19d 15h	**Station:**			

Sample Note: Lower Johnson Creek

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Angular (Corrected)	0	C > T	Not Run	Sample passes survival rate endpoint	35.3%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	DF	Ties	P-Value	Decision(α:5%)
Dilution Water		100	68		14	3	0.4796	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1043022	0.1043022	1	0.8643	0.3683	Non-Significant Effect
Error	1.689544	0.1206817	14			
Total	1.793846	0.2249839	15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	9.966	8.885	0.0071	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.833	0.8408	0.0077	Non-normal Distribution

Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.725	0.5759	0.8741	0.1	1	0.1386	0.3919	54.05%	0.0%
100		8	0.875	0.8356	0.9144	0.7	1	0.0366	0.1035	11.83%	-20.69%

Angular (Corrected) Transformed Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	1.061	0.8824	1.239	0.3218	1.412	0.1656	0.4684	44.16%	0.0%
100		8	1.222	1.166	1.279	0.9912	1.412	0.05245	0.1484	12.14%	-15.23%

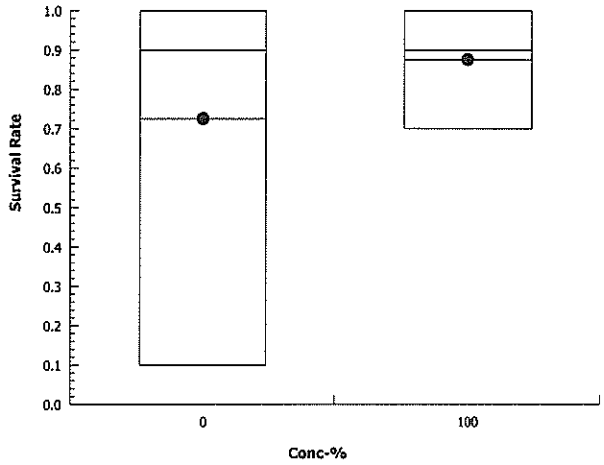
Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

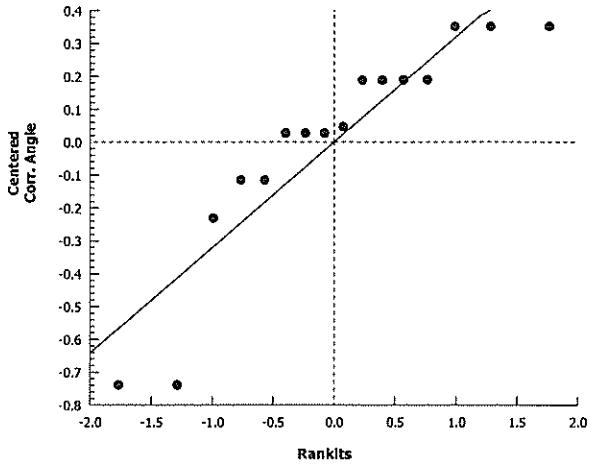
Analysis ID:	10-9498-4502	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:54	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.1	1	1	0.1	1	0.9	0.9	0.8
100		1	0.9	0.8	0.9	0.9	0.7	1	0.8

Graphics





Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Analysis ID:	00-4010-6385	**Endpoint:**	Mean AF Biomass-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:54	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	09-0601-4656	**Test Type:**	Survival-AF Growth	**Analyst:**	
Start Date:	19 Aug-14	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Aug-14	**Species:**	Chironomus tentans	**Brine:**	
Duration:	9d 0h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	17-7304-5180	**Code:**	B3151-03	**Client:**	
Sample Date:	30 Jul-14 09:00	**Material:**	Sediment	**Project:**	
Receive Date:	07 Aug-14 11:00	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	19d 15h	**Station:**			

Sample Note: Lower Johnson Creek

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Untransformed	0	C > T	Not Run	Sample passes mean af biomass-mg endpoint	34.8%

Unequal Variance t Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Dilution Water		100	-0.3612	1.895	7	0.2223	0.6357	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.00718259	0.00718259	1	0.1304	0.7234	Non-Significant Effect
Error	0.7709245	0.05506604	14			
Total	0.7781071	0.06224863	15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	36.84	8.885	0.0001	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8888	0.8408	0.0533	Normal Distribution

Mean AF Biomass-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.6392	0.5147	0.7638	0.141	0.963	0.1158	0.3274	51.22%	0.0%
100		8	0.6816	0.6611	0.7021	0.562	0.741	0.01907	0.05395	7.92%	-6.63%

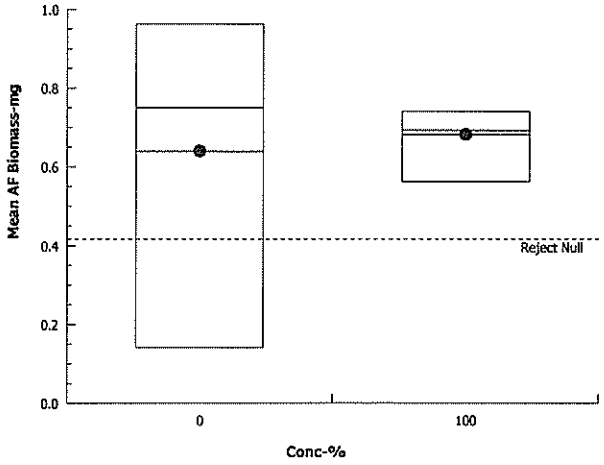
Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

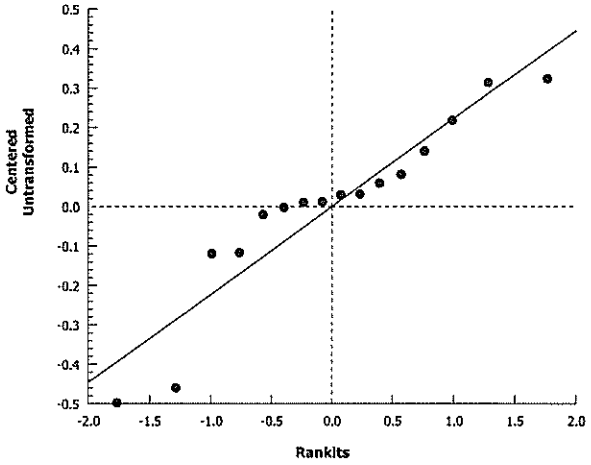
Analysis ID:	00-4010-6385	**Endpoint:**	Mean AF Biomass-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:54	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Mean AF Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.179	0.522	0.963	0.141	0.857	0.953	0.72	0.779
100		0.694	0.562	0.692	0.711	0.661	0.713	0.741	0.679

Graphics





CETIS Summary Report

Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Batch ID:	09-0601-4656	**Test Type:**	Survival-AF Growth	**Analyst:**	
Start Date:	19 Aug-14	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Aug-14	**Species:**	Chironomus tentans	**Brine:**	
Duration:	9d 0h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	17-1573-2640	**Code:**	B3151-04	**Client:**	
Sample Date:	28 Jul-14 14:00	**Material:**	Sediment	**Project:**	
Receive Date:	07 Aug-14 11:00	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	21d 10h	**Station:**			

Sample Note: Lower Slate Creek

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
07-8716-3017	Mean AF Biomass-mg	100	>100	N/A	34.4%	1	Equal Variance t Two-Sample Test
08-5938-9764	Survival Rate	100	>100	N/A	34.5%	1	Wilcoxon Rank Sum Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
08-5938-9764	Survival Rate	Control Resp	0.725	0.7 - NL	Yes	Passes Acceptability Criteria

Mean AF Biomass-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.6392	0.517	0.7615	0.141	0.963	0.1158	0.3274	51.22%	0.0%
100		8	0.8502	0.8009	0.8996	0.686	1.078	0.04674	0.1322	15.55%	-33.01%

Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.725	0.5787	0.8713	0.1	1	0.1386	0.3919	54.05%	0.0%
100		8	0.9	0.8718	0.9282	0.8	1	0.02673	0.07559	8.4%	-24.14%

Mean AF Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.179	0.522	0.963	0.141	0.857	0.953	0.72	0.779
100		0.901	0.686	0.957	0.843	0.71	0.873	1.078	0.754

Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.1	1	1	0.1	1	0.9	0.9	0.8
100		0.9	0.8	0.9	0.8	0.9	0.9	1	1

Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Analysis ID:	08-5938-9764	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:55	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes
Batch ID:	09-0601-4656	**Test Type:**	Survival-AF Growth	**Analyst:**	
Start Date:	19 Aug-14	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Aug-14	**Species:**	Chironomus tentans	**Brine:**	
Duration:	9d 0h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	17-1573-2640	**Code:**	B3151-04	**Client:**	
Sample Date:	28 Jul-14 14:00	**Material:**	Sediment	**Project:**	
Receive Date:	07 Aug-14 11:00	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	21d 10h	**Station:**			

Sample Note: Lower Slate Creek

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Angular (Corrected)	0	C > T	Not Run	Sample passes survival rate endpoint	34.5%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	DF	Ties	P-Value	Decision(α:5%)
Dilution Water		100	70		14	3	0.5608	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1501026	0.1501026	1	1.29	0.2751	Non-Significant Effect
Error	1.628633	0.116331	14			
Total	1.778736	0.2664336	15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	16.48	8.885	0.0015	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8206	0.8408	0.0052	Non-normal Distribution

Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.725	0.5759	0.8741	0.1	1	0.1386	0.3919	54.05%	0.0%
100		8	0.9	0.8712	0.9288	0.8	1	0.02673	0.07559	8.4%	-24.14%

Angular (Corrected) Transformed Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	1.061	0.8824	1.239	0.3218	1.412	0.1656	0.4684	44.16%	0.0%
100		8	1.254	1.21	1.298	1.107	1.412	0.04079	0.1154	9.2%	-18.26%

