Technical Report No. 23-06

Aquatic Studies at Kensington Mine, 2022

by

Jesse W. Lindgren and Erika M. King

February 2023

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

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in reports by the Divisions of Sport Fish and Commercial Fisheries and Habitat Section. 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 figures 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
nanometer	nm

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
inch of mercury	inHg
Kilopascal	kPa
Nephelometric Turbidity Unit	NTU
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.
etalii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
idest (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)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail fork	METF
standard length	SL
total length	TL

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)	'
no data	ND
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. 23-06

AQUATIC STUDIES AT KENSINGTON MINE, 2022

by

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February 2023

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Cover: Drone image of Lower Johnson Creek, September 8, 2022.

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Alaska Department of Fish and Game, Habitat Section,
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Habitat Biologists Bill Kane, Erika King, Greg Albrecht, Dylan Krull, Evan Fritz, and Jesse Lindgren assisted with data collection. Greg Albrecht, Jesse Lindgren, and Erika King processed periphyton samples. Matthew Kern of Alder Grove Farm identified benthic macroinvertebrates and Greg Albrecht assisted with benthic macroinvertebrate identification and quality control. Habitat Section Operations Manager Dr. Al Ott and Southeast Regional Supervisor Kate Kanouse reviewed and edited the report.

Thank you all for your contribution.

EXECUTIVE SUMMARY

Since 2011, the Alaska Department of Fish and Game Habitat Section has completed the aquatic resource monitoring required by the U.S. Forest Service and Alaska Department of Environmental Conservation for Coeur Alaska Inc.'s Kensington Mine operations. This partnership provides the Alaska Department of Fish and Game the opportunity to gather and review data, and help identify, assess, and resolve issues that could affect aquatic resources near the mine site.

The National Weather Service (2023) reports that during 2022, the Juneau area received precipitation (224 cm) about 32% above normal[a] and snowfall (165 cm) about 26% below normal. Continuous rainfall events July through October negatively affected our ability to consistently count salmon during the peak spawning.

The summer 2022 mean chlorophyll *a* density and mean proportions of chlorophylls a, b, and c among periphyton samples collected at all sampling sites on Slate and Sherman Creeks were similar to values previously observed 2011–2021. Since 2012, we also have sampled periphyton in Lower Slate Creek and East Fork Slate Creek in the spring to continue monitoring for changes that may occur from the tailings treatment facility; in spring 2022, the mean chlorophyll *a* density at both locations was similar to values previously observed.

The 2022 mean benthic macroinvertebrate density was the second lowest observed at Lower and Upper Slate Creeks; mean densities at other sampling sites were similar to values previously observed. The diversity and evenness of macroinvertebrate species among the Lower Sherman Creek samples were the second lowest observed and was the lowest observed for West Fork Slate Creek. Upper Johnson Creek had the greatest percentage of EPT insects observed.

Following the USFS 2022 Record of Decision (USDA 2022), this was the first year we surveyed adult salmon during peak runs instead of throughout the spawning seasons. In 2022, we observed a weak pink salmon *Oncorhynchus gorbuscha* return in Lower Slate, Johnson, and Sherman Creeks—consistent with the trend of dominant odd-year returns observed in the Northern Southeast Inside Subregion since 2006 (Piston and Heinl 2018). We cannot quantify marine survival factors influencing adult salmon returns so are unable to attribute changes in adult salmon abundance to construction or operation of the Kensington Mine.

The 2022 geometric mean particle size of pink salmon spawning substrate in Lower Slate Creek was among the greatest observed at Sample Point 1 and within the range previously observed at Sample Point 2.

To investigate element concentration variability, we collected three sediment samples at each site for the third consecutive year in 2022; prior to 2020, we collected one sample at each site. Most mean element concentrations in the 2022 sediment samples were lower than ranges previously observed at each site 2011–2021. Among all sites, arsenic, copper, nickel, and zinc concentrations remain near or above freshwater sediment toxicity screening guidelines; East Fork Slate Creek was also above the guidelines for cadmium and Upper Slate Creek was above the guidelines for chromium.

[a] Mean value, 1991–2021.

INTRODUCTION

The Kensington Mine is located near Berners Bay in Southeast Alaska (Figure 1), about 72 km north of Juneau and 56 km south of Haines 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. (Coeur), a wholly owned subsidiary of Coeur Mining, Inc.

The underground mine began producing gold concentrate for export on June 24, 2010. Tailings are disposed underground as paste backfill and in the tailings treatment facility (TTF) as slurry through a pipeline from the mill. Mine infrastructure is located in three drainages that support resident and anadromous fish: the TTF and water treatment plant in the Slate Creek drainage; the waste rock pile, camp, and mill facilities in the Johnson Creek drainage; and the waste rock pile and mine water treatment plant in the Sherman Creek drainage.

Contractors gathered aquatic data for the Kensington Mine from the late 1980s through 2005, which provided a basis for Alaska Department of Fish and Game (ADF&G) Habitat Section permit decisions, Plan of Operations monitoring requirements (Coeur 2022), the U.S. Environmental Protection Agency (USEPA) National Pollutant Elimination Discharge System Permit No. AK-005057-1, and the Alaska Department of Environmental Conservation Alaska Pollutant Discharge Elimination System (APDES) Permit No. AK0050571.[b] Monitoring and research reports published during project development and operations are in Aquatic Science Inc. (2006, 2007, 2008, 2009a, 2009b, 2009c, 2009d, 2011), Timothy and Kanouse (2012–2014), Kanouse (2015), Brewster (2016), Willson-Naranjo and Kanouse (2016), Kanouse and Zutz (2017), Zutz (2018), Albrecht (2018, 2019), and Kane (2020–2022).

Habitat Section staff completed the aquatic studies required for the Kensington Mine in Slate, Johnson, and Sherman Creeks since 2011. The APDES Permit requires sampling periphyton, benthic macroinvertebrates (BMI), and sediment. We assess stream health using estimates of chlorophyll density and composition, BMI density and community composition, pink salmon (Oncorhynchus gorbuscha) spawning substrate composition, and sediment element concentrations. Habitat Section staff also completed the adult salmon counts required in the project Plan of Operations (Coeur 2022).

PURPOSE

This technical report summarizes the 2022 aquatic study data and documents the condition of biological communities and sediments in Slate, Johnson, and Sherman Creeks near mine development and operations, satisfying the aquatic study requirements in the project Plan of Operations (Coeur 2022) and APDES Permit AK0050571.

[b] Contractor reports are listed in Zutz (2018).

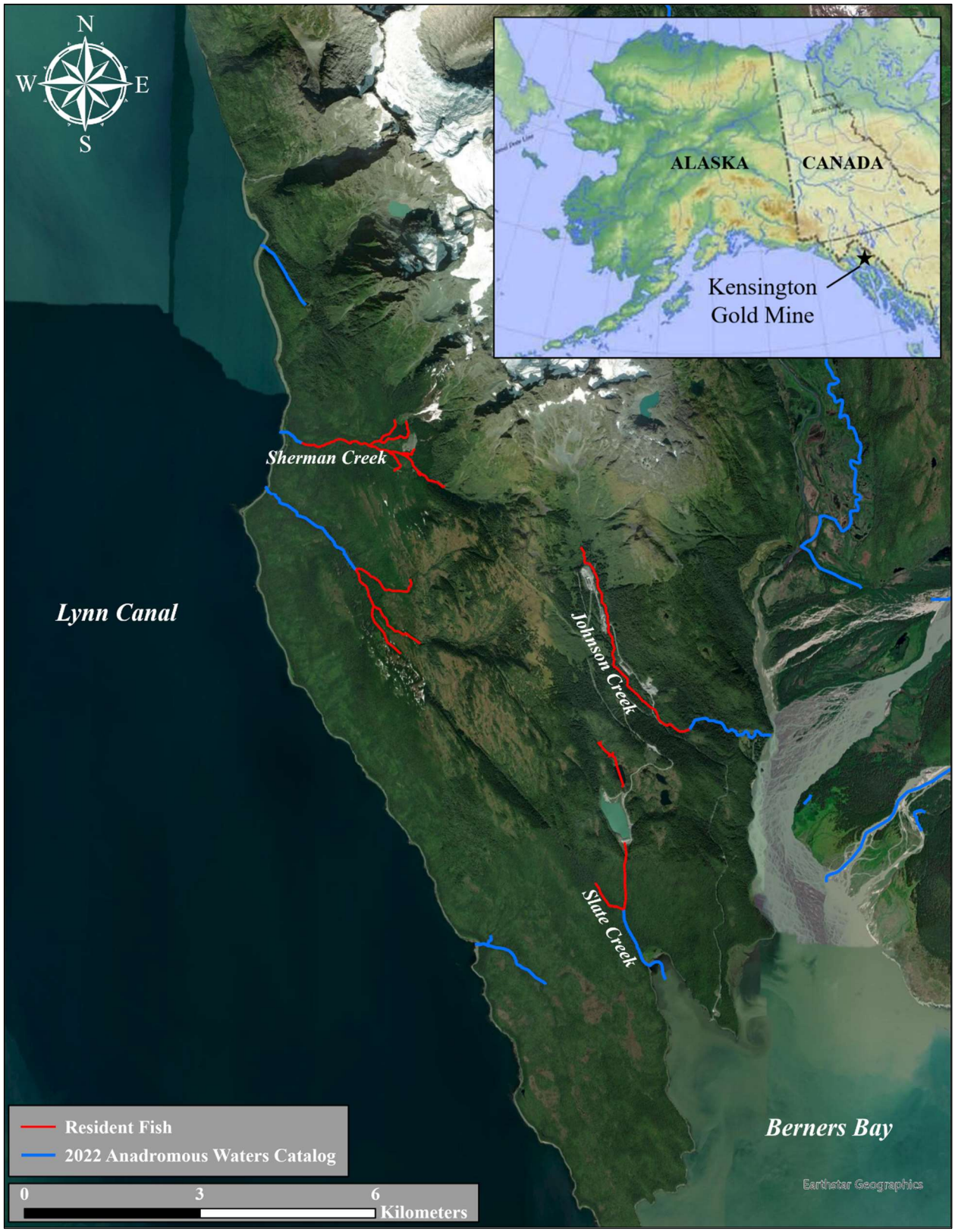

Figure 1.–Kensington Mine project area; streams adjacent to mine infrastructure and associated with aquatic studies are labeled.

STUDY AREA

Slate Creek Drainage

Slate Creek drains a 10.5 km^2 watershed into Slate Cove on the northwest side of Berners Bay (Coeur 2022; Figure 2). Water from the TTF (Figure 3) and acid rock drainage seepage from the TTF spillway (Figure 4) are collected and treated at TTF water treatment plants, then discharged to East Fork Slate Creek via Outfall 002. Approximately 1 km upstream of the mouth of Lower Slate Creek, two 25 m waterfalls at the confluence of the East and West Forks preclude upstream fish migration (Figure 5).

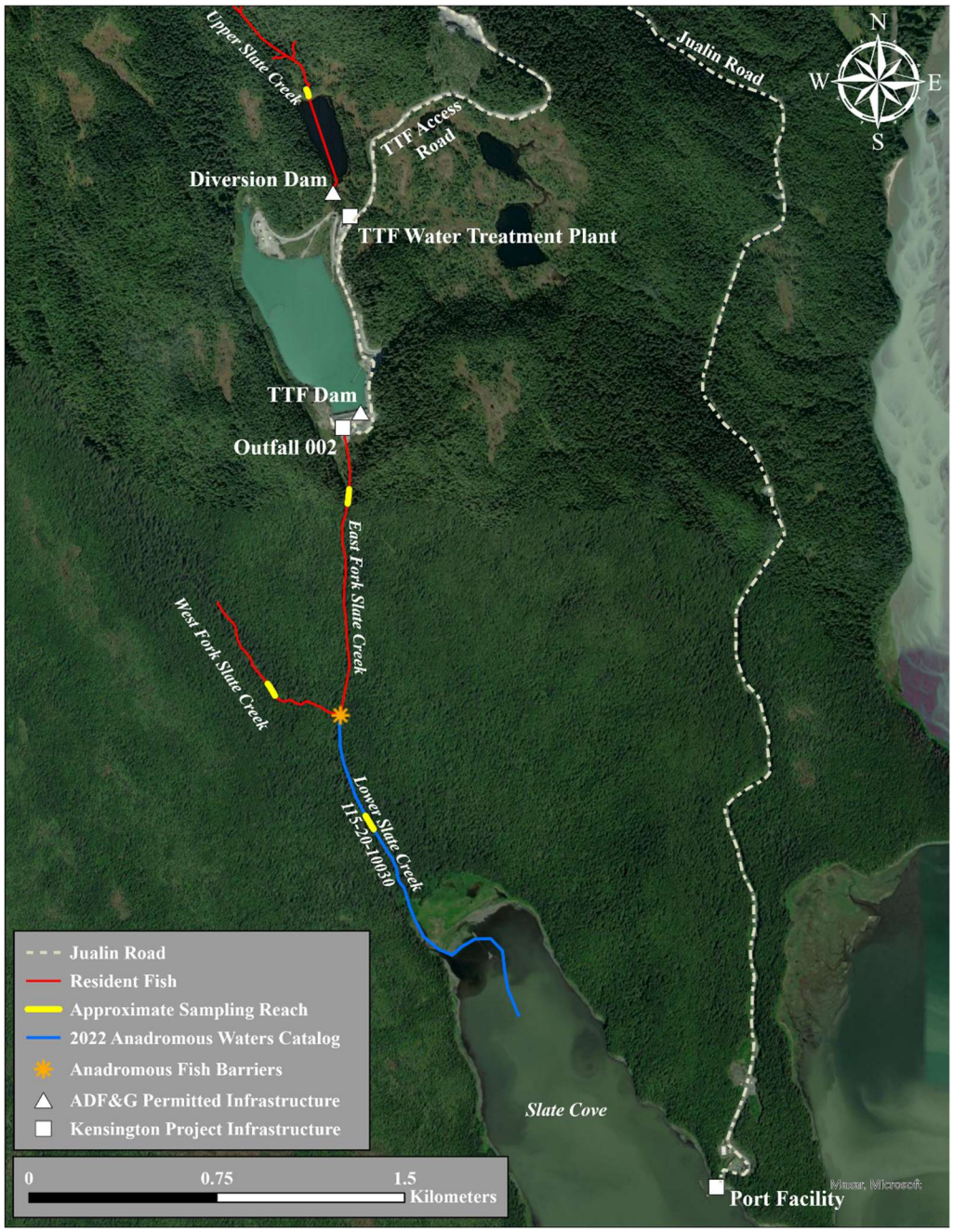

Figure 2.–Slate Creek area.

Figure 3.–Tailings treatment facility and dam, July 6, 2022.

Figure 4.–Tailings treatment facility dam spillway and plunge pool, April 26, 2022. The stage 3 spillway was complete in fall 2021. Drainages from the exposed graphitic phyllite on the west abutment are captured in the seepage collection sump and treated in the TTF seep water treatment plant.

Figure 5.–Confluence of West and East Fork Slate Creek, August 4, 2021.

Lower Slate Creek

Lower Slate Creek comprises a 1 km reach between the stream mouth in Slate Cove and the 25 m waterfalls at the confluence of East and West Fork Slate Creek and is a mixture of water from the East and West Forks, Outfall 002, and Upper Slate Lake. The reach provides spawning habitat for chum *O. keta*, coho *O. kisutch*, and pink salmon, and eulachon *Thaleichthys pacificus*, and rearing habitat for juvenile coho salmon (Stream No. 115-20-10030; Geifer and Blossom 2022). We also have documented Dolly Varden *Salvelinus malma* and cutthroat trout *O. clarkii* in the system (Timothy and Kanouse 2012). We sample periphyton, BMIs, pink salmon spawning substrate, and sediment at Sample Point 1 (SP1; Figure 6) and pink salmon spawning substrate at Sample Point 2 (SP2; Figure 7)—both a moderate gradient (2–6%) mixed control channel type (Paustian 2010)—and count adult salmon throughout Lower Slate Creek.

Figure 6.–Periphyton sampling in Lower Slate Creek at SP1, April 25, 2022.

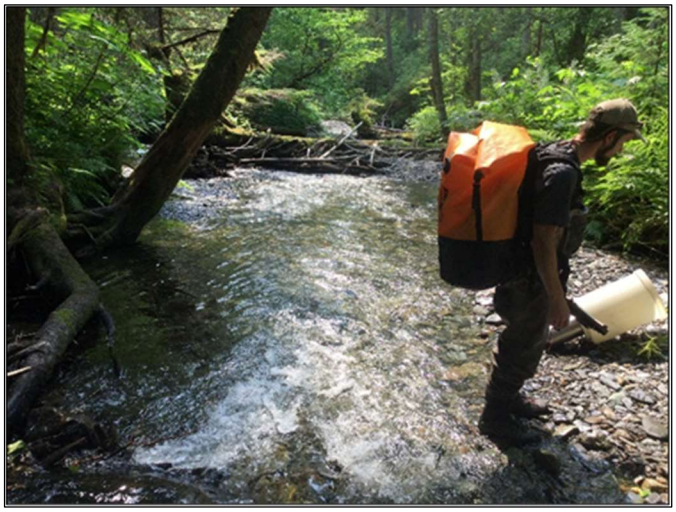

Figure 7.–Spawning substrate composition sampling in Lower Slate Creek at SP2, July 5, 2022.

West Fork Slate Creek

Located in a valley approximately 800 m west of the TTF, West Fork Slate Creek (Figure 8) is not influenced by mine activities; the sample reach serves to typify natural background conditions in the area. West Fork Slate Creek is a tributary to Lower Slate Creek and provides habitat for Dolly Varden (Timothy and Kanouse 2014). We sample periphyton and BMIs about 600 m upstream of the waterfall in Lower Slate Creek in a cobble-dominated moderate gradient mixed control channel (Paustian 2010).

Figure 8.–Benthic macroinvertebrate sampling in West Fork Slate Creek, April 25, 2022.

East Fork Slate Creek

East Fork Slate Creek (Figure 9) comprises a 1 km reach between the confluence with West Fork Slate Creek and the TTF dam and is a tributary to Lower Slate Creek. East Fork Slate Creek discharge is dependent on Upper Slate Lake discharge—routed through a diversion pipeline bypassing the TTF—and Outfall 002[c] effluent discharge from the TTF water treatment plant.[d] The reach provides habitat and fish passage for Dolly Varden and threespine stickleback *Gasterosteus aculeatus* (Kanouse and Zutz 2017) emigrating from Upper Slate Lake, currently via the diversion pipeline and formerly via Lower Slate Lake. We sample periphyton, BMIs, and sediments in East Fork Slate Creek 200 m downstream of the TTF in a moderate gradient bedrock contained channel (Paustian 2010) where angular cobble substrate is dominant.

[c] Outfall 002 began discharging to East Fork Slate Creek in December 2010.

[d] Daily mean discharge data combining the diversion pipeline and Outfall 002 data for July was presented 2011–2018 (Albrecht 2019).

Figure 9.–Benthic macroinvertebrate sampling in East Fork Slate Creek, April 26, 2022.

Upper Slate Creek

Upstream of mine influence, Upper Slate Creek (Figure 10) is a tributary to Upper Slate Lake and the sample reach serves to typify natural background conditions in the area. The stream provides habitat for Dolly Varden (Albrecht 2018). We sample periphyton, BMIs, and sediments in Upper Slate Creek within 75 m of Upper Slate Lake in a moderate gradient mixed control channel (Paustian 2010).

Figure 10.–Benthic macroinvertebrate sampling in Upper Slate Creek, April 26, 2022.

Johnson Creek Drainage

Johnson Creek drains a 14.6 km^2 watershed to the Lace River on the northwest shore of Berners Bay (Coeur 2022; Figure 11). Adjacent to the mill facilities, a water supply infiltration gallery installed in Upper Johnson Creek provides the primary source of fresh water for processing.[e] Upper and Middle Johnson Creek are immediately adjacent to supporting infrastructure and the Jualin Road crosses the stream at two locations (Bridge #1 and #2).

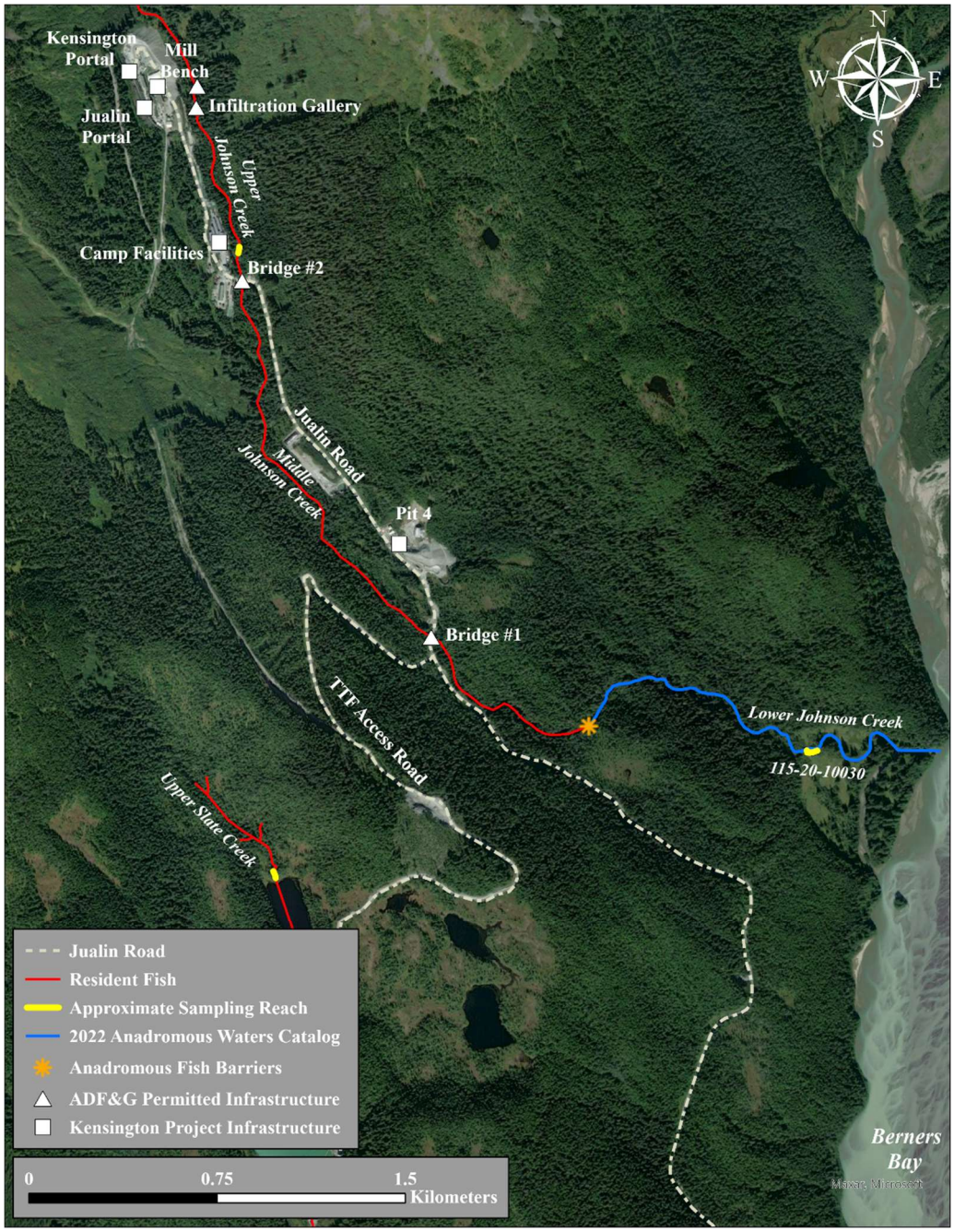

Figure 11.–Johnson Creek area.

[e] Authorized under fish habitat permit FH11-I-0130.

Lower Johnson Creek

Lower Johnson Creek comprises a 1.5 km reach between the stream mouth in Berners Bay and a 30 m waterfall precluding upstream fish migration; the reach is a mixture of drainages near mine infrastructure in Middle[f] and Upper Johnson Creeks. Lower Johnson Creek provides spawning habitat for chum, coho, and pink salmon, and rearing habitat for coho salmon (Stream No. 115-20-10030; Giefer and Blossom 2022). We also have documented Dolly Varden and cutthroat trout in the system (Timothy and Kanouse 2012). We sample sediment about 600 m upstream from the mouth in a moderate width low gradient (less than 2%; Figure 12) floodplain channel (Paustian 2010) and count adult salmon throughout Lower Johnson Creek (Figure 13).

Figure 12.– Lower Johnson Creek, July 5, 2022.

Figure 13.–Adult salmon survey in Lower Johnson Creek, October 6, 2022.

Upper Johnson Creek

Upper Johnson Creek comprises the reach between Bridge #2 and the headwaters and flows adjacent to the camp facilities, mill bench, and the Kensington Waste Rock Stockpile. Water is collected through an infiltration gallery in Upper Johnson Creek near the mill bench to support the camp. Upper Johnson Creek provides habitat for Dolly Varden (Timothy and Kanouse 2012). We sample BMIs about 50 m upstream of the Jualin Road Bridge #2 where the stream is a medium width mixed control channel (Paustian 2010) with boulder and cobble substrate.

[f] Mine facilities include the domestic wastewater treatment plant, warehouse, reclamation material and acid-generating rock storage piles, bridges, and Pit 4; drainages include Snowslide Gulch, the domestic wastewater outfall, and storm water discharges.

Sherman Creek Drainage

Sherman Creek drains a 10.84 km^2 watershed to the east shore of Lynn Canal (Coeur 2022; Figure 14). A 15 m waterfall approximately 360 m upstream from the Lower Sherman Creek mouth precludes upstream fish migration. Middle Sherman Creek comprises the 2 km reach between the waterfall and the Comet Beach Road bridge; Upper Sherman Creek comprises the reach upstream of the bridge to the headwaters. Water from the underground workings is collected and treated at the Comet Water Treatment Plants, then discharged to Middle Sherman Creek via Outfall 001.

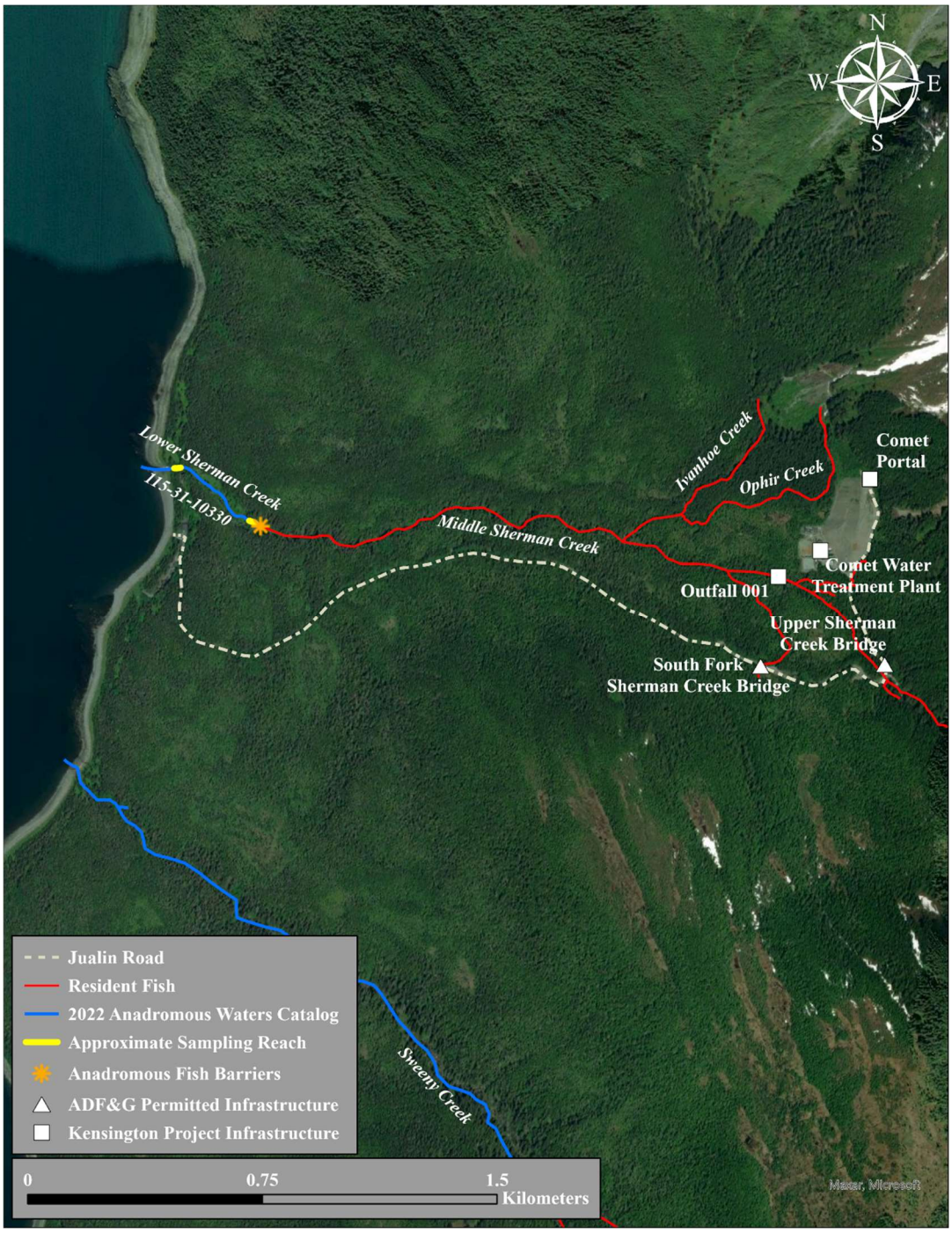

Figure 14.–Sherman Creek area.

Lower Sherman Creek

Lower Sherman Creek comprises the reach between the stream mouth and the 15 m barrier waterfall; the reach is a mixture of drainages near and from mine infrastructure in Middle Sherman Creek and its tributaries.[g] Lower Sherman Creek provides spawning habitat for chum and pink salmon (Stream No. 115-31-10330; Giefer and Blossom 2022). We also have documented Dolly Varden throughout the system (Timothy and Kanouse 2012). We sample periphyton, BMIs, and sediment in a moderate gradient medium width mixed control channel (Paustian 2010) at Sample Point 1 (SP1; Figure 15), and periphyton and BMIs at Sample Point 2 (SP2; Figure 16), a similar channel type. We count adult salmon throughout Lower Sherman Creek.

Figure 15.–Lower Sherman Creek at SP1, April 25, 2022.

Figure 16.–Lower Sherman Creek at SP2, April 25, 2022.

[g] Mine facilities and infrastructure include the Comet water treatment plant, waste rock pile, bridges and culverts; drainages include Ivanhoe Creek, Ophir Creek, South Fork Sherman Creek, and Comet water treatment plant Outfall 001.

AQUATIC STUDIES SAMPLING SCHEDULE

Between April 25 and October 21, 2022, we completed the Kensington Mine aquatic studies required in the project Plan of Operations (Coeur 2022) and APDES Permit AK0050571 (Table 1).

Table 1.–Aquatic studies sampling schedule, 2022.

Aquatic Study	Lower Slate	West Fork Slate	East Fork Slate	Upper Slate	Lower Johnson	Upper Johnson	Lower Sherman
Periphyton	4/25[a]	---	4/26[a]	---	---	---	---
	7/25	7/25	7/26	7/26	---	---	7/26
Benthic macroinvertebrates	4/25	4/25	4/26	4/26	---	4/27	4/27
Adult salmon counts	8/10–10/21	---	---	---	8/10-10/21	---	8/10–9/8
Spawning substrate	7/5	---	---	---	---	---	---
Sediment element concentrations	7/5	---	7/6	7/6	7/5	---	7/6

[a] Sampling not required by Plan of Operations or APDES permit.

SAMPLING LOCATIONS

We recorded coordinates for each sample site (Table 2) and adult salmon count reach markers in Lower Slate Creek, Lower Johnson Creek, and Lower Sherman Creek (Tables 3–5).

Table 2.–Aquatic study sample sites, 2022.

Location	Sample Site	Latitude	Longitude
Lower Slate Creek	Periphyton and benthic macroinvertebrates	58.7905	-135.0345
	Spawning substrate		
	Sample Point 1	58.7905	-135.0345
	Sample Point 2	58.7920	-135.0360
	Sediment composition and element concentrations	58.7905	-135.0345
West Fork Slate Creek	Periphyton and benthic macroinvertebrates	58.7993	-135.0457
East Fork Slate Creek	Periphyton and benthic macroinvertebrates	58.8045	-135.0381
	Sediment composition and element concentrations	58.8053	-135.0383
Upper Slate Creek	Periphyton and benthic macroinvertebrates	58.8189	-135.0415
	Sediment composition and element concentrations	58.8189	-135.0416
Lower Johnson Creek	Sediment composition and element concentrations	58.8235	-135.0024
Upper Johnson Creek	Benthic macroinvertebrates	58.8407	-135.0450
Lower Sherman Creek	Periphyton and benthic macroinvertebrates		
	Sample Point 1	58.8687	-135.1415
	Sample Point 2	58.8674	-135.1381
	Sediment composition and element concentrations	58.8687	-135.1413

Note: WGS84 datum.

Table 3.–Lower Slate Creek adult salmon count 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	58.7922	-135.0361
600 m	58.7930	-135.0368
700 m	58.7936	-135.0379
800 m	58.7944	-135.0384
900 m	58.7953	-135.0385
Falls	58.7964	-135.0389

Table 4.–Lower Johnson Creek adult salmon count 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	58.8258	-135.0168
#15	58.8252	-135.0190
Falls	58.8243	-135.0201

Table 5.–Lower Sherman Creek adult salmon count reach markers.

Location	Latitude	Longitude
50 m	58.8687	-135.1416
100 m	58.8687	-135.1408
150 m	58.8684	-135.1401
200 m	58.8682	-135.1394
250 m	58.8679	-135.1388
300 m	58.8675	-135.1383
350 m	58.8673	-135.1374
Falls	58.8671	-135.1367

METHODS

Data sets are reviewed annually to ensure accuracy and consistency; corrections and updates are reported 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.

PERIPHYTON: CHLOROPHYLL DENSITY AND COMPOSITION

Periphyton is composed of primary producing organisms such as algae, cyanobacteria, and heterotrophic microbes, and detritus attached to the submerged surfaces of aquatic ecosystems. Algal density and community structure are influenced by water and sediment quality through physical, chemical, and biological factors that change throughout the year (Barbour et al. 1999). The concentration of chlorophyll *a* (Chl-*a*) pigment in periphyton samples provides an estimate of active algal biomass (density), while concentrations of chlorophyll *b* (Chl-*b*) and chlorophyll *c* (Chl-*c*) pigments estimate the composition of algal organisms present, such as green algae that produce Chl-*b*, and diatoms and brown algae that produce Chl-*c*.

Requirement: APDES 1.5.3.5.2

The APDES permit requires monitoring periphyton chlorophyll density and composition in Lower Slate Creek, East Fork Slate Creek, and Lower Sherman Creek annually between late-June and early-August and not within three weeks following peak discharge to detect changes over time. The APDES permit also requires concurrent monitoring at reference sites in West Fork Slate Creek and Upper Slate Creek to detect variations due to natural factors, such as mineral seeps, climate, stream migration and stream flow.

Sample Collection and Analysis

Sampling methods are adapted from Barbour et al. (1999). Ten smooth, flat, undisturbed, and perennially wetted rocks were collected from submerged cobble in riffle habitats in less than 0.45 m water depth at each sample site and submerged in the creek in the same orientation they were collected. To collect a sample from each rock, a 5 × 5 cm square of high-density foam was held on the sample area; the area around the foam was scrubbed with a toothbrush to remove algae and other organisms outside the sample area. The rock was rinsed by submerging it in the stream while holding the foam in place; the toothbrush also was rinsed in the stream.

A 47 mm diameter Type A/E 1 µm glass fiber filter was placed into a Nalgene® filter receptacle attached to a vacuum pump with a gauge. The foam square was removed and the underside of the foam and the sample area were gently scrubbed in a circular pattern with the toothbrush into the filter receptacle. Stream water in a wash bottle was used to rinse loosened periphyton from the foam, rock, toothbrush, and the inside of the filter receptacle onto the filter. The sample area was scrubbed a second time and the rinse cycle was repeated. With most of the water pumped through the filter, maintaining pressure less than 34 kPa, a few drops[h] of saturated magnesium carbonate solution was added to the filter[i]. After all the water was pumped through the glass fiber filter, it was removed from the receptacle, folded in half with the sample inside, and wrapped in a white coffee filter for additional moisture absorption. The samples were placed in a sealed, labeled plastic bag with desiccant and stored in a light-proof cooler containing frozen icepacks during transportation; samples were stored in a -20°C freezer in the ADF&G Douglas laboratory until processing.

USEPA (1997) protocol was followed for chlorophyll extraction and measurement, determining instrument and estimated detection limits, and data analysis.[j] Samples were removed from the freezer, cut into small pieces, and placed into individual 15 mL screw cap centrifuge tubes containing 10 mL of 90% buffered acetone. The centrifuge tubes were capped and shaken to ensure complete submersion of the sample. Secured in a vial rack covered with aluminum foil, the samples were stored in a refrigerator for 12–24 hours to allow for saturation and chlorophyll extraction.

The samples were centrifuged for 20 min at 500 relative centrifugal force. Prior to sample measurement, two cuvettes containing 90% buffered acetone were placed into a Shimadzu UV-1800 spectrophotometer to calibrate absorbance of the solvent at wavelengths 664 nm, 647 nm, 630 nm, and 750 nm. Supernatant from each sample was decanted into an individual cuvette and absorbance was measured at each wavelength. Each sample was treated with 80 µL of 0.1 N hydrochloric acid for 90 seconds to convert the chlorophyll to phaeophytin, and absorbance was measured at wavelengths 665 nm and 750 nm. To minimize stray light and improve resolution, sample cuvettes were cleaned with a nonabrasive wipe prior to placement in the spectrophotometer.

Trichromatic equations were used to estimate Chl-*a*, Chl-*b*, and Chl-*c* concentrations, correcting for turbidity using the 750 nm absorbance value (APHA 2012, USEPA 1997). Chl-*a* concentrations were corrected when phaeophytin was detected. When Chl-*a* was not detected in a sample, the concentration is reported as the spectrophotometer estimated detection limit and the values for Chl-*b* or Chl-*c* were excluded. The 2022 estimated detection limit for Chl-*a* concentration was 0.22 mg/m^2.

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[h] This measurement is not exact as the amount of water and magnesium carbonate used to create a saturated solution varies and does not affect sample integrity; supernatant solution was used to avoid solids.

[i] To prevent acidification and conversion of chlorophyll to phaeophytin.

[j] Deviations from USEPA (1997) include samples storage longer than 3.5 weeks, and cutting sample filters to reduce acetone exposure for laboratory staff (as opposed to homogenization).

Data Presentation

For each site and by year, mean densities of Chl-*a*, Chl-*b*, and Chl-*c* are presented in a table, Chl-*a* densities in a figure, and mean proportions of Chl-*a,* Chl-*b,* and Chl-*c* in a figure. Annual data from 2011 through 2022 are provided in Appendix A.

BENTHIC MACROINVERTEBRATE DENSITY AND COMMUNITY COMPOSITION

Benthic macroinvertebrates (BMI) classified in the orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies), collectively known as EPT taxa, have complex and short life cycles and many genera are sensitive to changes in water and sediment quality (Barbour et al. 1999). These organisms are secondary producers, feed upon periphyton and other macroinvertebrates, and are a food source for fish.

Requirement: APDES 1.5.3.2

The APDES permit requires monitoring BMI density and community composition in Lower Slate Creek, East Fork Slate Creek, Upper Johnson Creek, and Lower Sherman Creek annually between late-March and late-May after spring breakup and before peak snowmelt to detect changes over time. The APDES permit also requires concurrent monitoring at reference sites in West Fork Slate Creek and Upper Slate Creek to detect variations due to natural factors.

Sample Collection and Analysis

Six BMI samples were collected from each site using a Surber stream bottom sampler in riffles and runs with gravel and cobble substrate and varying flow velocities—habitats that support greater BMI densities and taxonomic richness (Barbour et al. 1999). Other habitat types (e.g. pools) were excluded to reduce data variability.

The Surber stream bottom sampler has a 0.093 m^2 sample area and material is captured in a 200 mL cod end, both constructed with 300 µm mesh net. After securing the frame on the streambed with the opening facing upstream, rocks within the sample area were scoured with a scrub brush; gravel, sand, and silt were disturbed to about 10 cm depth to dislodge macroinvertebrates into the net. The net was rinsed in the stream to ensure all organisms drifted into the cod end, and each sample was transferred from the cod end to a labeled 500 mL plastic bottle. Samples were preserved in 95% ethanol at a ratio of three parts ethanol to one part sample. Samples exceeding the capacity of the cod end were discarded in the field to minimize detritus and substrate in samples and ensure proper sample preservation.

Contractor Matt Kern of Alder Grove Farm used an elutriator system and 0.5 mm and 0.3 mm sieves to sort macroinvertebrates from debris,[k] and identified organisms to the lowest practical taxonomic level[l] using Merritt and Cummins (1996) and Stewart and Oswood (2006). Habitat biologists provided quality control by verifying macroinvertebrate identification of eight samples.

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[k] Gordon Willson-Naranjo and Greg Albrecht, Habitat Biologists, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Division of Habitat. Memorandum: Benthic macroinvertebrate elutriation trials amendment; dated 12/17/2013. Unpublished document can be obtained from the Southeast Regional Supervisor, ADF&G Division of Habitat, 802 3rd Street, Douglas, AK.

[l] Insects of the orders Ephemeroptera, Plecoptera, Trichoptera, and Diptera to genus, except nonbiting midges to family Chironomidae, and all others to class or order.

