

**Technical Report No. 22-07**

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# **Aquatic Studies at Kensington Mine, 2021**

by

**William J. Kane**



February 2022

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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.

<b>Weights and measures (metric)</b>		<b>General</b>		<b>Measures (fisheries)</b>	
centimeter	cm	Alaska Administrative Code	AAC	fork length	FL
deciliter	dL	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	mid-eye-to-fork	MEF
gram	g	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.	mid-eye-to-tail fork	METF
hectare	ha	at	@	standard length	SL
kilogram	kg	compass directions:		total length	TL
kilometer	km	east	E		
liter	L	north	N	<b>Mathematics, statistics</b>	
meter	m	south	S	<i>all standard mathematical signs, symbols and abbreviations</i>	
milliliter	mL	west	W	alternate hypothesis	H <sub>A</sub>
millimeter	mm	copyright	©	base of natural logarithm	e
nanometer	nm	corporate suffixes:		catch per unit effort	CPUE
		Company	Co.	coefficient of variation	CV
<b>Weights and measures (English)</b>		Corporation	Corp.	common test statistics	(F, t, $\chi^2$ , etc.)
cubic feet per second	ft <sup>3</sup> /s	Incorporated	Inc.	confidence interval	CI
foot	ft	Limited	Ltd.	correlation coefficient	
gallon	gal	District of Columbia	D.C.	(multiple)	R
inch	in	et alii (and others)	et al.	correlation coefficient	
mile	mi	et cetera (and so forth)	etc.	(simple)	r
nautical mile	nmi	exempli gratia		covariance	cov
ounce	oz	(for example)	e.g.	degree (angular)	°
pound	lb	Federal Information Code	FIC	degrees of freedom	df
quart	qt	idest (that is)	i.e.	expected value	E
yard	yd	latitude or longitude	lat. or long.	greater than	>
		monetary symbols		greater than or equal to	≥
<b>Time and temperature</b>		(U.S.)	\$, ¢	harvest per unit effort	HPUE
day	d	months (tables and figures): first three letters	Jan,...,Dec	less than	<
degrees Celsius	°C	registered trademark	®	less than or equal to	≤
degrees Fahrenheit	°F	trademark	™	logarithm (natural)	ln
degrees kelvin	K	United States	U.S.	logarithm (base 10)	log
hour	h	(adjective)		logarithm (specify base)	log <sub>2</sub> , etc.
hour	h	United States of America (noun)	USA	minute (angular)	'
minute	min	U.S.C.	United States Code	no data	ND
second	s	U.S. state	use two-letter abbreviations (e.g., AK, WA)	not significant	NS
				null hypothesis	H <sub>0</sub>
<b>Physics and chemistry</b>				percent	%
all atomic symbols				probability	P
alternating current	AC			probability of a type I error (rejection of the null hypothesis when true)	α
ampere	A			probability of a type II error (acceptance of the null hypothesis when false)	β
calorie	cal			second (angular)	"
direct current	DC			standard deviation	SD
hertz	Hz			standard error	SE
horsepower	hp			variance	
hydrogen ion activity (negative log of)	pH			population	Var
inch of mercury	inHg			sample	var
Kilopascal	kPa				
Nephelometric Turbidity Unit	NTU				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

***TECHNICAL REPORT NO. 22-07***

**AQUATIC STUDIES AT KENSINGTON MINE, 2021**

by

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February 2022

This investigation was fully financed by Coeur Alaska, Inc.

Cover: A brown bear (*Ursus arctos*) with its catch—an adult pink salmon (*Oncorhynchus gorbuscha*)—observed in Lower Sherman Creek, September 14, 2021.

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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 (2022) reports the Juneau area experienced annual precipitation (194 cm) about 14% above normal<sup>a</sup> and snowfall (348 cm) about 56% above normal.

The summer 2021 mean chlorophyll *a* density among periphyton samples collected at Lower Slate Creek and East Fork Slate Creek were among the lowest observed 2011–2020; the mean chlorophyll *a* densities at Lower Sherman Creek Sample Points 1 and 2 and West Fork Slate Creek were among the greatest yet observed. Mean chlorophyll *a* densities at other sampling sites were similar to values previously observed. 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 2021, the mean chlorophyll *a* density at both locations was similar to values previously observed.

The 2021 mean benthic macroinvertebrate density was the lowest observed at Lower Slate Creek and among the lowest observed at Lower Sherman Creek Sample Points 1 and 2; mean densities at other sampling sites were similar to results previously observed.

In 2021, we observed a relatively strong 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 Heintz 2018)—though we were unable to complete all surveys due to logistical constraints imposed by the COVID-19 pandemic. 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 geometric mean particle sizes of pink salmon spawning substrate in Lower Slate Creek were within the range previously observed at both Sample Point 1 and 2.

To investigate element concentration variability, we collected three sediment samples at each site for the second consecutive year in 2021; prior to 2020, we collected one sample at each site. Most mean element concentrations in the 2021 sediment samples were within the ranges previously observed at each site. In Lower Sherman Creek, we observed the greatest mean lead concentration, though this value remains below freshwater sediment toxicity screening guidelines. Among all sites, arsenic, copper, nickel, and zinc concentrations remain near or above freshwater sediment toxicity screening guidelines, and we observed additional element concentrations above the guidelines at East Fork and Upper Slate Creeks, as in previous years. While we find sediment guidelines useful for evaluating the sample data, we recognize organisms may respond differently in nature.

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<sup>a</sup> Mean value, 1991–2020.

## 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 2005), 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.<sup>b</sup> 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, 2021).

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 spawning substrate composition, and sediment element concentrations. Habitat Section staff also completed the adult salmon counts required in the project Plan of Operations (Coeur 2005).

## PURPOSE

This technical report summarizes the 2021 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 2005) and APDES Permit AK0050571.

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<sup>b</sup> 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<sup>2</sup> watershed into Slate Cove on the northwest side of Berners Bay (Coeur 2005; Figure 2). Water from the TTF (Figure 3) and acid rock drainage seepage from the TTF spillway (Figure 4) is 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).

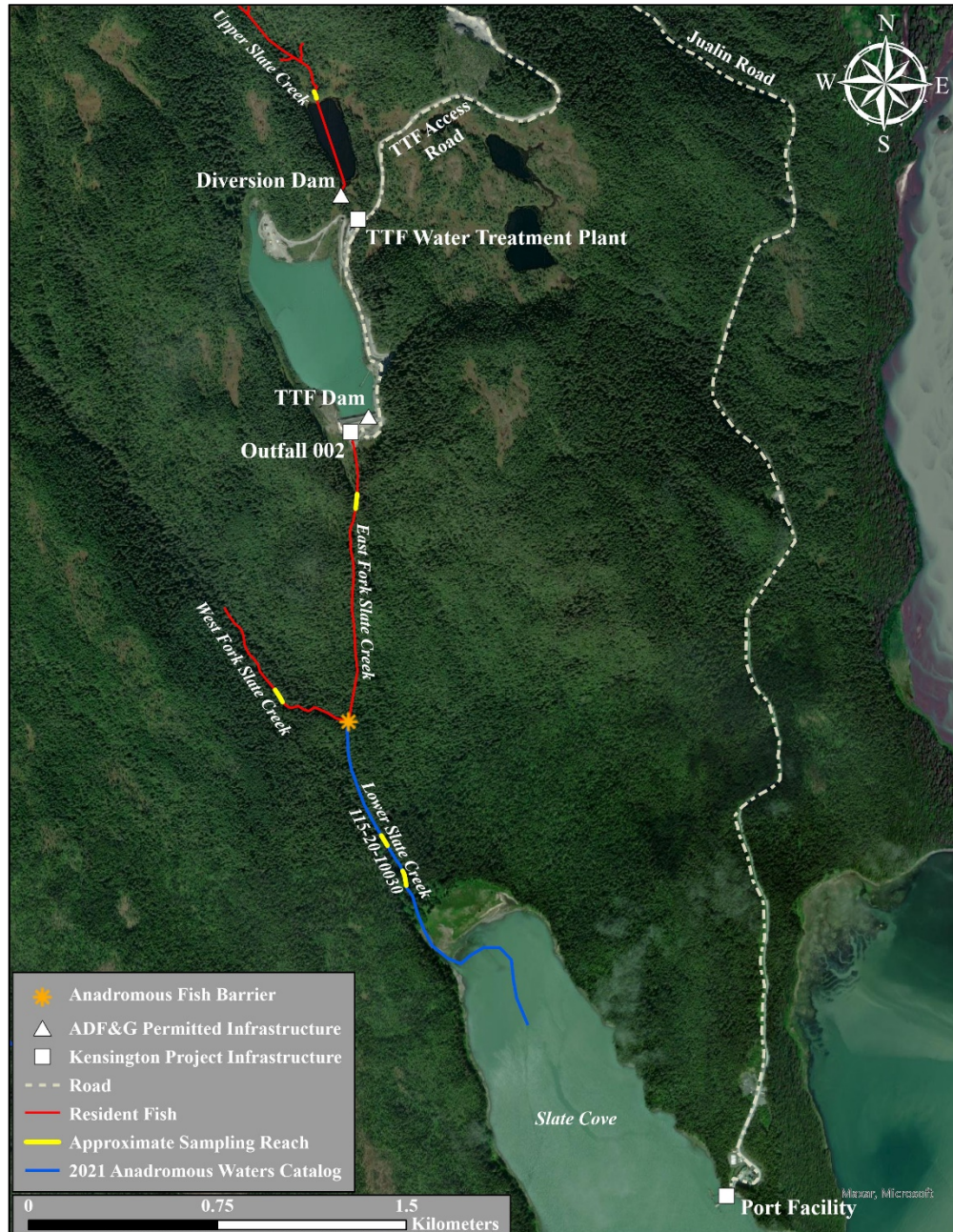


Figure 2.—Slate Creek area.



