Technical Report No. 16-03

Aquatic Studies at Kensington Gold Mine, 2015

by

Benjamin P. Brewster

February 2016

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

TECHNICAL REPORT NO. 16-03

AQUATIC STUDIES AT KENSINGTON GOLD MINE, 2015

by

Benjamin P. Brewster

Alaska Department of Fish and Game
Division of Habitat, Region I
802 W. 3rd Street, Douglas, Alaska, 99824-0024
February 2016

This investigation was fully financed by Coeur Alaska, Inc. through Reimbursable Services Agreement No. 1059558, with the Alaska Department of Natural Resources, Office of Project Management and Permitting.

Cover: Gordon Willson-Naranjo at Lower Johnson Creek during adult salmon surveys. Photo by Tess Quinn.

Technical Reports are available through the Alaska State Library, Alaska Resources Library and Information Services (ARLIS) and on the Internet: http://www.adfg.alaska.gov/index.cfm?adfg=habitat_publications.main. This publication has undergone editorial and peer review.

Note: Product names used in the publication are included for completeness but do not constitute product endorsement. The Alaska Department of Fish and Game does not endorse or recommend any specific company or their products.

Benjamin P. Brewster
Alaska Department of Fish and Game, Division of Habitat
802 W. 3rd Street, Douglas, AK 99824, USA

This document should be cited as:
Brewster, B. P. 2016. Aquatic studies at Kensington Gold Mine, 2015. Alaska Department of Fish and Game, Technical Report No. 16-03, Douglas, AK.

TABLE OF CONTENTS

Page

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES (Continued)

Figure **Page**

LIST OF APPENDICES

Appendix

ACKNOWLEDGEMENTS

Coeur Alaska, Inc. provided financial support and Kensington Gold Mine environmental staff, Kevin Eppers, Pete Strow, Ryan Bailey, Kristi Asplund, and Sierra Lammers provided project logistical support, East Fork Slate Creek discharge data, and water quality data.

Division of Habitat staff Greg Albrecht, Kate Kanouse, Tess Quinn, Gordon Willson-Naranjo, and Johnny Zutz assisted with data collection, Mr. Albrecht and Ms. Legere processed periphyton samples, and Ms. Kanouse verified data entry and analyses. Operations Manager Dr. Al Ott, Southeast Regional Supervisor Jackie Timothy, and Ms. Kanouse reviewed and edited the report, Division of Commercial Fisheries Biometrician Sara Miller performed the fish population power analysis, and Division of Commercial Fisheries Publication Specialist Amy Carroll prepared the report for publication.

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 National Weather Service reports 2015 was the second wettest year on record for Juneau, with July the wettest on record.[a]

The July 2015 mean periphyton density at each sampling site was similar to or lower than previous year densities.[b] Though not required, we sampled periphyton in Lower Slate and East Fork Slate Creeks in April to observe variability earlier in the year, and continue monitoring for changes that may occur from the tailing treatment facility (TTF) upstream. Periphyton densities at both sites were greater in spring compared to summer.

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] the TTF water treatment plant effluent, and downstream of the outfall 002 effluent discharge in East Fork Slate Creek. In the TTF during 2015, 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 Upper Slate Lake concentrations, while organic carbon concentrations were usually greatest in Upper Slate Lake.

We sampled benthic macroinvertebrates at a new sample site in Lower Slate Creek for the third 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 again observed about half the number of benthic macroinvertebrates and a greater proportion of sensitive aquatic insects than at Sample Point 1.[d] Stoneflies continue to dominate the sensitive taxa at Sample Point 1, a change we observed since 2013, while mayflies were dominant at Sample Point 2.

Benthic macroinvertebrate density nearly doubled in East Fork Slate Creek between 2014 and 2015, though remained lower than densities observed 2011–2013. The 2015 East Fork Slate

---

[a] The Juneau climate summary for the year of 2015. National Oceanic Atmospheric and Administration NWS Juneau, AK Climate Database. http://www.arh.noaa.gov/wmofcst.php?wmo=CXAK57PAJK&type=public (accessed February 12, 2016).

[b] Ben Brewster, Habitat Biologist, ADF&G Division of Habitat, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Division of Habitat. Memorandum: 2015 Kensington Gold Mine Periphyton Trip Report; dated 1/15/16. Unpublished document, can be obtained from the Southeast Regional Supervisor, ADF&G Division of Habitat, 803 3rd St., Douglas, AK.

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

[d] Ben Brewster, Habitat Biologist, ADF&G Division of Habitat, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Division of Habitat. Memorandum: 2015 Kensington Gold Mine Benthic Macroinvertebrate Trip Report; dated 2/19/2016. Unpublished document, can be obtained from the Southeast Regional Supervisor, ADF&G Division of Habitat, 803 3rd St., Douglas, AK.

Creek benthic macroinvertebrate diversity and evenness scores were the greatest observed at this site, and samples contained the greatest proportion of sensitive aquatic insects since 2012.

We continued to observe a lower abundance of sensitive taxa in Lower Sherman Creek benthic macroinvertebrate samples from both sample sites, though similar to the 2011 data, and the Sample Point 1 samples contained the fewest benthic macroinvertebrates since 2011. While the proportion of sensitive aquatic insects increased from 2014 at both sites, the proportions remain lower than we observed 2011–2013.

Beginning the 2013/2014 winter, Coeur reported periodic presence of a white substance, which became persistent in fall 2014. With Coeur and ADEC staffs, we continued to investigate the extent of the white substance and sampled benthic macroinvertebrates upstream and downstream of outfall 001 in April.[e] We found fewer insects and a lower proportion of sensitive insects among the samples collected downstream of outfall 001 compared to samples collected upstream. We sampled upstream and downstream of outfall 001 and Lower Sherman Creek Sample Point 1 again on November 10, 2015, and will report our findings in a separate report. With Coeur and ADEC, we will continue to monitor Sherman Creek in 2016. Habitat biologists did not observe a white substance on the East Fork or Lower Slate Creek stream beds during 2015.

The 2015 Upper Slate Creek Dolly Varden char *Salvelinus malma* population estimate was similar to the 2011–2014 population estimates.[f] For the third 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 6 occasions.[g] Fish population studies in East Fork Slate Creek do not provide reliable information to assess stream health or determine if TTF operations impact resident fish populations downstream.

In 2015, we observed the greatest numbers of adult pink salmon *Oncorhynchus gorbuscha* in Lower Slate and Lower Johnson Creeks since we began surveying in 2011,[h] and a lower number of adult pink salmon in Sherman Creek than observed in 2011 and 2013. In Johnson Creek, we observed 2 pulses of returning adult coho salmon *O. kitsutch*, in mid and late October, and a similar number of adult coho salmon compared to the 2012–2014 returns. We did not observe adult coho salmon in Lower Slate Creek during 2015. Since adult salmon run strengths depend on marine survival components we cannot quantify, we cannot use the data to determine if

---

[e] Kate Kanouse, Habitat Biologist, ADF&G Division of Habitat, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Division of Habitat. Memorandum: 2015 Kensington Gold Mine Sherman Creek White Substance; dated 7/24/15. Unpublished document, can be obtained from the Southeast Regional Supervisor, ADF&G Division of Habitat, 803 3rd St., Douglas, AK.

[f] Ben Brewster, Habitat Biologist, ADF&G Division of Habitat, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Division of Habitat. Memorandum: 2015 Kensington Gold Mine Resident Fish Trip Report; dated 1/15/16. Unpublished document, can be obtained from the Southeast Regional Supervisor, ADF&G Division of Habitat, 803 3rd St., Douglas, AK.

[g] Gordon Willson-Naranjo, Habitat Biologist, ADF&G Division of Habitat, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Division of Habitat. Memorandum: Kensington Gold Mine TTF and Plunge Pool Trapping Amended; dated 12/24/15. Unpublished document, can be obtained from the Southeast Regional Supervisor, ADF&G Division of Habitat, 803 3rd St., Douglas, AK.

[h] Ben Brewster, Habitat Biologist, ADF&G Division of Habitat, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Division of Habitat. Memorandum: 2015 Kensington Gold Mine Adult Salmon Counts; dated 1/13/16. Unpublished document, can be obtained from the Southeast Regional Supervisor, ADF&G Division of Habitat, 803 3rd St., Douglas, AK.

Kensington Gold Mine construction and operations impact adult salmon populations. We again recommend the USFS and the Berners 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, and the 2015 sampling results were similar to the 2014 results.[i]

Most sediment metals, arsenic, and selenium concentrations in Lower Slate and Lower Johnson Creeks were similar to or less than concentrations observed since 2011. Arsenic, lead, selenium, and zinc concentrations in Lower Sherman Creek were the greatest observed since 2011. Arsenic, cadmium, copper, and zinc concentrations in East Fork Slate Creek were lower than the 2011–2014 concentrations, though 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 (Aquatic Science Inc. 2006–2011).

Among the 5 sediment samples we submitted to a private laboratory for 10-day chronic toxicity testing, *Chironomus tentans* survival on each of the test sediments was significantly less than *C. tentans* survival on the control sediment. In contrast, *Hyallela azteca* survival during the 10-day chronic toxicity test was only significantly less on the Upper Slate Creek sediment compared to *H. azteca* survival on the control sediment.

We completed the TTF Environmental Monitoring Plan benthic macroinvertebrate habitability and basic water quality studies in 2015. We retrieved remaining benthic macroinvertebrate sample trays from Upper Slate Lake in June[j] and collected water column data in March[k] and August[l]. We will issue Technical Report No. 16-02 to summarize the results of these studies in February 2016.

Coeur's Alaska Pollution Discharge Elimination System Permit No. AK0050571 expires on August 31, 2016. We will provide Coeur and ADEC with recommendations to modify the aquatic monitoring requirements based on usefulness of the existing data, data trends, and future planned development.

---

[i] Ben Brewster, Habitat Biologist, ADF&G Division of Habitat, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Division of Habitat. Memorandum: 2015 Kensington Gold Mine Slate Creek Spawning Substrate; dated 1/21/16. Unpublished document, can be obtained from the Southeast Regional Supervisor, ADF&G Division of Habitat, 803 3rd St., Douglas, AK.

[j] Gordon Willson-Naranjo, Habitat Biologist, ADF&G Division of Habitat, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Division of Habitat. Memorandum: KGM TTF EMP Habitability Study; dated 6/29/15. Unpublished document, can be obtained from the Southeast Regional Supervisor, ADF&G Division of Habitat, 803 3rd St., Douglas, AK.

[k] Ben Brewster, Habitat Biologist, ADF&G Division of Habitat, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Division of Habitat. Memorandum: 2015 Kensington Gold Mine Upper Slate Lake Trip Report; dated 5/27/15. Unpublished document, can be obtained from the Southeast Regional Supervisor, ADF&G Division of Habitat, 803 3rd St., Douglas, AK.

[l] Not required.

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, 2004b). The mine is owned and operated by Coeur Alaska, Inc., a wholly owned subsidiary of Coeur Mining, Inc., Chicago, Illinois.

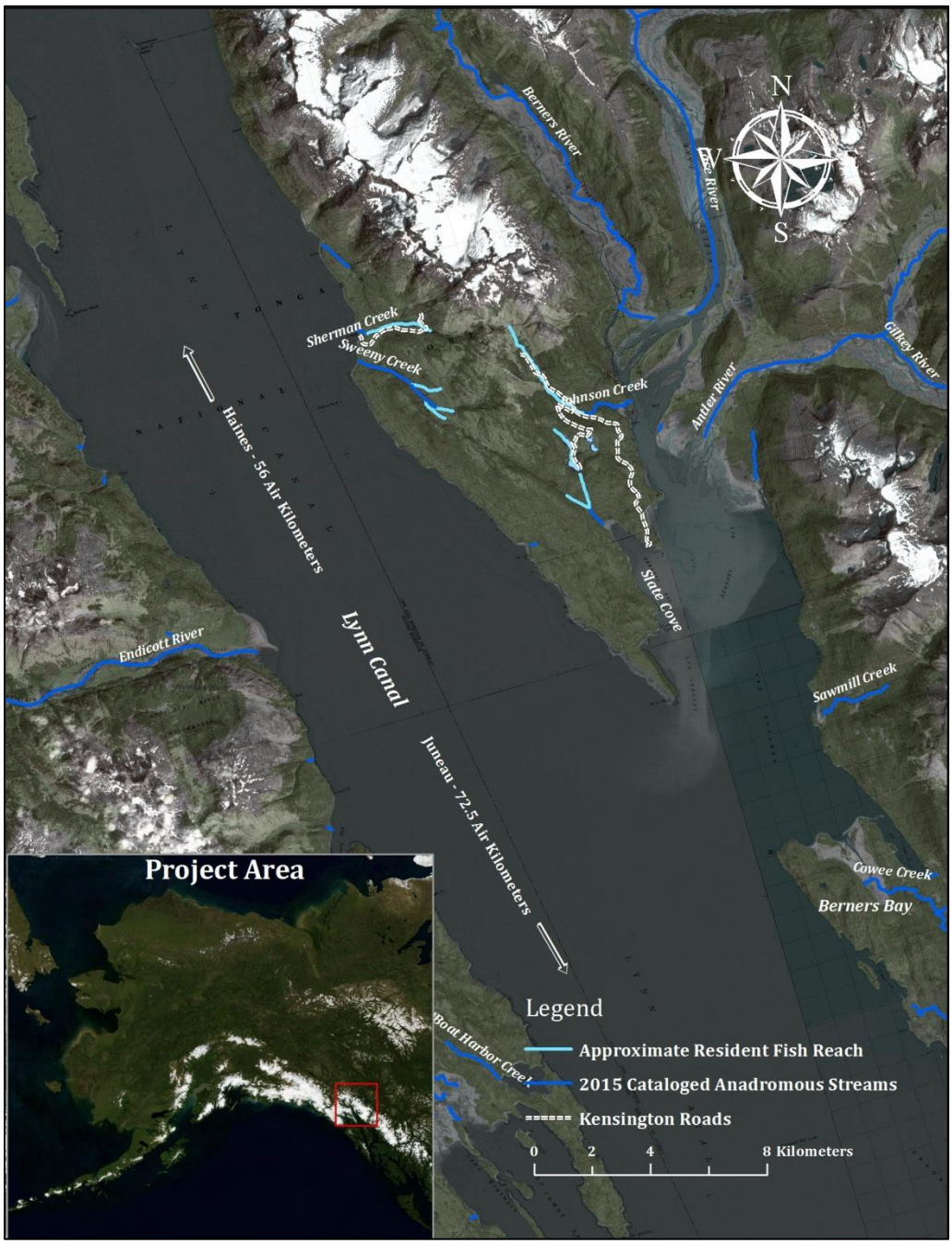


Figure 1.–Kensington Gold Mine area map.

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 3 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 National Pollutant Elimination Discharge System 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 Aquatic Science Inc. (1998, 1999, 2000, 2001a, 2001b, 2002, 2004), Archipelago Marine Research Ltd. (1991), Dames and Moore (1991), Earthworks Technology, Inc. (2002), EVS Environment Consultants (2000), 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 Aquatic Science Inc. (2006, 2007, 2008, 2009a, 2009b, 2009c, 2010, 2011), Kanouse (2015), 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 (Coeur 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 2015 aquatic study data and document the condition of biological communities and sediments in the Slate, Johnson, and Sherman Creeks drainages near mine development and operations. This report satisfies the aquatic study requirements of Coeur's USFS approved Plan of Operations (Coeur 2005) and ADEC APDES Permit AK0050571.

STUDY AREA

In 2015, we sampled the water bodies listed in Table 1.

Table 1.–2015 aquatic studies sampling locations.

Slate Creek Drainage	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		
TTF (Lower Slate Lake)		
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 2 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 (Johnson and Litchfield 2015) 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 Litchfield 2015) 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.–Upper 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 Litchfield 2015) lists Sherman Creek (Stream No. 115-31-10330) as 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 (Coeur 2005) and ADEC APDES Permit AK0050571 (Table 2). Figures 8–10 illustrate stream reaches and sampling locations for the aquatic studies we completed in 2015, and Table 3 lists the latitude and longitude of each sampling site.

Tables 4–6 list the reach markers for Lower Slate Creek, Lower Johnson Creek and Lower Sherman Creek.

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 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

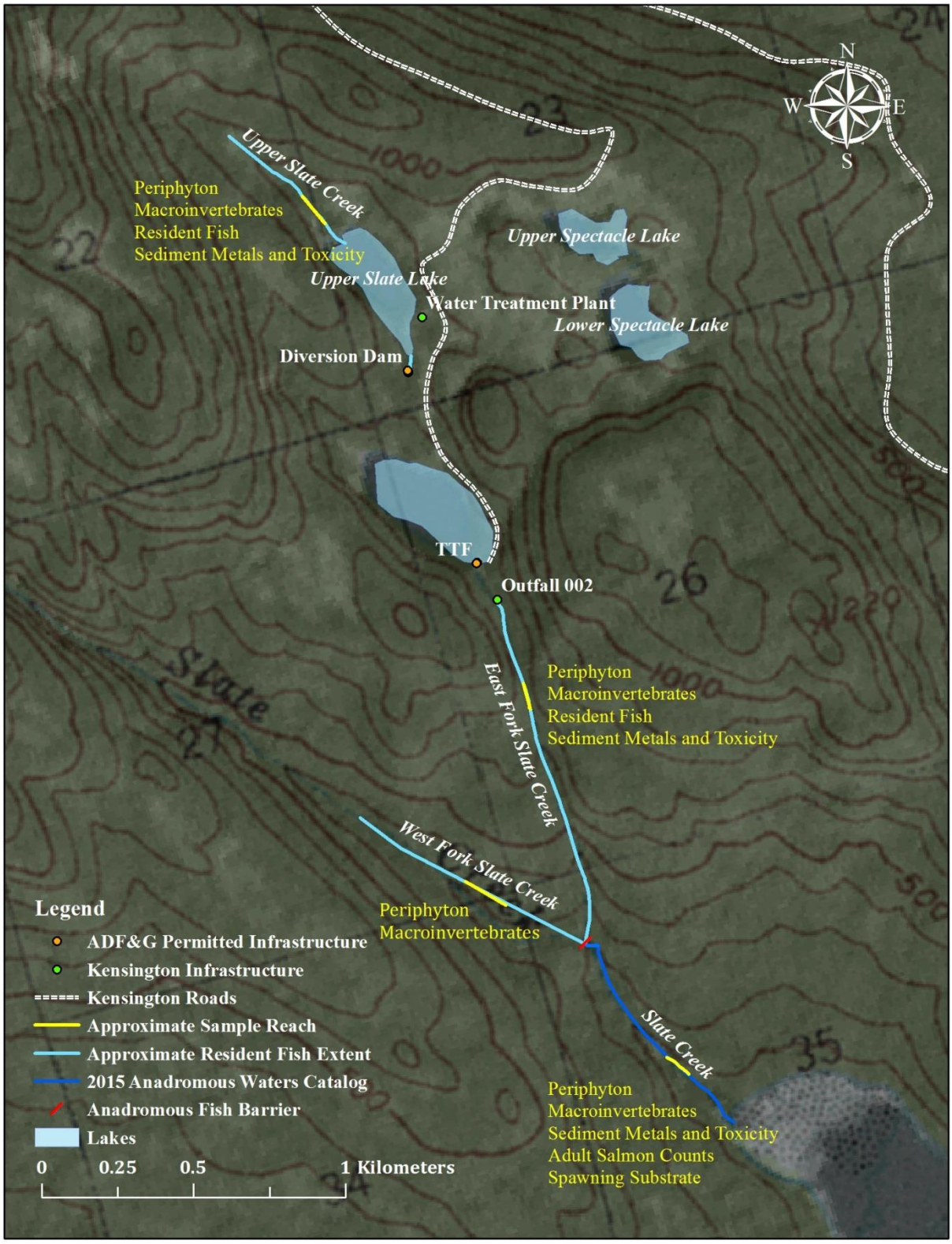


Figure 8.–Slate Creek aquatic studies.

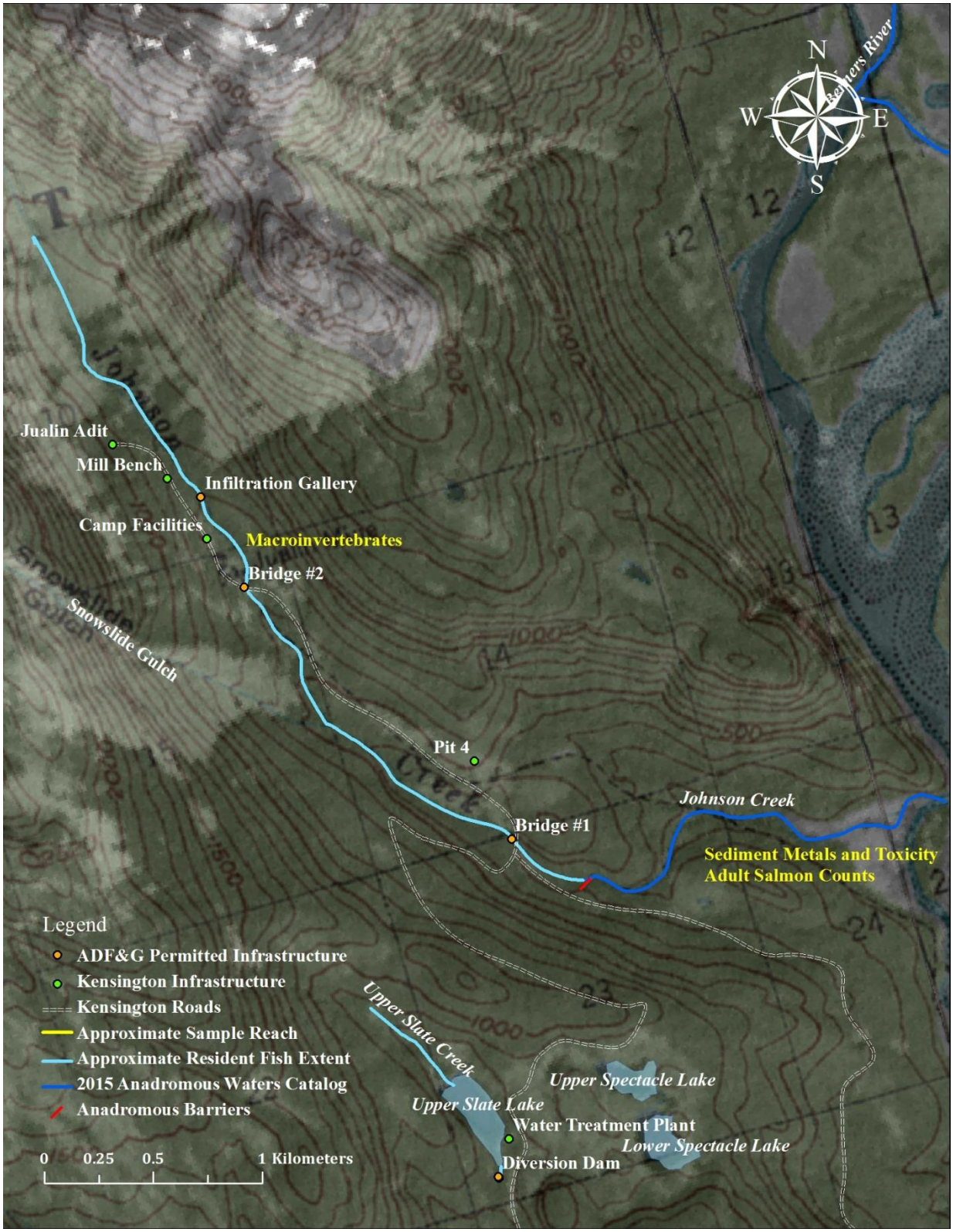


Figure 9.–Johnson Creek aquatic studies.

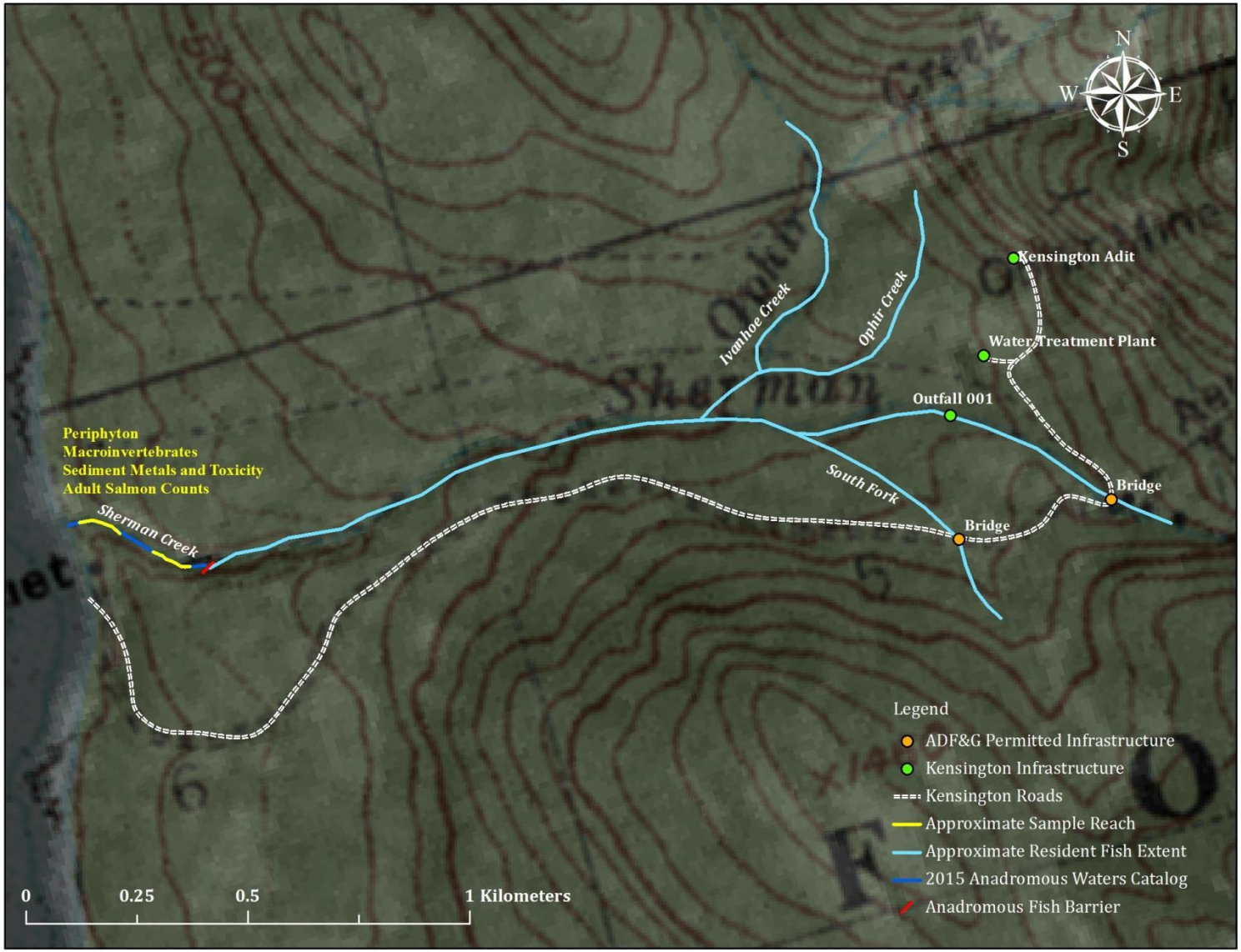


Figure 10.–Sherman Creek aquatic studies.

Table 3.–Latitude and longitude of the 2015 sample sites.

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

Source: World Geodetic System (WGS) 84 datum.

Table 4.–Lower Slate Creek reach markers.

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

Table 5.–Lower Johnson Creek reach markers.

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

Table 6.–Lower Sherman Creek reach markers.

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

MONITORING SCHEDULE

Table 7 presents the dates we collected data in 2015.

Table 7.–2015 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	4/27/2015	4/29/2015						
	7/28/2015	7/27/2015	7/28/2015	7/27/2015			7/27/2015(2)	
Benthic	4/27/2015 (2)	4/29/2015	4/27/2015	4/29/2015		4/28/2015	4/28/2015 (2)	4/25/2015(2)
Macroinvertebrates							11/10/2015	11/10/2015 (2)
Resident Fish		8/17/2015		8/20/2015				
Adult Salmon Counts	7/21/2015–				7/22/2015–		7/21/2015–	
	10/20/2015				10/27/2015		9/22/2015	
Spawning Substrate	7/6/2015 (2)							
Sediment Metals	7/6/2015	7/7/2015		7/7/2015	7/6/2015		7/7/2015	
Sediment Toxicity	7/6/2015	7/7/2015		7/7/2015	7/6/2015		7/7/2015	

Note: Cells 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 and data summaries 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 2013–2014 periphyton data by reducing the data to 2 decimal places for accuracy and consistency with previously reported data; and
- corrected data errors in the East Fork Slate Creek discharge graph.

RESULTS

SLATE CREEK

Lower Slate Creek

Periphyton Density and Composition

The July 2015 mean chlorophyll *a* density was the lowest we have 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
July 28, 2015	2.16	0.10	0.21

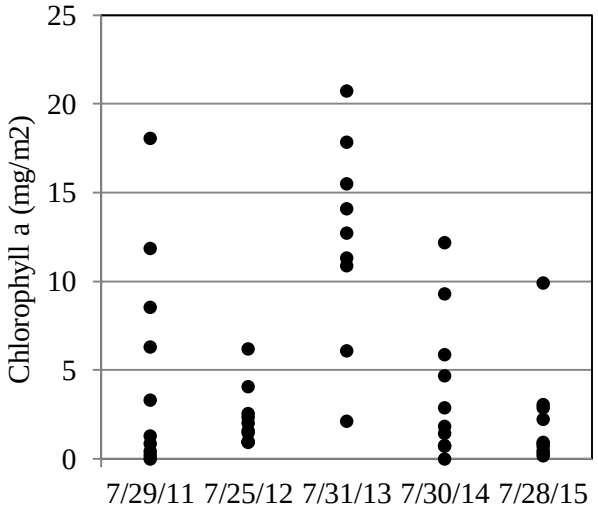


Figure 11.–Lower Slate Creek chlorophyll *a* sample densities.

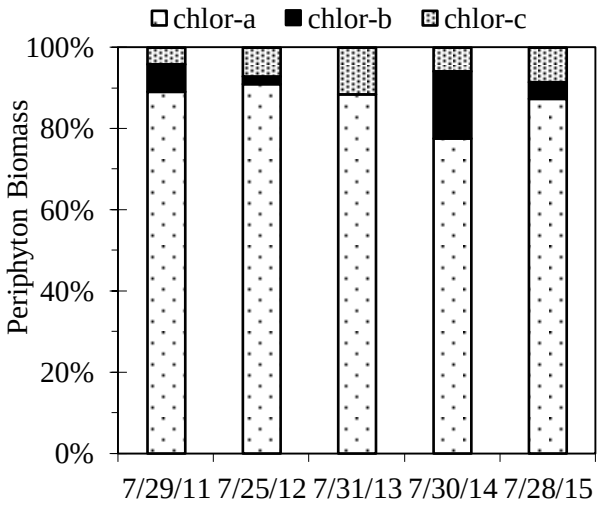


Figure 12.–Lower Slate Creek mean chlorophylls *a*, *b*, and *c* proportions.

Benthic Macroinvertebrate Density and Composition

Sample Point 1

Among the spring 2015 samples, we observed a similar number of EPT insects and fewer chironomids than the 2014 samples. We identified 26 taxa and estimate benthic macroinvertebrate density at 3,407 insects/m^2, of which 24% were EPT insects (Figure 13, Table 9), within ranges observed in previous years. The dominant taxon was Diptera: Chironomidae, representing 64% of samples.

Sample Point 2

Among the spring 2015 samples, we observed fewer insects compared to 2013–2014 samples and a similar percent EPT compared to 2014. We identified 23 taxa and estimate benthic macroinvertebrate density at 1,151 insects/m^2, of which 51% were EPT insects (Figure 13, Table 10). The dominant taxon were Diptera: Chironomidae and Ephemeroptera: Cinygmula, representing 27% and 14% of the samples.

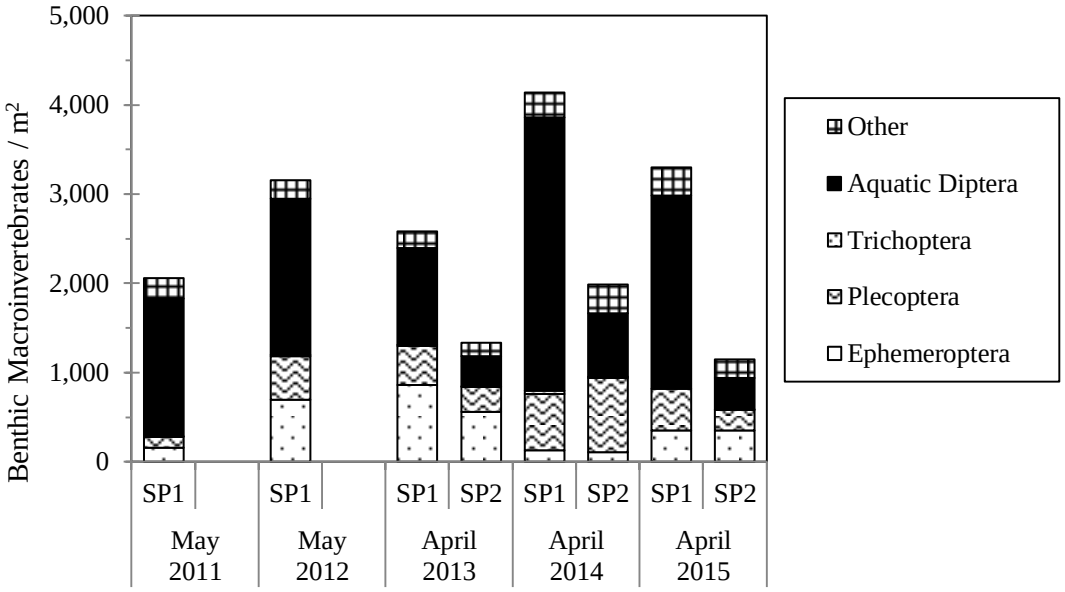


Figure 13.–Lower Slate Creek Sample Points 1 and 2 benthic macroinvertebrate densities and compositions.

Table 9.–Lower Slate Creek Sample Point 1 benthic macroinvertebrate data summary.

	2011	2012	2013	2014	2015
Benthic Macroinvertebrates /m^2	2,057	3,154	2,581	4,136	3,407
% EPT	14%	38%	51%	19%	24%
Number of EPT Taxa	13	17	16	17	13
Shannon Diversity Score	0.51	0.69	0.85	0.64	0.70
Evenness Score	0.48	0.58	0.70	0.52	0.58

Table 10.–Lower Slate Creek Sample Point 2 benthic macroinvertebrate data summary.

	2013	2014	2015
Benthic Macroinvertebrates / m^2	1,333	1,986	1,151
% EPT	63%	48%	51%
Number of EPT Taxa	12	16	12
Shannon Diversity Score	0.93	0.72	0.97
Evenness Score	0.78	0.62	0.82

Adult Salmon Counts

We counted 7,580 live adult pink salmon, 13 live chum salmon, and 0 live coho salmon during the 2015 spawning season.[m] Figure 14 presents the adult pink salmon count for each survey, and Figure 15 presents the distribution of pink salmon. Table 11 presents the 2011–2015 adult salmon counts.

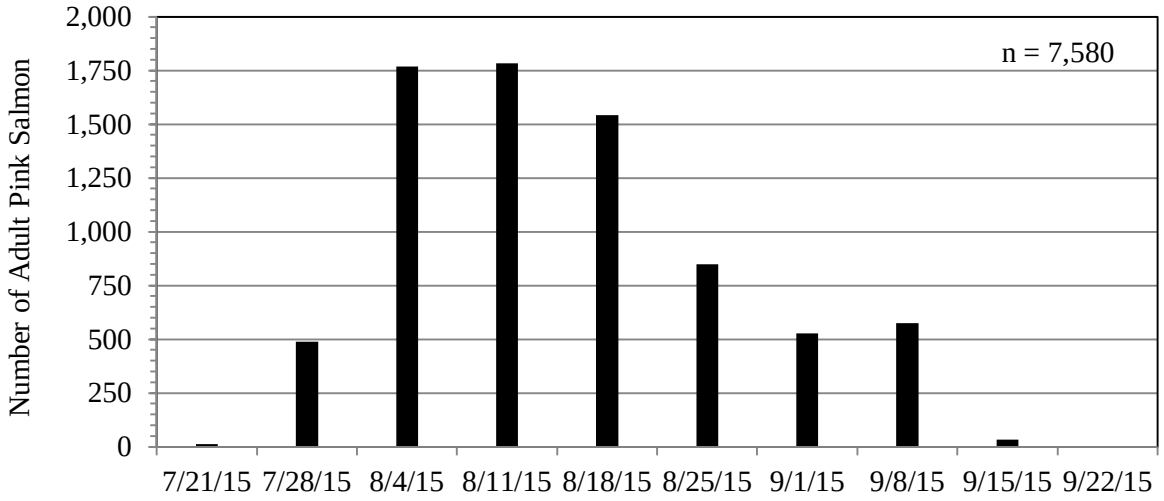


Figure 14.–2015 Lower Slate Creek weekly pink salmon counts.

[m] On July 28, we did not survey 300 m upstream from the mouth because a black bear sow and cub were present, so our count that day may be underestimated.

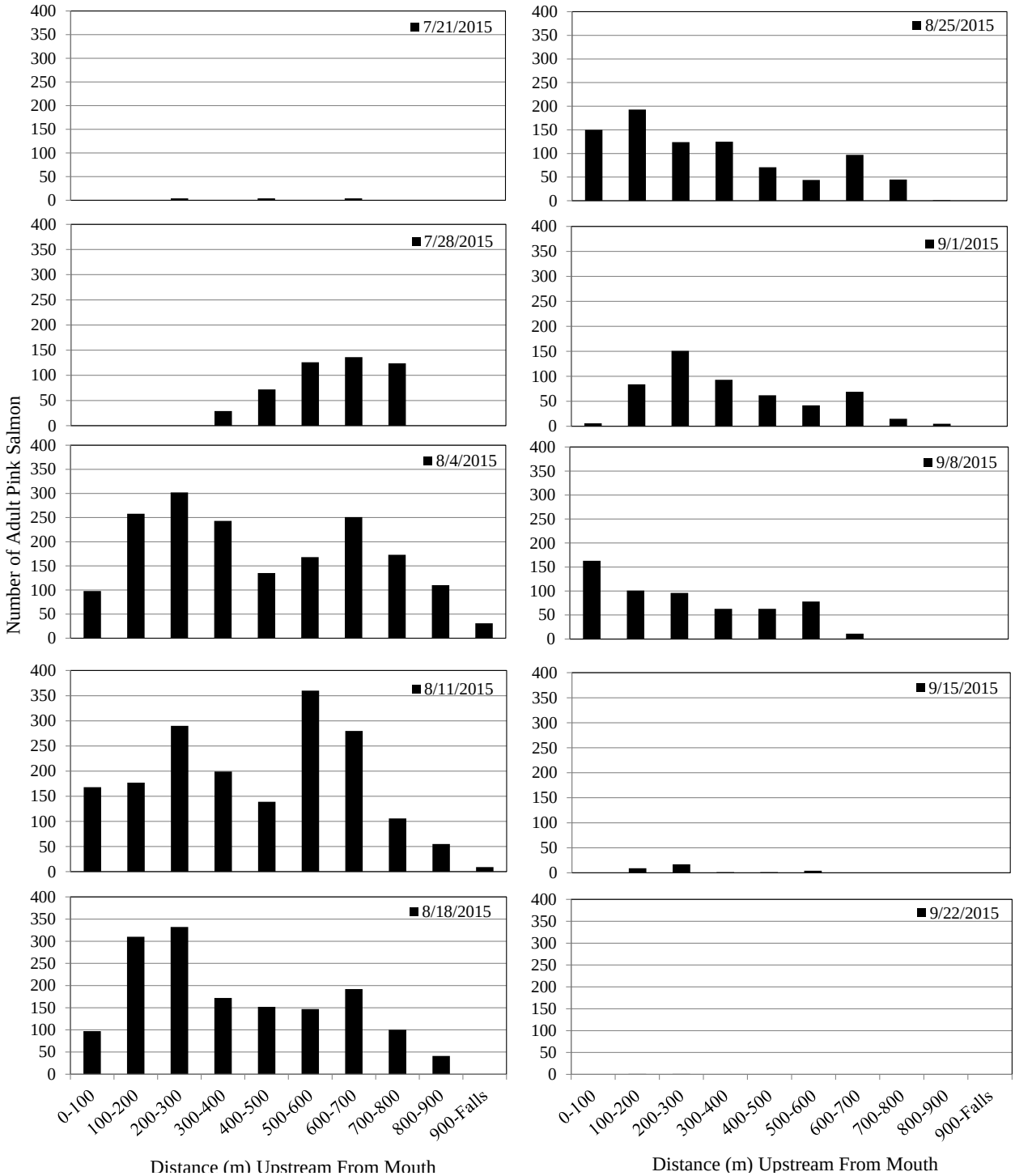


Figure 15.–2015 Lower Slate Creek weekly adult pink salmon distribution.

Table 11.–Lower Slate Creek adult salmon counts.

	2011	2012	2013	2014	2015
Pink Salmon	6,275	7,272	3,337	41	7,580
Chum Salmon	61	1	1	0	13
Coho Salmon	0	0	26	5	0

Spawning Substrate Quality

Sample Point 1

The geometric mean particle size among samples collected at Sample Point 1 was 12.5 mm, within the range of sizes observed since 2011 (Table 12).[n]

Sample Point 2

The geometric mean particle size among samples collected at Sample Point 2 was 16.5 mm, the greatest observed since 2011 (Table 12). The geometric mean particle size at this site increased each year since 2011.

Table 12.–Lower Slate Creek Sample Points 1 and 2 geometric mean particle sizes (mm).

	2011	2012	2013	2014	2015
Sample Point 1	10.1	10.6	13.9	12.7	12.5
Sample Point 2	10.9	11.0	12.9	16.2	16.5

Sediment Metals Concentrations

The 2015 sediment sample contained lower concentrations (mg/kg) of Ag, Cd, Cr, Cu, Ni, and Zn compared to samples collected 2011–2014. Concentrations of the other 5 elements (Al, As, Hg, Pb, and Se) were similar to those observed 2011–2014.[o,p] Figure 16 presents the 2015 sample results, and Figure 17 presents the 2011–2015 data.

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

[o] In 2015, we discontinued sieving the sediment during collection to avoid washing contaminants from the sample. Also, we didn't notice beforehand that the Chain of Custody form the lab provided did not include measuring total volatile solids for each sample, therefore we did not receive total volatile solids data for the 2015 samples.

[p] ALS Environmental of Kelso, WA performed the bioassays in 2014 and 2015.

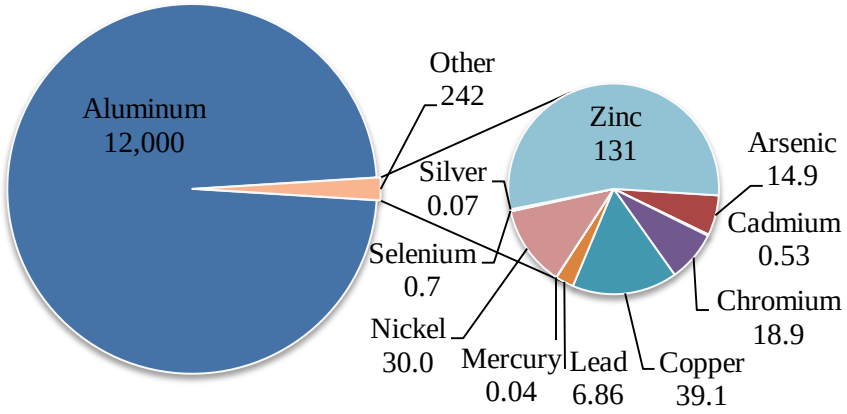


Figure 16.–2015 Lower Slate Creek sediment metals concentrations.

Sediment Toxicity

C. tentans survival on the 2015 Lower Slate Creek sediment sample was significantly different than survival on the control[q] sediment. *H. azteca* growth and survival on the sediment sample were not significantly different than growth and survival on the control sediment.

[q] CH2M Hill of Corvallis, OR performed the 2014 and 2015 analyses.

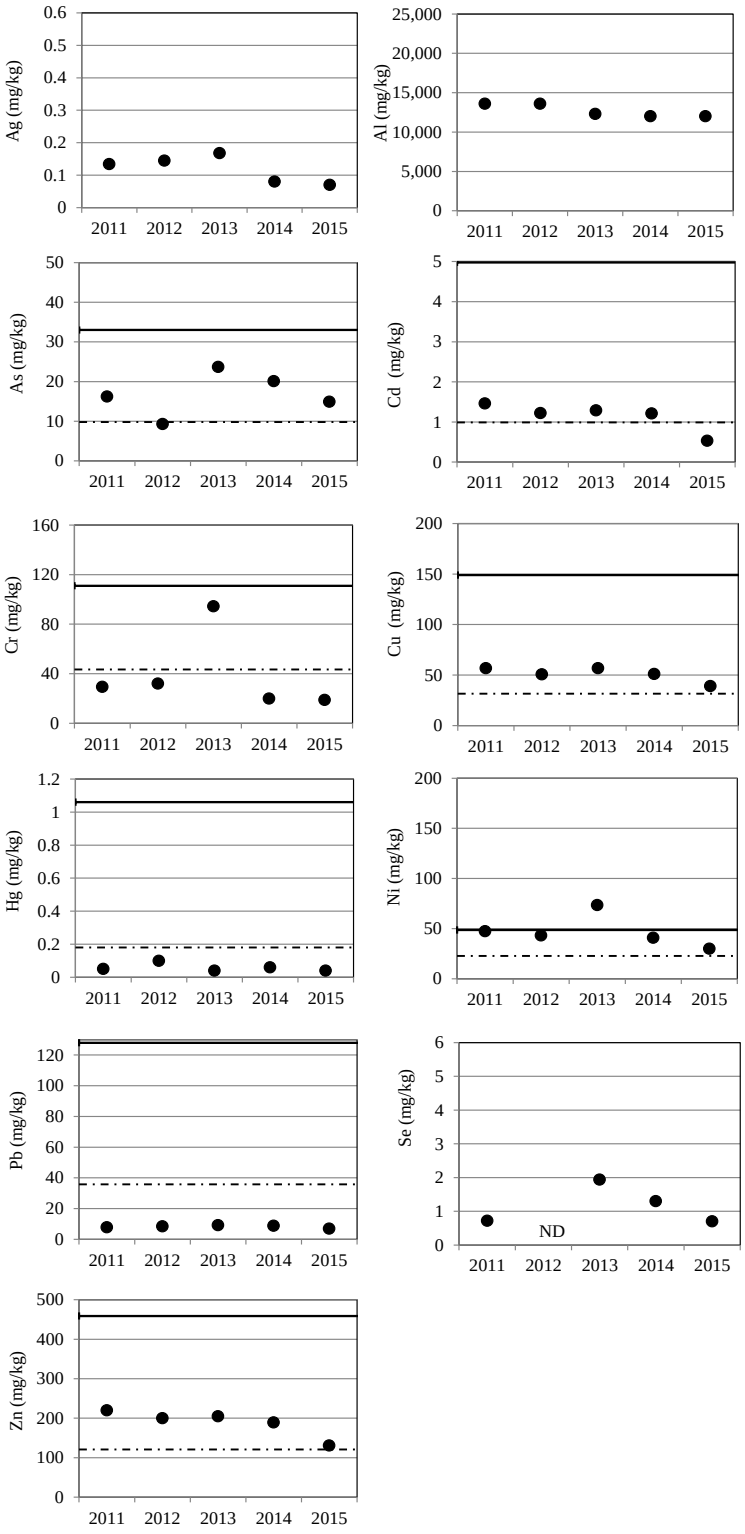


Figure 17.–Lower Slate Creek sediment metals concentrations.