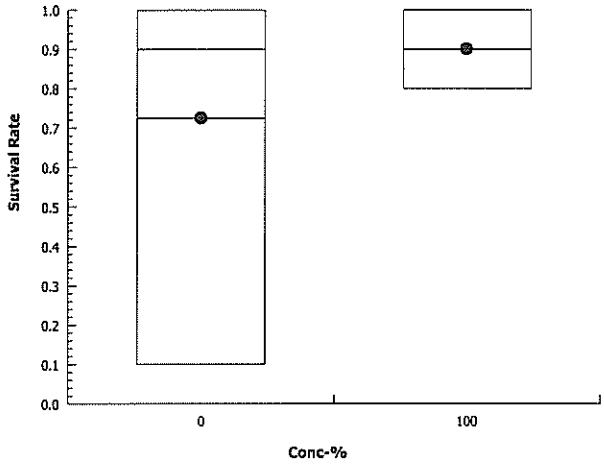
Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

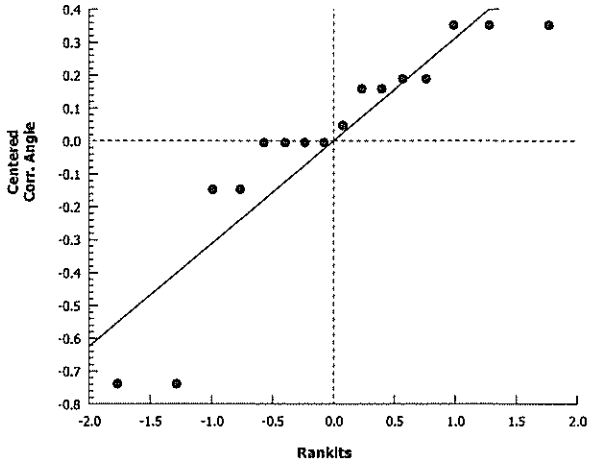
Analysis ID:	08-5938-9764	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:55	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.1	1	1	0.1	1	0.9	0.9	0.8
100		0.9	0.8	0.9	0.8	0.9	0.9	1	1

Graphics





Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Analysis ID:	07-8716-3017	**Endpoint:**	Mean AF Biomass-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:55	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	09-0601-4656	**Test Type:**	Survival-AF Growth	**Analyst:**	
Start Date:	19 Aug-14	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Aug-14	**Species:**	Chironomus tentans	**Brine:**	
Duration:	9d 0h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	17-1573-2640	**Code:**	B3151-04	**Client:**	
Sample Date:	28 Jul-14 14:00	**Material:**	Sediment	**Project:**	
Receive Date:	07 Aug-14 11:00	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	21d 10h	**Station:**			

Sample Note: Lower Slate Creek

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Untransformed	0	C > T	Not Run	Sample passes mean af biomass-mg endpoint	34.4%

Equal Variance t Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Dilution Water		100	-1.69	1.761	14	0.2199	0.9434	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1780839	0.1780839	1	2.856	0.1132	Non-Significant Effect
Error	0.8728722	0.06234801	14			
Total	1.050956	0.2404319	15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	6.136	8.885	0.0288	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9321	0.8408	0.2632	Normal Distribution

Mean AF Biomass-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.6392	0.5147	0.7638	0.141	0.963	0.1158	0.3274	51.22%	0.0%
100		8	0.8502	0.8	0.9005	0.686	1.078	0.04674	0.1322	15.55%	-33.01%

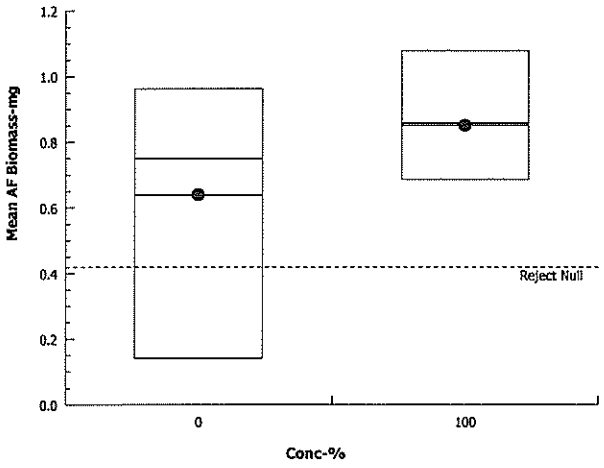
Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

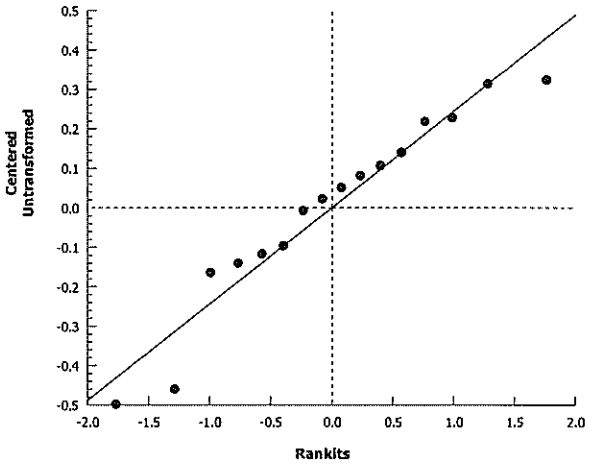
Analysis ID:	07-8716-3017	**Endpoint:**	Mean AF Biomass-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:55	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Mean AF Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.179	0.522	0.963	0.141	0.857	0.953	0.72	0.779
100		0.901	0.686	0.957	0.843	0.71	0.873	1.078	0.754

Graphics





CETIS Summary Report

Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Batch ID:	09-0601-4656	**Test Type:**	Survival-AF Growth	**Analyst:**	
Start Date:	19 Aug-14	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Aug-14	**Species:**	Chironomus tentans	**Brine:**	
Duration:	9d 0h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	19-8240-7616	**Code:**	B3151-05	**Client:**	
Sample Date:	30 Jul-14 17:00	**Material:**	Sediment	**Project:**	
Receive Date:	07 Aug-14 11:00	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	19d 7h	**Station:**			

Sample Note: Upper Slate Creek

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
07-1444-4104	Mean AF Biomass-mg	100	>100	N/A	34.6%	1	Unequal Variance t Two-Sample Test
18-0785-6139	Survival Rate	100	>100	N/A	34.4%	1	Wilcoxon Rank Sum Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
18-0785-6139	Survival Rate	Control Resp	0.725	0.7 - NL	Yes	Passes Acceptability Criteria

Mean AF Biomass-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.6392	0.517	0.7615	0.141	0.963	0.1158	0.3274	51.22%	0.0%
100		8	0.784	0.7683	0.7997	0.712	0.839	0.01487	0.04205	5.36%	-22.64%

Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.725	0.5787	0.8713	0.1	1	0.1386	0.3919	54.05%	0.0%
100		8	0.925	0.8986	0.9514	0.8	1	0.025	0.07071	7.64%	-27.59%

Mean AF Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.179	0.522	0.963	0.141	0.857	0.953	0.72	0.779
100		0.831	0.712	0.788	0.776	0.839	0.798	0.785	0.743

Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.1	1	1	0.1	1	0.9	0.9	0.8
100		0.9	0.9	1	0.9	1	0.9	1	0.8

CETIS Analytical Report

Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Analysis ID:	18-0785-6139	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:57	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes
Batch ID:	09-0601-4656	**Test Type:**	Survival-AF Growth	**Analyst:**	
Start Date:	19 Aug-14	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Aug-14	**Species:**	Chironomus tentans	**Brine:**	
Duration:	9d 0h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	19-8240-7616	**Code:**	B3151-05	**Client:**	
Sample Date:	30 Jul-14 17:00	**Material:**	Sediment	**Project:**	
Receive Date:	07 Aug-14 11:00	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	19d 7h	**Station:**			

Sample Note: Upper Slate Creek

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Angular (Corrected)	0	C > T	Not Run	Sample passes survival rate endpoint	34.4%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	DF	Ties	P-Value	Decision(α:5%)
Dilution Water		100	74		14	3	0.7131	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	0	2.248	2.586	0.2258	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.2149691	0.2149691	1	1.857	0.1944	Non-Significant Effect
Error	1.620228	0.1157305	14			
Total	1.835197	0.3306997	15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	18.12	8.885	0.0011	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8183	0.8408	0.0048	Non-normal Distribution

Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.725	0.5759	0.8741	0.1	1	0.1386	0.3919	54.05%	0.0%
100		8	0.925	0.8981	0.9519	0.8	1	0.025	0.07071	7.64%	-27.59%

Angular (Corrected) Transformed Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	1.061	0.8824	1.239	0.3218	1.412	0.1656	0.4684	44.16%	0.0%
100		8	1.292	1.251	1.334	1.107	1.412	0.0389	0.11	8.51%	-21.86%

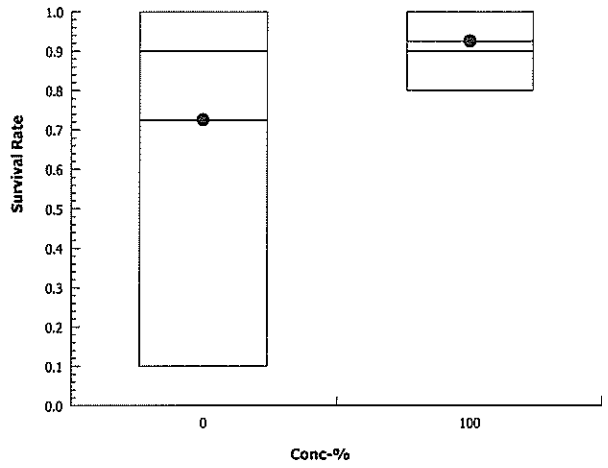
Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