BMI density (per m^2) for each sample was calculated by dividing the number of macroinvertebrates by 0.093 m^2—the Surber sampling area. Mean density was estimated for each site by calculating the mean density among the six samples. Taxa richness is reported as the number of taxonomic groups identified to the lowest practical level; terrestrial[m] organisms were excluded from all calculations.

Shannon Diversity (*H*) and Evenness (*E*) Indices provide measures of taxonomic diversity and abundance equality. These indices are calculated using the following equations from Magurran (1988):

$$H = -\sum_{i=1}^{S}(P_i \log_{10} P_i)$$

and

$$E = \frac{H}{\log_{10} S},$$

where P_i is the number of macroinvertebrates per taxonomic group divided by the total number of macroinvertebrates in the sample, and *S* is the number of taxonomic groups in the sample.[n] A single taxa macroinvertebrate community has an *H* value of 0, which increases with the number of taxa (richness) and abundance equality (evenness). The Evenness calculation normalizes the *H* value to a number between 0 and 1, with an *E* value of 1 indicating all taxa are equally abundant.

Data Presentation

For each site and by year, a table is presented summarizing mean BMI density, total taxa, total EPT taxa, percent EPT, and mean Shannon Diversity and Evenness scores. Mean densities and community composition are presented in a figure. Annual data from 2011 through 2022 are provided in Appendix B.

ADULT SALMON COUNTS

Requirement: Plan of Operations

The Plan of Operations (Coeur 2022) requires weekly surveys of adult chum, coho, and pink salmon in Lower Slate Creek, Lower Johnson Creek, and Lower Sherman Creek throughout the peak run period for each species.[o]

Sample Collection

We counted adult salmon downstream of fish migration barriers once per week during peak runs, August through early September for pink and chum salmon and late September through mid-October for coho salmon. Stream surveys for pink and chum salmon and carcasses were conducted by foot on Slate and Sherman Creeks and by aerial count via helicopter on Johnson Creek[p]. Foot surveys for coho salmon and carcasses were conducted on Slate and Johnson Creeks. To improve

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[m] Including adult terrestrial insects of the orders Ephemeroptera, Plecoptera, Trichoptera, and Diptera.

[n] Assuming all taxonomic groups are represented.

[o] Following the USFS 2022 Record of Decision, 2022 was the first year we surveyed during peak runs instead of throughout the spawning season.

[p] Aerial surveys are conducted on Lower Johnson Creek throughout the pink and chum salmon run due to the observed brown bear density in the area; this method of enumeration is inherently imprecise.

coho salmon observations, biologists conducted snorkel surveys and recorded underwater videos with a GoPro in large pools and around large woody debris—habitats where adult coho salmon tend to concentrate.

Each survey began at the stream mouth, proceeded upstream by established reach identifiers and concluded at the fish migration barrier. Slate Creek is segmented in 100 m reaches, Johnson Creek by landmarks, and Sherman Creek in 50 m reaches. One biologist enumerated and recorded while the other biologist verified counts and provided bear protection. Approximate weather and streamflow conditions were recorded at the beginning of each survey.

Data Presentation

For each site, figures are presented of the peak weekly adult pink salmon count; the 2011–2022 peak counts by species are presented in a table. Compiled 2022 data for each species by reach and the 2011–2022 pink salmon counts by statistical week are provided in Appendix C.

SPAWNING SUBSTRATE COMPOSITION

Requirement: APDES 1.5.3.5.1

The APDES permit requires annual sampling of pink salmon spawning substrate during early-July at Lower Slate Creek SP1 and SP2 to detect change in composition over time. Geometric mean particle size (GMPS)—an index of substrate textural composition—is calculated for each sample and among samples collected at each site.

Sample Collection

Sampling methods are adapted from Valentine (1995). Four sediment samples were collected at two locations in Lower Slate Creek using a McNeil sampler, which has a 15 cm basal core diameter and 25 cm core depth. Criteria for sample site selection included substrate measuring less than 10 cm—the maximum gravel size used by pink salmon (Lotspeich and Everest 1981, Kondolf and Wolman 1993)—and where the stream gradient was less than 3%. The McNeil sampler was worked into the substrate until the sample core was buried, and sediments were transferred to the upper barrel portion of the sampler. Samples were wet-sieved onsite using sieve sizes 101.6, 50.8, 25.4, 12.7, 6.35, 1.68, 0.42, and 0.15 mm. The contents of each sieve were measured to the nearest 25 mL via volume of water displaced in 600 mL and 1 L plastic beakers; fines that passed through the 0.15 mm sieve were transferred to Imhoff cones and allowed to settle for 10 min; sediment volume was measured to the nearest 1 mL using cone gradations.

For the fines that passed through the 0.15 mm sieve, sediment wet weights were converted to dry weights using standards identified by Zollinger (1981). For all other sediments, wet weights were converted to dry weights using a correction factor derived from Shirazi et al. (1981), assuming a gravel density of 2.6 g/cm^3 (Aquatic Science Inc. 2011). Geometric mean particle size (d_g) was calculated using methods developed by Lotspeich and Everest (1981), where the midpoint diameter of particles retained in each sieve (d) are raised to a power equal to the decimal fraction of volume retained by that sieve (w), and multiplied the products of each sieve size to obtain the final product:

$$d_g = d_1^{w1} \times d_2^{w2} \times d_3^{w3} \ldots d_n^{wn}$$

GMPS was estimated for each site by calculating the average GMPS among the four samples.

Data Presentation

Geometric mean particle sizes are presented in a table for the 2011–2022 data at each site. Annual data from 2011 through 2022 are provided in Appendix D.

SEDIMENT COMPOSITION AND ELEMENT CONCENTRATIONS

Requirement: APDES 1.5.2

Sediment element concentrations are influenced by a variety of factors, such as geochemical composition and weathering within the watershed, sediment grain size, organic content, and development (Tchounwou et al. 2012). Subsequently, sediment element concentrations influence benthic aquatic productivity, and heavy metals in sediments can decrease BMI taxa richness and alter the composition of BMI communities (Qu et al. 2010).

The APDES permit requires annual analysis of one[q] fine sediment sample in Lower Slate, East Fork Slate, Upper Slate, Lower Johnson, and Lower Sherman Creeks for particle size, total solids, total volatile solids, total sulfide, total organic carbon, and total concentrations of silver (Ag), aluminum (Al), arsenic (As) cadmium (Cd), chromium (Cr), copper (Cu), mercury (Hg), nickel (Ni), lead (Pb), selenium (Se), and zinc (Zn).

Sample Collection and Analysis

Wearing latex gloves, one sample of submerged sand and silt was collected at each site within actively flowing channels. For each sample, the top 4 cm of sediment was retained in three glass jars provided by the laboratory[r]. To preserve sulfide in the sample jar designated for sulfide analyses, 5–10 mL of zinc acetate was added immediately after sample collection to fill the sample jars; all other samples were filled to the top with stream water to minimize air space.[s] Samples were stored in a cooler with frozen icepacks during transport and in an ADF&G Douglas laboratory fridge until shipment to the ALS Environmental laboratory in Kelso, WA for analyses.

The samples were shipped in a cooler with frozen icepacks via overnight air freight, maintaining a written chain of custody documentation. ALS Environmental measured particle size, total solids, total volatile solids, total sulfide, total organic carbon, and total concentrations of Ag, Al, As, Cd, Cr, Cu, Hg, Ni, Pb, Se, and Zn on a dry-weight basis (Table 6).[t] The laboratory provided Tier IV quality assurance and quality control information, including results for matrix spikes, sample blanks, and sample duplicates.

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[q] Beginning in 2020, two additional samples at each site were voluntarily collected annually to better understand concentration variability.

[r] In 2015, sieving sediments during collection was discontinued to avoid sample bias.

[s] Per laboratory staff instruction (S. Samy, Kelso Laboratory Senior Project Manager, ALS Environmental, Kelso, WA, personal communication).

[t] The AECOM Environmental Toxicology lab in Fort Collins, CO completed the 2011–2013 sediment sample analyses; since 2014, the ALS Environmental lab in Kelso, WA has completed the sediment sample analyses.

Table 6.–Sediment tests, analytes, and methods used in 2022.

Test Description	Analyte	Method
Standard test method for particle-size analysis of soils	Particle size determination	ASTM D422M
Puget Sound Estuary Program sediment total organic carbon	Total organic carbon	PSEP TOC
Total solids on liquids, modified for solids	Total solids	EPA 160.3 Modified
Puget Sound Estuary Program sediment sulfide	Total sulfide	PSEP Sulfide
Total volatile solids, modified for solids	Total volatile solids	EPA 160.4 Modified
Mercury in solid or semisolid waste	Hg	EPA 7471B
Determination of trace elements in waters and wastes by ICP/MS	Ag, Al, As, Cd, Cr, Cu, Ni, Pb, Se, Zn	EPA 200.8

Data Presentation

For each site and by year, sediment element concentrations data are presented in a figure; mean values are reported when sample duplicate data are available. Sediment element concentrations undetected are illustrated as an empty circle (◦) at the method reporting limit and as a solid circle (•) for measured element concentrations.

The data are compared with the threshold effects concentrations (TEC) and the probable effects concentrations (PEC) for inorganics in freshwater sediment guidelines developed by the National Oceanic and Atmospheric Administration (Buchman 2008). The guidelines are based on results of controlled laboratory bioassays, where element concentrations below the TECs rarely affect aquatic life survival and growth, and element concentrations above the PECs can affect aquatic life survival and growth.

Annual data from 2011–2022 and the 2022 laboratory report are provided in Appendix E.

RESULTS

SLATE CREEK

Lower Slate Creek

Periphyton: Chlorophyll Density and Composition

In 2022, the Lower Slate Creek mean chlorophyll *a* density (Table 7; Figure 17) and mean proportions of chlorophylls *a*, *b*, and *c* (Figure 18) were similar to previous years.

Table 7.–Lower Slate Creek mean chlorophylls *a*, *b*, and *c* densities, 2011–2022.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Chl-*a* (mg/m^2)	5.15	2.31	12.59	3.97	2.16	5.26	2.30	4.21	33.71	1.22	2.01	4.87
Chl-*b* (mg/m^2)	0.43	0.05	0.00	0.85	0.10	0.21	0.23	0.04	0.00	0.11	0.04	0.09
Chl-*c* (mg/m^2)	0.26	0.18	1.64	0.30	0.21	0.62	0.23	0.63	6.49	0.06	0.32	0.62

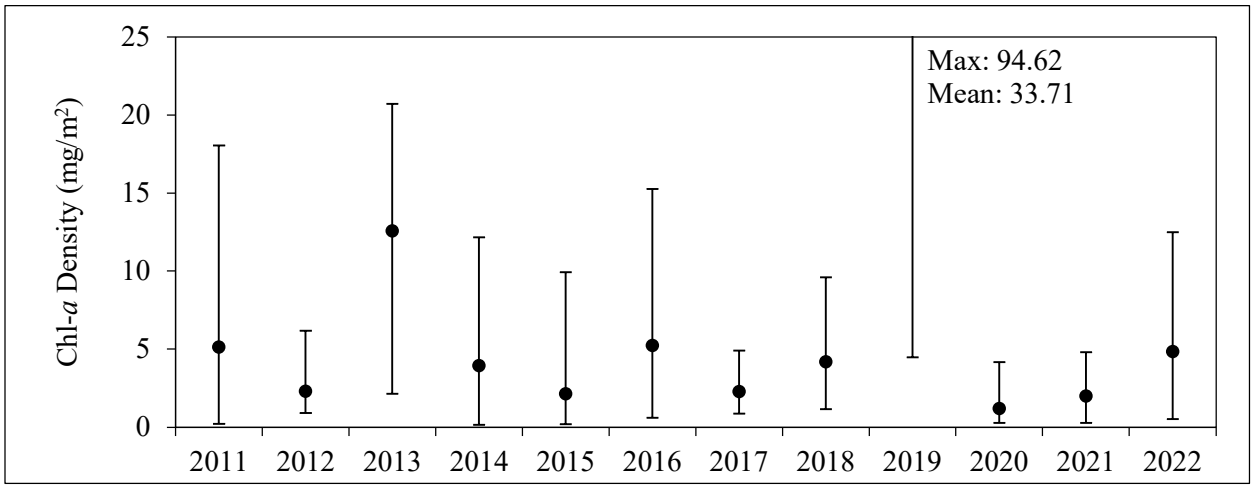

Figure 17.–Lower Slate Creek mean chlorophyll *a* densities, 2011–2022.

Note: Minimum, mean, and maximum values.

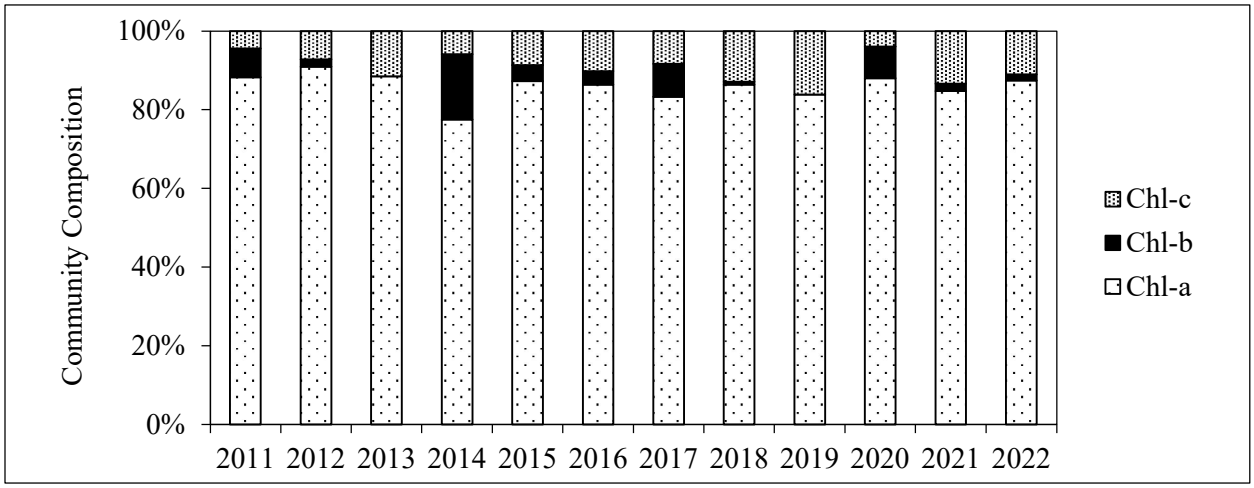

Figure 18.–Lower Slate Creek mean proportions of chlorophylls *a*, *b*, and *c*, 2011–2022.

Benthic Macroinvertebrate Density and Community Composition

The estimated Lower Slate Creek mean BMI density continued to be lower than observed 2011–2016, as with the other sites in the Slate Creek system. Among the 2022 BMI samples, we identified 15 taxa and estimate mean density at 810 BMI/m^2 (Table 8; Figure 19). The Shannon Diversity and Evenness scores were consistent with most previous years, and the dominant taxa were Diptera (nonbiting midges) of the family Chironomidae (53%) and Ephemeroptera (mayflies) of the family Baetidae (23%).

Table 8.–Lower Slate Creek BMI data summaries, 2011–2022.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Mean BMI density (per m^2)	2,057	3,154	2,581	4,136	3,407	3,394	1,308	482	934	1,208	425	810
Total BMI taxa	29	32	27	32	26	24	27	17	18	24	17	15
Number of EPT taxa	13	17	16	17	13	11	13	9	9	11	8	10
% EPT	14%	38%	51%	19%	24%	15%	50%	45%	57%	19%	49%	38%
Shannon Diversity score	0.51	0.69	0.85	0.64	0.70	0.65	0.81	0.81	0.83	0.59	0.77	0.59
Evenness score	0.48	0.58	0.70	0.52	0.58	0.57	0.73	0.84	0.81	0.56	0.82	0.65

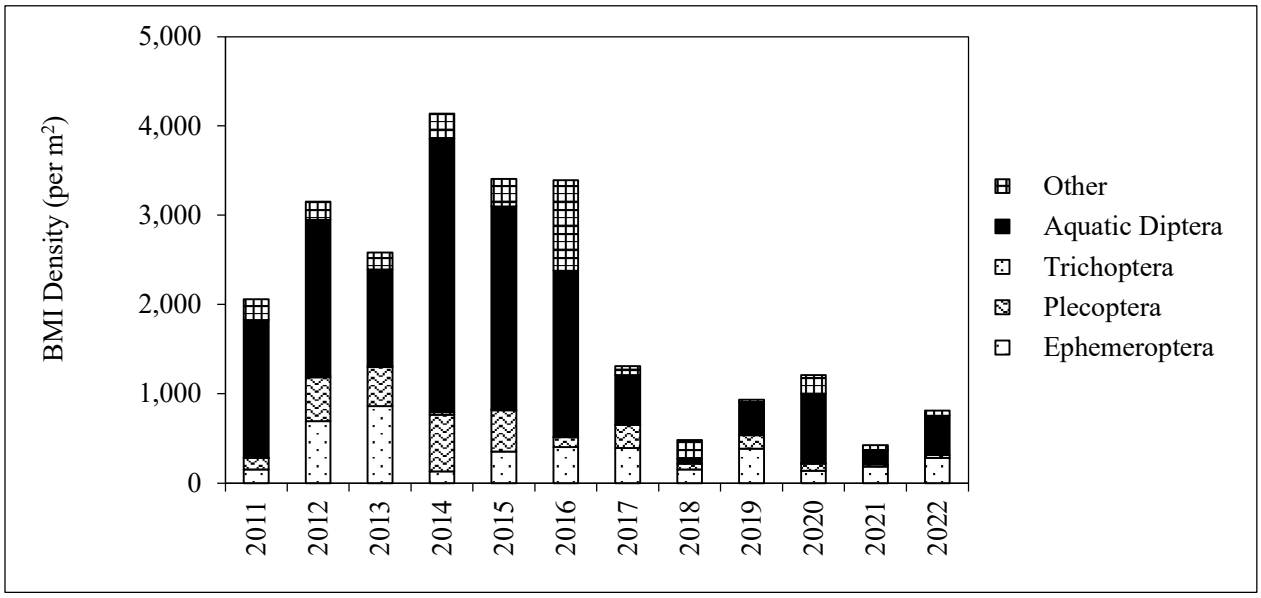

Figure 19.–Lower Slate Creek mean BMI densities and community compositions, 2011–2022.

Adult Salmon Counts

In 2022, we counted 23 pink salmon and zero chum salmon in Lower Slate Creek during four peak count surveys, and no coho salmon in the fall (Table 9; Figure 20). Continuous rainfall events July through October increased stream discharges and reduced visibility, negatively affecting our ability to consistently count salmon during the peak spawning seasons.

Table 9.–Lower Slate Creek adult salmon counts, 2011–2022.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Pink salmon	6,254	7,272	3,337	41	7,580	79	7,416	4	837	15	3,661	23
Chum salmon	59	1	1	0	13	45	1	0	0	0	0	0
Coho salmon	0	0	26	5	0	2	5	1	1	4	0	0

Note: The 2022 data presented are from peak counts during the spawning seasons; all other years include complete spawning season counts.

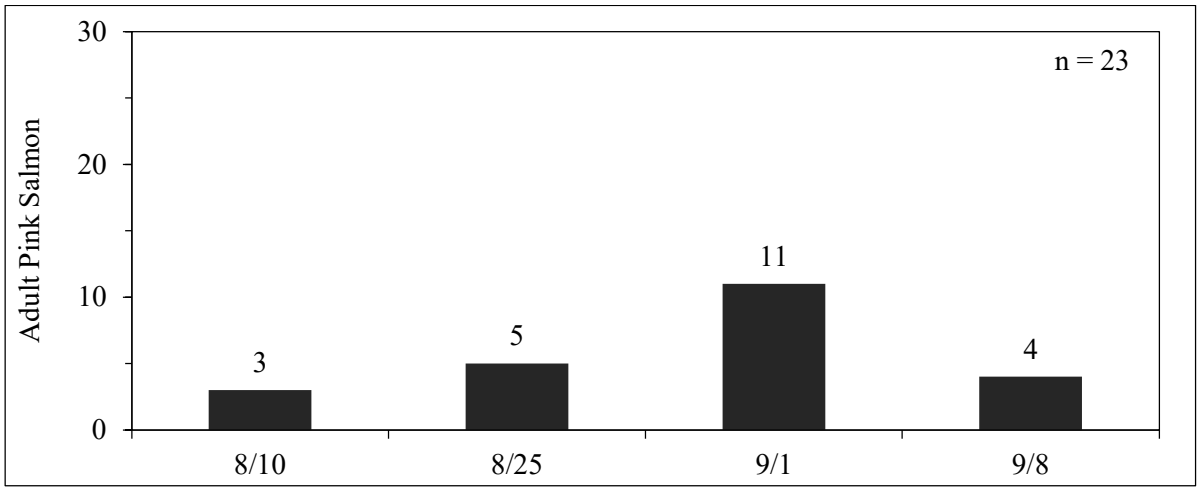

Figure 20.–Lower Slate Creek adult pink salmon counts, 2022.

Spawning Substrate Composition

In 2022, the GMPS at Sample Point 1 was 15.1 mm—slightly larger than previously observed. The GMPS at Sample Point 2 was 13.7 mm—within the range previously observed (Table 10).

Table 10.–Lower Slate Creek spawning substrate geometric mean particle sizes (mm), 2011–2022.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Sample Point 1	10.3	10.8	14.2	12.9	13.3	13.6	14.7	14.5	14.8	8.5	12.0	15.1
Sample Point 2	11.1	11.2	13.2	16.5	17.5	11.6	13.0	17.3	23.1	14.1	20.4	13.7

Sediment Element Concentrations

Among the 2022 Lower Slate Creek sediment samples, the mean As, Hg, and Zn concentrations were within the range previously observed; the mean Ag, Al, Cd, Cr, Cu, Ni, and Pb concentrations were lower than previously observed (Figure 21). The As, Cu, and Ni values remain above the TEC freshwater sediment toxicity guidelines (Buchman 2008).

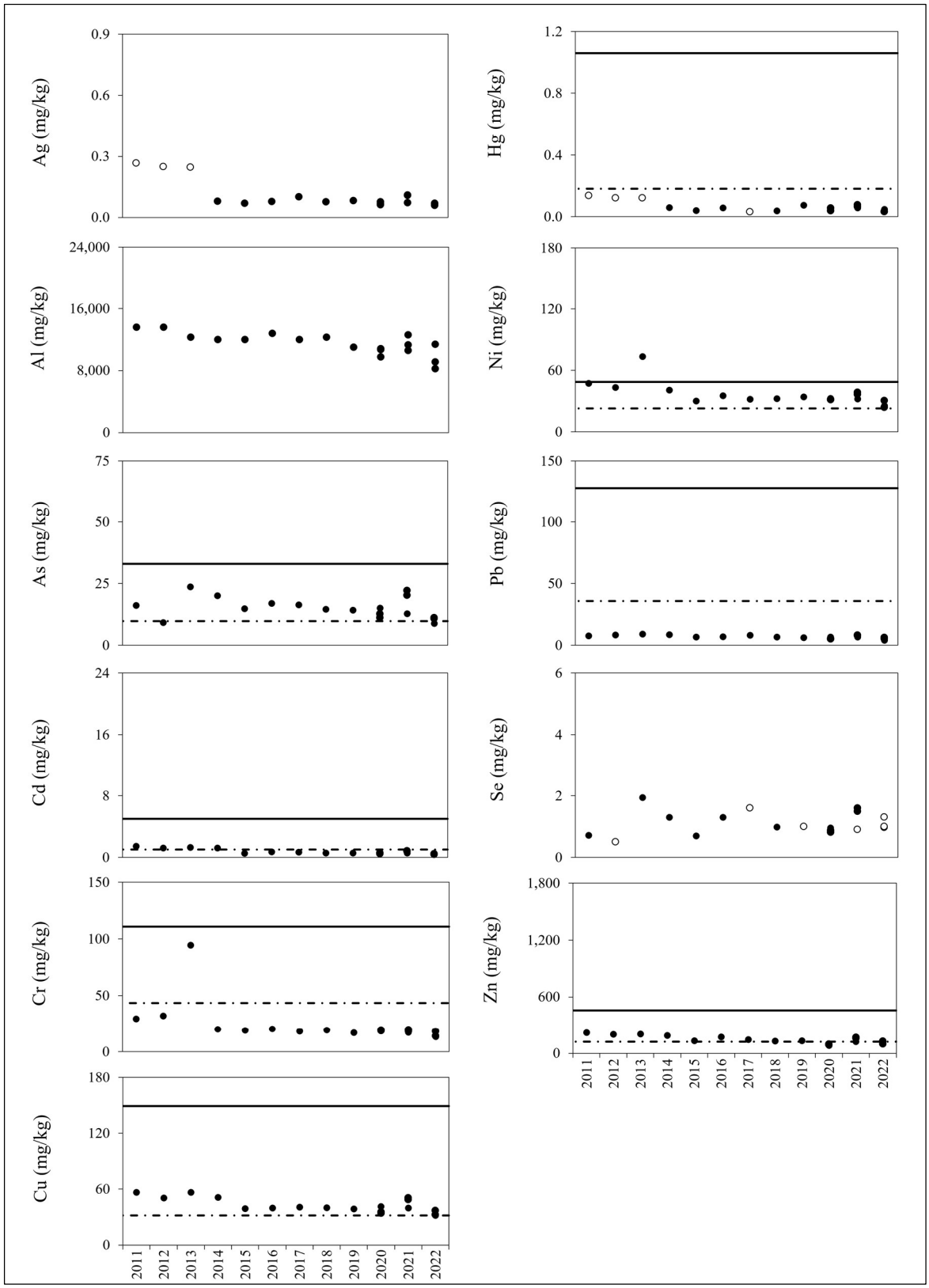

Figure 21.–Lower Slate Creek sediment element concentrations, 2011–2022.

Note: Elements undetected (o) are presented at the method reporting limit. The dashed line represents TEC and solid line represents the PEC; guidelines are not published for Ag, Al, or Se (Buchman 2008).

West Fork Slate Creek

Periphyton: Chlorophyll Density and Composition

In 2022, the West Fork Slate Creek mean chlorophyll *a* density (Table 11; Figure 22) and mean proportions of chlorophylls *a*, *b*, and *c* were similar to previous years (Figure 23).

Table 11.–West Fork Slate Creek mean chlorophylls *a*, *b*, and *c* densities, 2011–2022.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Chl-*a* (mg/m^2)	3.92	1.01	4.22	0.77	0.92	4.93	4.96	3.85	2.95	1.08	15.66	3.58
Chl-*b* (mg/m^2)	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chl-*c* (mg/m^2)	0.27	0.10	0.61	0.06	0.06	0.66	0.85	0.74	0.46	0.15	2.76	0.42

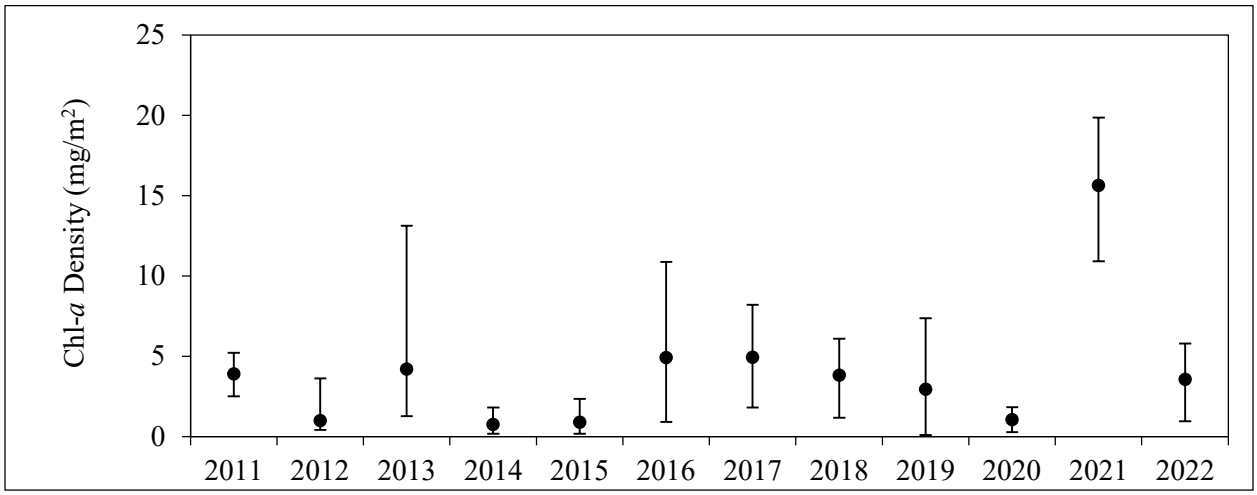

Figure 22.–West Fork Slate Creek mean chlorophyll *a* densities, 2011–2022.
Note: Minimum, mean, and maximum values.

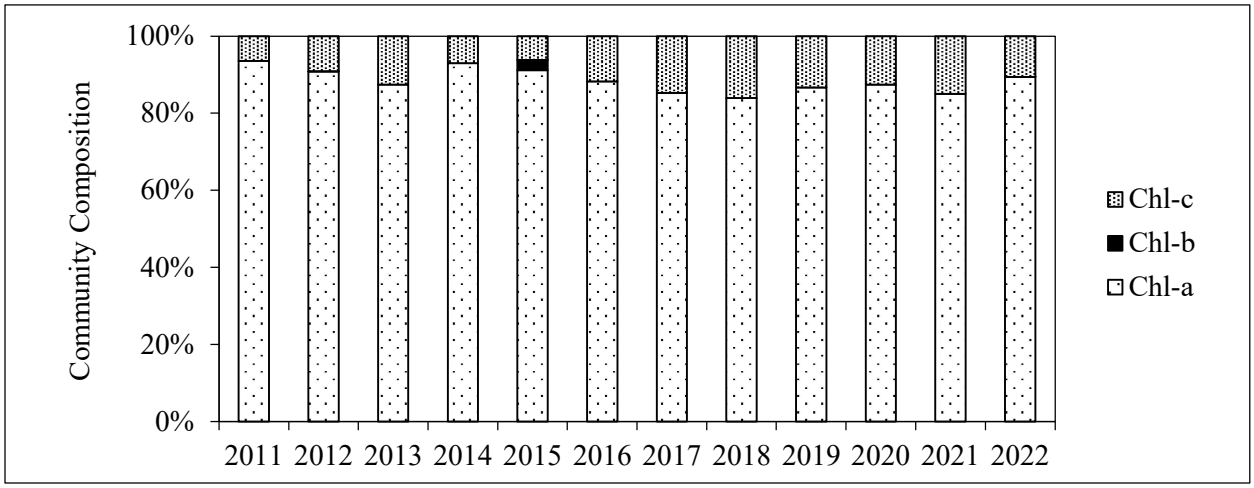

Figure 23.–West Fork Slate Creek mean proportions of chlorophylls *a*, *b*, and *c*, 2011–2022.

Benthic Macroinvertebrate Density and Community Composition

Among the 2022 West Fork Slate Creek BMI samples, we identified 22 taxa and estimate mean density at 1,437 BMI/m^2—within ranges previously observed (Table 12; Figure 24). EPT insects composed 86% of the samples. The Shannon Diversity and Evenness scores were lower than previous years, and the dominant taxon was Ephemeroptera of the family Baetidae composing 61.7% of the samples.

Table 12.–West Fork Slate Creek BMI data summaries, 2011–2022.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Mean BMI density (per m^2)	502	1,819	2,446	973	2,634	1,470	885	328	1,299	1,358	719	1,437
Total BMI taxa	21	31	28	29	28	25	21	18	16	18	17	22
Number of EPT taxa	11	21	18	17	16	15	13	12	11	12	14	15
% EPT	80%	80%	90%	71%	82%	77%	82%	84%	91%	78%	93%	86%
Shannon Diversity score	0.63	0.84	0.73	0.91	0.82	0.72	0.78	0.72	0.64	0.75	0.76	0.62
Evenness score	0.78	0.71	0.61	0.79	0.71	0.69	0.78	0.83	0.64	0.74	0.75	0.57

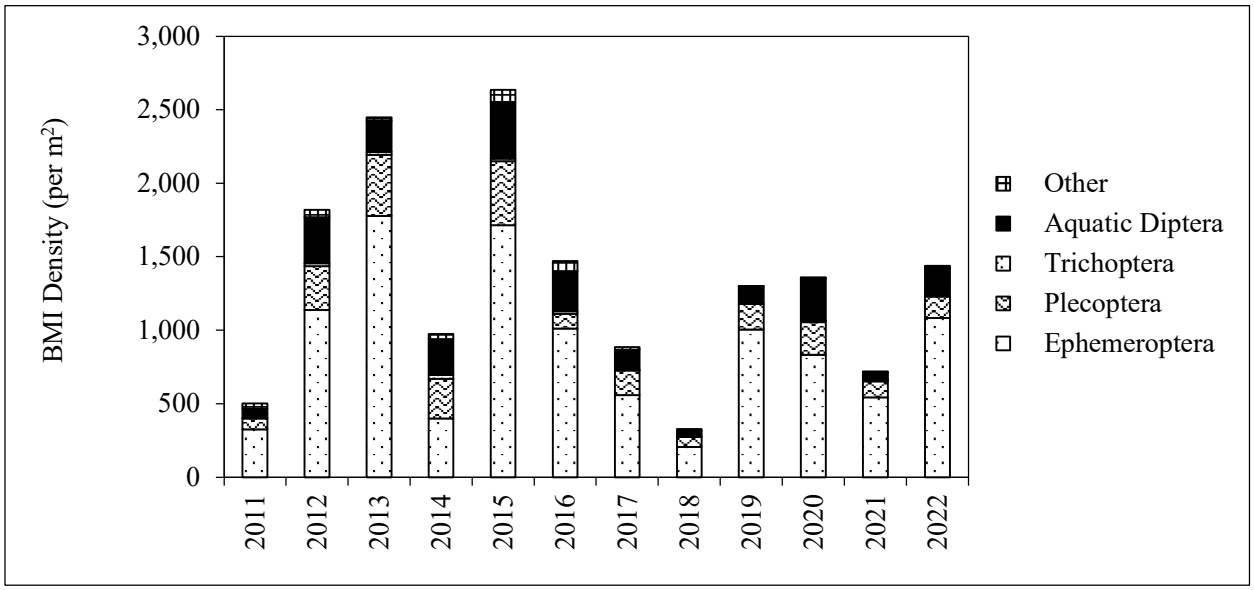

Figure 24.–West Fork Slate Creek mean BMI densities and community compositions, 2011–2022.

East Fork Slate Creek

Periphyton: Chlorophyll Density and Composition

In 2022, the East Fork Slate Creek mean chlorophyll *a* density (Table 13; Figure 25) and mean proportions of chlorophylls *a*, *b*, and *c* were similar to previous years (Figure 26).

Table 13.–East Fork Slate Creek mean chlorophylls *a*, *b*, and *c* densities, 2011–2022.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Chl-*a* (mg/m^2)	8.84	5.08	2.28	0.27	1.56	1.21	0.64	1.67	3.51	1.39	0.80	1.46
Chl-*b* (mg/m^2)	1.56	0.57	0.06	0.02	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.06
Chl-*c* (mg/m^2)	0.24	0.18	0.20	0.03	0.15	0.15	0.06	0.16	0.34	0.13	0.13	0.11

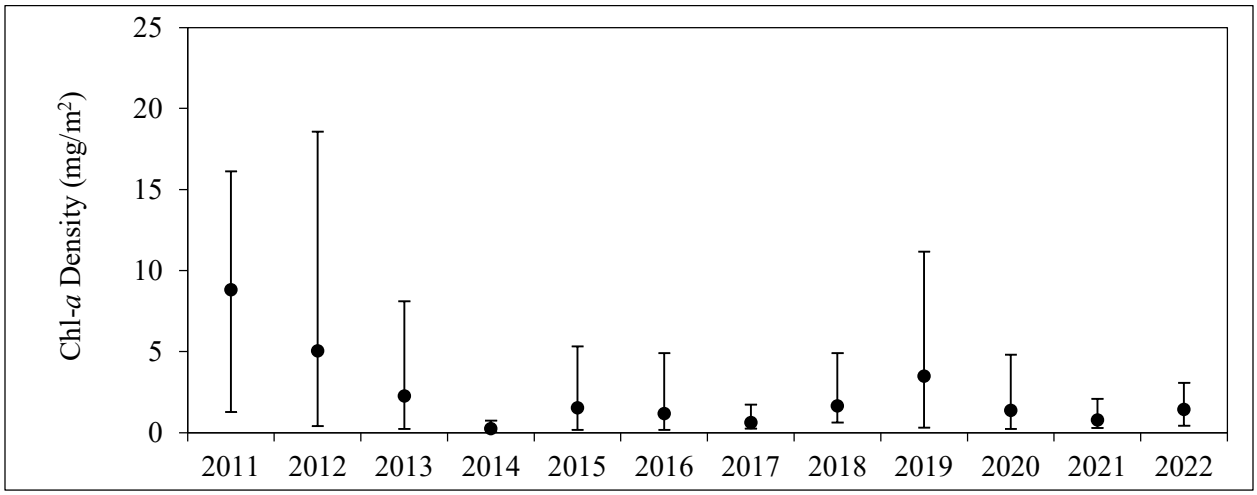

Figure 25.–East Fork Slate Creek mean chlorophyll *a* densities, 2011–2022.
Note: Minimum, mean, and maximum values.

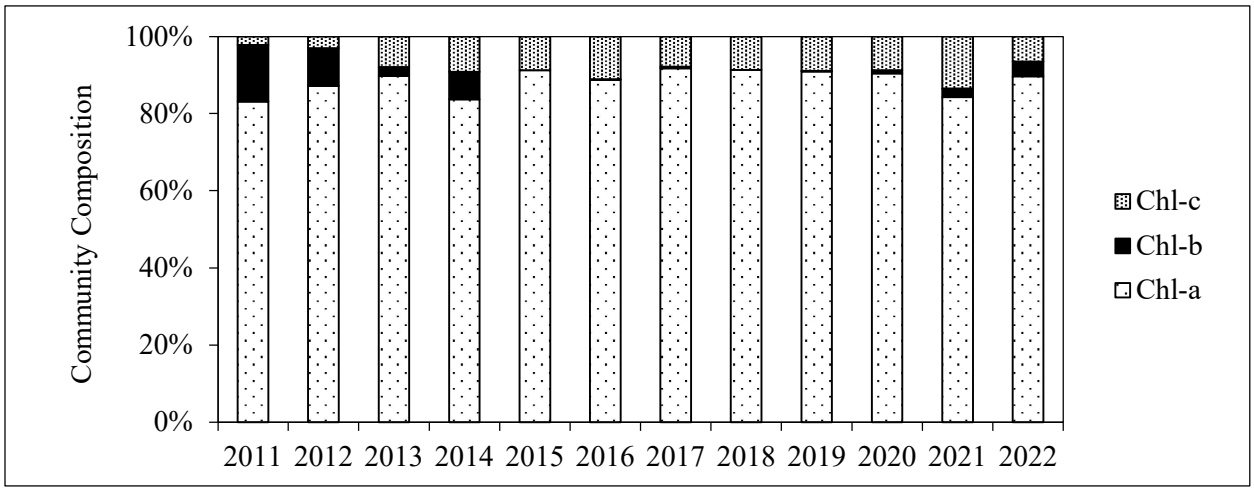

Figure 26.–East Fork Slate Creek mean proportions of chlorophylls *a*, *b*, and *c*, 2011–2022.

Benthic Macroinvertebrate Density and Community Composition

Among the 2022 East Fork Slate Creek BMI samples, we identified 25 taxa and estimate mean density at 3,093 BMI/m^2, of which 13% were EPT insects, all within ranges previously observed (Table 14; Figure 27). The Shannon Diversity and Evenness scores were consistent with previous years, and the dominant taxon was Diptera of the family Chironomidae composing 44% of the samples.

Table 14.–East Fork Slate Creek BMI data summaries, 2011–2022.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Mean BMI density (per m^2)	4,688	4,633	9,407	2,048	3,854	2,002	6,783	3,588	3,866	5,496	3,437	3,093
Total BMI taxa	27	33	33	24	28	21	27	26	25	26	23	25
Number of EPT taxa	15	17	17	9	16	11	13	15	15	14	14	13
% EPT	19%	23%	3%	2%	18%	28%	11%	8%	18%	13%	10%	13%
Shannon Diversity score	0.64	0.78	0.57	0.70	0.92	0.92	0.62	0.54	0.62	0.56	0.59	0.61
Evenness score	0.54	0.61	0.47	0.63	0.72	0.78	0.51	0.46	0.53	0.46	0.52	0.53

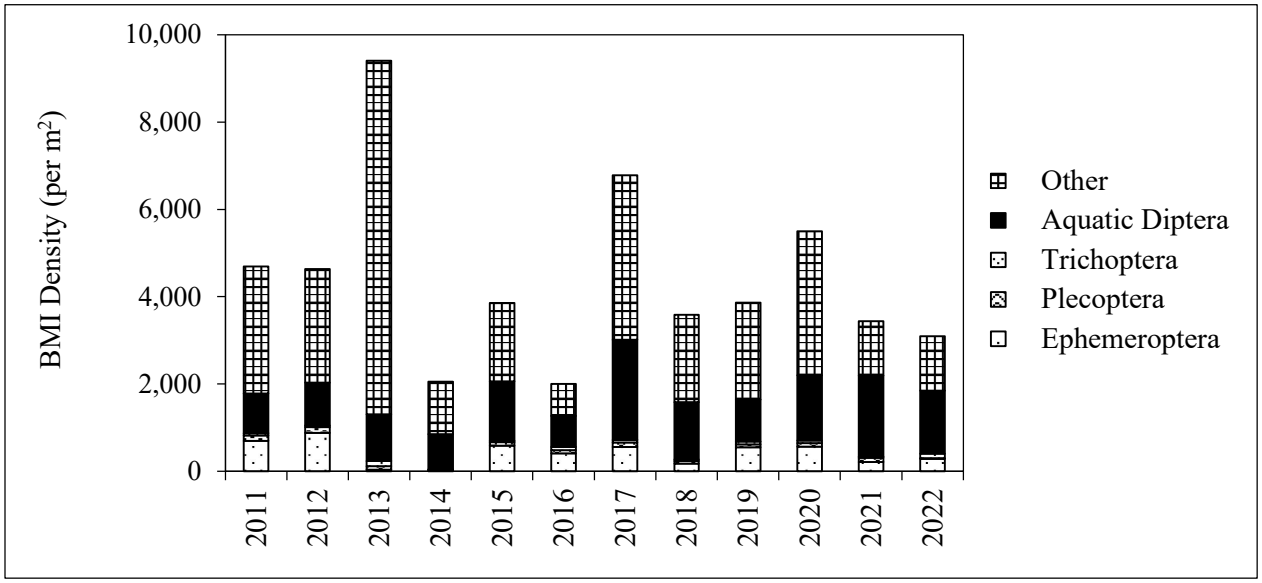

Figure 27.–East Fork Slate Creek mean BMI densities and community compositions, 2011–2022.