Note: The dashed lines represent threshold effect concentrations (mg/kg), and the solid line represents the probable effect concentrations (mg/kg), specified in Buchman (2008) for freshwater sediments. Effect concentrations for Ag, Al, and Se are not available.

West Fork Slate Creek

Periphyton Density and Composition

The July 2015 mean chlorophyll *a* density was within the range observed since 2011 (Table 13). 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 13.–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
July 28, 2015	0.92	0.03	0.06

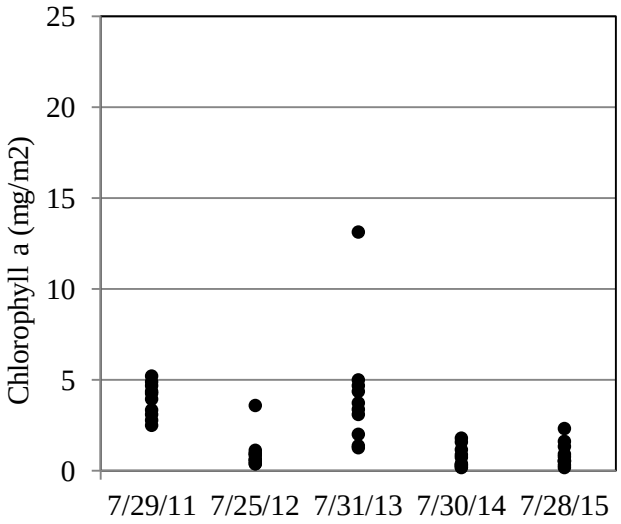


Figure 18.–West Fork Slate Creek chlorophyll *a* sample densities.

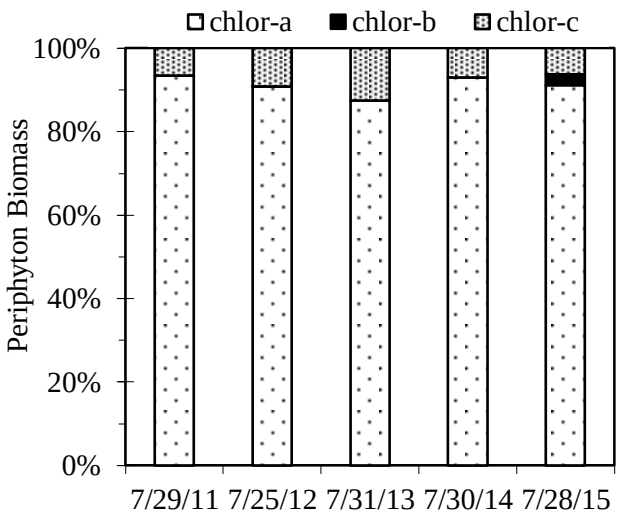


Figure 19.–West Fork Slate Creek mean chlorophylls *a*, *b*, and *c* proportions.

Benthic Macroinvertebrate Density and Composition

Among the spring 2015 samples, we observed the greatest number of insects compared to 2011–2014. We identified 28 taxa and estimate benthic macroinvertebrate density at 2,634 insects/m^2, of which 82% were EPT insects (Figure 20, Table 14). The dominant taxa were Ephemeroptera: Baetis and Cinygmula, representing 38% and 16% of the samples.

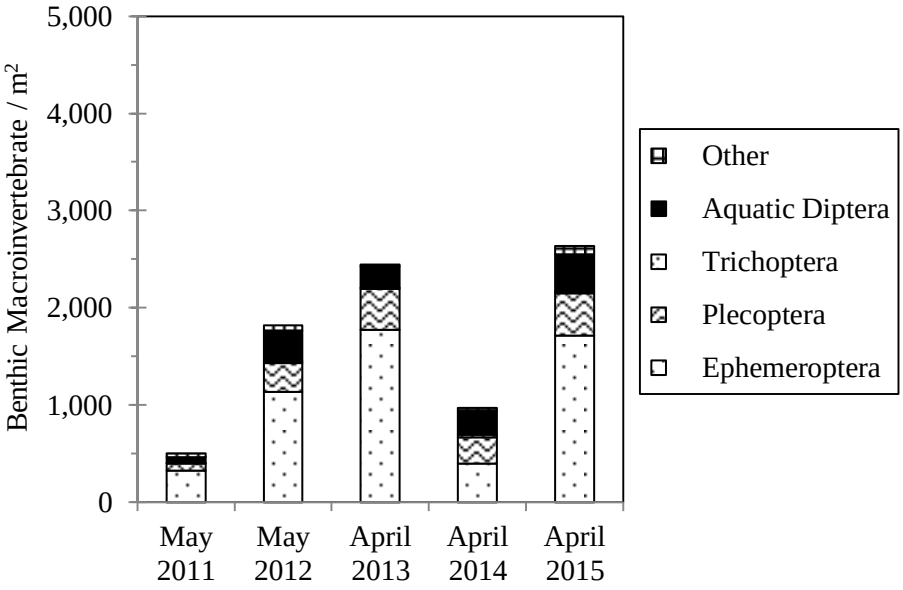


Figure 20.–West Fork Slate Creek benthic macroinvertebrate densities and compositions.

Table 14.– West Fork Slate Creek benthic macroinvertebrate data summary.

	2011	2012	2013	2014	2015
Benthic Macroinvertebrates / m^2	502	1,819	2,446	973	2,634
% EPT	80%	80%	90%	71%	82%
Number of EPT Taxa	11	21	18	17	16
Shannon Diversity Score	0.63	0.84	0.73	0.91	0.82
Evenness Score	0.78	0.71	0.61	0.79	0.71

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[r] from the TTF water treatment plant. East Fork Slate Creek mean daily discharges[s] during July were within ranges of previous years observations, except the last few days of the month when discharge was greater (Figure 21).

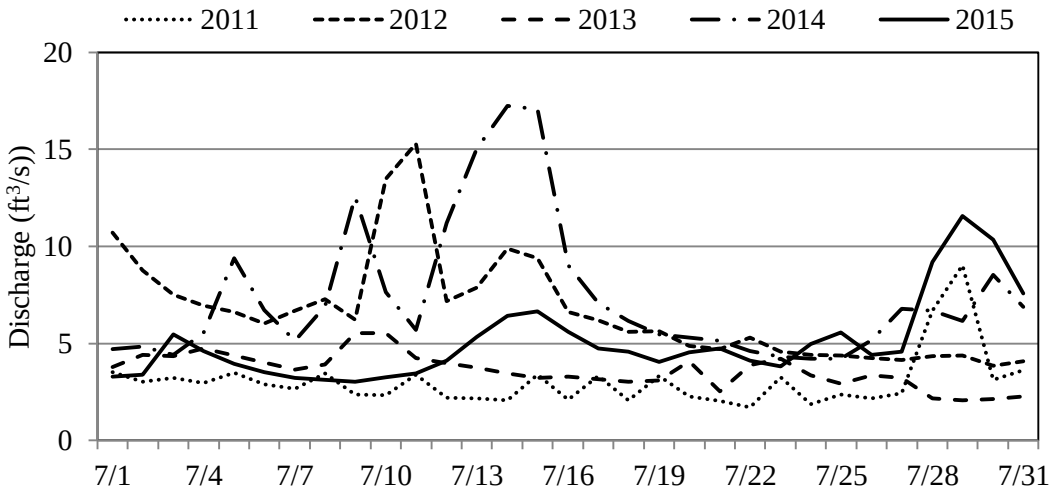


Figure 21.–East Fork Slate Creek discharge.
Note: Calculated using Parshall Flume discharge data and TTF WTP discharge data.

Periphyton Density and Composition

The July 2015 mean chlorophyll *a* density was greater than in 2014 and within the range observed since 2011 (Table 15). 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 15.–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
July 27, 2015	1.56	0.00	0.15

[r] The TTF water treatment plant began discharging to East Fork Slate Creek in December 2010.
[s] Calculated by combining the diversion pipeline Parshall Flume and TTF water treatment plant mean daily discharge data.

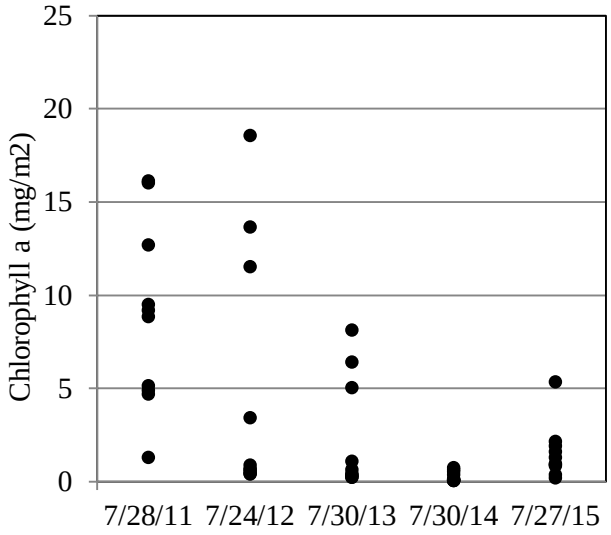


Figure 22.–East Fork Slate Creek chlorophyll *a* sample densities.

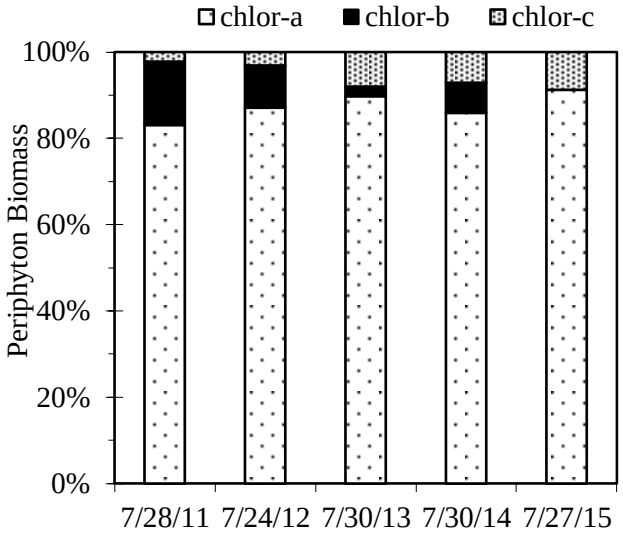


Figure 23.–East Fork Slate Creek mean chlorophylls *a*, *b*, and *c* proportions.

Benthic Macroinvertebrate Density and Composition

Among the spring 2015 samples, we observed the greatest percent EPT since 2011–2012. We identified 28 taxa and estimate benthic macroinvertebrate density at 3,854 insects/m^2, of which 18% were EPT insects (Figure 24, Table 16). The dominant taxa were Diptera: Chironomidae and Ostracoda, representing 28% and 14% of the samples.

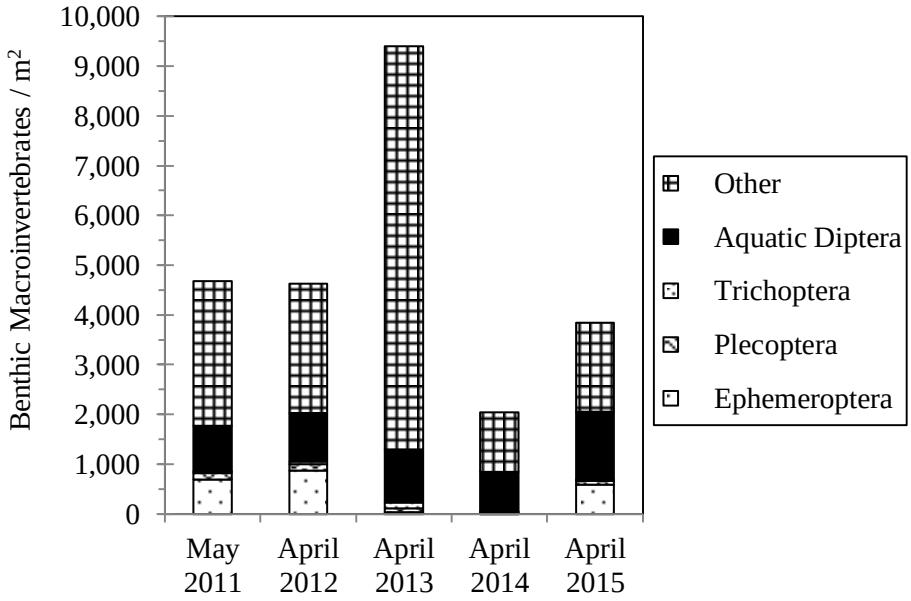


Figure 24.–East Fork Slate Creek benthic macroinvertebrate densities and compositions.

Table 16. –East Fork Slate Creek benthic macroinvertebrate data summary.

	2011	2012	2013	2014	2015
Benthic Macroinvertebrates / m^2	4,688	4,633	9,407	2,048	3,854
% EPT	19%	23%	2.5%	2.0%	18%
Number of EPT Taxa	15	17	17	9	16
Shannon Diversity Score	0.64	0.78	0.57	0.70	0.92
Evenness Score	0.54	0.61	0.47	0.63	0.72

Resident Fish Population and Condition

We did not capture fish during our East Fork Slate Creek survey, therefore the 2015 Dolly Varden char population estimate was 0 fish—the same as in 2013 and 2014 (Figures 25, 26).[t]

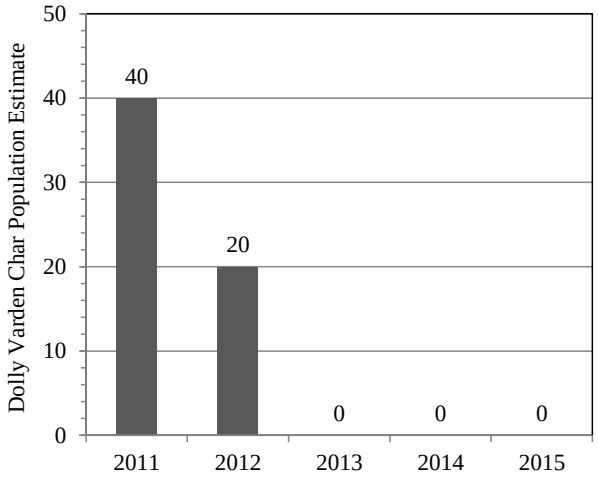


Figure 25.–East Fork Slate Creek resident fish population estimates.

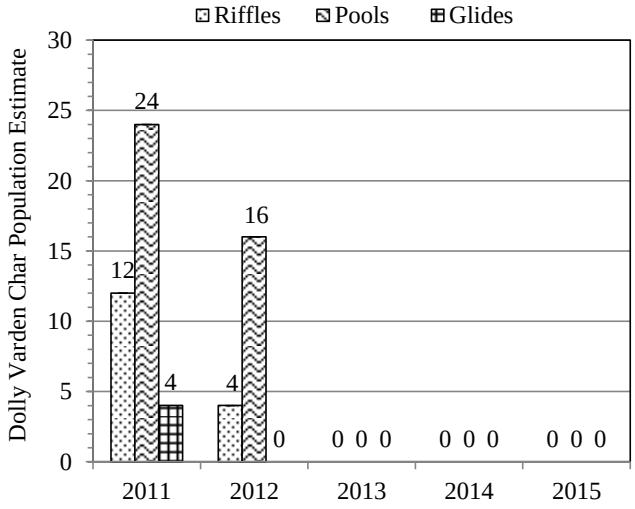


Figure 26.–East Fork Slate Creek resident fish population estimates by habitat type.

Sediment Metals Concentrations

The 2015 sediment sample contained lower concentrations (mg/kg) of Ag, Al, As, Cd, Cu, Ni, and Zn compared to samples collected 2011–2014. Concentrations of other 4 elements (Cr, Hg, Pb, and Se) were within the range of values observed 2011–2014. Figure 27 presents the 2015 sample results, and Figure 28 presents the 2011–2015 data.

[t] In 2014 and 2015 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).

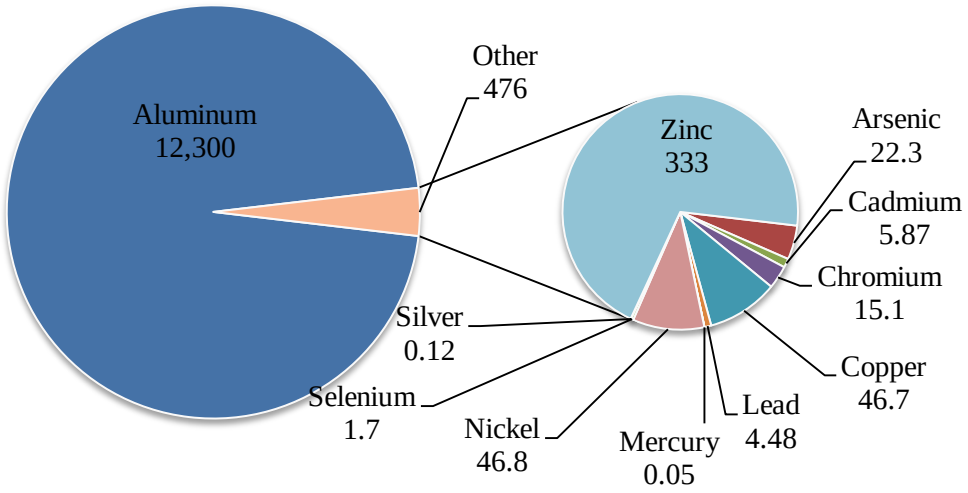


Figure 27.–2015 East Fork Slate Creek sediment metals concentrations.

Sediment Toxicity

C. tentans survival on the 2015 East Fork Slate Creek sediment sample was significantly different than organism survival on the control sediment. *H. azteca* growth and survival on the sediment sample were not significantly different than organism growth and survival on the control sediment.

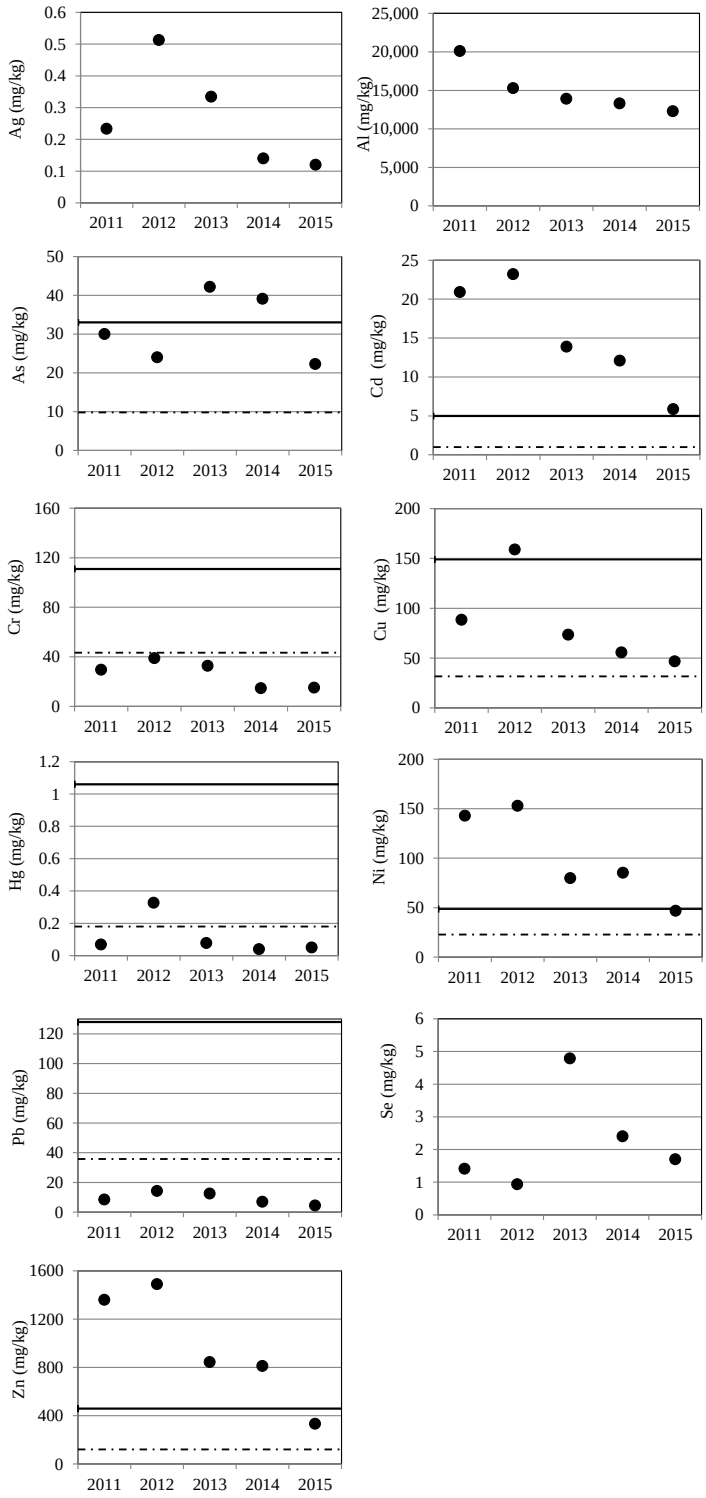


Figure 28.–East Fork Slate Creek sediment metals concentrations.

Note: The dashed lines represent threshold effect concentrations (mg/kg), and the solid line represents the probable effect concentrations (mg/kg), specified in Buchman (2008) for freshwater sediments. Effect concentrations for Ag, Al, and Se are not available.

Upper Slate Creek

Periphyton Density and Composition

The July 2015 mean chlorophyll *a* density was the lowest observed since 2011 (Table 17). 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 17.–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
July 27, 2015	0.63	0.00	0.09

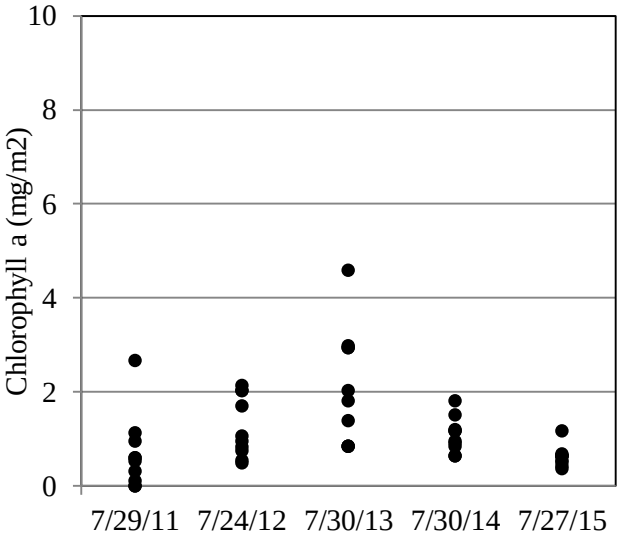


Figure 29.–Upper Slate Creek chlorophyll *a* sample densities.

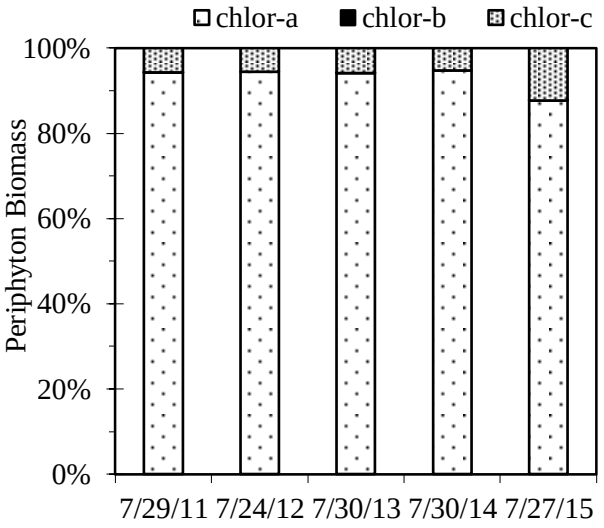


Figure 30.–Upper Slate Creek mean chlorophylls *a*, *b*, and *c* proportions.

Benthic Macroinvertebrate Density and Composition

Among the spring 2015 samples, we observed the greatest number of insects compared to the 2011–2014 samples. We identified 31 taxa and estimate benthic macroinvertebrate density at 3,776 insects/m^2, of which 68% were EPT insects (Figure 31, Table 18). The dominant taxa were Plecoptera: Despaxia and Diptera: Chironomidae, representing 25% and 22% of the samples.

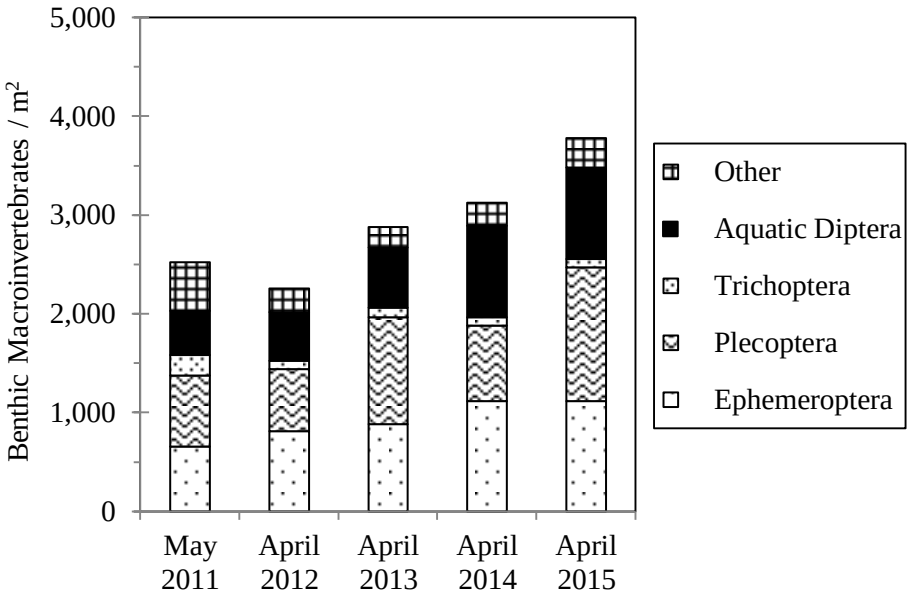


Figure 31.–Upper Slate Creek benthic macroinvertebrate density and composition.

Table 18.–Upper Slate Creek benthic macroinvertebrate data summary.

	2011	2012	2013	2014	2015
Benthic Macroinvertebrates / m^2	2,523	2,256	2,880	3,125	3,776
% EPT	63%	68%	72%	63%	68%
Number of EPT Taxa	18	21	20	20	19
Shannon Diversity Score	0.97	1.04	1.02	1.03	0.98
Evenness Score	0.76	0.79	0.78	0.76	0.74

Resident Fish Population and Condition

The 2015 Dolly Varden char population estimate was 136 ± 60 fish, similar to populations observed 2011–2014 (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 0.94 g/mm^3.

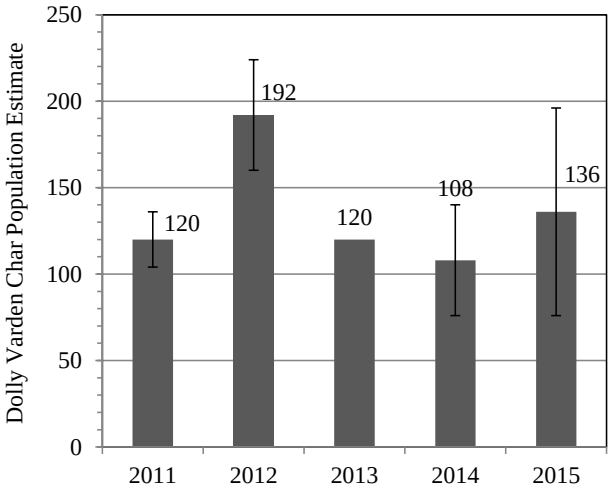


Figure 32.–Upper Slate Creek resident fish population estimates.

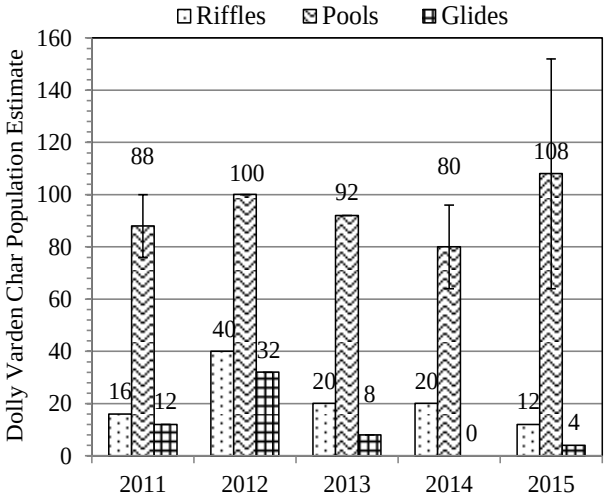


Figure 33.–Upper Slate Creek resident fish population estimates by habitat types.

Sediment Metals Concentrations

The 2015 sediment sample contained a greater concentration (mg/kg) of Hg compared to samples collected 2011–2014. Concentrations of the other 10 elements (Ag, Al, As, Cd, Cr, Cu, Ni, Pb, Se, and Zn) were within the range of values observed 2011–2014. Figure 34 presents the 2015 sample results and Figure 35 presents the 2011–2015 data.

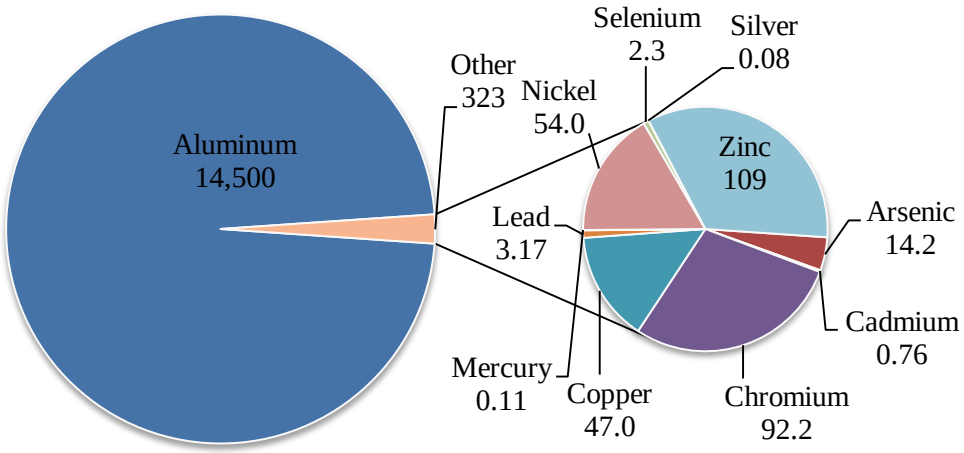


Figure 34.–2015 Upper Slate Creek sediment metals concentrations.

Sediment Toxicity

C. tentans and *H. azteca* survival on the 2015 Upper Slate Creek sediment sample were significantly different than organism survival on the control sediment. *C. tentans* and *H. azteca*

growth on the sediment sample were not significantly different than organism growth on the control sediment.

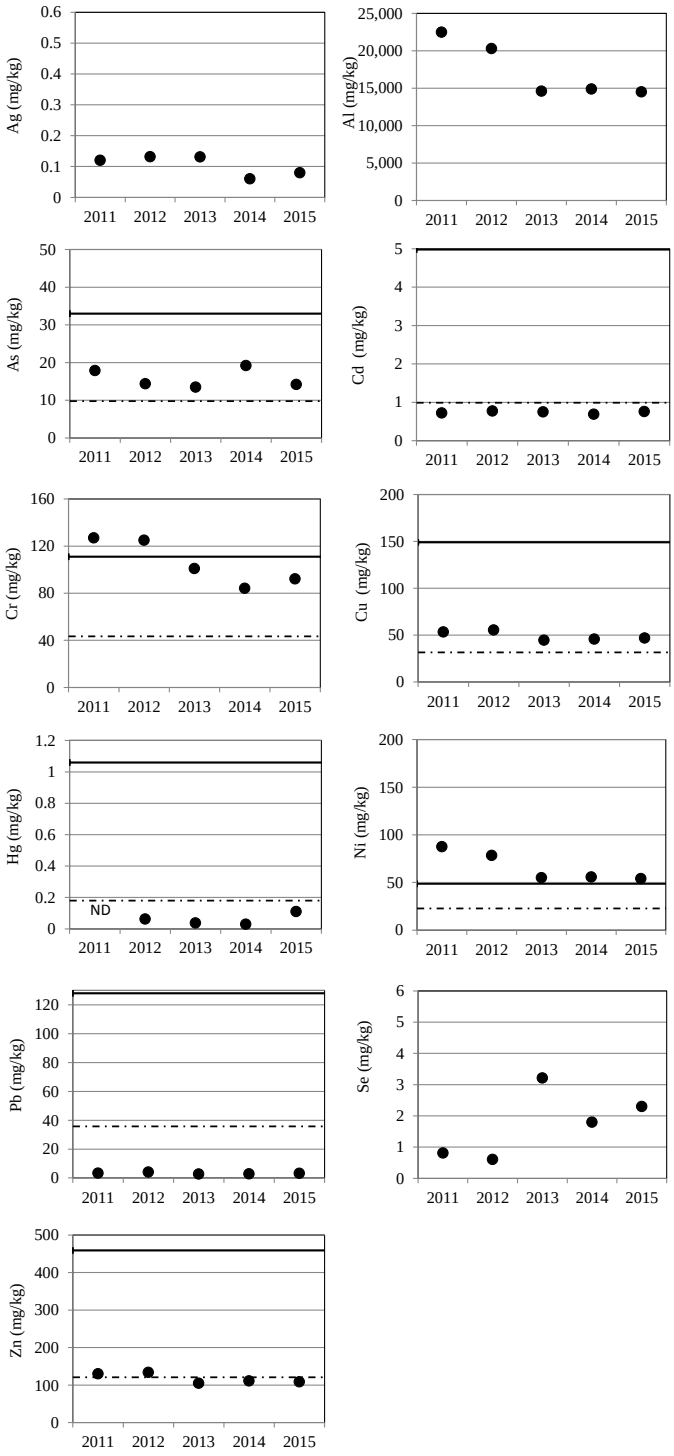


Figure 35.–Upper Slate Creek sediment metals concentrations.

Note: The dashed lines represent threshold effect concentrations (mg/kg), and the solid line represents the probable effect concentrations (mg/kg), specified in Buchman (2008) for freshwater sediments. Effect concentrations for Ag, Al, and Se are not available.

JOHNSON CREEK

Lower Johnson Creek

Adult Salmon Counts

We counted 128,294 live adult pink salmon, 0 live chum salmon, and 88 live coho salmon during the 2015 spawning season. Figure 36 presents the adult pink salmon count for each survey,[u] and Figure 37 presents the distribution of pink salmon. Table 19 presents the 2011–2015 adult salmon counts.

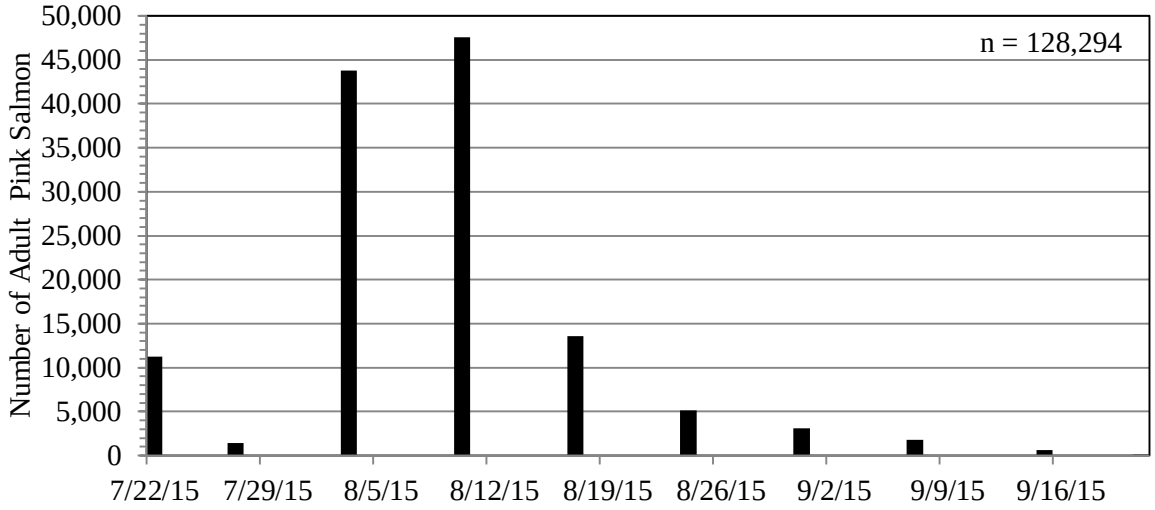


Figure 36.–2015 Lower Johnson Creek weekly pink salmon counts.

[u] We verified 3 aerial counts by foot on July 22, August 3, and August 25, and our 2015 average aerial survey underestimation for pink salmon was a factor of 2.0, similar to previous years.

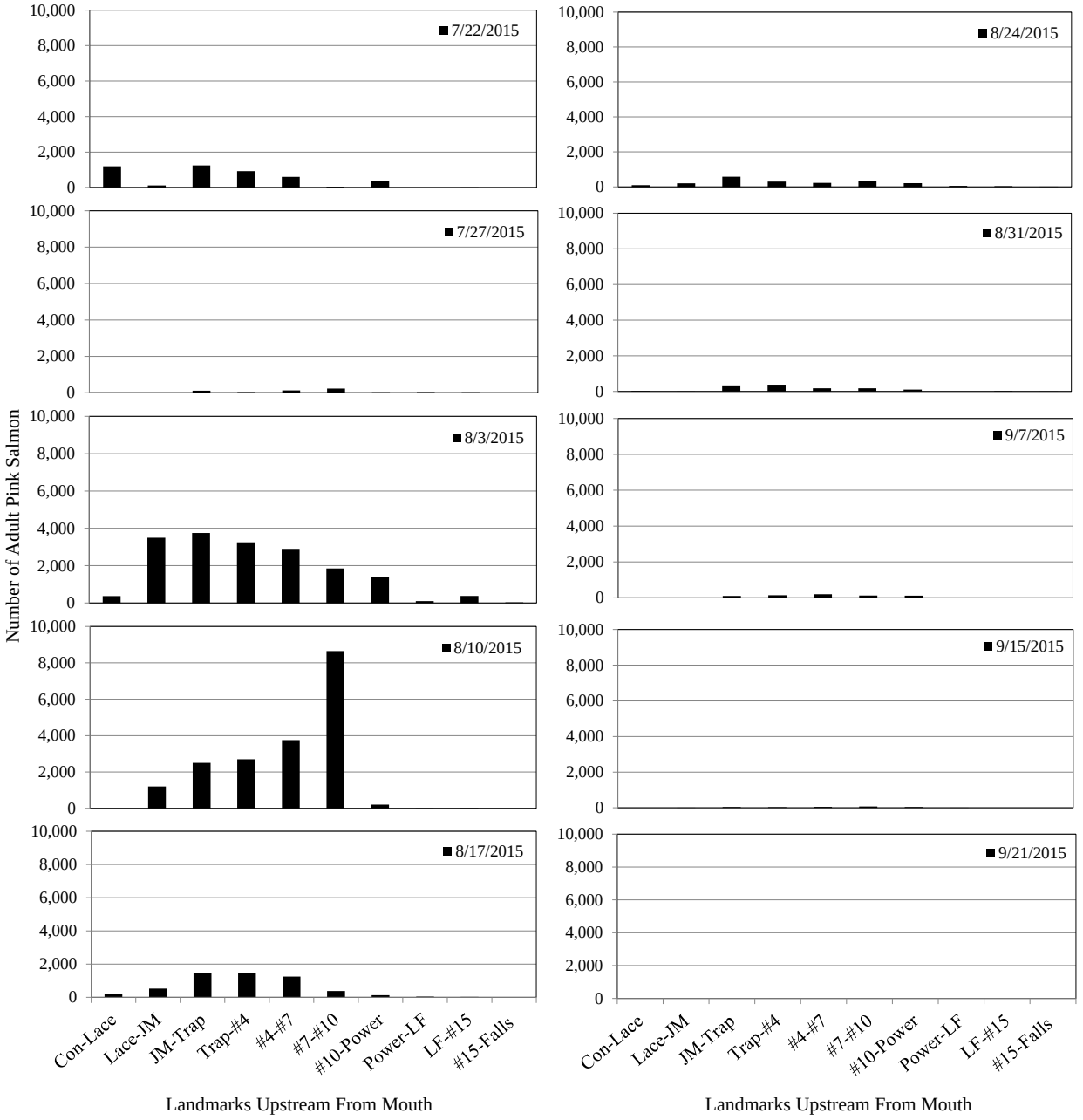


Figure 37.–2015 Lower Johnson Creek weekly adult pink salmon distribution.

Table 19.–Lower Johnson Creek adult salmon counts.

	2011	2012	2013	2014	2015
Pink Salmon	44,181	12,533	20,451	471	128,294
Chum Salmon	52	248	40	6	0
Coho Salmon	33	90	64	107	88

Sediment Metals Concentrations

The 2015 sediment sample contained lower concentrations (mg/kg) of Cd, Cr, Hg, and Zn compared to samples collected 2011–2014. Se was not detected for the fifth year in a row, and concentrations of the other 6 elements (Ag, Al, As, Cu, Ni, and Pb) were within the range of values observed 2011–2014. Figure 38 presents the 2015 sample results, and Figure 39 presents the 2011–2015 data.

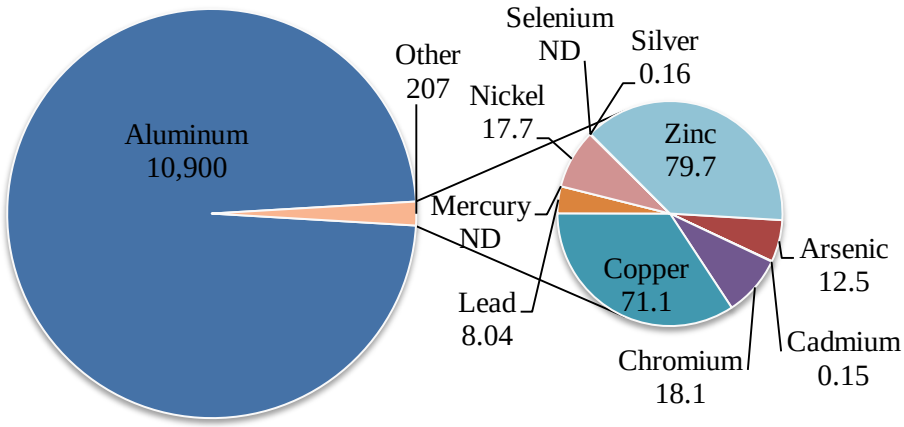


Figure 38.–2015 Lower Johnson Creek sediment metals concentrations.

Sediment Toxicity

C. tentans growth and survival on the 2015 Lower Johnson Creek sediment sample were significantly different than growth and survival on the control sediment. *H. azteca* growth and survival on the sediment sample were not significantly different than growth on the control sediment.

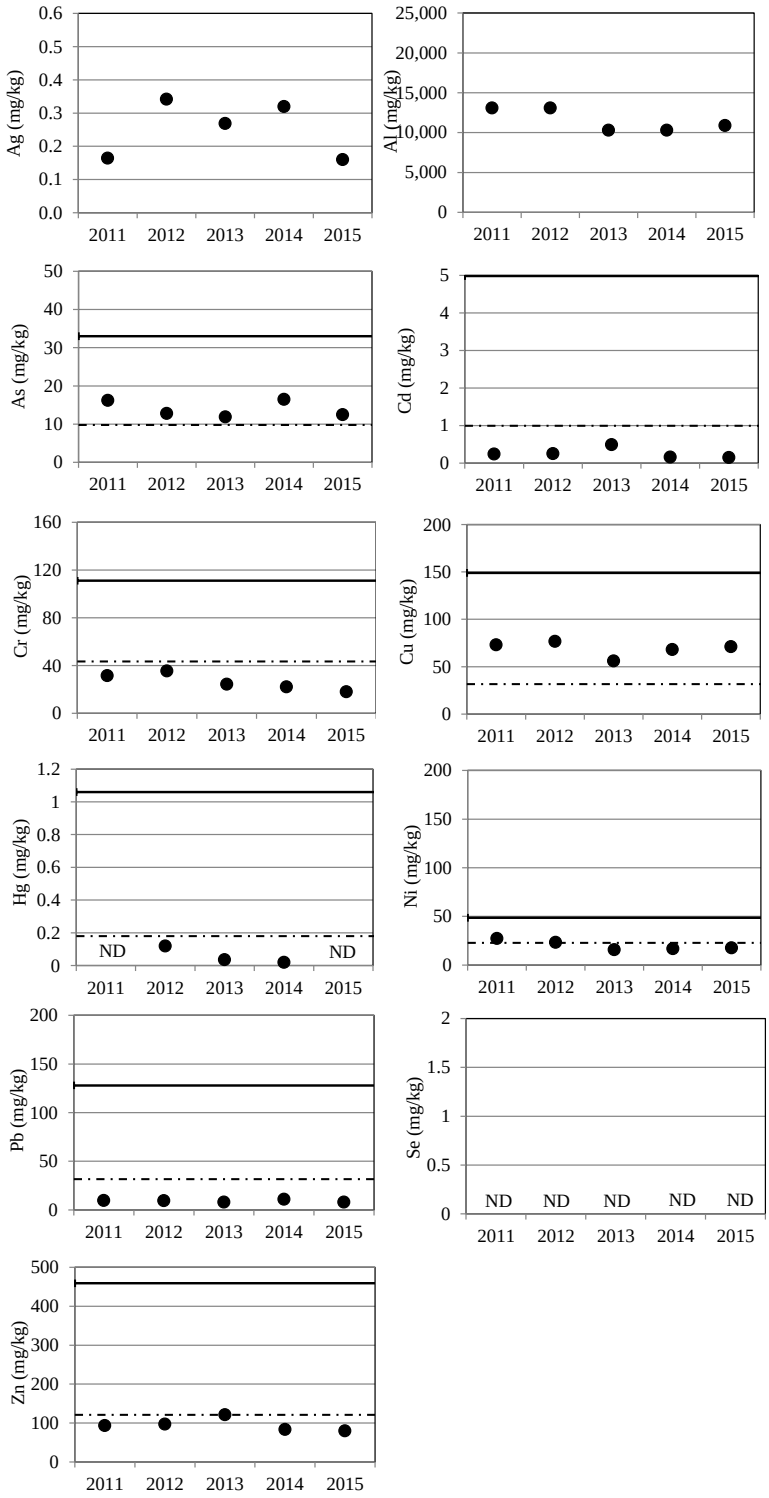


Figure 39.–Lower Johnson Creek sediment metals concentrations.