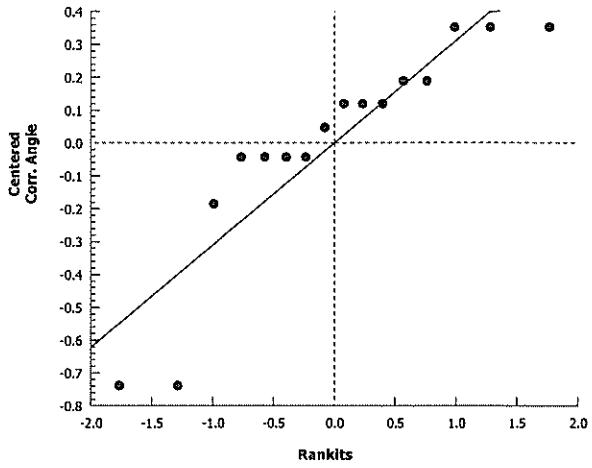
Analysis ID:	18-0785-6139	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:57	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.1	1	1	0.1	1	0.9	0.9	0.8
100		0.9	0.9	1	0.9	1	0.9	1	0.8

Graphics





Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

Analysis ID:	07-1444-4104	**Endpoint:**	Mean AF Biomass-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:57	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	09-0601-4656	**Test Type:**	Survival-AF Growth	**Analyst:**	
Start Date:	19 Aug-14	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Aug-14	**Species:**	Chironomus tentans	**Brine:**	
Duration:	9d 0h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	19-8240-7616	**Code:**	B3151-05	**Client:**	
Sample Date:	30 Jul-14 17:00	**Material:**	Sediment	**Project:**	
Receive Date:	07 Aug-14 11:00	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	19d 7h	**Station:**			

Sample Note: Upper Slate Creek

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Untransformed	0	C > T	Not Run	Sample passes mean af biomass-mg endpoint	34.6%

Unequal Variance t Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Dilution Water		100	-1.24	1.895	7	0.2211	0.8726	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	0	2.209	2.586	0.2613	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.08381026	0.08381026	1	1.538	0.2353	Non-Significant Effect
Error	0.7629247	0.05449462	14			
Total	0.8467349	0.1383049	15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	60.65	8.885	<0.0001	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8873	0.8408	0.0506	Normal Distribution

Mean AF Biomass-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.6392	0.5147	0.7638	0.141	0.963	0.1158	0.3274	51.22%	0.0%
100		8	0.784	0.768	0.8	0.712	0.839	0.01487	0.04205	5.36%	-22.64%

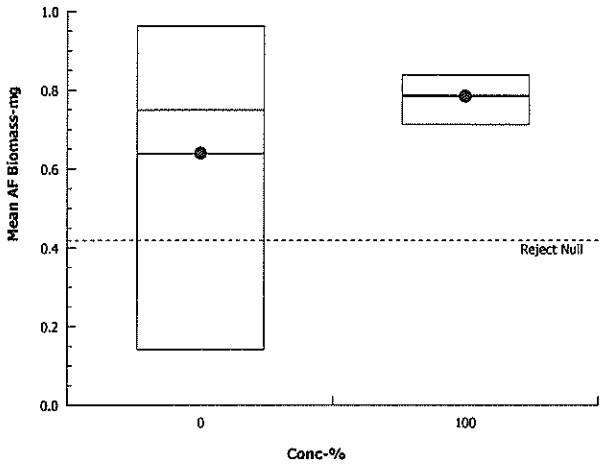
Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

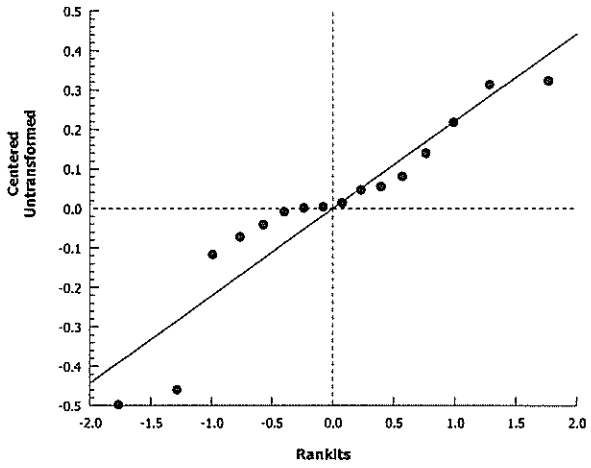
Analysis ID:	07-1444-4104	**Endpoint:**	Mean AF Biomass-mg	**CETIS Version:**	CETISv1.8.1
Analyzed:	03 Sep-14 14:57	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Mean AF Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.179	0.522	0.963	0.141	0.857	0.953	0.72	0.779
100		0.831	0.712	0.788	0.776	0.839	0.798	0.785	0.743

Graphics





APPENDIX B

REFERENCE TOXICANT DATA SHEETS

REFERENCE TOXICANT DATA SHEET

Client: QA/QC
Test Organism: *Hyallela azteca*
Source: Cheasepeake Cultures
ID#: Aug 30
Age: 9 days
Feeding: 0.1 ml YCT on Day 0 & 48 hrs.
Test Chamber Size: 30 ml
Volume per Replicate: 20 ml
*10 reps. w/1 organism per test chamber
SAND ID: ASL 14534 16 gybe

Reference Toxicant: KCl
Solvent: Milli-Q water Stock Solution: 50 g/L
Reagent Log ID #: 2B 048-06
*Dilution Water: Recon MH ID#: 4095
Total Hardness as $CaCO_3$: 88
Total Alkalinity as $CaCO_3$: 62
Conductivity (µmhos/cm) / ~~Salinity (ppt)~~: 296
Temperature: 23° C ± 2° C

Test Begin: Date 8-14-14 Time 1430
Test End: Date 8/18/14 Time 1500

Technician	0 hr	JDW/JDW	24 hr	JDW/JDW	48 hr	JDW	72 hr	JDW	96 hr	JDW
Time	0 hr	1430	24 hr	1335	48 hr	1135	72 hr	1309	96 hr	1508
Therm. ID #	0 hr	217	24 hr	213	48 hr	217	72 hr	217	96 hr	214
Food I.D. #	0 hr	1026	24 hr	NONE	48 hr	1026	72 hr	NONE	96 hr	NONE

Toxicant Concen. g/L	Test Chamber Number	Number of Live Organisms Surviving					Dissolved Oxygen (mg/l)					pH					Temperature °C					Cond.	
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
Cont	A	10	10	10	10	10	7.9	–	–	–	7.5	8.0	–	–	–	8.3	22.8	24.2	24.3	23.0	23.8	281	521
0.125	A	10	10	10	10	10	8.1	–	–	–	7.4	8.0	–	–	–	8.3	23.5	24.6	24.4	24.7	24.2	458	919
0.250	A	10	10	10	10	10	8.1	–	–	–	7.4	8.1	–	–	–	8.2	23.7	24.0	24.0	23.7	24.0	735	1174
0.500	A	10	3	0	—	—	8.1	7.3	7.7	—	—	8.2	8.0	8.1	—	—	23.8	23.7	23.9	—	—	1165	1267 *
1.00	A	10	0	—	—	—	8.2	7.2	—	—	—	8.1	7.9	—	—	—	23.7	23.7	—	—	—	1987	2139
2.00	A	10	0	—	—	—	8.2	7.1	—	—	—	8.1	7.9	—	—	—	23.7	23.9	—	—	—	3560	4069
Test Acceptability Limits:		Survival in Controls: > or = 90%					For Hyallela (at 23°C): >4.0 and <8.6					pH: > 6.0 and < 9.0					Temperature ±1 °C						

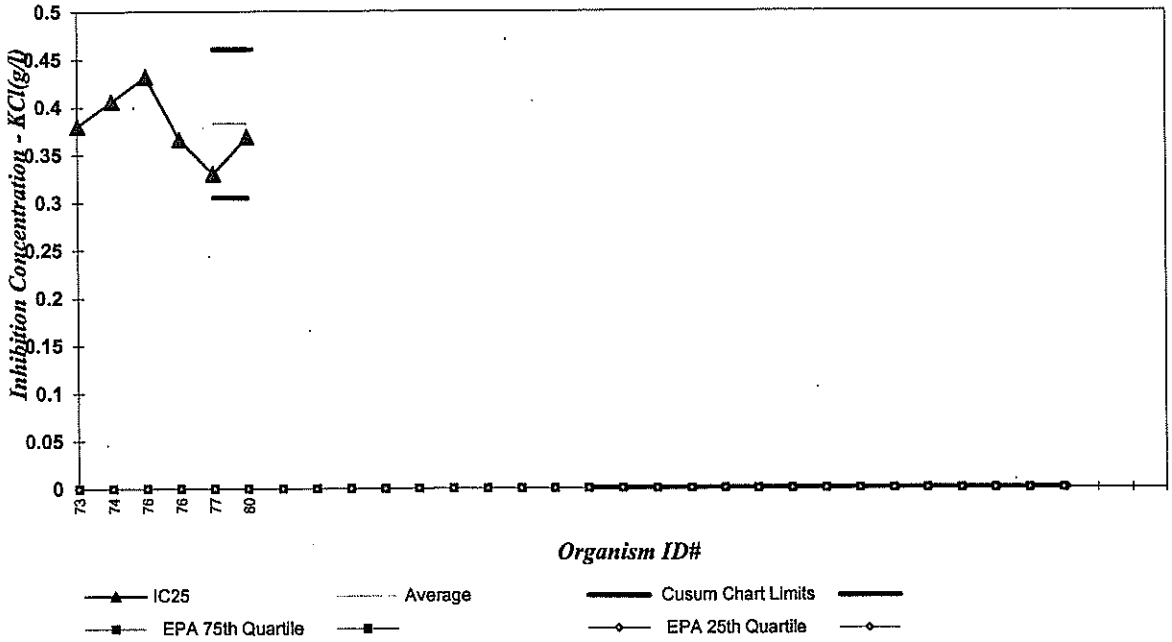
*Dilution Water Code
Recon. - reconstituted water
S - soft
MH - moderately hard
H - hard
Art. Sea - Artificial Sea Water

96 hr LC50: 0.369
Cusum Chart Limits: 0.310 to 0.451
Statistical Method: Linear Interpolation

We verify this data is true and correct.
Task Manager
Project Manager
QA Officer

* 24 hr 0.500 Cond: 1529 JDW 8/15/14

REFERENCE TOXICANT CUMLATIVE SUMMARY (CUSUM) CHART
Hyallala azteca Acute Survival - LC50 Values



***Hyallela azteca* - acute**

POTASIUM CHLORIDE (g/L)

Endpoint: 96 hour Survival

Stats Method: Probit, Spearman-Karber, Linear Interpolation

Test Conditions: Recon MH, 23 oC

From EPA 833-R-00-003:

10th Quartile CV (*control limit*) = na

25th Quartile CV (*warning limit*) = na

75th Quartile CV (*warning limit*) = na

90th Quartile CV (*control limit*) = na

As per EPA 833-R-00-003, section B.2.1, the quartiles listed above are from just a few labs (5) and therefore not to be considered typical or representative. Cusum limits are based on ASL data only.