Figure 3.—Tailings Treatment Facility and Dam, August 26, 2021.



Figure 4.—Tailings Treatment Facility Dam spillway and plunge pool, August 31, 2021. Drainage water from the exposed graphitic phyllite at the west abutment is captured in the seepage collection sump and treated in the 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 2021). We also have documented juvenile Dolly Varden char *Salvelinus malma* and adult 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 28, 2021.



Figure 7.—Spawning substrate composition sampling in Lower Slate Creek at SP2, July 7, 2021.



### ***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 char (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 26, 2021.

### ***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<sup>c</sup> effluent discharge from the TTF water treatment plant.<sup>d</sup> The reach provides habitat and a corridor for Dolly Varden char 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.

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<sup>c</sup> Outfall 002 began discharging to East Fork Slate Creek in December 2010.

<sup>d</sup> 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 28, 2021.

### *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 char (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 28, 2021.

## Johnson Creek Drainage

Johnson Creek drains a 14.6 km<sup>2</sup> watershed to the Lace River on the northwest shore of Berners Bay (Coeur 2005; 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.<sup>c</sup> 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).

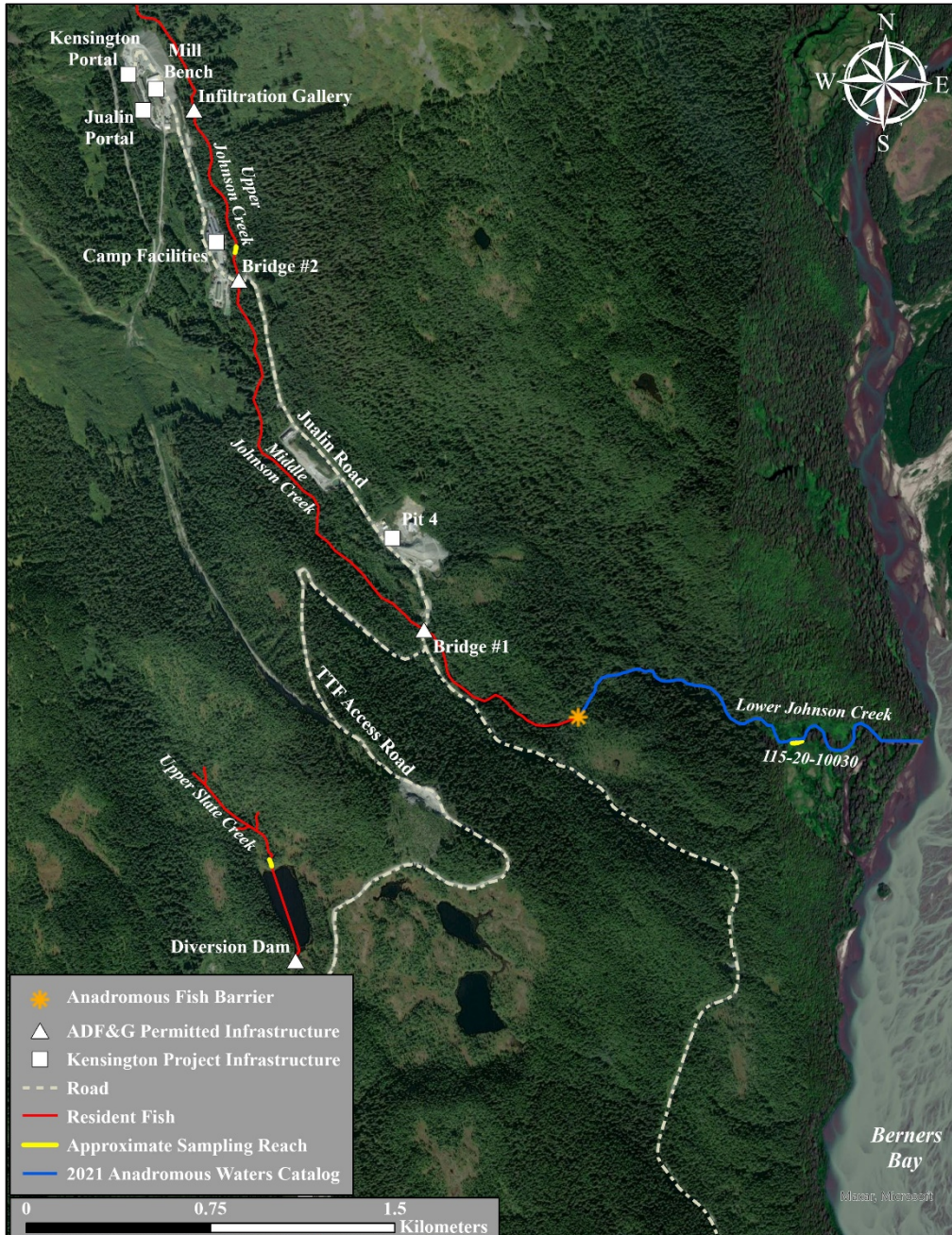


Figure 11.–Johnson Creek area.

<sup>c</sup> 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<sup>f</sup> 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 2021). We also have documented Dolly Varden char 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%) floodplain channel (Paustian 2010) and count adult salmon throughout Lower Johnson Creek (Figure 12).



Figure 12.—Adult salmon survey in Lower Johnson Creek, October 19, 2021.

### ***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 char (Timothy and Kanouse 2012). We sample BMIs about 50 m upstream of the Jualin Road Bridge #2 (Figure 13) where the stream is a medium width mixed control channel (Paustian 2010) with boulder and cobble substrate.



Figure 13.—Benthic macroinvertebrate sample collection in Upper Johnson Creek, April 28, 2021.

<sup>f</sup> 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<sup>2</sup> watershed to the east shore of Lynn Canal (Coeur 2005; 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.

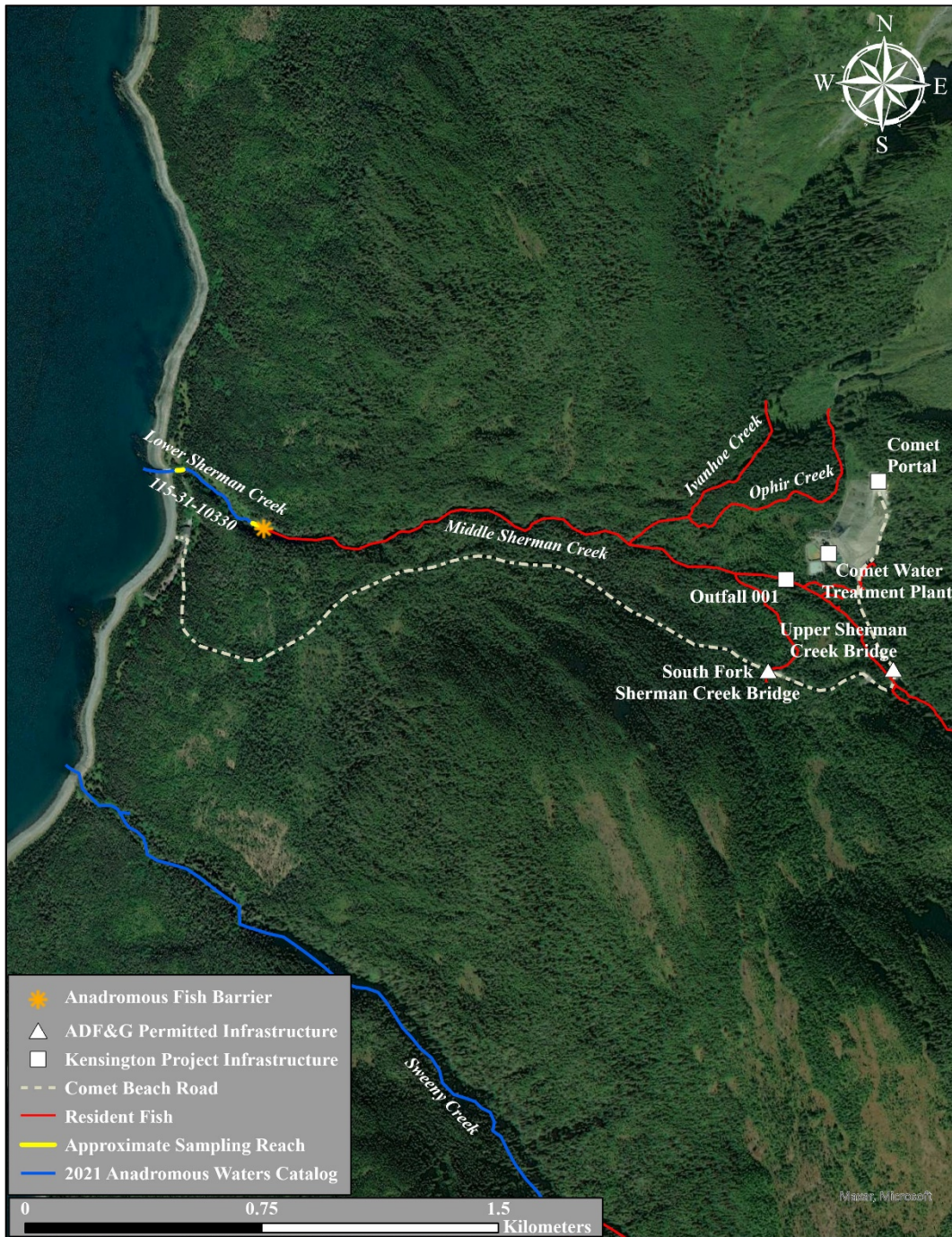


Figure 14.—Sherman Creek area.