Note: The dashed lines represent threshold effect concentrations (mg/kg), and the solid line represents the probable effect concentrations (mg/kg), specified in Buchman (2008) for freshwater sediments. Effect concentrations for Ag, Al, and Se are not available.

Upper Johnson Creek

Benthic Macroinvertebrate Density and Composition

Among the spring 2015 samples, we observed the greatest percent EPT and the second lowest density of macroinvertebrates compared to the 2011–2014 samples. We identified 28 taxa and estimate benthic macroinvertebrate density at 2,789 insects/m^2 (Figure 40), of which 71% were EPT insects (Table 20). We observed 3 dominant taxa that each made up 22% of the samples, Diptera: Chironomidae and Ephemeroptera: Drunella and Baetis.

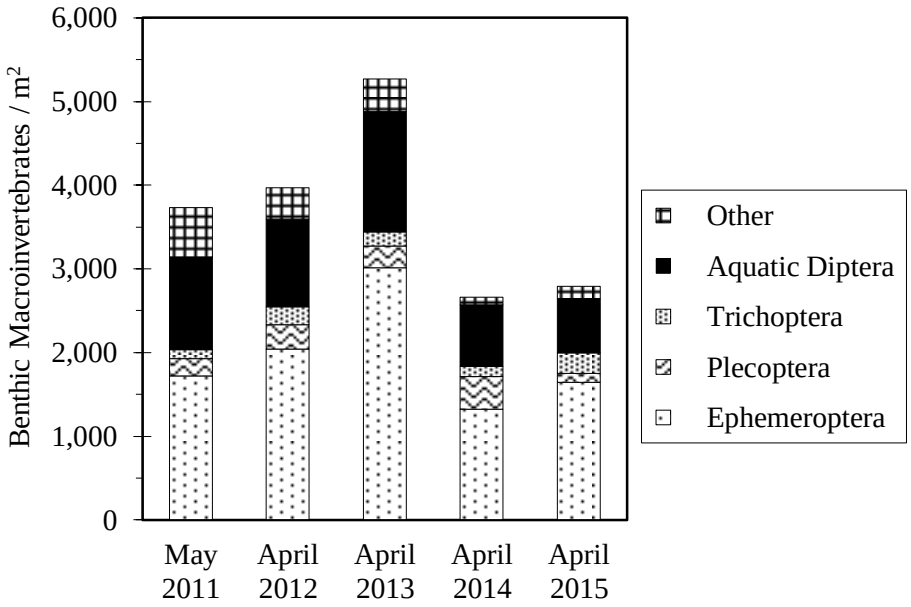


Figure 40.–Upper Johnson Creek benthic macroinvertebrate densities and compositions.

Table 20. Upper Johnson Creek benthic macroinvertebrate data summary.

	2011	2012	2013	2014	2015
Benthic Macroinvertebrates / m^2	3,735	3,968	5,265	2,658	2,789
% EPT	55%	64%	65%	69%	71%
Number of EPT Taxa	14	14	24	32	17
Shannon Diversity Score	0.76	0.81	0.74	0.74	0.87
Evenness Score	0.66	0.68	0.59	0.59	0.71

SHERMAN CREEK

Lower Sherman Creek

Periphyton Density and Composition

Sample Point 1

The July 2015 mean chlorophyll *a* density was similar to the 2014 mean density (Table 21). 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 21.–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	3.69	0.00	0.51
July 28, 2014	1.34	0.00	0.18
July 27, 2015	1.36	0.00	0.17

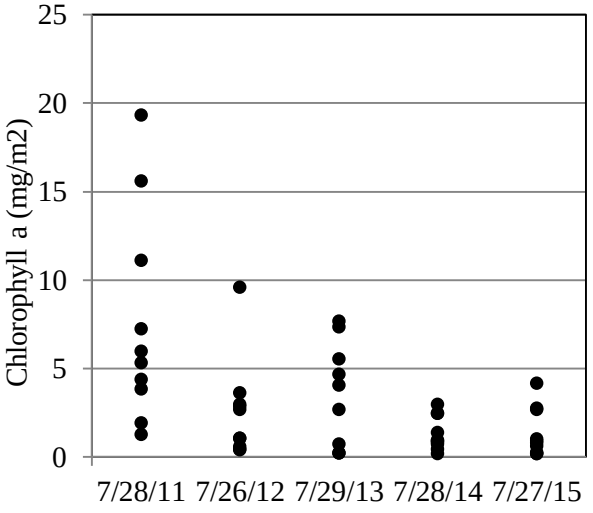


Figure 41.–Lower Sherman Creek Sample Point 1 mean chlorophylls *a*, *b*, and *c* proportions

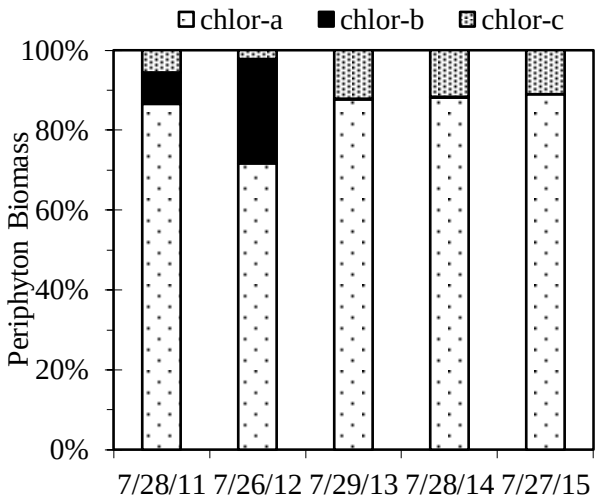


Figure 42.–Lower Sherman Creek Sample Point 1 chlorophyll *a* mean densities.

Sample Point 2

The July 2015 mean chlorophyll *a* density was similar to the 2014 mean density and within the range observed since 2011 (Table 22). 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 22.–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	0.32
July 28, 2014	1.32	0.00	0.12
July 27, 2015	1.62	0.15	0.27

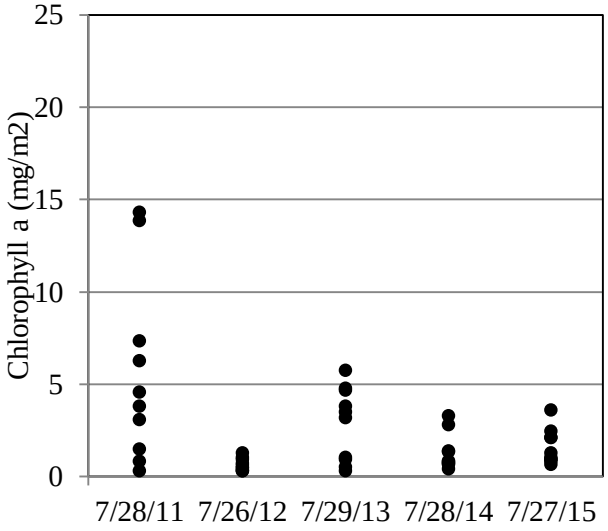


Figure 43.–Lower Sherman Creek Sample Point 2 chlorophyll *a* mean densities.

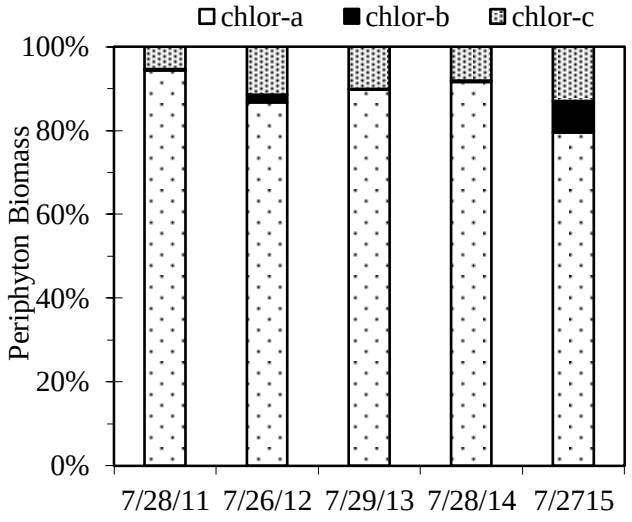


Figure 44.–Lower Sherman Creek Sample Point 2 mean chlorophylls *a, b,* and *c* proportions.

Benthic Macroinvertebrate Density and Composition

Sample Point 1

Among the spring 2015 samples, we observed an increase in percent EPT compared to the 2014 samples, due to fewer chironomids and other organisms present. We identified 26 taxa and estimate benthic macroinvertebrate density at 1,651 insects/m^2, of which 27% were EPT insects (Figure 45, Table 23). The dominant taxa were Diptera: Chironomidae representing and Oligochaeta, representing 33% and 28% of samples.

Sample Point 2

Among the spring 2015 samples, we observed an increase in the number of EPT insects and percent EPT compared to 2014 samples. We identified 23 taxa and estimate benthic macroinvertebrate density at 1,609 insects/m^2, of which 25% were EPT insects (Figure 45, Table 24). The dominant taxa were Oligochaeta and Diptera: Chironomidae, representing 38% and 33% of samples.

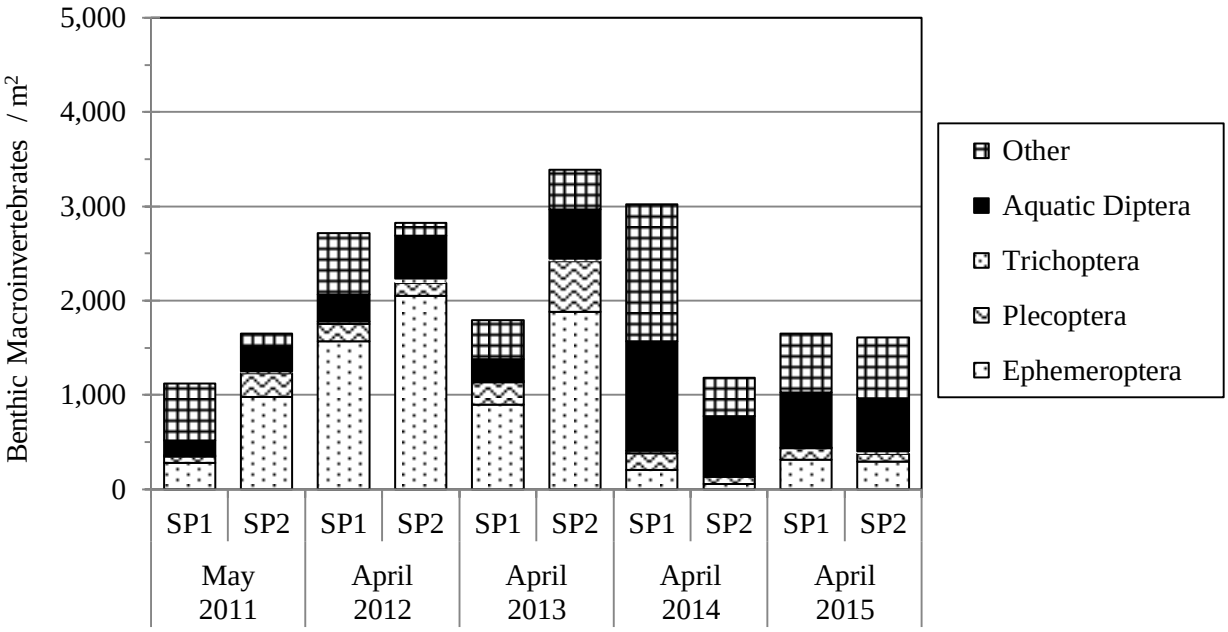


Figure 45.–Lower Sherman Creek Sample Points 1 and 2 benthic macroinvertebrate densities and compositions.

Table 23.–Lower Sherman Creek Sample Point 1 benthic macroinvertebrate data summary.

	2011	2012	2013	2014	2015
Benthic Macroinvertebrates / m^2	1,118	2,733	1,796	3,023	1,651
% EPT	32%	66%	64%	14%	27%
Number of EPT Taxa	15	18	16	13	13
Shannon Diversity Score	0.76	0.74	0.85	0.71	0.84
Evenness Score	0.71	0.62	0.71	0.57	0.70

Table 24.–Lower Sherman Creek Sample Point 2 benthic macroinvertebrate data summary.

	2011	2012	2013	2014	2015
Benthic Macroinvertebrates / m^2	1,651	2,823	3,385	1,185	1,609
% EPT	76%	79%	72%	12%	25%
Number of EPT Taxa	17	26	25	16	13
Shannon Diversity Score	0.93	0.7	0.84	0.70	0.77
Evenness Score	0.76	0.57	0.65	0.62	0.66

Adult Salmon Counts

We counted 2,798 live adult pink salmon and 1 live chum salmon during the 2015 spawning season.[v] 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 25 presents the 2011–2015 adult salmon counts.

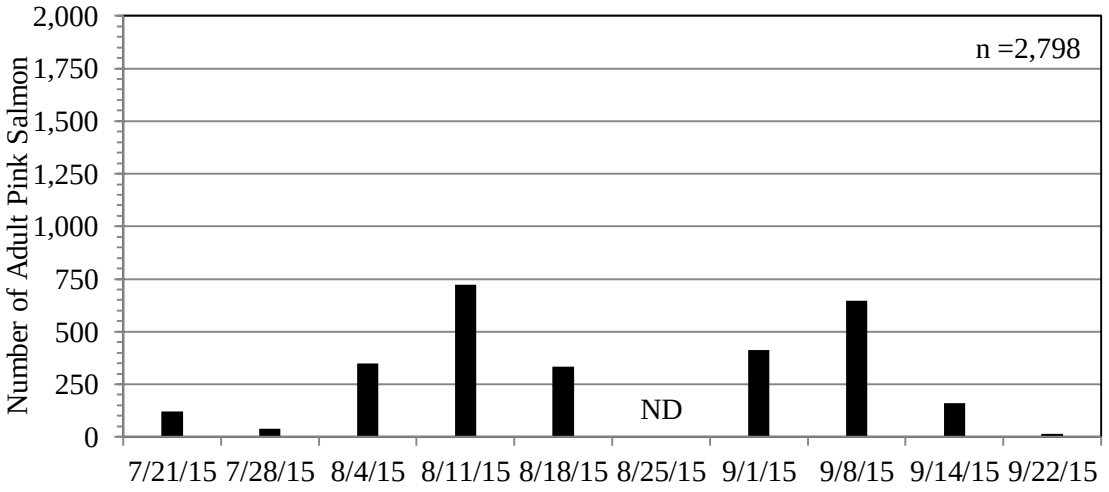


Figure 46.–2015 Lower Sherman Creek weekly adult pink salmon counts.
Note: ND = no data.

[v] Due to high stream discharge, we only surveyed the first 300 m on July 28, and we did not survey the week of August 24 because underground mine closures prevented transit.

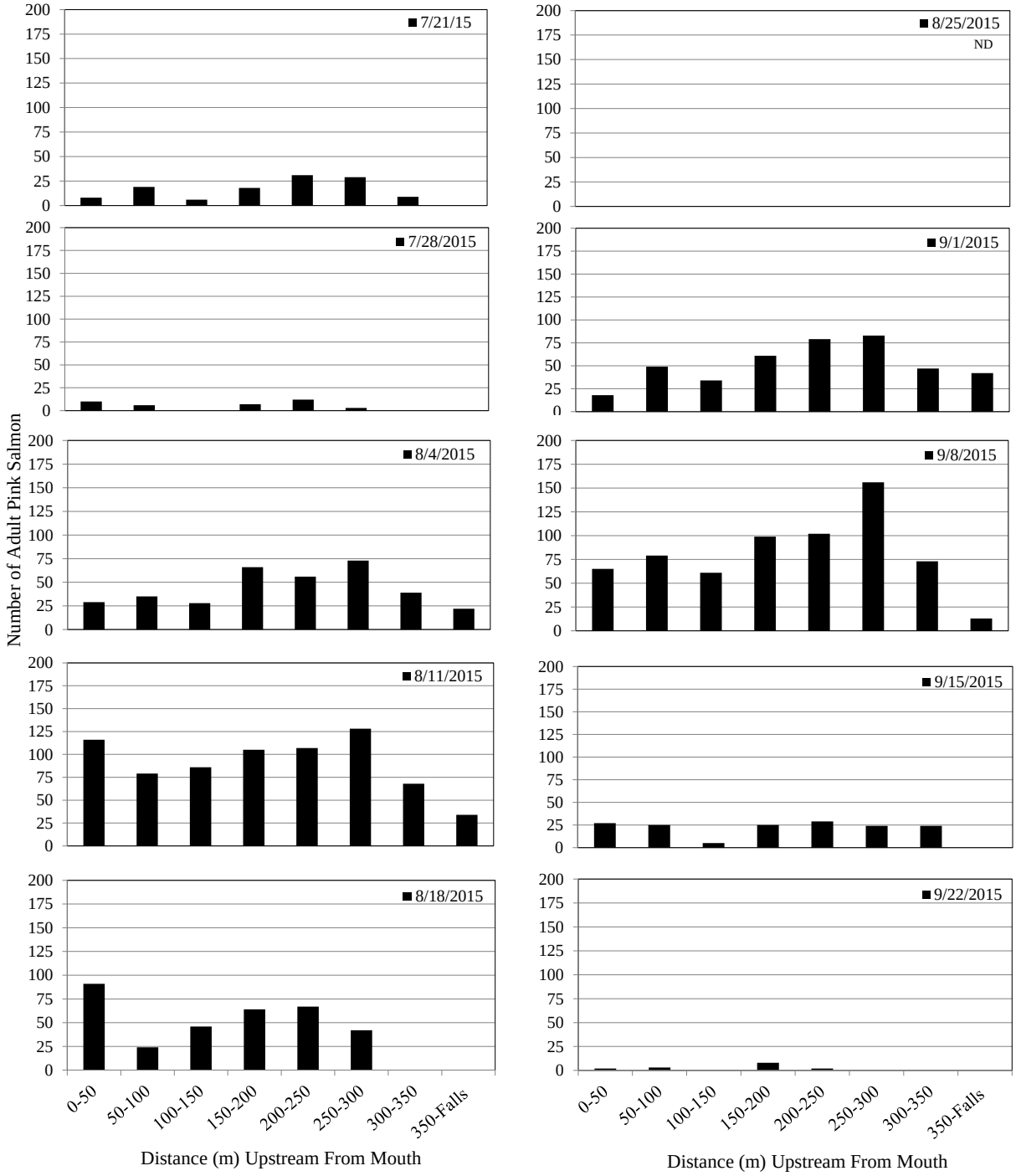


Figure 47.–2015 Lower Sherman Creek weekly adult pink salmon distribution.
Note: ND = no data.

Table 25.–Lower Sherman Creek adult salmon counts.

	2011	2012	2013	2014	2015
Pink Salmon	4,624	1,608	4,981	70	2,798
Chum Salmon	0	0	12	0	1

Sediment Metals Concentrations

The 2015 sediment sample contained the lowest Cr concentration (mg/kg) observed since we began sampling in 2011. Concentrations of As, Pb, Se, and Zn were greater than observed 2011–2014, and concentrations of Ag, Al, Cd, Cu, Hg, and Ni were similar to previous years. Figure 48 presents the 2015 sample results and Figure 49 presents the 2011–2015 data.

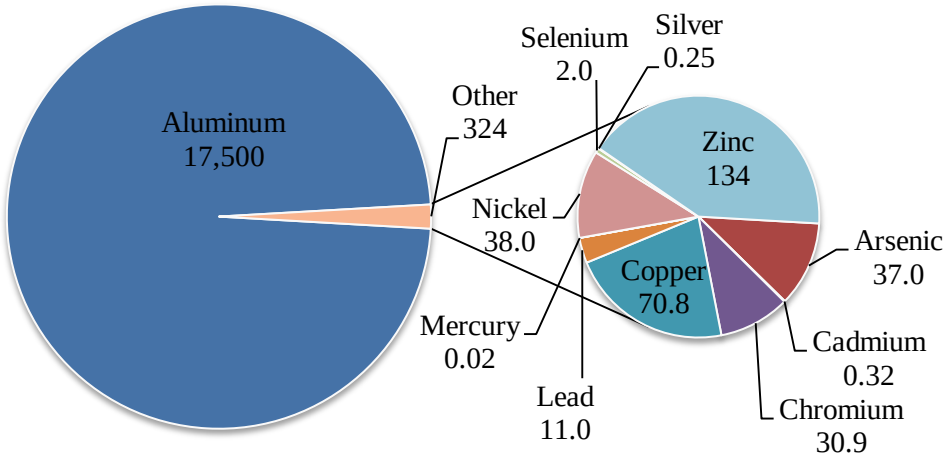


Figure 48.–2015 Lower Sherman Creek sediment metals concentrations.

Sediment Toxicity

C. tentans survival on the 2015 Lower Sherman Creek sediment sample was significantly different than organism survival on the control sediment. *H. azteca* growth and survival on the sediment sample were not significantly different than organism growth and survival on the control sediment.

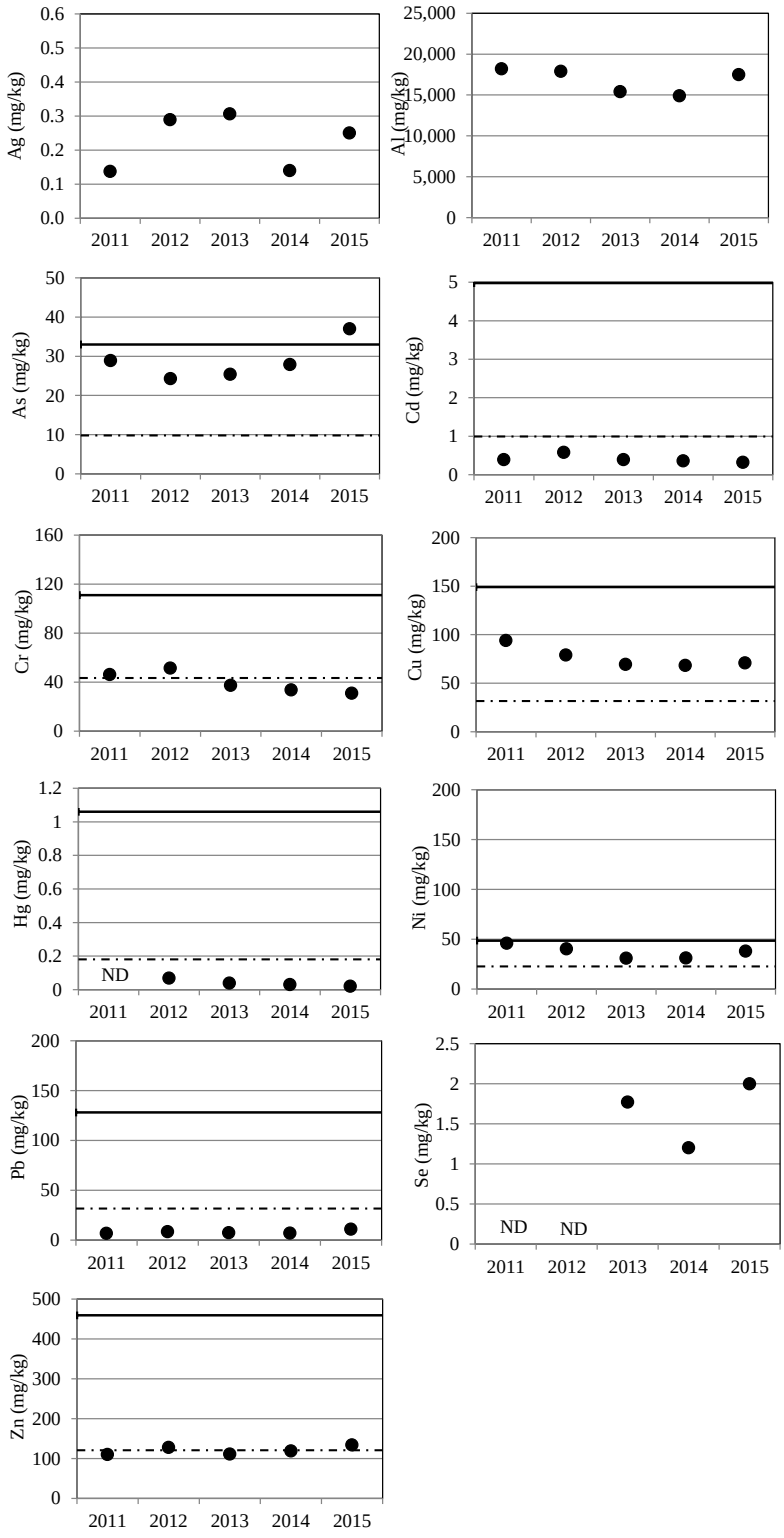


Figure 49.–Lower Sherman Creek sediment metals concentrations.
Note: The dashed lines represent threshold effect concentrations (mg/kg), and the solid line represents the probable effect concentrations (mg/kg), specified in Buchman (2008) for freshwater sediments. Effect concentrations for Ag, Al, and Se are not available.

REFERENCES CITED

Aquatic Science Inc. 1998. Kensington gold project 1998 aquatic resource surveys. Prepared for Coeur Alaska Inc.

Aquatic Science Inc. 1999. Kensington gold project 1999 aquatic resource surveys. Prepared for Coeur Alaska Inc.

Aquatic Science Inc. 2000. Kensington gold project 2000 aquatic resource surveys. Prepared for Coeur Alaska Inc.

Aquatic Science Inc. 2001a. Kensington gold project invertebrate tissue analysis. December 2001.[w] Prepared for Coeur Alaska Inc.

Aquatic Science Inc. 2001b. Kensington gold project resident fish surveys December 2001.[x] Prepared for Coeur Alaska Inc., Juneau, AK.

Aquatic Science Inc. 2002. Kensington gold project aquatic resource surveys December 2002. Prepared for Coeur Alaska Inc., Juneau, AK.

Aquatic Science Inc. 2004. Kensington gold project benthic invertebrate surveys Slate and Johnson Creeks. Prepared for Coeur Alaska Inc., Juneau, AK.

Aquatic Science Inc. 2006. Kensington gold project NPDES permit AK-005057-1 annual water quality monitoring summary Volume 1: Aquatic resource surveys 2005. Prepared for Coeur Alaska Inc., Juneau, AK.

Aquatic Science Inc. 2007. Kensington gold project NPDES permit AK-005057-1 annual water quality monitoring summary Volume 1: Aquatic resource surveys 2006. Prepared for Coeur Alaska Inc., Juneau, AK.

Aquatic Science Inc. 2008. NPDES Annual report 2007 Volume 1: Aquatic resources. Prepared for Coeur Alaska Inc., Juneau, AK.

Aquatic Science Inc. 2009a. Johnson Creek fish habitat channel types and aquatic capability. Prepared for Coeur Alaska Inc. , Juneau, AK.

Aquatic Science Inc. 2009b. Out-migrating salmon fry, Sherman, Johnson and Slate Creeks. Prepared for Alaska Department of Fish and Game (Permit No. SF-2009-059).

Aquatic Science Inc. 2009c. NPDES annual report 2008 Volume Science Inc., Juneau, AK. 1: Aquatic resources. Prepared for Coeur Alaska Inc., Juneau, AK.

Aquatic Science Inc. 2010. NPDES annual report 2009 Volume 1: Aquatic resources. Prepared for Coeur Alaska Inc., Juneau, AK.

Aquatic Science Inc. 2011. NPDES annual report 2010 Volume 1: Aquatic resources. Prepared for Coeur Alaska Inc., Juneau, AK.

Archipelago Marine Research Ltd. 1991. Use of nearshore habitat by juvenile salmonids near Point Sherman, Lynn Canal, Alaska. Prepared for Kensington Venture, Juneau, AK.

Buchman, M. F. 2008. NOAA Screening Quick Reference Tables, NOAA OR&R Report 08-1, Seattle WA, Office of Response and Restoration Division, National Oceanic and Atmospheric Administration.

Coeur Alaska, Inc. 2005. Final plan of operations for the Kensington gold project. Prepared for the USDA Forest Service, Juneau Ranger District, Tongass biological baseline survey Pt. Sherman, Lynn Canal, Alaska April 18–21, 1988 (16325-002-020). Prepared for Kensington National Forest. Juneau, AK.

Dames & Moore. 1991. Nearshore marine biological baseline survey Pt. Sherman, Lynn Canal, Alaska April 18–21, 1998 (16325-002-020). Prepared for Kensington Venture, Boise, ID.

Earthworks Technology, Inc. 2002. Kensington Project August–September 2001 Slate Lakes Basin. Prepared for Coeur Alaska, Inc. Juneau, AK.

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

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

REFERENCES CITED (Continued)

EVS Environment Consultants. 2000. Year 2000 Outmigration counts of juvenile pink salmon in Sherman and Sweeny Creeks. Prepared for Coeur Alaska, Inc. Juneau, AK.

HDR Alaska, Inc. 2003. Slate and Johnson Creek water years 2000, 2001, 2002, and 2003 streamflow analysis. Prepared for Coeur Alaska, Inc., Juneau, AK.

Johnson, J., and V. Litchfield. 2015. Catalog of waters important for spawning, rearing, or migration of anadromous fishes – Southeastern Region, Effective June 1, 2015. Alaska Department of Fish and Game, Special Publication No. 15-07, Anchorage, AK.

Kanouse, K. M. 2015. Aquatic Studies at Kensington Gold Mine, 2014. Alaska Department of Fish and Game, Technical Report No, 15-02, Douglas, AK.

Kline, E. 2003. Technical Memorandum: Preliminary results of 2003 Slate Lakes field work; dated 11/19/2003. Kline Environmental Research, LLC. Somerset, WI.

Kline Environmental Research, LLC. 2001. Kensington project June 2000 Slate Creek Basin survey data report. Prepared for Coeur Alaska, Inc.

Kline Environmental Research, LLC. 2003. Kensington Project: Summary of adult salmon counts during 1995–2000 in Slate Creek and Johnson Creek. Prepared for Earthworks Technology, Inc., Coeur d'Alene, ID.

Kline Environmental Research, LLC. 2005. Data report for aquatic studies conducted in the Slate Lakes Drainage during 2003-2004. Prepared for Coeur Alaska, Inc., Juneau, AK.

Konopacky Environmental. 1992a. Reconnaissance photograph study of Sherman and Sweeny Creeks, located near the Kensington Mine, Alaska, during mid-July 1991. Volume 1 of 2. Prepared for Kensington Venture. Boise, ID.

Konopacky Environmental. 1992b. Baseline monitoring studies of fish and fish habitat in Sherman and Sweeny Creeks, located near the Kensington Mine, Alaska, during 1991. Volume 2 of 2. Prepared for Kensington Venture. Boise, ID.

Konopacky Environmental. 1993a. Second-year reconnaissance photograph study of Sherman and Sweeny Creeks, located near the Kensington Mine, Alaska, during Mid-July 1992. Volume 1 of 2. Prepared for Kensington Venture. Boise, ID.

Konopacky Environmental. 1993b. Counts of adult pink, chum, and coho salmon in Sherman and Sweeny Creeks, located Near the Kensington Mine, Alaska, during spawning periods in 1990 through 1993. Prepared for Coeur-Alaska, Inc., Juneau, AK.

Konopacky Environmental. 1993c. Ongoing and completed monitoring studies of fish and fish habitat in Sherman and Sweeny Creeks, located near the Kensington Mine, Alaska, during 1992. Volume 2 of 2. Prepared for Kensington Venture. Boise, ID.

Konopacky Environmental. 1995. Baseline studies of aquatic habitat and salmonid populations in the Slate Creek System, located near Berner's Bay, Southeast Alaska, during Summer-1994. Volume 2 of 2. Prepared for Coeur Alaska, Inc. Juneau, AK.

Konopacky Environmental. 1996a. Presence-absence survey for fish in small unnamed streams, located in and near the area proposed for the dry tailings storage facility associated with the Kensington Mine, Alaska, during May 1996. Volume 1 of 2. Prepared for Coeur-Alaska, Inc., Juneau, AK.

Konopacky Environmental. 1996b. Counts of adult pink, chum, and coho salmon in Sherman Creek, located near the Kensington Mine, Southeast Alaska, during spawning periods in 1990 through 1993 and 1995. Prepared for Coeur-Alaska, Inc., Juneau, AK.

Konopacky Environmental. 1996c. Analyses of aquatic macroinvertebrate communities in selected stream reaches in the Sherman Creek Drainage, located near the Kensington Mine, Southeast Alaska, during September 1991, July 1995, and December 1995. Volume 1 of 2. Prepared for Coeur-Alaska, Inc., Juneau, AK.

REFERENCES CITED (Continued)

Konopacky Environmental. 1996d. Concentrations of nine trace elements in various size-classes of Dolly Varden char, prickly sculpin, and pink salmon collected from Sherman Creek, located near the Kensington Mine, Southeast Alaska, during 1995 and 1996. Prepared for Coeur-Alaska, Inc., Juneau, AK.

MacDonald, D. D., C. G. Ingersoll, and T. A. Berger. 2000. Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems. Archives of Environmental Contamination Toxicology 39(1):20–31.

Pentec Environmental, Inc. 1990. Escapement counts of pink and coho salmon and habitat surveys in three streams near the Kensington Mine, Alaska, from August to October 1990. Prepared for Kensington Venture, Boise, ID.

Pentec Environmental, Inc. 1991. Additional analyses of pink salmon counts and habitat composition in three streams near the Kensington Mine, Alaska, during August and September 1990. Prepared for Kensington Venture, Boise, ID.

Steffen Robertson and Kirsten Consulting Engineers and Scientists. 1997. Kensington gold project report on construction activity related to creek crossings and alterations. Prepared for Coeur Alaska, Inc., Juneau, AK.

Tetra Tech, Inc, Tongass National Forest (Alaska), U.S. Environmental Protection Agency (Region X), U.S. Army Corps of Engineers (Alaska District), Alaska Department of Natural Resources. 2004a. Kensington Gold Project: final supplemental environmental impact statement Volume 1. U.S. Dept. of Agriculture, Forest Service, Tongass National Forest, Juneau AK.

Tetra Tech, Inc, Tongass National Forest (Alaska), U.S. Environmental Protection Agency (Region X), U.S. Army Corps of Engineers (Alaska District), Alaska Department of Natural Resources. 2004b. Kensington Gold Project: final supplemental environmental impact statement Volume 2. U.S. Dept. of Agriculture, Forest Service, Tongass National Forest, Juneau AK.

Timothy, J. and K. M. Kanouse. 2012. Aquatic studies at Kensington Mine, 2011. Alaska Department of Fish and Game, Division of Habitat Technical Report No. 11-08, Douglas, AK.

Timothy, J. and K. M. Kanouse. 2013. Aquatic studies at Kensington Gold Mine, 2012. Alaska Department of Fish and Game, Division of Habitat Technical Report No.12-10, Douglas, AK.

Timothy, J. and K. M. Kanouse. 2014. Aquatic studies at Kensington Gold Mine, 2013. Alaska Department of Fish and Game, Division of Habitat Technical Report No. 14-01, Douglas, AK.

TPEC (Travis/Peterson Environmental Consulting, Inc.). 2014. Tailings treatment facility environmental monitoring plan for Kensington Gold Mine. Prepared for Coeur Alaska, Inc., Fairbanks, AK.

APPENDIX A: PERIPHYTON DATA

Appendix A1.–Lower Slate Creek chlorophylls *a*, *b*, and *c* densities, 2011–2015.

	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*
	0.21	0.05	0.00	1.60	0.13	0.07	14.10	0.00	1.56	0.00	0.00	0.00
	1.28	0.02	0.11	4.06	0.00	0.39	20.72	0.00	3.11	9.29	3.22	0.48
	0.85	0.01	0.07	2.03	0.00	0.18	10.89	0.00	1.01	1.45	0.00	0.23
	3.31	0.08	0.25	0.96	0.00	0.04	17.84	0.00	2.66	12.18	5.27	0.38
	11.85	3.11	0.30	2.56	0.04	0.22	2.14	0.00	0.24	0.75	0.00	0.05
	18.05	0.42	0.91	0.92	0.00	0.01	6.09	0.00	0.95	4.70	0.00	0.67
	-	0.13	0.00	1.49	0.13	0.13	15.49	0.00	1.99	2.88	0.00	0.49
	0.43	0.05	0.00	2.35	0.12	0.19	12.71	0.00	1.58	1.82	0.00	0.15
	8.54	0.39	0.58	6.19	0.05	0.54	11.32	0.00	1.87	0.73	0.00	0.07
	6.30	0.03	0.38	0.96	0.00	0.06	14.63	0.00	1.46	5.87	0.00	0.51
mean	5.65	0.43	0.26	2.31	0.05	0.18	12.59	0.00	1.64	3.97	0.85	0.30
max	18.05	3.11	0.91	6.19	0.13	0.54	20.72	0.00	3.11	12.18	5.27	0.67
min	0.21	0.01	0.00	0.92	0.00	0.01	2.14	0.00	0.24	0.00	0.00	0.00

	April 2015			July 2015		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*
	17.30	0.00	3.23	0.45	0.10	0.01
	3.74	0.00	0.73	3.06	0.00	0.28
	7.69	0.00	1.41	0.95	0.09	0.04
	10.25	0.00	1.61	0.85	0.00	0.06
	9.72	0.00	1.73	0.72	0.13	0.00
	19.76	0.00	3.03	2.24	0.44	0.12
	4.59	0.00	0.73	9.93	0.00	1.13
	14.31	0.00	2.21	**0.19**	-	-
	8.97	0.00	1.79	2.88	0.14	0.28
	6.62	0.00	1.22	0.32	0.01	0.00
mean	10.30	0.00	1.77	2.16	0.10	0.21
max	19.76	0.00	3.23	9.93	0.44	1.13
min	3.74	0.00	0.73	0.19	0.00	0.00

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

Appendix A2.–West Fork Creek chlorophylls *a*, *b*, and *c* densities, 2011–2015.

	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	1.18	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

	July 2015		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*
	1.34	0.00	0.21
	0.92	0.00	0.01
	0.77	0.02	0.03
	0.54	0.05	0.00
	0.19	-	-
	1.64	0.00	0.04
	2.35	0.00	0.21
	0.53	0.12	0.00
	0.56	0.00	0.06
	0.32	0.05	0.00
mean	0.92	0.03	0.06
max	2.35	0.12	0.21
min	0.19	0.00	0.00

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

Appendix A3.–East Fork Creek chlorophylls *a*, *b*, and *c* densities, 2011–2015.

	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*
	9.51	2.16	0.24	11.53	3.24	0.28	8.12	0.00	0.67	0.14	0.00	0.00
	9.18	0.02	0.20	0.41	0.04	0.04	**0.24**	-	-	0.64	0.00	0.07
	1.28	0.03	0.00	0.88	0.00	0.05	1.07	0.03	0.07	0.05	0.04	0.00
	5.13	1.15	0.11	0.50	0.00	0.03	0.32	0.07	0.00	0.75	0.14	0.10
	16.02	0.18	0.44	3.42	0.00	0.11	0.64	0.10	0.00	0.05	0.00	0.00
	8.86	1.94	0.70	0.64	0.08	0.05	5.02	0.16	0.35	0.37	0.00	0.00
	4.70	0.70	0.13	18.58	0.00	0.66	0.43	0.00	0.03	**0.05**	-	-
	16.13	5.35	0.28	13.67	2.32	0.57	6.41	0.11	0.50	0.11	0.00	0.00
	4.91	0.49	0.12	0.69	0.00	0.00	0.32	0.00	0.00	0.53	0.00	0.01
	12.71	3.59	0.15	0.43	0.00	0.00	**0.24**	-	-	**0.05**	-	-
mean	8.84	1.56	0.24	5.08	0.57	0.18	2.28	0.06	0.20	0.27	0.02	0.02
max	16.13	5.35	0.70	18.58	3.24	0.66	8.12	0.16	0.67	0.75	0.14	0.10
min	1.28	0.02	0.00	0.41	0.00	0.00	0.24	0.00	0.00	0.05	0.00	0.00

	April 2015			July 2015		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*
	1.71	0.03	0.29	0.85	0.00	0.12
	5.45	0.00	0.60	**0.19**	-	-
	12.28	0.00	1.91	1.92	0.00	0.09
	5.13	0.00	0.82	0.96	0.00	0.09
	0.64	0.01	0.13	1.60	0.00	0.22
	1.28	0.00	0.11	5.34	0.00	0.55
	-	-	-	2.14	0.00	0.09
	0.75	0.00	0.05	0.37	0.00	0.00
	1.14	0.00	0.11	0.92	0.00	0.11
	6.73	0.00	1.12	1.28	0.00	0.08
mean	3.90	0.00	0.57	1.56	0.00	0.15
max	12.28	0.03	1.91	5.34	0.00	0.55
min	0.64	0.00	0.05	0.19	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, 2011–2015.

	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*
	-	0.00	0.00	2.03	0.00	0.14	1.82	0.00	0.27	0.92	0.00	0.11
	0.32	0.00	0.04	0.96	0.00	0.09	0.85	0.01	0.07	1.20	0.00	0.07
	0.96	0.01	0.07	0.75	0.00	0.00	2.94	0.00	0.13	1.52	0.00	0.06
	0.11	0.00	0.00	0.50	0.00	0.03	1.39	0.00	0.12	1.82	0.00	0.15
	2.67	0.00	0.26	2.03	0.00	0.14	2.99	0.00	0.11	0.85	0.00	0.00
	-	0.00	0.00	1.07	0.00	0.14	4.59	0.00	0.20	0.64	0.00	0.01
	0.60	0.00	0.12	0.55	0.00	0.02	0.85	0.00	0.01	1.18	0.00	0.07
	1.14	0.00	0.01	1.71	0.00	0.06	2.03	0.00	0.20	0.96	0.00	0.00
	0.53	0.00	0.00	2.14	0.00	0.12	0.85	0.00	0.00	0.64	0.00	0.01
	0.60	0.00	0.02	0.83	0.00	0.00	2.94	0.00	0.20	1.17	0.00	0.12
mean	0.87	0.00	0.05	1.26	0.00	0.07	2.13	0.00	0.13	1.09	0.00	0.06
max	2.67	0.01	0.26	2.14	0.00	0.14	4.59	0.01	0.27	1.82	0.00	0.15
min	0.11	0.00	0.00	0.50	0.00	0.00	0.85	0.00	0.00	0.64	0.00	0.00

	July 2015		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*
	0.37	0.00	0.08
	0.64	0.00	0.08
	0.64	0.00	0.07
	0.51	0.00	0.06
	0.43	0.00	0.08
	0.55	0.00	0.28
	0.64	0.00	0.02
	0.64	0.00	0.08
	0.69	0.00	0.00
	1.17	0.00	0.13
mean	0.63	0.00	0.09
max	1.17	0.00	0.28
min	0.37	0.00	0.00

Appendix A5.–Lower Sherman Creek Sample Point 1 chlorophylls *a*, *b*, and *c* densities, 2011–2015.

	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	4.67	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	3.69	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

	July 2015		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*
	0.28	0.00	0.03
	0.19	-	-
	0.92	0.00	0.11
	0.64	0.00	0.01
	2.67	0.00	0.31
	0.79	0.00	0.00
	2.78	0.00	0.32
	0.19	-	-
	4.17	0.00	0.49
	1.01	0.00	0.09
mean	1.36	0.00	0.17
max	4.17	0.00	0.49
min	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, 2011–2015.

	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	0.43	0.69	0.00	0.07
mean	5.61	0.02	0.32	0.67	0.01	0.09	2.87	0.00	0.32	1.32	0.00	0.12
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

	July 2015		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*
	0.69	0.00	0.00
	0.96	0.00	0.00
	0.85	0.00	0.11
	1.28	0.00	0.16
	2.14	0.00	0.24
	3.63	0.65	0.43
	0.96	0.07	0.03
	2.14	0.78	1.30
	1.07	0.00	0.14
	2.46	0.00	0.24
mean	1.62	0.15	0.27
max	3.63	0.78	1.30
min	0.69	0.00	0.00

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, 2011–2015.

	May 2011	May 2012	April 2013	April 2014	April 2015
Total Benthic Macroinvertebrate Taxa Counted	29	32	27	32	26
Total Ephemeroptera	85	387	400	73	196
Total Plecoptera	70	274	203	352	258
Total Trichoptera	2	8	6	17	6
Total Aquatic Diptera	862	975	503	1,711	1,268
Total Other	129	116	88	155	173
% Ephemeroptera	7.4%	22%	33%	3.2%	10%
% Plecoptera	6.1%	16%	17%	15%	14%
% Trichoptera	0.2%	0.5%	0.5%	0.7%	0.3%
% Aquatic Diptera	75%	55%	42%	74%	67%
% Other	11%	6.6%	7.3%	6.7%	9%
% EPT	14%	38%	51%	19%	24%
% Chironomidae	72%	53%	35%	68%	64%
Shannon Diversity Score (H)	0.51	0.69	0.85	0.64	0.70
Evenness Score (E)	0.48	0.58	0.70	0.52	0.58
Total Aquatic Macroinvertebrates Counted	1,148	1,760	1,200	2,308	1,901
Total Terrestrial Macroinvertebrates Counted	0	4	0	1	3
Total Macroinvertebrates Counted	1,148	1,764	1,200	2,309	1,904
% Sample Aquatic	100%	99.8%	100%	99.96%	99.8%
% Sample Terrestrial	0%	0.2%	0%	0.04%	0.2%
Total Sample Area (m^2)	0.558	0.558	0.465	0.558	0.558
Mean Benthic Macroinvertebrates / Sample	191	293	240	385	317
±1 Standard Deviation	97	172	51	334	229
Estimated Mean Benthic Macroinvertebrates / m^2	2,057	3,154	2,581	4,136	3,407
±1 Standard Deviation	1,046	1,849	551	3,592	2,458
Juvenile Fish	1	0	0	1	0

Appendix B2.–Lower Slate Creek Sample Point 2 benthic macroinvertebrate data, 2011–2015.

	April 2013	April 2014	April 2015
Total Benthic Macroinvertebrate Taxa Counted	24	31	23
Total Ephemeroptera	311	58	197
Total Plecoptera	156	466	130
Total Trichoptera	4	7	1
Total Aquatic Diptera	189	396	198
Total Other	84	181	116
% Ephemeroptera	42%	5%	31%
% Plecoptera	21%	42%	20%
% Trichoptera	0.5%	0.6%	0.2%
% Aquatic Diptera	25%	36%	31%
% Other	11%	16%	18%
% EPT	63%	48%	51%
% Chironomidae	22%	33%	27%
Shannon Diversity Score (H)	0.93	0.72	0.97
Evenness Score (E)	0.78	0.62	0.82
Total Aquatic Macroinvertebrates Counted	744	1,108	642
Total Terrestrial Macroinvertebrates Counted	2	7	1
Total Macroinvertebrates Counted	746	1,115	643
% Sample Aquatic	99.7%	99.4%	99.8%
% Sample Terrestrial	0.3%	0.6%	0.2%
Total Sample Area (m^2)	0.558	0.558	0.558
Mean Benthic Macroinvertebrates / Sample	124	185	107
±1 Standard Deviation	43	72	28
Estimated Mean Benthic Macroinvertebrates / m^2	1,333	1,986	1,151
±1 Standard Deviation	460	773	299
Juvenile Fish	0	1	0

Appendix B3.–West Fork Slate Creek benthic macroinvertebrate data, 2011–2015.