Event #	AMP ID #	Test Start Date	LC50	Running Average	Running SD	Cusum Chart Limits AVG-2SD	Cusum Chart Limits AVG+2SD	Intralab CV
1	73	9/17/2008	0.380	0.380				
2	74	4/24/2009	0.406	0.393				
3	76	1/28/2011	0.432	0.406	0.026			
4	76	1/28/2011	0.366	0.396	0.029			
5	77	3/27/2014	0.330	0.383	0.039	0.305	0.461	0.07
6	80	8/14/2014	0.37	0.381	0.035	0.310	0.451	0.10
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								

REFERENCE TOXICANT DATA SHEET

Client: QA/QC
Test Organism: *Chironomus tentans*
Source: ABS
ID#: CHI #19
Age: 2nd instar ~10 days
Feeding: 0.1 ml of 4 g/L Tetramin @ 0 & 48 hrs.
Test Chamber Size: 400 ml
Volume per Replicate: 250 ml
*1 rep. w/10 organism per test chamber
Board #11

Reference Toxicant: KCl
Solvent: distilled water Stock Solution: 10 g/L
Reagent Log ID #: 2B048-01
*Dilution Water: Recon MH ID#: 4101
Total Hardness as CaCO3: 90 Total Alkalinity as CaCO3: 60
Conductivity (µmhos/cm) / ~~Salinity (ppt)~~: 303 Temperature: 23° C ± 2° C

Test Begin: Date 8/19/14 Time 1330
Test End: Date 8/23/14 Time 1205

	0 hr	24 hr	48 hr	72 hr	96 hr
Technician	MC/Bm	[illegible]	MC	MC	MC
Time	1330	1430	1640	1120	1205
Therm. ID #	177	177	177	184	201
Food I.D. #	1031	NONE	1031	NONE	NONE

Toxicant Concen. g/L	Test Chamber Number	Number of Live Organisms Surviving					Dissolved Oxygen (mg/l)					pH					Temperature °C					Cond.	
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
Cont	A	10	9	9	9	9	MC 8/19/14 Bm 7.7	6.9	8/21/14 BOG BM 6.5	-	7.4	8.2	7.8	-	-	8.0	23.4	23.3	23.6	23.1	23.6	301	333
1.25	A	10	9	9	9	9	7.3	6.5	6.4	-	8.0	8.0	7.6	-	-	8.0	23.5	23.3	23.8	23.4	23.4	2260	2450
2.50	A	10	9	7	7	7	7.5	6.5	6.3	-	7.5	8.0	7.5	7.6	-	7.9	23.7	23.3	23.6	23.3	23.6	4370	4710
5.00	A	10	6	5	5	5	7.7	6.9	6.4	-	7.6	7.9	7.5	7.6	-	7.8	23.4	23.3	23.6	23.1	23.5	8100	8810
7.50	A	10	0	-	-	-	7.7	8.0	-	-	-	7.7	7.3				23.6	23.3	-	-	-	11990	11980
10.0	A	10	0	-	-	-	7.8	7.7	-	-	-	7.5	6.5				23.4	23.3	-	-	-	15670	15720
Test Acceptability Limits:		Survival in Controls: > or = 90%					For Hyallela (at 23°C): >4.0 and <8.6					pH: > 6.0 and < 9.0					Temperature ±1 °C						

*Dilution Water Code
Recon. - reconstituted water
S - soft
MH - moderately hard
H - hard
Art. Sea - Artificial Sea Water

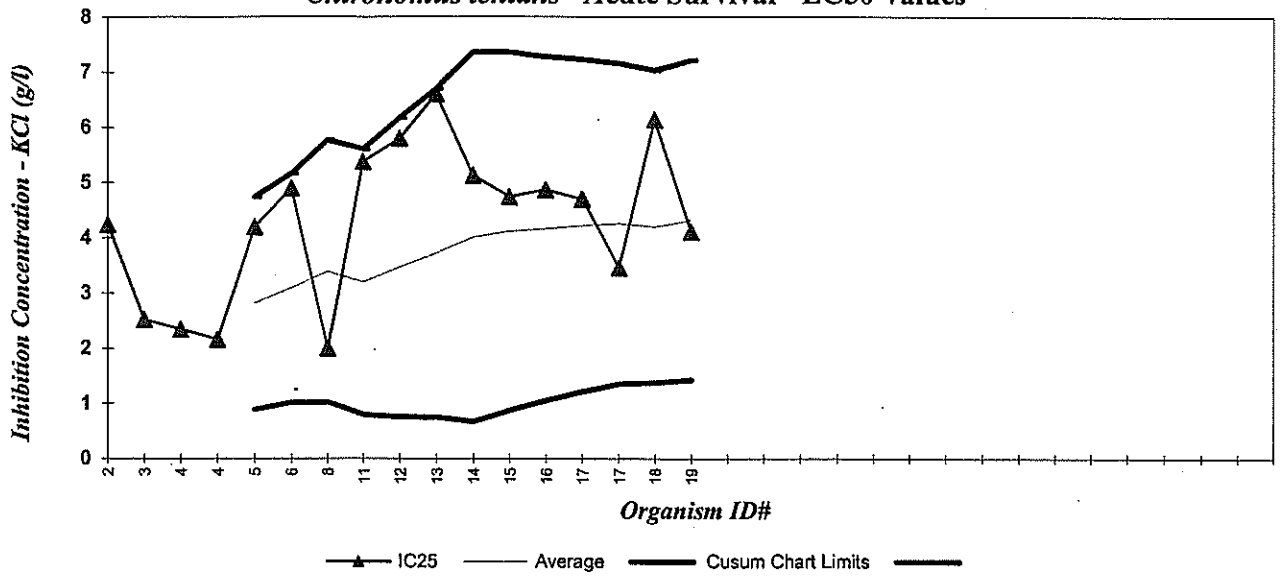
96 h LC50: 4.11
Cusum Chart Limits: 1.43 to 7.22
Statistical Method: Spearman-Karber

We verify this data is true and correct.
Task Manager
Project Manager
QA Officer: Ginger Collins

* DO, pH taken in chambers where the organism died. 24-72 hrs BM

REFERENCE TOXICANT CUMLATIVE SUMMARY (CUSUM) CHART

Chironomus tentans - Acute Survival - LC50 Values



Chironomus tentans **- acute**

POTASSIUM CHLORIDE (g/L)

From EPA 833-R-00-003:

10th Quartile CV (*control limit*) =	na
25th Quartile CV (*warning limit*) =	na
75th Quartile CV (*warning limit*) =	na
90th Quartile CV (*control limit*) =	na

Endpoint: 96 hour Survival

Stats Method: Probit, Spearman-Karber, Linear Interpolation

Test Conditions: Recon MH, 25 oC

As per EPA 833-R-00-003, section B.2.1, the quartiles listed above are from just a few labs (4) and therefore not to be considered typical or representative. Cusum limits are based on ASL data only.

Event #	Chi ID #	Test Start Date	LC50	Running Average	Running SD	Cusum Chart Limits AVG-2SD	Cusum Chart Limits AVG+2SD	Intralab CV
1	2	9/10/1999	**4.24**					
2	3	10/5/1999	**2.52**					
3	4	10/12/1999	**2.34**					
4	4	10/12/1999	**2.16**					
5	5	10/20/1999	**4.20**	2.82	0.96	**0.89**	**4.74**	0.34
6	6	11/2/1999	**4.90**	3.09	1.04	**1.02**	**5.17**	0.34
7	8	7/29/2002	**2.00**	3.39	1.19	**1.02**	**5.77**	0.35
8	11	10/1/2004	**5.38**	3.19	1.20	**0.79**	**5.60**	0.38
9	12	4/26/2005	**5.80**	3.47	1.36	**0.76**	**6.18**	0.39
10	13	4/29/2005	**6.61**	3.73	1.49	**0.75**	**6.70**	0.40
11	14	5/6/2005	**5.13**	4.02	1.67	**0.67**	**7.36**	0.42
12	15	7/14/2006	**4.74**	4.12	1.62	**0.87**	**7.36**	0.39
13	16	7/20/2006	**4.87**	4.17	1.56	**1.05**	**7.28**	0.37
14	17	1/28/2011	**4.70**	4.22	1.50	**1.22**	**7.23**	0.36
15	17	1/28/2011	**3.46**	4.26	1.45	**1.36**	**7.16**	0.34
16	18	7/1/2014	**6.14**	4.20	1.41	**1.38**	**7.03**	0.34
17	19	8/19/2014	**4.11**	4.32	1.45	**1.43**	**7.22**	0.33
18								
19								
20								