### *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.<sup>g</sup> Lower Sherman Creek provides spawning habitat for chum and pink salmon (Stream No. 115-31-10330; Giefer and Blossom 2021). We also have documented Dolly Varden char 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.—Benthic macroinvertebrate sample collection at Lower Sherman Creek at SP1, April 26, 2021.

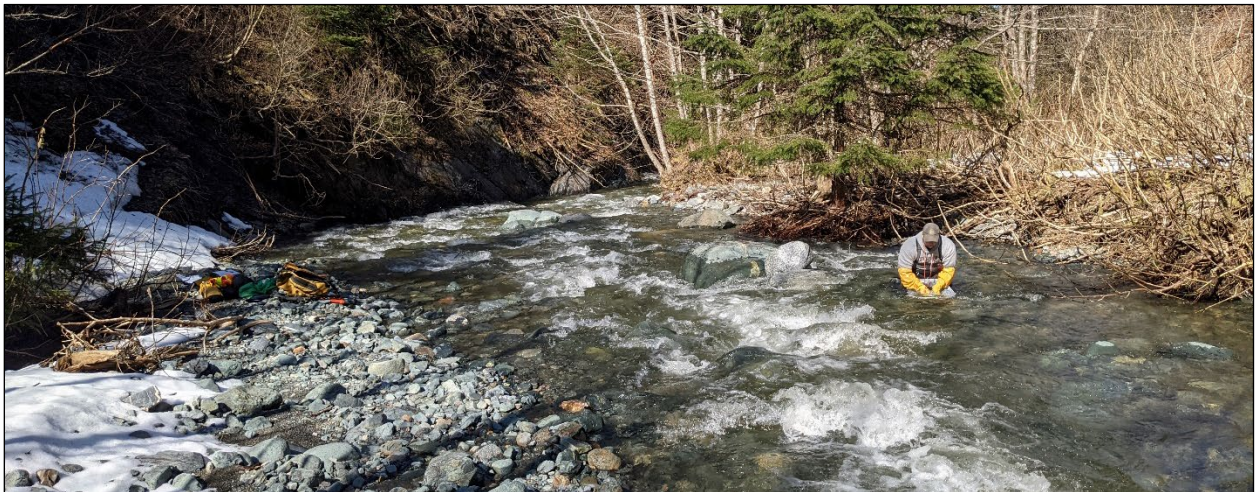


Figure 16.—Benthic macroinvertebrate sample collection in Lower Sherman Creek at SP2, April 26, 2021.

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<sup>g</sup> 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 26 and October 2, 2021, we completed the Kensington Mine aquatic studies required in the project Plan of Operations (Coeur 2005) and APDES Permit AK0050571 (Table 1).

Table 1.—Aquatic studies sampling schedule, 2021.

Aquatic Study	Lower Slate	West Fork Slate	East Fork Slate	Upper Slate	Lower Johnson	Upper Johnson	Lower Sherman
Periphyton	4/28 <sup>a</sup>	---	4/28 <sup>a</sup>	---	---	---	---
	7/29	7/29	7/29	7/28	---	---	7/28
Benthic macroinvertebrates	4/28	4/26	4/28	4/28	---	4/26	4/26
Adult salmon counts	7/20–10/26	---	---	---	7/20–10/26	---	7/20–9/14
Spawning substrate	7/7	---	---	---	---	---	---
Sediment element concentrations	7/8	---	7/9	7/9	7/9	---	7/9

<sup>a</sup> 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, 2021.

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 with modifications to methods; 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, 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  $\mu\text{m}$  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<sup>h</sup> of saturated magnesium carbonate solution was added to the filter<sup>i</sup>. 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  $-20^{\circ}\text{C}$  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.<sup>j</sup> 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  $\mu\text{L}$  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 2021 estimated detection limit for Chl-*a* concentration was 0.29  $\text{mg}/\text{m}^2$ .

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<sup>h</sup> This measurement is not exact as the amount of water and  $\text{MgCO}_3$  used to create a saturated solution varies and does not affect sample integrity; supernatant solution was used to avoid  $\text{MgCO}_3$  solids.

<sup>i</sup> To prevent acidification and conversion of chlorophyll to phaeophytin.

<sup>j</sup> 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 2021 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<sup>2</sup> 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,<sup>k</sup> and identified organisms to the lowest practical taxonomic level<sup>l</sup> 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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<sup>k</sup> 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 3<sup>rd</sup> Street, Douglas, AK.

<sup>l</sup> 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<sup>2</sup>) for each sample was calculated by dividing the number of macroinvertebrates by 0.093 m<sup>2</sup>—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<sup>m</sup> 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.<sup>n</sup> 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 2021 are provided in Appendix B.

## ADULT SALMON COUNTS

### Requirement: Plan of Operations

The Plan of Operations (Coeur 2005) requires weekly surveys of adult chum, coho, and pink salmon in Lower Slate Creek, Lower Johnson Creek, and Lower Sherman Creek throughout the spawning season.

### Sample Collection

Downstream of fish migration barriers once per week between mid-July and late-August, stream surveys were conducted by foot on Slate and Sherman Creeks and by aerial count via helicopter on Johnson Creek<sup>o</sup>; adult pink and chum salmon and carcasses were enumerated. Foot surveys on Slate and Johnson Creeks were also conducted once per week from late-September through October to enumerate adult coho salmon and carcasses. To improve coho salmon observations,

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<sup>m</sup> Including adult terrestrial insects of the orders Ephemeroptera, Plecoptera, Trichoptera, and Diptera.

<sup>n</sup> Assuming all taxonomic groups are represented.

<sup>o</sup> 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.

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 weekly adult pink salmon count; the 2011–2021 counts by species are presented in a table. Compiled 2021 data for each species by reach and the 2011–2021 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<sup>3</sup> (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:

$$d_g = d_1^{w_1} \times d_2^{w_2} \times d_3^{w_3} \dots d_n^{w_n}$$

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 2011–2021 data at each site. Annual data from 2011 through 2021 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 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). Beginning in 2020, three samples at each site were collected annually to better understand concentration variability.

### 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<sup>p</sup>; to preserve sulfide in the sample jar designated for sulfide analyses, 5–10 mL of zinc acetate was added immediately after sample collection.<sup>q</sup> 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).<sup>r</sup> 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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<sup>p</sup> In 2015, sieving sediments during collection was discontinued to avoid sample bias.

<sup>q</sup> Per laboratory staff instruction (S. Samy, Kelso Laboratory Senior Project Manager, ALS Environmental, Kelso, WA, personal communication).

<sup>r</sup> 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.

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 2011–2021 and the 2021 laboratory report are provided in Appendix E.

# RESULTS

## SLATE CREEK

### Lower Slate Creek

#### *Periphyton: Chlorophyll Density and Composition*

In 2021, the Lower Slate Creek mean chlorophyll *a* density was among the lowest previously observed (Table 7; Figure 17). The mean proportions of chlorophylls *a*, *b*, and *c* were similar to previous years (Figure 18).

Table 7.—Lower Slate Creek mean chlorophylls *a*, *b*, and *c* densities, 2011–2021.

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

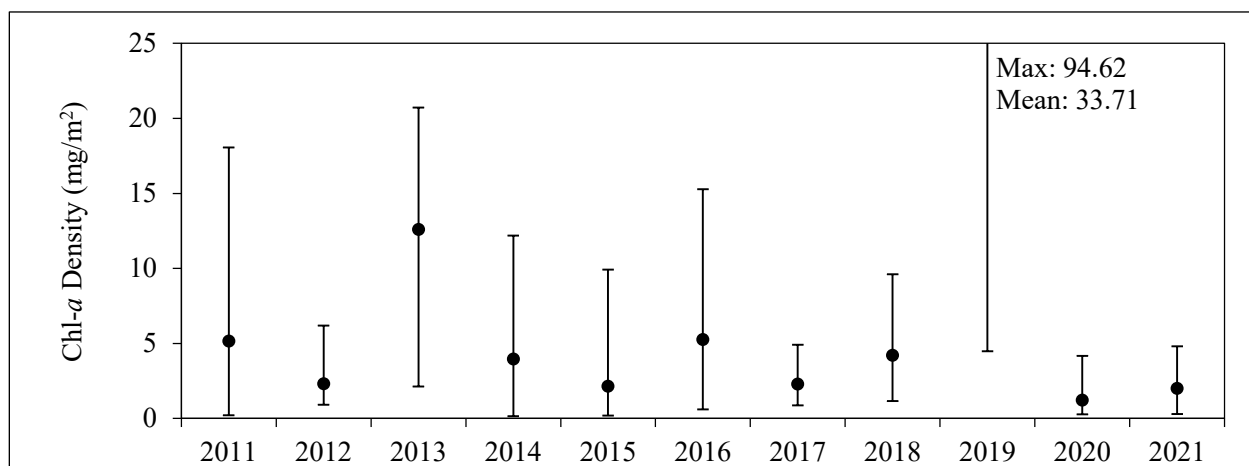


Figure 17.—Lower Slate Creek mean chlorophyll *a* densities, 2011–2021.