	May 2011	May 2012	April 2013	April 2014	April 2015
Total Benthic Macroinvertebrate Taxa Counted	21	31	28	29	28
Total Ephemeroptera	181	634	991	223	956
Total Plecoptera	41	166	233	150	243
Total Trichoptera	3	11	10	15	10
Total Aquatic Diptera	35	175	118	136	215
Total Other	20	29	13	19	46
% Ephemeroptera	65%	63%	73%	41%	65%
% Plecoptera	15%	16%	17%	28%	17%
% Trichoptera	1.1%	1.1%	0.7%	2.8%	0.7%
% Aquatic Diptera	13%	17%	8.6%	25%	15%
% Other	7.1%	2.9%	1.0%	3.5%	3.1%
% EPT	80%	80%	90%	71%	82%
% Chironomidae	10%	15%	7.2%	22%	12%
Shannon Diversity Score (H)	0.63	0.84	0.73	0.91	0.82
Evenness Score (E)	0.78	0.71	0.61	0.79	0.71
Total Aquatic Macroinvertebrates Counted	280	1,015	1,365	543	1,470
Total Terrestrial Macroinvertebrates Counted	2	0	0	0	1
Total Macroinvertebrates Counted	282	1,015	1,365	543	1,471
% Sample Aquatic	99%	100%	100%	100%	99.9%
% Sample Terrestrial	1%	0%	0%	0%	0%
Total Sample Area (m^2)	0.558	0.558	0.558	0.558	0.558
Mean Benthic Macroinvertebrates / Sample	47	169	228	91	245
±1 Standard Deviation	38	94	72	45	130
Estimated Mean Benthic Macroinvertebrates / m^2	502	1,819	2,446	973	2,634
±1 Standard Deviation	410	1,009	777	482	1,400
Juvenile Fish	0	0	0	0	0

Appendix B4.–East Fork Slate Creek benthic macroinvertebrate data, 2011–2015.

	May 2011	April 2012	April 2013	April 2014	April 2015
Total Benthic Macroinvertebrate Taxa Counted	27	33	33	24	28
Total Ephemeroptera	387	490	19	9	274
Total Plecoptera	70	73	45	10	36
Total Trichoptera	28	23	66	3	14
Total Aquatic Diptera	507	547	598	454	633
Total Other	1,624	1,451	4,521	667	835
% Ephemeroptera	15%	19%	0.4%	0.8%	15%
% Plecoptera	2.7%	2.8%	0.9%	0.9%	2.0%
% Trichoptera	1.1%	0.9%	1.3%	0.3%	0.8%
% Aquatic Diptera	19%	21%	11%	40%	35%
% Other	62%	56%	86%	58%	47%
% EPT	19%	23%	2.5%	1.9%	18%
% Chironomidae	17%	15%	9.6%	35%	28%
Shannon Diversity Score (H)	0.64	0.78	0.57	0.70	0.92
Evenness Score (E)	0.54	0.61	0.47	0.63	0.72
Total Aquatic Macroinvertebrates Counted	2,616	2,585	5,249	1,143	1,792
Total Terrestrial Macroinvertebrates Counted	3	1	0	0	5
Total Macroinvertebrates Counted	2,619	2,586	5,249	1,143	1,797
% Sample Aquatic	99.9%	99.96%	100%	100%	100%
% Sample Terrestrial	0.1%	0.04%	0%	0%	0%
Total Sample Area (m^2)	0.558	0.558	0.558	0.558	0.465
Mean Benthic Macroinvertebrates / Sample	436	431	875	191	358
±1 Standard Deviation	101	123	356	89	78
Estimated Mean Benthic Macroinvertebrates / m^2	4,688	4,633	9,407	2,048	3,854
±1 Standard Deviation	1,081	1,325	3,830	952	837
Juvenile Fish	0	0	0	0	0

Appendix B5.–Upper Slate Creek benthic macroinvertebrate data, 2011–2015.

	May 2011	April 2012	April 2013	April 2014	April 2015
Total Benthic Macroinvertebrate Taxa Counted	33	39	34	36	31
Total Ephemeroptera	368	454	492	622	622
Total Plecoptera	401	349	604	429	758
Total Trichoptera	116	48	55	44	44
Total Aquatic Diptera	248	273	338	518	517
Total Other	275	135	118	131	166
% Ephemeroptera	26%	36%	31%	36%	30%
% Plecoptera	29%	28%	38%	25%	36%
% Trichoptera	8.2%	3.8%	3.4%	2.5%	2.1%
% Aquatic Diptera	18%	22%	21%	30%	25%
% Other	20%	11%	7.3%	7.5%	8%
% EPT	63%	68%	72%	63%	68%
% Chironomidae	15%	20%	19%	28%	22%
Shannon Diversity Score (H)	0.97	1.04	1.02	1.03	0.98
Evenness Score (E)	0.76	0.79	0.78	0.76	0.74
Total Aquatic Macroinvertebrates Counted	1,408	1,259	1,607	1,744	2,107
Total Terrestrial Macroinvertebrates Counted	1	0	0	1	3
Total Macroinvertebrates Counted	1,409	1,259	1,607	1,745	2,110
% Sample Aquatic	99.9%	100%	100%	99.9%	99.9%
% Sample Terrestrial	0.1%	0%	0%	0.1%	0.1%
Total Sample Area (m^2)	0.558	0.558	0.558	0.558	0.558
Mean Benthic Macroinvertebrates / Sample	235	210	268	291	351
±1 Standard Deviation	109	123	98	61	109
Estimated Mean Benthic Macroinvertebrates / m^2	2,523	2,256	2,880	3,125	3,776
±1 Standard Deviation	1,173	1,321	1,049	660	1,174
Juvenile Fish	0	0	0	0	0

Appendix B6.–Upper Johnson Creek benthic macroinvertebrate data, 2011–2015.

	May 2011	April 2012	April 2013	April 2014	April 2015
Total Benthic Macroinvertebrate Taxa Counted	24	28	34	32	28
Total Ephemeroptera	962	1,139	1,680	740	917
Total Plecoptera	114	163	147	217	58
Total Trichoptera	59	118	95	68	137
Total Aquatic Diptera	619	586	799	407	366
Total Other	330	208	217	51	78
% Ephemeroptera	46%	51%	57%	50%	59%
% Plecoptera	5.5%	7.4%	5.0%	15%	3.7%
% Trichoptera	2.8%	5.3%	3.2%	4.6%	8.8%
% Aquatic Diptera	30%	27%	27%	27%	24%
% Other	16%	9.4%	7.4%	3.4%	5.0%
% EPT	55%	64%	65%	69%	71%
% Chironomidae	29%	26%	27%	26%	22%
Shannon Diversity Score (H)	0.76	0.81	0.74	0.74	0.87
Evenness Score (E)	0.66	0.68	0.59	0.59	0.71
Total Aquatic Macroinvertebrates Counted	2,084	2,214	2,938	1,483	1,556
Total Terrestrial Macroinvertebrates Counted	1	1	1	4	1
Total Macroinvertebrates Counted	2,085	2,215	2,939	1,487	1,557
% Sample Aquatic	99.95%	99.95%	99.97%	99.7%	99.9%
% Sample Terrestrial	0.05%	0.05%	0.03%	0.3%	0.1%
Total Sample Area (m^2)	0.558	0.558	0.558	0.558	0.558
Mean Benthic Macroinvertebrates / Sample	347	369	490	247	259
±1 Standard Deviation	178	214	234	188	80
Estimated Mean Benthic Macroinvertebrates / m^2	3,735	3,968	5,265	2,658	2,789
±1 Standard Deviation	1,918	2,305	2,512	2,017	858
Juvenile Fish	0	0	0	0	0

Appendix B7.–Lower Sherman Creek Sample Point 1 benthic macroinvertebrate data, 2011–2015.

	May 2011	April 2012	May 2013	April 2014	April 2015
Total Benthic Macroinvertebrate Taxa Counted	26	31	28	30	26
Total Ephemeroptera	157	876	499	114	175
Total Plecoptera	36	103	135	97	67
Total Trichoptera	7.0	14	6	18	6
Total Aquatic Diptera	89	160	131	648	326
Total Other	335	372	231	810	347
% Ephemeroptera	25%	58%	50%	6.8%	19%
% Plecoptera	5.8%	6.8%	13%	5.7%	7%
% Trichoptera	1.1%	0.9%	0.6%	1.1%	1.0%
% Aquatic Diptera	14%	11%	13%	38%	35%
% Other	54%	24%	23%	48%	38%
% EPT	32%	66%	64%	14%	27%
% Chironomidae	6%	8%	12%	33%	33%
Shannon Diversity Score (H)	0.76	0.74	0.85	0.71	0.84
Evenness Score (E)	0.71	0.62	0.71	0.57	0.70
Total Aquatic Macroinvertebrates Counted	624	1,525	1,002	1,687	921
Total Terrestrial Macroinvertebrates Counted	1	0	14	1	14
Total Macroinvertebrates Counted	625	1,525	1,016	1,688	935
% Sample Aquatic	99.8%	100%	99%	99.9%	98.5%
% Sample Terrestrial	0.2%	0%	1%	0.1%	1.5%
Total Sample Area (m^2)	0.558	0.558	0.558	0.558	0.558
Mean Benthic Macroinvertebrates / Sample	104	254	167	281	154
±1 Standard Deviation	93	131	23	87	67
Estimated Mean Benthic Macroinvertebrates / m^2	1,118	2,733	1,796	3,023	1,651
±1 Standard Deviation	1,000	1,410	247	936	718
Juvenile Fish	10	12	0	8	0

Appendix B8.–Lower Sherman Creek Sample Point 2 benthic macroinvertebrate data, 2011–2015.

	May 2011	April 2012	May 2013	April 2014	April 2015
Total Benthic Macroinvertebrate Taxa Counted	30	36	39	28	23
Total Ephemeroptera	548	1,143	1,049	31	163
Total Plecoptera	137	77	299	40	47
Total Trichoptera	14	26	18	7	13
Total Aquatic Diptera	143	254	289	354	315
Total Other	79	75	234	229	360
% Ephemeroptera	60%	73%	56%	4.7%	18%
% Plecoptera	15%	4.9%	16%	6.1%	5%
% Trichoptera	1.5%	1.7%	1.0%	1.1%	1.4%
% Aquatic Diptera	16%	16%	15%	54%	35%
% Other	8.6%	4.8%	12%	35%	40%
% EPT	76%	79%	72%	12%	25%
% Chironomidae	11%	15%	14%	48%	33%
Shannon Diversity Score (H)	0.93	0.70	0.84	0.70	0.77
Evenness Score (E)	0.76	0.57	0.65	0.62	0.66
Total Aquatic Macroinvertebrates Counted	921	1,573	1,889	661	898
Total Terrestrial Macroinvertebrates Counted	1	2	18	1	10
Total Macroinvertebrates Counted	922	1,575	1,907	662	908
% Sample Aquatic	99.9%	99.9%	99.1%	99.8%	98.9%
% Sample Terrestrial	0.1%	0.1%	0.9%	0.2%	1.1%
Total Sample Area (m^2)	0.558	0.558	0.558	0.558	0.558
Mean Benthic Macroinvertebrates / Sample	154	263	315	110	150
±1 Standard Deviation	86	109	137	72	70
Estimated Mean Benthic Macroinvertebrates / m^2	1,651	2,823	3,385	1,185	1,609
±1 Standard Deviation	927	1,174	1,471	769	748
Juvenile Fish	0	0	14	0	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, 2011–2015.

				Number of Fish Captured							
Site	Year	Species	FL (mm)	Set 1	Set 2	Set 3	Total	MLE	95% CI	Precision	Power
East Fork Slate Creek	2011	DV	105-140	6	2	2	10	40	---	n/a	---
East Fork Slate Creek	2012	DV	165-175	2	1	2	5	20	---	n/a	n/a
East Fork Slate Creek	2013	DV	---	0	0	0	0	0	---	---	---
East Fork Slate Creek	2014	DV	---	0	0	0	0	0	---	---	---
East Fork Slate Creek	2015	DV	---	0	0	0	0	0	---	---	---
Upper Slate Creek	2011	DV	35-145	14	12	2	28	120	104-136	13%	---
Upper Slate Creek	2012	DV	60-164	23	14	6	43	192	160-224	17%	44%
Upper Slate Creek	2013	DV	35-190	21	7	2	30	120	120-120	---	---
Upper Slate Creek	2014	DV	55-160	13	4	6	23	108	76-140	30%	0.03%
Upper Slate Creek	2015	DV	56-154	10	9	6	25	136	76-196	44%	0.1%

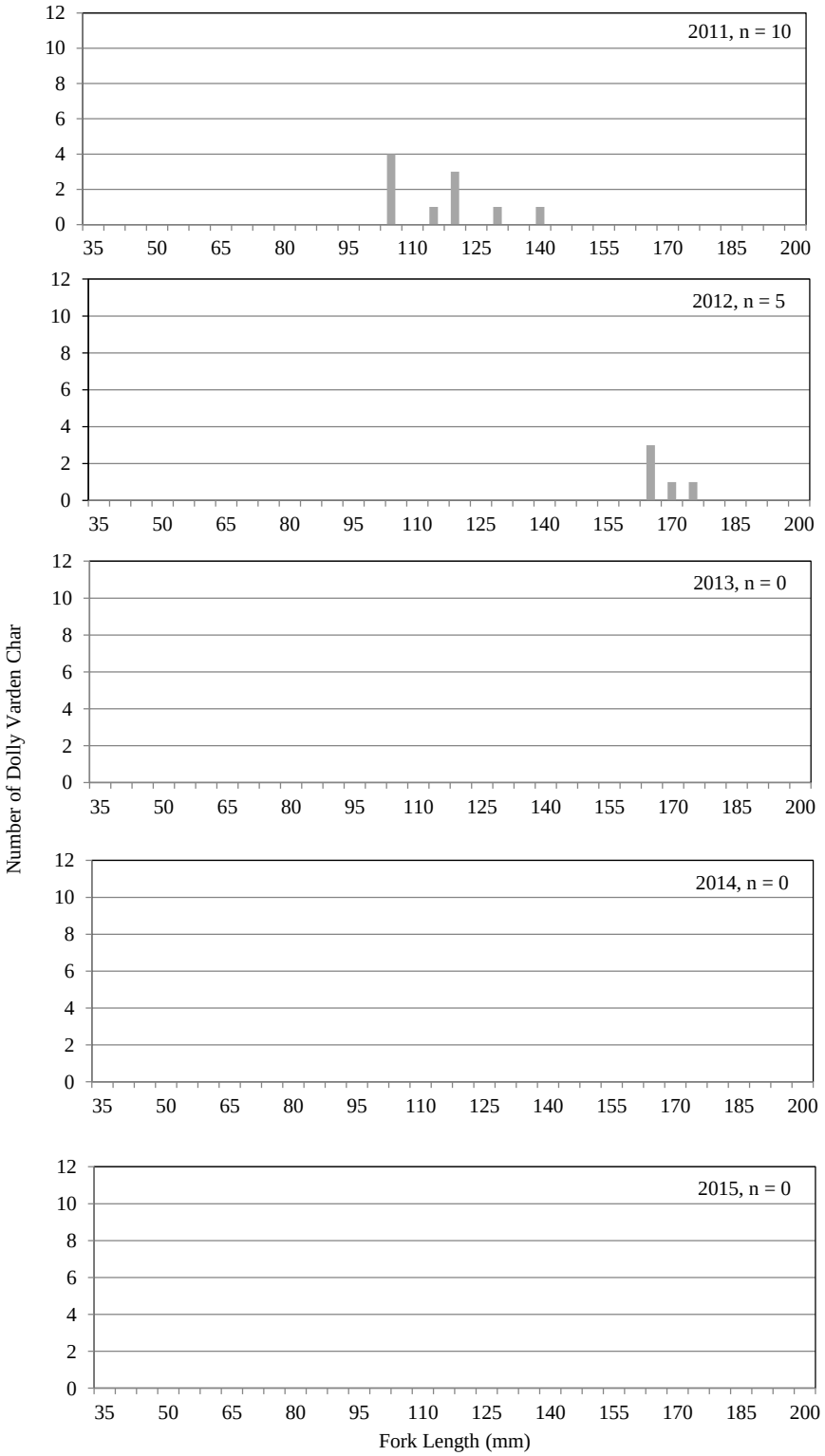
Appendix C2.–East Fork Slate Creek and Upper Slate Creek resident fish capture data and population estimates by habitat type, 2011–2015.

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	---
East Fork Slate Creek	2015	DV	Riffle	0	0	0	0	0	---
East Fork Slate Creek	2015	DV	Pool	0	0	0	0	0	---
East Fork Slate Creek	2015	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	---
Upper Slate Creek	2015	DV	Riffle	1	2	0	3	3	---
Upper Slate Creek	2015	DV	Pool	9	7	5	21	108	64-152
Upper Slate Creek	2015	DV	Glide	0	0	1	1	4	---

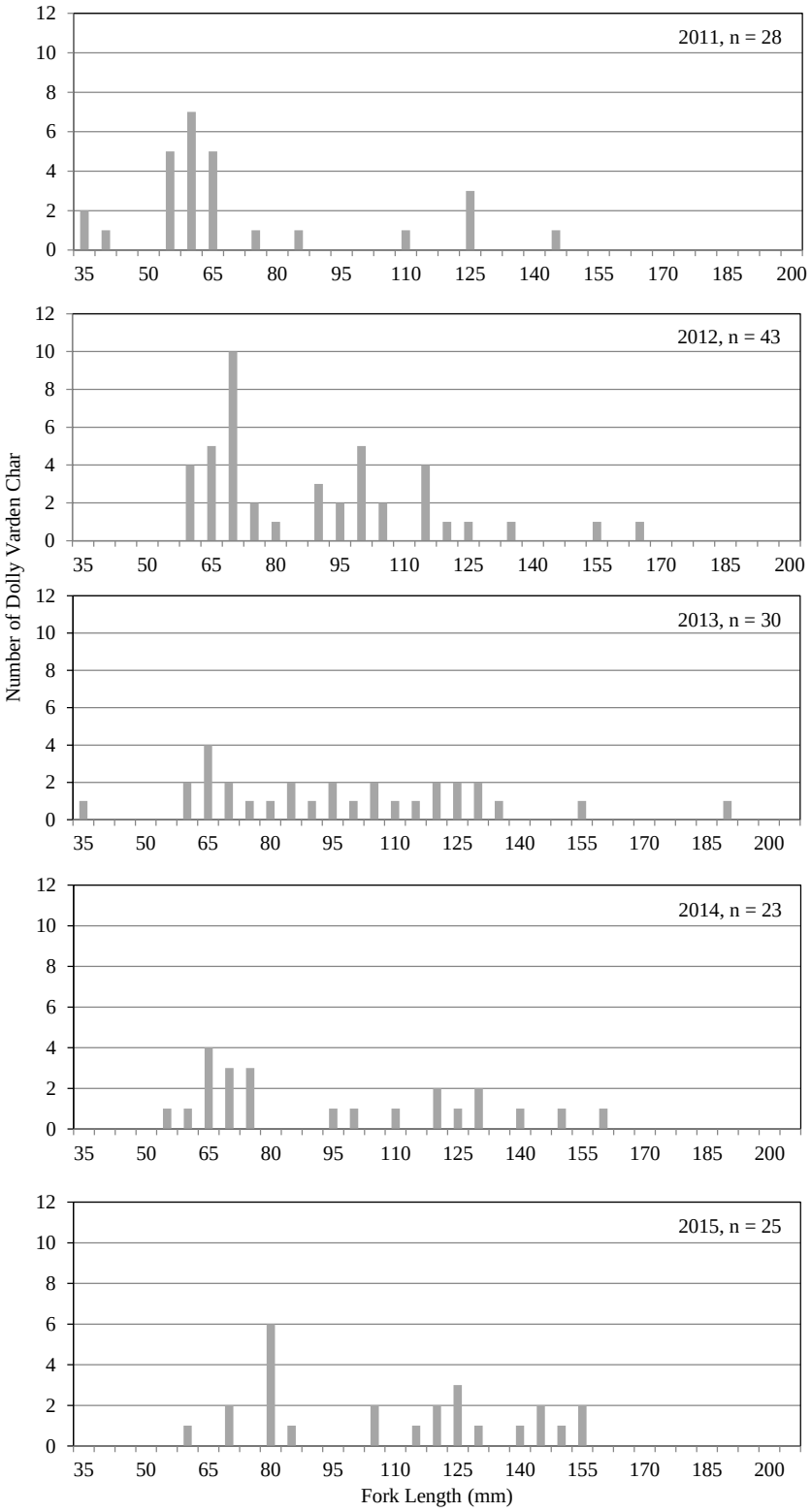
Appendix C3.–2015 Upper Slate Creek captured fish length, weight, and condition data.

Pass #	Species	FL (mm)	Weight (g)	Condition (g/mm^3)
1	DV	138	26.5	1.01
1	DV	123	16	0.86
1	DV	120	17.1	0.99
1	DV	121	16	0.90
1	DV	120	17.7	1.02
1	DV	105	10.7	0.92
1	DV	102	9.9	0.93
1	DV	80	4.6	0.90
1	DV	76	4.5	1.03
1	DV	82	4.5	0.82
2	DV	154	32.6	0.89
2	DV	122	15.8	0.87
2	DV	130	17.9	0.81
2	DV	77	4.4	0.96
2	DV	145	26.9	0.88
2	DV	148	28.8	0.89
2	DV	151	33.1	0.96
2	DV	80	4.6	0.90
2	DV	66	2.8	0.97
3	DV	145	29.4	0.96
3	DV	76	5.1	1.16
3	DV	56	1.9	1.08
3	DV	115	12	0.79
3	DV	76	4.3	0.98
3	DV	66	2.7	0.94
		Mean Fish Condition =		0.94

Appendix C4.–Length frequency diagrams of Dolly Varden char captured in East Fork Slate Creek, 2011–2015.



Appendix C5.–Length frequency diagrams of Dolly Varden char captured in Upper Slate Creek, 2011–2015.



APPENDIX D: ADULT SALMON DATA

Appendix D1.–2015 Lower Slate Creek adult pink salmon counts by reach.

	7/21/2015 Pink Salmon Counts				7/28/2015 Pink Salmon Counts				8/4/2015 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	100	97	98	1
100-200m	0	0	0	0	0	0	0	0	240	277	258	65
200-300m	6	3	4	0	0	0	0	0	230	375	302	15
300-400m	0	0	0	0	26	32	29	2	236	250	243	18
400-500m	4	4	4	0	72	73	72	0	146	125	135	4
500-600m	0	0	0	0	120	132	126	0	156	180	168	3
600-700m	4	4	4	0	123	150	136	1	257	245	251	0
700-800m	0	0	0	0	120	129	124	0	152	195	173	5
800-900m	0	0	0	0	0	0	0	0	100	120	110	2
900-Falls	0	0	0	0	0	0	0	0	41	21	31	0
Total	**14**	**11**	**12**	**0**	**461**	**516**	**487**	**3**	**1,658**	**1,885**	**1,769**	**113**

	8/11/2015 Pink Salmon Counts				8/18/2015 Pink Salmon Counts				8/25/2015 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	162	174	168	26	95	100	97	400	150	150	150	0
100-200m	164	191	177	150	361	260	310	125	175	212	193	0
200-300m	301	280	290	125	275	390	332	100	150	98	124	0
300-400m	200	198	199	65	176	168	172	35	126	124	125	0
400-500m	160	119	139	40	135	170	152	25	57	86	71	0
500-600m	320	400	360	75	135	160	147	15	42	46	44	0
600-700m	260	300	280	65	185	200	192	15	87	108	97	0
700-800m	96	116	106	15	75	125	100	10	42	49	45	0
800-900m	60	51	55	5	40	42	41	2	1	1	1	0
900-Falls	11	7	9	0	0	0	0	0	0	0	0	0
Total	**1,734**	**1,836**	**1,783**	**566**	**1,477**	**1,615**	**1,543**	**727**	**830**	**874**	**850**	**0**

	9/1/2015 Pink Salmon Counts				9/8/2015 Pink Salmon Counts				9/15/2015 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	6	6	6	0	134	193	163	0	1	0	0	0
100-200m	70	98	84	0	103	99	101	0	9	10	9	12
200-300m	135	168	151	0	95	97	96	0	18	16	17	3
300-400m	93	94	93	0	64	62	63	0	1	1	1	3
400-500m	60	64	62	0	64	62	63	0	1	1	1	1
500-600m	52	32	42	0	85	71	78	0	4	4	4	0
600-700m	74	64	69	0	11	11	11	0	0	0	0	0
700-800m	12	19	15	0	0	0	0	0	0	0	0	0
800-900m	5	5	5	0	0	0	0	0	0	0	0	0
900-Falls	0	0	0	0	0	0	0	0	0	0	0	0
Total	**507**	**550**	**527**	**0**	**556**	**595**	**575**	**0**	**34**	**32**	**32**	**19**

	9/22/2015 Pink Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
0-100m	0	0	0	0
100-200m	1	1	1	0
200-300m	1	1	1	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	0	0	0	0
Total	2	2	2	0

Appendix D2.–2015 Lower Slate Creek adult chum salmon counts by reach.

	7/28/2015 Chum Salmon Counts				8/4/2015 Chum Salmon Counts				8/11/2015 Chum 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	2	2	2	0	0	0	0	0
300-400m	0	0	0	0	0	0	0	0	2	2	2	0
400-500m	2	2	2	0	7	7	7	0	0	0	0	0
500-600m	0	0	0	0	0	0	0	0	0	0	0	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	**2**	**2**	**2**	**0**	**9**	**9**	**9**	**0**	**2**	**2**	**2**	**0**

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

	7/22/2015 Pink Salmon Counts				7/27/2015 Pink Salmon Counts				8/3/2015 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	1,400	1,000	1,200	0	0	0	0	0	500	230	365	0
Lace-JM	170	65	117	0	2	1	1	0	4,500	2,500	3,500	0
JM-Trap Site	1,300	1,200	1,250	0	62	160	111	0	4,500	3,000	3,750	0
Trap-Site #4	550	1,300	925	0	25	35	30	0	3,000	3,500	3,250	0
Site #4-Site #7	850	350	600	0	150	100	125	0	2,600	3,200	2,900	0
Site #7-Site #10	50	30	40	0	300	150	225	0	1,500	2,200	1,850	0
Site #10-PH	350	400	375	0	25	20	22	0	2,000	800	1,400	0
PH-LF	0	0	0	0	30	35	32	0	150	50	100	0
LF-Site #15	5	5	5	0	15	30	22	0	500	250	375	0
Site #15-Falls	0	0	0	0	0	0	0	0	50	5	27	0
Total	**4,675**	**4,350**	**4,512**	**0**	**609**	**531**	**568**	**0**	**19,300**	**15,735**	**17,517**	**0**

	8/10/2015 Pink Salmon Counts				8/17/2015 Pink Salmon Counts				8/24/2015 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	1	0	0	0	200	220	210	0	100	94	97	0
Lace-JM	1,000	1,400	1,200	15	550	500	525	0	200	210	205	0
JM-Trap Site	3,200	1,800	2,500	300	1,800	1,100	1,450	0	570	580	575	0
Trap-Site #4	2,600	2,800	2,700	125	1,600	1,300	1,450	0	300	300	300	0
Site #4-Site #7	4,800	2,700	3,750	75	1,500	1,000	1,250	0	130	320	225	0
Site #7-Site #10	10,500	6,800	8,650	300	500	250	375	0	320	375	348	0
Site #10-PH	250	160	205	300	160	85	122	0	200	215	208	0
PH-LF	8	13	10	250	50	25	37	0	60	52	56	0
LF-Site #15	15	11	13	100	30	20	25	0	30	38	34	0
Site #15-Falls	1	0	0	0	0	0	0	0	10	12	11	0
Total	**22,375**	**15,684**	**19,028**	**1,465**	**6,390**	**4,500**	**5,444**	**0**	**1,920**	**2,196**	**2,057**	**0**

	8/31/2015 Pink Salmon Counts				9/7/2015 Pink Salmon Counts				9/14/2015 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	25	37	31	0	3	4	3	0	0	0	0	0
Lace-JM	5	6	5	0	9	7	8	0	4	4	4	0
JM-Trap Site	350	325	337	0	72	132	102	0	34	50	42	0
Trap-Site #4	450	300	375	0	130	154	142	0	27	43	35	0
Site #4-Site #7	180	176	178	0	210	190	200	0	53	49	51	0
Site #7-Site #10	180	166	173	0	114	134	124	0	68	83	75	0
Site #10-PH	125	92	108	0	73	160	116	0	38	42	40	0
PH-LF	0	0	0	0	6	8	7	0	2	3	2	0
LF-Site #15	28	16	22	0	0	0	0	0	0	0	0	0
Site #15-Falls	16	2	9	0	0	0	0	0	0	0	0	0
Total	**1,359**	**1,120**	**1,238**	**0**	**617**	**789**	**702**	**0**	**226**	**274**	**249**	**0**

	9/21/2015 Pink Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
Con-Lace	0	0	0	0
Lace-JM	0	0	0	0
JM-Trap Site	7	7	7	0
Trap-Site #4	1	1	1	0
Site #4-Site #7	0	0	0	0
Site #7-Site #10	3	2	2	0
Site #10-PH	0	0	0	0
PH-LF	0	0	0	0
LF-Site #15	0	0	0	0
Site #15-Falls	0	0	0	0
Total	**11**	**10**	**10**	**0**

Appendix D4.–2015 Lower Johnson Creek adult coho salmon counts by reach.

	10//6/2015 Coho Salmon Counts				10/13/2015 Coho Salmon Counts				10/20/2015 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	9	-	-	0	7	-	-	0	2	-	-	0
Trap-Site #4	3	-	-	0	8	-	-	0	0	-	-	0
Site #4-Site #7	1	-	-	0	3	-	-	0	7	-	-	0
Site #7-Site #10	0	-	-	0	0	-	-	0	0	-	-	0
Site #10-PH	2	-	-	0	9	-	-	0	5	-	-	0
PH-LF	0	-	-	0	1	-	-	0	0	-	-	0
LF-Site #15	0	-	-	0	0	-	-	0	0	-	-	0
Site #15-Falls	0	-	-	0	3	-	-	0	0	-	-	0
Total	**15**	**-**	**-**	**0**	**31**	**-**	**-**	**0**	**14**	**-**	**-**	**0**

	10/27/2015 Coho Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
Con-Lace	0	-	-	0
Lace-JM	0	-	-	0
JM-Trap Site	16	-	-	0
Trap-Site #4	0	-	-	0
Site #4-Site #7	3	-	-	0
Site #7-Site #10	1	-	-	0
Site #10-PH	8	-	-	0
PH-LF	0	-	-	0
LF-Site #15	0	-	-	0
Site #15-Falls	0	-	-	0
Total	**28**	**-**	**-**	**0**

Appendix D5.–2015 Lower Sherman Creek adult pink salmon counts by reach.

	7/21/2015 Pink Salmon Counts				7/28/2015 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	10	7	8	0	10	10	10	12	22	36	29	15
50-100m	20	18	19	0	10	2	6	3	40	31	35	0
100-150m	7	6	6	0	1	0	0	5	25	31	28	1
150-200m	20	17	18	0	12	2	7	6	70	63	66	1
200-250m	30	33	31	1	19	6	12	0	61	52	56	3
250-300m	20	38	29	0	3	3	3	0	90	57	73	3
300-350m	6	12	9	0	0	0	0	0	35	43	39	0
350-Falls	0	0	0	0	0	0	0	0	20	25	22	4
Total	**113**	**131**	**120**	**1**	**55**	**23**	**38**	**26**	**363**	**338**	**348**	**27**

	8/11/2015 Pink Salmon Counts				8/18/2015 Pink Salmon Counts				8/25/2015 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	80	153	116	27	75	108	91	27	---	---	---	---
50-100m	64	94	79	4	20	28	24	5	---	---	---	---
100-150m	74	99	86	0	63	30	46	6	---	---	---	---
150-200m	88	122	105	15	40	88	64	8	---	---	---	---
200-250m	85	130	107	3	60	75	67	3	---	---	---	---
250-300m	124	132	128	6	35	50	42	5	---	---	---	---
300-350m	62	74	68	0	0	0	0	0	---	---	---	---
350-Falls	26	43	34	2	0	0	0	0	---	---	---	---
Total	**603**	**847**	**723**	**57**	**293**	**379**	**334**	**54**	---	---	---	---

	9/1/2015 Pink Salmon Counts				9/8/2015 Pink Salmon Counts				9/15/2015 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	21	15	18	15	70	61	65	0	35	20	27	6
50-100m	50	49	49	3	75	83	79	0	27	23	25	2
100-150m	26	42	34	6	59	63	61	0	4	7	5	0
150-200m	52	70	61	10	103	96	99	0	23	28	25	1
200-250m	36	49	79	36	94	110	102	0	28	31	29	25
250-300m	72	86	83	8	155	157	156	0	25	24	24	0
300-350m	75	92	47	12	66	80	73	0	28	21	24	0
350-Falls	42	53	42	0	15	12	13	0	0	0	0	0
Total	**374**	**456**	**413**	**90**	**637**	**662**	**648**	**0**	**170**	**154**	**159**	**34**

	9/22/2015 Pink Salmon Counts			
Stream Reach	**Obs. 1**	**Obs. 2**	**Mean**	**Carcass**
0-50m	2	2	2	0
50-100m	4	3	3	0
100-150m	0	0	0	0
150-200m	7	9	8	0
200-250m	2	2	2	0
250-300m	0	0	0	0
300-350m	0	0	0	0
350-Falls	0	0	0	0
Total	**15**	**16**	**15**	**0**

Appendix D6.–Lower Slate Creek adult pink salmon counts by statistical week, 2011–2015.

Stat Week	2011	2012	2013	2014	2015
29	--	0	0	0	--
30	--	0	7	0	12
31	0	364	66	2	487
32	371	1,106	604	14	1,769
33	765	3,152	864	13	1,783
34	1,396	2,331	1,199	12	1,543
35	1,649	318	472	0	850
36	1,816	1	97	---	527
37	232	0	27	---	575
38	46	---	1	---	32
39	0	---	---	---	2

Appendix D7.–Lower Johnson Creek adult pink salmon counts by statistical week, 2011–2015.

Stat Week	2011	2012	2013	2014	2015
29	--	0	147	--	--
30	2	182	499	110	11,278
31	448	1,026	5,623	120	1,418
32	4,725	1,882	3,639	209	43,791
33	9,623	4,244	4,680	5	47,569
34	13,159	4,538	3,890	27	13,608
35	3,374	494	1,360	0	5,139
36	9,728	150	372	0	3,092
37	1,673	17	241	---	1,754
38	1,088	0	0	---	621
39	361	---	---	---	24

Appendix D8.–Lower Sherman Creek adult pink salmon counts by statistical week, 2011–2015.

Stat Week	2011	2012	2013	2014	2015
29	--	0	2	--	--
30	1	2	164	0	120
31	301	9	860	6	38
32	774	97	979	40	348
33	1,051	285	765	10	723
34	399	521	549	4	334
35	159	521	785	10	0
36	873	145	624	0	413
37	418	25	232	---	648
38	612	3	21	---	159
39	36	---	---	---	15

APPENDIX E: SPAWNING SUBSTRATE DATA

Appendix E1.–Lower Slate Creek Sample Point 1 spawning substrate data, 2011–2015.

Sample Date	Sample Number	Sample Depth (cm)	Volume (mL/L) Retained Each Sieve (mm)									
			101.6	50.8	25.4	12.7	6.35	1.68	0.42	0.15	Imhoff	GMPS[a]
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	1,050	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
07/06/15	1	25	0	75	300	350	325	350	325	70	42	7.28
07/06/15	2	25	0	225	350	400	325	525	300	24	20.5	10.19
07/06/15	3	25	0	150	475	150	150	200	50	6	6.5	18.69
07/06/15	4	25	0	275	400	225	275	375	150	16	17	13.76

[a] Geometric mean particle size.

Appendix E2.–Lower Slate Creek Sample Point 2 spawning substrate data, 2011–2015.

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[a]
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
07/06/15	1	25	0	75	175	325	425	475	50	6	5.5	10.04
07/06/15	2	25	500	825	225	225	175	250	50	11	8	27.82
07/06/15	3	25	300	225	500	200	175	300	50	15	21.5	16.92
07/06/15	4	25	275	100	200	200	150	225	100	22	9	11.24

[a] Geometric mean particle size.

APPENDIX F: SEDIMENT METALS CONCENTRATION DATA AND TOXICITY LAB REPORTS

Appendix F1.–Stream sediment sample compositions, 2011–2015.

		Particle Size Data								
Sample Site	Sample Date	% Sand	% Silt	% Clay	% Course material (> 2 mm)	Texture	% Total Solids	% Total Volatile Solids	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	---	2.04
Lower Slate Creek	07/03/12	98.0	ND	2.0	0.1	sand	79.22	3.37	---	1.67
Lower Slate Creek	07/02/13	96.0	2.0	2.0	<0.05	sand	74.57	1.63	---	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
Lower Slate Creek	07/06/15	72.2	3.1	1.8	22.8	sand	83.5	---	<1.2	0.473
East Fork Slate Creek	10/03/11	86.0	4.0	10.0	1.7	loamy sand	60.17	7.81	---	11.00
East Fork Slate Creek	07/10/12	26.0	34.0	40.0	ND	clay	23.72	28.54	---	16.70
East Fork Slate Creek	07/01/13	82.0	12.0	6.0	<0.05	loamy Sand	43.66	13.30	---	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
East Fork Slate Creek	07/07/15	82.3	6.9	2.3	8.5	sand	76.2	---	<1.3	0.792
Upper Slate Creek	10/06/11	94.0	2.0	4.0	ND	sand	72.10	4.12	---	5.46
Upper Slate Creek	07/02/12	98.0	ND	2.0	0.3	sand	79.58	2.90	---	3.74
Upper Slate Creek	07/01/13	96.0	ND	4.0	0.2	sand	74.21	2.73	---	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
Upper Slate Creek	07/07/15	31.9	0.2	1.5	66.3	coarse sand	76.5	---	<1.3	1.04
Lower Johnson Creek	10/03/11	96.0	2.0	2.0	ND	sand	74.28	2.01	---	0.89
Lower Johnson Creek	07/02/12	92.0	ND	8.0	ND	sand	77.67	2.55	---	1.19
Lower Johnson Creek	07/01/13	96.0	2.0	2.0	0.3	sand	73.21	0.90	---	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 Johnson Creek	07/06/15	41.9	1.1	0.4	56.6	coarse sand	80.0	---	<1.3	0.376
Lower Sherman Creek	10/04/11	96.0	2.0	2.0	0.1	sand	73.15	2.75	---	0.54
Lower Sherman Creek	07/03/12	96.0	ND	4.0	0.1	sand	78.55	3.05	---	0.82
Lower Sherman Creek	07/01/13	96.0	2.0	2.0	0.6	sand	75.66	0.75	---	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
Lower Sherman Creek	07/07/15	86.1	3.0	1.8	9.0	sand	76.2	---	<1.3	0.399

ND = not detected.

Appendix F2.–Stream sediment sample metals, arsenic, and selenium concentrations, 2011–2015.

		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
Lower Slate Creek	07/06/15	0.07	12,000	14.9	0.53	18.9	39.1	0.04	30.0	6.86	0.7	131
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
East Fork Slate Creek	07/07/15	0.12	12,300	22.3	5.9	15.1	46.7	0.05	46.8	4.48	1.7	333
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
Upper Slate Creek	07/07/15	0.08	14,500	14.2	0.76	92.2	47.0	0.11	54.0	3.17	2.3	109
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
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
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 Johnson Creek	07/06/15	0.16	10,900	12.5	0.15	18.1	71.1	<0.02	17.7	8.04	<0.8	79.7
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
Lower Sherman Creek	07/07/15	0.25	17,500	37.0	0.32	30.9	70.8	0.02	38.0	11.0	2.0	134

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
T : +1 360 577 7222
F : +1 360 636 1068
www.alsglobal.com

July 29, 2015

Analytical Report for Service Request No: K1507493

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: Coeur Alaska Biomonitoring

Dear Kate,

Enclosed are the results of the sample(s) submitted to our laboratory July 10, 2015
For your reference, these analyses have been assigned our service request number **K1507493.**

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 contact me if you have any questions. My extension is 3293. You may also contact me via email at Shar.Samy@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Shar Samy, Ph.D.
Project Manager

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
T : +1 360 577 7222
F : +1 360 636 1068
www.alsglobal.com

Table of Contents

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.

Case Narrative

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS ENVIRONMENTAL

Client:	Alaska Department of Fish and Game	**Service Request No.:**	K1507493
Project:	Coeur Alaska Biomonitoring	**Date Received:**	07/10/15
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 07/10/15. 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:
The Relative Percent Difference (RPD) in the replicate matrix spike analyses of sample Batch QC was outside control criteria. All spike recoveries in the MS, DMS, and associated Laboratory Control Sample (LCS) were within acceptance limits, indicating the analytical batch was in control. No further corrective action was appropriate.

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

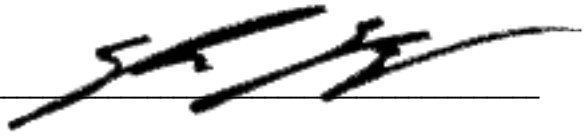
Total Metals

Matrix Spike Recovery Exceptions:
The control criteria for matrix spike recovery of Aluminum for the Batch QC1 and Batch QC3 samples were not applicable. The analyzed concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery.

The matrix spike recovery of Copper for the Batch QC1 sample was outside control criteria. Recovery in the Laboratory Control Sample (LCS) was acceptable, which indicated the analytical batch was in control. No further corrective action was appropriate.