APPENDIX C

CHAIN OF CUSTODY

CH2MHILL
Applied Sciences Laboratory (ASL)

Bioassay Sample Receipt Record

Batch Number: B3151-01

Date received: 7/3/14

Client/Project: Alaska Dept. of fish + game

Checked by: MC

VERIFICATION OF SAMPLE CONDITIONS (verify all items) * HD = Client Hand delivered Samples

Observation	NA	YES	NO
Were custody seals intact and on the outside of the cooler?		X	
Type of packing material: Ice (Blue Ice) Bubble wrap		X	
Was a Chain of Custody provided?		X	
Was the Chain of Custody properly filled out? If not document in SRER below.		X	
Were the sample containers in good condition (broken or leaking)?			X
Are all samples within 36 hours of collection? If not, contact LPM		X	
Was there ice in the cooler? Enter temp. If >6°C contact client/SRER 6 °C		X	

Sample Receipt Exception Report

The following exceptions were noted:		Comments (write number of exception description and the impacted sample numbers)
	1. No custody seal as required by project	
	2. No chain-of-custody provided	
	3. Analysis, description, date of collection not provided	
	4. Samples broken or leaking on receipt.	
	5. Temperature of samples inappropriate for analysis requested. (EPA recommends 0-6 °C for WET testing)	
	6. Container inappropriate for analysis requested	
	7. Inadequate sample volume.	
	8. Preservation inappropriate for analysis requested	
	9. Samples received out of holding time for analysis requested	
	10. Discrepancies between COC form and container labels.	
	11. Other.	

ACTION TAKEN (date/time):
Client notified on (date/time):
Originator:
Client Contact:

CH2MHILL **CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING**

Client Alaska Dept of Fish and Game
Address Bill Ray Center 10A8 F Street
Juneau, AK 99801

Contact Person: Kate Kanouse
Phone: 907-465-4290
E-mail: Kate.Kanouse@alaska.gov

NPDES# _____

Composite Sample Information:
Initiated: Date _____ Time _____
Ended: Date _____ Time _____
Chilled During Collection ? Yes ___ No ___
Dechlorinated prior to shipping ? Yes ___ No ___

Ship Samples to:
CH2M HILL - Applied Sciences Laboratory
Attention: Bioasssay Lab
1100 NE Circle Blvd. Suite 300
Corvallis, OR 97330
Lab Phone: (541) 768-3160
Customer Service: (541) 768-3120

CH2M HILL Project # / Purchase Order # _____

Analysis Required / Comments

Sample ID	Date	Time	Sample Type: Comp.	Sample Type: Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Green Algae	Trout Acute	Sheepshead Acute	Sheepshead Chronic	Menidia Acute	Menidia Chronic	Mysid Acute	Mysid Chronic	Haz Waste	Ceriodaphnia dubia Acute	Hyalella azteca Acute		Concentration and/or Comments
Lower Sharman Creek	6/30/14	1500	X		3															X	X		

Sampled By & Title	(Please sign and print name)	Date/Time	Relinquished By	(Please sign and print name)	Date/Time
Benjamin Brewster Hab Bio	Benjamin Brewster	7/2/14 0700	Benjamin Brewster	Benjamin Brewster	7/2/14 0700
Received By	(Please sign and print name)	Date/Time	Relinquished By	(Please sign and print name)	Date/Time
	Michelle Cartwright	7/3/14 1030			
Received By	(Please sign and print name)	Date/Time	Relinquished By	(Please sign and print name)	Date/Time
Received By	(Please sign and print name)	Date/Time	Shipped Via	UPS ___ Bus ___ Fed-Ex ___ Hand ___ Other ___	Shipping #
Work Authorized By	(Please sign and print name)	Remarks	1 plastic container was taken & discarded		

B3151-01

CH2MHILL **CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING**

Client Alaska Dept of Fish and Game
Address Bill Ray Center 1008 F Street
Juneau, Alaska 99801

Contact Person: Kate Kanouse
Phone: 907-465-4290
E-mail: Kate.Kanouse@alaska.gov

NPDES# _____

Composite Sample Information:
Initiated: Date _____ Time _____
Ended: Date _____ Time _____
Chilled During Collection ? Yes ___ No ___
Dechlorinated prior to shipping ? Yes ___ No ___

CH2M HILL Project # / Purchase Order # _____

Ship Samples to:
CH2M HILL - Applied Sciences Laboratory
Attention: Bioasssay Lab
1100 NE Circle Blvd. Suite 300
Corvallis, OR 97330
Lab Phone: (541) 768-3160
Customer Service: (541) 768-3120

Analysis Required / Comments

Sample ID	Date	Time	Sample Type: Comp.	Sample Type: Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Green Algae	Trout Acute	Sheepshead Acute	Sheepshead Chronic	Menidia Acute	Menidia Chronic	Mysid Acute	Mysid Chronic	Haz Waste	Native Tribes chronic	Hyalella Arctic Acute		Concentration and/or Comments
East Fork Slate Creek	6/30/14	1000	X		3															X	X		

Sampled By & Title (Please sign and print name) Benjamin Brewster Hab. Bio Benjamin Brewster	Date/Time 7/2/14 0700	Relinquished By (Please sign and print name) Benjamin Brewster Benjamin Brewster	Date/Time 7/2/14 0700
Received By (Please sign and print name) Michelle Cartwright	Date/Time 7/3/14 1030	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Shipped Via UPS ___ Bus ___ Fed-Ex ___ Hand ___ Other ___	Shipping #
Work Authorized By (Please sign and print name)	Remarks 1 plastic container was broken + discarded		

B3151-02

CH2MHILL
Applied Sciences Laboratory (ASL)

Bioassay Sample Receipt Record

Batch Number: B3151-03 Date received: 8/7/14

Client/Project: Kensington Checked by: MC

VERIFICATION OF SAMPLE CONDITIONS (verify all items) * HD = Client Hand delivered Samples

Observation	NA	YES	NO
Were custody seals intact and on the outside of the cooler?		X	
Type of packing material: (Ice) Blue Ice Bubble wrap		X	
Was a Chain of Custody provided?		X	
Was the Chain of Custody properly filled out? If not document in SRER below.		X	
Were the sample containers in good condition (broken or leaking)?		X	
Are all samples within 36 hours of collection? If not, contact LPM		X	
Was there ice in the cooler? Enter temp. If >6°C contact client/SRER 4.1 °C		Y	

Sample Receipt Exception Report

The following exceptions were noted:		Comments (write number of exception description and the impacted sample numbers)
	1. No custody seal as required by project	
	2. No chain-of-custody provided	
	3. Analysis, description, date of collection not provided	
	4. Samples broken or leaking on receipt.	
	5. Temperature of samples inappropriate for analysis requested. (EPA recommends 0-6 °C for WET testing)	
	6. Container inappropriate for analysis requested	
	7. Inadequate sample volume.	
	8. Preservation inappropriate for analysis requested	
	9. Samples received out of holding time for analysis requested	
	10. Discrepancies between COC form and container labels.	
	11. Other.	

ACTION TAKEN (date/time):
Client notified on (date/time):
Originator:
Client Contact:

CH2MHILL **CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING**

Client Coeur Alaska NPDES# _____

Address Bill Ray Center 1008 F Street
Juneau, AK (ADF&G)
Coeur: 3031 Clinton Dr Ste 202, Juneau AK

Contact Person: Kate Kanouse

Phone: 907-465-4290

E-mail: Kate.Kanouse@alaska.gov

CH2M HILL Project # / Purchase Order # _____

Composite Sample Information:
Initiated: Date _____ Time _____
Ended: Date _____ Time _____
Chilled During Collection ? Yes ___ No ___
Dechlorinated prior to shipping ? Yes ___ No ___

Ship Samples to:
CH2M HILL - Applied Sciences Laboratory
Attention: Bioasssay Lab
1100 NE Circle Blvd. Suite 300
Corvallis, OR 97330
Lab Phone: (541) 768-3160
Customer Service: (541) 768-3120

Analysis Required / Comments

Sample ID	Date	Time	Sample Type Comp.	Sample Type Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Green Algae	Trout Acute	Sheepshead Acute	Sheepshead Chronic	Menidia Acute	Menidia Chronic	Mysid Acute	Mysid Chronic	Haz Waste	Chronic tox Chlorotolurn	Chronic tox Hog Lake Amph		Concentration and/or Comments
Lower Johnson Creek	7/30/14	0900	X		3															X	X		

Sampled By & Title (Please sign and print name) Benjamin Brewster Hab. Bio Bégin Brewster	Date/Time 7/30/14 0900	Relinquished By (Please sign and print name) Benjamin Brewster Bégin Brewster	Date/Time 8/5/14 0900
Received By (Please sign and print name) Michelle Courtright	Date/Time 8/7/14 1100	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Shipped Via UPS ___ Bus ___ Fed-Ex ___ Hand ___ Other ___	Shipping #
Work Authorized By (Please sign and print name)	Remarks		

B3151-03

CH2MHILL
Applied Sciences Laboratory (ASL)

Bioassay Sample Receipt Record

Batch Number: B3151 - 04 Date received: 8/7/14

Client/Project: Kensington Checked by: MC

VERIFICATION OF SAMPLE CONDITIONS (verify all items) * HD = Client Hand delivered Samples

Observation	NA	YES	NO
Were custody seals intact and on the outside of the cooler?		X	
Type of packing material: (Ice) Blue Ice Bubble wrap melted		X	
Was a Chain of Custody provided?		X	
Was the Chain of Custody properly filled out? If not document in SRER below.		X	
Were the sample containers in good condition (broken or leaking)?		X	
Are all samples within 36 hours of collection? If not, contact LPM		X	
Was there ice in the cooler? Enter temp. If >6°C contact client/SRER 6.3 °C			

Sample Receipt Exception Report

The following exceptions were noted:		Comments (write number of exception description and the impacted sample numbers)
	1. No custody seal as required by project	
	2. No chain-of-custody provided	
	3. Analysis, description, date of collection not provided	
	4. Samples broken or leaking on receipt.	
	5. Temperature of samples inappropriate for analysis requested. (EPA recommends 0-6 °C for WET testing)	
	6. Container inappropriate for analysis requested	
	7. Inadequate sample volume.	
	8. Preservation inappropriate for analysis requested	
	9. Samples received out of holding time for analysis requested	
	10. Discrepancies between COC form and container labels.	
	11. Other.	