Note: Minimum, mean, and maximum values.

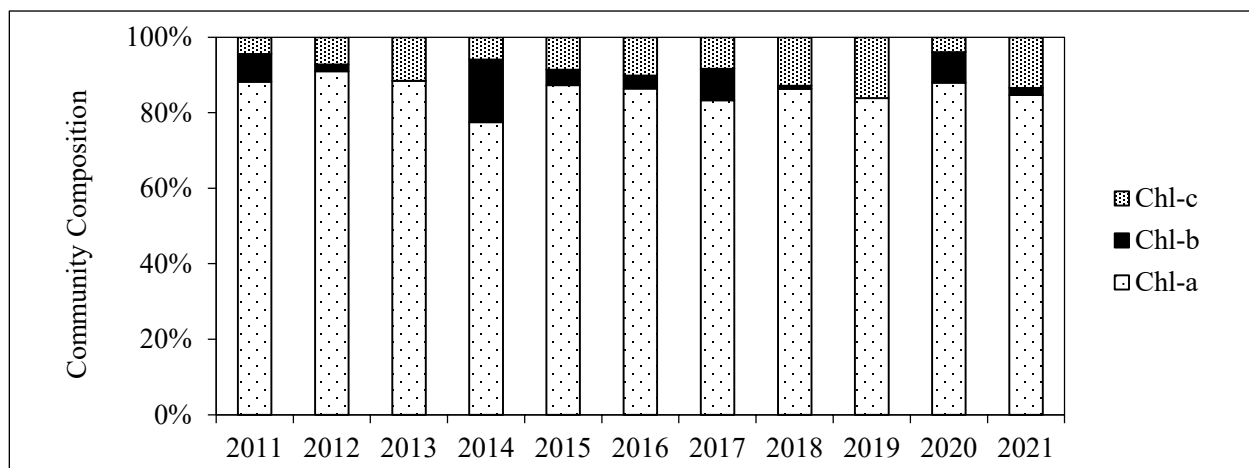


Figure 18.—Lower Slate Creek mean proportions of chlorophylls *a*, *b*, and *c*, 2011–2021.

### ***Benthic Macroinvertebrate Density and Community Composition***

Among the 2021 Lower Slate Creek BMI samples, we identified 17 taxa and estimate mean density at 425 BMI/m<sup>2</sup>—lower than previously observed (Table 8; Figure 19). Since 2017, the annual estimated mean BMI density continues to be lower than observed 2011–2016. The Shannon Diversity and Evenness scores were consistent with most previous years, and the dominant taxa were Diptera: Chironomidae (nonbiting midges) and Ephemeroptera (mayflies): *Cinygmula*, composing 31% and 21% of the samples.

Table 8.—Lower Slate Creek BMI data summaries, 2011–2021.

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

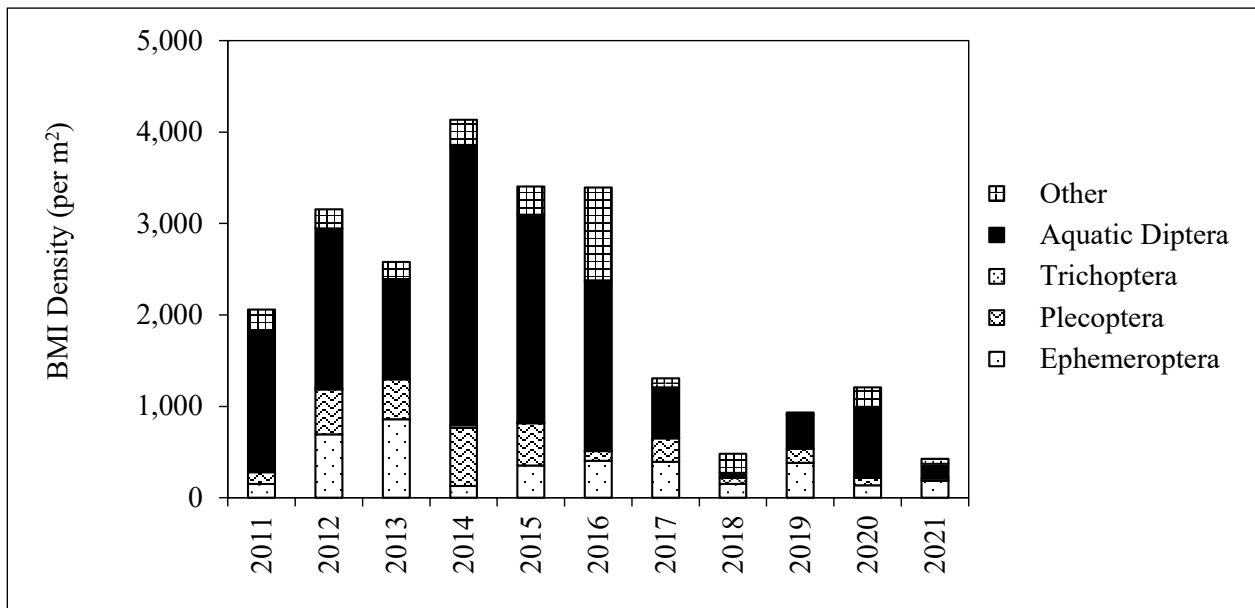


Figure 19.—Lower Slate Creek mean BMI densities and community compositions, 2011–2021.



### *Adult Salmon Counts*

In 2021, we counted 3,661 pink salmon in Lower Slate Creek (Table 9; Figure 20). We were unable to complete two intended surveys due to logistical constraints and safety precautions associated with the coronavirus pandemic.

Table 9.—Lower Slate Creek adult salmon counts, 2011–2021.

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

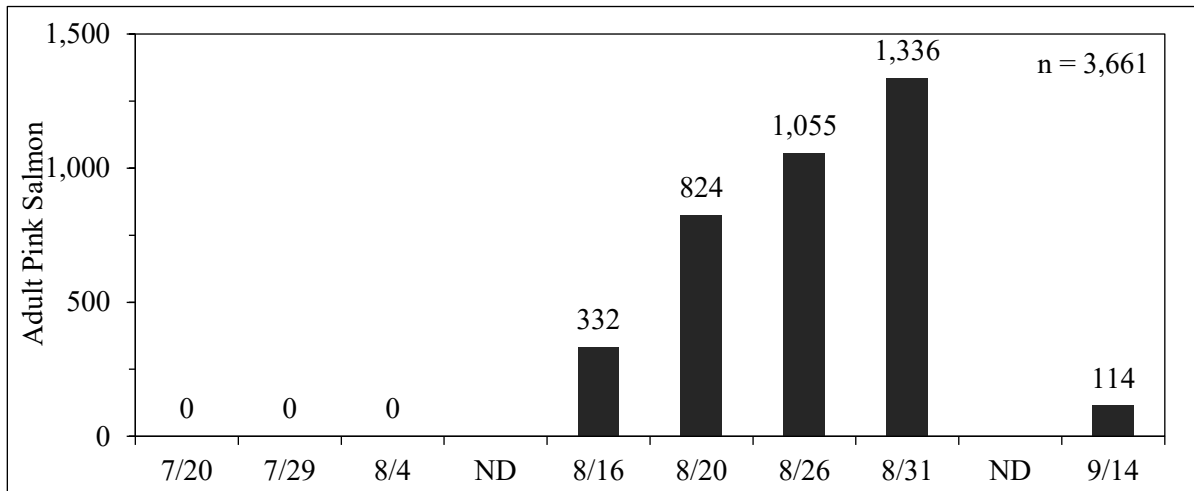


Figure 20.—Lower Slate Creek weekly adult pink salmon counts, 2021.

### *Spawning Substrate Composition*

In 2021, the GMPS at Sample Point 1 was 12.0 mm—within the range previously observed. The GMPS at Sample Point 2 was 20.4 mm—among the greatest previously observed (Table 10).

Table 10.—Lower Slate Creek spawning substrate geometric mean particle sizes (mm), 2011–2021.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
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
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

### *Sediment Element Concentrations*

Among the 2021 Lower Slate Creek sediment samples, the mean concentration of all analytes were within the range previously observed (Figure 21). The As, Cu, Ni, and Zn values remain above the TEC freshwater sediment toxicity guidelines (Buchman 2008).