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

Approved by_____



Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Environmental

CHAIN OF CUSTODY
59690

001

SR# K1507493

COC Set 1 of 1

COC# 59690

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

Project Name: Coeur Alaska Biomonitoring | Project Number:

Project Manager: Kate Kanouse

Company: Coeur Alaska / Alaska Department of Fish and Game

Address: Bill Ray Center 1008 F Street Juneau AK 99801

Phone #: 907-465-4290 | email: Kate.Kanouse@alaska.gov

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	999D 160.3 Modified / TS	1	2	3	4	5	Remarks
1. Lower Slate Creek		7/6/15	0900		3	X	X	X	X	X	X						
2. Lower Johnson Creek		7/6/15	1906		3	X	X	X	X	X	X						
3. Lower Sherman Creek		7/7/15	1000		3	X	X	X	X	X	X						
4. East Fork Slate Creek		7/7/15	1200		3	X	X	X	X	X	X						
5. Upper Slate Creek		7/7/15	1300		3	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.#_____

Bill To:_____

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: Benjamin Brewster	Printed Name:	Printed Name	Printed Name	Printed Name	Printed Name
Firm: ADFG	Firm: 7/10/15 0946	Firm	Firm	Firm	Firm
Date/Time: 7/8/15 1000	Date/Time	Date/Time	Date/Time	Date/Time	Date/Time

PC Shaw

Cooler Receipt and Preservation Form

Client / Project: AK Dept. of Fish & Game Service Request *K15* 07493

Received: 7/10/15 Opened: 7/10/15 By: [signature] Unloaded: 7/10/15 By: [signature]

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?_____
   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
9.2	9.1	10.8	10.7	-0.1	350	596990	8079 5705 4916	

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
ALL		X								

*Notes, Discrepancies, & Resolutions:*_____

*Page*____ *of*____

General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1507493
Project:	Coeur Alaska Biomonitoring	**Date Collected:**	07/06/15 - 07/07/15
Sample Matrix:	Sediment	**Date Received:**	07/10/15
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	K1507493-001	**83.5**	-	1	07/13/15 15:48	
Lower Johnson Creek	K1507493-002	**80.0**	-	1	07/13/15 15:48	
Lower Sherman Creek	K1507493-003	**76.2**	-	1	07/13/15 15:48	
East Fork Slate Creek	K1507493-004	**76.2**	-	1	07/13/15 15:48	
Upper Slate Creek	K1507493-005	**76.5**	-	1	07/13/15 15:48	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1507493
Project	Coeur Alaska Biomonitoring	**Date Collected:**	07/06/15
Sample Matrix:	Sediment	**Date Received:**	07/10/15
		Date Analyzed:	07/13/15

Replicate Sample Summary

General Chemistry Parameters

Sample Name:	Lower Slate Creek	**Units:**	Percent
Lab Code:	K1507493-001	**Basis:**	As Received

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1507493-001DUP Result	Average	RPD	RPD Limit
Solids, Total	160.3 Modified	-	83.5	85.3	84.4	2	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:**	K1507493
Project:	Coeur Alaska Biomonitoring	**Date Collected:**	7/6/2015
Sample Matrix:	Sediment	**Date Received:**	7/10/2015
		Date Analyzed:	7/13/2015

Particle Size Determination
ASTM D422

Sample Name: Lower Slate Creek
Lab Code: K1507493-001

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	99.50
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	99.50
Gravel, Medium	**No.4 (4.75 mm)**	4.6768	94.83
Gravel, Fine	**No.10 (2.00 mm)**	17.6736	77.18
Sand, Very Coarse	**No.20 (0.850 mm)**	33.9857	43.32
Sand, Coarse	**No.40 (0.425 mm)**	21.4179	21.99
Sand, Medium	**No.60 (0.250 mm)**	9.3514	12.67
Sand, Fine	**No.140 (0.106 mm)**	6.8873	5.81
Sand, Very Fine	**No.200 (0.0750 mm)**	0.8002	5.01

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	4.94
0.005 mm	1.88
0.001 mm	0.06

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1507493
Project:	Coeur Alaska Biomonitoring	**Date Collected:**	7/6/2015
Sample Matrix:	Sediment	**Date Received:**	7/10/2015
		Date Analyzed:	7/13/2015

Particle Size Determination
ASTM D422

Sample Name: Lower Johnson Creek
Lab Code: K1507493-002

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	99.70
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	11.1469	88.27
Gravel, Medium	**No.4 (4.75 mm)**	23.5403	64.12
Gravel, Fine	**No.10 (2.00 mm)**	20.1919	43.42
Sand, Very Coarse	**No.20 (0.850 mm)**	13.4396	29.71
Sand, Coarse	**No.40 (0.425 mm)**	17.8810	11.48
Sand, Medium	**No.60 (0.250 mm)**	7.7996	3.53
Sand, Fine	**No.140 (0.106 mm)**	2.1404	1.35
Sand, Very Fine	**No.200 (0.0750 mm)**	0.1177	1.23

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	1.52
0.005 mm	0.41
0.001 mm	0.00

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1507493
Project:	Coeur Alaska Biomonitoring	**Date Collected:**	7/7/2015
Sample Matrix:	Sediment	**Date Received:**	7/10/2015
		Date Analyzed:	7/13/2015

Particle Size Determination
ASTM D422

Sample Name: Lower Sherman Creek
Lab Code: K1507493-003

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	99.54
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.5580	98.98
Gravel, Medium	**No.4 (4.75 mm)**	1.7519	97.21
Gravel, Fine	**No.10 (2.00 mm)**	6.2068	90.96
Sand, Very Coarse	**No.20 (0.850 mm)**	22.8985	67.97
Sand, Coarse	**No.40 (0.425 mm)**	36.0817	31.74
Sand, Medium	**No.60 (0.250 mm)**	17.9181	13.75
Sand, Fine	**No.140 (0.106 mm)**	8.0583	5.66
Sand, Very Fine	**No.200 (0.0750 mm)**	0.7973	4.86

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	4.85
0.005 mm	1.89
0.001 mm	0.12

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1507493
Project:	Coeur Alaska Biomonitoring	**Date Collected:**	7/7/2015
Sample Matrix:	Sediment	**Date Received:**	7/10/2015
		Date Analyzed:	7/13/2015

Particle Size Determination
ASTM D422

Sample Name: East Fork Slate Creek
Lab Code: K1507493-004

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	99.59
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	99.59
Gravel, Medium	**No.4 (4.75 mm)**	1.7850	97.72
Gravel, Fine	**No.10 (2.00 mm)**	5.9333	91.48
Sand, Very Coarse	**No.20 (0.850 mm)**	20.9081	69.45
Sand, Coarse	**No.40 (0.425 mm)**	23.4991	44.68
Sand, Medium	**No.60 (0.250 mm)**	14.5874	29.31
Sand, Fine	**No.140 (0.106 mm)**	15.7636	12.70
Sand, Very Fine	**No.200 (0.0750 mm)**	2.0624	10.52

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	9.17
0.005 mm	2.32
0.001 mm	0.00

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1507493
Project:	Coeur Alaska Biomonitoring	**Date Collected:**	7/7/2015
Sample Matrix:	Sediment	**Date Received:**	7/10/2015
		Date Analyzed:	7/13/2015

Particle Size Determination
ASTM D422

Sample Name: Upper Slate Creek
Lab Code: K1507493-005

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	100.66
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	2.3003	98.29
Gravel, Medium	**No.4 (4.75 mm)**	31.0956	66.37
Gravel, Fine	**No.10 (2.00 mm)**	31.2342	34.31
Sand, Very Coarse	**No.20 (0.850 mm)**	21.7497	11.46
Sand, Coarse	**No.40 (0.425 mm)**	6.0672	5.08
Sand, Medium	**No.60 (0.250 mm)**	1.5709	3.43
Sand, Fine	**No.140 (0.106 mm)**	0.8702	2.52
Sand, Very Fine	**No.200 (0.0750 mm)**	0.1156	2.39

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	2.21
0.005 mm	0.70
0.001 mm	0.00

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1507493
Project:	Coeur Alaska Biomonitoring	**Date Collected:**	7/6/2015
Sample Matrix:	Sediment	**Date Received:**	7/10/2015
		Date Analyzed:	7/13/2015

Particle Size Determination
ASTM D422

Sample Name: Lower Slate Creek
Lab Code: K1507493-001 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	99.33
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	2.7843	96.54
Gravel, Medium	**No.4 (4.75 mm)**	6.8385	89.69
Gravel, Fine	**No.10 (2.00 mm)**	19.5714	70.07
Sand, Very Coarse	**No.20 (0.850 mm)**	32.7635	37.38
Sand, Coarse	**No.40 (0.425 mm)**	19.8256	17.60
Sand, Medium	**No.60 (0.250 mm)**	7.0490	10.56
Sand, Fine	**No.140 (0.106 mm)**	5.3515	5.22
Sand, Very Fine	**No.200 (0.0750 mm)**	0.7385	4.49

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	4.06
0.005 mm	1.51
0.001 mm	0.00

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1507493
Project:	Coeur Alaska Biomonitoring	**Date Collected:**	07/06/15 - 07/07/15
Sample Matrix:	Sediment	**Date Received:**	07/10/15
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	K1507493-001	ND U	1.2	1	07/14/15 00:09	7/13/15	
Lower Johnson Creek	K1507493-002	ND U	1.3	1	07/14/15 00:09	7/13/15	
Lower Sherman Creek	K1507493-003	ND U	1.3	1	07/14/15 00:09	7/13/15	
East Fork Slate Creek	K1507493-004	ND U	1.3	1	07/14/15 00:09	7/13/15	
Upper Slate Creek	K1507493-005	ND U	1.3	1	07/14/15 00:09	7/13/15	
Method Blank	K1507493-MB	ND U	1.0	1	07/14/15 00:09	7/13/15	

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1507493
Project	Coeur Alaska Biomonitoring	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA
		Date Analyzed:	07/14/15

Triplicate Sample Summary
General Chemistry Parameters

Sample Name:	Batch QC	**Units:**	mg/Kg
Lab Code:	K1507441-001	**Basis:**	Wet
Analysis Method:	PSEP Sulfide		
Prep Method:	None		

Analyte Name	MRL	Sample Result	Duplicate K1507441-001DUP Result	Triplicate K1507441-001TRP Result	Average	RSD	RSD Limit
Sulfide, Total	1.0	ND	ND	ND	NC	NC	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:**	K1507493
Project:	Coeur Alaska Biomonitoring	**Date Collected:**	N/A
Sample Matrix:	Sediment	**Date Received:**	N/A
		Date Analyzed:	07/14/15
		Date Extracted:	NA

Duplicate Matrix Spike Summary
Sulfide, Total

Sample Name:	Batch QC	**Units:**	mg/Kg
Lab Code:	K1507441-001	**Basis:**	Wet
Analysis Method:	PSEP Sulfide		
Prep Method:	None		

		Matrix Spike			**Duplicate Matrix Spike**					
		K1507441-001MS			K1507441-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Sulfide, Total	ND U	380	620	60	480	610	78	28-175	24*	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:**	K1507493
Project:	Coeur Alaska Biomonitoring	**Date Analyzed:**	07/14/15
Sample Matrix:	Sediment	**Date Extracted:**	NA

Lab Control Sample Summary
Sulfide, Total

Analysis Method:	PSEP Sulfide	**Units:**	mg/Kg
Prep Method:	None	**Basis:**	Dry
		Analysis Lot:	452900

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1507493-LCS	265	320	84	39-166

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1507493
Project:	Coeur Alaska Biomonitoring	**Date Collected:**	07/06/15 - 07/07/15
Sample Matrix:	Sediment	**Date Received:**	07/10/15
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	K1507493-001	**0.473**	0.050	1	07/17/15 15:00	7/17/15	
Lower Johnson Creek	K1507493-002	**0.376**	0.050	1	07/17/15 15:00	7/17/15	
Lower Sherman Creek	K1507493-003	**0.399**	0.050	1	07/17/15 15:00	7/17/15	
East Fork Slate Creek	K1507493-004	**0.792**	0.050	1	07/17/15 15:00	7/17/15	
Upper Slate Creek	K1507493-005	**1.04**	0.050	1	07/17/15 15:00	7/17/15	
Method Blank	K1507493-MB	ND	0.050	1	07/17/15 15:00	7/17/15	U

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1507493
Project	Coeur Alaska Biomonitoring	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA
		Date Analyzed:	07/17/15

Triplicate Sample Summary
General Chemistry Parameters

Sample Name:	Batch QC	**Units:**	Percent
Lab Code:	K1507441-008	**Basis:**	Dry, per Method
Analysis Method:	PSEP TOC		
Prep Method:	ALS SOP		

Analyte Name	MRL	Sample Result	Duplicate K1507441-008DUP Result	Triplicate K1507441-008TRP Result	Average	RSD	RSD Limit
Carbon, Total Organic (TOC)	0.050	2.87	2.85	2.83	2.85	<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.

Printed 7/28/2015 3:36:57 PM

SuperSet Reference:15-0000338819 rev 00

Client:	Alaska Department of Fish and Game	**Service Request:**	K1507493
Project:	Coeur Alaska Biomonitoring	**Date Collected:**	N/A
Sample Matrix:	Sediment	**Date Received:**	N/A
		Date Analyzed:	07/17/15
		Date Extracted:	07/17/15

Duplicate Matrix Spike Summary
Carbon, Total Organic (TOC)

Sample Name:	Batch QC	**Units:**	Percent
Lab Code:	K1507441-008	**Basis:**	Dry, per Method
Analysis Method:	PSEP TOC		
Prep Method:	ALS SOP		

		Matrix Spike			Duplicate Matrix Spike					
		K1507441-008MS			K1507441-008DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Carbon, Total Organic (TOC)	2.87	6.63	3.81	99	6.65	3.81	99	69-123	<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.

Client:	Alaska Department of Fish and Game	**Service Request:**	K1507493
Project:	Coeur Alaska Biomonitoring	**Date Analyzed:**	07/17/15
Sample Matrix:	Sediment	**Date Extracted:**	07/17/15

Lab Control Sample Summary
Carbon, Total Organic (TOC)

Analysis Method:	PSEP TOC	**Units:**	Percent
Prep Method:	ALS SOP	**Basis:**	Dry, per Method
		Analysis Lot:	454655

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1507493-LCS	0.519	0.543	96	74-118

Client: Alaska Department of Fish and Game
Project: Coeur Alaska Biomonitoring
Sample Matrix: Sediment

Service Request: K1507493
Date Analyzed: 7/17/15 15:00

Standard Reference Material Summary
General Chemistry Parameters

Sample Name: Standard Reference Material
Lab Code: KQ1508111-07

Units: Percent
Basis: Dry, per Method

Analyte Name	Prep Method	Analytical Method	Certified Value	Result	CAS Advisory Limits	Notes
Carbon, Total Organic (TOC)	ALS SOP	PSEP TOC	2.99	3.03	2.152 - 3.828	

Metals

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga
Service Request: K1507493
Project No.: NA
Date Collected: 7/6/2015
Project Name: Coeur Alaska Biomonitoring
Date Received: 7/10/2015
Matrix: SEDIMENT
Units: mg/Kg
Basis: DRY

Sample Name: Lower Slate Creek
Lab Code: K1507493-001

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	6010C	1.4	2.0	07/15/15	07/17/15	12000		
Arsenic	200.8	0.3	5.0	07/15/15	07/16/15	14.9		
Cadmium	200.8	0.01	5.0	07/15/15	07/16/15	0.53		
Chromium	200.8	0.1	5.0	07/15/15	07/16/15	18.9		
Copper	200.8	0.07	5.0	07/15/15	07/16/15	39.1		N
Lead	200.8	0.03	5.0	07/15/15	07/16/15	6.86		
Mercury	7471B	0.01	1.0	07/20/15	07/21/15	0.04		
Nickel	200.8	0.1	5.0	07/15/15	07/16/15	30.0		
Selenium	200.8	0.7	5.0	07/15/15	07/16/15	0.7		
Silver	200.8	0.01	5.0	07/15/15	07/16/15	0.07		
Zinc	200.8	0.3	5.0	07/15/15	07/16/15	131		

% Solids: 83.5

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga
Service Request: K1507493
Project No.: NA
Date Collected: 7/6/2015
Project Name: Coeur Alaska Biomonitoring
Date Received: 7/10/2015
Matrix: SEDIMENT
Units: mg/Kg
Basis: DRY

Sample Name: Lower Johnson Creek
Lab Code: K1507493-002

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	6010C	1.7	2.0	07/15/15	07/17/15	10900		
Arsenic	200.8	0.4	5.0	07/15/15	07/16/15	12.5		
Cadmium	200.8	0.02	5.0	07/15/15	07/16/15	0.15		
Chromium	200.8	0.2	5.0	07/15/15	07/16/15	18.1		
Copper	200.8	0.08	5.0	07/15/15	07/16/15	71.1		N
Lead	200.8	0.04	5.0	07/15/15	07/16/15	8.04		
Mercury	7471B	0.02	1.0	07/20/15	07/21/15	0.02	U	
Nickel	200.8	0.2	5.0	07/15/15	07/16/15	17.7		
Selenium	200.8	0.8	5.0	07/15/15	07/16/15	0.8	U	
Silver	200.8	0.02	5.0	07/15/15	07/16/15	0.16		
Zinc	200.8	0.4	5.0	07/15/15	07/16/15	79.7		

% Solids: 80.0

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga
Service Request: K1507493
Project No.: NA
Date Collected: 7/7/2015
Project Name: Coeur Alaska Biomonitoring
Date Received: 7/10/2015
Matrix: SEDIMENT
Units: mg/Kg
Basis: DRY

Sample Name: Lower Sherman Creek
Lab Code: K1507493-003

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	6010C	1.7	2.0	07/15/15	07/17/15	17500		
Arsenic	200.8	0.4	5.0	07/15/15	07/16/15	37.0		
Cadmium	200.8	0.02	5.0	07/15/15	07/16/15	0.32		
Chromium	200.8	0.2	5.0	07/15/15	07/16/15	30.9		
Copper	200.8	0.09	5.0	07/15/15	07/16/15	70.8		N
Lead	200.8	0.04	5.0	07/15/15	07/16/15	11.0		
Mercury	7471B	0.02	1.0	07/20/15	07/21/15	0.02		
Nickel	200.8	0.2	5.0	07/15/15	07/16/15	38.0		
Selenium	200.8	0.8	5.0	07/15/15	07/16/15	2.0		
Silver	200.8	0.02	5.0	07/15/15	07/16/15	0.25		
Zinc	200.8	0.4	5.0	07/15/15	07/16/15	134		

% Solids: 76.2

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga
Service Request: K1507493
Project No.: NA
Date Collected: 7/7/2015
Project Name: Coeur Alaska Biomonitoring
Date Received: 7/10/2015
Matrix: SEDIMENT
Units: mg/Kg
Basis: DRY

Sample Name: East Fork Slate Creek
Lab Code: K1507493-004

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	6010C	1.6	2.0	07/15/15	07/17/15	12300		
Arsenic	200.8	0.4	5.0	07/15/15	07/16/15	22.3		
Cadmium	200.8	0.02	5.0	07/15/15	07/16/15	5.87		
Chromium	200.8	0.2	5.0	07/15/15	07/16/15	15.1		
Copper	200.8	0.08	5.0	07/15/15	07/16/15	46.7		N
Lead	200.8	0.04	5.0	07/15/15	07/16/15	4.48		
Mercury	7471B	0.02	1.0	07/20/15	07/21/15	0.05		
Nickel	200.8	0.2	5.0	07/15/15	07/16/15	46.8		
Selenium	200.8	0.8	5.0	07/15/15	07/16/15	1.7		
Silver	200.8	0.02	5.0	07/15/15	07/16/15	0.12		
Zinc	200.8	0.4	5.0	07/15/15	07/16/15	333		

% Solids: 76.2

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga
Service Request: K1507493
Project No.: NA
Date Collected: 7/7/2015
Project Name: Coeur Alaska Biomonitoring
Date Received: 7/10/2015
Matrix: SEDIMENT
Units: mg/Kg
Basis: DRY

Sample Name: Upper Slate Creek
Lab Code: K1507493-005

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	6010C	1.0	2.0	07/15/15	07/17/15	14500		
Arsenic	200.8	0.3	5.0	07/15/15	07/16/15	14.2		
Cadmium	200.8	0.01	5.0	07/15/15	07/16/15	0.76		
Chromium	200.8	0.1	5.0	07/15/15	07/16/15	92.2		
Copper	200.8	0.05	5.0	07/15/15	07/16/15	47.0		N
Lead	200.8	0.03	5.0	07/15/15	07/16/15	3.17		
Mercury	7471B	0.02	1.0	07/20/15	07/21/15	0.11		
Nickel	200.8	0.1	5.0	07/15/15	07/16/15	54.0		
Selenium	200.8	0.5	5.0	07/15/15	07/16/15	2.3		
Silver	200.8	0.01	5.0	07/15/15	07/16/15	0.08		
Zinc	200.8	0.3	5.0	07/15/15	07/16/15	109		

% Solids: 76.5

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga
Service Request: K1507493
Project No.: NA
Date Collected:
Project Name: Coeur Alaska Biomonitoring
Date Received:
Matrix: SEDIMENT
Units: mg/Kg
Basis: DRY

Sample Name: Method Blank
Lab Code: KQ1507600-09

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	6010C	2.0	2.0	07/15/15	07/17/15	2.0	U	
Arsenic	200.8	0.5	5.0	07/15/15	07/16/15	0.5	U	
Cadmium	200.8	0.02	5.0	07/15/15	07/16/15	0.02	U	
Chromium	200.8	0.2	5.0	07/15/15	07/16/15	0.2	U	
Copper	200.8	0.10	5.0	07/15/15	07/16/15	0.10	U	N
Lead	200.8	0.05	5.0	07/15/15	07/16/15	0.05	U	
Nickel	200.8	0.2	5.0	07/15/15	07/16/15	0.2	U	
Selenium	200.8	1.0	5.0	07/15/15	07/16/15	1.0	U	
Silver	200.8	0.02	5.0	07/15/15	07/16/15	0.02	U	
Zinc	200.8	0.5	5.0	07/15/15	07/16/15	0.5	U	

% Solids: 100.0

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga
Service Request: K1507493
Project No.: NA
Date Collected:
Project Name: Coeur Alaska Biomonitoring
Date Received:
Matrix: SEDIMENT
Units: mg/Kg
Basis: DRY

Sample Name: Method Blank
Lab Code: KQ1507857-06

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Mercury	7471B	0.02	1.0	07/20/15	07/21/15	0.02	U	

% Solids: 100.0

Comments:

Metals

- 5A -

SPIKE SAMPLE RECOVERY

Client: Alaska Department of Fish and Ga **Service Request:** K1507493

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

Project Name: Coeur Alaska Biomonitoring **Basis:** DRY

Matrix: SEDIMENT **% Solids:** 55.8

Sample Name: Batch QC1S **Lab Code:** K1507211-004S

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Aluminum		4400		3540		231.24	371.9		6010C
Arsenic	70 - 130	64.5		11.5		57.8	92		200.8
Cadmium	70 - 130	6.95		0.70		5.8	108		200.8
Chromium	70 - 130	71.8		43.3		23.1	123		200.8
Copper	70 - 130	117.3		78.3		28.9	135	N	200.8
Lead	70 - 130	122.99		59.60		57.8	110		200.8
Nickel	70 - 130	81.9		24.2		57.8	100		200.8
Selenium	70 - 130	56.1		0.7		57.8	96		200.8
Silver	70 - 130	7.33		1.01		5.8	109		200.8
Zinc	70 - 130	191.4		136.7		57.8	95		200.8

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:** K1507493

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

Project Name: Coeur Alaska Biomonitoring **Basis:** DRY

Matrix: SOIL **% Solids:** 95.2

Sample Name: Batch QC2S **Lab Code:** K1507431-001S

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Mercury	80 - 120	0.53		0.08		0.52	86.5		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:** K1507493

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

Project Name: Coeur Alaska Biomonitoring **Basis:** DRY

Matrix: SOIL **% Solids:** 95.2

Sample Name: Batch QC2SD **Lab Code:** K1507431-001SD

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Mercury	80 - 120	0.55		0.08		0.48	97.9		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:** K1507493

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

Project Name: Coeur Alaska Biomonitoring **Basis:** DRY

Matrix: BIOSOLIDS **% Solids:** 14.3

Sample Name: **Batch QC3S** **Lab Code:** **K1507499-001S**

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Aluminum		6310		5400		888.00	102.5		6010C
Arsenic	70 - 130	218.9		1.6		222.0	98		200.8
Cadmium	70 - 130	24.32		1.70		22.2	102		200.8
Chromium	70 - 130	134.5		43.4		88.8	103		200.8
Copper	70 - 130	459.1		336.1		111.0	111		200.8
Lead	70 - 130	252.00		12.82		222.0	108		200.8
Nickel	70 - 130	257.4		29.9		222.0	102		200.8
Selenium	70 - 130	234.7		5.5		222.0	103		200.8
Silver	70 - 130	27.22		4.42		22.2	103		200.8
Zinc	70 - 130	910.1		711.1		222.0	90		200.8

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

Metals

- 6 -

DUPLICATES

Client:	Alaska Department of Fish and Ga	**Service Request:**	K1507493
Project No.:	NA	**Units:**	MG/KG
Project Name:	Coeur Alaska Biomonitoring	**Basis:**	DRY
Matrix:	SEDIMENT	**% Solids:**	55.8

Sample Name: Batch QC1D **Lab Code:** K1507211-004D

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Aluminum	20	3540		3490		1.4		6010C
Arsenic	20	11.5		11.4		0.9		200.8
Cadmium	20	0.70		0.63		10.5		200.8
Chromium	20	43.3		43.6		0.7		200.8
Copper	20	78.3		83.3		6.2		200.8
Lead	20	59.60		59.60		0.0		200.8
Nickel	20	24.2		28.2		15.3		200.8
Selenium		0.7		0.7		0.0		200.8
Silver	20	1.01		1.05		3.9		200.8
Zinc	20	136.7		131.9		3.6		200.8

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

Metals

- 6 -

DUPLICATES

Client: Alaska Department of Fish and Ga **Service Request:** K1507493

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

Project Name: Coeur Alaska Biomonitoring **Basis:** DRY

Matrix: SOIL **% Solids:** 95.2

Sample Name: Batch QC2SD **Lab Code:** K1507431-001SD

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Mercury	20	0.53		0.55		3.7		7471B

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

Metals

- 6 -

DUPLICATES

Client: Alaska Department of Fish and Ga **Service Request:** K1507493

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

Project Name: Coeur Alaska Biomonitoring **Basis:** DRY

Matrix: BIOSOLIDS **% Solids:** 14.3

Sample Name: Batch QC3D **Lab Code:** K1507499-001D

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Aluminum	20	5400		5210		3.6		6010C
Arsenic		1.6		1.5		6.5		200.8
Cadmium	20	1.70		1.80		5.7		200.8
Chromium	20	43.4		40.4		7.2		200.8
Copper	20	336.1		314.5		6.6		200.8
Lead	20	12.82		12.80		0.2		200.8
Nickel	20	29.9		28.9		3.4		200.8
Selenium		5.5		5.6		1.8		200.8
Silver	20	4.42		4.24		4.2		200.8
Zinc	20	711.1		678.6		4.7		200.8

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

Metals

- 7 -

LABORATORY CONTROL SAMPLE

Client: Alaska Department of Fish and Ga **Service Request:** K1507493

Project No.: NA

Project Name: Coeur Alaska Biomonitoring

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

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C Limits		%R
Aluminum				8840	7180	42	158	81.2
Arsenic				100	106.0	69	131	106
Cadmium				182	206.0	74	126	113
Chromium				136	147.0	70	130	108
Copper				102	108.0	74	126	106
Lead				115	127.0	72	129	110
Nickel				153	165.0	73	126	108
Selenium				150	169.0	67	133	113
Silver				40	46.6	66	134	115
Zinc				161	167.0	81	119	104

Metals

- 7 -

LABORATORY CONTROL SAMPLE

Client: Alaska Department of Fish and Ga **Service Request:** K1507493

Project No.: NA

Project Name: Coeur Alaska Biomonitoring

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

Analyte	Aqueous (ug/L)			Solid (mg/kg)				
	True	Found	%R	True	Found	C	Limits	%R
Mercury				19.9	18.3	51	148	92.0

BIOASSAY REPORT
CHRONIC DEFINITIVE SEDIMENT BIOASSAYS CONDUCTED
July 21 through 31, 2015

Prepared for

ALASKA DEPARTMENT OF FISH AND GAME
JUNEAU, ALASKA

Prepared by

CH2MHILL
Applied Sciences Laboratory (ASL)

1100 NE Circle Boulevard, Suite 300
Corvallis, Oregon 97330
541-768-3160

State of Washington Department of Ecology (WDOE), Lab ID C1233
NELAC #OR100022

Report Date: August 27, 2015
Lab I.D. No. B3151

CONTENTS

Page

Section

INTRODUCTION

CH2M HILL conducted 10 day chronic definitive sediment bioassays from July 21 through 31, 2015, 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:

- None noted.

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 2^{nd} to 3^{rd} 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 July 9, 2015.

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 July 6 and 7, 2015, and transported to CH2M HILL's Corvallis Aquatic Toxicology Laboratory. The samples 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 July 20, 2015.

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 1.8.8.3. 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	91.3	0.0819
Lower Sherman Creek	86.3	0.0825
East Fork Slate Creek	90.0	0.0868
Lower Johnson Creek	85.0	0.0797
Lower Slate Creek	86.3	0.0844
Upper Slate Creek	70.0 [a]	0.0856

[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 Johnson Creek", and "Lower Slate Creek" samples when compared to the control.

However, the test on the "Upper Slate Creek" sample showed a statistically significant reduction in survival but no 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 (initial dry weights were 0.0607 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".

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	91.3	2.024
Lower Sherman Creek	68.8 [a]	2.181
East Fork Slate Creek	73.8 [a]	2.254
Lower Johnson Creek	75.0 [a]	1.542 [a]
Lower Slate Creek	62.5 [a]	2.195
Upper Slate Creek	72.5 [a]	2.123

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

The chironomid tests resulted in a statistically significant reduction in survival but not for growth for the "Lower Sherman Creek", "East Fork Slate Creek", "Lower Slate Creek", and "Upper Slate Creek" samples when compared to the control.

The chironomid tests resulted in a statistically significant reduction in survival and in growth for the "Lower Johnson Creek" sample when compared to the control.

Note: Many chironomids matured (100 of the 480 added at test initiation) and, as adults, flew out of the test chambers prior to test termination. When this occurs, evidence of the pupation remains in the test chambers. This evidence was noted and the number of larvae found in each test chamber was augmented by the noted number of adults that left. This total number was used for the survival data. The ash-free weight data represents an average weight of the surviving larvae found at test termination.

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	0.317 (g/L)	0.286 to 0.446
Chironomus tentans	6.35 (g/L)	1.60 to 7.14

APPENDIX A

RAW DATA SHEETS

CH2M HILL TOXICITY TEST ORGANISM AND WATER QUALITY DATA

Client: Kensington Gold Mine

Contact:

Test Initiation: Date 7-21-2015 Technician Well, Winn, Mackey, Centurywt, Otten,

Test Termination: Date 7-31-15

Test Species/ID: *Hyalella azteca* / AMP 84

Chironomus tentans / CHI 22

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 $CaCO_3$
B3348-01	Lower Sherman Creek	7/7/15	1000	- / -	See Titration and Ammonia sheet		
B3348-02	East Fork Slate Creek	7/7/15	1200	- / -			
B3348-03	Lower Johnson Creek	7/6/15	1400	- / -	-	-	-
B3348-04	Lower Slate Creek	7/6/15	0900	- / -	-	-	-
B3348-05	Upper Slate Creek	7/7/15	1800	- / -	-	-	-
				/			
				/			
				/			
				/			
				/			
				/			
				/			
				/			

Test Species Information	ID# AMP 84	ID# CHI 22	ID#	ID#
	Chronic	Chronic		
Organism Age at Initiation	7 to 14 days (1 day range)	2nd to 3rd instar (~10 day old)		
Test Container Size	300 ml	300 ml		
Test Volume	100 ml sample, 175 ml overlying water	100 ml sample, 175 ml overlying water		
Feeding: Type	1 ml YCT	1.5 ml of a 4 g/L		
Feeding: Amount	daily	Tetrafin slurry daily		
	-	-		
Aeration: Began	none	none		
Aeration: Amount	—	—		
Dilution Water ID#	~~4245, 4241~~	~~4245, 4241~~	see Dilution water below.	
Acclimation Period	6 days	< 1 days		
Test Location	# 10	# 10		
Initial Size (mg/org)				

Dilution Water	ID#	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$	Initial pH
Dilution Sediment	4245	-	-	-
Recon MH (FHM)	4241 DW	94	70	7.9
	4242	90	64	8.0
	4246	90	66	7.7
	4248	90	64	7.7
	4249	94	68	8.2

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

* ← collected by NAS on 7-9-15 JM

Water Quality Meters Used/ID#

Dissolved Oxygen #2 pH ~~#3~~ #1 Conductivity #2

JM PDG 7/20/15

TITRATION AND AMMONIA DATA

Client: Kensington Gold Mine | Species ID#: CHI 22

Sample Description: See Randomization Sheet. | Start Date: 7-21-15

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	87	92	69	68	<0.10	0.70
B3348-01	92	112	78	77	<0.10	0.27
B3348-02	99	111	77	75	<0.10	0.14
B3348-03	88	98	73	73	<0.10	0.41
B3348-04	90	105	74	77	<0.10	0.28
B3348-05	90	109	78	77	<0.10	0.90

TITRATION AND AMMONIA DATA

Client: Kensington Gold Mine | Species ID#: AMP 84

Sample Description: See Randomization Sheet. | Start Date: 7-21-15

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	97	97	69	68	<0.10	0.28
B3348-01	92	100	78	73	<0.10	0.22
B3348-02	99	108	77	72	<0.10	<0.10
B3348-03	98	105	73	69	<0.10	0.23
B3348-04	90	105	74	71	<0.10	0.11
B3348-05	90	105	78	~~68~~ 69 RM 5/20/15	<0.10	0.42

Hyallela RANDOMIZATION SHEET

Client: **Kensington Gold Mine** **Test Start Date:**

Laboratory ID:	Field ID:	Alternate ID / Dilutions:	Replicate ID:	Random Number	Test Chamber Number:
Sediment Control	Beaver Creek	Control	A	0.72149	8
Sediment Control	Beaver Creek	Control	C	0.70926	9
Sediment Control	Beaver Creek	Control	B	0.56982	20
Sediment Control	Beaver Creek	Control	D	0.39501	27
Sediment Control	Beaver Creek	Control	E	0.29353	34
Sediment Control	Beaver Creek	Control	F	0.27789	35
Sediment Control	Beaver Creek	Control	G	0.16752	40
Sediment Control	Beaver Creek	Control	H	0.13563	43
B3348-05	Upper Slate Creek		A	0.97276	3
B3348-05	Upper Slate Creek		F	0.70118	10
B3348-05	Upper Slate Creek		G	0.60369	15
B3348-05	Upper Slate Creek		B	0.53158	21
B3348-05	Upper Slate Creek		D	0.46001	24
B3348-05	Upper Slate Creek		E	0.45308	25
B3348-05	Upper Slate Creek		C	0.43537	26
B3348-05	Upper Slate Creek		H	0.24307	38
B3348-04	Lower Slate Creek		A	0.88754	5
B3348-04	Lower Slate Creek		D	0.61655	14
B3348-04	Lower Slate Creek		B	0.37787	29
B3348-04	Lower Slate Creek		F	0.37356	30
B3348-04	Lower Slate Creek		H	0.33164	31
B3348-04	Lower Slate Creek		C	0.32010	32
B3348-04	Lower Slate Creek		G	0.24498	36
B3348-04	Lower Slate Creek		E	0.11439	45
B3348-03	Lower Johnson Creek		C	0.93566	4
B3348-03	Lower Johnson Creek		A	0.67221	11
B3348-03	Lower Johnson Creek		B	0.67189	12
B3348-03	Lower Johnson Creek		D	0.64030	13
B3348-03	Lower Johnson Creek		F	0.58190	18
B3348-03	Lower Johnson Creek		H	0.52695	22
B3348-03	Lower Johnson Creek		E	0.38391	28
B3348-03	Lower Johnson Creek		G	0.05028	48
B3348-02	East Fork Slate Creek		B	0.84212	7
B3348-02	East Fork Slate Creek		E	0.59372	16
B3348-02	East Fork Slate Creek		C	0.59198	17
B3348-02	East Fork Slate Creek		G	0.58029	19
B3348-02	East Fork Slate Creek		F	0.24393	37
B3348-02	East Fork Slate Creek		H	0.20874	39
B3348-02	East Fork Slate Creek		A	0.16693	41
B3348-02	East Fork Slate Creek		D	0.07082	47
B3348-01	Lower Sherman Creek		C	0.98404	1
B3348-01	Lower Sherman Creek		F	0.98067	2
B3348-01	Lower Sherman Creek		A	0.86885	6
B3348-01	Lower Sherman Creek		E	0.48907	23
B3348-01	Lower Sherman Creek		G	0.29417	33
B3348-01	Lower Sherman Creek		H	0.15193	42
B3348-01	Lower Sherman Creek		B	0.11869	44
B3348-01	Lower Sherman Creek		D	0.10192	46
			z		
			z		
			z		
			z		
			z		

CH2M HILL

FRESHWATER TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Client: Kensington Gold Mine
Sample Description: See Randomization Sheet. Batch Number B 3348
Test Species: Hyallela azteca
ID#:
Amp 04

Beginning (Day 0), Date 7-21-15 Time 1100
Ending (Day 10), Date 7-31-15 Time 1100

		Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Tech.		DW/BW/MC	DW	DW	BW	BW	MC	BW	DW	DW	DW	DW
Time		0700	0700	0645	0715	0740	0930	0900	0700	0700	0640	0630
Tech.	Day -1 BW	Day 0 BW/MC	Day 1 BW	Day 2 JW	Day 3 MC/BW	Day 4 JW	Day 5 JW	Day 6 BW	Day 7 BW	Day 8 BW	Day 9 JW	Day 10 BW
Time	Day -1 1700	Day 0 1715	Day 1 1700	Day 2 1645	Day 3 1630	Day 4 1630	Day 5 1745	Day 6 1655	Day 7 1600	Day 8 1625	Day 9 1645	Day 10 1100
Feeding: ✓ when done		Day 0 ✓	Day 1 ✓	Day 2 ✓	Day 3 ✓	Day 4 ✓	Day 5 ✓	Day 6 ✓	Day 7 ✓	Day 8 ✓	Day 9 ✓	

TH 159 TH 211 TH 213 TH 217 TH 213 TH 217 TH 213 TH 212 TH 214 TH 211 TH 214

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
3	7.4	7.4	7.6	7.4	7.2	7.0	7.6	7.7	7.2	7.5	7.2	22.9	22.3	22.3	22.5	22.4	22.3	22.3	22.4	22.5	22.7	22.5	7.7	7.2	328	340
5	7.5	7.5	7.5	7.3	7.3	6.9	7.7	7.5	7.2	7.4	7.0	22.8	22.4	22.3	22.5	22.4	22.5	22.3	22.7	22.5	22.6	22.5	7.6	7.2	327	322
6	7.5	7.2	7.4	7.3	7.3	6.7	7.5	7.4	7.2	7.4	6.8	22.6	22.4	22.3	22.4	22.4	22.6	22.4	22.6	22.6	22.7	22.5	7.8	7.4	330	331
8	7.6	7.4	7.5	7.1	7.3	6.7	7.5	7.3	7.1	7.4	6.8	22.6	22.4	22.3	22.4	22.4	22.7	22.4	22.6	22.5	22.7	22.5	7.4	7.2	330	327
11	7.5	7.2	7.4	7.0	7.3	6.8	7.6	7.3	6.7	7.1	6.5	22.8	22.3	22.3	22.4	22.4	22.7	22.4	22.6	22.5	22.6	22.5	7.5	7.2	328	321
41	7.5	7.2	7.2	6.9	7.2	6.9	7.6	7.0	6.6	7.1	6.4	22.6	22.3	22.3	22.4	22.4	22.7	22.4	22.6	22.4	22.6	22.4	7.6	7.2	347	337

CH2M HILL

FRESHWATER TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Client: Kensington Gold Mine
Sample Description: See Randomization Sheet(s). Batch number: B 3348
Test Species: Hyallela azteca ID#: AMP 24

Beginning, Date: 7-21-15 Time: 1440
Ending, Date: 7-31-15 Time: 1100

Test Initiation: Tech: Tech: Time: 1440
Test Termination: Tech: Tech: Time: 1100

Beaker Number	Start Count 0	# alive found 10	# dead found 10	Comments:
1	10	8	0	
2	10	8	0	
3	10	5	0	small worms present
4	10	10	0	
5	10	8	0	
6	10	10	0	
7	10	8	0	
8	10	8	0	
9	10	10	0	
10	10	9 DW	0	
11	10	9	0	
12	10	7	0	
13	10	10	0	
14	10	7	0	
15	10	9	0	

Beaker Number	Start Count 0	# alive found 10	# dead found 10	Comments:
16	10	8	0	
17	10	10	0	
18	10	10	0	
19	10	9	0	
20	10	9	0	some small worms present
21	10	6	0	
22	10	7	0	small worms present
23	10	9	0	
24	10	9	0	
25	10	3	0	
26	10	7	0	
27	10	9	0	
28	10	10	0	
29	10	9	0	
30	10	9	0	

Beaker #10 has 9 alive / hard to read! DW

CH2M HILL

FRESHWATER TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Client: Kensington Gold Mine
Sample Description: See Randomization Sheet(s). Batch number: B3348
Test Species: Hyallela azteca ID#: AMP

Beginning, Date: 7-21-15 Time: 1440
Ending, Date: 7-31-15 Time: 1100

Test Initiation: Tech: Tech: _____ Time: _____

Test Termination: Tech: Tech: [illegible] Time: 1100

Beaker Number	Start Count 0	# alive found 10	# dead found 10	Comments:
31	10	9	0	
32	10	9	0	
33	10	9	0	
34	10	10	0	
35	10	10	0	
36	10	9	0	
37	10	9	0	
38	10	8	0	
39	10	9	0	
40	10	9	0	
41	10	10	0	
42	10	9	0	
43	10	9	0	
44	10	6	0	
45	10	9	0	

Beaker Number	Start Count 0	# alive found 10	# dead found 10	Comments:
46	10	9	0	indigenous organisms noted.
47	10	9	0	
48	10	6	0	indigenous

Hyallela GROWTH DATA

Client: Kensington Gold Mine | Species ID#: #84

Lab ID: see randomization sheet batch nun number B3348 | Start Date: 7/21/2015

Sample Description:

Technician:	KJ	KJ
Date:	8/3/2015	7/17/2015
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
1	67.58	66.92		8
2	66.77	66.08		9
3	66.27	65.92		5
4	67.52	66.78		10
5	67.07	66.37		8
6	67.42	66.59		10
7	66.70	66.02		8
8	66.30	65.66		8
9	66.69	65.98		10
10	67.76	67.01		9
11	67.55	66.89		9
12	67.62	66.94		7
13	65.71	64.97		10
14	66.25	65.73		7
15	66.50	65.64		9
16	66.26	65.53		8
17	66.55	65.53		10
18	66.84	66.11		10
19	66.55	65.82		9
20	67.79	67.12		9
21	66.96	66.35		6
22	67.15	66.53		7
23	67.10	66.38		9
24	67.15	66.52		9
25	66.94	66.69		3
26	66.13	65.51		7
27	66.69	65.99		9
28	67.49	66.73		9
29	67.22	66.41		9
30	66.65	66.05		9

weigh to 0.01 mg

Hyallela GROWTH DATA

Client: Kensington Gold Mine | Species ID: #84

Lab ID: see randomization sheet batch nun number B3348 | Start Date: 7/21/2015

Sample Description:

Technician:	KJ	KJ
Date:	8/3/2015	7/17/2015
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
31	66.43	65.67		9
32	67.74	66.91		9
33	66.79	66.00		9
34	67.53	66.69		10
35	67.23	66.32		9
36	67.84	66.97		9
37	67.50	66.79		9
38	66.96	66.22		8
39	67.17	66.40		9
40	67.42	66.74		9
41	67.21	66.47		10
42	67.31	66.67		9
43	67.17	66.35		9
44	66.39	65.93		6
45	67.73	66.98		9
46	66.14	65.22		9
47	66.34	65.47		9
48	66.40	65.96		6

weigh to 0.01 mg

Hyallela GROWTH DATA

Client: Kensington Gold Mine Species ID# AMP 84

Lab ID: see randomization sheet batch number: B 3348 Start Date: 7/21/2015

Sample Description:

Technician:		KJ
Date:		7/17/2015
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
1		66.92		8
2		66.08		9
3		65.92		5
4		66.78		10
5		66.37		8
6		66.59		10
7		66.02		8
8		65.66		8
9		65.98		10
10		67.01		9 ~~10~~ ROB MWC 7/31/15
11		66.89		9
12		66.94		7
13		64.97		10
14		65.73		7
15		65.64		9
16		65.53		8
17		65.53		10
18		66.11		10
19		65.82		9
20		67.12		9
21		66.35		6
22		66.53		7
23		66.38		9
24		66.52		9
25		66.69		3
26		65.51		7
27		65.99		9
28		66.73		9
29		66.41		9
30		66.05		9

weigh to 0.01 mg

~~Chironomus~~ Hyalella 8/27/15

~~Hyallela~~ GROWTH DATA

Client: Kensington Gold Mine Species ID#: AMP 84

Lab ID: see randomization sheet batch number: B 3348 Start Date: 7/21/2015

Sample Description:

Technician:		KJ
Date:		7/17/2015
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
31		65.67		9
32		66.91		9
33		66.00		9
34		66.69		10
35		66.32		9
36		66.97		9
37		66.79		9
38		66.22		8
39		66.40		9
40		66.74		9
41		66.47		10
42		66.67		9
43		66.35	10	MWC ~~9~~ 9 7/31/15
44		65.93		6
45		66.98		9
46		65.22		9
47		65.47		9
48		65.96		6

weigh to 0.01 mg

Hyallela GROWTH DATA

Client: Kensington Gold Mine Species ID#: AMP #84

Lab ID: see randomization sheet batch nun B3348 Start Date: 7/21/2015

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

Technician:	KJ	KJ
Date:	7/22/2015	7/17/2015
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
@ Initiation A	67.56	67.02	na	10
@ Initiation B	65.91	65.25	na	10
@ Initiation C	66.14	65.52	na	10
@ Initiation D		66.28	na	0
@ Initiation E		66.65	na	0
@ Initiation F		65.70	na	0
@ Initiation G		65.46	na	0
@ Initiation H		65.79	na	0

too few organism from supplier

weigh to 0.01 mg

Hyallela GROWTH DATA

KJ Rod 8/3/15

Client: Kensington Gold Mine Species ID#: AMP ~~#48~~ 84

Lab ID: see randomization sheet batch nun B3348 Start Date: 7/21/2015

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

Technician:		KJ
Date:		7/17/2015
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
@ Initiation A		67.02	na	10
@ Initiation B		65.25	na	10
@ Initiation C		65.52	na	10
@ Initiation D		66.28	na	0
@ Initiation E		66.65	na	0
@ Initiation F		65.70	na	0
@ Initiation G		65.46	na	0
@ Initiation H		65.79	na	0

weigh to 0.01 mg

↑ too few from supplier.