Sediment Element Concentrations

Among the 2022 East Fork Slate Creek sediment samples, the mean concentrations of Cd, Cr, and Se were within the range previously observed; the mean Ag, Al, As, Cu, Hg, Ni, Pb, and Zn concentrations were lower than previously observed (Figure 28). The mean concentration of As, Cd, Ni, and Zn were above the TEC freshwater sediment toxicity guidelines.

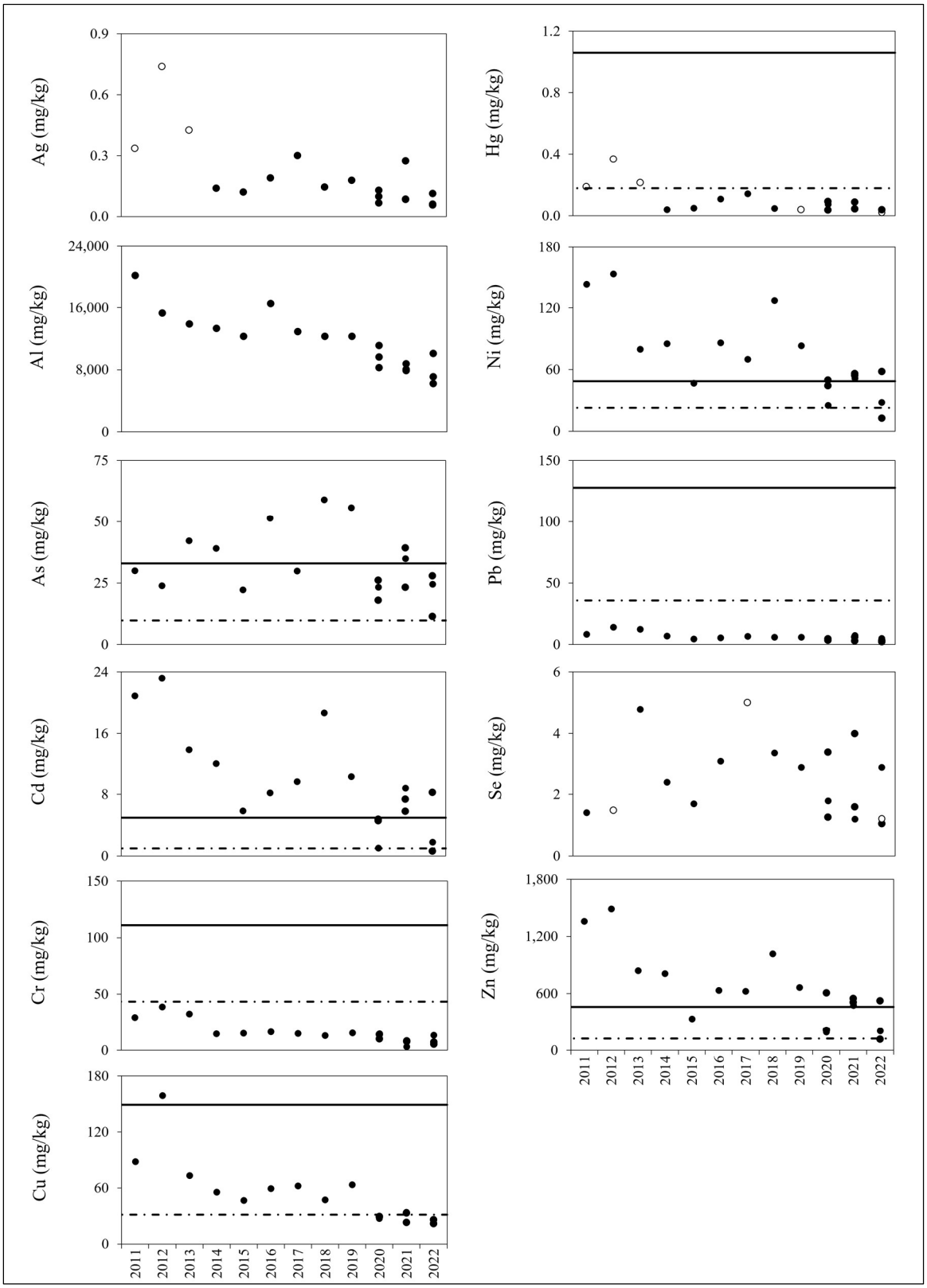

Figure 28.–East Fork Slate Creek sediment element concentrations, 2011–2022.

Note: Elements undetected (o) are presented at the method reporting limit. The dashed line represents TEC and solid line represents the PEC; guidelines are not published for Ag, Al, or Se (Buchman 2008).

Upper Slate Creek

Periphyton: Chlorophyll Density and Composition

In 2022, the Upper Slate Creek mean chlorophyll *a* density (Table 15; Figure 29) and mean proportions of chlorophylls *a*, *b*, and *c* also were similar to previous years (Figure 30).

Table 15.–Upper Slate Creek mean chlorophylls *a, b,* and *c* densities, 2011–2022.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Chl-*a* (mg/m^2)	0.76	1.26	2.13	1.09	0.63	3.86	0.83	2.57	7.47	1.13	2.89	1.47
Chl-*b* (mg/m^2)	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Chl-*c* (mg/m^2)	0.05	0.07	0.13	0.06	0.09	0.42	0.04	0.36	0.60	0.06	0.46	0.10

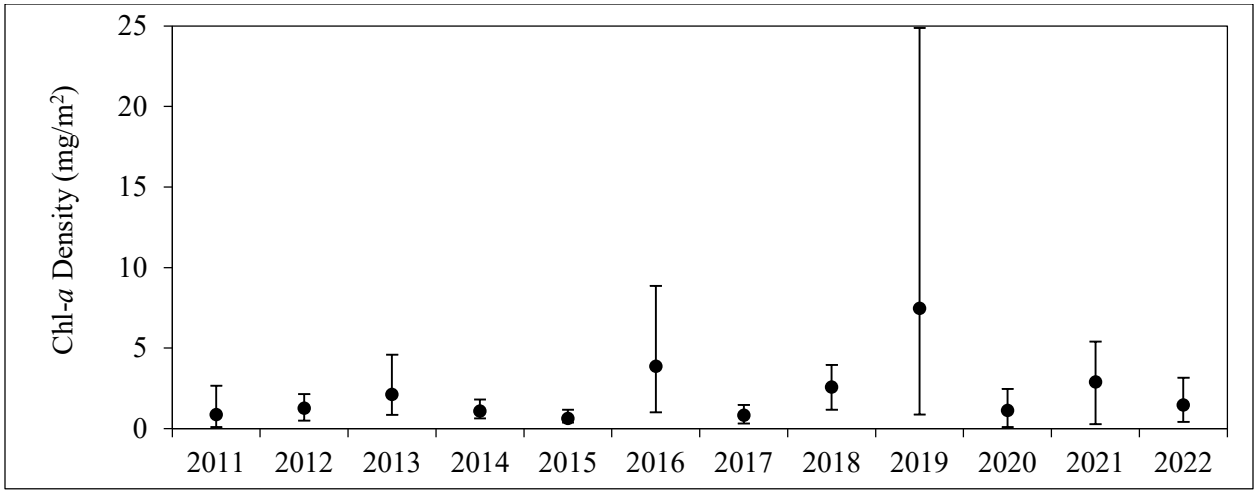

Figure 29.–Upper Slate Creek mean chlorophyll *a* densities, 2011–2022.
Note: Minimum, mean, and maximum values.

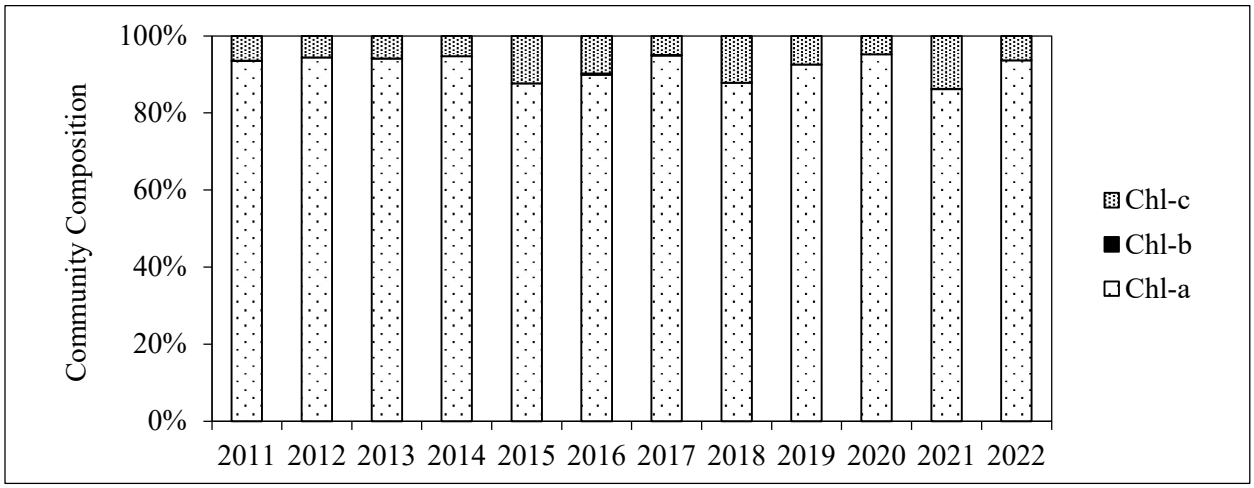

Figure 30.–Upper Slate Creek mean proportions of chlorophylls *a*, *b*, and *c*, 2011–2022.

Benthic Macroinvertebrate Density and Community Composition

The estimated Upper Slate Creek mean BMI density continued to be lower than observed 2011–2016. Among the 2022 BMI samples, we identified 29 taxa and estimate mean density at 1,246 BMI/m^2, of which 69% were EPT insects—all within ranges previously observed (Table 16; Figure 31). The Shannon Diversity and Evenness scores were consistent with previous years and the dominant taxa were Diptera of the family Chironomidae (26%) and Ephemeroptera of the family Baetidae (18%).

Table 16.–Upper Slate Creek BMI data summaries, 2011–2022.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Mean BMI density (per m^2)	2,523	2,256	2,880	3,125	3,776	2,398	2,029	1,548	1,634	973	1,409	1,246
Total BMI taxa	33	39	34	36	31	28	30	31	24	25	28	29
Number of EPT taxa	18	21	20	20	19	15	19	18	18	15	18	20
% EPT	63%	68%	72%	63%	68%	68%	61%	68%	83%	71%	81%	69%
Shannon Diversity score	0.97	1.04	1.02	1.03	0.98	1.06	0.96	0.92	0.99	0.92	0.97	0.98
Evenness score	0.76	0.79	0.78	0.76	0.74	0.82	0.73	0.75	0.80	0.78	0.77	0.8

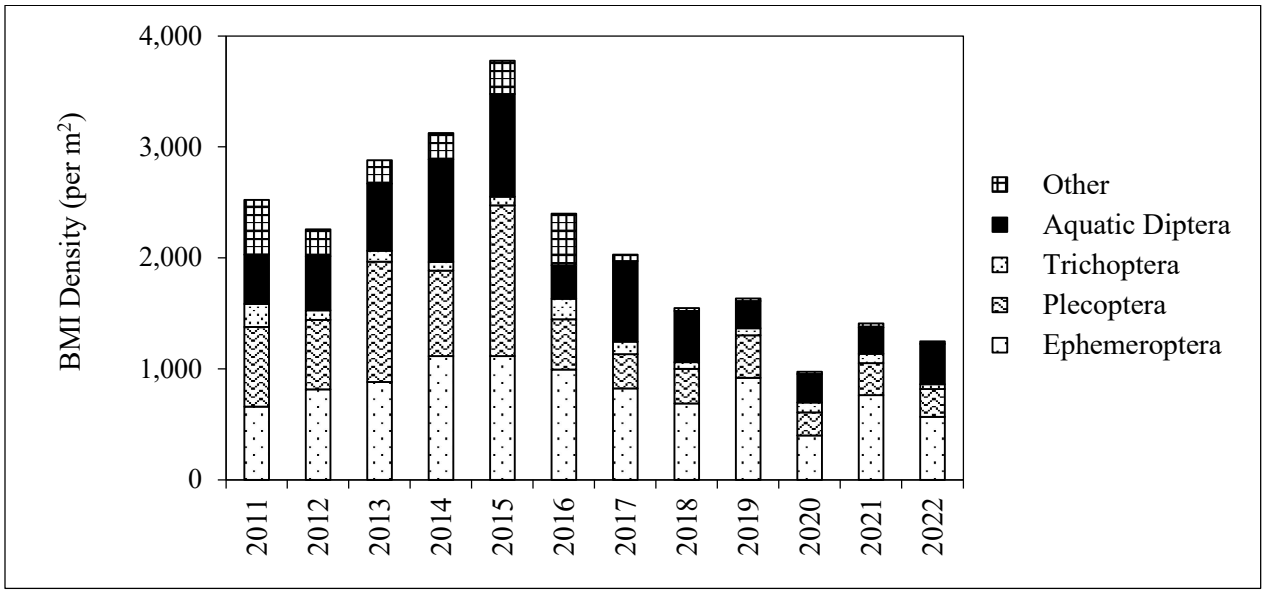

Figure 31.–Upper Slate Creek mean BMI densities and community compositions, 2011–2022.

Sediment Element Concentrations

Among the 2022 Upper Slate Creek sediment samples, the mean concentrations of Hg, Ni, and Se analytes were within the range previously observed; the mean concentrations of Ag, Al, As, Cd, Cr, Cu, Pb, and Zn were lower than previously observed (Figure 32). The mean As, Cr, Cu, and Ni concentrations remain above the TEC freshwater sediment toxicity guideline values.

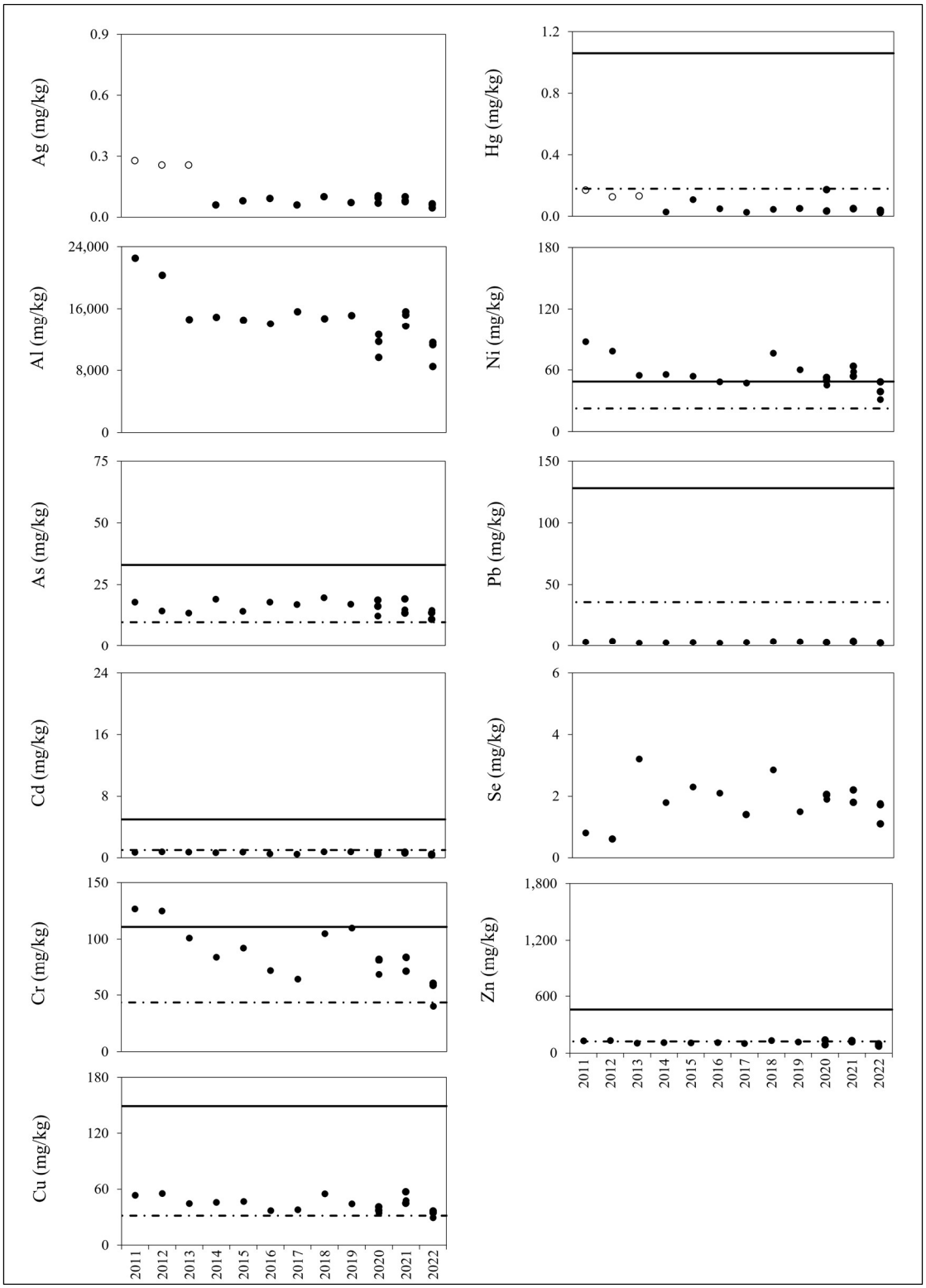

Figure 32.–Upper Slate Creek sediment element concentrations, 2011–2022.

Note: Elements undetected (o) are presented at the method reporting limit. The dashed line represents TEC and solid line represents the PEC; guidelines are not published for Ag, Al, or Se (Buchman 2008).

JOHNSON CREEK

Lower Johnson Creek

Adult Salmon Counts

In 2022, we counted 997 pink salmon, 22 chum salmon, and 43 coho salmon in Lower Johnson Creek (Table 17; Figure 33). Continuous rainfall events July through October increased stream discharges and reduced visibility, and a few bear encounters, negatively affected our ability to consistently count salmon during peak spawning.

Table 17.–Lower Johnson Creek adult salmon counts, 2011–2022.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Pink salmon	17,499	5,016	8,186	189	51,325	428	23,239	434	4,996	2,737	15,393	1,087
Chum salmon	21	99	17	3	0	39	0	2	334	5	0	22
Coho salmon	33	90	64	107	88	24	83	36	94	49	549	43

Note: The 2022 data presented are from peak counts during the spawning seasons; all other years include complete spawning season counts.

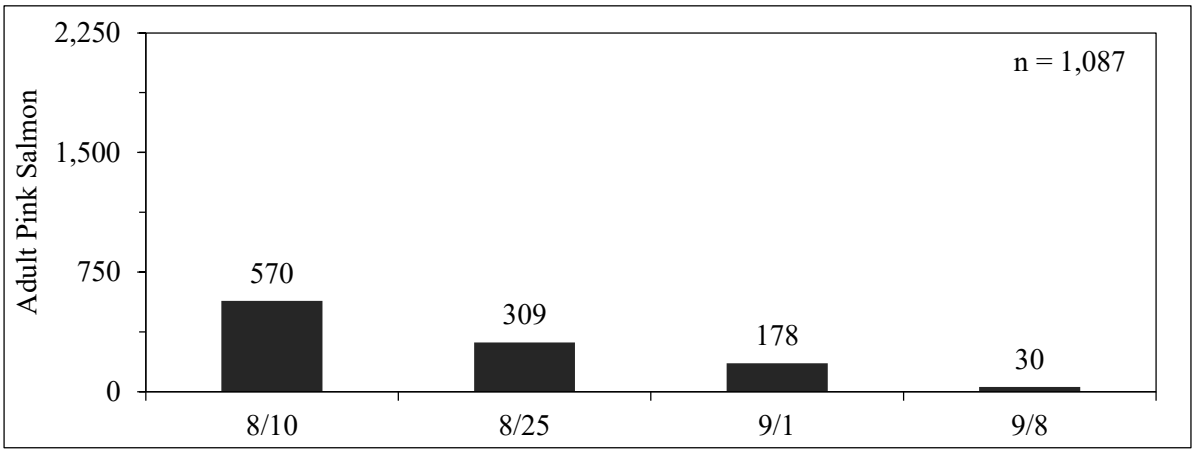

Figure 33.–Lower Johnson Creek pink salmon count, 2022.

Sediment Element Concentrations

Among the 2022 Lower Johnson Creek sediment samples, mean concentrations of all analytes were within the range previously observed (Figure 34). The As and Cu concentrations remain above the TEC freshwater sediment toxicity guidelines.

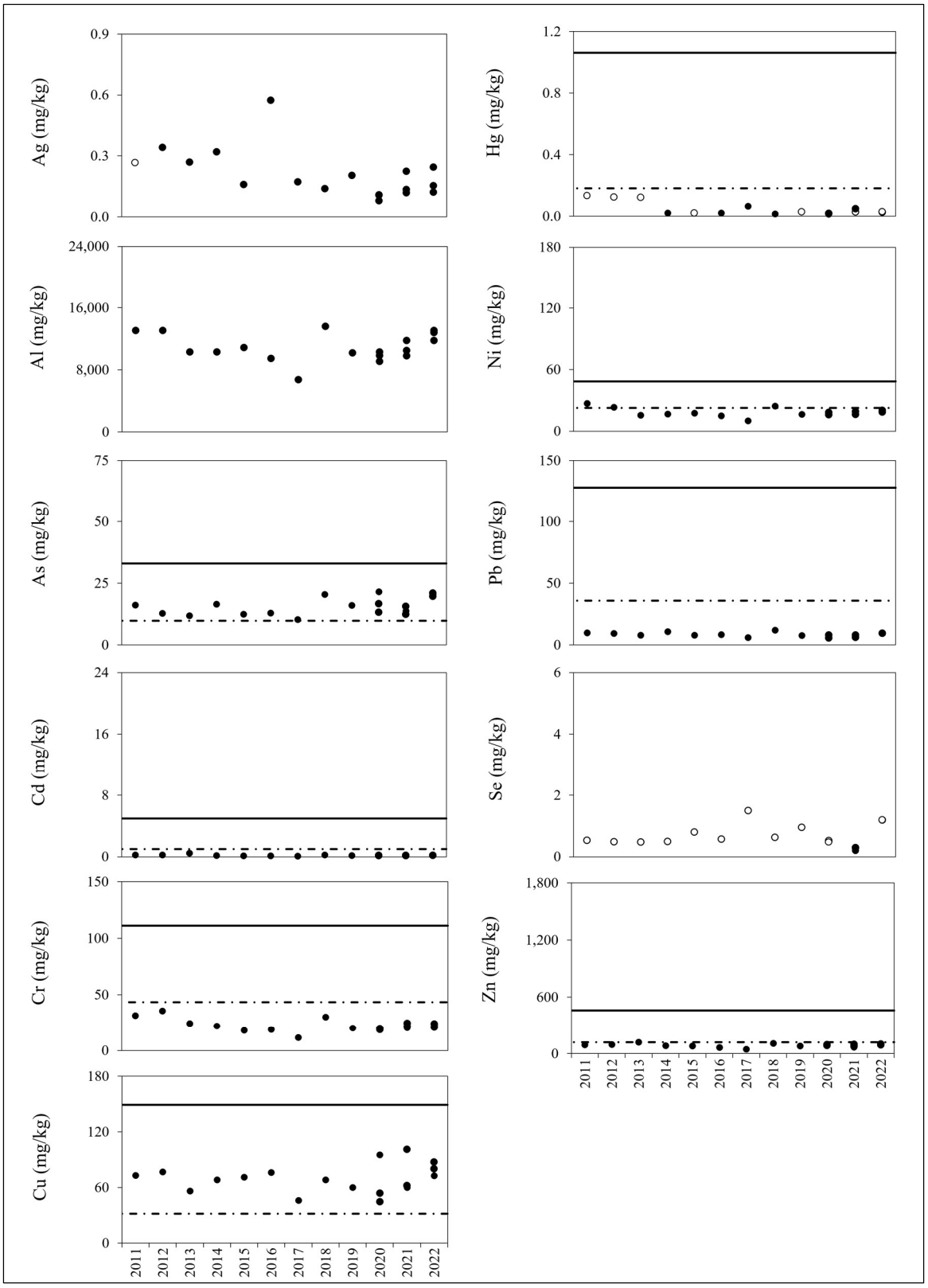

Figure 34.–Lower Johnson Creek sediment element concentrations, 2011–2022.

Note: Elements undetected (o) are presented at the method reporting limit. The dashed line represents TEC and solid line represents the PEC; guidelines are not published for Ag, Al, or Se (Buchman 2008).

Upper Johnson Creek

Benthic Macroinvertebrate Density and Community Composition

Among the 2022 Upper Johnson Creek BMI samples, we identified 20 taxa and estimate mean density at 2,473 BMI/m^2, of which 82% were EPT insects—the greatest percentage observed (Table 18; Figure 35). The Shannon Diversity and Evenness scores were consistent with previous years and the dominant taxa were Ephemeroptera of the family Baetidae (42%) and Heptageniidae (27%).

Table 18.–Upper Johnson Creek BMI data summaries, 2011–2022.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Mean BMI density (per m^2)	3,735	3,968	5,265	2,658	2,789	3,681	2,901	2,996	3,369	1,892	2,634	2,473
Total BMI taxa	24	28	34	32	28	32	33	31	25	31	29	20
Number of EPT taxa	14	14	24	21	17	21	19	20	18	19	18	13
% EPT	55%	64%	65%	69%	71%	71%	51%	67%	70%	76%	80%	82%
Shannon Diversity score	0.76	0.81	0.74	0.74	0.87	0.88	0.68	0.81	0.71	0.77	0.74	0.66
Evenness score	0.66	0.68	0.59	0.59	0.71	0.70	0.55	0.66	0.61	0.66	0.63	0.62

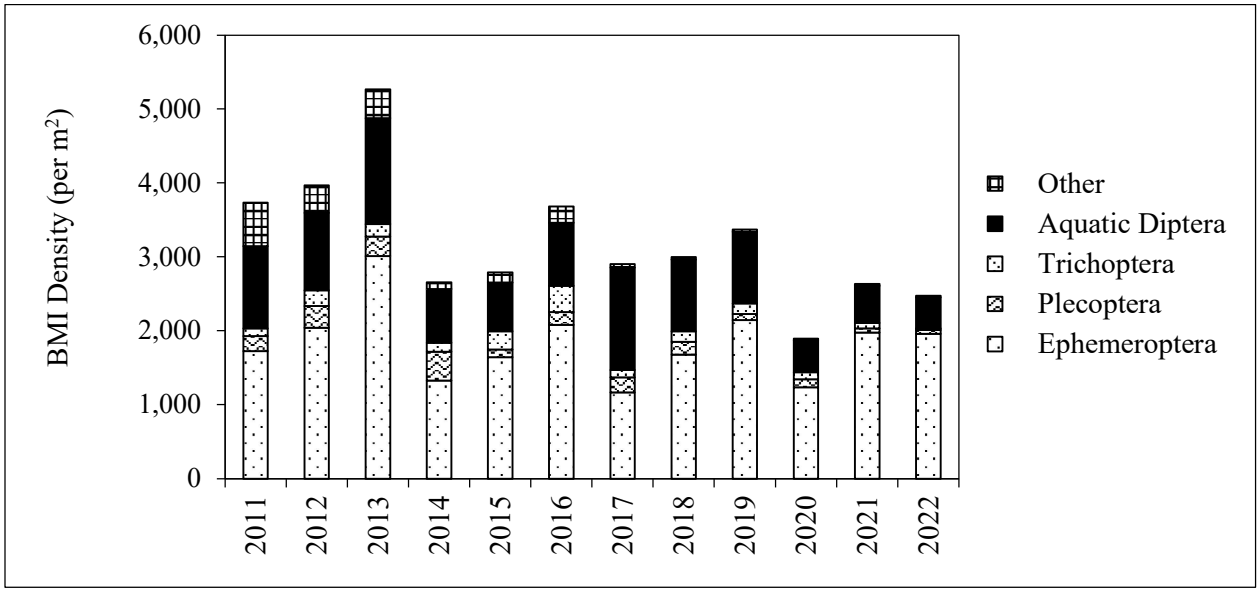

Figure 35.–Upper Johnson Creek mean BMI densities and community compositions, 2011–2022.

SHERMAN CREEK

Lower Sherman Creek

Periphyton: Chlorophyll Density and Composition

Sample Point 1

In 2022, the Lower Sherman Creek SP1 mean chlorophyll *a* density (Table 19; Figure 36) and mean proportions of chlorophylls *a*, *b*, and *c* (Figure 37) were similar to previous years.

Table 19.–Lower Sherman Creek SP1 mean chlorophylls *a, b,* and *c* densities, 2011–2022.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Chl-*a* (mg/m^2)	7.60	2.54	3.69	1.34	1.36	3.70	3.86	2.64	2.74	6.23	7.41	4.11
Chl-*b* (mg/m^2)	0.69	0.93	0.00	0.00	0.00	0.74	0.00	0.00	0.09	0.49	0.00	0.02
Chl-*c* (mg/m^2)	0.49	0.08	0.51	0.18	0.17	0.33	0.56	0.33	0.49	0.47	1.15	0.49

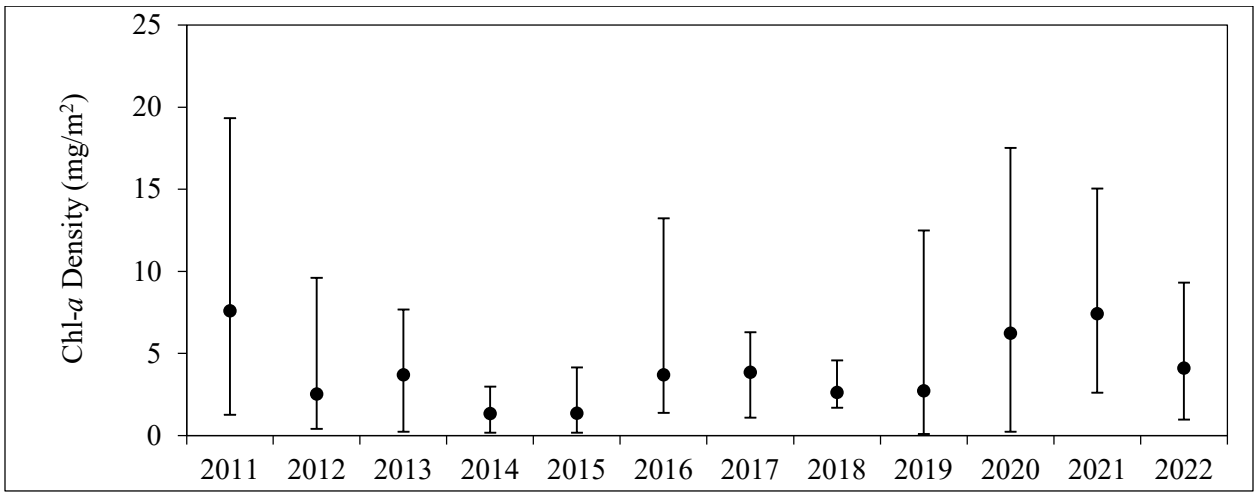

Figure 36.–Lower Sherman SP1 mean chlorophyll *a* densities, 2011–2022.
Note: Minimum, mean, and maximum values.

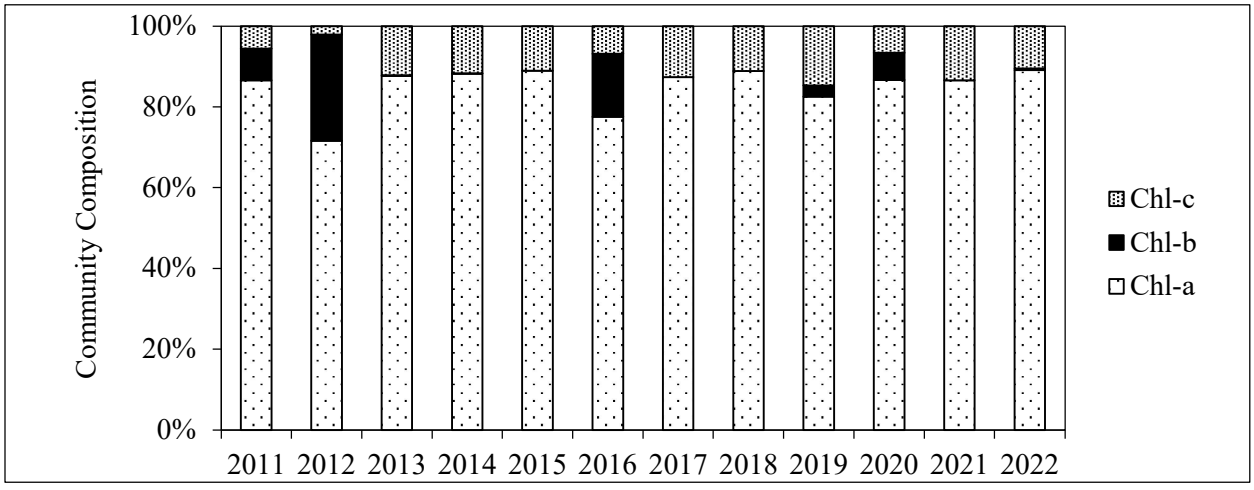

Figure 37.–Lower Sherman SP1 mean proportions of chlorophylls *a*, *b*, and *c*, 2011–2022.

Sample Point 2

In 2022, Lower Sherman Creek SP2 mean density of chlorophyll *a* (Table 20; Figure 38) and mean proportions of chlorophylls *a*, *b*, and *c* (Figure 39) were similar to previous years.

Table 20.–Lower Sherman Creek SP2 mean chlorophylls *a, b,* and *c* densities, 2011–2022.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Chl-*a* (mg/m^2)	5.61	0.67	2.87	1.32	1.62	1.42	1.15	1.49	2.12	7.60	5.54	2.54
Chl-*b* (mg/m^2)	0.02	0.01	0.00	0.00	0.15	0.04	0.00	0.00	0.00	0.87	0.00	0.00
Chl-*c* (mg/m^2)	0.32	0.09	0.32	0.12	0.27	0.19	0.12	0.19	0.29	0.49	0.72	0.24

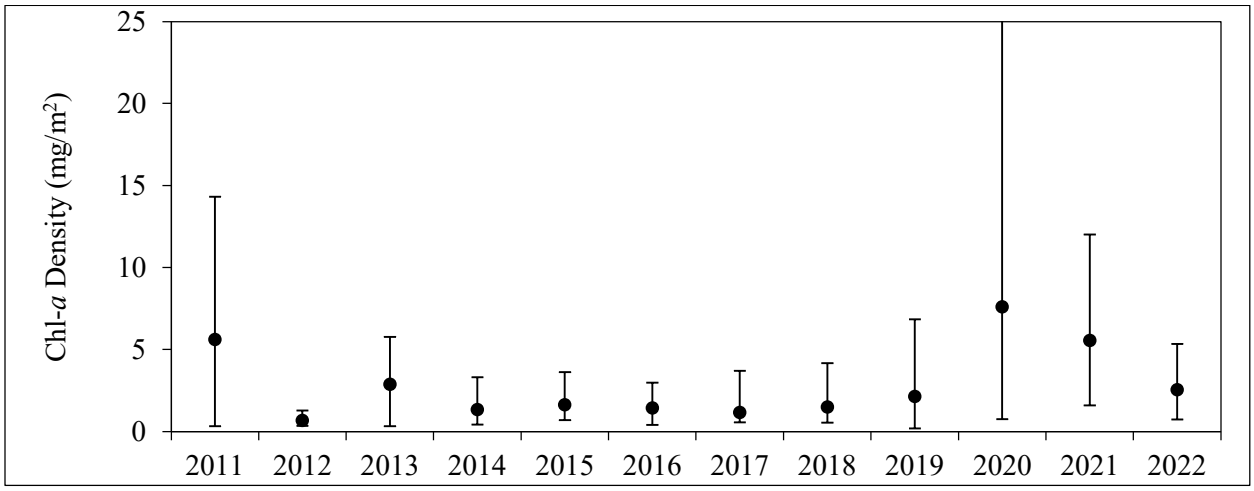

Figure 38.–Lower Sherman SP2 mean chlorophyll *a* densities, 2011–2022.
Note: Minimum, mean, and maximum values.

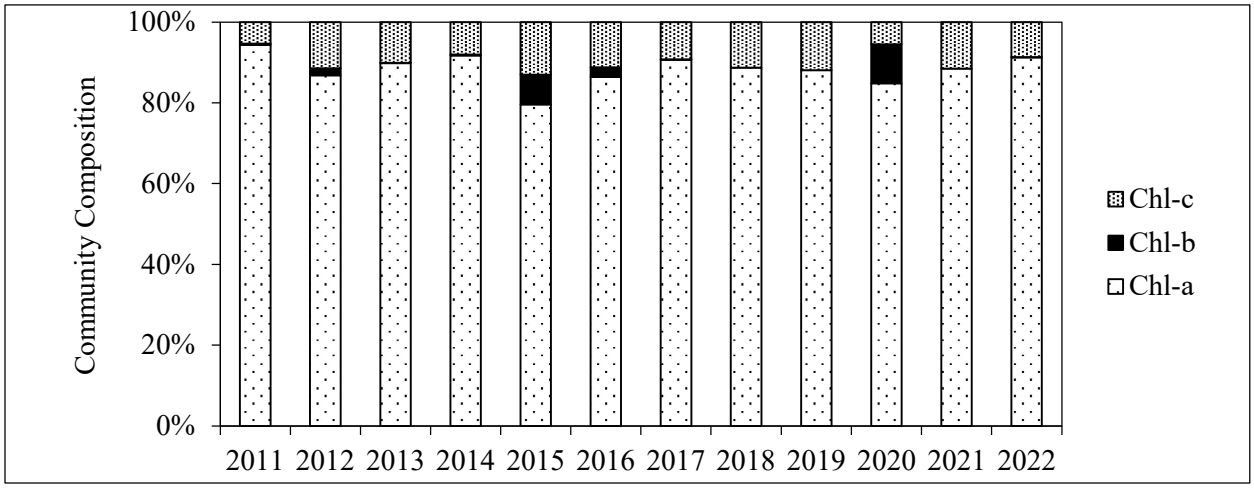

Figure 39.–Lower Sherman SP2 mean proportions of chlorophylls *a*, *b*, and *c*, 2011–2022.

Benthic Macroinvertebrate Density and Community Composition

Sample Point 1

Among the 2022 Lower Sherman Creek SP1 BMI samples, we identified 24 taxa and estimate mean density at 1,504 BMI/m^2 (Table 21; Figure 40). EPT taxa composed 74% of the samples—the second greatest observed. As in 2020 and 2021, the Shannon Diversity and Evenness scores were among the lowest observed; the dominant taxon was Ephemeroptera of the family Baetidae composing 57% of the samples.

Table 21.–Lower Sherman Creek SP1 BMI data summaries, 2011–2022.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Mean BMI density (per m^2)	1,118	2,733	1,796	3,023	1,651	6,839	1,009	912	1,263	1,272	989	1,504
Total BMI taxa	26	31	28	30	26	26	25	26	25	24	20	24
Number of EPT taxa	15	18	16	13	13	13	13	16	14	14	14	15
% EPT	32%	66%	64%	14%	27%	4%	31%	69%	64%	30%	89%	74%
Shannon Diversity score	0.76	0.74	0.85	0.71	0.84	0.32	0.81	0.73	0.79	0.64	0.62	0.62
Evenness score	0.71	0.62	0.71	0.57	0.70	0.27	0.69	0.71	0.71	0.61	0.62	0.56

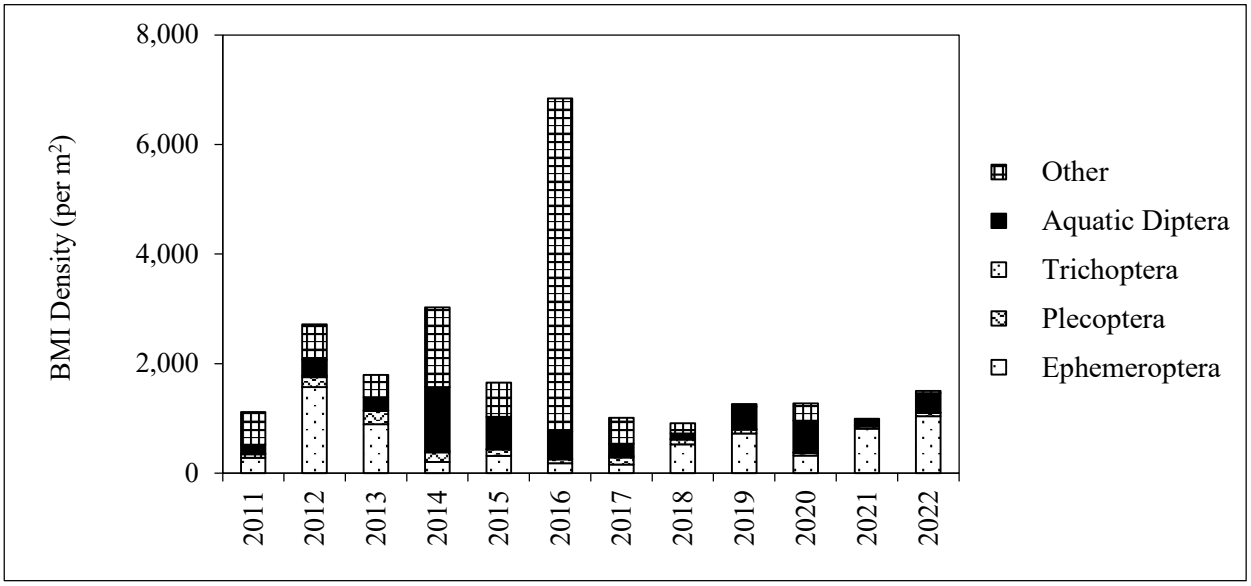

Figure 40.–Lower Sherman Creek SP1 mean BMI densities and community compositions, 2011–2022.