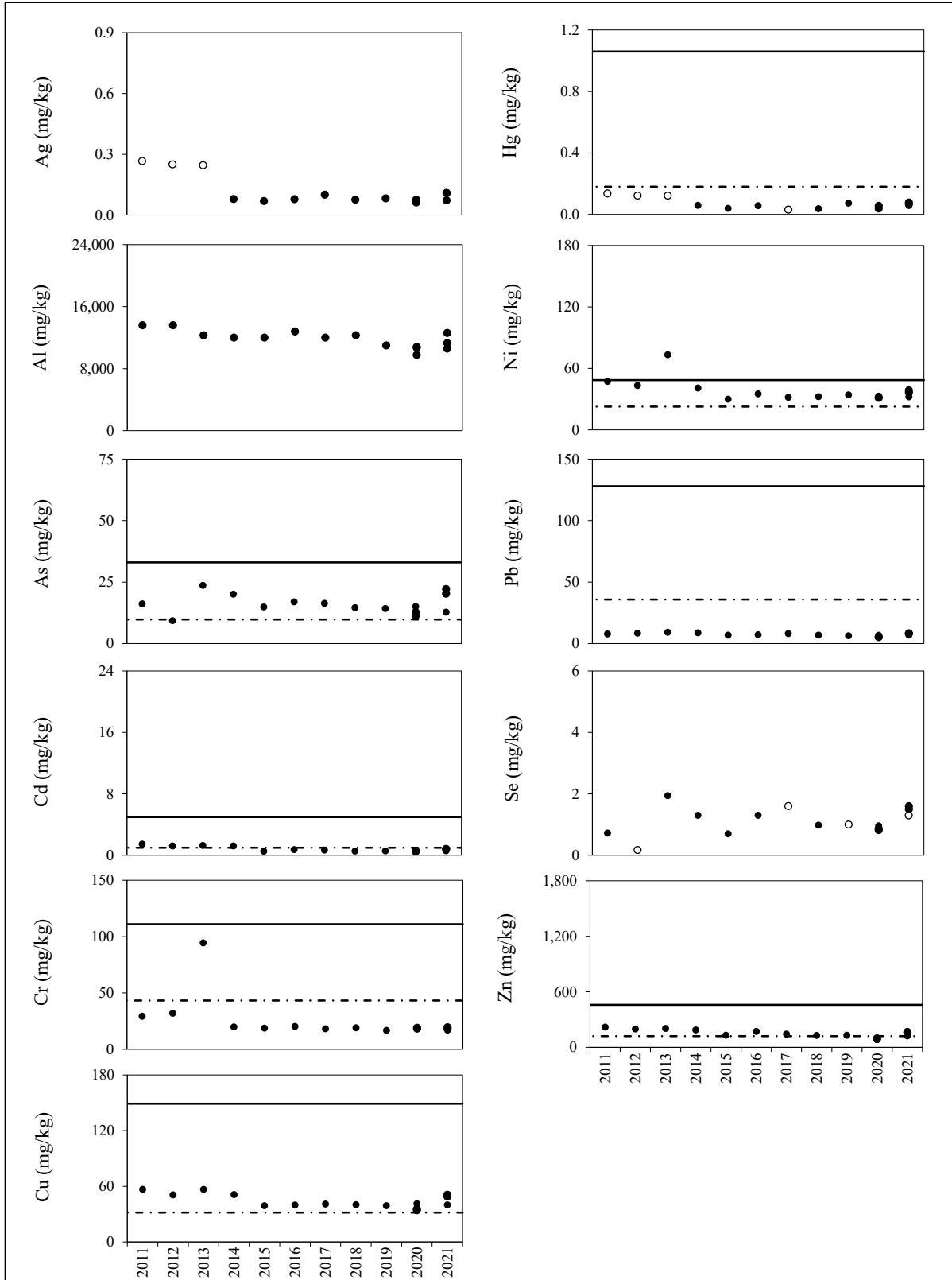


Figure 21.—Lower Slate Creek sediment element concentrations, 2011–2021.

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 2021, the West Fork Slate Creek mean chlorophyll *a* density was greater than previously observed (Table 11; Figure 22). The 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, 2011–2021.

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

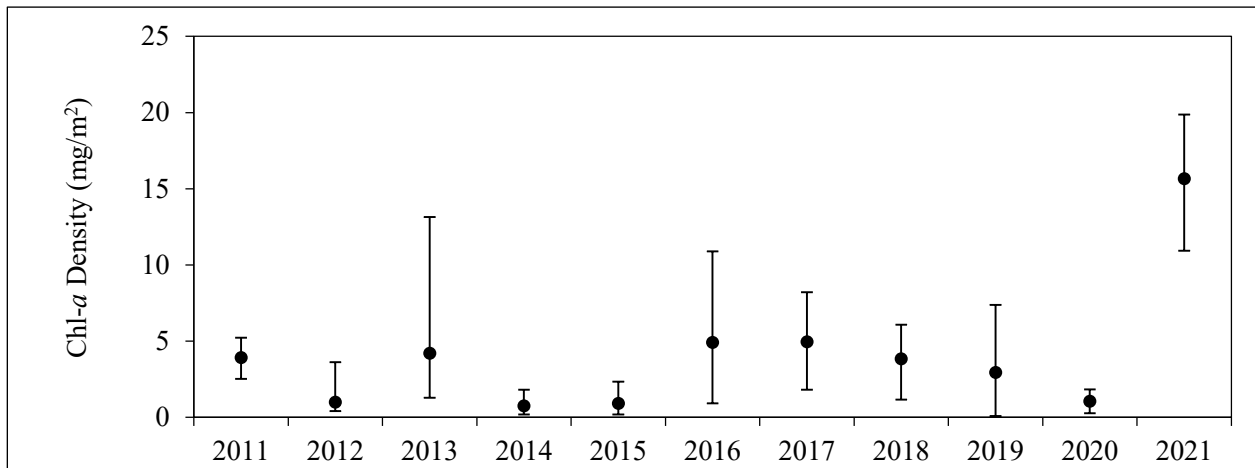


Figure 22.—West Fork Slate Creek mean chlorophyll *a* densities, 2011–2021.

Note: Minimum, mean, and maximum values.

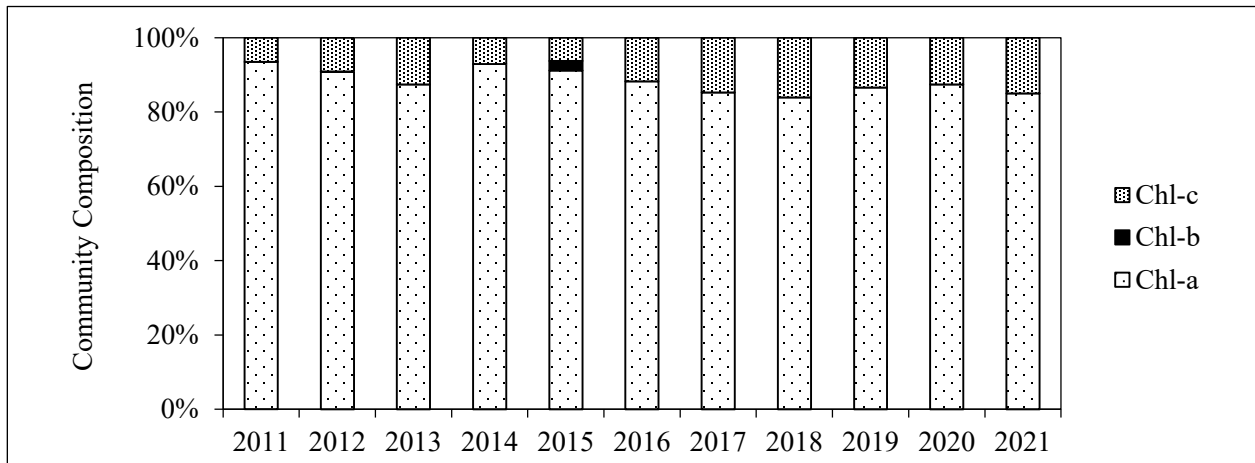


Figure 23.—West Fork Slate Creek mean proportions of chlorophylls *a*, *b*, and *c*, 2011–2021.

### ***Benthic Macroinvertebrate Density and Community Composition***

Among the 2021 West Fork Slate Creek BMI samples, we identified 17 taxa and estimate mean density at 719 BMI/m<sup>2</sup>—within ranges previously observed (Table 12; Figure 24). EPT insects composed 93% of the samples—greater than previously observed. The Shannon Diversity and Evenness scores were consistent with most previous years, and the dominant taxon was Ephemeroptera: *Cinygmula*, composing 44% of the samples.