Hyallela GROWTH DATA

Client: Kensington Gold Mine Species ID#: AMP #84

Lab ID: see randomization sheet batch nun B3348 Start Date: 7/21/2015

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

Technician:	KJ	KJ
Date:	7/22/2015	7/17/2015
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
@ Initiation A	67.56	67.02	na	10
@ Initiation B	65.91	65.25	na	10
@ Initiation C	66.14	65.52	na	10
@ Initiation D		66.28	na	
@ Initiation E		66.65	na	
@ Initiation F		65.70	na	
@ Initiation G		65.46	na	
@ Initiation H		65.79	na	

weigh to 0.01 mg

CETIS Summary Report

Test Code: B334801hac / 03-6045-5524

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

Batch ID:	05-5324-8546	**Test Type:**	Survival-Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Hyalella azteca	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	07-3577-8330	**Code:**	B3348-01	**Client:**	
Sample Date:	07 Jul-15 10:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 14h	**Station:**	Lower Sherman Creek		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
10-5156-0630	Mean Dry Weight-mg	100	>100	NA	10.4%	1	Equal Variance t Two-Sample Test
18-7774-6118	Survival Rate	100	>100	NA	8.01%	1	Equal Variance t Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
18-7774-6118	Survival Rate	Control Resp	0.9125	0.8 - NL	Yes	Passes Acceptability Criteria

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.08188	0.07355	0.0902	0.071	0.1011	0.003519	0.009954	12.16%	0.0%
100		8	0.08249	0.07462	0.09037	0.07111	0.1022	0.00333	0.009419	11.42%	-0.75%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.9125	0.8589	0.9661	0.8	1	0.02266	0.06409	7.02%	0.0%
100		8	0.8625	0.7632	0.9618	0.6	1	0.04199	0.1188	13.77%	5.48%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.08	0.07444	0.071	0.07778	0.084	0.1011	0.07556	0.09111
100		0.083	0.07667	0.0825	0.1022	0.08	0.07667	0.08778	0.07111

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.8	0.9	1	0.9	1	0.9	0.9	0.9
100		1	0.6	0.8	0.9	0.9	0.9	0.9	0.9

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	8/10	9/10	10/10	9/10	10/10	9/10	9/10	9/10
100		10/10	6/10	8/10	9/10	9/10	9/10	9/10	9/10

Average weight @ test initiation = 0.0607 mg/ individual

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

Analysis ID:	18-7774-6118	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 10:52	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	05-5324-8546	**Test Type:**	Survival-Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Hyalella azteca	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	07-3577-8330	**Code:**	B3348-01	**Client:**	
Sample Date:	07 Jul-15 10:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 14h	**Station:**	Lower Sherman Creek		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	8.01%	Passes survival rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		100	1.02	1.761	0.114	14	0.1626	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.57	2.586	0.0542	No Outliers Detected
Control Trend	Mann-Kendall Trend	2.57		0.7083	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01728824	0.01728824	1	1.039	0.3252	Non-Significant Effect
Error	0.2328482	0.01663201	14			
Total	0.2501365		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	2.374	8.885	0.2767	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.911	0.8408	0.1206	Normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	8	0.9125	0.8589	0.9661	0.9	0.8	1	0.02266	7.02%	0.0%
100		8	0.8625	0.7632	0.9618	0.9	0.6	1	0.04199	13.77%	5.48%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	8	1.272	1.189	1.355	1.249	1.107	1.412	0.03511	7.81%	0.0%
100		8	1.206	1.078	1.334	1.249	0.8861	1.412	0.05409	12.68%	5.17%

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.8	0.9	1	0.9	1	0.9	0.9	0.9
100		1	0.6	0.8	0.9	0.9	0.9	0.9	0.9

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	1.107	1.249	1.412	1.249	1.412	1.249	1.249	1.249
100		1.412	0.8861	1.107	1.249	1.249	1.249	1.249	1.249

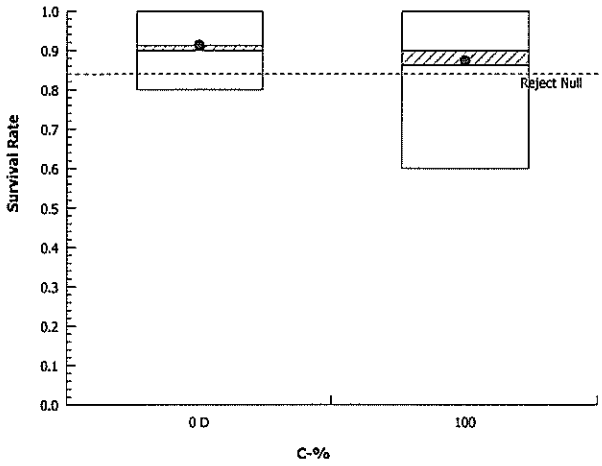
Hyallela 10-d Survival and Growth Sediment Test **CH2M HILL - ASL**

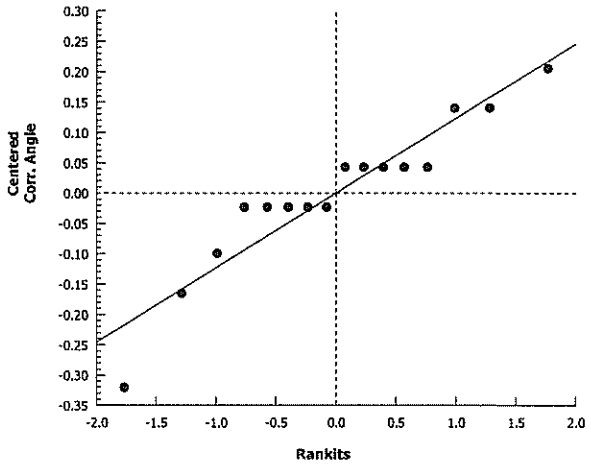
Analysis ID:	18-7774-6118	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 10:52	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	8/10	9/10	10/10	9/10	10/10	9/10	9/10	9/10
100		10/10	6/10	8/10	9/10	9/10	9/10	9/10	9/10

Graphics





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

Analysis ID:	10-5156-0630	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 10:54	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	05-5324-8546	**Test Type:**	Survival-Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Hyalella azteca	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	07-3577-8330	**Code:**	B3348-01	**Client:**	
Sample Date:	07 Jul-15 10:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 14h	**Station:**	Lower Sherman Creek		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	10.4%	Passes mean dry weight-mg

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		100	-0.1276	1.761	0.009	14	0.5498	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.107	2.586	0.3756	No Outliers Detected
Control Trend	Mann-Kendall Trend	2.107		0.2751	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.527781E-06	1.527781E-06	1	0.01627	0.9003	Non-Significant Effect
Error	0.001314666	9.390472E-05	14			
Total	0.001316194		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	1.117	8.885	0.8879	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8863	0.8408	0.0488	Normal Distribution

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	8	0.08188	0.07355	0.0902	0.07889	0.071	0.1011	0.003519	12.16%	0.0%
100		8	0.08249	0.07462	0.09037	0.08125	0.07111	0.1022	0.00333	11.42%	-0.75%

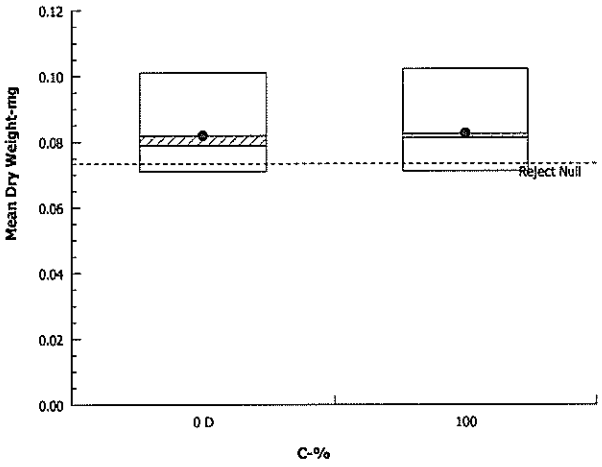
Mean Dry Weight-mg Detail

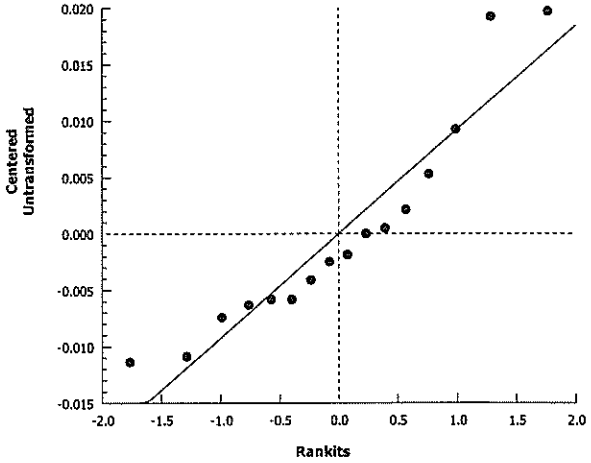
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.08	0.07444	0.071	0.07778	0.084	0.1011	0.07556	0.09111
100		0.083	0.07667	0.0825	0.1022	0.08	0.07667	0.08778	0.07111

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

Analysis ID:	10-5156-0630	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 10:54	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





CETIS Summary Report

Test Code: B334802hac | 13-9488-2765

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

Batch ID:	05-5324-8546	**Test Type:**	Survival-Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Hyalella azteca	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	

Sample ID:	18-0892-1483	**Code:**	B3348-02	**Client:**	
Sample Date:	07 Jul-15 12:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 12h	**Station:**	East Fork Slate Creek		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
18-8098-5901	Mean Dry Weight-mg	100	>100	NA	10.4%	1	Equal Variance t Two-Sample Test
09-0160-6710	Survival Rate	100	>100	NA	6.52%	1	Equal Variance t Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
09-0160-6710	Survival Rate	Control Resp	0.9125	0.8 - NL	Yes	Passes Acceptability Criteria

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.08188	0.07355	0.0902	0.071	0.1011	0.003519	0.009954	12.16%	0.0%
100		8	0.08681	0.07899	0.09462	0.074	0.102	0.003305	0.009349	10.77%	-6.03%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.9125	0.8589	0.9661	0.8	1	0.02266	0.06409	7.02%	0.0%
100		8	0.9	0.8368	0.9632	0.8	1	0.02673	0.07559	8.4%	1.37%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.08	0.07444	0.071	0.07778	0.084	0.1011	0.07556	0.09111
100		0.074	0.085	0.102	0.09667	0.09125	0.07889	0.08111	0.08556

Survival Rate Detail

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

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	8/10	9/10	10/10	9/10	10/10	9/10	9/10	9/10
100		10/10	8/10	10/10	9/10	8/10	9/10	9/10	9/10

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

Analysis ID:	09-0160-6710	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 10:55	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	05-5324-8546	**Test Type:**	Survival-Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Hyalella azteca	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	18-0892-1483	**Code:**	B3348-02	**Client:**	
Sample Date:	07 Jul-15 12:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 12h	**Station:**	East Fork Slate Creek		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	6.52%	Passes survival rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		100	0.3296	1.761	0.095	14	0.3733	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.586	2.586	1.0000	No Outliers Detected
Control Trend	Mann-Kendall Trend	1.586		0.7083	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001258423	0.001258423	1	0.1086	0.7466	Non-Significant Effect
Error	0.1621856	0.01158469	14			
Total	0.163444		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	1.35	8.885	0.7022	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8583	0.8408	0.0181	Normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	8	0.9125	0.8589	0.9661	0.9	0.8	1	0.02266	7.02%	0.0%
100		8	0.9	0.8368	0.9632	0.9	0.8	1	0.02673	8.4%	1.37%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	8	1.272	1.189	1.355	1.249	1.107	1.412	0.03511	7.81%	0.0%
100		8	1.254	1.158	1.351	1.249	1.107	1.412	0.04079	9.2%	1.39%

Survival Rate Detail

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

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	1.107	1.249	1.412	1.249	1.412	1.249	1.249	1.249
100		1.412	1.107	1.412	1.249	1.107	1.249	1.249	1.249

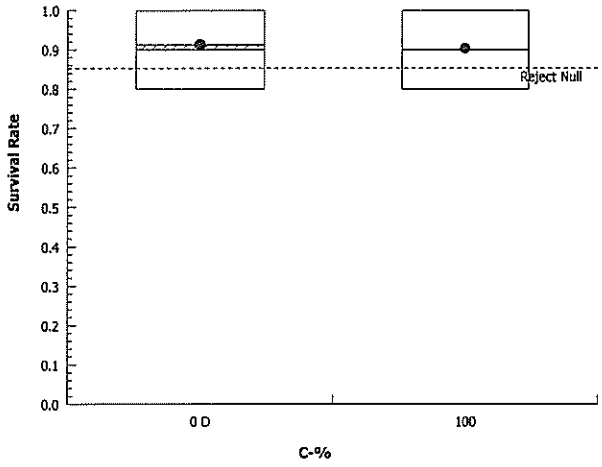
Hyallela 10-d Survival and Growth Sediment Test **CH2M HILL - ASL**

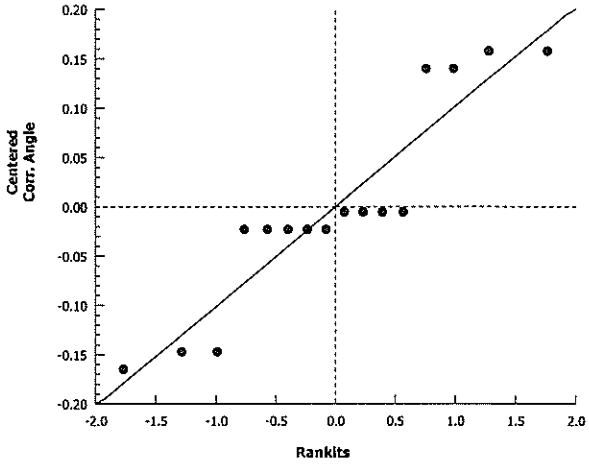
Analysis ID: 09-0160-6710 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.8.8
Analyzed: 20 Aug-15 10:55 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	8/10	9/10	10/10	9/10	10/10	9/10	9/10	9/10
100		10/10	8/10	10/10	9/10	8/10	9/10	9/10	9/10

Graphics





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

Analysis ID:	18-8098-5901	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 10:55	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	05-5324-8546	**Test Type:**	Survival-Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Hyalella azteca	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	18-0892-1483	**Code:**	B3348-02	**Client:**	
Sample Date:	07 Jul-15 12:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 12h	**Station:**	East Fork Slate Creek		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	10.4%	Passes mean dry weight-mg

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		100	-1.022	1.761	0.009	14	0.8379	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.062	2.586	0.4373	No Outliers Detected
Control Trend	Mann-Kendall Trend	2.062		0.2751	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	9.737779E-05	9.737779E-05	1	1.044	0.3241	Non-Significant Effect
Error	0.001305361	9.324007E-05	14			
Total	0.001402739		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	1.134	8.885	0.8728	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9388	0.8408	0.3349	Normal Distribution

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	8	0.08188	0.07355	0.0902	0.07889	0.071	0.1011	0.003519	12.16%	0.0%
100		8	0.08681	0.07899	0.09462	0.08528	0.074	0.102	0.003305	10.77%	-6.03%

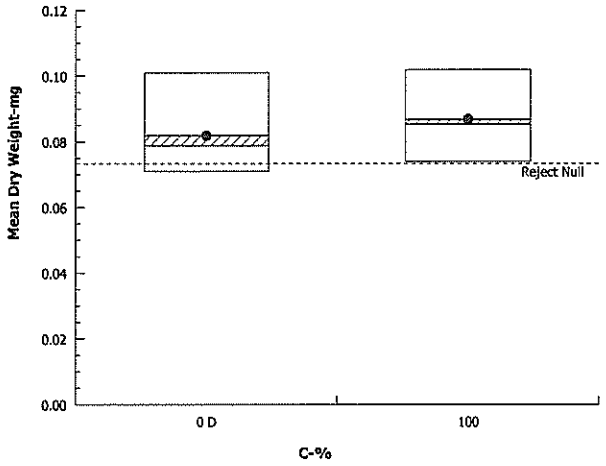
Mean Dry Weight-mg Detail

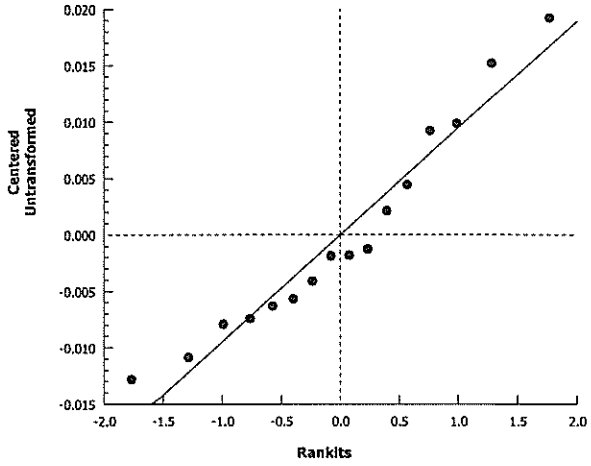
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.08	0.07444	0.071	0.07778	0.084	0.1011	0.07556	0.09111
100		0.074	0.085	0.102	0.09667	0.09125	0.07889	0.08111	0.08556

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

Analysis ID:	18-8098-5901	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 10:55	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





CETIS Summary Report

Test Code: B334803hac | 10-8166-3672

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

Batch ID:	05-5324-8546	**Test Type:**	Survival-Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Hyalella azteca	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	11-4480-5389	**Code:**	B3348-03	**Client:**	
Sample Date:	06 Jul-15 14:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	14d 10h	**Station:**	Lower Johnson Creek		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
07-3792-6504	Mean Dry Weight-mg	100	>100	NA	10.3%	1	Equal Variance t Two-Sample Test
01-1268-1983	Survival Rate	100	>100	NA	10.9%	1	Equal Variance t Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
01-1268-1983	Survival Rate	Control Resp	0.9125	0.8 - NL	Yes	Passes Acceptability Criteria

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.08188	0.07355	0.0902	0.071	0.1011	0.003519	0.009954	12.16%	0.0%
100		8	0.07973	0.07201	0.08744	0.073	0.09714	0.003263	0.00923	11.58%	2.62%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.9125	0.8589	0.9661	0.8	1	0.02266	0.06409	7.02%	0.0%
100		8	0.85	0.7159	0.9841	0.6	1	0.05669	0.1604	18.87%	6.85%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.08	0.07444	0.071	0.07778	0.084	0.1011	0.07556	0.09111
100		0.07333	0.09714	0.074	0.074	0.08444	0.073	0.07333	0.08857

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.8	0.9	1	0.9	1	0.9	0.9	0.9
100		0.9	0.7	1	1	0.9	1	0.6	0.7

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	8/10	9/10	10/10	9/10	10/10	9/10	9/10	9/10
100		9/10	7/10	10/10	10/10	9/10	10/10	6/10	7/10

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

Analysis ID:	01-1268-1983	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 10:57	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	05-5324-8546	**Test Type:**	Survival-Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Hyalella azteca	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	11-4480-5389	**Code:**	B3348-03	**Client:**	
Sample Date:	06 Jul-15 14:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	14d 10h	**Station:**	Lower Johnson Creek		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	10.9%	Passes survival rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		100	0.8547	1.761	0.148	14	0.2035	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.938	2.586	0.6466	No Outliers Detected
Control Trend	Mann-Kendall Trend	1.938		0.7083	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02058361	0.02058361	1	0.7305	0.4071	Non-Significant Effect
Error	0.3944608	0.02817577	14			
Total	0.4150444		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	4.715	8.885	0.0580	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9266	0.8408	0.2154	Normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	8	0.9125	0.8589	0.9661	0.9	0.8	1	0.02266	7.02%	0.0%
100		8	0.85	0.7159	0.9841	0.9	0.6	1	0.05669	18.87%	6.85%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	8	1.272	1.189	1.355	1.249	1.107	1.412	0.03511	7.81%	0.0%
100		8	1.2	1.02	1.381	1.249	0.8861	1.412	0.07623	17.96%	5.64%

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.8	0.9	1	0.9	1	0.9	0.9	0.9
100		0.9	0.7	1	1	0.9	1	0.6	0.7

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	1.107	1.249	1.412	1.249	1.412	1.249	1.249	1.249
100		1.249	0.9912	1.412	1.412	1.249	1.412	0.8861	0.9912

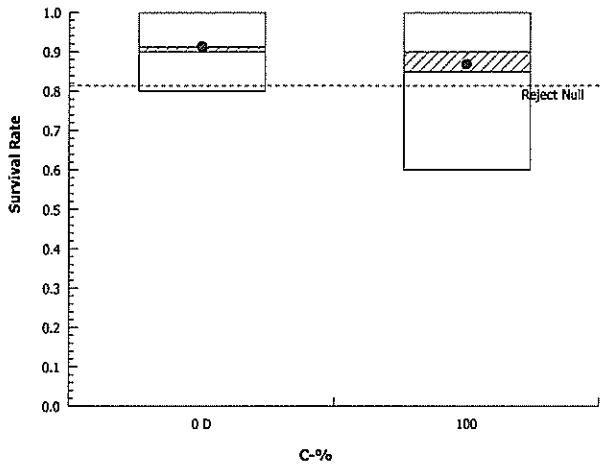
Hyallela 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

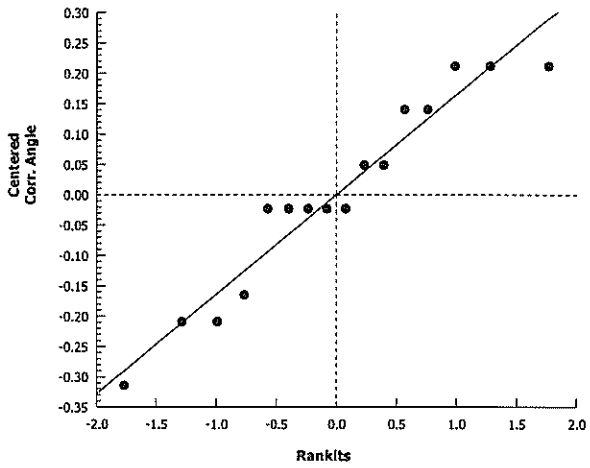
Analysis ID:	01-1268-1983	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 10:57	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	8/10	9/10	10/10	9/10	10/10	9/10	9/10	9/10
100		9/10	7/10	10/10	10/10	9/10	10/10	6/10	7/10

Graphics





CETIS Analytical Report

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

Analysis ID:	07-3792-6504	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 10:57	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	05-5324-8546	**Test Type:**	Survival-Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Hyalella azteca	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	11-4480-5389	**Code:**	B3348-03	**Client:**	
Sample Date:	06 Jul-15 14:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	14d 10h	**Station:**	Lower Johnson Creek		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	10.3%	Passes mean dry weight-mg

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		100	0.4473	1.761	0.008	14	0.3307	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.074	2.586	0.4199	No Outliers Detected
Control Trend	Mann-Kendall Trend	2.074		0.2751	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.843628E-05	1.843628E-05	1	0.2001	0.6615	Non-Significant Effect
Error	0.001289981	9.214152E-05	14			
Total	0.001308417		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	1.163	8.885	0.8473	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8492	0.8408	0.0133	Normal Distribution

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	8	0.08188	0.07355	0.0902	0.07889	0.071	0.1011	0.003519	12.16%	0.0%
100		8	0.07973	0.07201	0.08744	0.074	0.073	0.09714	0.003263	11.58%	2.62%

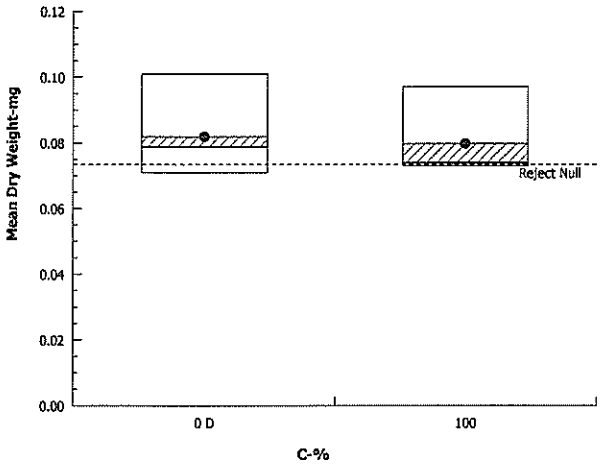
Mean Dry Weight-mg Detail

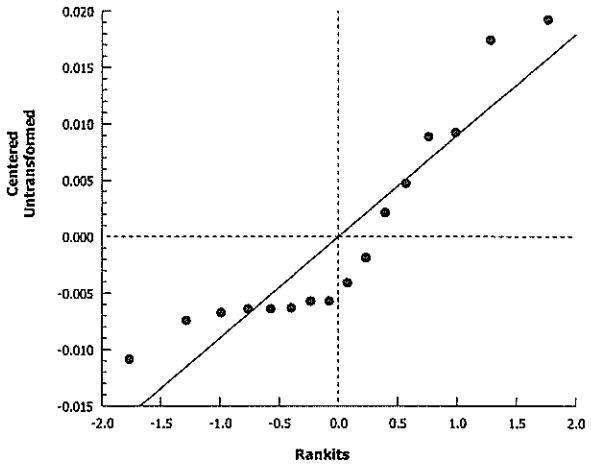
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.08	0.07444	0.071	0.07778	0.084	0.1011	0.07556	0.09111
100		0.07333	0.09714	0.074	0.074	0.08444	0.073	0.07333	0.08857

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

Analysis ID:	07-3792-6504	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 10:57	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





CETIS Summary Report

Test Code: B334804hac | 18-9646-9732

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

Batch ID:	05-5324-8546	**Test Type:**	Survival-Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Hyalella azteca	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	05-1841-3410	**Code:**	B3348-04	**Client:**	
Sample Date:	06 Jul-15 09:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	14d 15h	**Station:**	Lower Slate Creek		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
04-9424-0015	Mean Dry Weight-mg	100	>100	NA	10.6%	1	Equal Variance t Two-Sample Test
07-4008-0945	Survival Rate	100	>100	NA	5.9%	1	Equal Variance t Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
07-4008-0945	Survival Rate	Control Resp	0.9125	0.8 - NL	Yes	Passes Acceptability Criteria

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.08188	0.07355	0.0902	0.071	0.1011	0.003519	0.009954	12.16%	0.0%
100		8	0.08439	0.07621	0.09257	0.06667	0.09667	0.00346	0.009787	11.6%	-3.07%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.9125	0.8589	0.9661	0.8	1	0.02266	0.06409	7.02%	0.0%
100		8	0.8625	0.8003	0.9247	0.7	0.9	0.02631	0.0744	8.63%	5.48%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.08	0.07444	0.071	0.07778	0.084	0.1011	0.07556	0.09111
100		0.0875	0.09	0.09222	0.07429	0.08333	0.06667	0.09667	0.08444

Survival Rate Detail

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

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	8/10	9/10	10/10	9/10	10/10	9/10	9/10	9/10
100		8/10	9/10	9/10	7/10	9/10	9/10	9/10	9/10

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

Analysis ID:	07-4008-0945	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 10:58	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	05-5324-8546	**Test Type:**	Survival-Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Hyalella azteca	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	05-1841-3410	**Code:**	B3348-04	**Client:**	
Sample Date:	06 Jul-15 09:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	14d 15h	**Station:**	Lower Slate Creek		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	5.9%	Passes survival rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		100	1.483	1.761	0.087	14	0.0802	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.186	2.586	0.2846	No Outliers Detected
Control Trend	Mann-Kendall Trend	2.186		0.7083	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02130358	0.02130358	1	2.198	0.1603	Non-Significant Effect
Error	0.1356824	0.009691601	14			
Total	0.156986		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	1.035	8.885	0.9646	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.902	0.8408	0.0866	Normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	8	0.9125	0.8589	0.9661	0.9	0.8	1	0.02266	7.02%	0.0%
100		8	0.8625	0.8003	0.9247	0.9	0.7	0.9	0.02631	8.63%	5.48%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	8	1.272	1.189	1.355	1.249	1.107	1.412	0.03511	7.81%	0.0%
100		8	1.199	1.117	1.281	1.249	0.9912	1.249	0.0345	8.14%	5.74%

Survival Rate Detail

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

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	1.107	1.249	1.412	1.249	1.412	1.249	1.249	1.249
100		1.107	1.249	1.249	0.9912	1.249	1.249	1.249	1.249

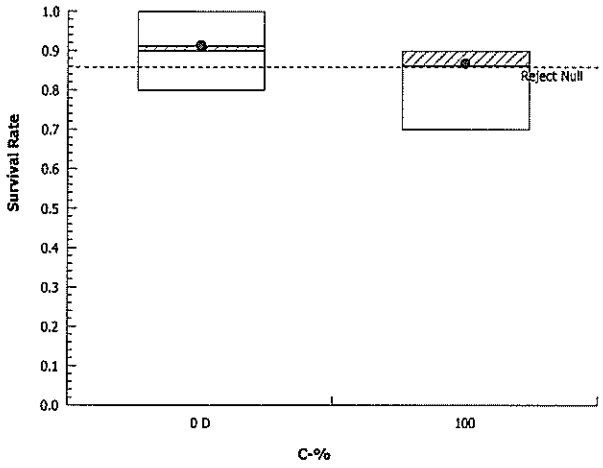
Hyallela 10-d Survival and Growth Sediment Test **CH2M HILL - ASL**

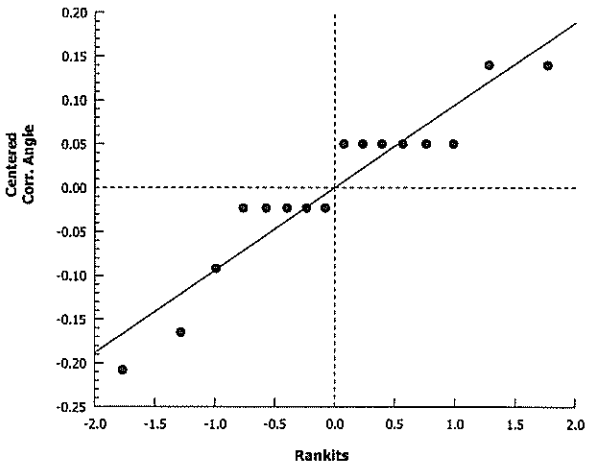
Analysis ID:	07-4008-0945	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 10:58	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	8/10	9/10	10/10	9/10	10/10	9/10	9/10	9/10
100		8/10	9/10	9/10	7/10	9/10	9/10	9/10	9/10

Graphics





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

Analysis ID:	04-9424-0015	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 10:58	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	05-5324-8546	**Test Type:**	Survival-Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Hyalella azteca	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	05-1841-3410	**Code:**	B3348-04	**Client:**	
Sample Date:	06 Jul-15 09:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	14d 15h	**Station:**	Lower Slate Creek		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	10.6%	Passes mean dry weight-mg

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		100	-0.5095	1.761	0.009	14	0.6908	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.017	2.586	0.5058	No Outliers Detected
Control Trend	Mann-Kendall Trend	2.017		0.2751	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.52924E-05	2.52924E-05	1	0.2596	0.6183	Non-Significant Effect
Error	0.001364105	9.743604E-05	14			
Total	0.001389397		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	1.034	8.885	0.9656	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9954	0.8408	1.0000	Normal Distribution

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	8	0.08188	0.07355	0.0902	0.07889	0.071	0.1011	0.003519	12.16%	0.0%
100		8	0.08439	0.07621	0.09257	0.08597	0.06667	0.09667	0.00346	11.6%	-3.07%

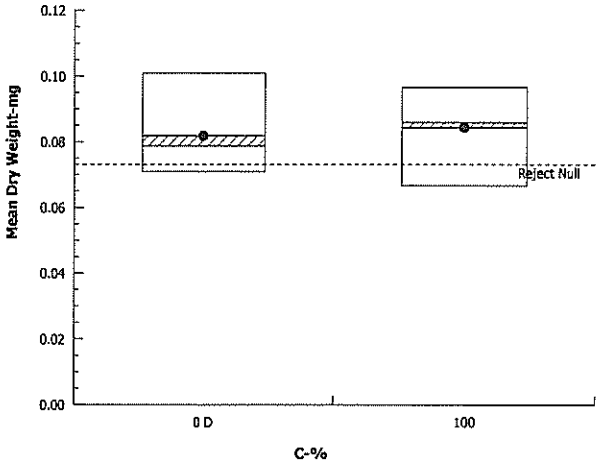
Mean Dry Weight-mg Detail

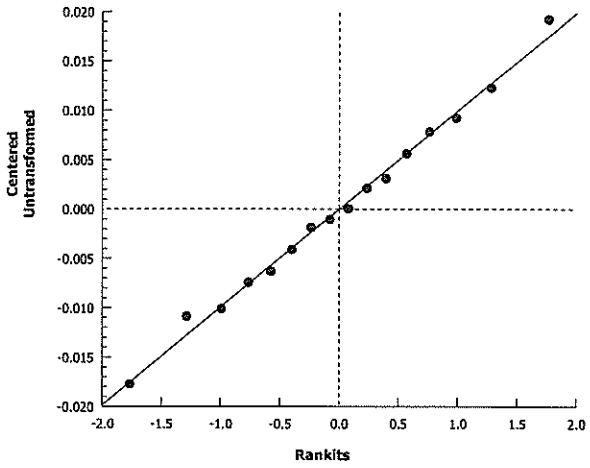
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.08	0.07444	0.071	0.07778	0.084	0.1011	0.07556	0.09111
100		0.0875	0.09	0.09222	0.07429	0.08333	0.06667	0.09667	0.08444

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

Analysis ID:	04-9424-0015	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 10:58	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





CETIS Summary Report

Test Code: B334805hac | 14-2552-9079

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

Batch ID:	05-5324-8546	**Test Type:**	Survival-Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Hyalella azteca	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	

Sample ID:	08-9019-4242	**Code:**	B3348-05	**Client:**	
Sample Date:	07 Jul-15 13:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 11h	**Station:**	Upper Slate Creek		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
05-2178-9468	Mean Dry Weight-mg	100	>100	NA	11.5%	1	Equal Variance t Two-Sample Test
17-6767-8272	Survival Rate	<100	100	NA	12.5%	>1	Equal Variance t Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
17-6767-8272	Survival Rate	Control Resp	0.9125	0.8 - NL	Yes	Passes Acceptability Criteria

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.08188	0.07355	0.0902	0.071	0.1011	0.003519	0.009954	12.16%	0.0%
100		8	0.08562	0.07608	0.09516	0.07	0.1017	0.004033	0.01141	13.32%	-4.57%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.9125	0.8589	0.9661	0.8	1	0.02266	0.06409	7.02%	0.0%
100		8	0.7	0.5157	0.8843	0.3	0.9	0.07792	0.2204	31.48%	23.29%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.08	0.07444	0.071	0.07778	0.084	0.1011	0.07556	0.09111
100		0.07	0.1017	0.08857	0.07	0.08333	0.08333	0.09556	0.0925

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.8	0.9	1	0.9	1	0.9	0.9	0.9
100		0.5	0.6	0.7	0.9	0.3	0.9	0.9	0.8

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	8/10	9/10	10/10	9/10	10/10	9/10	9/10	9/10
100		5/10	6/10	7/10	9/10	3/10	9/10	9/10	8/10

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

Analysis ID:	17-6767-8272	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 10:59	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	05-5324-8546	**Test Type:**	Survival-Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Hyalella azteca	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	08-9019-4242	**Code:**	B3348-05	**Client:**	
Sample Date:	07 Jul-15 13:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 11h	**Station:**	Upper Slate Creek		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	12.5%	Fails survival rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		100*	2.748	1.761	0.167	14	0.0079	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.366	2.586	0.1406	No Outliers Detected
Control Trend	Mann-Kendall Trend	2.366		0.7083	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.2703616	0.2703616	1	7.552	0.0157	Significant Effect
Error	0.5012196	0.0358014	14			
Total	0.7715812		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	6.262	8.885	0.0272	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.921	0.8408	0.1750	Normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	8	0.9125	0.8589	0.9661	0.9	0.8	1	0.02266	7.02%	0.0%
100		8	0.7	0.5157	0.8843	0.75	0.3	0.9	0.07792	31.48%	23.29%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	8	1.272	1.189	1.355	1.249	1.107	1.412	0.03511	7.81%	0.0%
100		8	1.012	0.8043	1.22	1.049	0.5796	1.249	0.08785	24.55%	20.44%

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.8	0.9	1	0.9	1	0.9	0.9	0.9
100		0.5	0.6	0.7	0.9	0.3	0.9	0.9	0.8

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	1.107	1.249	1.412	1.249	1.412	1.249	1.249	1.249
100		0.7854	0.8861	0.9912	1.249	0.5796	1.249	1.249	1.107

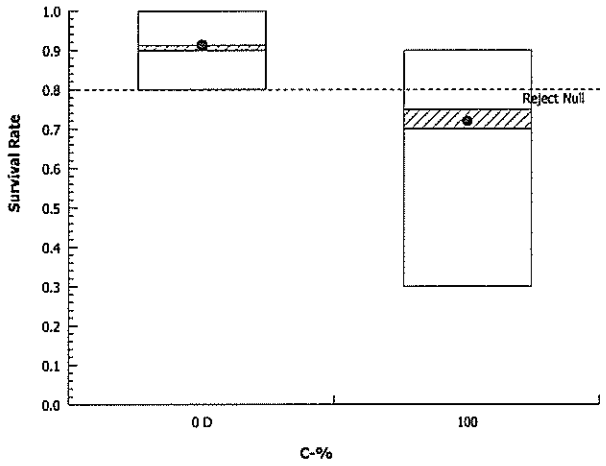
Hyallela 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

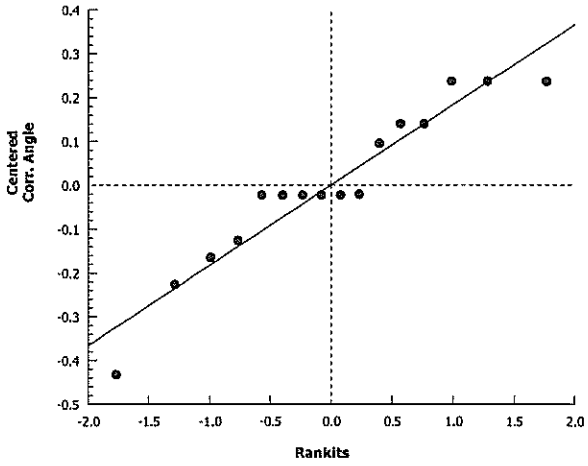
Analysis ID:	17-6767-8272	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 10:59	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	8/10	9/10	10/10	9/10	10/10	9/10	9/10	9/10
100		5/10	6/10	7/10	9/10	3/10	9/10	9/10	8/10

Graphics





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

Analysis ID:	05-2178-9468	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 10:59	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	05-5324-8546	**Test Type:**	Survival-Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Hyalella azteca	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	08-9019-4242	**Code:**	B3348-05	**Client:**	
Sample Date:	07 Jul-15 13:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 11h	**Station:**	Upper Slate Creek		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	11.5%	Passes mean dry weight-mg

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		100	-0.6997	1.761	0.009	14	0.7522	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.86	2.586	0.8110	No Outliers Detected
Control Trend	Mann-Kendall Trend	1.86		0.2751	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	5.609856E-05	5.609856E-05	1	0.4896	0.4956	Non-Significant Effect
Error	0.001604252	0.0001145895	14			
Total	0.001660351		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	1.313	8.885	0.7285	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9682	0.8408	0.8087	Normal Distribution

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	8	0.08188	0.07355	0.0902	0.07889	0.071	0.1011	0.003519	12.16%	0.0%
100		8	0.08562	0.07608	0.09516	0.08595	0.07	0.1017	0.004033	13.32%	-4.57%

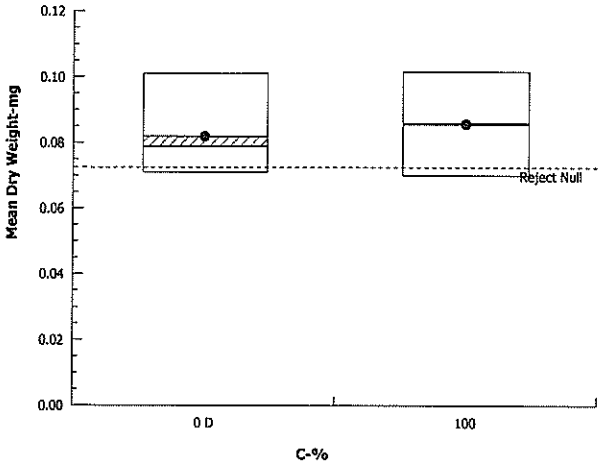
Mean Dry Weight-mg Detail

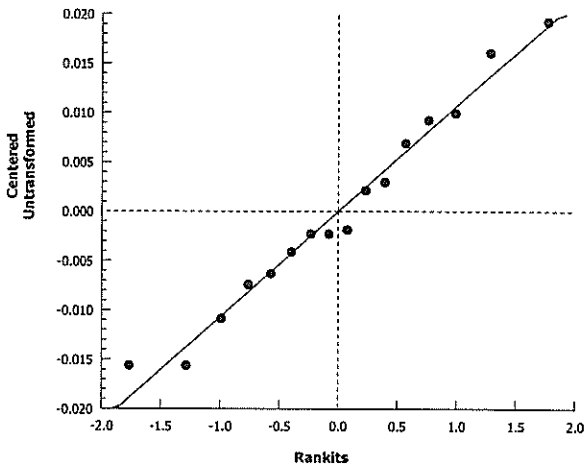
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.08	0.07444	0.071	0.07778	0.084	0.1011	0.07556	0.09111
100		0.07	0.1017	0.08857	0.07	0.08333	0.08333	0.09556	0.0925

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

Analysis ID:	05-2178-9468	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 10:59	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





CH2M HILL

FRESHWATER TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Client: Kensington Gold Mine

Sample Description: See Randomization Sheet. Batch Number B 3348

Test Species: Chironomus tentans

ID#: Amp Ctl 3rd Brood 7/24/15

Beginning (Day 0), Date 7-21-15 Time 1510

Ending (Day 10), Date 7-31-15 Time 1100

		Day -1	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Tech.			DW/BM	DW	DW	BM	MW	MC	MW	DW	DW	DW	DW
Time			0700	0700	0645	0715	0740	0920	0900	0700	0700	0640	0630
Tech.	TH		153	221	213	217	213	207	215	212	214	211	214
Tech.		BM	BM/CL	CL	BM	MC/BM	JW	BM	BM	BM	CL	JW	BM
Time		1700	1715	1715	1615	1630	1630	1745	1655	1650	1620	1645	1600
Feeding: ✓ when done			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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
55	7.0	6.2	6.3	5.9	5.7	5.7	6.1	6.2	5.7	6.1	5.8	22.5	22.4	22.2	22.2	22.3	22.3	22.4	22.7	22.4	22.6	22.4	7.7	7.1	328	342
58	7.4	6.2	6.4	5.7	6.0	5.4	5.9	6.0	5.4	6.1	5.5	22.5	22.3	22.2	22.2	22.3	22.4	22.4	22.6	22.5	22.6	22.4	7.8	7.1	331	337
62	7.7	6.2	6.3	5.5	6.1	5.3	5.9	5.8	5.4	6.1	5.2	22.5	22.3	22.2	22.3	22.4	22.5	22.3	22.6	22.4	22.6	22.5	7.8	7.2	329	334
75	7.8	6.0	6.1	5.4	6.3	5.3	5.4	5.7	5.3	6.2	5.4	22.4	22.3	22.1	22.2	22.4	22.4	22.3	22.5	22.4	22.5	22.4	7.5	6.9	322	318
79	7.7	5.9	6.0	5.4	6.1	5.1	5.3	5.5	5.0	6.1	5.0	22.3	22.2	22.1	22.2	22.4	22.4	22.4	22.5	22.5	22.6	22.4	7.7	7.1	328	333
92	7.6	5.8	6.0	5.4	6.0	5.0	5.4	5.3	5.0	6.2	5.1	22.3	22.3	22.1	22.2	22.4	22.4	22.4	22.6	22.4	22.5	22.4	7.6	7.1	327	339

CH2M HILL

FRESHWATER TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Client: Kensington Gold Mine
Sample Description: See Randomization Sheet(s). Batch number: B 3348
Test Species: Chironomus tentans ID#: ~~AMPCH12~~

Beginning, Date 7-21-15 Time 1310
Ending, Date 7-31-15 Time 1100

Test Initiation: Tech: Tech: BM Time: 1310
Test Termination: Tech: Tech: BM Time: 1100

Beaker Number	Start Count 0	# alive found 10	# dead found 10	Comments:
51	10	~~13~~ ROB MC 7-31-15 3		Empty burrows
52	10	4	1	
53	10	7	2	
54	10	10	1	
55	10	5	1	
56	10	5	1	worm observed
57	10	5	0	worms
58	10	7	0	
59	10	1	2	a lot of Other organisms observed
60	10	5Ø*	0	worms
61	10	3	2	worms + other organisms
62	10	6	1	
63	10	5	0	
64	10	9	0	
65	10	6	0	

Beaker Number	Start Count 0	# alive found 10	# dead found 10	Comments:
66	10	7	0	
67	10	8	1	
68	10	7	0	
69	10	4	0	
70	10	5	0	+1 ~~molting~~ pupae
71	10	3	0	+1 pupation, +1 exoskel.
72	10	5	0	
73	10	7	0	
74	10	5	0	worms
75	10	5	0	1 pupate
76	10	5	0	
77	10	4	0	
78	10	4	0	+1 pupate + 1 exoskeleton
79	10	8	0	
80	10	7	0	

exoskeletons noted during removals: (removed after counts)

7/29 pm BM: noted in rep5: 52(x2), 56, 63, 74, 76(x2), 77, 78(x2), 96, 98

exoskeletons noted in: 51 (x2), 55, 56, 60, 62, 69, 70, 72, 74, 75, 77, 80, 82, 83, 87, 94

7/30/2015 pm two exoskeletons noted: 51 (x2), 60, 61(x2), 62, 63 (x2), 65(x2), 66(x2), 67, 68, 69, 71(x2), 72, 73, 75(x2), 78, 83(x2), 84, 85, 88, 90(x2), 91, 93(x2), 98

51 had noted exoskeleton: 52, 53, 54, 56, 61, 62, 72

* ROB MC 7-31-15

CH2MHILL

FRESHWATER TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Client: Kensington Gold Mine
Sample Description: See Randomization Sheet(s). Batch number: B 3348
Test Species: Chironomus tentans
ID#: ~~AMP~~ CH122 B

Beginning, Date: 7-21-15 Time: 1310
Ending, Date: 7-31-15 Time: 1100

Test Initiation: Tech: Tech: BW Time: 0110

Test Termination: Tech: Tech: BW Time: 1100

Beaker Number	Start Count 0	# alive found 10	# dead found 10	Comments:
81	10	9	0	
82	10	5	0	+1 pupae
83	10	8	0	
84	10	1	6	+3 exoskel,
85	10	8	0	
86	10	5	0	
87	10	3	1	+ 2 exoskel,
88	10	2	0	+2 pupae
89	10	4	0	+2 pupae, 1 exo.
90	10	4	0	+1 exoskel.
91	10	5	0	
92	10	3	0	+3 pupae + 1 exo
93	10	4	0	1 pupae + 1 exo
94	10	4	0	+2 pupae + 1 exo
95	10	7	0	+2 pupae

Beaker Number	Start Count 0	# alive found 10	# dead found 10	Comments:
96	10	4	0	+1 pupa
97	10	7	0	+1 pupae
98	10	7	0	+1 exo

Chironomus tentans GROWTH DATA

Client: Kensington Gold Mine | Species ID#: CHI # 22

Lab ID: see randomization sheet batch nun B3348 | Start Date: 7/21/2015

Sample Description:

Technician:	KJ	KJ
Date:	8/3/2015	8/5/2015
Balance Serial #:	B328543647	B328543647

Tin ID Number	Total Dry Weight (mg) (including pan)	Total Ashed Weight (mg) (including pan)	No. of Amphipods Surviving	No. of Amphipods in Tin
51	73.71	67.50		
52	75.79	68.35		
53	83.61	69.11		
54	88.94	70.74		
55	78.94	70.08		
56	80.28	70.15		
57	75.78	67.07		
58	81.46	69.70		
59	68.14	66.29		
60	78.46	69.28		
61	72.32	68.08		
62	85.13	73.23		
63	80.06	70.71		
64	88.12	72.68		
65	87.32	74.82		
66	80.50	69.15		
67	87.44	71.72		
68	87.41	72.05		
69	73.22	67.67		
70	78.77	69.55		
71	75.83	68.07		
72	79.40	69.57		
73	86.63	73.66		
74	81.10	72.93		
75	78.39	68.92		
76	82.04	71.01		
77	77.62	68.34		
78	78.59	71.07		
79	86.12	75.12		
80	81.62	67.93		

weigh to 0.01 mg

Chironomus tentans GROWTH DATA

Client: Kensington Gold Mine Species ID#: CHI # 22

Lab ID: see randomization sheet batch nun B3348 Start Date: 7/21/2015

Sample Description:

Technician:	KJ	KJ
Date:	8/3/2015	8/5/2015
Balance Serial #:	B328543647	B328543647

Tin ID Number	Total Dry Weight (mg) (including pan)	Total Ashed Weight (mg) (including pan)	No. of Amphipods Surviving	No. of Amphipods in Tin
81	80.94	72.58		
82	79.46	69.54		
83	85.28	71.21		
84	71.15	68.10		
85	91.32	72.47		
86	82.74	69.00		
87	77.57	70.71		
88	75.48	71.07		
89	77.12	68.31		
90	77.52	71.07		
91	81.98	69.86		
92	78.63	69.85		
93	76.12	69.62		
94	77.34	68.82		
95	85.40	71.18		
96	81.42	71.83		
97	87.31	71.32		
98	87.16	71.78		

weigh to 0.01 mg

Chironomus tentans GROWTH DATA

Client Kensington Gold Mine Species ID# CHI 22

Lab ID: see randomization sheet batch number: B 3348 Start Date 7-21-15

Sample Description:

Technician:
Date:
Balance Serial #:

Tin ID Number	Total Dry Weight (mg) (including pan)	Total Ashed Weight (mg) (including pan)	No. of Amphipods Surviving	No. of Amphipods in Tin
51				3
52				3
53				7
54				8
55				5
56				5
57				5
58				7
59				1
60				5
61				3
62				6
63				5
64				9
65				6
66				7
67				8
68				7
69				2
70				4
71				3
72				5
73				7
74				5
75				5
76				5
77				4
78				4
79				8
80				7

weigh to 0.01 mg

Chironomus tentans GROWTH DATA

Client: Kensington Gold Mine Species ID#: CHI 22

Lab ID: see randomization sheet batch number: B3348 Start Date: 2-21-15

Sample Description:

Technician:		
Date:		
Balance Serial #:	50309851	50309851

Tin ID Number	Total Dry Weight (mg) (including pan)	Total Ashed Weight (mg) (including pan)	No. of Amphipods Surviving	No. of Amphipods in Tin
81				9
82				5
83				8
84				1
85				8
86				5
87				3
88				2
89				4
90				4
91				5
92				3
93				4
94				4
95				7
96				4
97				7
98				7

weigh to 0.01 mg

Chironomus tentans GROWTH DATA

Client: Kensington Gold Mine | Species ID#: CHI # 22

Lab ID: see randomization sheet batch nun B3348 | Start Date: 7/21/2015

Sample Description:

Technician:	KJ	
Date:	8/3/2015	
Balance Serial #:	B328543647	B328543647

Tin ID Number	Total Dry Weight (mg) (including pan)	Total Ashed Weight (mg) (including pan)	No. of Amphipods Surviving	No. of Amphipods in Tin
81	80.94			
82	79.46			
83	85.28			
84	71.15			
85	91.32			
86	82.74			
87	77.57			
88	75.48			
89	77.12			
90	77.52			
91	81.98			
92	78.63			
93	76.12			
94	77.34			
95	85.40			
96	81.42			
97	87.31			
98	87.16			

weigh to 0.01 mg

Chironomus tentans GROWTH DATA

Client: Kensington Gold Mine | Species ID#: CHI # 22

Lab ID: see randomization sheet batch nun B3348 | Start Date: 7/21/2015

Sample Description:

Technician:	KJ	
Date:	8/3/2015	
Balance Serial #:	B328543647	B328543647

Tin ID Number	Total Dry Weight (mg) (including pan)	Total Ashed Weight (mg) (including pan)	No. of Amphipods Surviving	No. of Amphipods in Tin
51	73.71			
52	75.79			
53	83.61			
54	88.94			
55	78.94			
56	80.28			
57	75.78			
58	81.46			
59	68.14			
60	78.46			
61	72.32			
62	85.13			
63	80.06			
64	88.12			
65	87.32			
66	80.50			
67	87.44			
68	87.41			
69	73.22			
70	78.77			
71	75.83			
72	79.40			
73	86.63			
74	81.10			
75	78.39			
76	82.04			
77	77.62			
78	78.59			
79	86.12			
80	81.62			

weigh to 0.01 mg

Chironomid GROWTH DATA

Client: Kensington Gold Mine Species ID#: CHI#22

Lab ID: see randomization sheet batch nun B3348 Start Date: 7/21/2015

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

Technician:	KJ	KJ
Date:	7/22/2015	8/5/2015
Balance Serial #:	B328543647	B3285423647

Tin ID Number	Total Dry Weight (mg) (including pan)	Total Ashed Weight (mg) (including pan)	No. of Amphipods Surviving	No. of Amphipods in Tin
@ Initiation A	66.39	65.86	na	5
@ Initiation B	66.15	65.61	na	5
@ Initiation C	67.07	66.14	na	5
@ Initiation D	68.33	67.04	na	5
@ Initiation E			na	0
@ Initiation F			na	0
@ Initiation G			na	0
@ Initiation H			na	0

weigh to 0.01 mg

Chironomid GROWTH DATA

Client: Kensington Gold Mine Species ID#: CHI#22

Lab ID: see randomization sheet batch number: B 3348 Start Date: 7/21/2015

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

Technician:	KJ	
Date:	7/22/2015	
Balance Serial #:	B328543647	B3285423647

Tin ID Number	Total Dry Weight (mg) (including pan)	Total Ashed Weight (mg) (including pan)	No. of Amphipods Surviving	No. of Amphipods in Tin
@ Initiation A	66.39		na	5
@ Initiation B	66.15		na	5
@ Initiation C	67.07		na	5
@ Initiation D	68.33		na	5
@ Initiation E			na	0
@ Initiation F			na	0
@ Initiation G			na	0
@ Initiation H			na	0

weigh to 0.01 mg

Chironomid GROWTH DATA

Client: Kensington Gold Mine Species ID#: CHI 22

Lab ID: see randomization sheet batch number: B 3348 Start Date: 7/21/15

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

Technician: _____ _____

Date: _____ _____

Balance Serial #: _____ _____

Tin ID Number	Total Dry Weight (mg) (including pan)	Total Ashed Weight (mg) (including pan)	No. of Amphipods Surviving	No. of Amphipods in Tin
@ Initiation A			na	~~10~~ 5
@ Initiation B			na	~~10~~ 5
@ Initiation C			na	~~10~~ 5
@ Initiation D			na	~~10~~ 5
@ Initiation E			na	~~10~~ 0
@ Initiation F			na	~~10~~ 0
@ Initiation G			na	~~10~~ 0
@ Initiation H			na	~~10~~ 0

weigh to 0.01 mg

↑ to few from Spiker. BM 7/21/15

Chironomid RANDOMIZATION SHEET

Client: **Kensington Gold Mine** **Test Start Date:**

Laboratory ID:	Field ID:	Alternate ID / Dilutions:	Replicate ID:	Random Number	Test Chamber Number:
Sediment Control	Beaver Creek	Control	D	0.93494	54
Sediment Control	Beaver Creek	Control	E	0.75506	64
Sediment Control	Beaver Creek	Control	C	0.71688	67
Sediment Control	Beaver Creek	Control	B	0.65157	68
Sediment Control	Beaver Creek	Control	A	0.52780	75
Sediment Control	Beaver Creek	Control	H	0.36123	83
Sediment Control	Beaver Creek	Control	F	0.35706	85
Sediment Control	Beaver Creek	Control	G	0.06277	95
B3348-05	Upper Slate Creek		A	0.93071	55
B3348-05	Upper Slate Creek		D	0.74438	66
B3348-05	Upper Slate Creek		B	0.62436	71
B3348-05	Upper Slate Creek		E	0.59768	72
B3348-05	Upper Slate Creek		G	0.43933	80
B3348-05	Upper Slate Creek		H	0.32784	86
B3348-05	Upper Slate Creek		F	0.22701	89
B3348-05	Upper Slate Creek		C	0.07536	94
B3348-04	Lower Slate Creek		E	0.95875	52
B3348-04	Lower Slate Creek		B	0.91695	56
B3348-04	Lower Slate Creek		H	0.86454	59
B3348-04	Lower Slate Creek		C	0.84546	60
B3348-04	Lower Slate Creek		A	0.83412	62
B3348-04	Lower Slate Creek		F	0.64510	69
B3348-04	Lower Slate Creek		G	0.49295	77
B3348-04	Lower Slate Creek		D	0.30736	87
B3348-03	Lower Johnson Creek		D	0.84531	61
B3348-03	Lower Johnson Creek		E	0.78806	63
B3348-03	Lower Johnson Creek		G	0.55040	74
B3348-03	Lower Johnson Creek		B	0.48691	78
B3348-03	Lower Johnson Creek		A	0.45982	79
B3348-03	Lower Johnson Creek		F	0.43628	81
B3348-03	Lower Johnson Creek		H	0.20698	90
B3348-03	Lower Johnson Creek		C	0.11717	93
B3348-02	East Fork Slate Creek		F	0.95799	53
B3348-02	East Fork Slate Creek		H	0.91401	57
B3348-02	East Fork Slate Creek		C	0.75413	65
B3348-02	East Fork Slate Creek		E	0.64460	70
B3348-02	East Fork Slate Creek		G	0.20009	91
B3348-02	East Fork Slate Creek		A	0.17748	92
B3348-02	East Fork Slate Creek		B	0.04148	97
B3348-02	East Fork Slate Creek		D	0.02686	98
B3348-01	Lower Sherman Creek		H	0.99053	51
B3348-01	Lower Sherman Creek		A	0.88064	58
B3348-01	Lower Sherman Creek		C	0.57906	73
B3348-01	Lower Sherman Creek		F	0.49653	76
B3348-01	Lower Sherman Creek		E	0.37660	82
B3348-01	Lower Sherman Creek		D	0.35732	84
B3348-01	Lower Sherman Creek		B	0.23254	88
B3348-01	Lower Sherman Creek		G	0.05424	96
			z		
			z		
			z		
			z		
			z		

CETIS Summary Report

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

Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	07-3577-8330	**Code:**	B3348-01	**Client:**	
Sample Date:	07 Jul-15 10:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 14h	**Station:**	Lower Sherman Creek		

Batch Note: # of pupae found to have flown away added to survival count (# found in test chamber at test initation) on 8/20/15 data analysis. Pan count used for weight data.