Sample Point 2

Among the 2022 Lower Sherman Creek SP2 BMI samples, we identified 18 taxa and estimate mean density at 1,156 BMI/m^2—within the range previously observed (Table 22; Figure 41). The Shannon Diversity and Evenness scores were among the lowest previously observed and the dominant taxon was Ephemeroptera of the family Baetidae composing 65% of the samples.

Table 22.–Lower Sherman Creek SP2 BMI data summaries, 2011–2022.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Mean BMI density (per m^2)	1,651	2,823	3,385	1,185	1,609	1,873	428	973	1,624	871	720	1,156
Total BMI taxa	30	37	39	28	23	23	26	21	25	23	26	18
Number of EPT taxa	17	26	25	16	13	13	14	18	15	16	18	12
% EPT	76%	79%	72%	12%	25%	12%	28%	88%	85%	44%	83%	81%
Shannon Diversity score	0.93	0.70	0.84	0.70	0.77	0.53	0.84	0.61	0.64	0.79	0.76	0.54
Evenness score	0.76	0.57	0.65	0.62	0.66	0.49	0.80	0.57	0.60	0.73	0.70	0.53

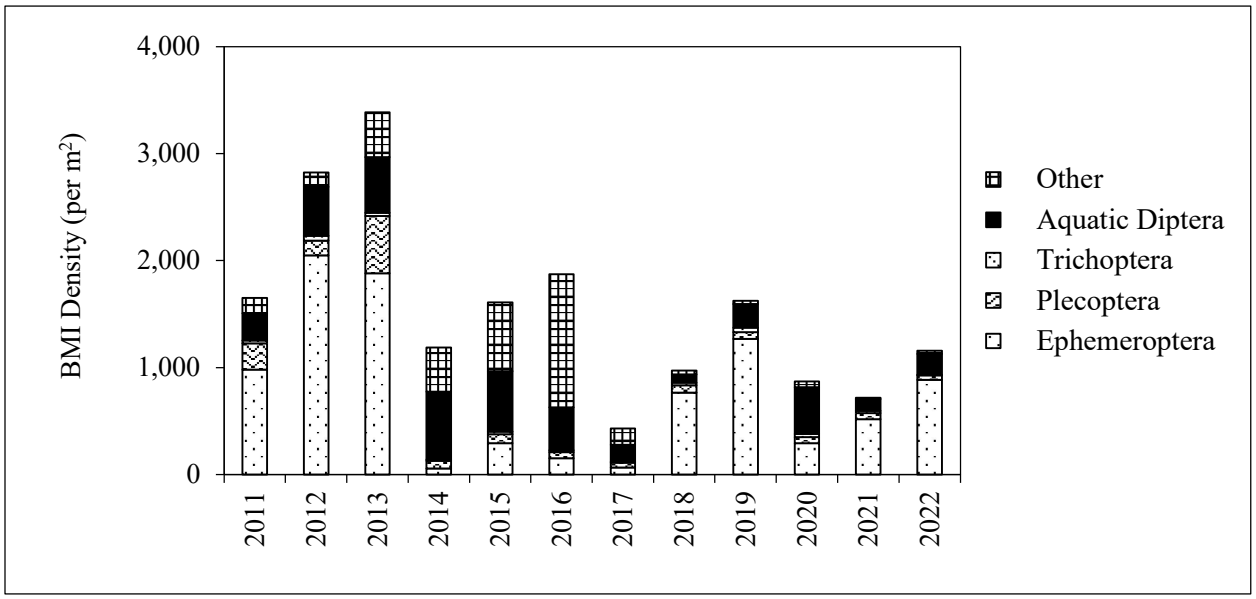

Figure 41.–Lower Sherman Creek SP2 mean BMI densities and community compositions, 2011–2022.

Adult Salmon Counts

In 2022, we counted 19 pink salmon in Lower Sherman Creek (Table 23; Figure 42). Since coho salmon do not use Sherman Creek, we did not survey for adults. Continuous rainfall events July through August increased stream discharges and reduced visibility, negatively affecting our ability to consistently count salmon during peak spawning.

Table 23.–Lower Sherman Creek adult salmon counts, 2011–2022.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Pink salmon	4,605	1,608	4,981	70	2,798	26	5,690	86	2,816	190	1,020	19
Chum salmon	0	0	12	0	1	5	122	7	147	0	0	0

Note: The 2022 data presented are from peak counts during the spawning seasons; all other years include complete spawning season counts.

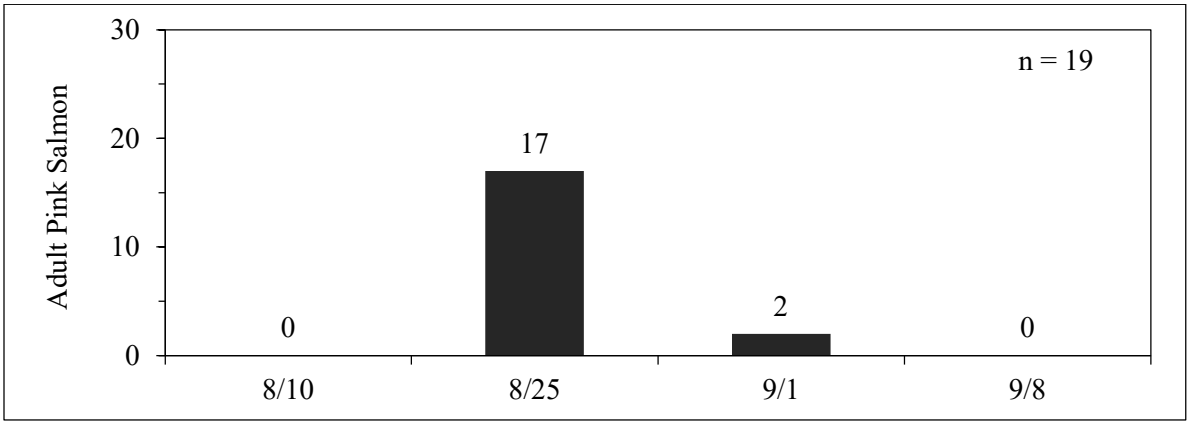

Figure 42.–Lower Sherman Creek weekly pink salmon count, 2022.

Sediment Element Concentrations

Among the 2022 Lower Sherman Creek sediment samples, the mean Hg and Se concentrations were within the range previously; the mean Ag, Al, As, Cd, Cr, Cu, Ni, Pb, and Zn concentrations were lower than previously observed (Figure 43). The mean As concentration remained above the TEC freshwater sediment toxicity guidelines.

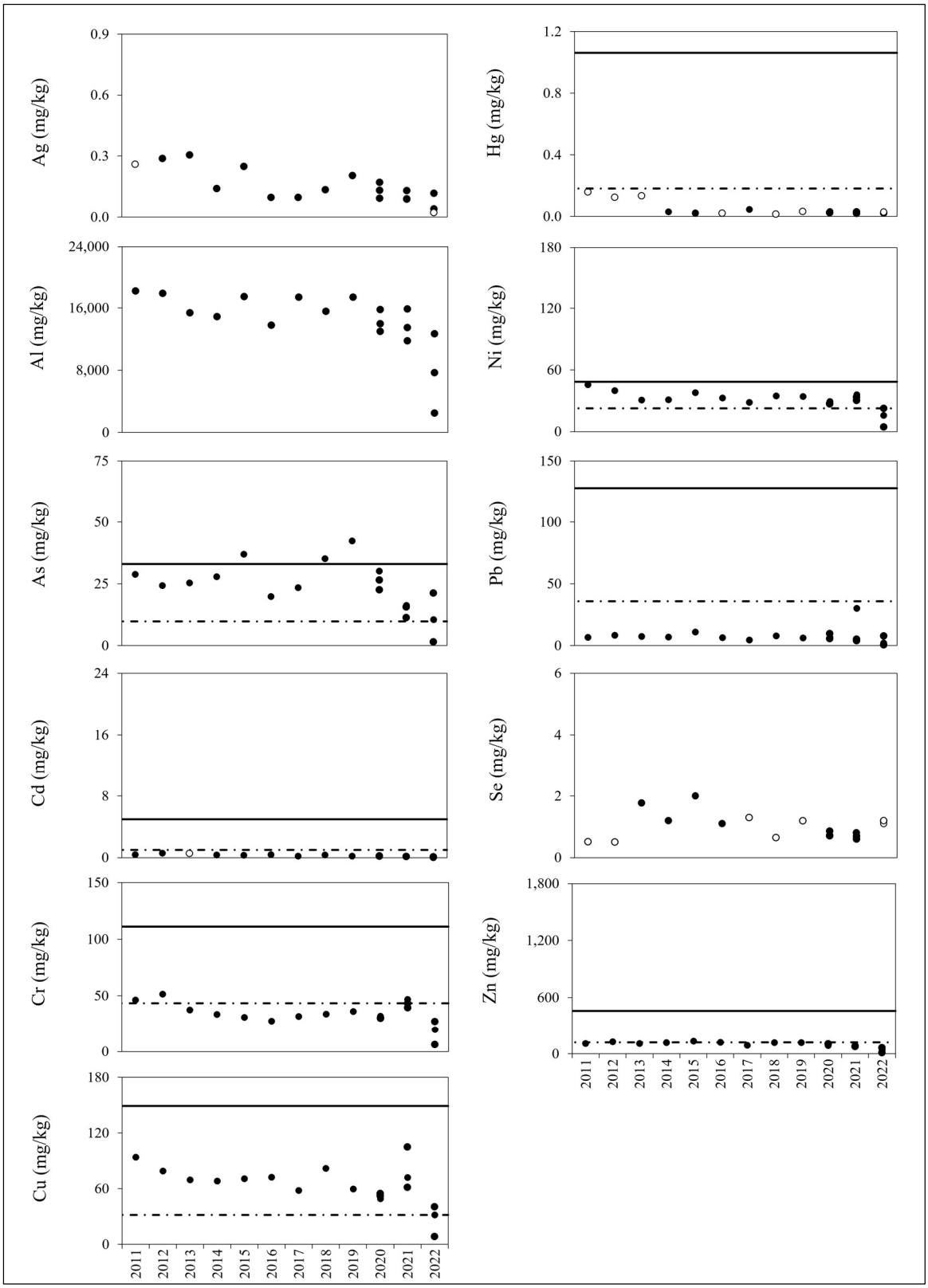

Figure 43.–Lower Sherman Creek sediment element concentrations, 2011–2022.

Note: Elements undetected (o) are presented at the method reporting limit. The dashed line represents TEC and solid line represents the PEC; guidelines are not published for Ag, Al, or Se (Buchman 2008).

REFERENCES CITED

Albrecht, G. 2018. Fish and fish habitat investigations at Kensington Gold Mine. Alaska Department of Fish and Game, Technical Report No. 17-12, Douglas, AK.

Albrecht, G. 2019. Aquatic studies at Kensington Gold Mine, 2018. Alaska Department of Fish and Game, Technical Report No. 19-06, Douglas, AK.

APHA (American Public Health Association). 2012. Standard methods for the examination of water and wastewater. 22nd edition. American Public Health Association, American Water Works Association, and Water Environment Federation, District of Columbia.

Aquatic Science Inc. 2006. Kensington Gold Project NPDES permit AK-0050571 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-0050571 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. NPDES annual report 2008 Volume 1: Aquatic resources. Prepared for Coeur Alaska Inc., Juneau, AK.

Aquatic Science Inc. 2009b [sic][u]. NPDES annual report 2009 Volume 1: Aquatic resources. Prepared for Coeur Alaska, Inc., Juneau, AK.

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

Aquatic Science Inc. 2009d. Out-migrating salmon fry, Sherman, Johnson and Slate Creeks. Prepared for ADF&G, Permit No. SF-2009-059, Juneau, AK.

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

ASTM International. 2002. Standard test method for particle-size analysis of soils: D 422. West Conshohocken, PA.

Barbour, M. T., J. Gerritsen, B. D. Snyder, and J. B. Stribling. 1999. Rapid bioassessment protocols for use in streams and wadeable rivers: periphyton, benthic macroinvertebrates and fish. 2nd edition. EPA 841-B-99-002. U.S. Environmental Protection Agency, Office of Water, Washington, D.C.

Brewster, B.P. 2016. Aquatic studies at Kensington Gold Mine, 2015. Alaska Department of Fish and Game, Technical Report No. 16-03, Douglas, AK.

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

Coeur. 2022. Final plan of operations for the Kensington Gold Project. Prepared for the U.S. Department of Agriculture Forest Service, Juneau Ranger District, Tongass National Forest, Juneau, AK.

Giefer, J., and B. Blossom. 2022. Catalog of waters important for spawning, rearing, or migration of anadromous fishes – Southeastern Region, effective June 15, 2022. Alaska Department of Fish and Game, Special Publication No. 22-04, Anchorage.

Kane, W. J. 2020. Aquatic studies at Kensington Gold Mine, 2019. Alaska Department of Fish and Game, Technical Report No. 20-04, Douglas, AK.

Kane, W. J. 2021. Aquatic studies at Kensington Gold Mine, 2020. Alaska Department of Fish and Game, Technical Report No. 21-03, Douglas, AK.

[u] Published February 2010.

REFERENCES CITED, CONTINUED

Kane, W. J. 2022. Aquatic studies at Kensington Gold Mine, 2021. Alaska Department of Fish and Game, Technical Report No. 22-07, Douglas, 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.

Kanouse, K. M. and J. Zutz. 2017. Aquatic studies at Kensington Gold Mine, 2016. Alaska Department of Fish and Game, Technical Report No. 17-02, Douglas, AK.

Kondolf, G. M. and M. G. Wolman. 1993. The sizes of salmonid spawning gravels. Water Resources Research. 29(7):2275–2285.

Lotspeich, F. B. and F. H. Everest. 1981. A new method for reporting and interpreting textural composition of spawning gravel. U.S. Department of Agriculture Forest Service, Pacific Northwest Forest and Range Experimental Station, Research Note PNW-369.

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 and Toxicology 39(1):20–31.

Magurran, A. 1988. Ecological diversity and its measurement. Princeton University Press, Princeton, NJ.

Merritt, R. W. and K. W. Cummins, editors. 1996. An introduction to the aquatic insects of North America. 3rd edition. Kendall/Hunt Publishing Co., Dubuque, IA.

National Weather Service. 2023. The Juneau climate summary for the Year 2022. National Oceanic Atmospheric and Administration, Juneau Weather Forecast Office. https://www.weather.gov/source/ajk/mobile/climate.html (Accessed January 27, 2023).

Paustian, S. 2010. Channel type user guide revision 2010. U.S. Forest Service, R-10-TP-26.

Piston, A. W., and S. C. Heinl. 2018. Pink salmon stock status and escapement goals in Southeast Alaska. Alaska Department of Fish and Game, Special Publication No. 18-14, Anchorage.

PSEP (Puget Sound Estuary Protocols). 1986. Recommended protocols for measuring conventional sediment variables in Puget Sound. Olympia, WA.

Qu, X., N. Wu, T. Tang, Q. Cai, and Y. S. Park. 2010. Effects of heavy metals on benthic macroinvertebrate communities in high mountain streams. International Journal of Limnology 46(4):291–302.

Shirazi, M. A., W. K. Seim, and D. H. Lewis. 1981. Characterization of spawning gravel and stream system evaluation. Pages 227-278 [*In*] Proceedings from the conference Salmon-spawning gravel, a renewable resource in the Pacific Northwest held October 6–7, 1980, Seattle, WA.

Stewart, K. W. and M. W. Oswood. 2006. The stoneflies (Plecoptera) of Alaska and Western Canada. The Caddis Press, Columbus, OH.

Tchounwou, P. B., C. G. Yedjou, A. K. Patlolla, and D. J. Sutton. 2012. Heavy metal toxicity and the environment. Pages 133–164 [*In*] Experimentia Supplementum: Molecular, Clinical and Environmental Toxicology: Volume 3: Environmental Toxicology. Springer Basel.

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. Department 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. Department of Agriculture Forest Service, Tongass National Forest, Juneau, AK.

REFERENCES CITED, CONTINUED

Timothy, J. and K. M. Kanouse. 2012. Aquatic studies at Kensington Mine, 2011. Alaska Department of Fish and Game, 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, 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, Technical Report No. 14-01, Douglas, AK.

USDA (U.S. Department of Agriculture). 2022. Supplemental Environmental Impact Statement Plan of Operations Amendment 1 for the Kensington Mine Final Record of Decision. Prepared by the U.S. Department of Agriculture, Forest Service Alaska Region for the Minerals Program Manager of the Tongass National Forrest, Juneau, AK.

USEPA (U.S. Environmental Protection Agency). 1997. Method 446.0: In vitro determination of chlorophylls a, b, c_1 + c_2 and pheopigments in marine and freshwater algae by visible spectrophotometry. Adapted by Elizabeth J. Arar. Revision 1.2.U.S. Environmental Protection Agency, Office of Research and Development, National Exposure Research Laboratory, Cincinnati, OH.

USEPA. 2007. Method 7471B revision 2: mercury in solid or semisolid waste (Manual Cold-Vapor Technique).

Valentine, B. E. 1995. Stream substrate quality for salmonids: guidelines for sampling, processing, and analysis. California Department of Forestry and Fire Protection, Coast Cascade Regional Office, Santa Rosa, CA.

Willson-Naranjo, G. R, and K. M. Kanouse. 2016. Kensington Gold Mine tailings treatment facility studies. Alaska Department of Fish and Game, Technical Report No. 16-02, Douglas, AK.

Zollinger, H. L. 1981. Engineering Technical Note No. 2: Estimating sediment concentrations by Imhoff Cone in runoff water from silt loam soils. U.S. Department of Agriculture, Natural Resources Conservation Service, Boise, ID.

Zutz, J. 2018. Aquatic studies at Kensington Gold Mine, 2017. Alaska Department of Fish and Game, Technical Report No. 18-02, Douglas, AK.

APPENDIX A: CHLOROPHYLL DATA

Appendix A.1.–Lower Slate Creek chlorophylls *a*, *b*, and *c* densities, 2011–2022.

	07/29/11			07/25/12		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	0.21	0.05	0.00	1.60	0.13	0.07
	1.28	0.02	0.11	4.06	0.00	0.39
	0.85	0.01	0.07	2.03	0.00	0.18
	3.31	0.08	0.25	0.96	0.00	0.04
	11.85	3.11	0.30	2.56	0.04	0.22
	18.05	0.42	0.91	0.92	0.00	0.01
	0.72	0.13	0.00	1.49	0.13	0.13
	0.43	0.05	0.00	2.35	0.12	0.19
	8.54	0.39	0.58	6.19	0.05	0.54
	6.30	0.03	0.38	0.96	0.00	0.06
mean	5.15	0.43	0.26	2.31	0.05	0.18
maximum	18.05	3.11	0.91	6.19	0.13	0.54
minimum	0.21	0.01	0.00	0.92	0.00	0.01
	07/31/13			07/30/14		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	14.10	0.00	1.56	0.00	0.00	0.00
	20.72	0.00	3.11	9.29	3.22	0.48
	10.89	0.00	1.01	1.45	0.00	0.23
	17.84	0.00	2.66	12.18	5.27	0.38
	2.14	0.00	0.24	0.75	0.00	0.05
	6.09	0.00	0.95	4.70	0.00	0.67
	15.49	0.00	1.99	2.88	0.00	0.49
	12.71	0.00	1.58	1.82	0.00	0.15
	11.32	0.00	1.87	0.73	0.00	0.07
	14.63	0.00	1.46	5.87	0.00	0.51
mean	12.59	0.00	1.64	3.97	0.85	0.30
maximum	20.72	0.00	3.11	12.18	5.27	0.67
minimum	2.14	0.00	0.24	0.00	0.00	0.00
	07/28/15			07/26/16		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	0.45	0.10	0.01	0.60	0.00	0.12
	3.06	0.00	0.28	15.27	0.00	2.14
	0.95	0.09	0.04	6.41	0.00	0.97
	0.85	0.00	0.06	2.35	0.00	0.22
	0.72	0.13	0.00	9.51	0.76	0.88
	2.24	0.44	0.12	2.88	0.66	0.20
	9.93	0.00	1.13	3.52	0.00	0.40
	0.19	ND	ND	2.03	0.00	0.28
	2.88	0.14	0.28	5.34	0.67	0.36
	0.32	0.01	0.00	4.70	0.00	0.65
mean	2.16	0.10	0.21	5.26	0.21	0.62
maximum	9.93	0.44	1.13	15.27	0.76	2.14
minimum	0.19	0.00	0.00	0.60	0.00	0.12

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	07/24/17			08/07/18		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	3.84	0.33	0.19	2.35	0.00	0.42
	1.71	0.00	0.27	3.31	0.00	0.56
	1.60	0.00	0.26	7.16	0.00	1.27
	2.14	0.00	0.41	3.63	0.00	0.59
	2.14	0.06	0.09	1.17	0.00	0.19
	4.91	1.86	0.16	3.10	0.08	0.26
	0.87	0.00	0.14	4.45	0.00	0.61
	2.14	0.00	0.36	9.61	0.30	1.21
	1.60	0.05	0.11	1.50	0.00	0.26
	2.01	0.00	0.32	5.77	0.00	0.91
mean	2.30	0.23	0.23	4.21	0.04	0.63
maximum	4.91	1.86	0.41	9.61	0.30	1.27
minimum	0.87	0.00	0.09	1.17	0.00	0.19

	08/01/19			07/29/20		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	6.73	0.00	1.02	0.55	0.00	0.02
	66.22	0.00	12.14	0.28	0.00	0.00
	4.49	0.00	0.71	0.96	0.07	0.03
	22.11	0.00	3.96	1.71	0.00	0.12
	15.38	0.00	3.57	0.73	0.04	0.04
	94.62	0.00	17.74	0.64	0.00	0.01
	8.12	0.00	1.59	2.15	0.00	0.20
	39.41	0.00	6.52	0.27	0.03	0.00
	14.95	0.00	2.64	4.17	0.98	0.13
	65.04	0.00	15.02	0.73	0.00	0.00
mean	33.71	0.00	6.49	1.22	0.11	0.06
maximum	94.62	0.00	17.74	4.17	0.98	0.20
minimum	4.49	0.00	0.71	0.27	0.00	0.00

	04/28/21			07/29/21		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	0.83	0.00	0.15	3.95	0.00	0.61
	ND	ND	ND	3.31	0.00	0.61
	0.85	0.00	0.17	3.31	0.40	0.33
	1.33	0.00	0.28	1.42	0.00	0.17
	ND	ND	ND	4.81	0.00	0.6
	ND	ND	ND	0.55	0.00	0.12
	0.32	0.00	0.18	0.43	0.00	0.07
	ND	ND	ND	0.43	0.00	0.07
	0.96	0.00	0.25	1.55	0.00	0.28
	2.67	0.00	0.39	**0.29**	ND	ND
mean	1.16	0.00	0.24	2.01	0.04	0.32
maximum	2.67	0.00	0.39	4.81	0.40	0.61
minimum	0.32	0.00	0.15	0.29	0.00	0.07

Note: Bold values are the spectrophotometer estimated detection limit; chlorophyll *a* not detected. Sample turbidity precluded precise measurement of four samples collected on 04/28/21.

	04/25/22			07/25/22		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	1.28	0.00	0.24	5.66	0.00	0.81
	5.09	0.00	0.89	3.63	0.00	0.22
	4.50	0.00	0.80	6.91	0.00	0.88
	2.10	0.00	0.47	6.73	0.00	0.95
	2.97	0.00	0.32	0.77	0.09	0.10
	0.31	0.07	0.16	12.50	0.00	1.84
	1.60	0.00	0.33	0.53	0.07	0.15
	2.99	0.00	0.59	5.13	0.48	0.53
	5.34	0.00	0.85	0.85	0.00	0.11
	2.78	0.00	0.39	5.95	0.23	0.56
mean	2.90	0.01	0.50	4.87	0.09	0.62
maximum	5.34	0.07	0.89	12.50	0.48	1.84
minimum	0.31	0.00	0.16	0.53	0.00	0.10

Note: Bold values are the spectrophotometer estimated detection limit; chlorophyll *a* not detected.

Appendix A.2.–West Fork Slate Creek chlorophylls *a*, *b*, and *c* densities, 2011–2022.

	07/29/11			07/25/12		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	2.52	0.00	0.19	1.15	0.00	0.04
	4.70	0.00	0.43	0.41	0.00	0.08
	2.78	0.00	0.26	0.53	0.00	0.02
	3.35	0.00	0.04	0.64	0.00	0.16
	4.27	0.00	0.25	3.62	0.00	0.24
	4.91	0.00	0.42	0.85	0.00	0.14
	3.95	0.00	0.27	0.96	0.01	0.07
	3.10	0.00	0.25	0.41	0.00	0.08
	4.38	0.00	0.39	0.60	0.00	0.12
	5.23	0.00	0.20	0.96	0.00	0.06
mean	3.92	0.00	0.27	1.01	0.00	0.10
maximum	5.23	0.00	0.43	3.62	0.01	0.24
minimum	2.52	0.00	0.04	0.41	0.00	0.02
	07/31/13			07/30/14		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	4.70	0.00	0.74	0.32	0.00	0.01
	1.39	0.00	0.16	0.19	0.00	0.00
	13.14	0.00	2.19	0.75	0.00	0.05
	4.38	0.00	0.47	0.88	0.00	0.00
	1.28	0.00	0.11	1.60	0.00	0.19
	3.10	0.00	0.50	0.23	0.00	0.03
	3.74	0.00	0.53	0.41	0.00	0.00
	2.03	0.00	0.33	0.33	0.00	0.02
	5.02	0.00	0.67	1.18	0.00	0.13
	3.40	0.00	0.36	1.82	0.00	0.15
mean	4.22	0.00	0.61	0.77	0.00	0.06
maximum	13.14	0.00	2.19	1.82	0.00	0.19
minimum	1.28	0.00	0.11	0.19	0.00	0.00
	07/28/15			07/26/16		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	1.34	0.00	0.21	7.48	0.00	1.16
	0.92	0.00	0.01	4.70	0.00	0.71
	0.77	0.02	0.03	3.22	0.00	0.25
	0.54	0.05	0.00	5.34	0.00	0.61
	0.19	ND	ND	2.67	0.00	0.34
	1.64	0.00	0.04	3.31	0.00	0.45
	2.35	0.00	0.21	4.27	0.00	0.44
	0.53	0.12	0.00	0.92	0.00	0.01
	0.56	0.00	0.06	10.89	0.00	1.64
	0.32	0.05	0.00	6.51	0.00	0.95
mean	0.92	0.03	0.06	4.93	0.00	0.66
maximum	2.35	0.12	0.21	10.89	0.00	1.64
minimum	0.19	0.00	0.00	0.92	0.00	0.01

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	07/24/17			07/25/18		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	5.13	0.00	0.60	1.17	0.00	0.22
	5.13	0.00	0.96	4.17	0.00	0.86
	1.82	0.00	0.19	2.35	0.00	0.32
	3.95	0.00	0.83	5.02	0.00	0.93
	5.87	0.00	1.22	5.55	0.00	1.22
	8.22	0.00	1.38	4.91	0.00	1.12
	8.22	0.00	1.58	3.10	0.00	0.53
	3.74	0.00	0.53	1.71	0.00	0.24
	2.78	0.00	0.33	4.38	0.00	0.75
	4.70	0.00	0.92	6.09	0.00	1.16
mean	4.96	0.00	0.85	3.85	0.00	0.74
maximum	8.22	0.00	1.58	6.09	0.00	1.22
minimum	1.82	0.00	0.19	1.17	0.00	0.22
	08/01/19			07/29/20		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	0.10	ND	ND	1.84	0.00	0.24
	4.17	0.00	0.49	1.65	0.00	0.27
	6.15	0.00	0.88	1.65	0.00	0.27
	1.28	0.00	0.14	ND	ND	ND
	3.42	0.00	0.27	1.42	0.00	0.17
	7.38	0.00	1.17	0.50	0.00	0.13
	4.04	0.00	0.34	0.28	0.00	0.03
	0.73	0.00	0.16	0.78	0.00	0.06
	2.14	0.00	0.19	0.96	0.00	0.10
	0.10	ND	ND	0.60	0.00	0.12
mean	2.95	0.00	0.46	1.08	0.00	0.15
maximum	7.38	0.00	1.17	1.84	0.00	0.27
minimum	0.10	0.00	0.14	0.28	0.00	0.03
	07/29/21			07/25/22		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	15.38	0.00	3.12	4.22	0.00	0.48
	15.27	0.00	2.99	3.62	0.00	0.46
	12.07	0.00	2.19	5.46	0.00	0.61
	13.95	0.00	2.38	3.53	0.00	0.41
	17.71	0.00	2.99	2.29	0.00	0.18
	10.93	0.00	2.03	1.6	0.00	0.17
	19.86	0.00	3.39	5.79	0.00	0.73
	15.56	0.00	2.49	2.89	0.00	0.3
	19.70	0.00	3.25	0.96	0.01	0.07
	16.13	0.00	2.76	5.41	0.00	0.81
mean	15.66	0.00	2.76	3.58	0.00	0.42
maximum	19.86	0.00	3.39	5.79	0.01	0.81
minimum	10.93	0.00	2.03	0.96	0.00	0.07

Note: Bold values are the spectrophotometer estimated detection limit; chlorophyll *a* not detected.

Appendix A.3.–East Fork Slate Creek chlorophylls *a*, *b*, and *c* densities, 2011–2022.

	07/28/11			07/24/12		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	9.51	2.16	0.24	11.53	3.24	0.28
	9.18	0.02	0.20	0.41	0.04	0.04
	1.28	0.03	0.00	0.88	0.00	0.05
	5.13	1.15	0.11	0.50	0.00	0.03
	16.02	0.18	0.44	3.42	0.00	0.11
	8.86	1.94	0.70	0.64	0.08	0.05
	4.70	0.70	0.13	18.58	0.00	0.66
	16.13	5.35	0.28	13.67	2.32	0.57
	4.91	0.49	0.12	0.69	0.00	0.00
	12.71	3.59	0.15	0.43	0.00	0.00
mean	8.84	1.56	0.24	5.08	0.57	0.18
maximum	16.13	5.35	0.70	18.58	3.24	0.66
minimum	1.28	0.02	0.00	0.41	0.00	0.00
	07/30/13			07/30/14		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	8.12	0.00	0.67	0.14	0.00	0.00
	0.24	ND	ND	0.64	0.00	0.07
	1.07	0.03	0.07	**0.05**	ND	ND
	0.32	0.07	0.00	0.75	0.14	0.10
	0.64	0.10	0.00	**0.05**	ND	ND
	5.02	0.16	0.35	0.37	0.00	0.00
	0.43	0.00	0.03	**0.05**	ND	ND
	6.41	0.11	0.50	0.11	0.00	0.00
	0.32	0.00	0.00	0.53	0.00	0.01
	0.24	ND	ND	**0.05**	ND	ND
mean	2.28	0.06	0.20	0.27	0.02	0.03
maximum	8.12	0.16	0.67	0.75	0.14	0.10
minimum	0.24	0.00	0.00	0.05	0.00	0.00
	07/27/15			07/25/16		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	0.85	0.00	0.12	0.23	0.00	0.03
	0.19	ND	ND	4.91	0.00	0.69
	1.92	0.00	0.09	0.75	0.00	0.05
	0.96	0.00	0.09	1.42	0.00	0.14
	1.60	0.00	0.22	0.85	0.02	0.17
	5.34	0.00	0.55	1.56	0.00	0.12
	2.14	0.00	0.09	0.64	0.00	0.08
	0.37	0.00	0.00	**0.19**	ND	ND
	0.92	0.00	0.11	0.87	0.00	0.02
	1.28	0.00	0.08	0.64	0.00	0.06
mean	1.56	0.00	0.15	1.21	0.00	0.15
maximum	5.34	0.00	0.55	4.91	0.02	0.69
minimum	0.19	0.00	0.00	0.19	0.00	0.02

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	07/25/17			07/24/18		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	0.56	0.00	0.00	0.64	0.00	0.00
	0.51	0.00	0.00	2.14	0.00	0.12
	0.27	0.03	0.00	1.39	0.00	0.00
	0.41	0.00	0.08	0.75	0.00	0.02
	0.96	0.00	0.00	4.91	0.00	0.92
	0.85	0.00	0.15	0.69	0.00	0.00
	0.32	0.00	0.08	0.88	0.00	0.05
	1.74	0.00	0.16	1.61	0.00	0.11
	0.32	0.00	0.08	2.71	0.00	0.36
	0.46	0.00	0.00	0.96	0.00	0.00
mean	0.64	0.00	0.06	1.67	0.00	0.16
maximum	1.74	0.03	0.16	4.91	0.00	0.92
minimum	0.27	0.00	0.00	0.64	0.00	0.00

	08/01/19			07/30/20		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	0.75	0.00	0.02	1.60	0.07	0.00
	1.92	0.00	0.33	1.84	0.00	0.05
	5.07	0.00	0.31	4.81	0.00	0.80
	1.60	0.00	0.19	0.92	0.00	0.04
	0.63	0.07	0.15	**0.25**	ND	ND
	9.51	0.00	1.15	1.28	0.00	0.19
	0.32	0.00	0.08	0.50	0.00	0.00
	0.85	0.01	0.07	0.51	0.00	0.00
	11.17	0.00	0.80	0.60	0.00	0.02
	3.30	0.00	0.34	1.60	0.05	0.11
mean	3.51	0.01	0.34	1.39	0.01	0.13
maximum	11.17	0.07	1.15	4.81	0.07	0.80
minimum	0.32	0.00	0.02	0.25	0.00	0.00

	04/28/21			07/29/21		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	0.73	0.00	0.07	1.92	0.00	0.25
	2.34	0.00	0.18	0.32	0.06	0.05
	0.29	ND	ND	0.43	0.07	0.10
	ND	ND	ND	2.09	0.06	0.35
	3.10	0.00	0.35	0.55	0.00	0.12
	2.01	0.00	0.35	**0.29**	ND	ND
	5.40	0.00	0.56	0.56	0.00	0.06
	1.38	0.00	0.08	0.85	0.00	0.04
	4.65	0.02	0.30	0.33	0.00	0.02
	1.06	0.00	0.00	0.64	0.00	0.16
mean	2.33	0.00	0.24	0.80	0.02	0.13
maximum	5.40	0.02	0.56	2.09	0.07	0.35
minimum	0.29	0.00	0.00	0.29	0.00	0.02

Note: Bold values are the spectrophotometer estimated detection limit; chlorophyll *a* not detected. Sample turbidity precluded precise measurement of one sample collected on 04/28/21.

	04/26/22			07/26/22		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	5.23	0.00	0.41	1.41	0.01	0.21
	0.75	0.00	0.22	1.05	0.00	0.06
	0.53	0.00	0.18	0.75	0.00	0.00
	1.82	0.64	0.09	0.43	0.00	0.07
	3.87	0.08	0.34	3.08	0.32	0.12
	2.52	0.00	0.38	0.82	0.00	0.12
	0.22	ND	ND	1.17	0.00	0.16
	0.53	0.02	0.09	2.99	0.29	0.21
	0.96	0.01	0.12	2.21	0.00	0.03
	0.87	0.00	0.02	0.64	0.00	0.08
mean	1.73	0.08	0.21	1.46	0.06	0.11
maximum	5.23	0.64	0.41	3.08	0.32	0.21
minimum	0.22	0.00	0.02	0.43	0.00	0.00

Note: Bold values are the spectrophotometer estimated detection limit; chlorophyll *a* not detected.

Appendix A.4.–Upper Slate Creek chlorophylls *a*, *b*, and *c* densities, 2011–2022.

	07/29/11			07/24/12		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	0.41	0.00	0.00	2.03	0.00	0.14
	0.32	0.00	0.04	0.96	0.00	0.09
	0.96	0.01	0.07	0.75	0.00	0.00
	0.11	0.00	0.00	0.50	0.00	0.03
	2.67	0.00	0.26	2.03	0.00	0.14
	0.28	0.00	0.00	1.07	0.00	0.14
	0.60	0.00	0.12	0.55	0.00	0.02
	1.14	0.00	0.01	1.71	0.00	0.06
	0.53	0.00	0.00	2.14	0.00	0.12
	0.60	0.00	0.02	0.83	0.00	0.00
mean	0.76	0.00	0.05	1.26	0.00	0.07
maximum	2.67	0.01	0.26	2.14	0.00	0.14
minimum	0.11	0.00	0.00	0.50	0.00	0.00
	07/30/13			07/30/14		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	1.82	0.00	0.27	0.92	0.00	0.11
	0.85	0.01	0.07	1.20	0.00	0.07
	2.94	0.00	0.13	1.52	0.00	0.06
	1.39	0.00	0.12	1.82	0.00	0.15
	2.99	0.00	0.11	0.85	0.00	0.00
	4.59	0.00	0.20	0.64	0.00	0.01
	0.85	0.00	0.01	1.18	0.00	0.07
	2.03	0.00	0.20	0.96	0.00	0.00
	0.85	0.00	0.00	0.64	0.00	0.01
	2.94	0.00	0.20	1.17	0.00	0.12
mean	2.13	0.00	0.13	1.09	0.00	0.06
maximum	4.59	0.01	0.27	1.82	0.00	0.15
minimum	0.85	0.00	0.00	0.64	0.00	0.00
	07/27/15			07/25/16		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	0.37	0.00	0.08	1.15	0.00	0.07
	0.64	0.00	0.08	8.86	0.00	1.12
	0.64	0.00	0.07	1.52	0.00	0.06
	0.51	0.00	0.06	5.34	0.00	0.93
	0.43	0.00	0.08	2.85	0.00	0.14
	0.55	0.00	0.28	1.01	0.00	0.09
	0.64	0.00	0.02	4.81	0.00	0.40
	0.64	0.00	0.08	2.40	0.16	0.21
	0.69	0.00	0.00	4.49	0.00	0.36
	1.17	0.00	0.13	6.19	0.00	0.79
mean	0.63	0.00	0.09	3.86	0.02	0.42
maximum	1.17	0.00	0.28	8.86	0.16	1.12
minimum	0.37	0.00	0.00	1.01	0.00	0.06

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	07/24/17			07/25/18		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	0.43	0.00	0.00	3.95	0.00	0.67
	1.06	0.00	0.00	3.31	0.00	0.73
	0.64	0.00	0.00	1.82	0.00	0.13
	0.50	0.00	0.03	2.88	0.00	0.37
	0.96	0.00	0.00	2.24	0.00	0.14
	1.17	0.00	0.03	1.17	0.00	0.03
	1.07	0.00	0.14	3.52	0.00	0.55
	0.64	0.00	0.00	2.56	0.00	0.35
	0.32	0.01	0.00	1.60	0.00	0.41
	1.47	0.00	0.23	2.67	0.00	0.18
mean	0.83	0.00	0.04	2.57	0.00	0.36
maximum	1.47	0.01	0.23	3.95	0.00	0.73
minimum	0.32	0.00	0.00	1.17	0.00	0.03
	08/01/19			07/30/20		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	24.88	0.00	1.78	2.46	0.00	0.05
	23.39	0.00	2.08	1.19	0.00	0.04
	2.78	0.00	0.16	1.52	0.00	0.00
	3.11	0.00	0.21	0.43	0.00	0.00
	2.43	0.00	0.23	0.97	0.00	0.03
	1.70	0.00	0.17	1.80	0.00	0.08
	7.67	0.00	0.57	0.96	0.00	0.10
	0.87	0.00	0.11	1.34	0.00	0.02
	3.71	0.00	0.29	0.11	0.00	0.18
	4.17	0.00	0.36	0.51	0.00	0.06
mean	7.47	0.00	0.60	1.13	0.00	0.06
maximum	24.88	0.00	2.08	2.46	0.00	0.18
minimum	0.87	0.00	0.11	0.11	0.00	0.00
	07/28/21			07/26/22		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	3.95	0.00	0.50	0.96	0.00	0.00
	5.41	0.00	0.49	2.14	0.00	0.32
	2.67	0.00	0.14	3.16	0.00	0.20
	0.53	0.01	0.18	0.41	0.00	0.00
	ND	ND	ND	1.79	0.00	0.05
	4.04	0.00	0.57	2.94	0.00	0.23
	0.29	ND	ND	0.83	0.00	0.05
	3.44	0.00	0.72	0.51	0.00	0.06
	1.60	0.00	0.25	0.43	0.00	0.00
	4.06	0.00	0.83	1.50	0.00	0.08
mean	2.89	0.00	0.46	1.47	0.00	0.10
maximum	5.41	0.01	0.83	3.16	0.00	0.32
minimum	0.29	0.00	0.14	0.41	0.00	0.00

Note: Bold values are the spectrophotometer estimated detection limit; chlorophyll *a* not detected. Sample turbidity precluded precise measurement of one sample collected on 07/28/21.