Table 12.—West Fork Slate Creek BMI data summaries, 2011–2021.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Mean BMI density (per m <sup>2</sup> )	502	1,819	2,446	973	2,634	1,470	885	328	1,299	1,358	719
Total BMI taxa	21	31	28	29	28	25	21	18	16	18	17
Number of EPT taxa	11	21	18	17	16	15	13	12	11	12	14
% EPT	80%	80%	90%	71%	82%	77%	82%	84%	91%	78%	93%
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
Evenness score	0.78	0.71	0.61	0.79	0.71	0.69	0.78	0.83	0.64	0.74	0.75

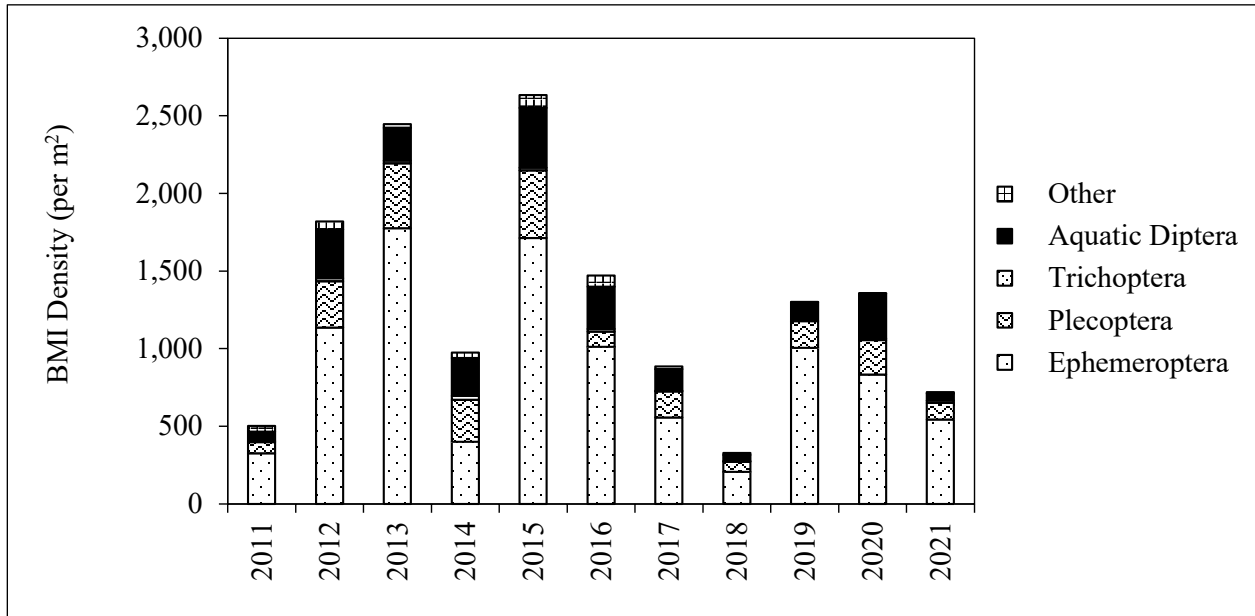


Figure 24.—West Fork Slate Creek mean BMI densities and community compositions, 2011–2021.

## East Fork Slate Creek

### *Periphyton: Chlorophyll Density and Composition*

In 2021, the East Fork Slate Creek mean chlorophyll *a* density was among the lowest previously observed (Table 13; Figure 25). The 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, 2011–2021.

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

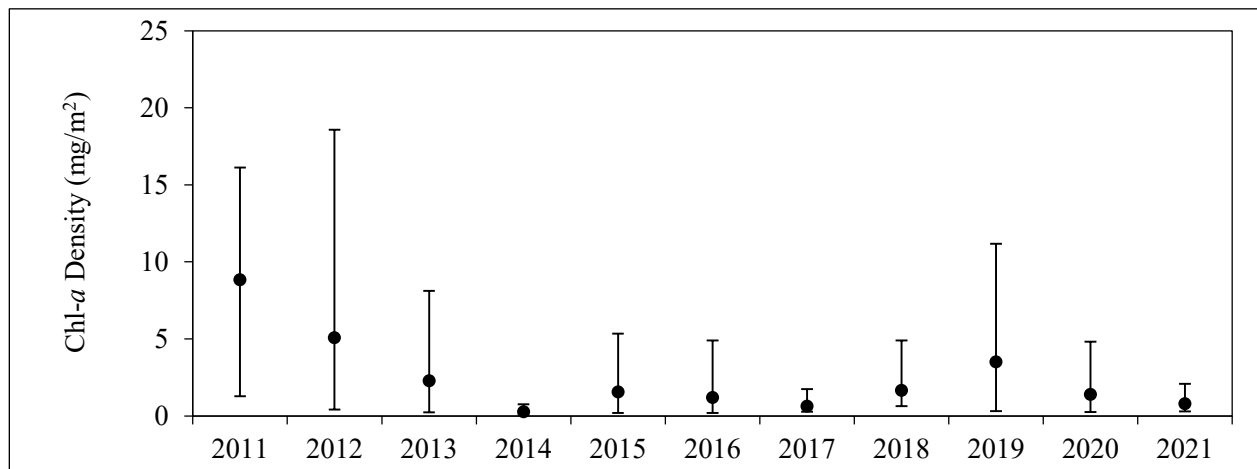


Figure 25.—East Fork Slate Creek mean chlorophyll *a* densities, 2011–2021.

Note: Minimum, mean, and maximum values.

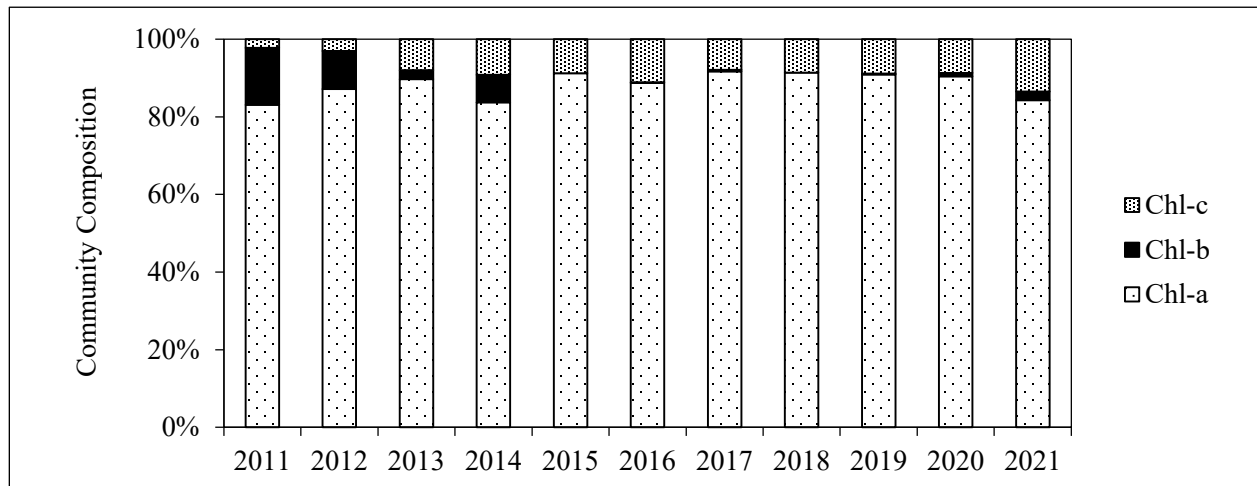


Figure 26.—East Fork Slate Creek mean proportions of chlorophylls *a*, *b*, and *c*, 2011–2021.

***Benthic Macroinvertebrate Density and Community Composition***

Among the 2021 East Fork Slate Creek BMI samples, we identified 23 taxa and estimate mean density at 3,437 BMI/m<sup>2</sup>, of which 10% were EPT insects, all within ranges previously observed (Table 14; Figure 27). The Shannon Diversity and Evenness scores were consistent with most previous years, and the dominant taxon was Diptera: Chironomidae, composing 45% of the samples.

Table 14.–East Fork Slate Creek BMI data summaries, 2011–2021.

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

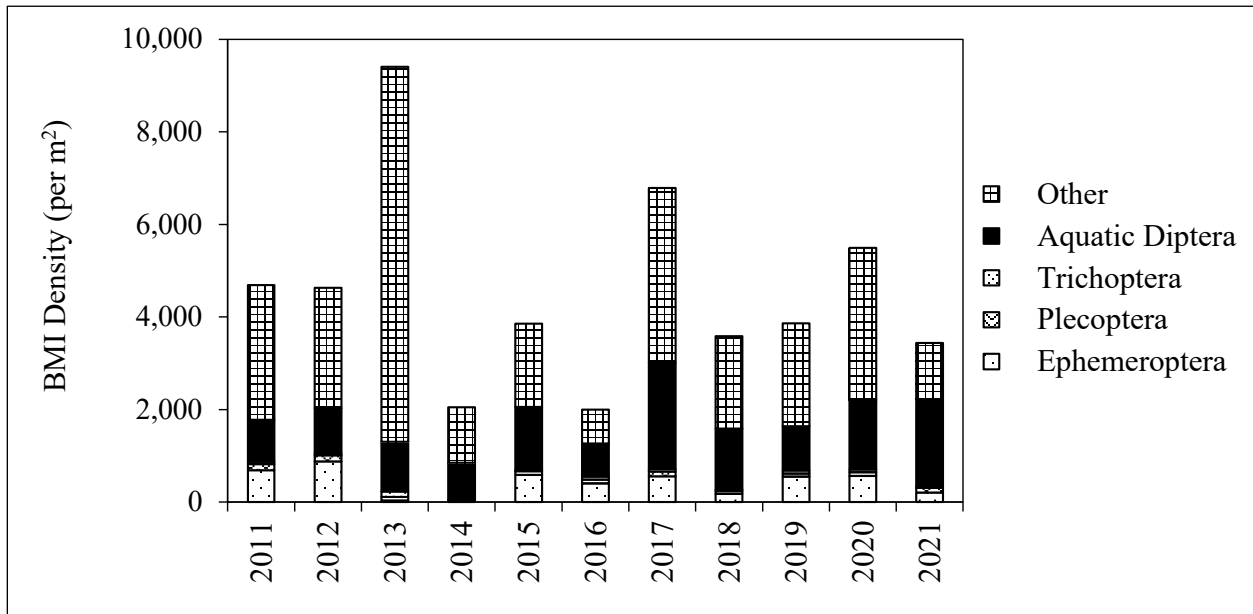


Figure 27.–East Fork Slate Creek mean BMI densities and community compositions, 2011–2021.