ACTION TAKEN (date/time):
Client notified on (date/time):
Originator:
Client Contact:

CH2MHILL **CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING**

Client Coeur Alaska
Address 3031 Clinton Dr Ste 202
Juneau, AK 99801

Contact Person: Kate Kanouse
Phone: 907-465-4290
E-mail: Kate.Kanouse@alaska.gov

CH2M HILL Project # / Purchase Order # _____

NPDES# _____

Composite Sample Information:
Initiated: Date _____ Time _____
Ended: Date _____ Time _____
Chilled During Collection ? Yes ___ No ___
Dechlorinated prior to shipping ? Yes ___ No ___

Ship Samples to:
CH2M HILL - Applied Sciences Laboratory
Attention: Bioasssay Lab
1100 NE Circle Blvd. Suite 300
Corvallis, OR 97330
Lab Phone: (541) 768-3160
Customer Service: (541) 768-3120

Analysis Required / Comments

Sample ID	Date	Time	Sample Type: Comp.	Sample Type: Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Green Algae	Trout Acute	Sheepshead Acute	Sheepshead Chronic	Menidia Acute	Menidia Chronic	Mysid Acute	Mysid Chronic	Haz Waste	Custom for Cation Titration	Custom for Hardness	Concentration and/or Comments
Lower Slate Creek	7/28/14	1400	X		3															X	X	

Sampled By & Title (Please sign and print name): Benjamin Brewster Hab. Bio. Benjamin Brewster	Date/Time: 7/28/14 1400	Relinquished By (Please sign and print name): Benjamin Brewster Benjamin Brewster	Date/Time: 8/5/0900
Received By (Please sign and print name): Michelle Courtney	Date/Time: 8/7/14 1100	Relinquished By (Please sign and print name):	Date/Time:
Received By (Please sign and print name):	Date/Time:	Relinquished By (Please sign and print name):	Date/Time:
Received By (Please sign and print name):	Date/Time:	Shipped Via: UPS ___ Bus ___ Fed-Ex ___ Hand ___ Other ___	Shipping #:
Work Authorized By (Please sign and print name):	Remarks: 6.3°C		

B3151-04

CH2MHILL
Applied Sciences Laboratory (ASL)

Bioassay Sample Receipt Record

rec'd mc 8/7/14

Batch Number: B338151-05

Date received: 8/7/14

Client/Project: Kensington

Checked by: MC

VERIFICATION OF SAMPLE CONDITIONS (verify all items) * HD = Client Hand delivered Samples

Observation	NA	YES	NO
Were custody seals intact and on the outside of the cooler?		X	
Type of packing material: Ice Blue Ice Bubble wrap		Y	
Was a Chain of Custody provided?		X	
Was the Chain of Custody properly filled out? If not document in SRER below.		X	
Were the sample containers in good condition (broken or leaking)?		X	
Are all samples within 36 hours of collection? If not, contact LPM		X	
Was there ice in the cooler? Enter temp. If >6°C contact client/SRER 5.6 °C		Y	

Sample Receipt Exception Report

The following exceptions were noted:		Comments (write number of exception description and the impacted sample numbers)
	1. No custody seal as required by project	
	2. No chain-of-custody provided	
	3. Analysis, description, date of collection not provided	
	4. Samples broken or leaking on receipt.	
	5. Temperature of samples inappropriate for analysis requested. (EPA recommends 0-6 °C for WET testing)	
	6. Container inappropriate for analysis requested	
	7. Inadequate sample volume.	
	8. Preservation inappropriate for analysis requested	
	9. Samples received out of holding time for analysis requested	
	10. Discrepancies between COC form and container labels.	
	11. Other.	

ACTION TAKEN (date/time):
Client notified on (date/time):
Originator:
Client Contact:

CH2MHILL **CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING**

Client Coeur Alaska
Address 3031 Clinton Dr, Ste 202
Juneau, AK 99801

Contact Person: Kate Kanouse
Phone: 907-465-4290
E-mail: Kate.Kanouse@coeralaska.com

CH2M HILL Project # / Purchase Order # _____

NPDES# _____

Composite Sample Information:
Initiated: Date _____ Time _____
Ended: Date _____ Time _____
Chilled During Collection ? Yes ___ No ___
Dechlorinated prior to shipping ? Yes ___ No ___

Ship Samples to:
CH2M HILL - Applied Sciences Laboratory
Attention: Bioasssay Lab
1100 NE Circle Blvd. Suite 300
Corvallis, OR 97330
Lab Phone: (541) 768-3160
Customer Service: (541) 768-3120

Analysis Required / Comments

Sample ID	Date	Time	Sample Type: Comp.	Sample Type: Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Green Algae	Trout Acute	Sheepshead Acute	Sheepshead Chronic	Menidia Acute	Menidia Chronic	Mysid Acute	Mysid Chronic	Haz Waste	Chron. for Chlor. Tol.	Chron for Ammonia		Concentration and/or Comments
Upper Slate Creek	7/30/14	1700	X																	X	X		

Sampled By & Title (Please sign and print name) Benjamin Brewster Hab. Bio Benjamin Brewster	Date/Time 7/30/14 1700	Relinquished By (Please sign and print name) Benjamin Brewster Benjamin Brewster	Date/Time 8/5/14 0900
Received By (Please sign and print name) Michelle Cartwright	Date/Time 8/7/14 1100	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Shipped Via UPS ___ Bus ___ Fed-Ex ___ Hand ___ Other ___	Shipping #
Work Authorized By (Please sign and print name)	Remarks 5.6°C		

B3151-05

CH2MHILL
Applied Sciences Laboratory (ASL)

Bioassay Sample Receipt Record

Bmp pg 902-19

Batch Number: 3151- B

Date received: 7/4/14? (7/7/14) mkk

Client/Project: Alaska Dept of Fish + Game

Checked by: AH

VERIFICATION OF SAMPLE CONDITIONS (verify all items) * HD = Client Hand delivered Samples

Observation	NA	YES	NO
Were custody seals intact and on the outside of the cooler?		✓	
Type of packing material: Ice (Blue Ice) Bubble wrap		✓	
Was a Chain of Custody provided?		✓	
Was the Chain of Custody properly filled out? If not document in SRER below.			✓
Were the sample containers in good condition (broken or leaking)?			✓
Are all samples within 36 hours of collection? If not, contact LPM			✓
Was there ice in the cooler? Enter temp. If >6°C contact client/SRER 23.0C Lower Johnson 22.4 Upper Slate Creek 23.0 Hamer Slab Creek			

Sample Receipt Exception Report

The following exceptions were noted:		Comments (write number of exception description and the impacted sample numbers)
	1. No custody seal as required by project	
	2. No chain-of-custody provided	
	3. Analysis, description, date of collection not provided	
	4. Samples broken or leaking on receipt.	* INSUFFICIENT VOLUME AVAIL - RESAMPLED.
	5. Temperature of samples inappropriate for analysis requested. (EPA recommends 0-6 °C for WET testing)	
	6. Container inappropriate for analysis requested	
	7. Inadequate sample volume.	
	8. Preservation inappropriate for analysis requested	
	9. Samples received out of holding time for analysis requested	
	10. Discrepancies between COC form and container labels.	
	11. Other.	

ACTION TAKEN (date/time):
Client notified on (date/time):
Originator:
Client Contact:

CH2MHILL **CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING**

Client Alaska Dept. of Fish and Game NPDES# _____

Address Bill Ray Center 1000 F Street
Juneau, AK 99801

Contact Person: Kate Kanouse
Phone: 907-465-4290
E-mail: Kate.Kanouse@alaska.gov

CH2M HILL Project # / Purchase Order # _____

Composite Sample Information:
Initiated: Date _____ Time _____
Ended: Date _____ Time _____
Chilled During Collection ? Yes ___ No ___
Dechlorinated prior to shipping ? Yes ___ No ___

Ship Samples to:
CH2M HILL - Applied Sciences Laboratory
Attention: Bioasssay Lab
1100 NE Circle Blvd. Suite 300
Corvallis, OR 97330
Lab Phone: (541) 768-3160
Customer Service: (541) 768-3120

Analysis Required / Comments

Sample ID	Date	Time	Sample Type Comp.	Sample Type Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Green Algae	Trout Acute	Sheepshead Acute	Sheepshead Chronic	Menidia Acute	Menidia Chronic	Mysid Acute	Mysid Chronic	Haz Waste	Ceriodaphnia Chronic	Pimephales Chronic		Concentration and/or Comments
Upper Slate Creek	6/30/14	0800	X		3	133151-B														X	X		

Sampled By & Title (Please sign and print name) Benjamin Brewster, Bejai Brewster Lab Bio	Date/Time 7/2/14 0700	Relinquished By (Please sign and print name) Benjamin Brewster, Bejai Brewster	Date/Time 7/2/14 0700
Received By (Please sign and print name) Annie Horton	Date/Time 7/7/14 1100	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Shipped Via UPS ___ Bus ___ Fed-Ex ___ Hand ___ Other ___	Shipping #
Work Authorized By (Please sign and print name)	Remarks 22.4°C		

CH2MHILL **CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING**

Client Alaska Dept. of Fish and Game
Address Bill Ray Center 1008 F Street
Juneau, Alaska 99801
Contact Person: Kate Kanouse
Phone: 907-465-4290
E-mail: kate.kanouse@alaska.gov
CH2M HILL Project # / Purchase Order # _____