Appendix A.5.–Lower Sherman Creek SP1 chlorophylls *a*, *b*, and *c* densities, 2011–2022.

	07/28/11			07/26/12		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	1.28	0.00	0.05	1.07	0.00	0.14
	5.34	0.00	0.36	2.88	0.87	0.16
	5.98	0.00	0.54	0.41	0.04	0.04
	3.84	0.10	0.48	2.67	1.27	0.00
	15.59	3.98	0.17	0.60	0.00	0.12
	11.11	2.64	0.28	1.07	0.00	0.11
	19.33	0.00	1.65	3.63	1.56	0.03
	7.26	0.00	0.74	9.61	4.12	0.08
	1.92	0.04	0.19	2.99	1.43	0.02
	4.38	0.17	0.44	0.43	0.00	0.06
mean	7.60	0.69	0.49	2.54	0.93	0.08
maximum	19.33	3.98	1.65	9.61	4.12	0.16
minimum	1.28	0.00	0.05	0.41	0.00	0.00
	07/29/13			07/28/14		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	4.06	0.00	0.38	2.46	0.00	0.30
	5.55	0.00	0.73	0.74	0.00	0.10
	0.24	ND	ND	0.19	0.00	0.00
	4.67	0.00	0.55	0.92	0.00	0.14
	7.69	0.00	0.89	0.83	0.00	0.15
	7.37	0.00	0.62	2.99	0.00	0.47
	0.24	ND	ND	1.39	0.00	0.17
	2.67	0.00	0.35	2.46	0.00	0.25
	0.75	0.03	0.08	0.45	0.01	0.04
	ND	ND	ND	0.96	0.00	0.16
mean	3.69	0.00	0.51	1.34	0.00	0.18
maximum	7.69	0.03	0.89	2.99	0.01	0.47
minimum	0.24	0.00	0.08	0.19	0.00	0.00
	07/27/15			07/25/16		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	0.28	0.00	0.03	3.31	0.52	0.31
	0.19	ND	ND	4.27	0.00	0.76
	0.92	0.00	0.11	1.39	0.00	0.16
	0.64	0.00	0.01	2.14	0.00	0.37
	2.67	0.00	0.31	2.28	0.00	0.32
	0.79	0.00	0.00	13.24	6.47	0.31
	2.78	0.00	0.32	2.78	0.13	0.23
	0.19	ND	ND	2.24	0.00	0.31
	4.17	0.00	0.49	3.31	0.12	0.35
	1.01	0.00	0.09	2.03	0.20	0.17
mean	1.36	0.00	0.17	3.70	0.74	0.33
maximum	4.17	0.00	0.49	13.24	6.47	0.76
minimum	0.19	0.00	0.00	1.39	0.00	0.16

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	07/25/17			07/24/18		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	5.02	0.00	0.68	2.88	0.00	0.36
	5.13	0.00	0.93	3.95	0.00	0.50
	2.35	0.00	0.28	2.14	0.00	0.38
	2.99	0.00	0.40	2.43	0.00	0.23
	4.49	0.00	0.64	2.56	0.00	0.36
	3.84	0.00	0.55	2.06	0.00	0.15
	6.30	0.00	1.05	1.82	0.00	0.20
	4.06	0.00	0.63	4.58	0.00	0.63
	1.10	0.00	0.05	2.24	0.00	0.35
	3.31	0.00	0.39	1.71	0.00	0.15
mean	3.86	0.00	0.56	2.64	0.00	0.33
maximum	6.30	0.00	1.05	4.58	0.00	0.63
minimum	1.10	0.00	0.05	1.71	0.00	0.15
	08/02/19			07/29/20		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	ND	ND	ND	17.52	0.00	1.73
	0.10	ND	ND	8.01	0.00	0.80
	0.43	0.07	0.10	2.66	0.00	0.07
	0.50	0.00	0.13	5.55	0.35	0.29
	0.10	ND	ND	13.67	4.03	0.31
	5.66	0.47	0.45	**0.25**	ND	ND
	0.10	ND	ND	1.15	0.00	0.04
	5.02	0.00	0.66	6.51	0.00	0.48
	12.50	0.00	1.56	1.89	0.00	0.14
	0.21	0.00	0.03	5.13	0.00	0.41
mean	2.74	0.09	0.49	6.23	0.49	0.47
maximum	12.50	0.47	1.56	17.52	4.03	1.73
minimum	0.10	0.00	0.03	0.25	0.00	0.04
	07/28/21			07/26/22		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	7.47	0.00	1.03	3.16	0.00	0.27
	4.44	0.00	0.78	9.32	0.00	0.94
	6.83	0.00	1.05	1.42	0.00	0.17
	5.66	0.00	0.96	1.65	0.00	0.17
	7.29	0.00	1.02	0.98	0.18	0.46
	14.20	0.00	2.48	1.55	0.00	0.09
	5.23	0.00	0.77	5.45	0.00	0.68
	2.62	0.00	0.40	6.51	0.00	0.86
	5.34	0.00	0.95	8.28	0.00	0.89
	15.05	0.00	2.04	2.75	0.00	0.32
mean	7.41	0.00	1.15	4.11	0.02	0.49
maximum	15.05	0.00	2.48	9.32	0.18	0.94
minimum	2.62	0.00	0.40	0.98	0.00	0.09

Note: Bold values are the spectrophotometer estimated detection limit; chlorophyll *a* not detected.

Appendix A.6.–Lower Sherman Creek SP2 chlorophylls *a*, *b*, and *c* densities, 2011–2022.

	07/28/11			07/26/12		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	3.10	0.00	0.26	1.05	0.04	0.12
	6.30	0.19	0.62	0.64	0.00	0.11
	4.59	0.00	0.38	0.73	0.00	0.07
	0.32	0.00	0.00	0.50	0.07	0.10
	13.88	0.00	0.54	**0.34**	ND	ND
	7.37	0.00	0.46	0.51	0.00	0.06
	1.50	0.00	0.09	0.96	0.00	0.16
	14.31	0.00	0.59	0.37	0.00	0.00
	0.85	0.00	0.01	1.28	0.00	0.09
	3.84	0.00	0.25	**0.34**	ND	ND
mean	5.61	0.02	0.32	0.67	0.01	0.09
maximum	14.31	0.19	0.62	1.28	0.07	0.16
minimum	0.32	0.00	0.00	0.34	0.00	0.00
	07/29/13			07/28/14		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	1.07	0.00	0.14	0.74	0.00	0.10
	3.84	0.00	0.34	1.38	0.00	0.18
	0.96	0.00	0.15	2.83	0.00	0.15
	4.81	0.00	0.49	3.31	0.00	0.31
	5.77	0.00	0.78	0.75	0.00	0.06
	0.32	0.02	0.10	0.85	0.03	0.08
	4.70	0.00	0.44	0.85	0.00	0.01
	3.52	0.00	0.35	1.39	0.00	0.16
	0.53	0.00	0.02	0.43	0.01	0.04
	3.20	0.00	0.43	0.69	0.00	0.07
mean	2.87	0.00	0.32	1.32	0.00	0.12
maximum	5.77	0.02	0.78	3.31	0.03	0.31
minimum	0.32	0.00	0.02	0.43	0.00	0.01
	07/27/15			07/25/16		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	0.69	0.00	0.00	1.50	0.00	0.17
	0.96	0.00	0.00	2.03	0.00	0.30
	0.85	0.00	0.11	0.43	0.00	0.13
	1.28	0.00	0.16	2.98	0.00	0.38
	2.14	0.00	0.24	0.96	0.00	0.09
	3.63	0.65	0.43	1.28	0.04	0.26
	0.96	0.07	0.03	1.71	0.00	0.22
	2.14	0.78	1.30	1.92	0.35	0.16
	1.07	0.00	0.14	0.41	0.00	0.08
	2.46	0.00	0.24	0.96	0.00	0.06
mean	1.62	0.15	0.27	1.42	0.04	0.19
maximum	3.63	0.78	1.30	2.98	0.35	0.38
minimum	0.69	0.00	0.00	0.41	0.00	0.06

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	07/25/17			07/24/18		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	0.75	0.00	0.05	0.96	0.00	0.09
	0.85	0.01	0.07	1.38	0.00	0.21
	0.88	0.00	0.05	1.60	0.00	0.17
	0.69	0.00	0.07	0.53	0.00	0.02
	3.70	0.00	0.46	1.50	0.00	0.26
	0.69	0.00	0.07	1.60	0.00	0.23
	0.64	0.00	0.07	0.64	0.00	0.11
	1.82	0.00	0.20	4.17	0.00	0.58
	0.92	0.00	0.11	0.96	0.00	0.09
	0.55	0.00	0.02	1.60	0.00	0.15
mean	1.15	0.00	0.12	1.49	0.00	0.19
maximum	3.70	0.01	0.46	4.17	0.00	0.58
minimum	0.55	0.00	0.02	0.53	0.00	0.02
	08/02/19			07/29/20		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	0.43	0.00	0.03	5.42	0.04	0.33
	1.60	0.00	0.23	1.65	0.00	0.20
	6.84	0.00	1.07	2.78	0.29	0.20
	1.11	0.00	0.08	1.93	0.00	0.20
	1.33	0.00	0.18	4.38	0.48	0.25
	0.18	0.00	0.00	6.84	0.39	0.70
	5.02	0.00	0.63	5.18	0.00	0.45
	0.85	0.00	0.13	0.75	0.00	0.00
	2.14	0.00	0.31	30.44	5.80	1.15
	1.71	0.00	0.21	16.66	1.69	1.44
mean	2.12	0.00	0.29	7.60	0.87	0.49
maximum	6.84	0.00	1.07	30.44	5.80	1.44
minimum	0.18	0.00	0.00	0.75	0.00	0.00
	07/28/21			07/26/22		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	4.50	0.00	0.71	0.82	0.00	0.12
	3.76	0.00	0.51	3.81	0.00	0.21
	1.60	0.00	0.14	4.38	0.00	0.29
	12.02	0.00	1.66	1.75	0.00	0.19
	4.17	0.00	0.50	0.85	0.03	0.08
	3.17	0.00	0.43	2.46	0.00	0.36
	5.73	0.00	0.77	5.34	0.00	0.39
	6.55	0.00	0.83	0.74	0.00	0.10
	5.34	0.00	0.72	3.63	0.00	0.50
	8.53	0.00	0.95	1.60	0.00	0.17
mean	5.54	0.00	0.72	2.54	0.00	0.24
maximum	12.02	0.00	1.66	5.34	0.03	0.50
minimum	1.60	0.00	0.14	0.74	0.00	0.08

Note: Bold values are the spectrophotometer estimated detection limit; chlorophyll *a* not detected.

APPENDIX B: BENTHIC MACROINVERTEBRATE DATA

Appendix B.1.–Lower Slate Creek BMI data summary, 2011–2022.

	05/04/11	05/02/12	04/30/13	04/30/14	04/27/15	04/26/16	04/25/17	05/03/18	05/01/19	05/06/20	04/28/21	04/25/22
Total BMI Taxa	29	32	27	32	26	24	27	17	18	24	17	15
Total EPT Taxa	13	17	16	17	13	11	13	9	9	11	8	10
Total BMI Counted	1,148	1,760	1,200	2,308	1,901	1,894	730	269	521	674	237	452
Ephemeroptera	85	387	400	73	196	225	219	84	214	77	103	157
Plecoptera	70	274	203	352	258	61	145	37	85	44	14	17
Trichoptera	2	8	6	17	6	3	3	0	0	4	0	0
Aquatic Diptera	862	975	503	1,711	1,268	1,038	308	32	208	431	90	248
Other	129	116	88	155	173	567	55	116	14	118	30	30
% Ephemeroptera	7%	22%	33%	3%	10%	12%	30%	31%	41%	11%	43%	34.7%
% Plecoptera	6%	16%	17%	15%	14%	3%	20%	14%	16%	7%	6%	4.0%
% Trichoptera	0.2%	0.5%	0.5%	0.7%	0.3%	0.2%	0.4%	0.0%	0.0%	0.6%	0.0%	0.0%
% Aquatic Diptera	75%	55%	42%	74%	67%	55%	42%	12%	40%	64%	38%	55%
% Other	11%	7%	7%	7%	9%	30%	8%	43%	3%	18%	13%	7%
% EPT	14%	38%	51%	19%	24%	15%	50%	45%	57%	19%	49%	38%
% Chironomidae	72%	53%	35%	68%	64%	51%	36%	11%	29%	57%	31%	53%
Shannon Diversity Score	0.51	0.69	0.85	0.64	0.70	0.65	0.81	0.81	0.83	0.59	0.77	0.59
Evenness Score	0.48	0.58	0.70	0.52	0.58	0.57	0.73	0.84	0.81	0.56	0.82	0.65
Total Sample Area (m^2)	0.558	0.558	0.465	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558
Mean BMI/m^2	2,057	3,154	2,581	4,136	3,407	3,394	1,308	482	934	1,208	425	810
±1 SD	1,046	1,849	551	3,592	2,458	1,667	436	461	267	629	167	358
Terrestrial Invertebrates	0	4	0	1	3	88	1	0	7	1	0	3
Juvenile Fish	1	0	0	1	0	0	0	1	0	0	0	1

Appendix B.2.–West Fork Slate Creek BMI data summary, 2011–2022.

	05/04/11	05/02/12	04/30/13	04/30/14	04/27/15	04/26/16	04/25/17	05/03/18	05/01/19	05/04/20	04/26/21	04/25/22
Total BMI Taxa	21	31	28	29	28	25	21	18	16	18	17	22
Total EPT Taxa	11	21	18	17	16	15	13	12	11	12	14	15
Total BMI Counted	280	1,015	1,365	543	1,470	820	494	183	725	758	401	802
Ephemeroptera	181	634	991	223	956	564	311	115	560	465	303	604
Plecoptera	41	166	233	150	243	55	94	37	97	124	60	82
Trichoptera	3	11	10	15	10	10	2	2	0	6	8	2
Aquatic Diptera	35	175	118	136	215	151	77	22	67	160	25	107
Other	20	29	13	19	46	40	10	7	1	3	5	7
% Ephemeroptera	65%	63%	73%	41%	65%	69%	63%	63%	77%	61%	76%	75%
% Plecoptera	15%	16%	17%	28%	17%	7%	19%	20%	13%	16%	15%	10%
% Trichoptera	1%	1%	0.7%	3%	0.7%	1%	0.4%	1%	0%	1%	2%	0%
% Aquatic Diptera	13%	17%	9%	25%	15%	18%	16%	12%	9%	21%	6%	13%
% Other	7%	3%	1%	3%	3%	5%	2%	4%	0%	0%	1%	1%
% EPT	80%	80%	90%	71%	82%	77%	82%	84%	91%	78%	93%	86%
% Chironomidae	10%	15%	7%	22%	12%	18%	14%	10%	7%	20%	6%	11%
Shannon Diversity Score	0.63	0.84	0.73	0.91	0.82	0.72	0.78	0.72	0.64	0.75	0.76	0.62
Evenness Score	0.78	0.71	0.61	0.79	0.71	0.69	0.78	0.83	0.64	0.74	0.75	0.57
Total Sample Area (m^2)	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558
Mean BMI/m^2	502	1,819	2,446	973	2,634	1,470	885	328	1,299	1,358	719	1,437
±1 SD	410	1,009	777	482	1,400	703	592	140	501	734	452	427
Terrestrial Invertebrates	2	0	0	0	1	7	0	2	1	2	2	5
Juvenile Fish	0	0	0	0	0	0	0	0	0	0	0	0

Appendix B.3.–East Fork Slate Creek BMI data summary, 2011–2022.

	05/12/11	04/27/12	04/29/13	04/30/14	04/29/15	04/25/16	04/27/17	05/03/18	04/30/19	05/05/20	04/28/21	04/26/22
Total BMI Taxa	27	33	33	24	28	21	27	26	25	26	23	25
Total EPT Taxa	15	17	17	9	16	11	13	15	15	14	14	13
Total BMI Counted	2,616	2,585	5,249	1,143	1,792	1,117	3,785	2,002	2,157	3,067	1,918	1,726
Ephemeroptera	387	490	19	9	274	227	310	99	306	314	118	160
Plecoptera	70	73	45	10	36	42	58	33	37	46	54	7
Trichoptera	28	23	66	3	14	40	33	21	38	33	18	56
Aquatic Diptera	507	547	598	454	633	398	1,281	732	535	835	1,034	808
Other	1,624	1,451	4,521	667	835	410	2,103	1,117	1,241	1,839	694	695
% Ephemeroptera	15%	19%	0.4%	0.8%	15%	20%	8%	5%	14%	10%	6%	9%
% Plecoptera	3%	3%	0.9%	0.9%	2%	4%	2%	2%	2%	1%	3%	0%
% Trichoptera	1%	0.9%	1%	0.3%	0.8%	4%	1%	1%	2%	1%	1%	3%
% Aquatic Diptera	19%	21%	11%	40%	35%	36%	34%	37%	25%	27%	54%	47%
% Other	62%	56%	86%	58%	47%	37%	56%	56%	58%	60%	36%	40%
% EPT	19%	23%	2%	2%	18%	28%	11%	8%	18%	13%	10%	13%
% Chironomidae	17%	15%	10%	35%	28%	26%	21%	31%	20%	25%	45%	43%
Shannon Diversity Score	0.64	0.78	0.57	0.70	0.92	0.92	0.62	0.54	0.62	0.56	0.59	0.61
Evenness Score	0.54	0.61	0.47	0.63	0.72	0.78	0.51	0.46	0.53	0.46	0.52	0.53
Total Sample Area (m^2)	0.558	0.558	0.558	0.558	0.465	0.558	0.558	0.558	0.558	0.558	0.558	0.558
Mean BMI/m^2	4,688	4,633	9,407	2,048	3,854	2,002	6,783	3,588	3,866	5,496	3,437	3,093
±1 SD	1,081	1,325	3,830	952	837	469	2,365	1,984	1,083	1,862	1,256	1,131
Terrestrial Invertebrates	3	1	0	0	5	11	0	0	2	0	0	1
Juvenile Fish	0	0	0	0	0	0	0	0	0	0	0	0

Appendix B.4.–Upper Slate Creek BMI data summary, 2011–2022.

	05/12/11	04/27/12	04/29/13	04/28/14	04/29/15	04/25/16	04/27/17	05/02/18	04/30/19	05/05/20	04/28/21	04/26/22
Total BMI Taxa	33	39	34	36	31	28	30	31	24	25	28	29
Total EPT Taxa	18	21	20	20	19	15	19	18	18	15	18	20
Total BMI Counted	1,408	1,259	1,607	1,744	2,107	1,338	1,132	864	912	543	786	695
Ephemeroptera	368	454	492	622	622	554	460	383	513	222	426	315
Plecoptera	401	349	604	429	758	252	172	175	213	116	160	140
Trichoptera	116	48	55	44	44	104	62	33	35	50	47	25
Aquatic Diptera	248	273	338	518	517	169	406	258	137	144	133	202
Other	275	135	118	131	166	259	32	15	14	11	20	13
% Ephemeroptera	26%	36%	31%	36%	30%	41%	41%	44%	56%	41%	54%	45%
% Plecoptera	29%	28%	38%	25%	36%	19%	15%	20%	23%	21%	20%	20%
% Trichoptera	8%	4%	3%	3%	2%	8%	5%	4%	4%	9%	6%	4%
% Aquatic Diptera	18%	22%	21%	30%	25%	13%	36%	30%	15%	27%	17%	29%
% Other	20%	11%	7%	8%	8%	19%	3%	2%	2%	2%	3%	2%
% EPT	63%	68%	72%	63%	68%	68%	61%	68%	83%	71%	81%	69%
% Chironomidae	15%	20%	19%	28%	22%	11%	34%	28%	11%	22%	15%	26%
Shannon Diversity Score	0.97	1.04	1.02	1.03	0.98	1.06	0.96	0.92	0.99	0.92	0.97	0.98
Evenness Score	0.76	0.79	0.78	0.76	0.74	0.82	0.73	0.75	0.80	0.78	0.77	0.80
Total Sample Area (m^2)	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558
Mean BMI/m^2	2,523	2,256	2,880	3,125	3,776	2,398	2,029	1,548	1,634	973	1,409	1,246
±1 SD	1,173	1,321	1,049	660	1,174	520	1,143	574	170	295	494	667
Terrestrial Invertebrates	1	0	0	1	3	6	3	1	0	4	2	2
Juvenile Fish	0	0	0	0	0	0	0	0	2	0	0	0

Appendix B.5.–Upper Johnson Creek BMI data summary, 2011–2022.

	05/03/11	04/26/12	04/29/13	04/29/14	04/28/15	04/27/16	04/26/17	05/04/18	05/01/19	05/05/20	04/28/21	04/27/22
Total BMI Taxa	24	28	34	32	28	32	33	31	25	31	29	20
Total EPT Taxa	14	14	24	21	17	21	19	20	18	19	18	13
Total BMI Counted	2,084	2,214	2,938	1,483	1,556	2,054	1,619	1,672	1,880	1,056	1,470	1,380
Ephemeroptera	962	1,139	1,680	740	917	1,160	651	935	1195	688	1101	1,093
Plecoptera	114	163	147	217	58	97	113	97	47	60	33	28
Trichoptera	59	118	95	68	137	198	54	80	79	53	41	13
Aquatic Diptera	619	586	799	407	366	476	773	542	543	244	281	235
Other	330	208	217	51	78	123	28	18	16	11	14	11
% Ephemeroptera	46%	51%	57%	50%	59%	56%	40%	56%	64%	65%	75%	79%
% Plecoptera	6%	7%	5%	15%	4%	5%	7%	6%	3%	6%	2%	2%
% Trichoptera	3%	5%	3%	5%	9%	10%	3%	5%	4%	5%	3%	1%
% Aquatic Diptera	30%	27%	27%	27%	24%	23%	48%	32%	29%	23%	19%	17%
% Other	16%	9%	7%	3%	5%	6%	2%	1%	1%	1%	1%	1%
% EPT	55%	64%	65%	69%	71%	71%	51%	67%	70%	76%	80%	82%
% Chironomidae	29%	26%	27%	26%	22%	22%	46%	31%	28%	22%	18%	17%
Shannon Diversity Score	0.76	0.81	0.74	0.74	0.87	0.88	0.68	0.81	0.71	0.77	0.74	0.66
Evenness Score	0.66	0.68	0.59	0.59	0.71	0.70	0.55	0.66	0.61	0.66	0.63	0.62
Total Sample Area (m^2)	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558
Mean BMI/m^2	3,735	3,968	5,265	2,658	2,789	3,681	2,901	2,996	3,369	1,892	2,634	2,473
±1 SD	1,918	2,305	2,512	2,017	858	1,025	1,056	1,430	1,070	693	1,122	725
Terrestrial Invertebrates	1	1	1	4	1	2	6	1	11	2	0	4
Juvenile Fish	0	0	0	0	0	0	0	0	0	0	0	0

Appendix B.6.–Lower Sherman Creek SP1 BMI data summary, 2011–2022.

	05/04/11	04/30/12	05/01/13	04/29/14	04/28/15	04/27/16	04/26/17	05/02/18	04/30/19	05/04/20	04/26/21	04/27/22
Total BMI Taxa	26	31	28	30	26	26	25	26	25	24	20	24
Total EPT Taxa	15	18	16	13	13	13	13	16	14	14	14	15
Total BMI Counted	624	1,525	1,002	1,687	921	3,816	563	509	705	710	552	839
Ephemeroptera	157	876	499	114	175	101	88	293	404	179	452	581
Plecoptera	36	103	135	97	67	41	72	48	41	30	25	32
Trichoptera	7.0	14	6	18	6	9	16	11	4	3	14	5
Aquatic Diptera	89	160	131	648	326	273	123	51	228	322	54	196
Other	335	372	231	810	347	3,392	264	106	28	176	7	25
% Ephemeroptera	25%	58%	50%	7%	19%	3%	16%	58%	57%	25%	82%	69%
% Plecoptera	6%	7%	13%	6%	7%	1%	13%	9%	6%	4%	5%	4%
% Trichoptera	1%	0.9%	0.6%	1%	1%	0.2%	3%	2%	1%	0%	3%	1%
% Aquatic Diptera	14%	11%	13%	38%	35%	7%	22%	10%	32%	45%	10%	23%
% Other	54%	24%	23%	48%	38%	89%	47%	21%	4%	25%	1%	3%
% EPT	32%	66%	64%	14%	27%	4%	31%	69%	64%	30%	89%	74%
% Chironomidae	6%	8%	12%	33%	33%	7%	13%	7%	27%	42%	9%	21%
Shannon Diversity Score	0.76	0.74	0.85	0.71	0.84	0.32	0.81	0.73	0.79	0.64	0.62	0.62
Evenness Score	0.71	0.62	0.71	0.57	0.70	0.27	0.69	0.71	0.71	0.61	0.62	0.56
Total Sample Area (m^2)	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558
Mean BMI/m^2	1,118	2,733	1,796	3,023	1,651	6,839	1,009	912	1,263	1,272	989	1,504
±1 SD	1,000	1,410	247	936	718	1,398	168	408	345	638	464	462
Terrestrial Invertebrates	1	0	14	1	14	21	1	0	2	0	1	4
Juvenile Fish	10	12	0	8	0	77	0	11	0	2	0	0

Appendix B.7.–Lower Sherman Creek SP2 BMI data summary, 2011–2022.

	05/03/11	04/30/12	04/30/13	04/29/14	04/28/15	04/27/16	04/26/17	05/02/18	04/30/19	05/04/20	04/26/21	04/27/22
Total BMI Taxa	30	36	39	28	23	23	26	21	25	23	26	18
Total EPT Taxa	17	26	25	16	13	13	14	18	15	16	18	12
Total BMI Counted	921	1,573	1,889	661	898	1,045	239	543	906	486	402	645
Ephemeroptera	548	1,143	1,049	31	163	84	37	427	708	163	288	494
Plecoptera	137	77	299	40	47	32	25	39	35	32	32	24
Trichoptera	14	26	18	7	13	10	5	13	23	18	13	2
Aquatic Diptera	143	254	289	354	315	224	88	43	124	242	61	108
Other	79	75	234	229	360	695	84	21	16	31	8	17
% Ephemeroptera	60%	73%	56%	5%	18%	8%	15%	79%	78%	34%	72%	77%
% Plecoptera	15%	5%	16%	6%	5%	3%	10%	7%	4%	7%	8%	4%
% Trichoptera	2%	2%	1%	1%	1%	1%	2%	2%	3%	4%	3%	0%
% Aquatic Diptera	16%	16%	15%	54%	35%	21%	37%	8%	14%	50%	15%	17%
% Other	9%	5%	12%	35%	40%	67%	35%	4%	2%	6%	2%	3%
% EPT	76%	79%	72%	12%	25%	12%	28%	88%	85%	44%	83%	81%
% Chironomidae	11%	15%	14%	48%	33%	20%	24%	6%	11%	44%	12%	15%
Shannon Diversity Score	0.93	0.70	0.84	0.70	0.77	0.53	0.84	0.61	0.64	0.79	0.76	0.54
Evenness Score	0.76	0.57	0.65	0.62	0.66	0.49	0.80	0.57	0.60	0.73	0.70	0.53
Total Sample Area (m^2)	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558	0.558
Mean BMI/m^2	1,651	2,823	3,385	1,185	1,609	1,873	428	973	1,624	871	720	1,156
±1 SD	927	1,174	1,471	769	748	982	219	370	712	410	321	169
Terrestrial Invertebrates	1	2	18	1	10	4	2	1	4	0	0	1
Juvenile Fish	0	0	14	0	0	6	0	13	0	0	0	12

APPENDIX C: ADULT SALMON DATA

Appendix C.1.–Lower Slate Creek weekly adult pink salmon count by reach, 2022.

	08/10/22		08/25/22		09/01/22		09/08/22	
Stream Reach	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass
0-100 m	0	0	5	0	8	0	4	0
100-200 m	0	0	0	0	3	0	0	0
200-300 m	0	0	0	0	0	0	0	0
300-400 m	3	0	0	0	0	0	0	0
400-500 m	0	0	0	0	0	0	0	0
500-600 m	0	0	0	0	0	0	0	0
600-700 m	0	0	0	0	0	0	0	0
700-800 m	0	0	0	0	0	0	0	0
800-900 m	0	0	0	0	0	0	0	0
900-Falls	0	0	0	0	0	0	0	0
Total	3	0	5	0	11	0	4	0

Appendix C.2.–Lower Slate Creek weekly adult coho salmon count by reach, 2022.

	09/29/22		10/06/22		10/21/22	
Stream Reach	Count	Carcass	Count	Carcass	Count	Carcass
0-100 m	0	0	0	0	0	0
100-200 m	0	0	0	0	0	0
200-300 m	0	0	0	0	0	0
300-400 m	0	0	0	0	0	0
400-500 m	0	0	0	0	0	0
500-600 m	0	0	0	0	0	0
600-700 m	0	0	0	0	0	0
700-800 m	0	0	0	0	0	0
800-900 m	0	0	0	0	0	0
900-Falls	0	0	0	0	0	0
Total	0	0	0	0	0	0

Appendix C.3.–Lower Johnson Creek weekly adult pink salmon count by reach, 2022.

	08/10/22		08/25/22		09/01/22		09/08/22	
Stream Reach	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass
Con-Lace	0	0	5	0	0	0	0	0
Lace-JM	0	0	35	0	9	0	0	0
JM-Trap Site	57	0	62	0	24	0	0	0
Trap-Site #4	294	0	140	0	139	0	30	0
Site #4-Site #7	216	3	50	0	6	0	0	0
Site #7-Site #10	3	0	17	0	0	0	0	0
Site #10-PH	0	0	0	0	0	0	0	0
PH-LF	0	0	0	0	0	0	0	0
LF-Site #15	0	0	0	0	0	0	0	0
Site #15-Falls	0	0	0	0	0	0	0	0
Total	570	3	309	0	178	0	30	0

Appendix C.4.–Lower Johnson Creek weekly adult chum salmon count by reach, 2022.

	08/10/22		08/25/22		09/01/22		09/08/22	
Stream Reach	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass
Con-Lace	0	0	0	0	0	0	0	0
Lace-JM	0	0	0	0	0	0	0	0
JM-Trap Site	0	0	0	0	0	0	0	0
Trap-Site #4	4	0	0	0	0	0	0	0
Site #4-Site #7	5	0	0	0	0	0	0	0
Site #7-Site #10	13	0	0	0	0	0	0	0
Site #10-PH	0	0	0	0	0	0	0	0
PH-LF	0	0	0	0	0	0	0	0
LF-Site #15	0	0	0	0	0	0	0	0
Site #15-Falls	0	0	0	0	0	0	0	0
Total	22	0	0	0	0	0	0	0

Appendix C.5.–Lower Johnson Creek weekly adult coho salmon count by reach, 2022.

	09/29/22		10/06/22		10/21/22	
Stream Reach	Count	Carcass	Count	Carcass	Count	Carcass
Con-Lace	ND	ND	0	0	0	0
Lace-JM	ND	ND	1	0	0	0
JM-Trap Site	ND	ND	18	0	0	0
Trap-Site #4	ND	ND	21	0	0	0
Site #4-Site #7	ND	ND	0	0	0	0
Site #7-Site #10	ND	ND	0	0	0	0
Site #10-PH	ND	ND	0	0	0	0
PH-LF	ND	ND	0	0	0	0
LF-Site #15	ND	ND	0	0	0	0
Site #15-Falls	ND	ND	0	0	3	0
Total	ND	ND	40	0	3	0

Appendix C.6.–Lower Sherman Creek weekly adult pink salmon count by reach, 2022.

	08/10/22		08/25/22		09/01/22		09/08/22	
Stream Reach	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass
0-50 m	0	0	0	1	0	0	0	0
50-100 m	0	0	3	0	0	0	0	0
100-150 m	0	0	0	0	2	0	0	0
150-200 m	0	0	1	0	0	0	0	0
200-250 m	0	0	1	0	0	0	0	0
250-300 m	0	0	0	0	0	0	0	0
300-350 m	0	0	2	0	0	0	0	0
350-Falls	0	0	10	0	0	0	0	0
Total	0	0	17	1	2	0	0	0

Appendix C.7.–Lower Slate Creek adult pink salmon count by statistical week, 2011–2022.

Statistical Week	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
29	ND	0	0	0	ND	ND	0	ND	ND	ND	ND	ND
30	**0**	0	7	0	12	0	0	0	0	0	0	ND
31	0	364	66	2	487	0	7	ND	0	1	0	ND
32	369	1,106	604	14	1,769	1	386	0	0	0	0	3
33	763	3,152	864	13	1,783	0	**477**	**3**	200	ND	ND	ND
34	1,394	2,331	1,199	12	1,543	64	2,818	**1**	11	4	1,156	5
35	1,646	318	472	0	850	12	**1,340**	ND	532	8	1,055	11
36	1,807	1	97	ND	527	**2**	1,811	ND	69	ND	1,336	4
37	229	0	27	ND	575	ND	577	ND	25	**2**	ND	ND
38	46	ND	1	ND	32	ND	ND	ND	ND	ND	114	ND
39	0	ND	ND	ND	2	ND	0	ND	ND	ND	ND	ND
40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total	6,254	7,272	3,337	41	7,580	79	7,416	4	837	15	3,661	23

Note: Bold numbers indicate incomplete surveys.

Appendix C.8.–Lower Johnson Creek adult pink salmon count by statistical week, 2011–2022.

Statistical Week	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
29	ND	0	59	ND	ND	ND	109	ND	ND	ND	ND	ND
30	1	73	200	44	4,512	0	1,222	42	96	31	0	ND
31	180	411	2,250	48	568	6	3,291	90	457	319	34	ND
32	1,891	753	1,456	84	17,517	154	2,272	91	514	1,806	164	**570**
33	3,850	1,698	1,873	2	19,028	125	3,364	145	783	ND	ND	ND
34	5,264	1,816	1,557	11	5,444	15	4,010	**66**	976	ND	8,394	309
35	1,350	198	545	0	2,057	95	5,165	0	1,241	482	3,236	**178**
36	3,712	60	149	ND	1,238	33	1,775	0	574	ND	2,380	30
37	670	7	97	ND	702	ND	1,587	ND	337	**99**	ND	ND
38	436	0	ND	ND	249	ND	**288**	ND	18	ND	1,185	ND
39	145	ND	ND	ND	10	ND	**156**	ND	ND	ND	ND	ND
40	ND	ND	ND	ND	ND	ND	**0**	ND	ND	ND	ND	ND
Total	17,499	5,016	8,186	189	51,325	428	23,239	434	4,996	2,737	15,393	1,087

Note: Bold numbers indicate incomplete surveys.

Appendix C.9.–Lower Sherman Creek adult pink salmon count by statistical week, 2011–2022.

Statistical Week	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
29	ND	0	2	ND	ND	ND	0	ND	ND	ND	ND	ND
30	1	2	164	0	120	0	4	0	0	0	0	ND
31	298	9	860	6	38	0	61	0	214	0	5	ND
32	773	97	979	40	348	0	778	4	438	17	37	0
33	1,049	285	765	10	723	0	1,076	81	850	0	ND	ND
34	397	521	549	4	334	**0**	730	1	460	74	368	17
35	157	521	785	10	ND	24	941	ND	220	99	254	2
36	870	145	624	0	413	**2**	781	ND	322	ND	222	0
37	**416**	25	232	ND	648	ND	841	ND	237	ND	ND	ND
38	609	3	21	ND	159	ND	478	ND	75	ND	134	ND
39	**35**	ND	ND	ND	15	ND	ND	ND	ND	ND	ND	ND
40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total	4,605	1,608	4,981	70	2,798	26	5,690	86	2,816	190	1,020	19

Note: Bold numbers indicate incomplete surveys.

APPENDIX D: SPAWNING SUBSTRATE DATA

Appendix D.1.–Lower Slate Creek SP1 pink salmon spawning substrate data, 2011–2022.

Sample	Sample	Volume (mL) Retained Each Sieve (mm)									
Date	No.	101.6	50.8	25.4	12.7	6.35	1.68	0.42	0.15	Imhoff	GMPS
08/17/11	1	0	0	470	260	340	425	225	20	22.0	9.8
08/17/11	2	750	70	460	250	200	280	100	25	8.0	14.0
08/17/11	3	525	280	240	210	290	440	100	70	20.5	12.2
08/17/11	4	0	0	250	340	495	1425	525	55	68.0	5.2
07/09/12	1	1,050	140	140	280	190	395	95	15	24.0	10.6
07/09/12	2	0	0	200	225	140	325	140	15	24.0	8.2
07/09/12	3	0	515	310	225	250	580	240	27	65.0	12.8
07/09/12	4	0	570	510	260	290	750	435	53	54.0	11.8
07/02/13	1	0	400	460	430	320	365	145	25	66.0	15.4
07/02/13	2	0	150	400	250	245	515	225	36	53.0	9.8
07/02/13	3	0	800	325	320	255	445	205	25	60.0	18.0
07/02/13	4	0	275	565	385	245	495	250	19	28.0	13.5
07/01/14	1	600	420	375	225	235	320	165	22	57.0	15.5
07/01/14	2	0	50	350	300	175	225	25	7.5	41.0	14.0
07/01/14	3	0	100	510	465	275	420	250	38	52.0	11.0
07/01/14	4	400	275	260	220	225	375	225	19	51.0	11.2
07/06/15	1	0	75	300	350	325	350	325	70	42.0	8.2
07/06/15	2	0	225	350	400	325	525	300	24	20.5	10.8
07/06/15	3	0	150	475	150	150	200	50	6	6.5	19.6
07/06/15	4	0	275	400	225	275	375	150	16	17.0	14.6
07/05/16	1	0	175	600	300	375	625	100	25	34.0	12.8
07/05/16	2	0	500	375	375	300	700	100	50	26.0	14.6
07/05/16	3	0	275	300	475	725	500	100	25	15.0	12.9
07/05/16	4	0	100	725	250	300	500	125	25	15.0	13.9
07/06/17	1	0	625	400	425	400	600	300	62	47.0	13.7
07/06/17	2	0	550	275	350	250	575	275	44	34.0	13.3
07/06/17	3	0	775	200	325	300	575	175	14	13.0	17.6
07/06/17	4	0	550	325	325	400	525	250	44	25.0	14.0
06/28/18	1	0	700	150	200	150	300	100	18	7.5	23.2
06/28/18	2	700	275	250	450	300	375	125	13	6.0	14.5
06/28/18	3	0	100	500	375	400	625	250	50	33.0	9.9
06/28/18	4	0	250	400	350	450	700	225	66	39.0	10.3
07/22/19	1	0	350	200	175	150	100	25	2	2.0	26.9
07/22/19	2	0	300	325	350	300	450	225	25	56.0	11.7
07/22/19	3	0	225	350	300	325	600	275	30	57.0	9.7
07/22/19	4	0	125	425	300	25	450	225	25	31.0	10.8
07/08/20	1	0	75	525	525	475	925	400	75	40.0	8.3
07/08/20	2	0	300	200	450	425	750	450	75	75.0	7.9
07/08/20	3	0	275	450	575	450	775	325	25	70.0	10.3
07/08/20	4	0	150	325	550	350	625	450	50	117.0	7.6
07/07/21	1	0	225	550	500	400	725	500	75	55.0	9.2
07/07/21	2	0	275	550	475	350	525	400	50	38.0	11.3
07/07/21	3	0	325	525	525	350	650	325	25	37.0	12.1
07/07/21	4	0	575	475	425	325	600	250	25	26.0	15.3
07/05/22	1	0	50	800	825	500	700	275	25	11.0	12.2
07/05/22	2	0	150	800	650	350	250	50	0	3.0	19.8
07/05/22	3	0	225	825	450	425	575	225	25	16.5	14.2
07/05/22	4	0	325	575	450	700	250	325	25	17.0	14.1

Note: GMPS = Geometric mean particle size.

Appendix D.2.–Lower Slate Creek SP2 pink salmon spawning substrate data, 2011–2022.