***Sediment Element Concentrations***

Among the 2021 East Fork Slate Creek sediment samples, the mean concentrations of Ag, As, Cd, Cu, Hg, Ni, Pb, Se, and Zn were within the range previously observed; the mean Al and Cr concentrations were lower than previously observed (Figure 28). The mean concentration of As was above the TEC freshwater sediment toxicity guideline value; mean concentrations of Cd, Ni, and Zn were above the PEC values.

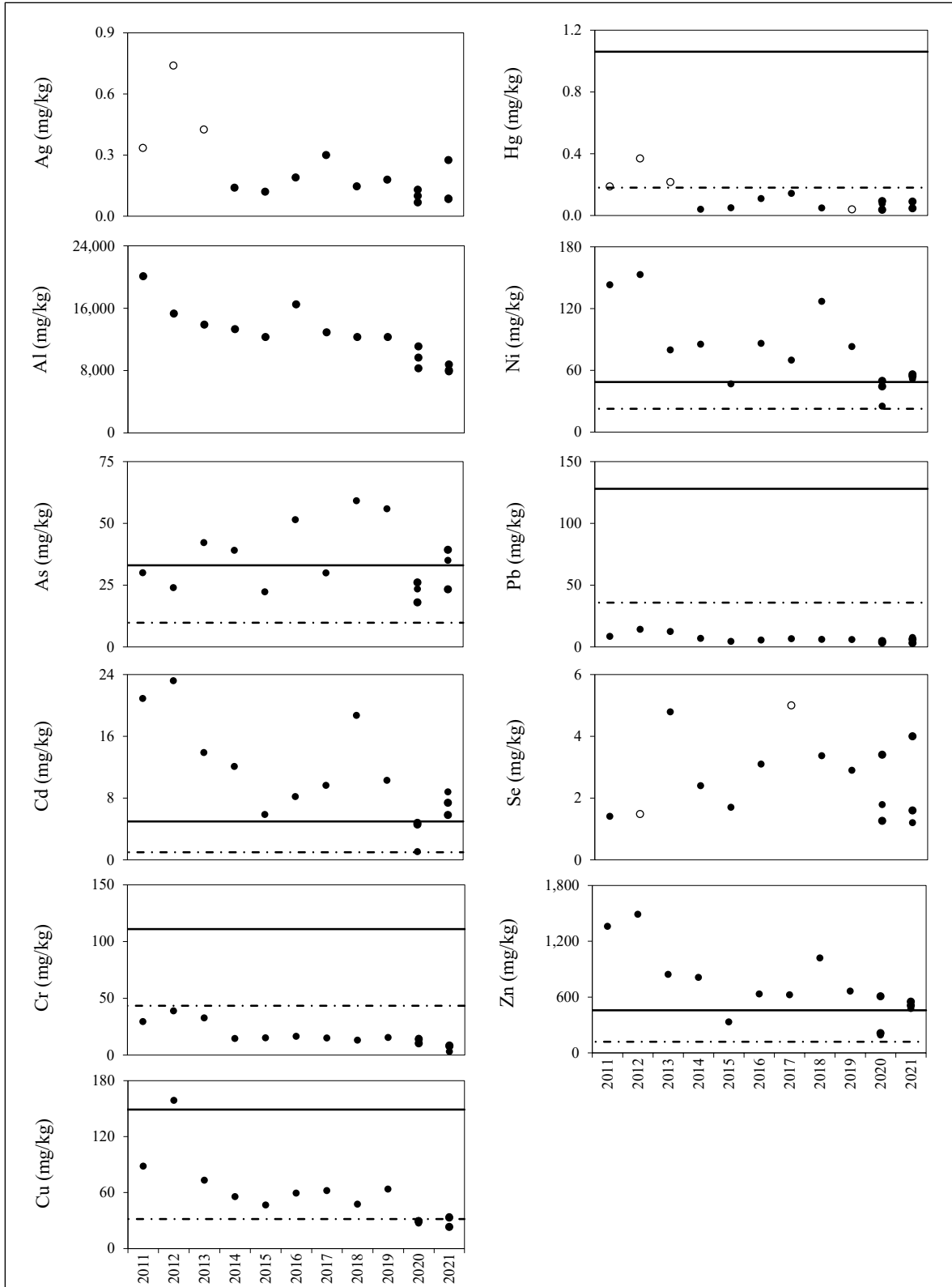


Figure 28.—East Fork Slate Creek sediment element concentrations, 2011–2021.

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 2021, the Upper Slate Creek mean chlorophyll *a* density was within the range observed since 2011 (Table 15; Figure 29). The 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, 2011–2021.

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

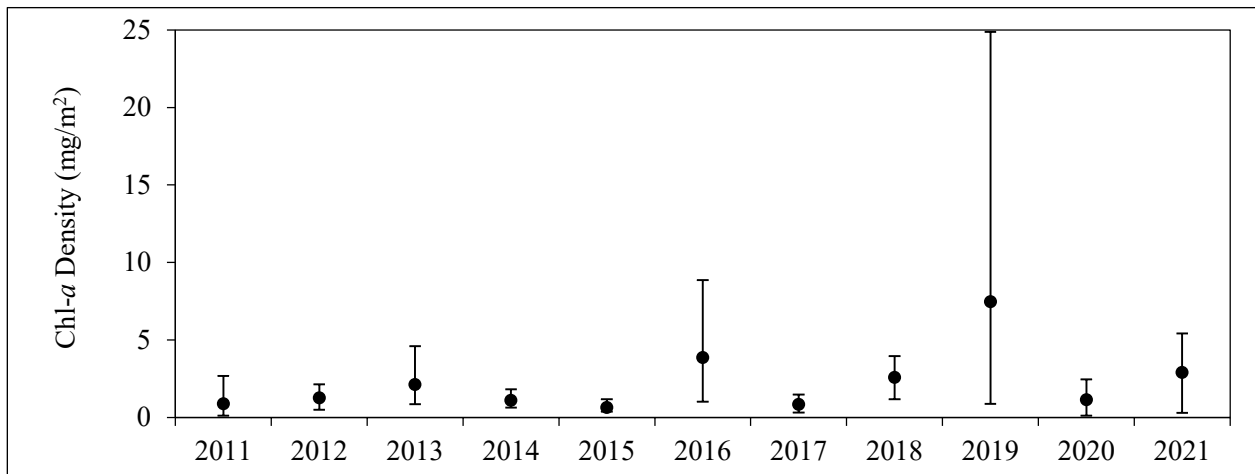


Figure 29.–Upper Slate Creek mean chlorophyll *a* densities, 2011–2021.

Note: Minimum, mean, and maximum values.

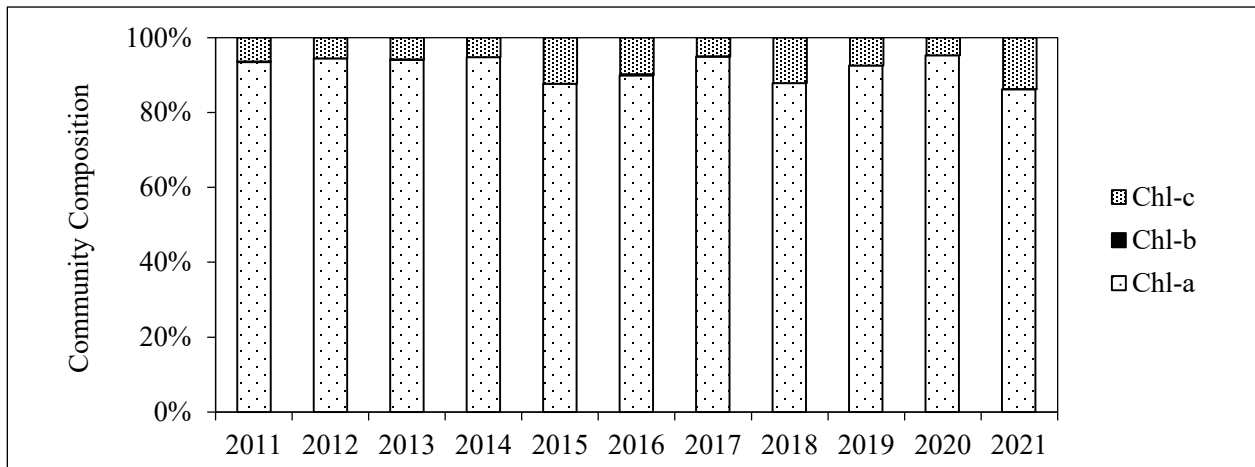


Figure 30.–Upper Slate Creek mean proportions of chlorophylls *a*, *b*, and *c*, 2011–2021.



### ***Benthic Macroinvertebrate Density and Community Composition***

Among the 2021 Upper Slate Creek BMI samples, we identified 28 taxa and estimate mean density at 1,409 BMI/m<sup>2</sup>, of which 81% were EPT insects—all within ranges previously observed (Table 16; Figure 31). The Shannon Diversity and Evenness scores were consistent with most previous years and the dominant taxa were Ephemeroptera: *Cinygmula* and *Baetis*, composing 28% and 18% of the samples.