NPDES# _____

Composite Sample Information:
Initiated: Date _____ Time _____
Ended: Date _____ Time _____
Chilled During Collection ? Yes ___ No ___
Dechlorinated prior to shipping ? Yes ___ No ___

Ship Samples to:
CH2M HILL - Applied Sciences Laboratory
Attention: Bioasssay Lab
1100 NE Circle Blvd. Suite 300
Corvallis, OR 97330
Lab Phone: (541) 768-3160
Customer Service: (541) 768-3120

Analysis Required / Comments

Sample ID	Date	Time	Sample Type: Comp.	Sample Type: Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Green Algae	Trout Acute	Sheepshead Acute	Sheepshead Chronic	Menidia Acute	Menidia Chronic	Mysid Acute	Mysid Chronic	Haz Waste	Chiron. Tetans Chronic	Hyalella Azteca Chronic		Concentration and/or Comments
Lower Slate Creek	7/1/14	1000	✓		2	B3151-5														✓	✓		

Sampled By & Title (Please sign and print name) Benjamin Brewster Hab. Bio	Date/Time 7/2/14 0700	Relinquished By (Please sign and print name) Benjamin Brewster	Date/Time 7/2/14 0700
Received By (Please sign and print name) Annie Horton	Date/Time 7/7/14 1100	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Shipped Via UPS ___ Bus ___ Fed-Ex ___ Hand ___ Other ___	Shipping #
Work Authorized By (Please sign and print name)	Remarks Only 2 sample containers returned 23.0° C		

CH2MHILL **CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING**

Client Alaska Dept of Fish and Game
Address Bill Ray Center - 1008 F Street
Juneau, Alaska 99801

Contact Person: Kate Kanouse
Phone: Kate.Kanouse@alaska.gov
E-mail: 907-465-4296

CH2M HILL Project # / Purchase Order # _____

NPDES# _____

Composite Sample Information:
Initiated: Date _____ Time _____
Ended: Date _____ Time _____
Chilled During Collection ? Yes ___ No ___
Dechlorinated prior to shipping ? Yes ___ No ___

Ship Samples to:
CH2M HILL - Applied Sciences Laboratory
Attention: Bioasssay Lab
1100 NE Circle Blvd. Suite 300
Corvallis, OR 97330
Lab Phone: (541) 768-3160
Customer Service: (541) 768-3120

Analysis Required / Comments

Sample ID	Date	Time	Sample Type: Comp.	Sample Type: Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Green Algae	Trout Acute	Sheepshead Acute	Sheepshead Chronic	Menidia Acute	Menidia Chronic	Mysid Acute	Mysid Chronic	Haz Waste	Chinook Tubing Chron 2	Cathy Mallet Artem chronic		Concentration and/or Comments
Lower Johnson Creek	6/30/14	1500	X		3	B3151B														X	X		

Sampled By & Title: Benjamin Brewster, Hab. Bio	(Please sign and print name) Benjamin Brewster	Date/Time 7/2/14 0700	Relinquished By (Please sign and print name) Benjamin Brewster Benjamin Brewster	Date/Time 7/2/14 0700
Received By: Annie Horton	(Please sign and print name) Annie Horton	Date/Time 7/7/14 1100	Relinquished By (Please sign and print name)	Date/Time
Received By	(Please sign and print name)	Date/Time	Relinquished By (Please sign and print name)	Date/Time
Received By	(Please sign and print name)	Date/Time	Shipped Via: UPS ___ Bus ___ Fed-Ex ___ Hand ___ Other ___	Shipping #
Work Authorized By	(Please sign and print name)	Remarks: 1 plastic container was broken & discarded		23.0°C

Winn, Doug/CVO

From: Muckey, Brett/CVO
Sent: Wednesday, June 25, 2014 3:17 PM
To: Winn, Doug/CVO
Cc: Stanaway, Mike/CVO
Subject: Ben P Brewster - Alaska Department of Fish and Game, division of habitat
Attachments: Brewster Ben P (DFG).vcf

465-4290 Kate

Brewster, Ben P (DFG)
Alaska Department of Fish and Game, divi...

(907) 465-6160 Work
ben.brewster@alaska.gov

802 3rd Street, Rm 133
Douglas, AK 99824

Guys, this is the contact for the Hyallela and Chrinomid testing coming out of Alaska. They plan on sampling July 1,2,3.

Brett

Winn, Doug/CVO

From: Brewster, Ben P (DFG) <ben.brewster@alaska.gov>
Sent: Wednesday, July 02, 2014 11:09 AM
To: Winn, Doug/CVO
Subject: RE: Kensington Gold Mine sediment toxicity sampling supplies

Doug,
I forgot Friday is the 4th, so you should receive the samples tomorrow afternoon. I shipped five samples. Just a head-up, we misplaced a lid for the sample site Lower Slate Creek. You have enough sample to run both toxicity tests, but no "extra" sample. I thought I would let you know so you can keep that in mind before running that sample. I will be out of the office from July 4th until mid-August, so you can contact my supervisor Kate Kanouse at 907-465-4290. Thanks

-Ben

From: Doug.Winn@CH2M.com [mailto:Doug.Winn@CH2M.com]
Sent: Tuesday, July 01, 2014 11:03 AM
To: Brewster, Ben P (DFG)
Subject: RE: Kensington Gold Mine sediment toxicity sampling supplies

Hi Ben, I just wanted to be sure you received the coolers that you should have got late last week or early this week.

From: Brewster, Ben P (DFG) [mailto:ben.brewster@alaska.gov]
Sent: Friday, June 27, 2014 9:01 AM
To: Winn, Doug/CVO
Subject: Kensington Gold Mine sediment toxicity sampling supplies

Doug,
I've been in contact with Brett in regards to the Kensington Mine sediment toxicity analysis. I wanted to check in on the status of the coolers. I was told there has been a backorder on supplies and that they would be shipped to us this week and would be here today. Have the coolers shipped yet? If they have do you by chance have tracking information? Thanks for your time.

-Ben

Benjamin Brewser
Habitat Biologist

Alaska Department of Fish and Game
Division of Habitat
907-465-6160

Brett

Brett Muckey

CH2M HILL - Applied Sciences Laboratory
Bioassay Laboratory Manager
1100 NE Circle Blvd, Suite 300
Corvallis, OR 97330
(541) 768-3160 (lab)
(541) 768-3112 (desk)
www.ch2mlab.com

From: Brewster, Ben P (DFG) [mailto:ben.brewster@alaska.gov]
Sent: Tuesday, May 06, 2014 11:39 AM
To: Muckey, Brett/CVO
Subject: Kensington Gold Mine acute toxcity testing requirements

Hello Brett,
Attached are the pages from the APDES permit that outline our reporting requirements. Section 1.5.2.3 pertains specifically to the biological testing of sediments. We will be collecting five samples. Thanks again for your time.

-Ben

Benjamin Brewster, Habitat Biologist
Alaska Department of Fish and Game
Division of Habitat
802 3rd Street, Rm 133
Douglas, AK 99824
(907)-465-6160

Muckey, Brett/CVO

From: Brewster, Ben P (DFG) <ben.brewster@alaska.gov>
Sent: Tuesday, May 27, 2014 1:29 PM
To: Muckey, Brett/CVO
Subject: RE: Kensington Gold Mine acute toxcity testing requirements

We are in the process of moving, so if you could send the sample kits to the address below that would be perfect. Thanks.

-Ben

From: Brett.Muckey@CH2M.com [mailto:Brett.Muckey@CH2M.com]
Sent: Tuesday, May 27, 2014 12:08 PM
To: Brewster, Ben P (DFG)
Subject: RE: Kensington Gold Mine acute toxcity testing requirements

Ben,

That's great news! Thanks.

Will you need sample kits sent to your Douglas Alaska address?

Brett

Will

From: Brewster, Ben P (DFG) [mailto:ben.brewster@alaska.gov]
Sent: Tuesday, May 27, 2014 12:53 PM
To: Muckey, Brett/CVO
Subject: FW: Kensington Gold Mine acute toxcity testing requirements

Hey Brett,
We heard back from Couer Alaska's environmental superintendent Kevin Eppers and he has approved the quote. All billing will go through Couer Alaska's Kensington Gold Mine. We will be collecting the samples the first week of July so you can expect the samples to arrive the following week. The following is Kevin Eppers billing information and our mailing address for sample containers. Thanks.

Kevin Eppers

Environmental Superintendent
Couer Alaska
3031 Clinton Dr. Suite 202
Juneau, Alaska 99801

Alaska Department of Fish and Game
Division of Habitat
1008 F Street
Juneau, AK 99801

From: Kanouse, Kate M (DFG)
Sent: Tuesday, May 27, 2014 8:58 AM
To: Brewster, Ben P (DFG)
Subject: FW: Kensington Gold Mine acute toxcity testing requirements

go

From: Eppers, Kevin [mailto:KEppers@coeur.com]
Sent: Tuesday, May 27, 2014 7:09 AM
To: Kanouse, Kate M (DFG)
Subject: RE: Kensington Gold Mine acute toxcity testing requirements

Looks good to me Kate.

Thanks,

Kevin

From: Kanouse, Kate M (DFG) [mailto:kate.kanouse@alaska.gov]
Sent: Friday, May 23, 2014 3:14 PM
To: Eppers, Kevin
Subject: FW: Kensington Gold Mine acute toxcity testing requirements

Hi Kevin:

Attached is a quote from CH2M Hill for the laboratory sediment toxicity tests. Please let me know if you approve of the new laboratory, as soon as possible (sorry for the rush – I thought I sent this to you a couple weeks ago but failed to do so).