Sample	Sample	Volume (mL) Retained Each Sieve (mm)									
Date	No.	101.6	50.8	25.4	12.7	6.35	1.68	0.42	0.15	Imhoff	GMPS
08/17/11	1	1,050	130	305	210	205	350	200	20	11.5	11.0
08/17/11	2	0	120	320	405	335	740	415	85	53.0	7.3
08/17/11	3	0	400	350	295	290	540	200	40	17.5	13.4
08/17/11	4	0	100	450	580	320	390	160	15	25.0	12.8
07/09/12	1	0	250	380	270	260	475	195	23	46.5	11.8
07/09/12	2	600	75	395	295	180	375	135	15	18.5	12.0
07/09/12	3	0	450	340	370	340	590	295	30	18.0	12.8
07/09/12	4	0	0	320	460	285	545	300	28	16.5	8.3
07/02/13	1	0	310	490	440	505	640	410	35	107.5	9.8
07/02/13	2	0	420	270	240	215	560	150	34	42.0	13.1
07/02/13	3	0	550	885	375	290	570	290	45	108.0	15.0
07/02/13	4	0	785	230	340	240	580	330	30	46.5	14.8
07/01/14	1	0	1225	450	495	305	760	300	12	110.0	17.7
07/01/14	2	0	450	250	250	200	300	100	11	65.0	16.5
07/01/14	3	0	850	480	200	175	490	175	30	106.0	18.4
07/01/14	4	0	150	350	200	225	300	120	15	20.0	13.3
07/06/15	1	0	75	175	325	425	475	50	6	5.5	10.7
07/06/15	2	500	825	225	225	175	250	50	11	8.0	28.9
07/06/15	3	300	225	500	200	175	300	50	15	21.5	18.1
07/06/15	4	275	100	200	200	150	225	100	22	9.0	12.2
07/05/16	1	0	300	275	400	350	525	100	25	26.0	13.1
07/05/16	2	0	0	200	600	575	550	150	25	30.0	9.0
07/05/16	3	0	0	100	1150	450	650	100	25	26.0	10.1
07/05/16	4	125	275	575	525	450	475	150	25	39.0	14.3
07/06/17	1	0	0	675	600	550	525	350	82	47.0	9.8
07/06/17	2	0	300	300	650	475	500	375	60	28.0	10.8
07/06/17	3	0	525	450	500	475	400	50	5	3.0	19.7
07/06/17	4	0	375	375	550	475	625	325	58	22.0	11.7
06/28/18	1	0	450	575	475	600	625	175	28	14.0	14.9
06/28/18	2	725	325	400	400	300	375	150	22	18.0	15.4
06/28/18	3	700	525	500	275	225	200	100	28	12.0	23.1
06/28/18	4	0	575	400	250	375	725	125	20	8.0	15.6
07/25/19	1	0	550	225	225	200	175	25	4	4.0	27.3
07/25/19	2	0	1150	375	275	425	575	325	75	62.0	17.5
07/25/19	3	0	800	200	325	325	375	175	15	22.0	19.7
07/25/19	4	0	975	550	300	375	275	75	5	5.0	28.0
07/08/20	1	0	550	475	375	275	750	225	25	67.0	13.5
07/08/20	2	0	350	575	250	225	575	100	25	21.0	15.7
07/08/20	3	0	175	375	300	250	500	250	25	21.0	10.7
07/08/20	4	0	375	700	475	650	425	100	25	28.0	16.6
07/07/21	1	0	300	550	375	300	675	275	25	11.0	12.5
07/07/21	2	0	700	700	625	400	175	100	50	30.0	23.2
07/07/21	3	0	1075	475	300	325	350	75	25	13.0	27.2
07/07/21	4	0	875	350	350	300	475	250	50	12.0	18.8
07/05/22	1	0	350	575	400	400	650	200	75	8.5	13.4
07/05/22	2	0	0	500	575	600	400	200	50	41.0	10.6
07/05/22	3	0	350	450	425	375	500	125	25	14.0	15.2
07/05/22	4	850	500	275	325	275	425	200	25	15.0	15.5

Note: GMPS = Geometric mean particle size.

APPENDIX E: SEDIMENT DATA AND LAB REPORT

Appendix E.1.–Lower Slate Creek sediment compositions, 2011–2022.

	Particle Size Data							
Sample Date	% Clay	% Silt	% Sand	% Coarse material (> 2 mm)	% Total Solids	% Total Volatile Solids	Total Sulfide (mg/kg)	% Total Organic Carbon
10/03/11	2.0	4.0	94.0	0.4	78.00	3.38	<0.55	2.04
07/03/12	2.0	0.0	98.0	0.1	79.22	3.37	<1.50	1.67
07/02/13	2.0	2.0	96.0	0.0	74.57	1.63	ND	1.67
07/28/14	2.3	3.8	91.8	0.9	75.4	3.22	<1.3	0.58
07/06/15	1.8	3.1	72.2	22.8	84.4	ND	<1.2	0.473
07/05/16	0.0	23.1	55.1	21.8	70.3	7.70	<2.5	0.585
07/07/17	1.5	6.9	84.5	7.1	59.6	2.80	<3.2	0.494
06/28/18	1.5	3.3	69.6	25.6	64.2	3.00	<2.9	0.416
07/22/19	0.0	2.6	37.4	60.0	67.2	2.90	<2.6	0.366
07/08/20	0.9	2.6	85.5	1.2	73.8	3.15	<1.4	0.612
07/08/20	0.3	0.7	77.8	19.1	72.8	2.90	1.7	0.376
07/08/20	0.3	0.4	84.5	13.0	74.1	2.80	1.33	0.402
07/07/21	0.1	0.3	76.4	21.6	74.0	2.75	<1.3	0.352
07/07/21	0.2	2.5	86.5	8.9	68.6	3.50	<1.5	0.563
07/07/21	0.3	3.3	99.6	12.8	68.4	3.20	<4.8	0.586
07/05/22	*1.4*		84.6	14.0	70.4	2.40	<0.84	0.4
07/05/22	*1.4*		66.9	31.7	71.2	2.60	<0.82	0.469
07/05/22	*1.6*		81.0	17.4	69.5	2.70	<0.82	0.424

Note: In 2022, lab results did not distinguish between clay and silt.

Appendix E.2.–East Fork Slate Creek sediment compositions, 2011–2022.

	Particle Size Data							
Sample Date	% Clay	% Silt	% Sand	% Coarse material (> 2 mm)	% Total Solids	% Total Volatile Solids	Total Sulfide (mg/kg)	% Total Organic Carbon
10/03/11	10.0	4.0	86.0	1.7	60.17	7.81	<0.55	11.00
07/10/12	40.0	34.0	26.0	0.0	23.72	28.54	<1.50	16.70
07/01/13	6.0	12.0	82.0	0.0	43.66	13.30	ND	18.30
07/30/14	3.8	21.1	75.0	0.1	65.5	6.21	<1.5	1.84
07/07/15	2.3	6.9	82.3	8.5	76.2	ND	<1.3	0.792
07/06/16	3.5	24.8	53.7	18.0	21.0	31.40	<6.8	13.0
07/07/17	34.9	32.2	28.8	4.0	18.9	32.50	<9.0	16.3
06/29/18	1.5	6.5	53.5	38.5	74.8	6.70	<1.8	1.75
07/22/19	0.5	4.5	47.5	47.5	39.1	9.30	<4.5	1.72
07/09/20	0.9	2.7	59.8	48.9	61.6	7.60	4.8	2.68
07/09/20	0.9	2.2	24.7	58.6	77.4	3.20	2.1	7.52
07/09/20	0.6	0.1	31.3	63.8	81.4	3.80	1.9	1.21
07/06/21	0.1	0.3	17.9	63.1	75.3	3.80	<0.4	0.307
07/06/21	0.2	0.4	35.9	67.3	72.7	3.50	<0.4	0.733
07/06/21	0.1	0.3	36.4	58.1	77.0	4.90	<1.2	5.36
07/06/22	1.5	3.2	58.6	34	76.5	3.40	<0.74	2.72
07/06/22	0.8	5.2	35	57.1	84.6	3.40	0.71	2.65
07/06/22	1.5	6.6	79.2	4.1	84.0	2.40	<0.69	3.19

Appendix E.3.–Upper Slate Creek sediment compositions, 2011–2022.

	Particle Size Data							
Sample Date	% Clay	% Silt	% Sand	% Coarse material (> 2 mm)	% Total Solids	% Total Volatile Solids	Total Sulfide (mg/kg)	% Total Organic Carbon
10/06/11	4.0	2.0	94.0	0.0	72.10	4.12	<1.50	5.46
07/02/12	2.0	0.0	98.0	0.3	79.58	2.90	<1.50	3.74
07/01/13	4.0	0.0	96.0	0.2	74.21	2.73	ND	5.50
07/30/14	4.3	8.2	87.5	0.0	72.4	3.88	<1.4	0.87
07/07/15	1.5	0.2	31.9	66.3	76.5	ND	<1.3	1.04
07/06/16	0.0	2.9	73.1	24.0	62.9	5.00	<2.2	2.14
07/07/17	3.0	4.6	89.9	2.5	72.7	3.45	<2.4	0.84
06/28/18	2.7	5.3	80.6	11.4	67.6	4.10	<2.7	0.815
08/05/19	2.5	0.4	60.5	36.7	72.4	3.75	<2.4	0.676
07/09/20	0.6	0.3	12.4	97.4	76.9	3.50	2.5	0.328
07/09/20	0.7	0.5	74.4	22.4	70.6	4.10	1.8	0.734
07/09/20	0.6	0.5	52.3	41.0	75.5	4.50	2.9	1.05
07/07/21	0.1	0.9	90.9	4.5	68.2	3.90	<1.5	0.871
07/07/21	0.0	0.3	93.3	6.8	67.7	3.70	<1.5	0.585
07/07/21	0.2	0.7	93.9	5.3	63.7	4.40	<5.2	0.818
07/06/22	1.4	6	73.3	20.6	86.7	1.30	<0.69	0.775
07/06/22	0.7	2.7	56.4	27	82.4	1.60	<0.72	0.694
07/06/22	0.8	4.4	81.1	9.5	83.8	1.50	<0.71	0.72

Appendix E.4.–Lower Johnson Creek sediment compositions, 2011–2022.

	Particle Size Data							
Sample Date	% Clay	% Silt	% Sand	% Coarse material (> 2 mm)	% Total Solids	% Total Volatile Solids	Total Sulfide (mg/kg)	% Total Organic Carbon
10/03/11	2.0	2.0	96.0	0.0	74.28	2.01	<0.55	0.89
07/02/12	8.0	0.0	92.0	0.0	77.67	2.55	<1.50	1.19
07/01/13	2.0	2.0	96.0	0.3	73.21	0.90	ND	1.08
07/30/14	2.9	4.8	91.4	0.2	73.7	1.93	<1.4	0.26
07/06/15	0.4	1.1	41.9	56.6	80.0	ND	<1.3	0.376
08/08/16	5.1	25.4	69.4	0.0	71.9	2.40	<2.5	0.422
07/07/17	4.1	20.8	72.6	2.5	57.6	4.60	<3.3	1.6
06/29/18	2.8	5.6	89.4	2.2	77.6	2.35	<2.5	0.483
07/22/19	1.1	2.4	89.5	7.0	71.3	2.50	<2.8	0.452
07/09/20	0.2	1.1	80.8	15.2	77.4	2.20	2.5	0.298
07/09/20	0.6	1.7	88.2	6.5	74.2	2.40	3.6	0.341
07/09/20	0.7	0.8	84.1	3.2	78.8	2.10	1.4	0.269
07/06/21	0.1	3.8	97.2	1.8	65.4	2.20	<1.4	0.319
07/06/21	0.2	2.1	87.3	4.7	72.1	2.40	<1.3	0.340
07/06/21	0.2	2.9	101.6	0.1	62.5	3.40	<1.5	0.270
07/05/22	2.1	8.6	89.1	0.1	64.3	2.45	<0.92	0.398
07/05/22	4.2	4.5	89.2	2.1	66.5	2.40	<0.89	0.340
07/05/22	5.3	18.7	74.7	1.4	59.4	3.70	<1	0.811

Appendix E.5.–Lower Sherman Creek sediment compositions, 2011–2022.

Sample Date	Particle Size Data				% Total Solids	% Total Volatile Solids	Total Sulfide (mg/kg)	% Total Organic Carbon
	% Clay	% Silt	% Sand	% Coarse material (> 2 mm)				
10/04/11	2.0	2.0	96.0	0.1	73.15	2.75	1.50	0.54
07/03/12	4.0	0.0	96.0	0.1	78.55	3.05	<0.55	0.82
07/01/13	2.0	2.0	96.0	0.6	75.66	0.75	ND	0.61
07/28/14	3.4	6.5	89.9	0.3	76.7	2.50	<1.3	0.35
07/07/15	1.8	3.0	86.1	9.0	76.2	ND	<1.3	0.399
07/06/16	0.1	0.9	71.2	27.8	80.5	3.10	<2.4	0.322
07/07/17	1.5	5.4	67.0	26.1	76.5	2.00	<2.5	0.288
06/29/18	2.3	2.5	88.9	6.3	69.3	2.50	<2.6	0.294
07/22/19	0.0	1.6	72.2	26.2	61.4	2.60	<3.2	0.317
07/09/20	1.0	1.1	87.3	10.7	68.4	3.20	1.5	0.443
07/09/20	0.2	1.3	97.7	14.5	70.1	2.60	3.5	0.417
07/09/20	0.4	0.9	89.0	14.5	70.5	2.80	3.0	0.417
07/06/21	0.3	0.3	104.7	1.0	70.0	2.55	<0.5	0.252
07/06/21	0.3	0.1	93.5	11.9	67.8	2.10	<1.4	0.190
07/06/21	0.0	0.5	88.3	11.1	68.5	2.30	<1.4	0.281
07/06/22	1.2	11.5	81.6	4.9	70.2	2.25	<0.85	0.501
07/06/22	0.4	0.7	71	16	81.1	2.10	<0.73	0.291
07/06/22	0.5	2.4	85.3	8.9	71.1	2.20	<0.79	0.278

Appendix E.6.–Lower Slate Creek sediment element concentrations, 2011–2022.

Sample	Concentration (mg/kg dry weight)										
Date	Ag	Al	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
10/03/11	<0.267	13,600	16.2	1.46	29.4	56.7	<0.136	47.4	7.79	0.720	220
07/03/12	<0.250	13,600	9.31	1.22	32.0	50.7	<0.122	43.2	8.45	<0.170	200
07/02/13	<0.246	12,300	23.7	1.29	94.5	56.7	<0.122	73.4	9.14	1.94	205
07/28/14	0.08	12,000	20.1	1.21	20.0	51.1	0.06	40.8	8.78	1.3	189
07/06/15	0.07	12,000	14.9	0.53	18.9	39.1	0.04	30.0	6.86	0.7	131
07/05/16	0.079	12,800	17.0	0.735	20.4	39.8	0.057	35.2	7.16	1.3	173
07/07/17	0.101	12,000	16.4	0.681	18.3	40.9	<0.031	31.7	8.16	<1.6	145
06/28/18	0.077	12,300	14.6	0.554	19.3	40.1	0.038	32.4	6.93	0.98	129
07/22/19	0.083	11,000	14.3	0.559	16.9	39.0	0.074	34.2	6.36	<1.0	132
07/08/20	0.077	10,700	15.1	0.602	19.1	41.3	0.0513	32.8	6.80	0.96	84.1
07/08/20	0.063	10,800	12.8	0.489	19.3	35.5	0.0565	31.3	5.57	0.82	89.9
07/08/20	0.0688	9,770	11.3	0.587	18.5	34.2	0.0390	31.7	5.27	0.87	96.9
07/07/21	0.073	10,600	12.8	0.580	17.1	39.9	0.058	32.2	6.88	<1.3	124
07/07/21	0.109	12,600	20.3	0.811	19.7	50.9	0.067	38.6	8.07	1.5	168
07/07/21	0.110	11,300	22.2	0.838	18.3	48.9	0.078	36.5	8.43	1.6	160
07/05/22	0.065	8,230	8.88	0.396	13.2	32	0.048	25.6	4.19	<0.97	97.2
07/05/22	0.059	9,100	10.9	0.381	13.9	32.8	0.034	23.8	5.61	<1.0	100
07/05/22	0.069	11,400	11.2	0.482	18	37.2	0.033	30.6	6.42	<1.3	127

Appendix E.7.–East Fork Slate Creek sediment element concentrations, 2011–2022.

Sample	Concentration (mg/kg dry weight)										
Date	Ag	Al	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
10/03/11	<0.335	20,100	30.0	20.9	29.5	88.4	<0.188	143	8.50	1.41	1,360
07/10/12	<0.739	15,300	24.0	23.2	38.9	159.0	<0.369	153	14.2	<1.48	1,490
07/01/13	<0.425	13,900	42.2	13.9	32.7	73.4	<0.216	79.8	12.5	4.79	844
07/30/14	0.14	13,300	39.1	12.1	14.6	55.7	0.04	85.3	6.94	2.4	812
07/07/15	0.12	12,300	22.3	5.87	15.1	46.7	0.05	46.8	4.48	1.7	333
07/06/16	0.190	16,500	51.5	8.20	16.5	59.5	0.109	86.1	5.54	3.1	634
07/07/17	0.30	12,900	29.9	9.65	15.0	62.3	0.143	69.9	6.61	<5.0	625
06/29/18	0.146	12,300	59.1	18.7	13.0	47.6	0.049	127	6.07	3.37	1,020
07/22/19	0.179	12,300	55.9	10.3	15.5	63.8	<0.039	83.1	5.93	2.9	665
07/09/20	0.130	11,100	23.4	1.06	14.7	27.4	0.0758	25.1	4.50	1.79	193
07/09/20	0.0674	8,290	18.0	4.58	10.2	29.3	0.0368	44.3	3.55	1.26	609
07/09/20	0.0991	9,650	26.1	4.79	13.9	29.6	0.0932	49.7	4.66	3.40	213
07/06/21	0.084	7,900	35.0	8.80	3.10	34.3	0.045	51.6	7.50	1.2	477
07/06/21	0.275	8,770	39.3	7.39	8.29	33.4	0.046	56.1	6.11	4.0	551
07/06/21	0.086	8,050	23.3	5.81	7.76	23.2	0.090	54.3	3.12	1.6	509
07/06/22	0.113	10,100	24.5	1.79	13.4	22	0.026	28.2	5.01	2.9	204
07/06/22	0.061	6,240	27.9	8.27	5.32	25.9	<0.021	58.2	2.25	1.1	526
07/06/22	0.057	7,110	11.4	0.656	7.11	22	0.039	12.8	3.25	<1.2	115

Appendix E.8.–Upper Slate Creek sediment element concentrations, 2011–2022.

Sample	Concentration (mg/kg dry weight)										
Date	Ag	Al	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
10/06/11	<0.278	22,500	17.9	0.722	127	53.4	<0.0489	87.5	3.37	0.809	130
07/02/12	<0.256	20,300	14.4	0.776	125	55.4	<0.126	78.4	4.05	0.606	134
07/01/13	<0.256	14,600	13.5	0.750	101	44.6	<0.0380	55.0	2.70	3.21	105
07/30/14	0.06	14,900	19.2	0.69	84.2	45.8	0.03	55.7	2.86	1.8	111
07/07/15	0.08	14,500	14.2	0.76	92.2	47.0	0.11	54.0	3.17	2.3	109
07/06/16	0.092	14,000	18.0	0.507	71.7	37.0	0.051	48.5	2.69	2.1	111
07/07/17	0.060	15,600	17.0	0.490	64.1	38.1	0.030	47.3	3.06	1.4	101
06/28/18	0.101	14,700	19.7	0.789	105	55.1	0.047	76.4	3.97	2.86	133
08/05/19	0.071	15,100	17.1	0.808	110	44.5	0.051	60.2	3.58	1.5	116
07/09/20	0.105	9,650	12.3	0.561	68.2	34.5	0.0393	45.5	2.93	1.90	94.4
07/09/20	0.095	12,600	16.2	0.472	81.5	37.1	0.173	49.5	2.94	2.06	139
07/09/20	0.0687	11,700	18.7	0.672	82.3	41.0	0.0336	52.7	3.10	2.04	86.8
07/07/21	0.080	15,600	14.8	0.609	83.7	47.7	0.050	58.3	3.04	1.8	117
07/07/21	0.076	13,700	13.5	0.611	71.1	44.7	0.049	53.9	3.75	1.8	118
07/07/21	0.100	15,200	19.2	0.730	84.1	57.1	0.051	63.7	3.94	2.2	131
07/06/22	0.066	8,490	14.6	0.383	40.2	29.5	0.024	31.3	2.65	1.8	71.1
07/06/22	0.061	11,300	13.6	0.457	58.4	36.5	0.04	48.3	2.66	1.72	97
07/06/22	0.045	11,600	11	0.342	60.4	34.8	0.029	38.9	2.28	1.1	76.3

Appendix E.9.–Lower Johnson Creek sediment element concentrations, 2011–2022.

Sample	Concentration (mg/kg dry weight)										
Date	Ag	Al	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
10/03/11	<0.266	13,100	16.2	0.238	31.5	73.1	<0.0386	27.3	9.76	<0.181	93.3
07/02/12	0.342	13,100	12.8	0.250	35.5	76.8	<0.123	23.4	9.45	<0.167	97.3
07/01/13	0.269	10,300	11.9	0.492	24.4	56.1	<0.0354	15.7	8.00	<0.163	121
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
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
08/08/16	0.574	9,470	13.0	0.150	18.9	76.3	0.020	15.1	8.41	<0.57	65.7
07/06/17	0.172	6,730	10.3	0.115	11.7	46.2	0.064	10.3	5.96	<1.5	48.0
06/29/18	0.139	13,600	20.5	0.264	30.2	68.4	0.015	24.6	11.9	<0.63	109
07/22/19	0.205	10,200	16.1	0.168	20.2	60.1	<0.028	16.4	7.80	<0.96	81.2
07/09/20	0.107	10,300	21.5	0.158	19.8	95.4	0.0137	17.9	5.44	<0.51	89.3
07/09/20	0.080	9,850	16.7	0.181	19.9	53.9	0.0171	18.4	8.10	<0.53	85.8
07/09/20	0.109	9,110	13.3	0.164	18.8	44.7	0.0187	16.0	5.70	<0.48	94.1
07/06/21	0.135	9,820	13.8	0.127	20.5	60.0	0.034	16.4	6.16	<1.5	70.3
07/06/21	0.118	10,500	12.4	0.161	21.4	62.1	0.028	16.4	6.14	<1.4	76.4
07/06/21	0.224	11,800	15.6	0.188	24.5	101	0.048	19.2	7.98	<1.5	98.1
07/05/22	0.154	12,800	20.5	0.208	22.7	72.6	<0.027	20.2	9.37	<1.2	102
07/05/22	0.121	13,100	19.7	0.211	24.1	80.3	0.026	20.5	9.46	<1.2	101
07/05/22	0.245	11,800	21	0.212	21	87.6	<0.03	18.8	9.57	<1.2	91.9

Appendix E.10.–Lower Sherman Creek sediment element concentrations, 2011–2022.

Sample Date	Concentration (mg/kg dry weight)										
	Ag	Al	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
10/04/11	<0.259	18,200	28.9	0.389	46.2	94.0	<0.0455	45.9	6.70	<0.176	110
07/03/12	0.289	17,900	24.3	0.578	51.4	79.1	<0.124	40.2	8.43	<0.174	128
07/01/13	0.306	15,400	25.4	<0.520	37.4	69.4	<0.0384	30.9	7.39	1.77	111
07/28/14	0.14	14,900	27.9	0.360	33.6	68.4	0.03	31.1	6.97	1.2	119
07/07/15	0.25	17,500	37.0	0.32	30.9	70.8	0.02	38.0	11.0	2.0	134
07/06/16	0.097	13,800	19.9	0.388	27.5	72.5	<0.020	32.9	6.6	1.1	123
07/06/17	0.097	17,400	23.5	0.194	31.8	58.1	0.045	28.5	4.69	<1.3	90.2
06/29/18	0.135	15,600	35.2	0.353	33.7	81.9	<0.014	34.8	8.05	<0.65	120
07/22/19	0.205	17,400	42.4	0.222	36.1	59.6	<0.032	34.2	6.19	<1.2	118
07/09/20	0.092	15,800	30.2	0.276	32.1	49.3	0.0313	29.6	6.65	0.71	86.5
07/09/20	0.132	14,000	22.6	0.223	30.1	52.2	0.0262	27.7	5.66	0.72	104
07/09/20	0.171	13,000	26.5	0.201	30.5	54.8	0.0243	27.1	9.68	0.86	104
07/06/21	0.088	15,900	16.3	0.171	46.9	72.0	<0.028	36.2	30.1	<1.4	87.0
07/06/21	0.131	11,800	11.3	0.156	39.5	61.4	<0.029	33.6	5.16	<1.4	77.8
07/06/21	0.090	13,500	15.6	0.161	43.3	105	0.029	30.5	4.10	<1.4	79.2
07/06/22	0.04	7,860	10.5	0.087	19.8	31.7	<0.027	16.1	2.24	<1.2	41.8
07/06/22	<0.021	2,490	1.57	<0.021	6.3	8.41	<0.021	4.72	0.59	<1.1	13
07/06/22	0.117	12,700	21.3	0.109	27.1	40.6	0.0270	22.6	7.75	<1.2	64.1

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August 19, 2022

Analytical Report for Service Request No: K2207703

Kate Kanouse
Alaska Department of Fish and Game
Division of Habitat
802 3rd Street
P.O. Box 110024
Douglas, AK 99811-0024

RE: Coeur AK Biomonitoring

Dear Kate,

Enclosed are the results of the sample(s) submitted to our laboratory July 08, 2022
For your reference, these analyses have been assigned our service request number **K2207703.**

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 3376. You may also contact me via email at Mark.Harris@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Mark Harris
Project Manager

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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.
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.
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 DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	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	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	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/EnvironmentalLabCertification/	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
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
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
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ALS Environmental

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

Service Request: K2207703
Date Received: 07/08/2022

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Six sediment samples were received for analysis at ALS Environmental on 07/08/2022. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

Method 200.8, 07/28/2022:The Relative Percent Difference (RPD) for the replicate analysis of Lead in sample 2022KGMLJCS2 was outside the normal ALS control limits. The variability in the results was attributed to the heterogeneous character of the sample. Standard mixing techniques were used, but were not sufficient for complete homogenization of this sample.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by Noe D. Davis Date 08/19/2022

Chain of Custody

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ALS Environmental

CHAIN OF CUSTODY
101357

002

SR#_____

COC Set____of____

COC#_____

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KZ207703

Project Name	Coeur AK Biomonitoring
Project Number	
Project Manager	Erika King
Company	Coeur AK / ADF&G
Address	802 3rd St. Douglas, AK 99824
Phone #	
email	erika.king@alaska.gov
Sampler Signature	
Sampler Printed Name	William Kane

CLIENT SAMPLE ID	LABID	SAMPLING Date	SAMPLING Time	Matrix	NUMBER OF CONTAINERS	7D 160.4 Modified / TVS	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. 2022KGMLJCS1		7/5/22	1330	Soil	3	X	X	X	X	X	X	X						
2. 2022KGMLJCS2		7/5/22	1330	Soil	3	X	X	X	X	X	X	X						
3. 2022KGMLJCS3		7/5/22	1330	Soil	3	X	X	X	X	X	X	X						
4. 2022KGMLSCS1		7/5/22	1000	Soil	3	X	X	X	X	X	X	X						
5. 2022KGMLSCS2		7/5/22	1000	Soil	3	X	X	X	X	X	X	X						
6. 2022KGMLSCS3		7/5/22	1000	Soil	3	X	X	X	X	X	X	X						
7.																		
8.																		
9.																		
10.																		

Report Requirements

___ I. Routine Report: Method Blank, Surrogate, as required

✓ 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: Coeur, AK

_____

Keppers@coeur.com

Turnaround Requirements

___ 24 hr. ___ 48 hr.

___ 5 Day

✓ 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:

Please send lab report to the following emails:
- Kate Kanouse: Kate.Kanouse@alaska.gov
- Erika King: erika.king@alaska.gov

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

Please send billing info to Kevin Eppers:
- Keppers@coeur.com

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature	Signature	Signature	Signature	Signature	Signature
Printed Name: William J. Kane	Printed Name	Printed Name	Printed Name	Printed Name	Printed Name
Firm: ADF&G	Firm	Firm	Firm	Firm	Firm
Date/Time: 7/6/22 0840	Date/Time: 7/8/22 1015	Date/Time	Date/Time	Date/Time	Date/Time

PM KL

Cooler Receipt and Preservation Form

Client Coeur AK Service Request K2207703

Received: 7/8/22 Opened: 7/8/22 By: A Unloaded: 7/8/22 By: A

1. Samples were received via? *USPS* (*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

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
5.4	—	IR01				2751 9767 5519	

4. Was a Temperature Blank present in cooler? NA (Y) N If yes, notate the temperature in the appropriate column above:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA (Y) N
   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. (NA) Y N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

6. Packing material: *Inserts* *Baggies* (*Bubble Wrap*) (*Gel Packs*) *Wet Ice* *Dry Ice* *Sleeves* _____
7. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
8. Were samples received in good condition (unbroken) NA (Y) N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA (Y) N
10. Did all sample labels and tags agree with custody papers? NA (Y) N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* (NA) Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
14. Was C12/Res negative? (NA) Y N
15. Were 100ml sterile microbiology bottles filled exactly to the 100ml mark? (NA) Y N Under filled Overfilled

Sample ID on Bottle	Sample ID on COC	Identified by:

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

Notes, Discrepancies, Resolutions: _____

Total Solids

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/5/22
Sample Matrix:	Sediment	**Date Received:**	07/8/22
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
2022KGMLJCS1	K2207703-001	**64.4**	-	1	07/26/22 14:37	
2022KGMLJCS2	K2207703-002	**66.5**	-	1	07/26/22 14:37	
2022KGMLJCS3	K2207703-003	**59.4**	-	1	07/26/22 14:37	
2022KGMLSCS1	K2207703-004	**70.4**	-	1	07/26/22 14:37	
2022KGMLSCS2	K2207703-005	**71.2**	-	1	07/26/22 14:37	
2022KGMLSCS3	K2207703-006	**69.5**	-	1	07/26/22 14:37	
Method Blank	K2207703-MB	ND U	-	1	07/26/22 14:37	

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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project	Coeur AK Biomonitoring	**Date Collected:**	07/05/22
Sample Matrix:	Sediment	**Date Received:**	07/08/22
		Date Analyzed:	07/26/22

Replicate Sample Summary
Inorganic Parameters

Sample Name:	2022KGMLJCS1	**Units:**	Percent
Lab Code:	K2207703-001	**Basis:**	As Received

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K2207703-001DUP Result	Average	RPD	RPD Limit
Solids, Total	160.3 Modified	-	64.4	64.1	64.3	<1	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.

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/5/22
Sample Matrix:	Sediment	**Date Received:**	07/8/22
Analysis Method:	160.4 Modified	**Units:**	Percent
Prep Method:	None	**Basis:**	Dry, per Method

Solids, Total Volatile

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
2022KGMLJCS1	K2207703-001	**2.50**	0.10	1	07/26/22 14:37	
2022KGMLJCS2	K2207703-002	**2.40**	0.10	1	07/26/22 14:37	
2022KGMLJCS3	K2207703-003	**3.70**	0.10	1	07/26/22 14:37	
2022KGMLSCS1	K2207703-004	**2.40**	0.10	1	07/26/22 14:37	
2022KGMLSCS2	K2207703-005	**2.60**	0.10	1	07/26/22 14:37	
2022KGMLSCS3	K2207703-006	**2.70**	0.10	1	07/26/22 14:37	
Method Blank	K2207703-MB	ND U	0.10	1	07/26/22 14:37	

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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project	Coeur AK Biomonitoring	**Date Collected:**	07/05/22
Sample Matrix:	Sediment	**Date Received:**	07/08/22
		Date Analyzed:	07/26/22

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	2022KGMLJCS1	**Units:**	Percent
Lab Code:	K2207703-001	**Basis:**	Dry, per Method

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K2207703-001DUP Result	Average	RPD	RPD Limit
Solids, Total Volatile	160.4 Modified	0.10	2.50	2.40	2.45	4	20

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General Chemistry

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/5/22
Sample Matrix:	Sediment	**Date Received:**	07/8/22
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
2022KGMLJCS1	K2207703-001	ND U	0.92	1	07/11/22 15:55	7/11/22	
2022KGMLJCS2	K2207703-002	ND U	0.89	1	07/11/22 15:55	7/11/22	
2022KGMLJCS3	K2207703-003	ND U	1.0	1	07/11/22 15:55	7/11/22	
2022KGMLSCS1	K2207703-004	ND U	0.84	1	07/11/22 15:55	7/11/22	
2022KGMLSCS2	K2207703-005	ND U	0.82	1	07/11/22 15:55	7/11/22	
2022KGMLSCS3	K2207703-006	ND U	0.82	1	07/11/22 15:55	7/11/22	
Method Blank	K2207703-MB	ND U	0.60	1	07/11/22 15:55	7/11/22	

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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project	Coeur AK Biomonitoring	**Date Collected:**	07/05/22
Sample Matrix:	Sediment	**Date Received:**	07/08/22
		Date Analyzed:	07/11/22

Triplicate Sample Summary
General Chemistry Parameters

Sample Name:	2022KGMLSCS1	**Units:**	mg/Kg
Lab Code:	K2207703-004	**Basis:**	Dry
Analysis Method:	PSEP Sulfide		
Prep Method:	Method		

Analyte Name	MRL	Sample Result	Duplicate K2207703-004DUP Result	Triplicate K2207703-004TRP Result	Average	RSD	RSD Limit
Sulfide, Total	0.85	ND	ND	ND	NC	NC	20

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Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/05/22
Sample Matrix:	Sediment	**Date Received:**	07/08/22
		Date Analyzed:	07/11/22
		Date Extracted:	07/11/22

Duplicate Matrix Spike Summary
Sulfide, Total

Sample Name:	2022KGMLSCS1	**Units:**	mg/Kg
Lab Code:	K2207703-004	**Basis:**	Dry
Analysis Method:	PSEP Sulfide		
Prep Method:	Method		

		Matrix Spike			**Duplicate Matrix Spike**					
		K2207703-004MS			K2207703-004DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Sulfide, Total	ND U	1240	1030	121	1230	1010	122	28-175	2	20

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

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Analyzed:**	07/11/22
Sample Matrix:	Sediment	**Date Extracted:**	07/11/22

Lab Control Sample Summary
Sulfide, Total

Analysis Method:	PSEP Sulfide	**Units:**	mg/Kg
Prep Method:	Method	**Basis:**	Dry
		Analysis Lot:	770097

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K2207703-LCS	540	410	132	39-166

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/5/22
Sample Matrix:	Sediment	**Date Received:**	07/8/22
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
2022KGMLJCS1	K2207703-001	**0.400**	0.050	1	07/19/22 14:00	7/19/22	
2022KGMLJCS2	K2207703-002	**0.340**	0.050	1	07/19/22 14:00	7/19/22	
2022KGMLJCS3	K2207703-003	**0.811**	0.050	1	07/19/22 14:00	7/19/22	
2022KGMLSCS1	K2207703-004	**0.411**	0.050	1	07/19/22 14:00	7/19/22	
2022KGMLSCS2	K2207703-005	**0.469**	0.050	1	07/19/22 14:00	7/19/22	
2022KGMLSCS3	K2207703-006	**0.424**	0.050	1	07/19/22 14:00	7/19/22	
Method Blank	K2207703-MB	ND U	0.050	1	07/19/22 14:00	7/19/22	

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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project	Coeur AK Biomonitoring	**Date Collected:**	07/05/22
Sample Matrix:	Sediment	**Date Received:**	07/08/22
		Date Analyzed:	07/19/22

Triplicate Sample Summary
General Chemistry Parameters

Sample Name:	2022KGMLJCS1	**Units:**	Percent
Lab Code:	K2207703-001	**Basis:**	Dry, per Method
Analysis Method:	PSEP TOC		
Prep Method:	ALS SOP		

Analyte Name	MRL	Sample Result	Duplicate K2207703-001DUP Result	Triplicate K2207703-001TRP Result	Average	RSD	RSD Limit
Carbon, Total Organic (TOC)	0.050	0.400	0.396	0.398	0.398	<1	27

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

Printed 8/19/2022 1:32:31 PM

SuperSet Reference:22-0000632802 rev 00

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/05/22
Sample Matrix:	Sediment	**Date Received:**	07/08/22
		Date Analyzed:	07/19/22
		Date Extracted:	07/19/22

Duplicate Matrix Spike Summary
Carbon, Total Organic (TOC)

Sample Name:	2022KGMLJCS1	**Units:**	Percent
Lab Code:	K2207703-001	**Basis:**	Dry, per Method
Analysis Method:	PSEP TOC		
Prep Method:	ALS SOP		

		Matrix Spike			Duplicate Matrix Spike					
		K2207703-001MS			K2207703-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Carbon, Total Organic (TOC)	0.400	3.54	3.19	98	3.91	3.50	100	69-123	2	27

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

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

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

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Analyzed:**	07/19/22
Sample Matrix:	Sediment	**Date Extracted:**	07/19/22

Lab Control Sample Summary
Carbon, Total Organic (TOC)

Analysis Method:	PSEP TOC	**Units:**	Percent
Prep Method:	ALS SOP	**Basis:**	Dry, per Method
		Analysis Lot:	771043

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K2207703-LCS	4.88	4.40	111	74-118

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Sediment - 2019	**Date Collected:**	07/05/22
Sample Matrix:	Sediment	**Date Received:**	07/08/22
		Date Analyzed:	08/12/22

Particle Size Determination
ASTM D422

Sample Name: 2022KGMLJCS1
Lab Code: K2207703-001

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	99.99
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	99.99
Gravel, Medium	**No.4 (4.75 mm)**	0.0000	99.99
Gravel, Fine	**No.10 (2.00 mm)**	0.0471	99.89
Sand, Very Coarse	**No.20 (0.850 mm)**	1.0897	97.48
Sand, Coarse	**No.40 (0.425 mm)**	14.7209	65.03
Sand, Medium	**No.60 (0.250 mm)**	4.9957	54.01
Sand, Fine	**No.140 (0.106 mm)**	19.8233	10.31
Sand, Very Fine	**No.200 (0.0750 mm)**	0.0322	10.24

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	10.37
0.005 mm	1.79
0.001 mm	0.00

ALS Group USA, Corp.
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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Sediment - 2019	**Date Collected:**	07/05/22
Sample Matrix:	Sediment	**Date Received:**	07/08/22
		Date Analyzed:	08/12/22

Particle Size Determination
ASTM D422

Sample Name: 2022KGMLJCS1
Lab Code: K2207703-001DUP

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	99.99
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	99.99
Gravel, Medium	**No.4 (4.75 mm)**	0.0000	99.99
Gravel, Fine	**No.10 (2.00 mm)**	0.0321	99.92
Sand, Very Coarse	**No.20 (0.850 mm)**	0.8743	98.02
Sand, Coarse	**No.40 (0.425 mm)**	13.8520	67.93
Sand, Medium	**No.60 (0.250 mm)**	7.7542	51.08
Sand, Fine	**No.140 (0.106 mm)**	18.2571	11.41
Sand, Very Fine	**No.200 (0.0750 mm)**	0.0478	11.30

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	11.72
0.005 mm	2.50
0.001 mm	0.00

ALS Group USA, Corp.
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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/05/22
Sample Matrix:	Sediment	**Date Received:**	07/08/22
		Date Analyzed:	08/12/22

Particle Size Determination
ASTM D422

Sample Name: 2022KGMLJCS2
Lab Code: K2207703-002

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	99.66
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	99.66
Gravel, Medium	**No.4 (4.75 mm)**	0.0000	99.66
Gravel, Fine	**No.10 (2.00 mm)**	0.8523	97.89
Sand, Very Coarse	**No.20 (0.850 mm)**	8.5464	80.21
Sand, Coarse	**No.40 (0.425 mm)**	19.1500	40.57
Sand, Medium	**No.60 (0.250 mm)**	0.9929	38.51
Sand, Fine	**No.140 (0.106 mm)**	14.3389	8.84
Sand, Very Fine	**No.200 (0.0750 mm)**	0.0472	8.74

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	10.21
0.005 mm	4.20
0.001 mm	0.00

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/05/22
Sample Matrix:	Sediment	**Date Received:**	07/08/22
		Date Analyzed:	08/12/22

Particle Size Determination
ASTM D422

Sample Name: 2022KGMLJCS3
Lab Code: K2207703-003

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	99.80
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	99.80
Gravel, Medium	**No.4 (4.75 mm)**	0.3125	99.16
Gravel, Fine	**No.10 (2.00 mm)**	0.2512	98.64
Sand, Very Coarse	**No.20 (0.850 mm)**	0.9152	96.76
Sand, Coarse	**No.40 (0.425 mm)**	7.9429	80.44
Sand, Medium	**No.60 (0.250 mm)**	1.5605	77.23
Sand, Fine	**No.140 (0.106 mm)**	23.0533	29.86
Sand, Very Fine	**No.200 (0.0750 mm)**	2.8940	23.91

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	24.07
0.005 mm	5.26
0.001 mm	0.00

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/05/22
Sample Matrix:	Sediment	**Date Received:**	07/08/22
		Date Analyzed:	08/12/22

Particle Size Determination
ASTM D422

Sample Name: 2022KGMLSCS1
Lab Code: K2207703-004

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	99.29
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	99.29
Gravel, Medium	**No.4 (4.75 mm)**	0.0000	99.29
Gravel, Fine	**No.10 (2.00 mm)**	6.0600	86.00
Sand, Very Coarse	**No.20 (0.850 mm)**	17.3372	48.20
Sand, Coarse	**No.40 (0.425 mm)**	17.6160	9.78
Sand, Medium	**No.60 (0.250 mm)**	0.1227	9.52
Sand, Fine	**No.140 (0.106 mm)**	3.6402	1.58
Sand, Very Fine	**No.200 (0.0750 mm)**	0.0825	1.40

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	3.71
0.005 mm	3.72
0.001 mm	0.00

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/05/22
Sample Matrix:	Sediment	**Date Received:**	07/08/22
		Date Analyzed:	08/12/22

Particle Size Determination
ASTM D422

Sample Name: 2022KGMLSCS2
Lab Code: K2207703-005

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	98.77
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	98.77
Gravel, Medium	**No.4 (4.75 mm)**	7.1253	84.07
Gravel, Fine	**No.10 (2.00 mm)**	7.6509	68.29
Sand, Very Coarse	**No.20 (0.850 mm)**	10.5409	46.89
Sand, Coarse	**No.40 (0.425 mm)**	14.4165	17.63
Sand, Medium	**No.60 (0.250 mm)**	0.2194	17.19
Sand, Fine	**No.140 (0.106 mm)**	7.6096	1.74
Sand, Very Fine	**No.200 (0.0750 mm)**	0.1876	1.36

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	3.49
0.005 mm	3.25
0.001 mm	0.00

ALS Group USA, Corp.
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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/05/22
Sample Matrix:	Sediment	**Date Received:**	07/08/22
		Date Analyzed:	08/12/22

Particle Size Determination
ASTM D422

Sample Name: 2022KGMLSCS3
Lab Code: K2207703-006

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	99.02
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	99.02
Gravel, Medium	**No.4 (4.75 mm)**	1.1164	96.58
Gravel, Fine	**No.10 (2.00 mm)**	6.3736	82.61
Sand, Very Coarse	**No.20 (0.850 mm)**	13.0960	54.18
Sand, Coarse	**No.40 (0.425 mm)**	18.5926	13.83
Sand, Medium	**No.60 (0.250 mm)**	0.1846	13.42
Sand, Fine	**No.140 (0.106 mm)**	5.3508	1.81
Sand, Very Fine	**No.200 (0.0750 mm)**	0.1012	1.59