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
15-4560-1947	Mean AF Weight-mg	100	>100	NA	14.7%	1	Equal Variance t Two-Sample Test
01-0317-6064	Survival Rate	<100	100	NA	6.21%	>1	Equal Variance t Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
01-0317-6064	Survival Rate	Control Resp	0.9125	0.7 - NL	Yes	Passes Acceptability Criteria

Mean AF Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Control Sed	8	2.024	1.827	2.221	1.716	2.356	0.08327	0.2355	11.64%	0.0%
100		8	2.181	1.833	2.529	1.68	3.05	0.1472	0.4163	19.09%	-7.75%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Control Sed	8	0.9125	0.8589	0.9661	0.8	1	0.02266	0.06409	7.02%	0.0%
100		8	0.6875	0.6046	0.7704	0.5	0.8	0.03504	0.0991	14.41%	24.66%

Mean AF Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.894	2.194	1.965	2.275	1.716	2.356	2.031	1.759
100		1.68	2.205	1.853	3.05	1.984	2.206	2.397	2.07

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1	0.9	0.9	0.8	0.9	1	0.9	0.9
100		0.8	0.7	0.8	0.7	0.7	0.5	0.7	0.6

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	10/10	9/10	9/10	8/10	9/10	10/10	9/10	9/10
100		8/10	7/10	8/10	7/10	7/10	5/10	7/10	6/10

Ave weight @ initiation = 0.1645 mg/individual

BM

CETIS Analytical Report

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

Analysis ID:	01-0317-6064	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 9:01	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	07-3577-8330	**Code:**	B3348-01	**Client:**	
Sample Date:	07 Jul-15 10:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 14h	**Station:**	Lower Sherman Creek		

Batch Note: # of pupae found to have flown away added to survival count (# found in test chamber at test initation) on 8/20/15 data analysis. Pan count used for weight data.

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	6.21%	Fails survival rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Control Sed		100*	5.646	1.761	0.091	14	<0.0001	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			0.3928	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.3381454	0.3381454	1	31.87	<0.0001	Significant Effect
Error	0.1485288	0.0106092	14			
Total	0.4866741		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	1.152	8.885	0.8567	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8987	0.8408	0.0767	Normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	0.9125	0.8589	0.9661	0.9	0.8	1	0.02266	7.02%	0.0%
100		8	0.6875	0.6046	0.7704	0.7	0.5	0.8	0.03504	14.42%	24.66%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	1.272	1.189	1.355	1.249	1.107	1.412	0.03511	7.81%	0.0%
100		8	0.9813	0.8922	1.07	0.9912	0.7854	1.107	0.03768	10.86%	22.86%

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1	0.9	0.9	0.8	0.9	1	0.9	0.9
100		0.8	0.7	0.8	0.7	0.7	0.5	0.7	0.6

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.412	1.249	1.249	1.107	1.249	1.412	1.249	1.249
100		1.107	0.9912	1.107	0.9912	0.9912	0.7854	0.9912	0.8861

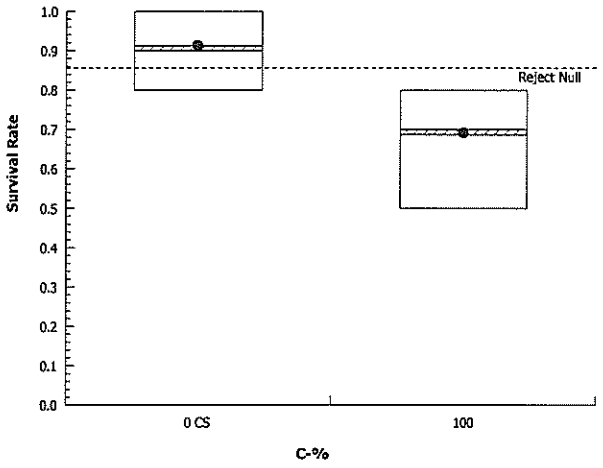
Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

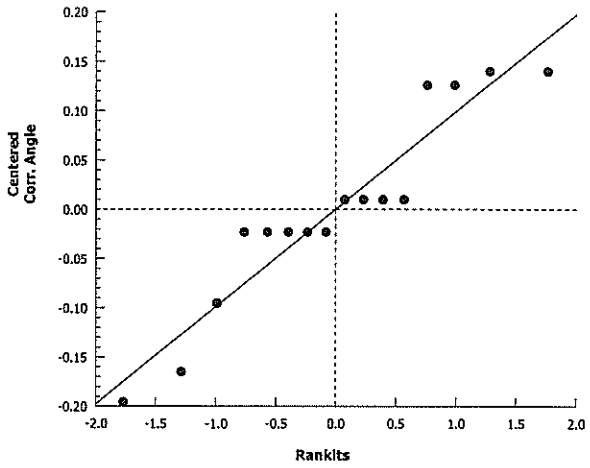
Analysis ID:	01-0317-6064	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 9:01	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	10/10	9/10	9/10	8/10	9/10	10/10	9/10	9/10
100		8/10	7/10	8/10	7/10	7/10	5/10	7/10	6/10

Graphics





CETIS Summary Report

Report Date: 07 Aug-15 12:35 (p 1 of 1)
Test Code: B334801ctc | 14-4474-1542

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

Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	07-3577-8330	**Code:**	B3348-01	**Client:**	
Sample Date:	07 Jul-15 10:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 14h	**Station:**	Lower Sherman Creek		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
15-4560-1947	Mean AF Weight-mg	100	>100	NA	14.7%	1	Equal Variance t Two-Sample Test
17-6206-9648	Survival Rate	<100	100	NA	20.1%	>1	Equal Variance t Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
17-6206-9648	Survival Rate	Control Resp	0.775	0.7 - NL	Yes	Passes Acceptability Criteria

Mean AF Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Control Sed	8	2.024	1.827	2.221	1.716	2.356	0.08327	0.2355	11.64%	0.0%
100		8	2.181	1.833	2.529	1.68	3.05	0.1472	0.4163	19.09%	-7.75%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Control Sed	8	0.775	0.6506	0.8994	0.5	1	0.05261	0.1488	19.2%	0.0%
100		8	0.425	0.2421	0.6079	0.1	0.7	0.07734	0.2188	51.47%	45.16%

Mean AF Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.894	2.194	1.965	2.275	1.716	2.356	2.031	1.759
100		1.68	2.205	1.853	3.05	1.984	2.206	2.397	2.07

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	0.5	0.7	0.8	1	0.9	0.8	0.7	0.8
100		0.7	0.2	0.7	0.1	0.5	0.5	0.4	0.3

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	5/10	7/10	8/10	10/10	9/10	8/10	7/10	8/10
100		7/10	2/10	7/10	1/10	5/10	5/10	4/10	3/10

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

Analysis ID:	17-6206-9648	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	07 Aug-15 12:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	07-3577-8330	**Code:**	B3348-01	**Client:**	
Sample Date:	07 Jul-15 10:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 14h	**Station:**	Lower Sherman Creek		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	20.1%	Fails survival rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Control Sed		100*	3.68	1.761	0.188	14	0.0012	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			0.9122	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.6191143	0.6191143	1	13.55	0.0025	Significant Effect
Error	0.6398645	0.04570461	14			
Total	1.258979		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	1.643	8.885	0.5281	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9598	0.8408	0.6578	Normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	0.775	0.6506	0.8994	0.8	0.5	1	0.05261	19.2%	0.0%
100		8	0.425	0.2421	0.6079	0.45	0.1	0.7	0.07734	51.47%	45.16%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	1.094	0.9383	1.249	1.107	0.7854	1.412	0.06575	17.0%	0.0%
100		8	0.7004	0.5011	0.8997	0.7351	0.3218	0.9912	0.08428	34.04%	35.97%

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	0.5	0.7	0.8	1	0.9	0.8	0.7	0.8
100		0.7	0.2	0.7	0.1	0.5	0.5	0.4	0.3

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	0.7854	0.9912	1.107	1.412	1.249	1.107	0.9912	1.107
100		0.9912	0.4636	0.9912	0.3218	0.7854	0.7854	0.6847	0.5796

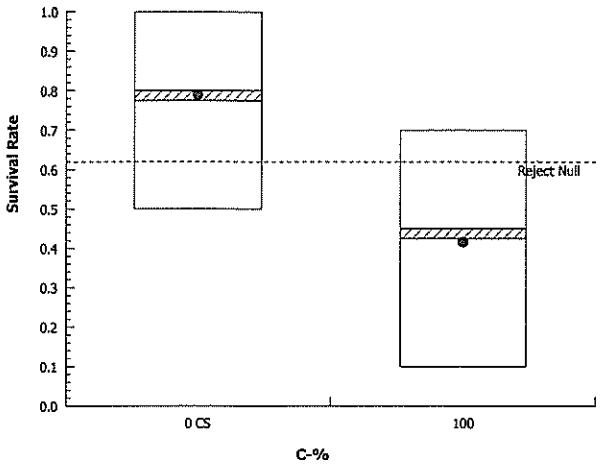
Survival Rate Binomials

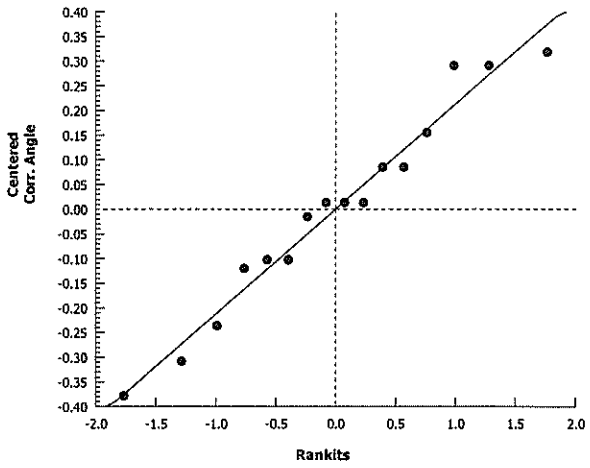
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	5/10	7/10	8/10	10/10	9/10	8/10	7/10	8/10
100		7/10	2/10	7/10	1/10	5/10	5/10	4/10	3/10

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

Analysis ID:	17-6206-9648	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	07 Aug-15 12:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





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

Analysis ID:	15-4560-1947	**Endpoint:**	Mean AF Weight-mg	**CETIS Version:**	CETISv1.8.8
Analyzed:	07 Aug-15 12:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	07-3577-8330	**Code:**	B3348-01	**Client:**	
Sample Date:	07 Jul-15 10:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 14h	**Station:**	Lower Sherman Creek		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	14.7%	Passes mean af weight-mg

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Control Sed		100	-0.9278	1.761	0.298	14	0.8154	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			1.0000	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.09845294	0.09845294	1	0.8607	0.3693	Non-Significant Effect
Error	1.601367	0.1143834	14			
Total	1.69982		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	3.124	8.885	0.1559	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9331	0.8408	0.2730	Normal Distribution

Mean AF Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	2.024	1.827	2.221	1.998	1.716	2.356	0.08327	11.64%	0.0%
100		8	2.181	1.833	2.529	2.138	1.68	3.05	0.1472	19.09%	-7.75%

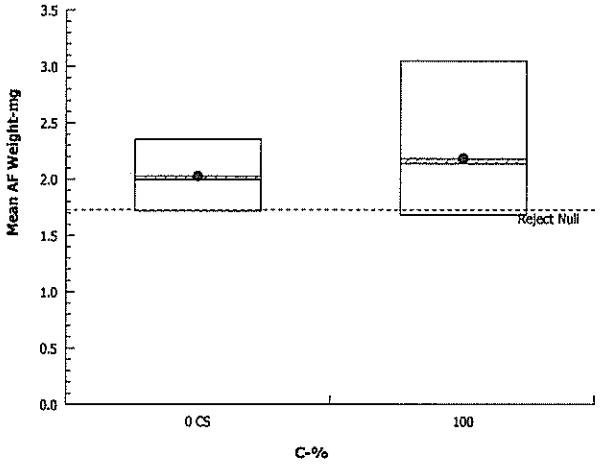
Mean AF Weight-mg Detail

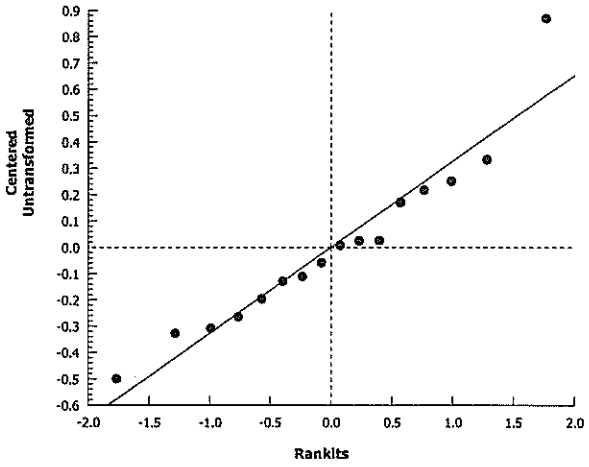
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.894	2.194	1.965	2.275	1.716	2.356	2.031	1.759
100		1.68	2.205	1.853	3.05	1.984	2.206	2.397	2.07

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

Analysis ID:	15-4560-1947	**Endpoint:**	Mean AF Weight-mg	**CETIS Version:**	CETISv1.8.8
Analyzed:	07 Aug-15 12:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





CETIS Summary Report

Report Date: 20-Aug-15 09:04 (p 1 of 1)
Test Code: B334802ctc | 02-5505-8014

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

Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	18-0892-1483	**Code:**	B3348-02	**Client:**	
Sample Date:	07 Jul-15 12:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 12h	**Station:**	East Fork Slate Creek		

Batch Note: # of pupae found to have flown away added to survival count (# found in test chamber at test initation) on 8/20/15 data analysis. Pan count used for weight data.

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
07-9988-6960	Mean AF Weight-mg	100	>100	NA	12.7%	1	Equal Variance t Two-Sample Test
13-0622-5145	Survival Rate	<100	100	NA	9.5%	>1	Equal Variance t Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
13-0622-5145	Survival Rate	Control Resp	0.9125	0.7 - NL	Yes	Passes Acceptability Criteria

Mean AF Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Control Sed	8	2.024	1.827	2.221	1.716	2.356	0.08327	0.2355	11.64%	0.0%
100		8	2.254	1.969	2.539	1.742	2.927	0.1205	0.3407	15.12%	-11.39%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Control Sed	8	0.9125	0.8589	0.9661	0.8	1	0.02266	0.06409	7.02%	0.0%
100		8	0.7375	0.6116	0.8634	0.5	1	0.05324	0.1506	20.42%	19.18%

Mean AF Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.894	2.194	1.965	2.275	1.716	2.356	2.031	1.759
100		2.927	2.284	2.083	2.197	2.305	2.071	2.424	1.742

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1	0.9	0.9	0.8	0.9	1	0.9	0.9
100		0.8	0.5	0.8	0.7	0.6	0.7	0.8	1

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	10/10	9/10	9/10	8/10	9/10	10/10	9/10	9/10
100		8/10	5/10	8/10	7/10	6/10	7/10	8/10	10/10

CETIS Analytical Report

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

Analysis ID:	13-0622-5145	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 9:04	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	18-0892-1483	**Code:**	B3348-02	**Client:**	
Sample Date:	07 Jul-15 12:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 12h	**Station:**	East Fork Slate Creek		

Batch Note: # of pupae found to have flown away added to survival count (# found in test chamber at test initation) on 8/20/15 data analysis. Pan count used for weight data.

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	9.5%	Fails survival rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Control Sed		100*	2.988	1.761	0.132	14	0.0049	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			0.3928	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.2000681	0.2000681	1	8.93	0.0098	Significant Effect
Error	0.3136626	0.02240448	14			
Total	0.5137308		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	3.545	8.885	0.1169	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9323	0.8408	0.2655	Normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	0.9125	0.8589	0.9661	0.9	0.8	1	0.02266	7.02%	0.0%
100		8	0.7375	0.6116	0.8634	0.75	0.5	1	0.05324	20.42%	19.18%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	1.272	1.189	1.355	1.249	1.107	1.412	0.03511	7.81%	0.0%
100		8	1.048	0.8921	1.205	1.049	0.7854	1.412	0.0661	17.83%	17.58%

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1	0.9	0.9	0.8	0.9	1	0.9	0.9
100		0.8	0.5	0.8	0.7	0.6	0.7	0.8	1

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.412	1.249	1.249	1.107	1.249	1.412	1.249	1.249
100		1.107	0.7854	1.107	0.9912	0.8861	0.9912	1.107	1.412

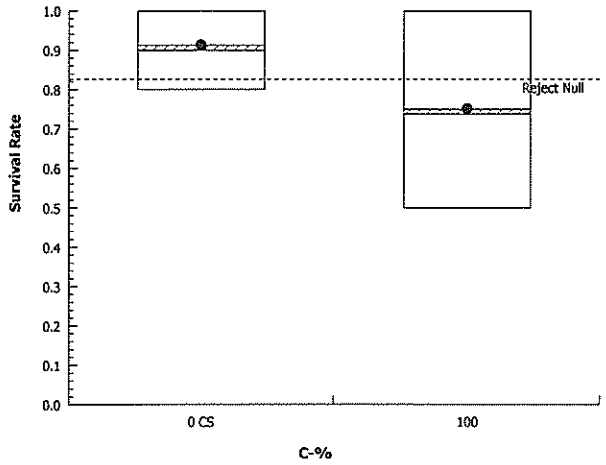
Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

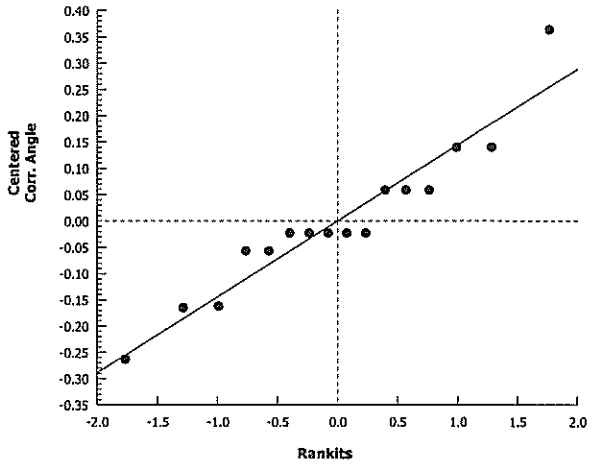
Analysis ID:	13-0622-5145	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 9:04	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	10/10	9/10	9/10	8/10	9/10	10/10	9/10	9/10
100		8/10	5/10	8/10	7/10	6/10	7/10	8/10	10/10

Graphics





CETIS Summary Report

Test Code: B334802ctc / 02-5505-8014

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

Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	18-0892-1483	**Code:**	B3348-02	**Client:**	
Sample Date:	07 Jul-15 12:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 12h	**Station:**	East Fork Slate Creek		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
07-9988-6960	Mean AF Weight-mg	100	>100	NA	12.7%	1	Equal Variance t Two-Sample Test
05-9138-8897	Survival Rate	<100	100	NA	15.0%	>1	Equal Variance t Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
05-9138-8897	Survival Rate	Control Resp	0.775	0.7 - NL	Yes	Passes Acceptability Criteria

Mean AF Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Control Sed	8	2.024	1.827	2.221	1.716	2.356	0.08327	0.2355	11.64%	0.0%
100		8	2.254	1.969	2.539	1.742	2.927	0.1205	0.3407	15.12%	-11.39%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Control Sed	8	0.775	0.6506	0.8994	0.5	1	0.05261	0.1488	19.2%	0.0%
100		8	0.5625	0.4448	0.6802	0.3	0.7	0.04978	0.1408	25.03%	27.42%

Mean AF Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.894	2.194	1.965	2.275	1.716	2.356	2.031	1.759
100		2.927	2.284	2.083	2.197	2.305	2.071	2.424	1.742

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	0.5	0.7	0.8	1	0.9	0.8	0.7	0.8
100		0.3	0.7	0.6	0.7	0.5	0.7	0.5	0.5

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	5/10	7/10	8/10	10/10	9/10	8/10	7/10	8/10
100		3/10	7/10	6/10	7/10	5/10	7/10	5/10	5/10

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

Analysis ID:	05-9138-8897	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	07 Aug-15 12:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	18-0892-1483	**Code:**	B3348-02	**Client:**	
Sample Date:	07 Jul-15 12:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 12h	**Station:**	East Fork Slate Creek		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	15.0%	Fails survival rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Control Sed		100*	2.933	1.761	0.147	14	0.0055	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			0.9122	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.238837	0.238837	1	8.601	0.0109	Significant Effect
Error	0.3887696	0.02776926	14			
Total	0.6276066		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	1.65	8.885	0.5245	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9577	0.8408	0.6210	Normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	0.775	0.6506	0.8994	0.8	0.5	1	0.05261	19.2%	0.0%
100		8	0.5625	0.4448	0.6802	0.55	0.3	0.7	0.04978	25.03%	27.42%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	1.094	0.9383	1.249	1.107	0.7854	1.412	0.06575	17.0%	0.0%
100		8	0.8494	0.7284	0.9704	0.8357	0.5796	0.9912	0.05118	17.04%	22.34%

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	0.5	0.7	0.8	1	0.9	0.8	0.7	0.8
100		0.3	0.7	0.6	0.7	0.5	0.7	0.5	0.5

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	0.7854	0.9912	1.107	1.412	1.249	1.107	0.9912	1.107
100		0.5796	0.9912	0.8861	0.9912	0.7854	0.9912	0.7854	0.7854

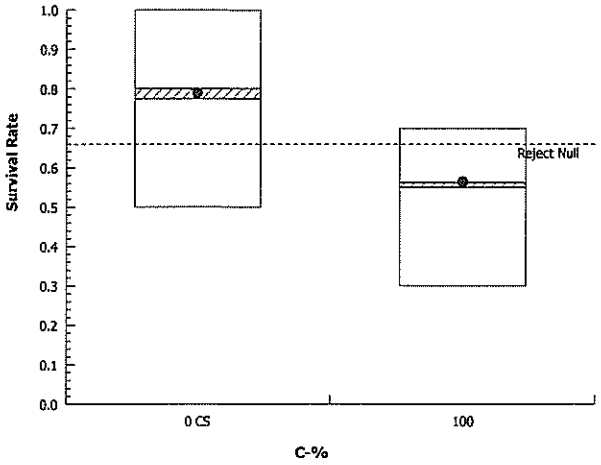
Survival Rate Binomials

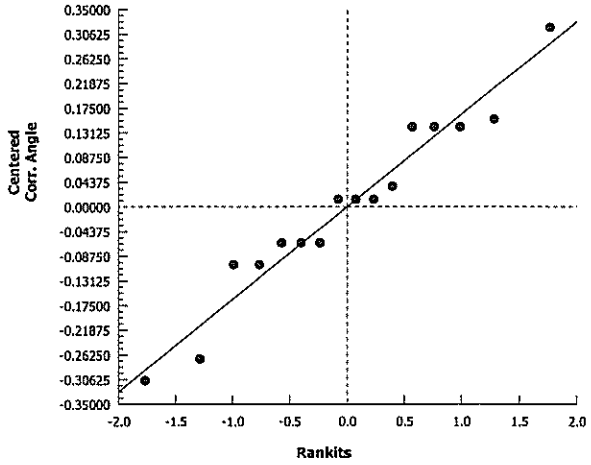
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	5/10	7/10	8/10	10/10	9/10	8/10	7/10	8/10
100		3/10	7/10	6/10	7/10	5/10	7/10	5/10	5/10

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

Analysis ID:	05-9138-8897	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	07 Aug-15 12:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





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

Analysis ID:	07-9988-6960	**Endpoint:**	Mean AF Weight-mg	**CETIS Version:**	CETISv1.8.8
Analyzed:	07 Aug-15 12:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	18-0892-1483	**Code:**	B3348-02	**Client:**	
Sample Date:	07 Jul-15 12:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 12h	**Station:**	East Fork Slate Creek		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	12.7%	Passes mean af weight-mg

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Control Sed		100	-1.574	1.761	0.258	14	0.9310	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			1.0000	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.2124252	0.2124252	1	2.476	0.1379	Non-Significant Effect
Error	1.201054	0.08578954	14			
Total	1.413479		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	2.093	8.885	0.3509	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9755	0.8408	0.9176	Normal Distribution

Mean AF Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	2.024	1.827	2.221	1.998	1.716	2.356	0.08327	11.64%	0.0%
100		8	2.254	1.969	2.539	2.241	1.742	2.927	0.1205	15.12%	-11.39%

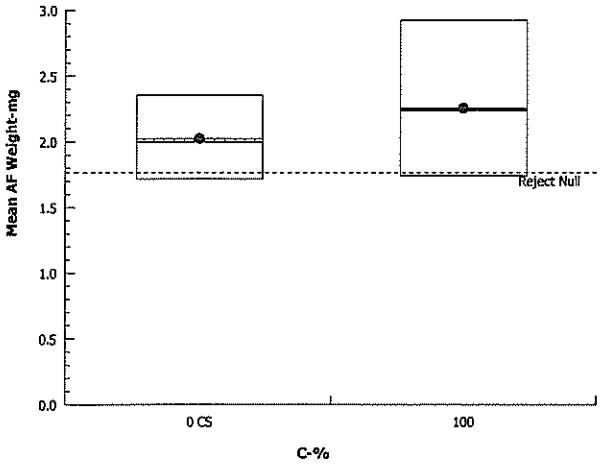
Mean AF Weight-mg Detail

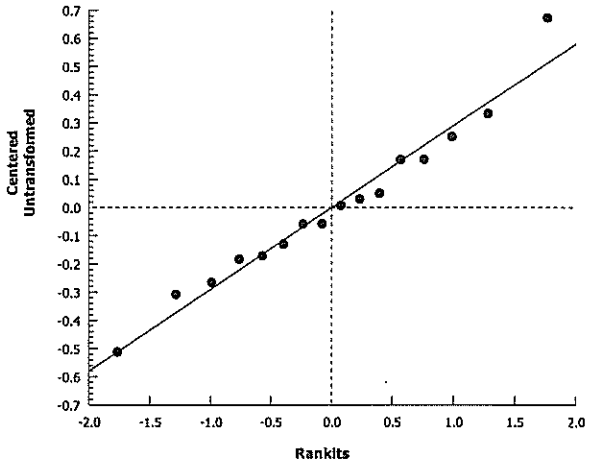
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.894	2.194	1.965	2.275	1.716	2.356	2.031	1.759
100		2.927	2.284	2.083	2.197	2.305	2.071	2.424	1.742

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

Analysis ID:	07-9988-6960	**Endpoint:**	Mean AF Weight-mg	**CETIS Version:**	CETISv1.8.8
Analyzed:	07 Aug-15 12:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





CETIS Summary Report

Test Code: B334803ctc | 09-6824-7819

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

Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	11-4480-5389	**Code:**	B3348-03	**Client:**	
Sample Date:	06 Jul-15 14:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	14d 10h	**Station:**	Lower Johnson Creek		

Batch Note: # of pupae found to have flown away added to survival count (# found in test chamber at test initation) on 8/20/15 data analysis. Pan count used for weight data.

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
00-6299-2032	Mean AF Weight-mg	<100	100	NA	11.9%	>1	Equal Variance t Two-Sample Test
02-3867-6130	Survival Rate	<100	100	NA	6.37%	>1	Equal Variance t Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
02-3867-6130	Survival Rate	Control Resp	0.9125	0.7 - NL	Yes	Passes Acceptability Criteria

Mean AF Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Control Sed	8	2.024	1.827	2.221	1.716	2.356	0.08327	0.2355	11.64%	0.0%
100		8	1.542	1.285	1.8	0.9289	1.88	0.1088	0.3076	19.95%	23.79%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Control Sed	8	0.9125	0.8589	0.9661	0.8	1	0.02266	0.06409	7.02%	0.0%
100		8	0.75	0.6726	0.8274	0.6	0.9	0.03273	0.09258	12.34%	17.81%

Mean AF Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.894	2.194	1.965	2.275	1.716	2.356	2.031	1.759
100		1.375	1.88	1.625	1.413	1.87	0.9289	1.634	1.612

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1	0.9	0.9	0.8	0.9	1	0.9	0.9
100		0.6	0.8	0.7	0.7	0.8	0.9	0.7	0.8

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	10/10	9/10	9/10	8/10	9/10	10/10	9/10	9/10
100		6/10	8/10	7/10	7/10	8/10	9/10	7/10	8/10

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

Analysis ID:	02-3867-6130	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 9:06	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	11-4480-5389	**Code:**	B3348-03	**Client:**	
Sample Date:	06 Jul-15 14:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	14d 10h	**Station:**	Lower Johnson Creek		

Batch Note: # of pupae found to have flown away added to survival count (# found in test chamber at test initation) on 8/20/15 data analysis. Pan count used for weight data.

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	6.37%	Fails survival rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Control Sed		100*	4.142	1.761	0.093	14	0.0005	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			0.3928	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1906132	0.1906132	1	17.15	0.0010	Significant Effect
Error	0.1555821	0.01111301	14			
Total	0.3461954		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	1.254	8.885	0.7727	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9373	0.8408	0.3169	Normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	0.9125	0.8589	0.9661	0.9	0.8	1	0.02266	7.02%	0.0%
100		8	0.75	0.6726	0.8274	0.75	0.6	0.9	0.03273	12.34%	17.81%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	1.272	1.189	1.355	1.249	1.107	1.412	0.03511	7.81%	0.0%
100		8	1.054	0.9608	1.147	1.049	0.8861	1.249	0.03932	10.55%	17.16%

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1	0.9	0.9	0.8	0.9	1	0.9	0.9
100		0.6	0.8	0.7	0.7	0.8	0.9	0.7	0.8

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.412	1.249	1.249	1.107	1.249	1.412	1.249	1.249
100		0.8861	1.107	0.9912	0.9912	1.107	1.249	0.9912	1.107

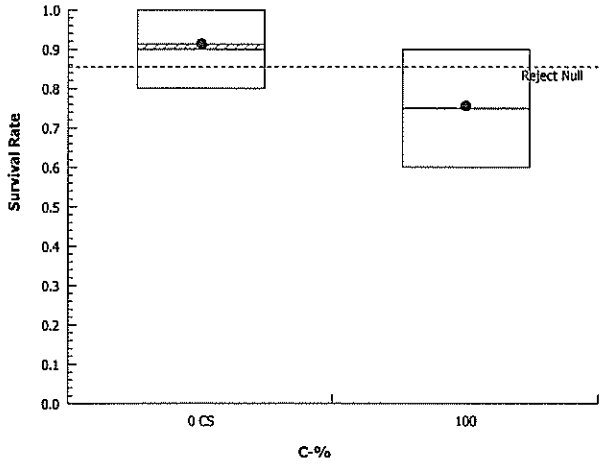
Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

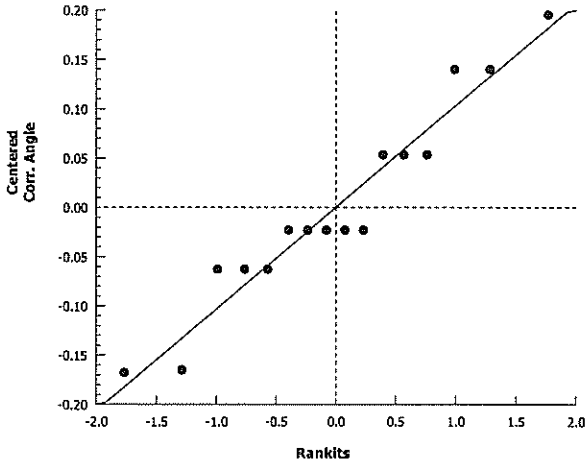
Analysis ID:	02-3867-6130	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 9:06	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	10/10	9/10	9/10	8/10	9/10	10/10	9/10	9/10
100		6/10	8/10	7/10	7/10	8/10	9/10	7/10	8/10

Graphics





CETIS Summary Report

Test Code: B334803ctc | 09-6824-7819

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

Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	11-4480-5389	**Code:**	B3348-03	**Client:**	
Sample Date:	06 Jul-15 14:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	14d 10h	**Station:**	Lower Johnson Creek		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
00-6299-2032	Mean AF Weight-mg	<100	100	NA	11.9%	>1	Equal Variance t Two-Sample Test
00-9451-7947	Survival Rate	<100	100	NA	19.8%	>1	Equal Variance t Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
00-9451-7947	Survival Rate	Control Resp	0.775	0.7 - NL	Yes	Passes Acceptability Criteria

Mean AF Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Control Sed	8	2.024	1.827	2.221	1.716	2.356	0.08327	0.2355	11.64%	0.0%
100		8	1.542	1.285	1.8	0.9289	1.88	0.1088	0.3076	19.95%	23.79%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Control Sed	8	0.775	0.6506	0.8994	0.5	1	0.05261	0.1488	19.2%	0.0%
100		8	0.525	0.3477	0.7023	0.3	0.9	0.075	0.2121	40.41%	32.26%

Mean AF Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.894	2.194	1.965	2.275	1.716	2.356	2.031	1.759
100		1.375	1.88	1.625	1.413	1.87	0.9289	1.634	1.612

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	0.5	0.7	0.8	1	0.9	0.8	0.7	0.8
100		0.8	0.4	0.4	0.3	0.5	0.9	0.5	0.4

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	5/10	7/10	8/10	10/10	9/10	8/10	7/10	8/10
100		8/10	4/10	4/10	3/10	5/10	9/10	5/10	4/10

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

Analysis ID:	00-9451-7947	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	07 Aug-15 12:37	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	11-4480-5389	**Code:**	B3348-03	**Client:**	
Sample Date:	06 Jul-15 14:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	14d 10h	**Station:**	Lower Johnson Creek		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	19.8%	Fails survival rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Control Sed		100*	2.593	1.761	0.186	14	0.0106	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			0.9122	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.2996006	0.2996006	1	6.725	0.0213	Significant Effect
Error	0.6236852	0.04454894	14			
Total	0.9232858		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	1.576	8.885	0.5628	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.925	0.8408	0.2026	Normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	0.775	0.6506	0.8994	0.8	0.5	1	0.05261	19.2%	0.0%
100		8	0.525	0.3477	0.7023	0.45	0.3	0.9	0.075	40.41%	32.26%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	1.094	0.9383	1.249	1.107	0.7854	1.412	0.06575	17.0%	0.0%
100		8	0.8201	0.6249	1.015	0.7351	0.5796	1.249	0.08255	28.47%	25.02%

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	0.5	0.7	0.8	1	0.9	0.8	0.7	0.8
100		0.8	0.4	0.4	0.3	0.5	0.9	0.5	0.4

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	0.7854	0.9912	1.107	1.412	1.249	1.107	0.9912	1.107
100		1.107	0.6847	0.6847	0.5796	0.7854	1.249	0.7854	0.6847

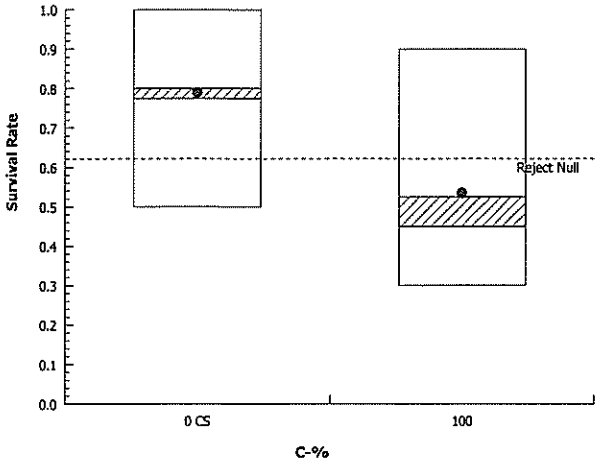
Survival Rate Binomials

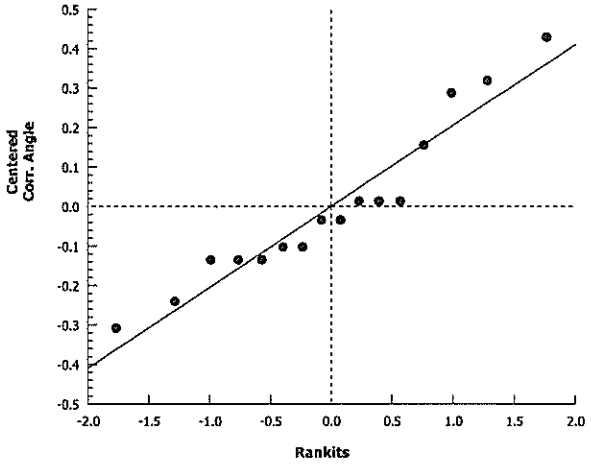
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	5/10	7/10	8/10	10/10	9/10	8/10	7/10	8/10
100		8/10	4/10	4/10	3/10	5/10	9/10	5/10	4/10

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

Analysis ID:	00-9451-7947	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	07 Aug-15 12:37	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





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

Analysis ID:	00-6299-2032	**Endpoint:**	Mean AF Weight-mg	**CETIS Version:**	CETISv1.8.8
Analyzed:	07 Aug-15 12:37	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	11-4480-5389	**Code:**	B3348-03	**Client:**	
Sample Date:	06 Jul-15 14:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	14d 10h	**Station:**	Lower Johnson Creek		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	11.9%	Fails mean af weight-mg

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Control Sed		100*	3.515	1.761	0.241	14	0.0017	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			1.0000	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.9271533	0.9271533	1	12.35	0.0034	Significant Effect
Error	1.050818	0.07505846	14			
Total	1.977972		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	1.706	8.885	0.4977	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9468	0.8408	0.4411	Normal Distribution

Mean AF Weight-mg Summary

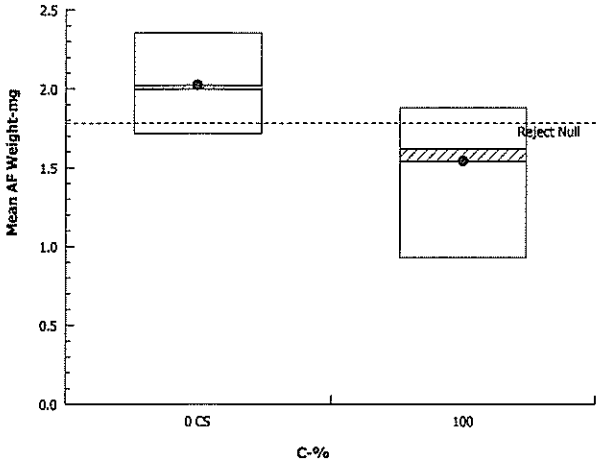
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	2.024	1.827	2.221	1.998	1.716	2.356	0.08327	11.64%	0.0%
100		8	1.542	1.285	1.8	1.619	0.9289	1.88	0.1088	19.95%	23.79%

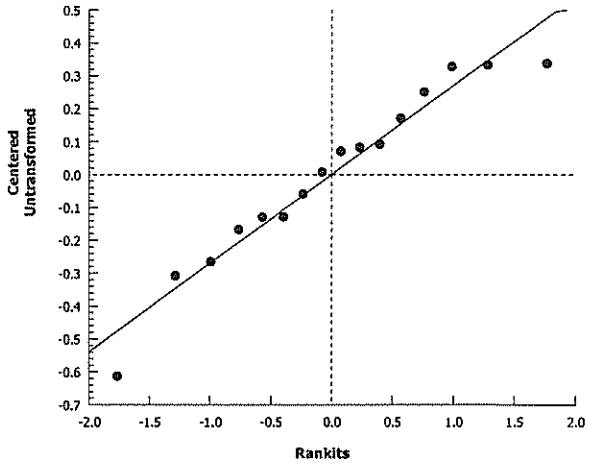
Mean AF Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.894	2.194	1.965	2.275	1.716	2.356	2.031	1.759
100		1.375	1.88	1.625	1.413	1.87	0.9289	1.634	1.612

Analysis ID:	00-6299-2032	**Endpoint:**	Mean AF Weight-mg	**CETIS Version:**	CETISv1.8.8
Analyzed:	07 Aug-15 12:37	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





CETIS Summary Report

Report Date: 20 Aug-15 09:11 (p 1 of 1)
Test Code: B334804ctc | 19-1252-5016

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

Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	05-1841-3410	**Code:**	B3348-04	**Client:**	
Sample Date:	06 Jul-15 09:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	14d 15h	**Station:**	Lower Slate Creek		

Batch Note: # of pupae found to have flown away added to survival count (# found in test chamber at test initation) on 8/20/15 data analysis. Pan count used for weight data.