Thank you.
Kate

From: Brewster, Ben P (DFG)
Sent: Thursday, May 15, 2014 2:57 PM
To: Kanouse, Kate M (DFG)
Subject: FW: Kensington Gold Mine acute toxcity testing requirements

Hey Kate,
Attached is the acute toxicity analysis quote from CH2M Hill.

From: Brett.Muckey@CH2M.com [mailto:Brett.Muckey@CH2M.com]
Sent: Thursday, May 15, 2014 2:53 PM
To: Brewster, Ben P (DFG)
Subject: RE: Kensington Gold Mine acute toxcity testing requirements

Hi Ben.

That is excellent. I've prepared a quote for you with the anticipated permit change.

We can reserve lab space for you any time in July, just let us know.

Thanks for the opportunity to earn your business!

Brett

From: Brewster, Ben P (DFG) [mailto:ben.brewster@alaska.gov]
Sent: Thursday, May 15, 2014 10:01 AM
To: Muckey, Brett/CVO
Subject: RE: Kensington Gold Mine acute toxcity testing requirements

Hello Brett,
The ADEC is in the process of making the edit to the APDES permit. We would like to move forward with this project, so if you could get me a quote for this work that would be great. Let me know the information you need from me. Thanks for your time.

-Ben

From: Brett.Muckey@CH2M.com [mailto:Brett.Muckey@CH2M.com]
Sent: Thursday, May 08, 2014 10:20 AM
To: Brewster, Ben P (DFG)
Subject: RE: Kensington Gold Mine acute toxcity testing requirements

Thanks for checking back up the line, Ben. I'd like to do the work ... just want to be sure it's the best product we can make.

Brett

From: Brewster, Ben P (DFG) [mailto:ben.brewster@alaska.gov]
Sent: Thursday, May 08, 2014 9:32 AM
To: Muckey, Brett/CVO
Subject: RE: Kensington Gold Mine acute toxcity testing requirements

Hello Brett,
Thanks for getting back to me. I don't think any of us were aware we were using an outdated protocol. We have contacted the folks at ADEC and requested that we update the methods in the APDES permit. It may be able to change without having to go out for public comment an all that. They will hopefully get back to me in the next week, so I will let you know. Thanks for your time.

-Ben

From: Brett.Muckey@CH2M.com [mailto:Brett.Muckey@CH2M.com]
Sent: Tuesday, May 06, 2014 3:44 PM
To: Brewster, Ben P (DFG)
Subject: RE: Kensington Gold Mine acute toxcity testing requirements

Ben,

Thanks for the permit.

I do have one question for you. The permit specifically states *Chironomus dilutus* using EPA/600/R-94/024 (written in 1994). The thing is that EPA protocol was revised in 2000 to EPA/600-R/94/064 and the species changed to *Chironomus tentans*. (see page 3 of the attachment)

As the older EPA manual is no longer available and has been replaced, I'm thinking that the revision should be used along with the *Chironomus tentans*. We often see these types of references to old protocols in NPDES permits, and often with the language "or most recent update" ... but this should definitely be comfirmed with the Alaska DEC/client before testing.

What do you think?

FedEx Express *NEW Package US Airbill*

FedEx Tracking Number 8037 3695 7174

Form ID No. 0200

1 From

Date 7/2/14

Sender's Name Ben Brewster Phone 907 465-6160

Company Corvus Alaska

Address 3031 Clinton Dr Ste 202 Dept./Floor/Suite/Room

City Juneau State AK ZIP 99801

2 Your Internal Billing Reference

3 To

Recipient's Name Brett Mackey Phone 541 768-3160

Company CH2M Hill Applied Sciences Laboratory

Address 1100 NE Circle Blvd Suite 300 Dept./Floor/Suite/Room

We cannot deliver to P.O. boxes or P.O. ZIP codes.

☐ HOLD Weekday — FedEx location address REQUIRED. NOT available for FedEx First Overnight.

Address Rec

Use this line for the HOLD location address or for continuation of your shipping address.

☐ HOLD Saturday — FedEx location address REQUIRED. Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.

City Corvallis State OR ZIP 97330

8037 3695 7174

4 Express Pacl

NOTE: Service order

Next Business D

☐ FedEx First Overn — Earliest next business m locations. Friday shipme Monday unless SATURD

☐ FedEx Priority Ov — Next business morning.* delivered on Monday un is selected.

☒ FedEx Standard (— Next business afternoon Saturday Delivery NOT a

5 Packaging

☐ FedEx Envelope*

6 Special Handl

☐ SATURDAY Delive — NOT available for FedEx

☐ No Signature Req — Package may be left witho obtaining a signature for d

Does this shipment

One box

☒ No ☐ Yes As per at Shipper's

Dangerous goods (including dry ic or placed in a FedEx Express Drop

7 Payment *Bill to*

☒ Sender — Acct. No. in Section 1 will be billed.

Total Packages 5 Total Weight 100 lbs.

Credit Card Auth.

†Our liability is limited to US$100 unless you declare a higher value. See the current FedEx Service Guide for details.

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XH CVOA

FID 152825 02JUL14 JNUA 51AC2/ED4F/65DD

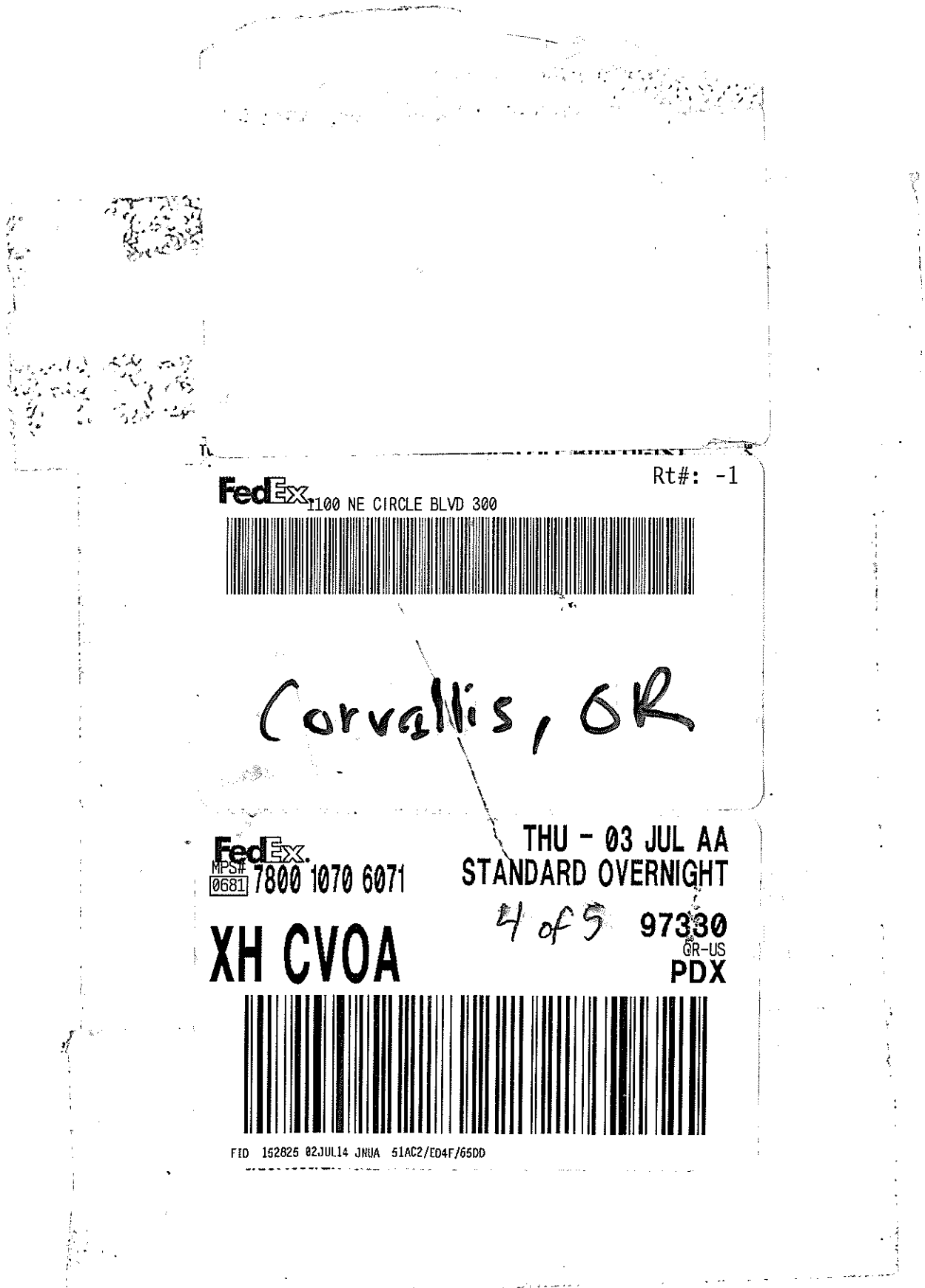
THU - 03 JUL AA

STANDARD OVERNIGHT

97330

OR-US

PDX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Corvallis, OR
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MPS# 0681 7800 1070 6071
THU - 03 JUL AA
STANDARD OVERNIGHT
4 of 5
97330
OR-US
XH CVOA
PDX
FID 152825 02JUL14 JNUA 51AC2/ED4F/65DD

Horton, Annie/CVO

From: Horton, Annie/CVO
Sent: Monday, July 07, 2014 3:33 PM
To: 'kate.kanouse@alaska.gov'
Subject: Resampling

Hello Kate Kanouse,

I spoke with you earlier today about resampling some of the sites due to temperatures and sample delivery being out of range. I sent off three coolers this afternoon to be overnighted to Douglas, AK. The three sites that need to be resampled are: Lower Johnson Creek, Lower Slate Creek, and Upper Slate Creek.
If you have any questions or concerns please feel free to contact me. Thank you for your willingness to resample.

Thank You,
Annie Horton
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