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	3.74
0.005 mm	3.04
0.001 mm	0.00

Metals

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:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/05/22 13:30
Sample Matrix:	Sediment	**Date Received:**	07/08/22 10:15
Sample Name:	2022KGMLJCS1	**Basis:**	Dry
Lab Code:	K2207703-001		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**12800**	mg/Kg	2.3	5	07/28/22 14:24	07/27/22	
Arsenic	200.8	**20.5**	mg/Kg	0.58	5	07/28/22 14:24	07/27/22	
Cadmium	200.8	**0.208**	mg/Kg	0.023	5	07/28/22 14:24	07/27/22	
Chromium	200.8	**22.7**	mg/Kg	0.23	5	07/28/22 14:24	07/27/22	
Copper	200.8	**72.6**	mg/Kg	0.12	5	07/28/22 14:24	07/27/22	
Lead	200.8	**9.37**	mg/Kg	0.058	5	07/28/22 14:24	07/27/22	
Mercury	7471B	ND U	mg/Kg	0.026	1	07/29/22 11:00	07/28/22	
Nickel	200.8	**20.2**	mg/Kg	0.23	5	07/28/22 14:24	07/27/22	
Selenium	200.8	ND U	mg/Kg	1.2	5	07/28/22 14:24	07/27/22	
Silver	200.8	**0.154**	mg/Kg	0.023	5	07/28/22 14:24	07/27/22	
Zinc	200.8	**102**	mg/Kg	0.58	5	07/28/22 14:24	07/27/22	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/05/22 13:30
Sample Matrix:	Sediment	**Date Received:**	07/08/22 10:15
Sample Name:	2022KGMLJCS2	**Basis:**	Dry
Lab Code:	K2207703-002		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**13700**	mg/Kg	2.7	5	07/28/22 14:26	07/27/22	
Arsenic	200.8	**19.8**	mg/Kg	0.68	5	07/28/22 14:26	07/27/22	
Cadmium	200.8	**0.187**	mg/Kg	0.027	5	07/28/22 14:26	07/27/22	
Chromium	200.8	**25.6**	mg/Kg	0.27	5	07/28/22 14:26	07/27/22	
Copper	200.8	**72.8**	mg/Kg	0.14	5	07/28/22 14:26	07/27/22	
Lead	200.8	**7.21**	mg/Kg	0.068	5	07/28/22 14:26	07/27/22	
Mercury	7471B	**0.026**	mg/Kg	0.026	1	07/29/22 11:07	07/28/22	
Nickel	200.8	**21.3**	mg/Kg	0.27	5	07/28/22 14:26	07/27/22	
Selenium	200.8	ND	U mg/Kg	1.4	5	07/28/22 14:26	07/27/22	
Silver	200.8	**0.127**	mg/Kg	0.027	5	07/28/22 14:26	07/27/22	
Zinc	200.8	**99.4**	mg/Kg	0.68	5	07/28/22 14:26	07/27/22	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/05/22 13:30
Sample Matrix:	Sediment	**Date Received:**	07/08/22 10:15
Sample Name:	2022KGMLJCS3	**Basis:**	Dry
Lab Code:	K2207703-003		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**11800**	mg/Kg	2.4	5	07/28/22 14:34	07/27/22	
Arsenic	200.8	**21.0**	mg/Kg	0.60	5	07/28/22 14:34	07/27/22	
Cadmium	200.8	**0.212**	mg/Kg	0.024	5	07/28/22 14:34	07/27/22	
Chromium	200.8	**21.0**	mg/Kg	0.24	5	07/28/22 14:34	07/27/22	
Copper	200.8	**87.6**	mg/Kg	0.12	5	07/28/22 14:34	07/27/22	
Lead	200.8	**9.57**	mg/Kg	0.060	5	07/28/22 14:34	07/27/22	
Mercury	7471B	ND U	mg/Kg	0.030	1	07/29/22 11:08	07/28/22	
Nickel	200.8	**18.8**	mg/Kg	0.24	5	07/28/22 14:34	07/27/22	
Selenium	200.8	ND U	mg/Kg	1.2	5	07/28/22 14:34	07/27/22	
Silver	200.8	**0.245**	mg/Kg	0.024	5	07/28/22 14:34	07/27/22	
Zinc	200.8	**91.9**	mg/Kg	0.60	5	07/28/22 14:34	07/27/22	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/05/22 10:00
Sample Matrix:	Sediment	**Date Received:**	07/08/22 10:15
Sample Name:	2022KGMLSCS1	**Basis:**	Dry
Lab Code:	K2207703-004		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**8230**	mg/Kg	1.9	5	07/28/22 14:36	07/27/22	
Arsenic	200.8	**8.88**	mg/Kg	0.49	5	07/28/22 14:36	07/27/22	
Cadmium	200.8	**0.396**	mg/Kg	0.019	5	07/28/22 14:36	07/27/22	
Chromium	200.8	**13.2**	mg/Kg	0.19	5	07/28/22 14:36	07/27/22	
Copper	200.8	**32.0**	mg/Kg	0.097	5	07/28/22 14:36	07/27/22	
Lead	200.8	**4.19**	mg/Kg	0.049	5	07/28/22 14:36	07/27/22	
Mercury	7471B	**0.048**	mg/Kg	0.026	1	07/29/22 11:10	07/28/22	
Nickel	200.8	**25.6**	mg/Kg	0.19	5	07/28/22 14:36	07/27/22	
Selenium	200.8	ND	U mg/Kg	0.97	5	07/28/22 14:36	07/27/22	
Silver	200.8	**0.065**	mg/Kg	0.019	5	07/28/22 14:36	07/27/22	
Zinc	200.8	**97.2**	mg/Kg	0.49	5	07/28/22 14:36	07/27/22	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/05/22 10:00
Sample Matrix:	Sediment	**Date Received:**	07/08/22 10:15
Sample Name:	2022KGMLSCS2	**Basis:**	Dry
Lab Code:	K2207703-005		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**9100**	mg/Kg	2.0	5	07/28/22 14:38	07/27/22	
Arsenic	200.8	**10.9**	mg/Kg	0.50	5	07/28/22 14:38	07/27/22	
Cadmium	200.8	**0.381**	mg/Kg	0.020	5	07/28/22 14:38	07/27/22	
Chromium	200.8	**13.9**	mg/Kg	0.20	5	07/28/22 14:38	07/27/22	
Copper	200.8	**32.8**	mg/Kg	0.10	5	07/28/22 14:38	07/27/22	
Lead	200.8	**5.61**	mg/Kg	0.050	5	07/28/22 14:38	07/27/22	
Mercury	7471B	**0.034**	mg/Kg	0.025	1	07/29/22 11:11	07/28/22	
Nickel	200.8	**23.8**	mg/Kg	0.20	5	07/28/22 14:38	07/27/22	
Selenium	200.8	ND	U mg/Kg	1.0	5	07/28/22 14:38	07/27/22	
Silver	200.8	**0.059**	mg/Kg	0.020	5	07/28/22 14:38	07/27/22	
Zinc	200.8	**100**	mg/Kg	0.50	5	07/28/22 14:38	07/27/22	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/05/22 10:00
Sample Matrix:	Sediment	**Date Received:**	07/08/22 10:15
Sample Name:	2022KGMLSCS3	**Basis:**	Dry
Lab Code:	K2207703-006		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**11400**	mg/Kg	2.6	5	07/28/22 14:41	07/27/22	
Arsenic	200.8	**11.2**	mg/Kg	0.65	5	07/28/22 14:41	07/27/22	
Cadmium	200.8	**0.482**	mg/Kg	0.026	5	07/28/22 14:41	07/27/22	
Chromium	200.8	**18.0**	mg/Kg	0.26	5	07/28/22 14:41	07/27/22	
Copper	200.8	**37.2**	mg/Kg	0.13	5	07/28/22 14:41	07/27/22	
Lead	200.8	**6.42**	mg/Kg	0.065	5	07/28/22 14:41	07/27/22	
Mercury	7471B	**0.033**	mg/Kg	0.026	1	07/29/22 11:16	07/28/22	
Nickel	200.8	**30.6**	mg/Kg	0.26	5	07/28/22 14:41	07/27/22	
Selenium	200.8	ND	U mg/Kg	1.3	5	07/28/22 14:41	07/27/22	
Silver	200.8	**0.069**	mg/Kg	0.026	5	07/28/22 14:41	07/27/22	
Zinc	200.8	**127**	mg/Kg	0.65	5	07/28/22 14:41	07/27/22	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	Dry
Lab Code:	KQ2212183-03		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	ND U	mg/Kg	2.0	5	07/28/22 14:19	07/27/22	
Arsenic	200.8	ND U	mg/Kg	0.5	5	07/28/22 14:19	07/27/22	
Cadmium	200.8	ND U	mg/Kg	0.020	5	07/28/22 14:19	07/27/22	
Chromium	200.8	ND U	mg/Kg	0.20	5	07/28/22 14:19	07/27/22	
Copper	200.8	ND U	mg/Kg	0.10	5	07/28/22 14:19	07/27/22	
Lead	200.8	ND U	mg/Kg	0.05	5	07/28/22 14:19	07/27/22	
Nickel	200.8	ND U	mg/Kg	0.20	5	07/28/22 14:19	07/27/22	
Selenium	200.8	ND U	mg/Kg	1.0	5	07/28/22 14:19	07/27/22	
Silver	200.8	ND U	mg/Kg	0.020	5	07/28/22 14:19	07/27/22	
Zinc	200.8	ND U	mg/Kg	0.5	5	07/28/22 14:19	07/27/22	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	Dry
Lab Code:	KQ2212182-03		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Mercury	7471B	ND U	mg/Kg	0.02	1	07/29/22 10:57	07/28/22	

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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project	Coeur AK Biomonitoring	**Date Collected:**	07/05/22
Sample Matrix:	Sediment	**Date Received:**	07/08/22
		Date Analyzed:	07/28/22

Replicate Sample Summary
Total Metals

Sample Name:	2022KGMLJCS2	**Units:**	mg/Kg
Lab Code:	K2207703-002	**Basis:**	Dry

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample KQ2212183-01 Result	Average	RPD	RPD Limit
Aluminum	200.8	2.5	13700	12400	13100	10	30
Arsenic	200.8	0.62	19.8	19.6	19.7	<1	30
Cadmium	200.8	0.025	0.187	0.234	0.211	23	30
Chromium	200.8	0.25	25.6	22.6	24.1	12	30
Copper	200.8	0.12	72.8	87.7	80.3	19	30
Lead	200.8	0.062	7.21	11.7	9.46	48 *	30
Nickel	200.8	0.25	21.3	19.6	20.5	9	30
Selenium	200.8	1.2	ND U	ND U	ND	-	30
Silver	200.8	0.025	0.127	0.114	0.121	10	30
Zinc	200.8	0.62	99.4	103	101	4	30

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.

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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project	Coeur AK Biomonitoring	**Date Collected:**	07/05/22
Sample Matrix:	Sediment	**Date Received:**	07/08/22
		Date Analyzed:	07/29/22

Replicate Sample Summary

Total Metals

Sample Name:	2022KGMLJCS1	**Units:**	mg/Kg
Lab Code:	K2207703-001	**Basis:**	Dry

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample KQ2212182-01 Result	Average	RPD	RPD Limit
Mercury	7471B	0.027	ND U	ND U	ND	-	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.

Printed 7/29/2022 5:53:44 PM Superset Reference:

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/05/22
Sample Matrix:	Sediment	**Date Received:**	07/08/22
		Date Analyzed:	07/28/22
		Date Extracted:	07/27/22

Matrix Spike Summary
Total Metals

Sample Name:	2022KGMLJCS2	**Units:**	mg/Kg
Lab Code:	K2207703-002	**Basis:**	Dry
Analysis Method:	200.8		
Prep Method:	EPA 3050B		

Matrix Spike
KQ2212183-02

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Aluminum	13700	13000	538	-137 #	70-130
Arsenic	19.8	154	134	100	70-130
Cadmium	0.187	13.5	13.4	99	70-130
Chromium	25.6	75.8	53.8	93	70-130
Copper	72.8	133	67.2	89	70-130
Lead	7.21	142	134	100	70-130
Nickel	21.3	149	134	95	70-130
Selenium	ND U	136	134	101	70-130
Silver	0.127	12.9	13.4	95	70-130
Zinc	99.4	230	134	97	70-130

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.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/05/22
Sample Matrix:	Sediment	**Date Received:**	07/08/22
		Date Analyzed:	07/29/22
		Date Extracted:	07/28/22

Matrix Spike Summary
Total Metals

Sample Name:	2022KGMLJCS1	**Units:**	mg/Kg
Lab Code:	K2207703-001	**Basis:**	Dry
Analysis Method:	7471B		
Prep Method:	Method		

Matrix Spike
KQ2212182-02

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Mercury	ND U	0.677	0.672	98	80-120

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.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

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QA/QC Report

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

Service Request: K2207703
Date Analyzed: 07/28/22

Lab Control Sample Summary
Total Metals

Units:mg/Kg
Basis: Dry

Lab Control Sample
KQ2212183-04

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Aluminum	200.8	430	400	107	85-115
Arsenic	200.8	102	100	102	85-115
Cadmium	200.8	9.80	10.0	98	85-115
Chromium	200.8	39.2	40.0	98	85-115
Copper	200.8	48.3	50.0	97	85-115
Lead	200.8	98.3	100	98	85-115
Nickel	200.8	98.0	100	98	85-115
Selenium	200.8	98.5	100	98	85-115
Silver	200.8	9.85	10.0	99	85-115
Zinc	200.8	98.4	100	98	85-115

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207703
Project:	Coeur AK Biomonitoring	**Date Analyzed:**	07/29/22
Sample Matrix:	Sediment		

Lab Control Sample Summary
Total Metals

Units:mg/Kg
Basis: Dry

Lab Control Sample
KQ2212182-04

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Mercury	7471B	0.493	0.500	99	80-120

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July 27, 2022

Analytical Report for Service Request No: K2207795

Bill Kane
Alaska Department of Fish and Game
Division of Habitat
802 3rd Street
P.O. Box 110024
Douglas, AK 99811-0024

RE: Coeur AK Biomonitoring

Dear Bill,

Enclosed are the results of the sample(s) submitted to our laboratory July 12, 2022
For your reference, these analyses have been assigned our service request number **K2207795.**

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 3376. You may also contact me via email at Mark.Harris@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Mark Harris
Project Manager

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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.
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.
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 DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	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	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	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/EnvironmentalLabCertification/	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
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
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
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ALS Environmental

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

Service Request: K2207795
Date Received: 07/12/2022

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier level IV requested by the client.

Sample Receipt:

Nine soil samples were received for analysis at ALS Environmental on 07/12/2022. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

Method 200.8, 07/18/2022: The Relative Percent Difference (RPD) for the replicate analysis of Arsenic and Lead in sample 2022KGMLSHS1 was outside the normal ALS control limits. The variability in the results was attributed to the heterogeneous character of the sample. Standard mixing techniques were used, but were not sufficient for complete homogenization of this sample.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by Noe D. Diaz Date 07/27/2022

Chain of Custody

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ALS Environmental

CHAIN OF CUSTODY
124481

001

SR#_____

COC Set_____of_____

COC#_____

[redacted]

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R2207795

Project Name: Coeur AK Biomonitoring | Project Number:
Project Manager: Kate Kanouse
Company: Coeur AK | ADFG
Address: 802 3rd St Douglas AK 99824
Phone #: 907-465-4290 | email: kate.kanouse@alaska.gov
Sampler Signature: | Sampler Printed Name: Erika King

CLIENT SAMPLE ID	LABID	SAMPLING Date	Time	Matrix	NUMBER OF CONTAINERS	7D: 160.4 Modified / TVS	7D: PSEP Sulfide / PSEP Sulfide	14D: PSEP TOC / PSEP TOC	14D: PSEP TOC / PSEP TOC T	28D: 7471B / Hg	180D: 200.8 / Metals T	180D: ASTM D422M / Partsize	999D: 160.3 Modified / TS	F	G	H	K	L	Remarks
1. 2022KGMLSHS1		7/6/2022	0830	Soil	3	X	X	X	X	X	X	X	X						
2. 2022KGMLSHS2		7/6/2022	0830	Soil	3	X	X	X	X	X	X	X	X						
3. 2022KGMLSHS3		7/6/2022	0830	Soil	3	X	X	X	X	X	X	X	X						
4. 2022KGMEFSCS1		7/6/2022	1000	Soil	3	X	X	X	X	X	X	X	X						
5. 2022KGMEFSCS2		7/6/2022	1000	Soil	3	X	X	X	X	X	X	X	X						
6. 2022KGMEFSCS3		7/6/2022	1000	Soil	3	X	X	X	X	X	X	X	X						
7. 2022KGMUSCS1		7/6/2022	1100	Soil	3	X	X	X	X	X	X	X	X						
8. 2022KGMUSCS2		7/6/2022	1100	Soil	3	X	X	X	X	X	X	X	X						
9. 2022KGMUSCS3		7/6/2022	1100	Soil	3	X	X	X	X	X	X	X	X						
10.																			

Report Requirements

___ I. Routine Report: Method Blank, Surrogate, as required
✓ 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: Coeur AK
Kevin Eppers
Keppers@coeur.com

Turnaround Requirements

___ 24 hr ___ 48 hr.
___ 5 Day
✓ 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:
Please send lab report to the following emails:
- Kate.Kanouse@alaska.gov
- erika.King@alaska.gov

Please send billing info to Kevin Eppers:
- Keppers@coeur.com

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

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature:	Signature: Naomi Pedersen	Signature	Signature	Signature	Signature
Printed Name: William J. Kane	Printed Name: MTS	Printed Name	Printed Name	Printed Name	Printed Name
Firm: ADF&G	Firm: 7/12/22 0950	Firm	Firm	Firm	Firm
Date/Time: 7/6/2022 0830	Date/Time	Date/Time	Date/Time	Date/Time	Date/Time

PM MH

Cooler Receipt and Preservation Form

Client Coeur AK Service Request K22 07795

Received: 7/12/22 Opened: 7/12/22 By: AP Unloaded: 7/12/22 By: AP

1. Samples were received via? *USPS* (*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? 1 Front
   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp Indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
2.8	2.1	IR02	124481	—	—	2753 8730 7926	

4. Was a Temperature Blank present in cooler? NA (Y) N If yes, notate the temperature in the appropriate column above:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA (Y) N
   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. (NA) Y N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

6. Packing material: *Inserts* *Baggies* (*Bubble Wrap*) (*Gel Packs*) *Wet Ice* *Dry Ice* *Sleeves* Paper
7. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
8. Were samples received in good condition (unbroken) NA (Y) N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA (Y) N
10. Did all sample labels and tags agree with custody papers? NA (Y) N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* (NA) Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
14. Was C12/Res negative? (NA) Y N
15. Were 100ml sterile microbiology bottles filled exactly to the 100ml mark? (NA) Y N Under filled Overfilled

Sample ID on Bottle	Sample ID on COC	Identified by:

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

Notes, Discrepancies, Resolutions:_____

Total Solids

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/6/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
Analysis Method:	160.3 Modified	**Units:**	Percent
Prep Method:	None	**Basis:**	As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
2022KGMLSHS1	K2207795-001	**69.5**	-	-	1	07/20/22 08:18	
2022KGMLSH2	K2207795-002	**81.1**	-	-	1	07/20/22 08:18	
2022KGMLSH3	K2207795-003	**71.1**	-	-	1	07/20/22 08:18	
2022KGMEFSCS1	K2207795-004	**76.5**	-	-	1	07/20/22 08:18	
2022KGMEFSCS2	K2207795-005	**84.6**	-	-	1	07/20/22 08:18	
2022KGMEFSCS3	K2207795-006	**84.0**	-	-	1	07/20/22 08:18	
2022KGMUSCS1	K2207795-007	**86.7**	-	-	1	07/20/22 08:18	
2022KGMUSCS2	K2207795-008	**82.4**	-	-	1	07/20/22 08:18	
2022KGMUSCS3	K2207795-009	**83.8**	-	-	1	07/20/22 08:18	
Method Blank	K2207795-MB	ND U	-	-	1	07/20/22 08:18	

ALS Group USA, Corp.

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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project	Coeur AK Biomonitoring	**Date Collected:**	07/06/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
		Date Analyzed:	07/20/22

Replicate Sample Summary
Inorganic Parameters

Sample Name:	2022KGMLSHS1	**Units:**	Percent
Lab Code:	K2207795-001	**Basis:**	As Received

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample K2207795-001DUP Result	Average	RPD	RPD Limit
Solids, Total	160.3 Modified	-	-	69.5	70.8	70.2	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.

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/6/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
Analysis Method:	160.4 Modified	**Units:**	Percent
Prep Method:	None	**Basis:**	Dry, per Method

Solids, Total Volatile

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
2022KGMLSHS1	K2207795-001	**2.10**	0.10	-	1	07/20/22 08:18	
2022KGMLSH2	K2207795-002	**2.10**	0.10	-	1	07/20/22 08:18	
2022KGMLSH3	K2207795-003	**2.20**	0.10	-	1	07/20/22 08:18	
2022KGMEFSCS1	K2207795-004	**3.40**	0.10	-	1	07/20/22 08:18	
2022KGMEFSCS2	K2207795-005	**3.40**	0.10	-	1	07/20/22 08:18	
2022KGMEFSCS3	K2207795-006	**2.40**	0.10	-	1	07/20/22 08:18	
2022KGMUSCS1	K2207795-007	**1.30**	0.10	-	1	07/20/22 08:18	
2022KGMUSCS2	K2207795-008	**1.60**	0.10	-	1	07/20/22 08:18	
2022KGMUSCS3	K2207795-009	**1.50**	0.10	-	1	07/20/22 08:18	
Method Blank	K2207795-MB	ND U	0.10	-	1	07/20/22 08:18	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project	Coeur AK Biomonitoring	**Date Collected:**	07/06/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
		Date Analyzed:	07/20/22

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	2022KGMLSHS1	**Units:**	Percent
Lab Code:	K2207795-001	**Basis:**	Dry, per Method

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample K2207795-001DUP Result	Average	RPD	RPD Limit
Solids, Total Volatile	160.4 Modified	0.10	-	2.10	2.40	2.25	13	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.

General Chemistry

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www.alsglobal.com

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/6/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
Analysis Method:	PSEP Sulfide	**Units:**	mg/Kg
Prep Method:	Method	**Basis:**	Dry

Sulfide, Total

Sample Name	Lab Code	Result		MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2022KGMLSHS1	K2207795-001	**0.59**	**J**	0.85	0.43	1	07/13/22 17:30	7/13/22	
2022KGMLSH2	K2207795-002	ND	U	0.73	0.37	1	07/13/22 17:30	7/13/22	
2022KGMLSH3	K2207795-003	**0.46**	**J**	0.79	0.40	1	07/13/22 17:30	7/13/22	
2022KGMEFSCS1	K2207795-004	**0.61**	**J**	0.74	0.38	1	07/13/22 17:30	7/13/22	
2022KGMEFSCS2	K2207795-005	**0.71**		0.69	0.35	1	07/13/22 17:30	7/13/22	
2022KGMEFSCS3	K2207795-006	**0.65**	**J**	0.69	0.35	1	07/13/22 17:30	7/13/22	
2022KGMUSCS1	K2207795-007	ND	U	0.69	0.35	1	07/13/22 17:30	7/13/22	
2022KGMUSCS2	K2207795-008	ND	U	0.72	0.36	1	07/13/22 17:30	7/13/22	
2022KGMUSCS3	K2207795-009	ND	U	0.71	0.36	1	07/13/22 17:30	7/13/22	
Method Blank	K2207795-MB	ND	U	0.60	0.30	1	07/13/22 17:30	7/13/22	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project	Coeur AK Biomonitoring	**Date Collected:**	07/06/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
		Date Analyzed:	07/13/22

Triplicate Sample Summary
General Chemistry Parameters

Sample Name:	2022KGMUSCS1	**Units:**	mg/Kg
Lab Code:	K2207795-007	**Basis:**	Dry
Analysis Method:	PSEP Sulfide		
Prep Method:	Method		

Analyte Name	MRL	MDL	Sample Result	Duplicate K2207795-007DUP Result	Triplicate K2207795-007TRP Result	Average	RSD	RSD Limit
Sulfide, Total	0.69	0.35	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:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
		Date Analyzed:	07/13/22
		Date Extracted:	07/13/22

Duplicate Matrix Spike Summary
Sulfide, Total

Sample Name:	2022KGMUSCS1	**Units:**	mg/Kg
Lab Code:	K2207795-007	**Basis:**	Dry
Analysis Method:	PSEP Sulfide		
Prep Method:	Method		

		Matrix Spike			Duplicate Matrix Spike					
		K2207795-007MS			K2207795-007DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Sulfide, Total	ND U	810	900	90	750	830	91	28-175	8	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.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Analyzed:**	07/13/22
Sample Matrix:	Soil	**Date Extracted:**	07/13/22

Lab Control Sample Summary
Sulfide, Total

Analysis Method:	PSEP Sulfide	**Units:**	mg/Kg
Prep Method:	Method	**Basis:**	Dry
		Analysis Lot:	770393

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K2207795-LCS	413	410	101	39-166

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring

Continuing Calibration Verification (CCV) Summary

Sulfide, Total

Analysis Method: PSEP Sulfide **Units:** mg/L

	Analysis Lot	Lab Code	Date Analyzed	True Value	Measured Value	Percent Recovery	Acceptance Limits
CCV1	770393	KQ2211403-01	07/13/22 17:30	0.615	0.595	97	90-110
CCV2	770393	KQ2211403-02	07/13/22 17:30	0.615	0.605	98	90-110
CCV3	770393	KQ2211403-03	07/13/22 17:30	0.615	0.598	97	90-110

Client: Alaska Department of Fish and Game **Service Request:**K2207795
Project: Coeur AK Biomonitoring

Continuing Calibration Blank (CCB) Summary
Sulfide, Total

Analysis Method: PSEP Sulfide **Units:**mg/Kg

	Analysis Lot	Lab Code	Date Analyzed	MRL	MDL	Result	Q
CCB1	770393	KQ2211403-04	07/13/22 17:30	0.60	0.30	ND	U
CCB2	770393	KQ2211403-05	07/13/22 17:30	0.60	0.30	ND	U
CCB3	770393	KQ2211403-06	07/13/22 17:30	0.60	0.30	ND	U

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/6/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
Analysis Method:	PSEP TOC	**Units:**	Percent
Prep Method:	ALS SOP	**Basis:**	Dry, per Method

Carbon, Total Organic (TOC)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2022KGMLSHS1	K2207795-001	**0.501**	0.050	0.020	1	07/19/22 14:00	7/19/22	
2022KGMLSH2	K2207795-002	**0.291**	0.050	0.020	1	07/19/22 14:00	7/19/22	
2022KGMLSH3	K2207795-003	**0.278**	0.050	0.020	1	07/19/22 14:00	7/19/22	
2022KGMEFSCS1	K2207795-004	**2.72**	0.050	0.020	1	07/19/22 14:00	7/19/22	
2022KGMEFSCS2	K2207795-005	**2.65**	0.050	0.020	1	07/19/22 14:00	7/19/22	
2022KGMEFSCS3	K2207795-006	**3.19**	0.050	0.020	1	07/19/22 14:00	7/19/22	
2022KGMUSCS1	K2207795-007	**0.775**	0.050	0.020	1	07/19/22 14:00	7/19/22	
2022KGMUSCS2	K2207795-008	**0.694**	0.050	0.020	1	07/19/22 14:00	7/19/22	
2022KGMUSCS3	K2207795-009	**0.720**	0.050	0.020	1	07/19/22 14:00	7/19/22	
Method Blank	K2207795-MB	ND U	0.050	0.020	1	07/19/22 14:00	7/19/22	

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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Analyzed:**	07/19/22
Sample Matrix:	Soil	**Date Extracted:**	07/19/22

Lab Control Sample Summary
Carbon, Total Organic (TOC)

Analysis Method:	PSEP TOC	**Units:**	Percent
Prep Method:	ALS SOP	**Basis:**	Dry, per Method
		Analysis Lot:	771043

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K2207795-LCS	4.88	4.40	111	74-118

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring

Continuing Calibration Verification (CCV) Summary

Carbon, Total Organic (TOC)

Analysis Method: PSEP TOC **Units:** Percent

	Analysis Lot	Lab Code	Date Analyzed	True Value	Measured Value	Percent Recovery	Acceptance Limits
CCV1	771043	KQ2211771-01	07/19/22 14:00	20.0	19.8	99	90-110
CCV2	771043	KQ2211771-02	07/19/22 14:00	20.0	19.7	99	90-110
CCV3	771043	KQ2211771-03	07/19/22 14:00	20.0	19.8	99	90-110
CCV4	771043	KQ2211771-07	07/19/22 14:00	20.0	19.8	99	90-110

Client: Alaska Department of Fish and Game **Service Request:**K2207795
Project: Coeur AK Biomonitoring

Continuing Calibration Blank (CCB) Summary
Carbon, Total Organic (TOC)

Analysis Method: PSEP TOC **Units:**Percent

	Analysis Lot	Lab Code	Date Analyzed	MRL	MDL	Result	Q
CCB1	771043	KQ2211771-04	07/19/22 14:00	0.050	0.020	ND	U
CCB2	771043	KQ2211771-05	07/19/22 14:00	0.050	0.020	ND	U
CCB3	771043	KQ2211771-06	07/19/22 14:00	0.050	0.020	ND	U
CCB4	771043	KQ2211771-08	07/19/22 14:00	0.050	0.020	ND	U

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
		Date Analyzed:	7/20/022

Particle Size Determination
ASTM D422M

Sample Name: 2022KGMLSHS1
Lab Code: K2207795-001

Sand Fraction: Dry Weight (Grams)	18.8417
Sand Fraction: Weight Recovered (Grams)	18.7598
Sand Fraction: Percent Recovery	99.57

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	0.0227	0.11
Gravel, Fine	-2 Ø to -1 Ø	0.9093	4.31
Sand, Very Coarse	-1 to 0 Ø	3.5427	16.80
Sand, Coarse	0 to 1 Ø	5.6549	26.81
Sand, Medium	1 to 2 Ø	3.9823	18.88
Sand, Fine	2 to 3 Ø	3.5234	16.70
Sand, Very Fine	3 to 4 Ø	0.8372	3.97
75.0 µm	4 Ø	1.3800	6.54
31.3 µm	5 Ø	0.2850	1.35
15.6 µm	6 Ø	0.1750	0.83
7.8 µm	7 Ø	0.1950	0.92
3.9 µm	8 Ø	0.1650	0.78
1.95 µm	9 Ø	0.0300	0.14
0.98 µm	> 10 Ø	0.0300	0.14
		20.7325	98.29

dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
		Date Analyzed:	07/20/22

Particle Size Determination
ASTM D422M

Sample Name: 2022KGMLSHS1
Lab Code: K2207795-001DUP

Sand Fraction: Dry Weight (Grams)	18.9772
Sand Fraction: Weight Recovered (Grams)	18.8856
Sand Fraction: Percent Recovery	99.52

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	0.0000	0.00
Gravel, Fine	-2 Ø to -1 Ø	1.1793	5.45
Sand, Very Coarse	-1 to 0 Ø	3.0134	13.91
Sand, Coarse	0 to 1 Ø	5.0292	23.22
Sand, Medium	1 to 2 Ø	3.9153	18.08
Sand, Fine	2 to 3 Ø	4.2841	19.78
Sand, Very Fine	3 to 4 Ø	1.1120	5.13
75.0 µm	4 Ø	1.7600	8.13
31.3 µm	5 Ø	0.5150	2.38
15.6 µm	6 Ø	0.2900	1.34
7.8 µm	7 Ø	0.3300	1.52
3.9 µm	8 Ø	0.1250	0.58
1.95 µm	9 Ø	0.0350	0.16
0.98 µm	> 10 Ø	0.1100	0.51
		21.6983	100.19

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
		Date Analyzed:	7/20/022

Particle Size Determination
ASTM D422M

Sample Name: 2022KGMLSH2
Lab Code: K2207795-002

Sand Fraction:	Dry Weight (Grams)	21.5334
Sand Fraction:	Weight Recovered (Grams)	21.4674
Sand Fraction:	Percent Recovery	99.69

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	0.6399	2.60
Gravel, Fine	-2 Ø to -1 Ø	3.3014	13.41
Sand, Very Coarse	-1 to 0 Ø	8.5997	34.94
Sand, Coarse	0 to 1 Ø	6.3661	25.87
Sand, Medium	1 to 2 Ø	1.8209	7.40
Sand, Fine	2 to 3 Ø	0.5978	2.43
Sand, Very Fine	3 to 4 Ø	0.0933	0.38
75.0 µm	4 Ø	0.0650	0.26
31.3 µm	5 Ø	0.1000	0.41
15.6 µm	6 Ø	0.0100	0.04
7.8 µm	7 Ø	0.0000	0.00
3.9 µm	8 Ø	0.0600	0.24
1.95 µm	9 Ø	0.0150	0.06
0.98 µm	> 10 Ø	0.0300	0.12
		21.6991	88.17

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
		Date Analyzed:	7/20/022

Particle Size Determination
ASTM D422M

Sample Name: 2022KGMLSH3
Lab Code: K2207795-003

Sand Fraction: Dry Weight (Grams)	20.3797
Sand Fraction: Weight Recovered (Grams)	20.2708
Sand Fraction: Percent Recovery	99.47

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	0.0000	0.00
Gravel, Fine	-2 Ø to -1 Ø	1.9038	8.87
Sand, Very Coarse	-1 to 0 Ø	7.5160	35.01
Sand, Coarse	0 to 1 Ø	6.8001	31.67
Sand, Medium	1 to 2 Ø	2.6176	12.19
Sand, Fine	2 to 3 Ø	1.2163	5.67
Sand, Very Fine	3 to 4 Ø	0.1643	0.77
75.0 µm	4 Ø	0.0500	0.23
31.3 µm	5 Ø	0.2150	1.00
15.6 µm	6 Ø	0.0750	0.35
7.8 µm	7 Ø	0.1750	0.82
3.9 µm	8 Ø	0.0350	0.16
1.95 µm	9 Ø	0.0050	0.02
0.98 µm	> 10 Ø	0.0750	0.35
		20.8481	97.11

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
		Date Analyzed:	7/20/022

Particle Size Determination
ASTM D422M

Sample Name: 2022KGMEFSCS1
Lab Code: K2207795-004

Sand Fraction: Dry Weight (Grams)	19.5013
Sand Fraction: Weight Recovered (Grams)	19.4838
Sand Fraction: Percent Recovery	99.91

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	3.1015	14.78
Gravel, Fine	-2 Ø to -1 Ø	4.0425	19.26
Sand, Very Coarse	-1 to 0 Ø	6.4834	30.90
Sand, Coarse	0 to 1 Ø	3.7098	17.68
Sand, Medium	1 to 2 Ø	1.0746	5.12
Sand, Fine	2 to 3 Ø	0.8790	4.19
Sand, Very Fine	3 to 4 Ø	0.1418	0.68
75.0 µm	4 Ø	0.1600	0.76
31.3 µm	5 Ø	0.1150	0.55
15.6 µm	6 Ø	0.2800	1.33
7.8 µm	7 Ø	0.1150	0.55
3.9 µm	8 Ø	0.1800	0.86
1.95 µm	9 Ø	0.0350	0.17
0.98 µm	> 10 Ø	0.0900	0.43
		20.4076	97.25

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
		Date Analyzed:	7/20/022

Particle Size Determination
ASTM D422M

Sample Name: 2022KGMEFSCS2
Lab Code: K2207795-005

Sand Fraction: Dry Weight (Grams)	20.2058
Sand Fraction: Weight Recovered (Grams)	20.2526
Sand Fraction: Percent Recovery	100.23

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	5.0892	23.19
Gravel, Fine	-2 Ø to -1 Ø	7.4347	33.88
Sand, Very Coarse	-1 to 0 Ø	4.1294	18.82
Sand, Coarse	0 to 1 Ø	1.5236	6.94
Sand, Medium	1 to 2 Ø	0.6572	3.00
Sand, Fine	2 to 3 Ø	1.1756	5.36
Sand, Very Fine	3 to 4 Ø	0.1815	0.83
75.0 µm	4 Ø	0.3850	1.75
31.3 µm	5 Ø	0.5350	2.44
15.6 µm	6 Ø	0.0100	0.05
7.8 µm	7 Ø	0.2000	0.91
3.9 µm	8 Ø	0.0700	0.32
1.95 µm	9 Ø	0.0250	0.11
0.98 µm	> 10 Ø	0.0850	0.39
		21.5012	97.99

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
		Date Analyzed:	7/20/022

Particle Size Determination
ASTM D422M

Sample Name: 2022KGMEFSCS3
Lab Code: K2207795-006

Sand Fraction: Dry Weight (Grams)	16.7758
Sand Fraction: Weight Recovered (Grams)	16.6763
Sand Fraction: Percent Recovery	99.41

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	0.0923	0.47
Gravel, Fine	-2 Ø to -1 Ø	0.7203	3.64
Sand, Very Coarse	-1 to 0 Ø	2.8627	14.46
Sand, Coarse	0 to 1 Ø	6.0568	30.59
Sand, Medium	1 to 2 Ø	4.1133	20.77
Sand, Fine	2 to 3 Ø	2.3481	11.86
Sand, Very Fine	3 to 4 Ø	0.2970	1.50
75.0 µm	4 Ø	0.3550	1.79
31.3 µm	5 Ø	0.6950	3.51
15.6 µm	6 Ø	0.0100	0.05
7.8 µm	7 Ø	0.2400	1.21
3.9 µm	8 Ø	0.1600	0.81
1.95 µm	9 Ø	0.0100	0.05
0.98 µm	> 10 Ø	0.1250	0.63
		18.0855	91.34

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
		Date Analyzed:	7/20/022

Particle Size Determination
ASTM D422M

Sample Name: 2022KGMUSCS1
Lab Code: K2207795-007

Sand Fraction:	Dry Weight (Grams)	19.4821
Sand Fraction:	Weight Recovered (Grams)	19.3149
Sand Fraction:	Percent Recovery	99.14

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	0.5795	2.84
Gravel, Fine	-2 Ø to -1 Ø	3.6111	17.71
Sand, Very Coarse	-1 to 0 Ø	8.9640	43.95
Sand, Coarse	0 to 1 Ø	4.4197	21.67
Sand, Medium	1 to 2 Ø	0.8386	4.11
Sand, Fine	2 to 3 Ø	0.6038	2.96
Sand, Very Fine	3 to 4 Ø	0.1137	0.56
75.0 µm	4 Ø	0.2850	1.40
31.3 µm	5 Ø	0.3700	1.81
15.6 µm	6 Ø	0.2950	1.45
7.8 µm	7 Ø	0.2650	1.30
3.9 µm	8 Ø	0.1550	0.76
1.95 µm	9 Ø	0.0550	0.27
0.98 µm	> 10 Ø	0.0750	0.37
		20.6304	101.15

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
		Date Analyzed:	7/20/022

Particle Size Determination
ASTM D422M

Sample Name: 2022KGMUSCS2
Lab Code: K2207795-008

Sand Fraction:	Dry Weight (Grams)	20.1351
Sand Fraction:	Weight Recovered (Grams)	20.0726
Sand Fraction:	Percent Recovery	99.69

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	2.1783	9.07
Gravel, Fine	-2 Ø to -1 Ø	4.2960	17.89
Sand, Very Coarse	-1 to 0 Ø	8.3305	34.70
Sand, Coarse	0 to 1 Ø	4.2769	17.81
Sand, Medium	1 to 2 Ø	0.5602	2.33
Sand, Fine	2 to 3 Ø	0.3030	1.26
Sand, Very Fine	3 to 4 Ø	0.0727	0.30
75.0 µm	4 Ø	0.2050	0.85
31.3 µm	5 Ø	0.1600	0.67
15.6 µm	6 Ø	0.1150	0.48
7.8 µm	7 Ø	0.1650	0.69
3.9 µm	8 Ø	0.1300	0.54
1.95 µm	9 Ø	0.0250	0.10
0.98 µm	> 10 Ø	0.0150	0.06
		20.8326	86.76

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
		Date Analyzed:	7/20/022

Particle Size Determination
ASTM D422M

Sample Name: 2022KGMUSCS3
Lab Code: K2207795-009

Sand Fraction: Dry Weight (Grams)	21.1638
Sand Fraction: Weight Recovered (Grams)	21.0558
Sand Fraction: Percent Recovery	99.49

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	1.1752	5.08
Gravel, Fine	-2 Ø to -1 Ø	1.0157	4.39
Sand, Very Coarse	-1 to 0 Ø	6.0819	26.31
Sand, Coarse	0 to 1 Ø	8.7049	37.65
Sand, Medium	1 to 2 Ø	2.7106	11.72
Sand, Fine	2 to 3 Ø	1.1089	4.80
Sand, Very Fine	3 to 4 Ø	0.1523	0.66
75.0 µm	4 Ø	0.3300	1.43
31.3 µm	5 Ø	0.1950	0.84
15.6 µm	6 Ø	0.3050	1.32
7.8 µm	7 Ø	0.1750	0.76
3.9 µm	8 Ø	0.1200	0.52
1.95 µm	9 Ø	0.0200	0.09
0.98 µm	> 10 Ø	0.0450	0.19
		22.1395	95.76