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
18-6319-7430	Mean AF Weight-mg	100	>100	NA	12.5%	1	Equal Variance t Two-Sample Test
17-3531-6497	Survival Rate	<100	100	NA	7.59%	>1	Equal Variance t Two-Sample Test
09-3170-0035	Survival Rate	<100	100	NA	13.6%	>1	Wilcoxon Rank Sum Two-Sample Test

t with stat outlier - occurred removed.

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
09-3170-0035	Survival Rate	Control Resp	0.9125	0.7 - NL	Yes	Passes Acceptability Criteria
17-3531-6497	Survival Rate	Control Resp	0.9125	0.7 - NL	Yes	Passes Acceptability Criteria

no change

Mean AF Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Control Sed	8	2.024	1.827	2.221	1.716	2.356	0.08327	0.2355	11.64%	0.0%
100		8	2.195	1.919	2.471	1.836	2.775	0.1167	0.3301	15.04%	-8.44%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Control Sed	8	0.9125	0.8589	0.9661	0.8	1	0.02266	0.06409	7.02%	0.0%
100		8	0.625	0.4264	0.8236	0.1	0.9	0.08399	0.2375	38.01%	31.51%

Mean AF Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.894	2.194	1.965	2.275	1.716	2.356	2.031	1.759
100		1.983	2.026	1.836	2.287	2.48	2.775	2.32	1.85

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1	0.9	0.9	0.8	0.9	1	0.9	0.9
100		0.7	0.8	0.1	0.7	0.9	0.6	0.6	0.6

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	10/10	9/10	9/10	8/10	9/10	10/10	9/10	9/10
100		7/10	8/10	1/10	7/10	9/10	6/10	6/10	6/10

Chironomus 10-d Survival and Growth Sediment Test

CH2M HILL - ASL

Analysis ID:	09-3170-0035	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 9:11	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes
Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	05-1841-3410	**Code:**	B3348-04	**Client:**	
Sample Date:	06 Jul-15 09:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	14d 15h	**Station:**	Lower Slate Creek		

Batch Note: # of pupae found to have flown away added to survival count (# found in test chamber at test initation) on 8/20/15 data analysis. Pan count used for weight data.

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	13.6%	Fails survival rate

Wilcoxon Rank Sum Two-Sample Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Control Sed		100*	40	NA	2	14	0.0010	Exact	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	3.007	2.586	0.0030	Outlier Detected
Control Trend	Mann-Kendall Trend	3.007		0.3928	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.5104818	0.5104818	1	12.25	0.0035	Significant Effect
Error	0.583581	0.04168436	14			
Total	1.094063		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	7.455	8.885	0.0167	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8084	0.8408	0.0035	Non-normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	0.9125	0.8589	0.9661	0.9	0.8	1	0.02266	7.02%	0.0%
100		8	0.625	0.4264	0.8236	0.65	0.1	0.9	0.08399	38.01%	31.51%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	1.272	1.189	1.355	1.249	1.107	1.412	0.03511	7.81%	0.0%
100		8	0.9148	0.6881	1.141	0.9386	0.3218	1.249	0.09586	29.64%	28.08%

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1	0.9	0.9	0.8	0.9	1	0.9	0.9
100		0.7	0.8	0.1	0.7	0.9	0.6	0.6	0.6

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.412	1.249	1.249	1.107	1.249	1.412	1.249	1.249
100		0.9912	1.107	0.3218	0.9912	1.249	0.8861	0.8861	0.8861

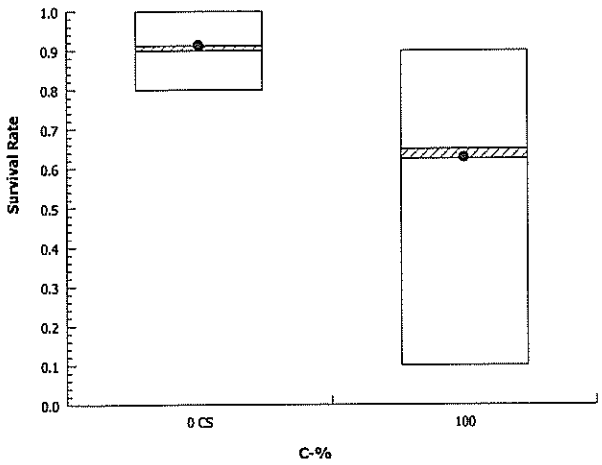
Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

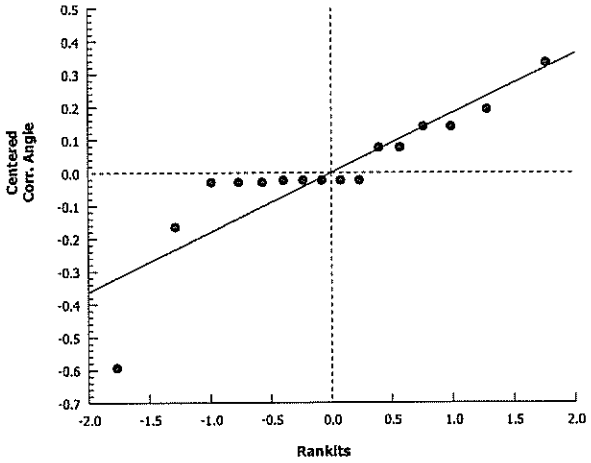
Analysis ID:	09-3170-0035	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 9:11	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	10/10	9/10	9/10	8/10	9/10	10/10	9/10	9/10
100		7/10	8/10	1/10	7/10	9/10	6/10	6/10	6/10

Graphics





CETIS Analytical Report

w/ OUTLIER Removed (-04 100% ctgH S)

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

Analysis ID:	17-3531-6497	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 9:11	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	05-1841-3410	**Code:**	B3348-04	**Client:**	
Sample Date:	06 Jul-15 09:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	14d 15h	**Station:**	Lower Slate Creek		

Batch Note: # of pupae found to have flown away added to survival count (# found in test chamber at test initation) on 8/20/15 data analysis. Pan count used for weight data.

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	7.59%	Fails survival rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Control Sed		100*	4.455	1.771	0.108	13	0.0003	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			0.3928	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.2772581	0.2772581	1	19.85	0.0006	Significant Effect
Error	0.1816142	0.01397033	13			
Total	0.4588723		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	1.903	9.155	0.4193	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9039	0.8328	0.1091	Normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	0.9125	0.8589	0.9661	0.9	0.8	1	0.02266	7.02%	0.0%
100		7	0.7	0.5932	0.8068	0.7	0.6	0.9	0.04364	16.5%	23.29%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	1.272	1.189	1.355	1.249	1.107	1.412	0.03511	7.81%	0.0%
100		7	0.9995	0.8728	1.126	0.9912	0.8861	1.249	0.05178	13.71%	21.42%

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1	0.9	0.9	0.8	0.9	1	0.9	0.9
100		0.7	0.8	Outlier	0.7	0.9	0.6	0.6	0.6

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.412	1.249	1.249	1.107	1.249	1.412	1.249	1.249
100		0.9912	1.107	0.9912	1.249	0.8861	0.8861	0.8861	

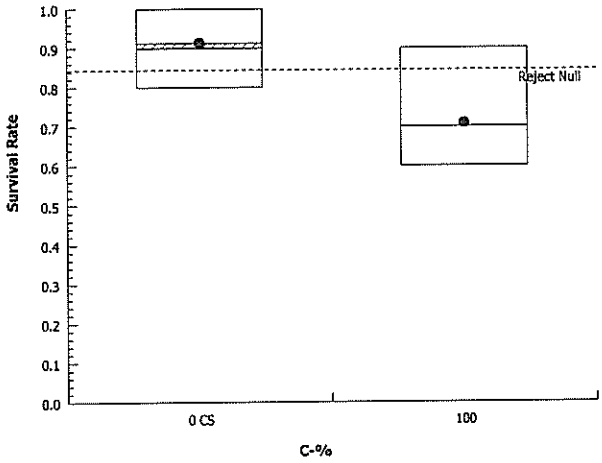
Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

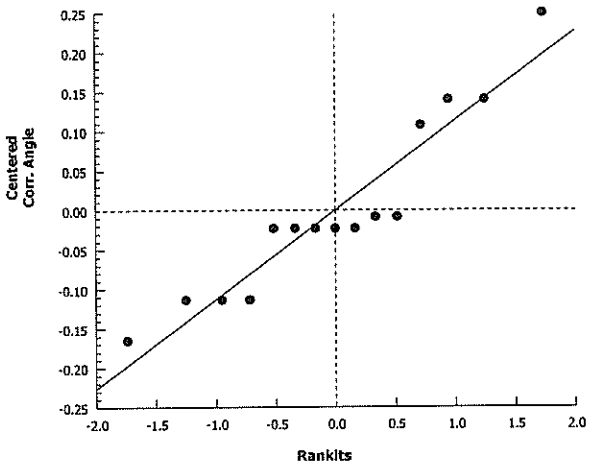
Analysis ID:	17-3531-6497	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 9:11	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	10/10	9/10	9/10	8/10	9/10	10/10	9/10	9/10
100		7/10	8/10	1/10	7/10	9/10	6/10	6/10	6/10

Graphics





CETIS Summary Report

Test Code: B334804ctc | 19-1252-5016

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

Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	05-1841-3410	**Code:**	B3348-04	**Client:**	
Sample Date:	06 Jul-15 09:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	14d 15h	**Station:**	Lower Slate Creek		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
18-6319-7430	Mean AF Weight-mg	100	>100	NA	12.5%	1	Equal Variance t Two-Sample Test
11-5418-4601	Survival Rate	<100	100	NA	16.3%	>1	Equal Variance t Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
11-5418-4601	Survival Rate	Control Resp	0.775	0.7 - NL	Yes	Passes Acceptability Criteria

Mean AF Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Control Sed	8	2.024	1.827	2.221	1.716	2.356	0.08327	0.2355	11.64%	0.0%
100		8	2.195	1.919	2.471	1.836	2.775	0.1167	0.3301	15.04%	-8.44%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Control Sed	8	0.775	0.6506	0.8994	0.5	1	0.05261	0.1488	19.2%	0.0%
100		8	0.4	0.2736	0.5264	0.1	0.6	0.05345	0.1512	37.8%	48.39%

Mean AF Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.894	2.194	1.965	2.275	1.716	2.356	2.031	1.759
100		1.983	2.026	1.836	2.287	2.48	2.775	2.32	1.85

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	0.5	0.7	0.8	1	0.9	0.8	0.7	0.8
100		0.6	0.5	0.5	0.3	0.4	0.4	0.4	0.1

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	5/10	7/10	8/10	10/10	9/10	8/10	7/10	8/10
100		6/10	5/10	5/10	3/10	4/10	4/10	4/10	1/10

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

Analysis ID:	11-5418-4601	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	07 Aug-15 12:38	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	05-1841-3410	**Code:**	B3348-04	**Client:**	
Sample Date:	06 Jul-15 09:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	14d 15h	**Station:**	Lower Slate Creek		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	16.3%	Fails survival rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Control Sed		100*	4.68	1.761	0.157	14	0.0002	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			0.9122	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.696306	0.696306	1	21.9	0.0004	Significant Effect
Error	0.4451523	0.03179659	14			
Total	1.141458		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	1.192	8.885	0.8226	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9418	0.8408	0.3714	Normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	0.775	0.6506	0.8994	0.8	0.5	1	0.05261	19.2%	0.0%
100		8	0.4	0.2736	0.5264	0.4	0.1	0.6	0.05345	37.8%	48.39%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	1.094	0.9383	1.249	1.107	0.7854	1.412	0.06575	17.0%	0.0%
100		8	0.6766	0.5342	0.8189	0.6847	0.3218	0.8861	0.06022	25.18%	38.15%

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	0.5	0.7	0.8	1	0.9	0.8	0.7	0.8
100		0.6	0.5	0.5	0.3	0.4	0.4	0.4	0.1

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	0.7854	0.9912	1.107	1.412	1.249	1.107	0.9912	1.107
100		0.8861	0.7854	0.7854	0.5796	0.6847	0.6847	0.6847	0.3218

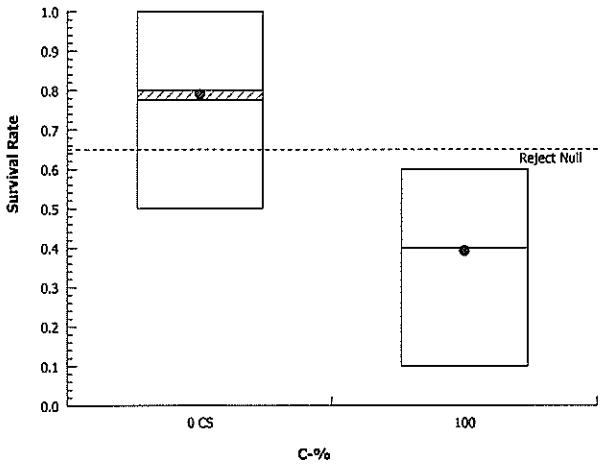
Survival Rate Binomials

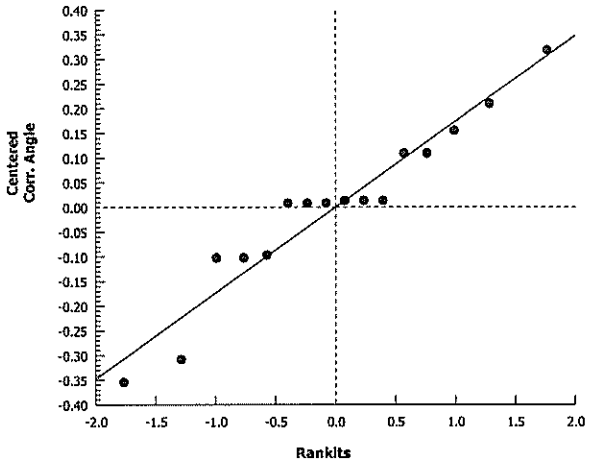
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	5/10	7/10	8/10	10/10	9/10	8/10	7/10	8/10
100		6/10	5/10	5/10	3/10	4/10	4/10	4/10	1/10

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

Analysis ID:	11-5418-4601	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	07 Aug-15 12:38	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





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

Analysis ID:	18-6319-7430	**Endpoint:**	Mean AF Weight-mg	**CETIS Version:**	CETISv1.8.8
Analyzed:	07 Aug-15 12:38	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	05-1841-3410	**Code:**	B3348-04	**Client:**	
Sample Date:	06 Jul-15 09:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	14d 15h	**Station:**	Lower Slate Creek		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	12.5%	Passes mean af weight-mg

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Control Sed		100	-1.192	1.761	0.253	14	0.8734	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			1.0000	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1167469	0.1167469	1	1.42	0.2533	Non-Significant Effect
Error	1.151245	0.0822318	14			
Total	1.267992		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	1.965	8.885	0.3929	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9514	0.8408	0.5117	Normal Distribution

Mean AF Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	2.024	1.827	2.221	1.998	1.716	2.356	0.08327	11.64%	0.0%
100		8	2.195	1.919	2.471	2.156	1.836	2.775	0.1167	15.04%	-8.44%

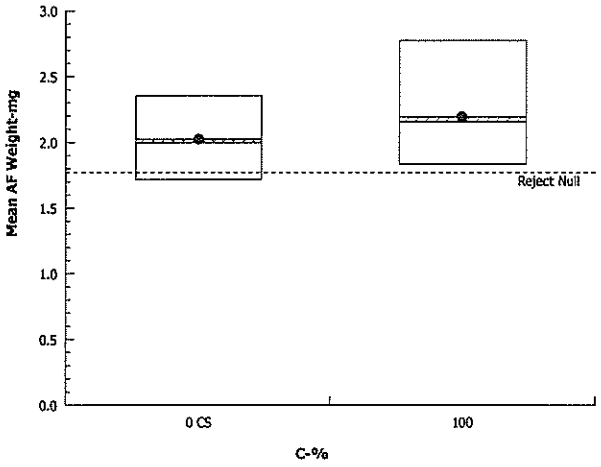
Mean AF Weight-mg Detail

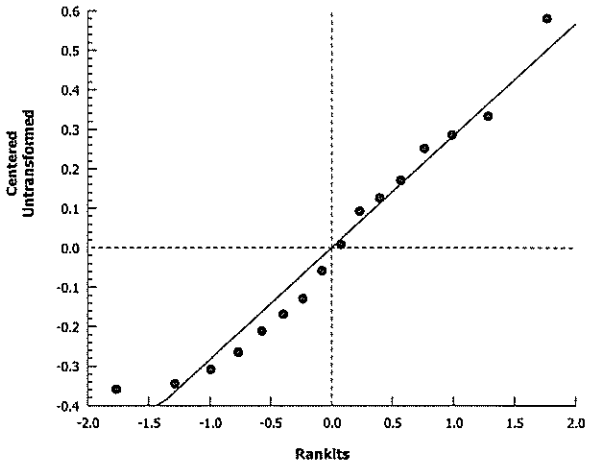
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.894	2.194	1.965	2.275	1.716	2.356	2.031	1.759
100		1.983	2.026	1.836	2.287	2.48	2.775	2.32	1.85

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

Analysis ID:	18-6319-7430	**Endpoint:**	Mean AF Weight-mg	**CETIS Version:**	CETISv1.8.8
Analyzed:	07 Aug-15 12:38	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





CETIS Summary Report

Test Code: B334805ctc | 01-6256-8722

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

Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	08-9019-4242	**Code:**	B3348-05	**Client:**	
Sample Date:	07 Jul-15 13:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 11h	**Station:**	Upper Slate Creek		

Batch Note: # of pupae found to have flown away added to survival count (# found in test chamber at test initation) on 8/20/15 data analysis. Pan count used for weight data.

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
08-8964-2608	Mean AF Weight-mg	100	>100	NA	13.9%	1	Equal Variance t Two-Sample Test
08-7096-7021	Survival Rate	<100	100	NA	7.72%	>1	Equal Variance t Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
08-7096-7021	Survival Rate	Control Resp	0.9125	0.7 - NL	Yes	Passes Acceptability Criteria

Mean AF Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Control Sed	8	2.024	1.827	2.221	1.716	2.356	0.08327	0.2355	11.64%	0.0%
100		8	2.123	1.801	2.445	1.621	2.748	0.1362	0.3853	18.15%	-4.89%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Control Sed	8	0.9125	0.8589	0.9661	0.8	1	0.02266	0.06409	7.02%	0.0%
100		8	0.725	0.6178	0.8322	0.5	0.9	0.04532	0.1282	17.68%	20.55%

Mean AF Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.894	2.194	1.965	2.275	1.716	2.356	2.031	1.759
100		1.772	2.587	2.13	1.621	1.966	2.203	1.956	2.748

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1	0.9	0.9	0.8	0.9	1	0.9	0.9
100		0.6	0.9	0.7	0.8	0.8	0.5	0.7	0.8

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	10/10	9/10	9/10	8/10	9/10	10/10	9/10	9/10
100		6/10	9/10	7/10	8/10	8/10	5/10	7/10	8/10

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

Analysis ID:	08-7096-7021	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 9:15	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	08-9019-4242	**Code:**	B3348-05	**Client:**	
Sample Date:	07 Jul-15 13:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 11h	**Station:**	Upper Slate Creek		

Batch Note: # of pupae found to have flown away added to survival count (# found in test chamber at test initation) on 8/20/15 data analysis. Pan count used for weight data.

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	7.72%	Fails survival rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Control Sed		100*	3.908	1.761	0.11	14	0.0008	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.011	2.586	0.5160	No Outliers Detected
Control Trend	Mann-Kendall Trend	2.011		0.3928	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.2381756	0.2381756	1	15.27	0.0016	Significant Effect
Error	0.2183868	0.01559906	14			
Total	0.4565624		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	2.164	8.885	0.3300	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9493	0.8408	0.4783	Normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	0.9125	0.8589	0.9661	0.9	0.8	1	0.02266	7.02%	0.0%
100		8	0.725	0.6178	0.8322	0.75	0.5	0.9	0.04532	17.68%	20.55%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	1.272	1.189	1.355	1.249	1.107	1.412	0.03511	7.81%	0.0%
100		8	1.028	0.9059	1.15	1.049	0.7854	1.249	0.05165	14.21%	19.18%

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1	0.9	0.9	0.8	0.9	1	0.9	0.9
100		0.6	0.9	0.7	0.8	0.8	0.5	0.7	0.8

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.412	1.249	1.249	1.107	1.249	1.412	1.249	1.249
100		0.8861	1.249	0.9912	1.107	1.107	0.7854	0.9912	1.107

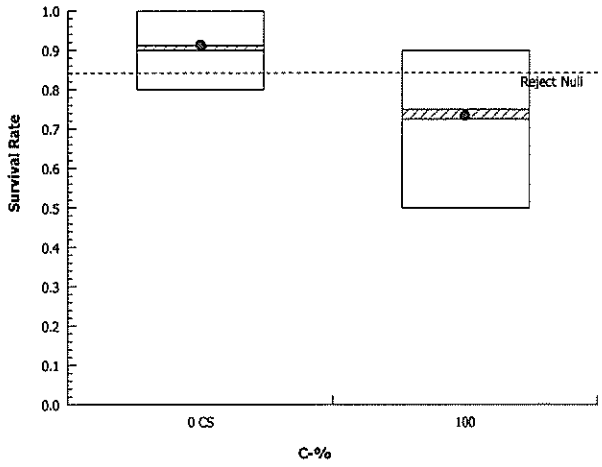
Chironomus 10-d Survival and Growth Sediment Test — **CH2M HILL - ASL**

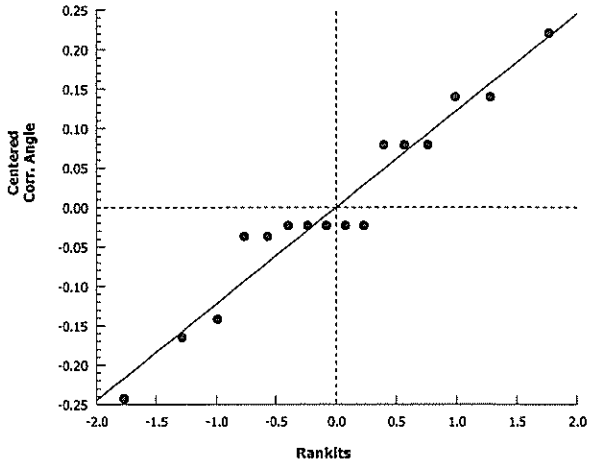
Analysis ID:	08-7096-7021	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	20 Aug-15 9:15	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	10/10	9/10	9/10	8/10	9/10	10/10	9/10	9/10
100		6/10	9/10	7/10	8/10	8/10	5/10	7/10	8/10

Graphics





CETIS Summary Report

Test Code: B334805ctc | 01-6256-8722

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

Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	08-9019-4242	**Code:**	B3348-05	**Client:**	
Sample Date:	07 Jul-15 13:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 11h	**Station:**	Upper Slate Creek		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
08-8964-2608	Mean AF Weight-mg	100	>100	NA	13.9%	1	Equal Variance t Two-Sample Test
21-1091-7061	Survival Rate	<100	100	NA	15.0%	>1	Equal Variance t Two-Sample Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
21-1091-7061	Survival Rate	Control Resp	0.775	0.7 - NL	Yes	Passes Acceptability Criteria

Mean AF Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Control Sed	8	2.024	1.827	2.221	1.716	2.356	0.08327	0.2355	11.64%	0.0%
100		8	2.123	1.801	2.445	1.621	2.748	0.1362	0.3853	18.15%	-4.89%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Control Sed	8	0.775	0.6506	0.8994	0.5	1	0.05261	0.1488	19.2%	0.0%
100		8	0.5	0.3818	0.6182	0.3	0.7	0.05	0.1414	28.28%	35.48%

Mean AF Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.894	2.194	1.965	2.275	1.716	2.356	2.031	1.759
100		1.772	2.587	2.13	1.621	1.966	2.203	1.956	2.748

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	0.5	0.7	0.8	1	0.9	0.8	0.7	0.8
100		0.5	0.3	0.4	0.7	0.5	0.4	0.7	0.5

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	5/10	7/10	8/10	10/10	9/10	8/10	7/10	8/10
100		5/10	3/10	4/10	7/10	5/10	4/10	7/10	5/10

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

Analysis ID:	08-8964-2608	**Endpoint:**	Mean AF Weight-mg	**CETIS Version:**	CETISv1.8.8
Analyzed:	07 Aug-15 12:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	08-9019-4242	**Code:**	B3348-05	**Client:**	
Sample Date:	07 Jul-15 13:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 11h	**Station:**	Upper Slate Creek		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	13.9%	Passes mean af weight-mg

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Control Sed		100	-0.6201	1.761	0.281	14	0.7274	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			1.0000	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.03920791	0.03920791	1	0.3845	0.5452	Non-Significant Effect
Error	1.427709	0.1019792	14			
Total	1.466917		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	2.677	8.885	0.2173	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9775	0.8408	0.9403	Normal Distribution

Mean AF Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	2.024	1.827	2.221	1.998	1.716	2.356	0.08327	11.64%	0.0%
100		8	2.123	1.801	2.445	2.048	1.621	2.748	0.1362	18.15%	-4.89%

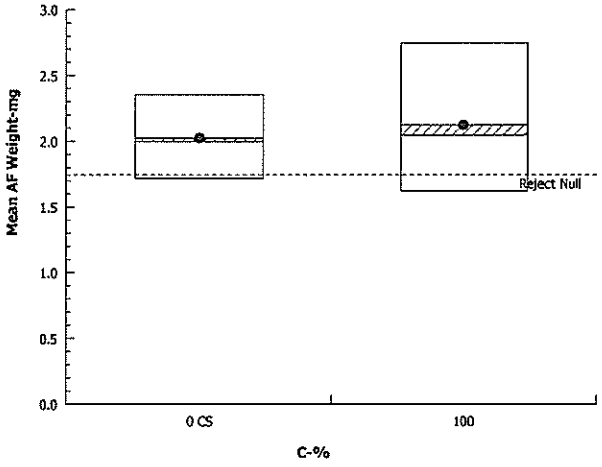
Mean AF Weight-mg Detail

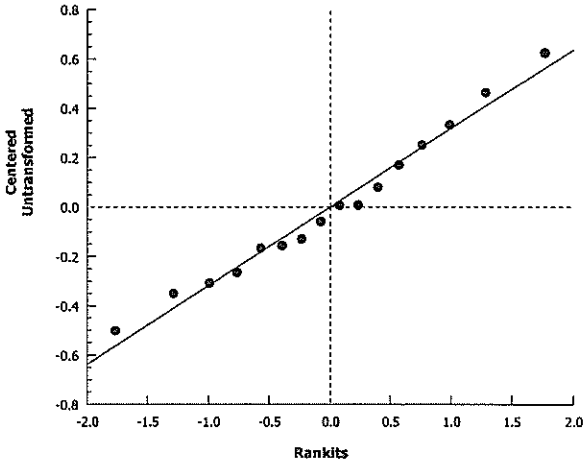
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	1.894	2.194	1.965	2.275	1.716	2.356	2.031	1.759
100		1.772	2.587	2.13	1.621	1.966	2.203	1.956	2.748

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

Analysis ID:	08-8964-2608	**Endpoint:**	Mean AF Weight-mg	**CETIS Version:**	CETISv1.8.8
Analyzed:	07 Aug-15 12:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





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

Analysis ID:	21-1091-7061	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	07 Aug-15 12:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	17-7198-5925	**Test Type:**	Survival-AF Growth	**Analyst:**	Brett Muckey
Start Date:	21 Jul-15	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	31 Jul-15	**Species:**	Chironomus tentans	**Brine:**	
Duration:	10d 0h	**Source:**	Chesapeak Cultures, Nayes, Virginia	**Age:**	
Sample ID:	08-9019-4242	**Code:**	B3348-05	**Client:**	
Sample Date:	07 Jul-15 13:00	**Material:**	Sediment	**Project:**	
Receive Date:	10 Jul-15 10:20	**Source:**	Kensington Gold Mine (AK0050571)		
Sample Age:	13d 11h	**Station:**	Upper Slate Creek		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	15.0%	Fails survival rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Control Sed		100*	3.692	1.761	0.147	14	0.0012	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			0.9122	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.3790353	0.3790353	1	13.63	0.0024	Significant Effect
Error	0.38936	0.02781143	14			
Total	0.7683953		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	1.644	8.885	0.5278	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9518	0.8408	0.5180	Normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	0.775	0.6506	0.8994	0.8	0.5	1	0.05261	19.2%	0.0%
100		8	0.5	0.3818	0.6182	0.5	0.3	0.7	0.05	28.28%	35.48%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Control Sed	8	1.094	0.9383	1.249	1.107	0.7854	1.412	0.06575	17.0%	0.0%
100		8	0.7859	0.6647	0.9072	0.7854	0.5796	0.9912	0.05128	18.46%	28.14%

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	0.5	0.7	0.8	1	0.9	0.8	0.7	0.8
100		0.5	0.3	0.4	0.7	0.5	0.4	0.7	0.5

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	0.7854	0.9912	1.107	1.412	1.249	1.107	0.9912	1.107
100		0.7854	0.5796	0.6847	0.9912	0.7854	0.6847	0.9912	0.7854

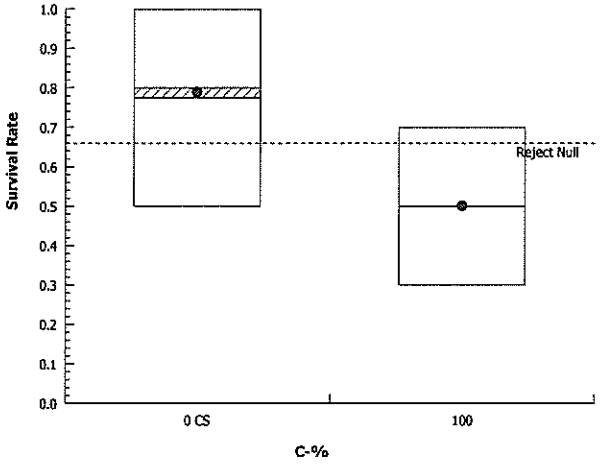
Survival Rate Binomials

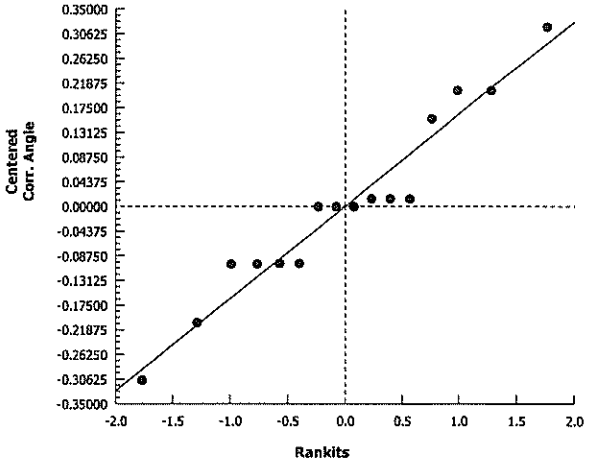
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Control Sed	5/10	7/10	8/10	10/10	9/10	8/10	7/10	8/10
100		5/10	3/10	4/10	7/10	5/10	4/10	7/10	5/10

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

Analysis ID:	21-1091-7061	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.8
Analyzed:	07 Aug-15 12:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





APPENDIX B

REFERENCE TOXICANT DATA SHEETS

REFERENCE TOXICANT DATA SHEET

Client: QA/QC
Test Organism: *Hyallela azteca*
Source: Cheasepeake Cultures
ID#: Aug 84
Age: 8 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

Reference Toxicant: KCl
Solvent: Milli-Q water Stock Solution: 50 g/L
Reagent Log ID #: 2B051-03
*Dilution Water: Recon MH ID#: 4238
Total Hardness as $CaCO_3$: 96
Total Alkalinity as $CaCO_3$: 68
Conductivity (µmhos/cm) / ~~Salinity (ppt)~~: 318
Temperature: 23° C ± 2° C

Test Begin: Date 7-15-15 Time 16:05
Test End: Date 7-A-5 Time 1420

	0 hr	24 hr	48 hr	72 hr	96 hr
Technician	BW/KS	DW/BW	BW	BW	BW
Time	1550	1010	1420	0945	1420
Therm. ID #	217	217	213	213	214
Food I.D. #	1059	NONE	1059	NONE	NONE

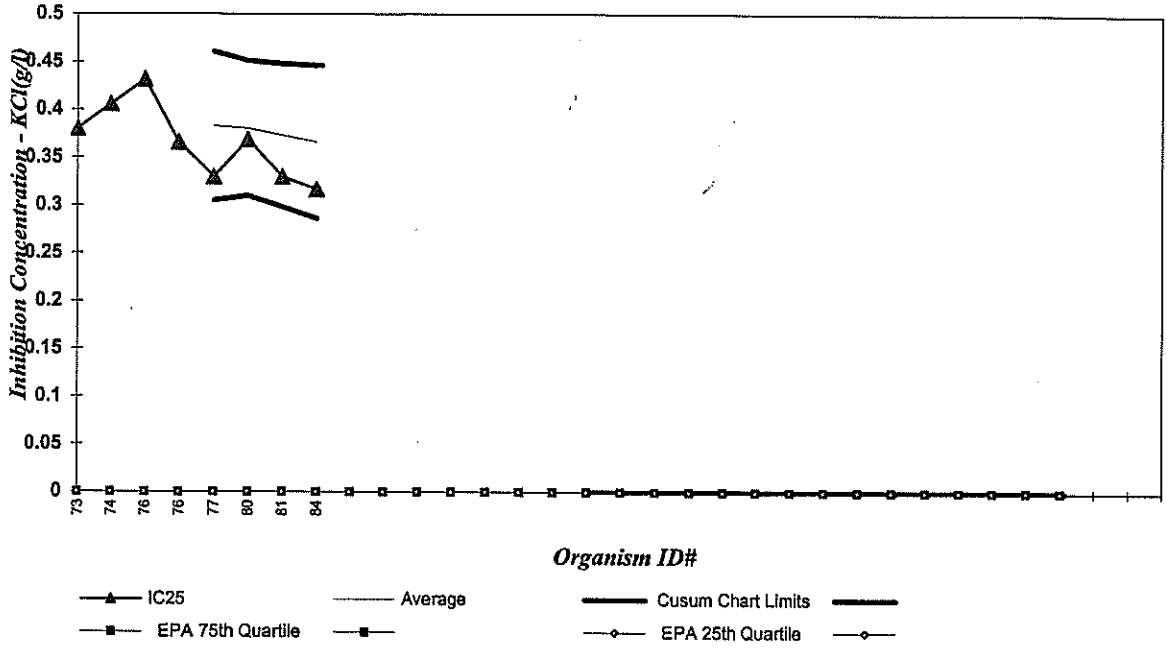
Toxicant Concen. g/L	Test Chamber Number	Number of Live Organisms Surviving					Dissolved Oxygen (mg/l)					pH					Temperature °C					Cond.	
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
Cont	A	10	10	10	10	9	8.0	–	–	–	7.2	8.0	–	–	–	8.0	22.5	22.5	22.6	22.4	22.5	313	375
0.125	A	10	10	10	10	10	8.1	–	–	–	7.5	8.0	–	–	–	8.3	22.6	22.7	22.5	22.2	22.4	550	729
0.250	A	10	10	6	6	6	8.2	–	7.3	–	7.8	8.1	–	7.8	–	8.2	23.0	22.5	22.6	22.4	22.8	779	845
0.500	A	10	2	2	2	2	8.2	7.5	–	–	8.0	8.1	8.0	–	–	8.3	22.6	22.6	22.5	22.4	22.8	1206	24hr 1200
1.00	A	10	0	–	–	–	8.3	7.6	–	–	–	8.1	8.0	–	–	–	22.7	22.6	–	–	–	2016	24hr 2050
2.00	A	10	0	–	–	–	8.3	7.7	–	–	–	8.2	8.0	–	–	–	22.7	22.5	–	–	–	3670	24hr 3910
																						pH 7/15/15	
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: 0.317
Cusum Chart Limits: 0.286 to 0.446
Statistical Method: Spearman-Kaber

We verify this data is true and correct.
Task Manager
Project Manager
QA Officer: Ginger Collins

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	0.369	0.381	0.035	0.310	0.451	0.10
7	81	11/12/2014	0.330	0.373	0.037	0.299	0.448	0.09
8	84	7/15/2015	0.317	0.366	0.040	0.286	0.446	0.10
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								

REFERENCE TOXICANT DATA SHEET

Client: QA/QC
Test Organism: *Chironomus tentans*
Source: ABS
ID#: C41 22
Age: 2nd/3rd instar (mixed)
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

Reference Toxicant: KCl
Solvent: distilled water Stock Solution: 10 g/L
Reagent Log ID #: 2B054-04
*Dilution Water: Recon MH ID#: 1242
Total Hardness as CaCO3: 90
Total Alkalinity as CaCO3: 64
Conductivity (µmhos/cm) / ~~Salinity (ppt)~~: 301
Temperature: 23° C ± 2° C

Test Begin: Date 7-21-15 Time 1335
Test End: Date 7/25/2015 Time 1512

		24 hr	48 hr	72 hr	96 hr
Technician	0 hr BM / KJL	NOT MAINTAINED	JW	MC	JW
Time	0 hr 1335	—	1630	1410	1512
Therm. ID #	0 hr 217	—	202	213	217
Food I.D. #	0 hr 1064	NONE	1064	NONE	NONE

Toxicant Concen. g/L	Test Chamber Number	Number of Live Organisms Surviving 0	24	48	72	96	Dissolved Oxygen (mg/l) 0	24	48	72	96	pH 0	24	48	72	96	Temperature °C 0	24	48	72	96	Cond. 0	96
Cont	A	10	-	9	9	9	7.7	-	6.7	—	7.2	7.8	-	7.6	—	7.9	22.2	-	22.5	22.3	22.4	302	324
1.25	A	10	-	10	10	10	7.8	-	-	-	7.6	8.0	-	—	—	7.7	22.2	-	22.5	22.4	22.4	2330	2320
2.50	A	10	-	10	10	10	7.8	-	-	-	7.6	7.9	-	-	—	7.7	22.2	-	22.4	22.5	22.3	4280	4140
5.00	A	10	-	10	10	10	7.9	-	-	—	7.7	7.8	-	-	—	7.7	22.3	-	22.6	22.4	22.3	8360	8230
7.50	A	10	-	6	5	1	7.9	-	7.6	7.0	7.8	7.6	-	7.4	7.2	7.5	22.4	-	22.4	22.4	22.3	12140	11530
10.0	A	10	-	0	0	—	7.9	-	7.6	7.1	—	6.8	-	7.1	7.0	—	22.4	-	22.4	22.5	22.4	15890	15250
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						

48 hr

*Dilution Water Code
Recon. - reconstituted water
S - soft
MH - moderately hard
H - hard
Art. Sea - Artificial Sea Water

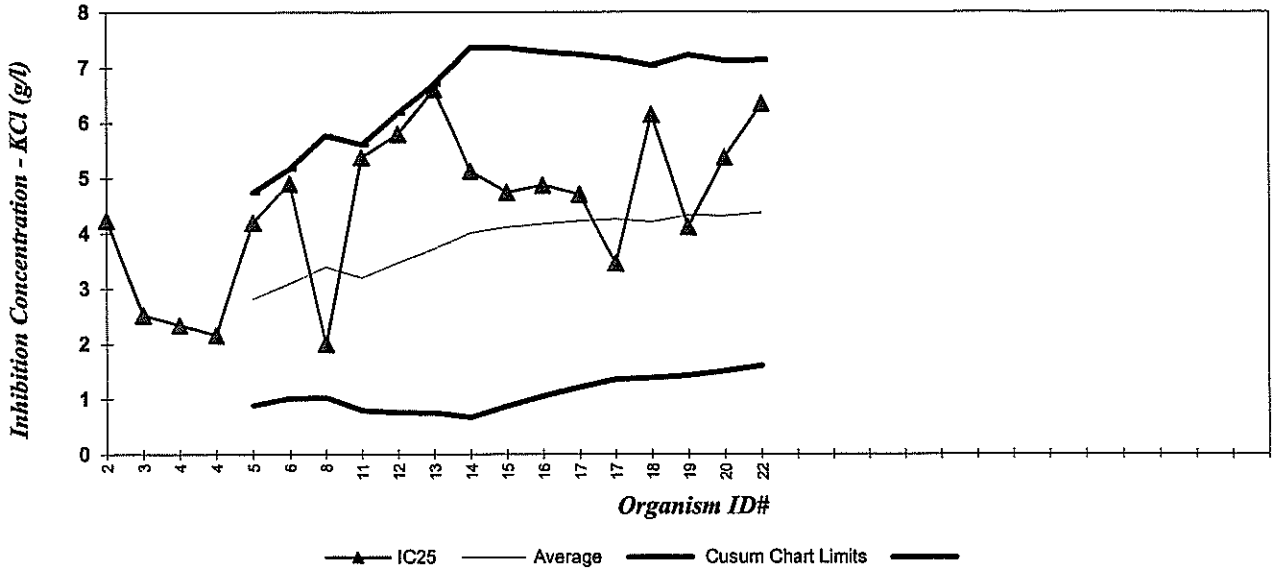
96 h LC50 6.35
Cusum Chart Limits 1.60 L 7.14
Statistical Method Spearman-Kaber

We verify this data is true and correct.
Task Manager
Project Manager Doug Winn
QA Officer Ginger Collins

Test not maintained on 7/22/15
↳ no maintenance or feeding required that day. No impact on 96hr survival data BM 7/28/15

REFERENCE TOXICANT CUMLATIVE SUMMARY (CUSUM) CHART

Chironomus tentans - Acute Survival - LC50 Values



Chironomus tentans **- acute**

POTASSIUM CHLORIDE (g/L)

Endpoint: 96 hour Survival

Stats Method: Probit, Spearman-Karber, Linear Interpolation

Test Conditions: Recon MH, 25 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 (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	20	11/14/2014	**5.37**	4.31	1.40	**1.51**	**7.12**	0.33
19	22	7/21/2015	**6.35**	4.37	1.38	**1.60**	**7.14**	0.32
20								

APPENDIX C

CHAIN OF CUSTODY

CH2MHILL
Applied Sciences Laboratory (ASL)

Sample Receipt Record

Batch Number: B3348
Client/Project: ADFG

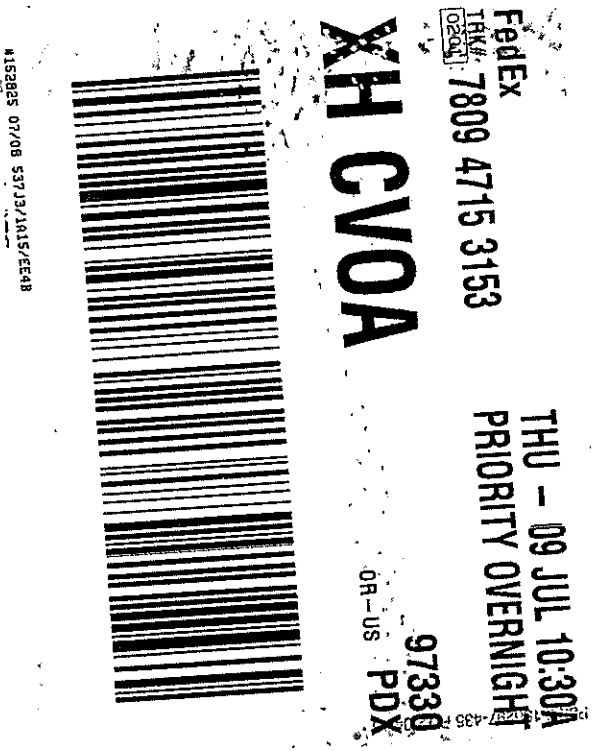
Date Received: 7/10/15
Received By: Bernette Castro

Were custody seals intact and on the outside of the cooler?	☒ Yes	☐ No	☐ N/A	
Packing Material:	☐ Hand Delivered	☒ Ice	☐ Blue Ice	☐ Box
Temp OK? (<6C) Therm ID: TH173 Exp	8.5 °C	☐ Yes	☒ No	☐ N/A
Was a Chain of Custody (CoC) Provided?	☒ Yes	☐ No	☐ N/A	
Was the CoC correctly filled out (If No, document below)	☒ Yes	☐ No	☐ N/A	
Were the sample containers in good condition (broken or leaking)?	☒ Yes	☐ No	☐ N/A	
Was enough sample volume provided for analysis? (If No, document below)	☒ Yes	☐ No	☐ N/A	
Are all samples within 36 hours of collection?	☐ Yes	☒ No	☐ N/A	

Sample Exception Report (The following exceptions were noted)

Client was notified on: Client contact:

Resolution to Exception:



ORIGIN ID:JNUA (907) 523-3315
COEUR ALASKA,INC
3031 CLINTON DR STE 202

JUNEAU, AK 998017153
UNITED STATES US

SHIP DATE: 08JUL15
ACTWGT: 60.8 LB
CAD: /POS1604
DIMS: 24x14x14 IN

BILL SENDER

TO MIKE STANAWAY
CH2M APPLIED SCIENCES LAB
1100 NE CIRCLE BLVD
STE 300
CORVALLIS OR 97330
(541) 768-3120 REF:
INV:
PO: DEPT:

FedEx Express

THU - 09 JUL 10:30A
PRIORITY OVERNIGHT

TRK# 0200 8079 5705 4905

XH CVOA

97330
OR-US PDX

Part # 156827-435 REV2 04/15

#152825 07/08 537J3/1015/EE4B

CH2MHILL **CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING**

B3348

Client Coeur Alaska / ADFG
Address 1008 F Street Juneau AK 99801

Contact Person: Kate Kanouse
Phone: 907-465-4296
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# (7/14/15 3:30)	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	C. Tetras Chronic	H. Azteca Chronic		Concentration and/or Comments
																							ICE 8.5°C
Lower Slate Creek	7/6/15	0900	X		4	1 3334-04														X	X		1
Lower Johnson Creek	7/6/15	1400	X		4	2 -03														X	X		2
Lower Sherman Creek	7/7/15	1000	X		1	3 -01														X	X		3

Sampled By & Title (Please sign and print name): Benjamin Brewster Hab. Biological Biologist	Date/Time: 7/6/15 1600	Relinquished By (Please sign and print name): Benjamin Brewster Benjamin Brewster	Date/Time: 7/8/15 1000
Received By (Please sign and print name): Pierrette Castro Pierrette Castro	Date/Time: 7/10/15 1020	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: preserved w/ N_2 upon arrival. 7-10-15		

CH2MHILL **CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING** B3348

Client Coeur Alaska / ADFG
Address 1058 F Street Juneau, AK 99801
Contact Person: Kate Kanouse
Phone: 907-465-4290
E-mail:
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# (B3348)	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	C. Tetans	H. Azteca		Concentration and/or Comments
																							ICE 8.5°C
East Fork Slate Creek	7/7/15	1200	X		4	4 -02														X	X		4
Upper Slate Creek	7/7/15	1300	X		4	5 -05														X	X		~~4~~ 3
Lower Sherman Creek	7/7/15	1000	X		3	3 -01														X	X		3

Sampled By & Title (Please sign and print name): Benjamin Brewster Fish. Bio	Date/Time: 7/8/15 0900	Relinquished By (Please sign and print name): Benjamin Brewster	Date/Time: 7/8/15 1000
Received By (Please sign and print name): Pierrette Castro	Date/Time: 7/10/15 1020	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: preserved w/ N2 upon arrival. 7-10-15		