Metals

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22 08:30
Sample Matrix:	Soil	**Date Received:**	07/12/22 09:50
Sample Name:	2022KGMLSHS1	**Basis:**	Dry
Lab Code:	K2207795-001		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**8510**	mg/Kg	2.8	0.9	5	07/18/22 09:49	07/15/22	
Arsenic	200.8	**14.6**	mg/Kg	0.71	0.09	5	07/18/22 09:49	07/15/22	
Cadmium	200.8	**0.095**	mg/Kg	0.028	0.010	5	07/18/22 09:49	07/15/22	
Chromium	200.8	**22.2**	mg/Kg	0.28	0.09	5	07/18/22 09:49	07/15/22	
Copper	200.8	**36.2**	mg/Kg	0.14	0.06	5	07/18/22 09:49	07/15/22	
Lead	200.8	**2.59**	mg/Kg	0.071	0.028	5	07/18/22 09:49	07/15/22	
Mercury	7471B	**0.016**	**J** mg/Kg	0.025	0.002	1	07/19/22 11:21	07/18/22	
Nickel	200.8	**18.4**	mg/Kg	0.28	0.04	5	07/18/22 09:49	07/15/22	
Selenium	200.8	**0.3**	**J** mg/Kg	1.4	0.1	5	07/18/22 09:49	07/15/22	
Silver	200.8	**0.051**	mg/Kg	0.028	0.006	5	07/18/22 09:49	07/15/22	
Zinc	200.8	**46.4**	mg/Kg	0.71	0.28	5	07/18/22 09:49	07/15/22	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22 08:30
Sample Matrix:	Soil	**Date Received:**	07/12/22 09:50
Sample Name:	2022KGMLSH2	**Basis:**	Dry
Lab Code:	K2207795-002		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**2490**	mg/Kg	2.1	0.6	5	07/18/22 09:56	07/15/22	
Arsenic	200.8	**1.57**	mg/Kg	0.53	0.06	5	07/18/22 09:56	07/15/22	
Cadmium	200.8	**0.020 J**	mg/Kg	0.021	0.007	5	07/18/22 09:56	07/15/22	
Chromium	200.8	**6.30**	mg/Kg	0.21	0.06	5	07/18/22 09:56	07/15/22	
Copper	200.8	**8.41**	mg/Kg	0.11	0.04	5	07/18/22 09:56	07/15/22	
Lead	200.8	**0.585**	mg/Kg	0.053	0.021	5	07/18/22 09:56	07/15/22	
Mercury	7471B	**0.019 J**	mg/Kg	0.021	0.002	1	07/19/22 11:27	07/18/22	
Nickel	200.8	**4.72**	mg/Kg	0.21	0.03	5	07/18/22 09:56	07/15/22	
Selenium	200.8	**0.2 J**	mg/Kg	1.1	0.10	5	07/18/22 09:56	07/15/22	
Silver	200.8	**0.005 J**	mg/Kg	0.021	0.004	5	07/18/22 09:56	07/15/22	
Zinc	200.8	**13.0**	mg/Kg	0.53	0.21	5	07/18/22 09:56	07/15/22	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22 08:30
Sample Matrix:	Soil	**Date Received:**	07/12/22 09:50
Sample Name:	2022KGMLSH3	**Basis:**	Dry
Lab Code:	K2207795-003		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**12700**	mg/Kg	2.4	0.7	5	07/18/22 09:58	07/15/22	
Arsenic	200.8	**21.3**	mg/Kg	0.60	0.07	5	07/18/22 09:58	07/15/22	
Cadmium	200.8	**0.109**	mg/Kg	0.024	0.008	5	07/18/22 09:58	07/15/22	
Chromium	200.8	**27.1**	mg/Kg	0.24	0.07	5	07/18/22 09:58	07/15/22	
Copper	200.8	**40.6**	mg/Kg	0.12	0.05	5	07/18/22 09:58	07/15/22	
Lead	200.8	**7.75**	mg/Kg	0.060	0.024	5	07/18/22 09:58	07/15/22	
Mercury	7471B	**0.027**	mg/Kg	0.025	0.003	1	07/19/22 11:29	07/18/22	
Nickel	200.8	**22.6**	mg/Kg	0.24	0.04	5	07/18/22 09:58	07/15/22	
Selenium	200.8	**0.4**	mg/Kg	1.2	0.1	5	07/18/22 09:58	07/15/22	**J**
Silver	200.8	**0.117**	mg/Kg	0.024	0.005	5	07/18/22 09:58	07/15/22	
Zinc	200.8	**64.1**	mg/Kg	0.60	0.24	5	07/18/22 09:58	07/15/22	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22 10:00
Sample Matrix:	Soil	**Date Received:**	07/12/22 09:50
Sample Name:	2022KGMEFSCS1	**Basis:**	Dry
Lab Code:	K2207795-004		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**10100**	mg/Kg	2.1	0.6	5	07/18/22 10:01	07/15/22	
Arsenic	200.8	**24.5**	mg/Kg	0.52	0.06	5	07/18/22 10:01	07/15/22	
Cadmium	200.8	**1.79**	mg/Kg	0.021	0.007	5	07/18/22 10:01	07/15/22	
Chromium	200.8	**13.4**	mg/Kg	0.21	0.06	5	07/18/22 10:01	07/15/22	
Copper	200.8	**22.0**	mg/Kg	0.10	0.04	5	07/18/22 10:01	07/15/22	
Lead	200.8	**5.01**	mg/Kg	0.052	0.021	5	07/18/22 10:01	07/15/22	
Mercury	7471B	**0.026**	mg/Kg	0.025	0.002	1	07/19/22 11:31	07/18/22	
Nickel	200.8	**28.2**	mg/Kg	0.21	0.03	5	07/18/22 10:01	07/15/22	
Selenium	200.8	**2.9**	mg/Kg	1.0	0.09	5	07/18/22 10:01	07/15/22	
Silver	200.8	**0.113**	mg/Kg	0.021	0.004	5	07/18/22 10:01	07/15/22	
Zinc	200.8	**204**	mg/Kg	0.52	0.21	5	07/18/22 10:01	07/15/22	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22 10:00
Sample Matrix:	Soil	**Date Received:**	07/12/22 09:50
Sample Name:	2022KGMEFSCS2	**Basis:**	Dry
Lab Code:	K2207795-005		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**6240**	mg/Kg	1.9	0.6	5	07/18/22 10:03	07/15/22	
Arsenic	200.8	**27.9**	mg/Kg	0.48	0.06	5	07/18/22 10:03	07/15/22	
Cadmium	200.8	**8.27**	mg/Kg	0.019	0.007	5	07/18/22 10:03	07/15/22	
Chromium	200.8	**5.32**	mg/Kg	0.19	0.06	5	07/18/22 10:03	07/15/22	
Copper	200.8	**25.9**	mg/Kg	0.097	0.039	5	07/18/22 10:03	07/15/22	
Lead	200.8	**2.25**	mg/Kg	0.048	0.019	5	07/18/22 10:03	07/15/22	
Mercury	7471B	**0.016**	mg/Kg	0.021	0.002	1	07/19/22 11:36	07/18/22	**J**
Nickel	200.8	**58.2**	mg/Kg	0.19	0.03	5	07/18/22 10:03	07/15/22	
Selenium	200.8	**1.05**	mg/Kg	0.97	0.09	5	07/18/22 10:03	07/15/22	
Silver	200.8	**0.061**	mg/Kg	0.019	0.004	5	07/18/22 10:03	07/15/22	
Zinc	200.8	**526**	mg/Kg	0.48	0.19	5	07/18/22 10:03	07/15/22	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22 10:00
Sample Matrix:	Soil	**Date Received:**	07/12/22 09:50
Sample Name:	2022KGMEFSCS3	**Basis:**	Dry
Lab Code:	K2207795-006		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**7110**	mg/Kg	2.3	0.7	5	07/18/22 10:06	07/15/22	
Arsenic	200.8	**11.4**	mg/Kg	0.58	0.07	5	07/18/22 10:06	07/15/22	
Cadmium	200.8	**0.656**	mg/Kg	0.023	0.008	5	07/18/22 10:06	07/15/22	
Chromium	200.8	**7.11**	mg/Kg	0.23	0.07	5	07/18/22 10:06	07/15/22	
Copper	200.8	**22.0**	mg/Kg	0.12	0.05	5	07/18/22 10:06	07/15/22	
Lead	200.8	**3.25**	mg/Kg	0.058	0.023	5	07/18/22 10:06	07/15/22	
Mercury	7471B	**0.039**	mg/Kg	0.023	0.002	1	07/19/22 11:37	07/18/22	
Nickel	200.8	**12.8**	mg/Kg	0.23	0.03	5	07/18/22 10:06	07/15/22	
Selenium	200.8	**1.0**	mg/Kg	1.2	0.1	5	07/18/22 10:06	07/15/22	**J**
Silver	200.8	**0.057**	mg/Kg	0.023	0.005	5	07/18/22 10:06	07/15/22	
Zinc	200.8	**115**	mg/Kg	0.58	0.23	5	07/18/22 10:06	07/15/22	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22 11:00
Sample Matrix:	Soil	**Date Received:**	07/12/22 09:50
Sample Name:	2022KGMUSCS1	**Basis:**	Dry
Lab Code:	K2207795-007		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**8490**	mg/Kg	1.9	0.6	5	07/18/22 10:13	07/15/22	
Arsenic	200.8	**14.6**	mg/Kg	0.47	0.06	5	07/18/22 10:13	07/15/22	
Cadmium	200.8	**0.383**	mg/Kg	0.019	0.007	5	07/18/22 10:13	07/15/22	
Chromium	200.8	**40.2**	mg/Kg	0.19	0.06	5	07/18/22 10:13	07/15/22	
Copper	200.8	**29.5**	mg/Kg	0.094	0.038	5	07/18/22 10:13	07/15/22	
Lead	200.8	**2.65**	mg/Kg	0.047	0.019	5	07/18/22 10:13	07/15/22	
Mercury	7471B	**0.024**	mg/Kg	0.020	0.002	1	07/19/22 11:39	07/18/22	
Nickel	200.8	**31.3**	mg/Kg	0.19	0.03	5	07/18/22 10:13	07/15/22	
Selenium	200.8	**1.77**	mg/Kg	0.94	0.08	5	07/18/22 10:13	07/15/22	
Silver	200.8	**0.066**	mg/Kg	0.019	0.004	5	07/18/22 10:13	07/15/22	
Zinc	200.8	**71.1**	mg/Kg	0.47	0.19	5	07/18/22 10:13	07/15/22	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22 11:00
Sample Matrix:	Soil	**Date Received:**	07/12/22 09:50
Sample Name:	2022KGMUSCS2	**Basis:**	Dry
Lab Code:	K2207795-008		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**11300**	mg/Kg	1.8	0.5	5	07/18/22 10:15	07/15/22	
Arsenic	200.8	**13.6**	mg/Kg	0.44	0.05	5	07/18/22 10:15	07/15/22	
Cadmium	200.8	**0.457**	mg/Kg	0.018	0.006	5	07/18/22 10:15	07/15/22	
Chromium	200.8	**58.4**	mg/Kg	0.18	0.05	5	07/18/22 10:15	07/15/22	
Copper	200.8	**36.5**	mg/Kg	0.089	0.036	5	07/18/22 10:15	07/15/22	
Lead	200.8	**2.66**	mg/Kg	0.044	0.018	5	07/18/22 10:15	07/15/22	
Mercury	7471B	**0.040**	mg/Kg	0.022	0.002	1	07/19/22 11:40	07/18/22	
Nickel	200.8	**48.3**	mg/Kg	0.18	0.03	5	07/18/22 10:15	07/15/22	
Selenium	200.8	**1.72**	mg/Kg	0.89	0.08	5	07/18/22 10:15	07/15/22	
Silver	200.8	**0.061**	mg/Kg	0.018	0.004	5	07/18/22 10:15	07/15/22	
Zinc	200.8	**97.0**	mg/Kg	0.44	0.18	5	07/18/22 10:15	07/15/22	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22 11:00
Sample Matrix:	Soil	**Date Received:**	07/12/22 09:50
Sample Name:	2022KGMUSCS3	**Basis:**	Dry
Lab Code:	K2207795-009		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**11600**	mg/Kg	2.0	0.6	5	07/18/22 10:18	07/15/22	
Arsenic	200.8	**11.0**	mg/Kg	0.51	0.06	5	07/18/22 10:18	07/15/22	
Cadmium	200.8	**0.342**	mg/Kg	0.020	0.007	5	07/18/22 10:18	07/15/22	
Chromium	200.8	**60.4**	mg/Kg	0.20	0.06	5	07/18/22 10:18	07/15/22	
Copper	200.8	**34.8**	mg/Kg	0.10	0.04	5	07/18/22 10:18	07/15/22	
Lead	200.8	**2.28**	mg/Kg	0.051	0.020	5	07/18/22 10:18	07/15/22	
Mercury	7471B	**0.029**	mg/Kg	0.022	0.002	1	07/19/22 11:42	07/18/22	
Nickel	200.8	**38.9**	mg/Kg	0.20	0.03	5	07/18/22 10:18	07/15/22	
Selenium	200.8	**1.1**	mg/Kg	1.0	0.09	5	07/18/22 10:18	07/15/22	
Silver	200.8	**0.045**	mg/Kg	0.020	0.004	5	07/18/22 10:18	07/15/22	
Zinc	200.8	**76.3**	mg/Kg	0.51	0.20	5	07/18/22 10:18	07/15/22	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	Dry
Lab Code:	KQ2211468-03		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**1.0 J**	mg/Kg	2.0	0.6	5	07/18/22 09:44	07/15/22	
Arsenic	200.8	ND U	mg/Kg	0.5	0.06	5	07/18/22 09:44	07/15/22	
Cadmium	200.8	ND U	mg/Kg	0.020	0.007	5	07/18/22 09:44	07/15/22	
Chromium	200.8	ND U	mg/Kg	0.20	0.06	5	07/18/22 09:44	07/15/22	
Copper	200.8	**0.07 J**	mg/Kg	0.10	0.04	5	07/18/22 09:44	07/15/22	
Lead	200.8	ND U	mg/Kg	0.05	0.020	5	07/18/22 09:44	07/15/22	
Nickel	200.8	**0.04 J**	mg/Kg	0.20	0.03	5	07/18/22 09:44	07/15/22	
Selenium	200.8	ND U	mg/Kg	1.0	0.09	5	07/18/22 09:44	07/15/22	
Silver	200.8	ND U	mg/Kg	0.020	0.004	5	07/18/22 09:44	07/15/22	
Zinc	200.8	ND U	mg/Kg	0.5	0.20	5	07/18/22 09:44	07/15/22	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	Dry
Lab Code:	KQ2211471-05		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Mercury	7471B	**0.002 J**	mg/Kg	0.02	0.002	1	07/19/22 11:16	07/18/22	

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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project	Coeur AK Biomonitoring	**Date Collected:**	07/06/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
		Date Analyzed:	07/18/22

Replicate Sample Summary
Total Metals

Sample Name:	2022KGMLSHS1	**Units:**	mg/Kg
Lab Code:	K2207795-001	**Basis:**	Dry

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample KQ2211468-01 Result	Average	RPD	RPD Limit
Aluminum	200.8	2.5	0.7	8510	6840	7680	22	30
Arsenic	200.8	0.62	0.07	14.6	6.34	10.5	79 *	30
Cadmium	200.8	0.025	0.009	0.095	0.078	0.087	20	30
Chromium	200.8	0.25	0.07	22.2	17.4	19.8	24	30
Copper	200.8	0.12	0.05	36.2	27.2	31.7	29	30
Lead	200.8	0.062	0.025	2.59	1.88	2.24	32 *	30
Nickel	200.8	0.25	0.04	18.4	13.7	16.1	29	30
Selenium	200.8	1.2	0.1	0.3 J	0.2 J	0.3	49 #	30
Silver	200.8	0.025	0.005	0.051	0.029	0.040	50 #	30
Zinc	200.8	0.62	0.25	46.4	37.2	41.8	22	30

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.

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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project	Coeur AK Biomonitoring	**Date Collected:**	07/06/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
		Date Analyzed:	07/19/22

Replicate Sample Summary

Total Metals

Sample Name:	2022KGMLSHS1	**Units:**	mg/Kg
Lab Code:	K2207795-001	**Basis:**	Dry

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample KQ2211471-03 Result	Average	RPD	RPD Limit
Mercury	7471B	0.027	0.003	0.016 J	0.009 J	0.013	44 #	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.

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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
		Date Analyzed:	07/18/22
		Date Extracted:	07/15/22

Matrix Spike Summary
Total Metals

Sample Name:	2022KGMLSHS1	**Units:**	mg/Kg
Lab Code:	K2207795-001	**Basis:**	Dry
Analysis Method:	200.8		
Prep Method:	EPA 3050B		

Matrix Spike
KQ2211468-02

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Aluminum	8510	10100	528	306 #	70-130
Arsenic	14.6	146	132	99	70-130
Cadmium	0.095	13.4	13.2	101	70-130
Chromium	22.2	76.5	52.8	103	70-130
Copper	36.2	112	66.0	115	70-130
Lead	2.59	143	132	106	70-130
Nickel	18.4	149	132	99	70-130
Selenium	0.3 J	131	132	99	70-130
Silver	0.051	13.2	13.2	99	70-130
Zinc	46.4	183	132	104	70-130

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.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Client:	Alaska Department of Fish and Game	**Service Request:**	K2207795
Project:	Coeur AK Biomonitoring	**Date Collected:**	07/06/22
Sample Matrix:	Soil	**Date Received:**	07/12/22
		Date Analyzed:	07/19/22
		Date Extracted:	07/18/22

Matrix Spike Summary
Total Metals

Sample Name:	2022KGMLSHS1	**Units:**	mg/Kg
Lab Code:	K2207795-001	**Basis:**	Dry
Analysis Method:	7471B		
Prep Method:	Method		

Matrix Spike
KQ2211471-04

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Mercury	0.016 J	0.669	0.647	101	80-120

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.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

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

Service Request: K2207795
Date Analyzed: 07/18/22

Lab Control Sample Summary
Total Metals

Units:mg/Kg
Basis: Dry

Lab Control Sample
KQ2211468-04

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Aluminum	200.8	408	400	102	85-115
Arsenic	200.8	101	100	101	85-115
Cadmium	200.8	10.0	10.0	100	85-115
Chromium	200.8	39.6	40.0	99	85-115
Copper	200.8	48.8	50.0	98	85-115
Lead	200.8	98.1	100	98	85-115
Nickel	200.8	98.1	100	98	85-115
Selenium	200.8	100	100	100	85-115
Silver	200.8	10.2	10.0	102	85-115
Zinc	200.8	98.0	100	98	85-115

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

Service Request: K2207795
Date Analyzed: 07/19/22

Lab Control Sample Summary
Total Metals

Units:mg/Kg
Basis: Dry

Lab Control Sample
KQ2211471-06

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Mercury	7471B	0.503	0.500	101	80-120

Prep Summary Report

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring
Sample Matrix: Soil

Metals

Prep Method: EPA 3050B **Extraction Lot:** 402839
Analytical Method: 200.8 **Extraction Date:** 07/15/22 07:00

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Amount	Percent Solids
2022KGMLSHS1	K2207795-001	7/6/22	7/12/22	1.011 g	100 mL	
2022KGMLSH2	K2207795-002	7/6/22	7/12/22	1.161 g	100 mL	
2022KGMLSH3	K2207795-003	7/6/22	7/12/22	1.163 g	100 mL	
2022KGMEFSCS1	K2207795-004	7/6/22	7/12/22	1.255 g	100 mL	
2022KGMEFSCS2	K2207795-005	7/6/22	7/12/22	1.219 g	100 mL	
2022KGMEFSCS3	K2207795-006	7/6/22	7/12/22	1.034 g	100 mL	
2022KGMUSCS1	K2207795-007	7/6/22	7/12/22	1.222 g	100 mL	
2022KGMUSCS2	K2207795-008	7/6/22	7/12/22	1.366 g	100 mL	
2022KGMUSCS3	K2207795-009	7/6/22	7/12/22	1.172 g	100 mL	
Duplicate	KQ2211468-01DUP	7/6/22	7/12/22	1.156 g	100 mL	
Matrix Spike	KQ2211468-02MS	7/6/22	7/12/22	1.090 g	100 mL	
Method Blank	KQ2211468-03MB	NA	NA	1 g	100 mL	
Lab Control Sample	KQ2211468-04LCS	NA	NA	1 g	100 mL	

Prep Summary Report

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring
Sample Matrix: Soil

Metals

Prep Method: Method **Extraction Lot:** 402842
Analytical Method: 7471B **Extraction Date:** 07/18/22 11:20

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Amount	Percent Solids
2022KGMLSHS1	K2207795-001	7/6/22	7/12/22	0.582 g	50 mL	
2022KGMLSH2	K2207795-002	7/6/22	7/12/22	0.579 g	50 mL	
2022KGMLSH3	K2207795-003	7/6/22	7/12/22	0.554 g	50 mL	
2022KGMEFSCS1	K2207795-004	7/6/22	7/12/22	0.530 g	50 mL	
2022KGMEFSCS2	K2207795-005	7/6/22	7/12/22	0.571 g	50 mL	
2022KGMEFSCS3	K2207795-006	7/6/22	7/12/22	0.519 g	50 mL	
2022KGMUSCS1	K2207795-007	7/6/22	7/12/22	0.588 g	50 mL	
2022KGMUSCS2	K2207795-008	7/6/22	7/12/22	0.546 g	50 mL	
2022KGMUSCS3	K2207795-009	7/6/22	7/12/22	0.534 g	50 mL	
Duplicate	KQ2211471-03DUP	7/6/22	7/12/22	0.535 g	50 mL	
Matrix Spike	KQ2211471-04MS	7/6/22	7/12/22	0.556 g	50 mL	
Method Blank	KQ2211471-05MB	NA	NA	0.5 g	50 mL	
Lab Control Sample	KQ2211471-06LCS	NA	NA	0.5 g	50 mL	

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Concentration Units: ug/L

Sample ID / Analyte	Method	Analysis Batch:	Result	True Value	% Rec	% Rec. Limits
ICV 07/18/22 09:18						
Aluminum	200.8	770711	107	100	107	90-110
Arsenic	200.8	770711	24.8	25.0	99	90-110
Cadmium	200.8	770711	12.5	12.5	100	90-110
Chromium	200.8	770711	9.93	10.0	99	90-110
Copper	200.8	770711	12.3	12.5	99	90-110
Lead	200.8	770711	24.0	25.0	96	90-110
Nickel	200.8	770711	24.8	25.0	99	90-110
Selenium	200.8	770711	24.6	25.0	98	90-110
Silver	200.8	770711	12.7	12.5	101	90-110
Zinc	200.8	770711	25.2	25.0	101	90-110
CCV 07/18/22 09:20						
Aluminum	200.8	770711	247	250	99	90-110
Arsenic	200.8	770711	25.1	25.0	100	90-110
Cadmium	200.8	770711	24.9	25.0	99	90-110
Chromium	200.8	770711	25.1	25.0	100	90-110
Copper	200.8	770711	24.7	25.0	99	90-110
Lead	200.8	770711	24.6	25.0	98	90-110
Nickel	200.8	770711	25.1	25.0	100	90-110
Selenium	200.8	770711	24.9	25.0	100	90-110
Silver	200.8	770711	12.4	12.5	99	90-110
Zinc	200.8	770711	24.8	25.0	99	90-110
CCV 07/18/22 10:08						
Aluminum	200.8	770711	259	250	103	90-110
Arsenic	200.8	770711	25.1	25.0	101	90-110
Cadmium	200.8	770711	24.5	25.0	98	90-110
Chromium	200.8	770711	25.1	25.0	100	90-110
Copper	200.8	770711	25.2	25.0	101	90-110
Lead	200.8	770711	24.2	25.0	97	90-110
Nickel	200.8	770711	25.4	25.0	101	90-110
Selenium	200.8	770711	24.3	25.0	97	90-110
Silver	200.8	770711	12.4	12.5	99	90-110
Zinc	200.8	770711	25.2	25.0	101	90-110
CCV 07/18/22 10:29						
Aluminum	200.8	770711	249	250	99	90-110
Arsenic	200.8	770711	25.2	25.0	101	90-110
Cadmium	200.8	770711	24.2	25.0	97	90-110

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Concentration Units: ug/L

Sample ID / Analyte	Method	Analysis Batch:	Result	True Value	% Rec	% Rec. Limits
CCV 07/18/22 10:29						
Chromium	200.8	770711	24.9	25.0	99	90-110
Copper	200.8	770711	24.8	25.0	99	90-110
Lead	200.8	770711	23.8	25.0	95	90-110
Nickel	200.8	770711	25.6	25.0	102	90-110
Selenium	200.8	770711	24.2	25.0	97	90-110
Silver	200.8	770711	12.1	12.5	97	90-110
Zinc	200.8	770711	24.7	25.0	99	90-110
ICV 07/19/22 11:08						
Mercury	7471B	770933	4.99	5.00	100	90-110
CCV 07/19/22 11:13						
Mercury	7471B	770933	5.00	5.00	100	90-110
CCV 07/19/22 11:32						
Mercury	7471B	770933	5.01	5.00	100	90-110
CCV 07/19/22 11:52						
Mercury	7471B	770933	4.96	5.00	99	90-110

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring

INITIAL AND CONTINUING CALIBRATION BLANKS

Concentration Units: ug/L

Sample ID / Analyte	Method	Analysis Batch:	Result	C
ICB 07/18/22 09:23				
Aluminum	200.8	770711	1.2	U
Arsenic	200.8	770711	0.1	U
Cadmium	200.8	770711	0.014	U
Chromium	200.8	770711	0.12	U
Copper	200.8	770711	0.08	U
Lead	200.8	770711	0.04	U
Nickel	200.8	770711	0.06	U
Selenium	200.8	770711	0.2	U
Silver	200.8	770711	0.008	U
Zinc	200.8	770711	0.4	U
CCB 07/18/22 09:25				
Aluminum	200.8	770711	1.2	U
Arsenic	200.8	770711	0.1	U
Cadmium	200.8	770711	0.014	U
Chromium	200.8	770711	0.12	U
Copper	200.8	770711	0.08	U
Lead	200.8	770711	0.04	U
Nickel	200.8	770711	0.06	U
Selenium	200.8	770711	0.2	U
Silver	200.8	770711	0.008	U
Zinc	200.8	770711	0.4	U
CCB 07/18/22 10:11				
Aluminum	200.8	770711	1.2	U
Arsenic	200.8	770711	0.1	U
Cadmium	200.8	770711	0.014	U
Chromium	200.8	770711	0.12	U
Copper	200.8	770711	0.08	U
Lead	200.8	770711	0.04	U
Nickel	200.8	770711	0.06	U
Selenium	200.8	770711	0.2	U
Silver	200.8	770711	0.008	U
Zinc	200.8	770711	0.4	U
CCB 07/18/22 10:32				
Aluminum	200.8	770711	1.2	U
Arsenic	200.8	770711	0.1	U
Cadmium	200.8	770711	0.014	U

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring

INITIAL AND CONTINUING CALIBRATION BLANKS

Concentration Units: ug/L

Sample ID / Analyte	Method	Analysis Batch:	Result	C
CCB 07/18/22 10:32				
Chromium	200.8	770711	0.12	U
Copper	200.8	770711	0.08	U
Lead	200.8	770711	0.04	U
Nickel	200.8	770711	0.06	U
Selenium	200.8	770711	0.2	U
Silver	200.8	770711	0.008	U
Zinc	200.8	770711	0.4	U
ICB 07/19/22 11:10				
Mercury	7471B	770933	0.02	U
CCB 07/19/22 11:14				
Mercury	7471B	770933	0.02	U
CCB 07/19/22 11:34				
Mercury	7471B	770933	0.02	U
CCB 07/19/22 11:53				
Mercury	7471B	770933	0.02	U

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring

LOW LEVEL INITIAL AND LOW LEVEL CONTINUING CALIBRATION VERIFICATION

Concentration Units: ug/L

Sample ID / Analyte	Method	Analysis Batch:	Result	True Value	% Rec	% Rec. Limits	Analysis Date
LLICVS							
Aluminum	200.8	770711	3.7	4.0	93	50-199	07/18/22 09:31
Arsenic	200.8	770711	1.0	1.0	100	50-199	07/18/22 09:31
Cadmium	200.8	770711	0.043	0.04	108	50-199	07/18/22 09:31
Chromium	200.8	770711	0.39	0.4	97	50-199	07/18/22 09:31
Copper	200.8	770711	0.19	0.2	93	50-199	07/18/22 09:31
Lead	200.8	770711	0.095	0.1	95	50-199	07/18/22 09:31
Nickel	200.8	770711	0.41	0.4	104	50-199	07/18/22 09:31
Selenium	200.8	770711	2.0	2.0	100	50-199	07/18/22 09:31
Silver	200.8	770711	0.039	0.04	99	50-199	07/18/22 09:31
Zinc	200.8	770711	1.1	1.0	109	50-199	07/18/22 09:31
LLICV							
Mercury	7471B	770933	0.20	0.2	99	50-150	07/19/22 11:11

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring

POST SPIKE SAMPLE RECOVERY

Concentration Units: ug/L

Sample ID / Analyte	Method	Analysis Batch:	Initial Sample Result	Post Spike Result	True Value	% Rec	% Rec. Limits	Analysis Date
K2207795-001A								
Mercury	7471B	770933	0.13 J	5.12	5.00	100	80-120	07/19/22 11:26

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

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring/

Detection Limits

Instrument: K-CVAA-03 **Matrix:** Soil

Analyte	Wavelength (nm)	Units	MRL	MDL	Method
Mercury	253	ug/L	0.2	0.02	7471B

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring/

Detection Limits

Instrument: K-ICP-MS-05 **Matrix:** Soil

Analyte	Mass	Units	MRL	MDL	Method
Aluminum	27	ug/L	4	1.2	200.8
Arsenic	75	ug/L	1	0.12	200.8
Cadmium	111	ug/L	0.04	0.014	200.8
Chromium	52	ug/L	0.4	0.12	200.8
Copper	65	ug/L	0.2	0.08	200.8
Lead	208	ug/L	0.1	0.04	200.8
Nickel	60	ug/L	0.4	0.06	200.8
Selenium	78	ug/L	2	0.18	200.8
Silver	107	ug/L	0.04	0.008	200.8
Zinc	66	ug/L	1	0.4	200.8

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring/

ICP Linear Range (Quarterly)

Instrument: K-CVAA-03

Analyte	Concentration (ug/L)	Method
Mercury	10	7471B

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring/

ICP Linear Range (Quarterly)

Instrument: K-ICP-MS-05

Analyte	Concentration (ug/L)	Method
Aluminum 27	45000	200.8
Arsenic 75	3150	200.8
Cadmium 111	3150	200.8
Chromium 52	3150	200.8
Copper 65	3150	200.8
Lead 208	3150	200.8
Nickel 60	3150	200.8
Selenium 78	3150	200.8
Silver 107	180	200.8
Zinc 66	3150	200.8

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring/

Analysis Run Log

Instrument ID: **K-ICP-MS-05** **Analytical BatchID:** **770711**

Sample	Dilution Factor	Date/Time	Al	As	Cd	Cr	Cu	Pb	Ni	Se	Ag	Zn
ZZZZZZ	1	07/18/22 09:07										
ZZZZZZ	1	07/18/22 09:10										
ZZZZZZ	1	07/18/22 09:14										
ICV	1	07/18/22 09:18	X	X	X	X	X	X	X	X	X	X
CCV	1	07/18/22 09:20	X	X	X	X	X	X	X	X	X	X
ICB	1	07/18/22 09:23	X	X	X	X	X	X	X	X	X	X
CCB	1	07/18/22 09:25	X	X	X	X	X	X	X	X	X	X
ZZZZZZ	1	07/18/22 09:28										
LLICVS	1	07/18/22 09:31	X	X	X	X	X	X	X	X	X	X
ZZZZZZ	1	07/18/22 09:35										
ZZZZZZ	1	07/18/22 09:37										
ZZZZZZ	1	07/18/22 09:39										
KQ2211468-03MB	5	07/18/22 09:44	X	X	X	X	X	X	X	X	X	X
KQ2211468-04LCS	20	07/18/22 09:46	X	X	X	X	X	X	X	X	X	X
K2207795-001	5	07/18/22 09:49	X	X	X	X	X	X	X	X	X	X
K2207795-001DUP	5	07/18/22 09:51	X	X	X	X	X	X	X	X	X	X
K2207795-001MS	5	07/18/22 09:54	X	X	X	X	X	X	X	X	X	X
K2207795-002	5	07/18/22 09:56	X	X	X	X	X	X	X	X	X	X
K2207795-003	5	07/18/22 09:58	X	X	X	X	X	X	X	X	X	X
K2207795-004	5	07/18/22 10:01	X	X	X	X	X	X	X	X	X	X
K2207795-005	5	07/18/22 10:03	X	X	X	X	X	X	X	X	X	X
K2207795-006	5	07/18/22 10:06	X	X	X	X	X	X	X	X	X	X
CCV	1	07/18/22 10:08	X	X	X	X	X	X	X	X	X	X
CCB	1	07/18/22 10:11	X	X	X	X	X	X	X	X	X	X
K2207795-007	5	07/18/22 10:13	X	X	X	X	X	X	X	X	X	X
K2207795-008	5	07/18/22 10:15	X	X	X	X	X	X	X	X	X	X
K2207795-009	5	07/18/22 10:18	X	X	X	X	X	X	X	X	X	X
CCV	1	07/18/22 10:29	X	X	X	X	X	X	X	X	X	X
CCB	1	07/18/22 10:32	X	X	X	X	X	X	X	X	X	X
ZZZZZZ	5	07/18/22 10:34										
ZZZZZZ	20	07/18/22 10:37										
ZZZZZZ	5	07/18/22 10:39										
ZZZZZZ	5	07/18/22 10:42										
ZZZZZZ	25	07/18/22 10:44										
ZZZZZZ	5	07/18/22 10:46										
ZZZZZZ	5	07/18/22 10:49										
ZZZZZZ	1	07/18/22 10:54										

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring/

Analysis Run Log

Instrument ID: **K-ICP-MS-05** **Analytical BatchID:** **770711**

Sample	Dilution Factor	Date/Time	Al	As	Cd	Cr	Cu	Pb	Ni	Se	Ag	Zn
ZZZZZZ	1	07/18/22 10:57										
ZZZZZZ	1	07/18/22 10:59										
ZZZZZZ	1	07/18/22 11:06										
ZZZZZZ	1	07/18/22 11:10										
ZZZZZZ	1	07/18/22 11:22										

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring/

Analysis Run Log

Instrument ID: **K-CVAA-03** **Analytical BatchID:** **770933**

Sample	Dilution Factor	Date/Time	Hg
ZZZZZZ	1	07/19/22 10:58	
ZZZZZZ	1	07/19/22 11:00	
ZZZZZZ	1	07/19/22 11:01	
ZZZZZZ	1	07/19/22 11:03	
ZZZZZZ	1	07/19/22 11:05	
ZZZZZZ	1	07/19/22 11:06	
ICV1	1	07/19/22 11:08	X
ICB1	1	07/19/22 11:10	X
LLICV1	1	07/19/22 11:11	X
CCV1	1	07/19/22 11:13	X
CCB1	1	07/19/22 11:14	X
KQ2211471-05MB	1	07/19/22 11:16	X
KQ2211471-06LCS	1	07/19/22 11:18	X
ZZZZZZ	1	07/19/22 11:19	
K2207795-001	1	07/19/22 11:21	X
K2207795-001DUP	1	07/19/22 11:23	X
K2207795-001MS	1	07/19/22 11:24	X
K2207795-001PS	1	07/19/22 11:26	X
K2207795-002	1	07/19/22 11:27	X
K2207795-003	1	07/19/22 11:29	X
K2207795-004	1	07/19/22 11:31	X
CCV2	1	07/19/22 11:32	X
CCB2	1	07/19/22 11:34	X
K2207795-005	1	07/19/22 11:36	X
K2207795-006	1	07/19/22 11:37	X
K2207795-007	1	07/19/22 11:39	X
K2207795-008	1	07/19/22 11:40	X
K2207795-009	1	07/19/22 11:42	X
ZZZZZZ	1	07/19/22 11:44	
ZZZZZZ	1	07/19/22 11:45	
ZZZZZZ	1	07/19/22 11:47	
ZZZZZZ	1	07/19/22 11:48	
ZZZZZZ	1	07/19/22 11:50	
CCV3	1	07/19/22 11:52	X
CCB3	1	07/19/22 11:53	X
ZZZZZZ	1	07/19/22 11:55	
ZZZZZZ	1	07/19/22 11:57	

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring/

Analysis Run Log

Instrument ID: **K-CVAA-03** **Analytical BatchID:** **770933**

Sample	Dilution Factor	Date/Time	Hg
ZZZZZZ	1	07/19/22 11:58	
ZZZZZZ	1	07/19/22 12:00	
ZZZZZZ	1	07/19/22 12:01	
ZZZZZZ	1	07/19/22 12:03	
ZZZZZZ	1	07/19/22 12:05	
ZZZZZZ	1	07/19/22 12:06	
ZZZZZZ	1	07/19/22 12:08	
ZZZZZZ	1	07/19/22 12:10	
ZZZZZZ	1	07/19/22 12:11	
ZZZZZZ	1	07/19/22 12:13	
ZZZZZZ	1	07/19/22 12:14	
ZZZZZZ	1	07/19/22 12:16	
ZZZZZZ	1	07/19/22 12:18	
ZZZZZZ	1	07/19/22 12:19	
ZZZZZZ	1	07/19/22 12:21	
ZZZZZZ	1	07/19/22 12:23	
ZZZZZZ	1	07/19/22 12:24	
ZZZZZZ	1	07/19/22 12:26	
ZZZZZZ	1	07/19/22 12:27	
ZZZZZZ	1	07/19/22 12:29	
ZZZZZZ	1	07/19/22 12:31	
ZZZZZZ	1	07/19/22 12:32	
ZZZZZZ	1	07/19/22 12:34	
ZZZZZZ	1	07/19/22 12:36	
ZZZZZZ	1	07/19/22 12:37	
ZZZZZZ	1	07/19/22 12:39	
ZZZZZZ	1	07/19/22 12:40	
ZZZZZZ	1	07/19/22 12:42	
ZZZZZZ	1	07/19/22 12:44	
ZZZZZZ	1	07/19/22 12:45	
ZZZZZZ	1	07/19/22 12:47	
ZZZZZZ	1	07/19/22 12:49	
ZZZZZZ	1	07/19/22 12:50	
ZZZZZZ	1	07/19/22 12:52	
ZZZZZZ	1	07/19/22 12:53	
ZZZZZZ	1	07/19/22 12:55	
ZZZZZZ	1	07/19/22 12:57	

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring/

Analysis Run Log

Instrument ID: **K-CVAA-03** **Analytical BatchID:** **770933**

Sample	Dilution Factor	Date/Time	Hg
ZZZZZZ	1	07/19/22 12:58	
ZZZZZZ	1	07/19/22 13:00	
ZZZZZZ	1	07/19/22 13:01	
ZZZZZZ	1	07/19/22 13:03	
ZZZZZZ	1	07/19/22 13:06	
ZZZZZZ	1	07/19/22 13:07	

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring/

ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY

Instrument ID: **K-ICP-MS-05** **Analytical BatchID:** **770711**

Sample	Date/Time	Li6NG	Ge72H2	Ge72He	In115He	Lu175He
ZZZZZZ	07/18/22 09:07					
ZZZZZZ	07/18/22 09:10					
ZZZZZZ	07/18/22 09:14					
ICV	07/18/22 09:18	99	100	100	96	100
CCV	07/18/22 09:20	102	100	100	99	99
ICB	07/18/22 09:23	102	102	99	98	101
CCB	07/18/22 09:25	100	101	100	99	102
ZZZZZZ	07/18/22 09:28					
LLICVS	07/18/22 09:31	101	103	100	97	100
ZZZZZZ	07/18/22 09:35					
ZZZZZZ	07/18/22 09:37					
ZZZZZZ	07/18/22 09:39					
KQ2211468-03MB	07/18/22 09:44	91	92	90	89	93
KQ2211468-04LCS	07/18/22 09:46	89	93	92	89	93
K2207795-001	07/18/22 09:49	90	102	94	93	95
K2207795-001DUP	07/18/22 09:51	93	99	95	95	98
K2207795-001MS	07/18/22 09:54	95	96	93	89	93
K2207795-002	07/18/22 09:56	91	93	93	93	95
K2207795-003	07/18/22 09:58	91	96	93	92	95
K2207795-004	07/18/22 10:01	94	93	91	89	93
K2207795-005	07/18/22 10:03	95	98	95	94	95
K2207795-006	07/18/22 10:06	92	97	96	95	97
CCV	07/18/22 10:08	94	99	96	96	96
CCB	07/18/22 10:11	95	96	97	93	96
K2207795-007	07/18/22 10:13	97	96	94	92	94
K2207795-008	07/18/22 10:15	92	93	91	89	93
K2207795-009	07/18/22 10:18	90	91	90	88	92
CCV	07/18/22 10:29	97	97	94	94	96
CCB	07/18/22 10:32	96	97	95	94	96
ZZZZZZ	07/18/22 10:34					
ZZZZZZ	07/18/22 10:37					
ZZZZZZ	07/18/22 10:39					
ZZZZZZ	07/18/22 10:42					
ZZZZZZ	07/18/22 10:44					
ZZZZZZ	07/18/22 10:46					
ZZZZZZ	07/18/22 10:49					
ZZZZZZ	07/18/22 10:54					

Client: Alaska Department of Fish and Game **Service Request:** K2207795
Project: Coeur AK Biomonitoring/

ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY

Instrument ID: **K-ICP-MS-05** **Analytical BatchID:** **770711**

Sample	Date/Time	Li6NG	Ge72H2	Ge72He	In115He	Lu175He
ZZZZZZ	07/18/22 10:57					
ZZZZZZ	07/18/22 10:59					
ZZZZZZ	07/18/22 11:06					
ZZZZZZ	07/18/22 11:10					
ZZZZZZ	07/18/22 11:22					