Table 16.—Upper Slate Creek BMI data summaries, 2011–2021.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Mean BMI density (per m <sup>2</sup> )	2,523	2,256	2,880	3,125	3,776	2,398	2,029	1,548	1,634	973	1,409
Total BMI taxa	33	39	34	36	31	28	30	31	24	25	28
Number of EPT taxa	18	21	20	20	19	15	19	18	18	15	18
% EPT	63%	68%	72%	63%	68%	68%	61%	68%	83%	71%	81%
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
Evenness score	0.76	0.79	0.78	0.76	0.74	0.82	0.73	0.75	0.80	0.78	0.77

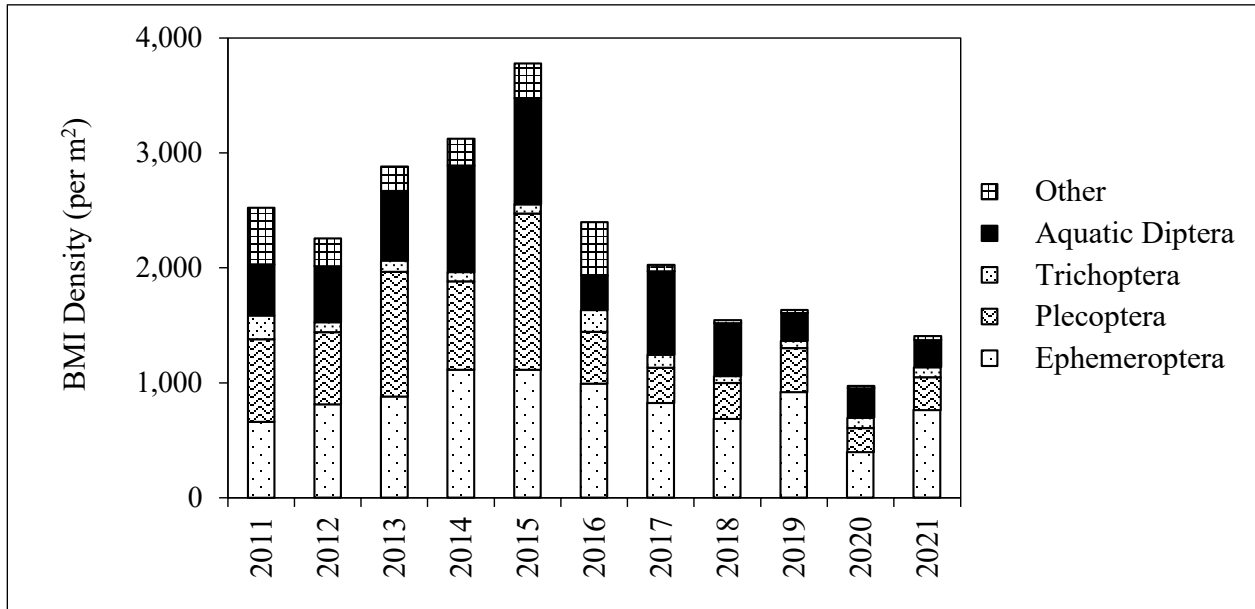


Figure 31.—Upper Slate Creek mean BMI densities and community compositions, 2011–2021.

### ***Sediment Element Concentrations***

Among the 2021 Upper Slate Creek sediment samples, the mean concentrations of all analytes were within the range previously observed (Figure 32). The mean As, Cr, and Cu concentrations remain above the TEC freshwater sediment toxicity guideline values; the mean Zn concentration also was above the TEC value. The mean Ni concentration remains above the PEC guideline value.

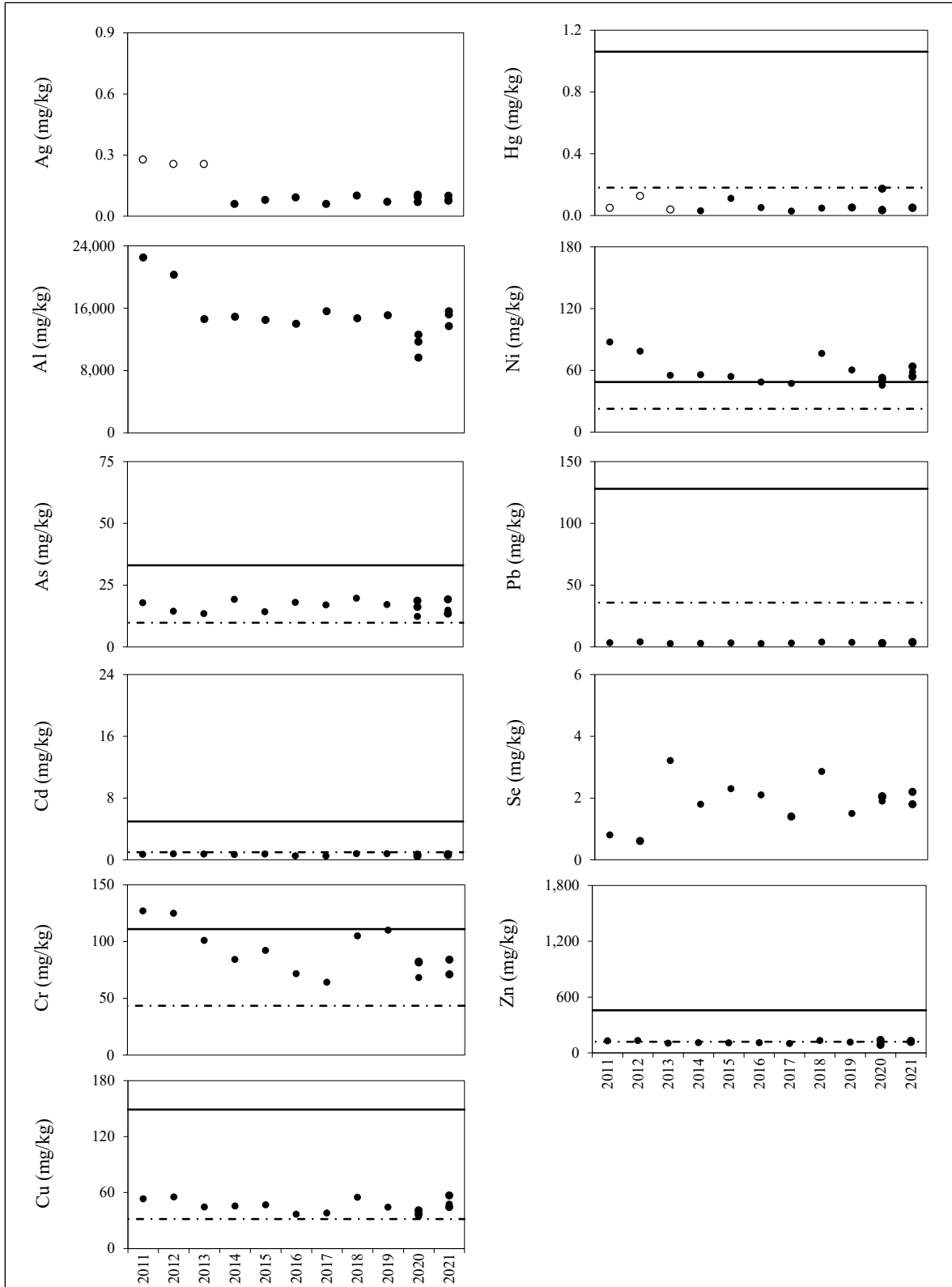


Figure 32.—Upper Slate Creek sediment element concentrations, 2011–2021.

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 2021, we counted 15,393 pink salmon and 549 coho salmon in Lower Johnson Creek (Table 17; Figure 33). We were unable to complete two intended surveys due to logistical constraints and safety precautions associated with the coronavirus pandemic.

Table 17.—Lower Johnson Creek adult salmon counts, 2011–2021.

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

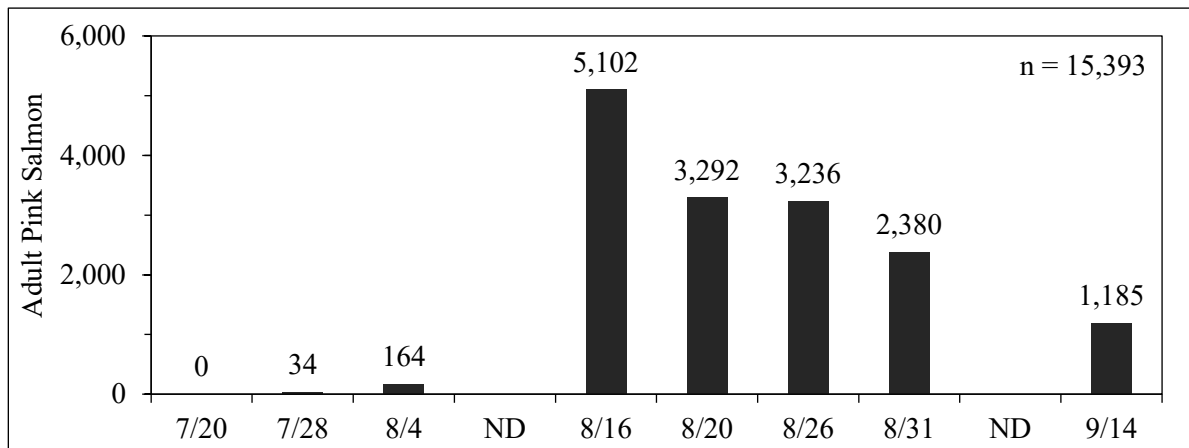


Figure 33.—Lower Johnson Creek weekly pink salmon count, 2021.

### *Sediment Element Concentrations*

Among the 2021 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.

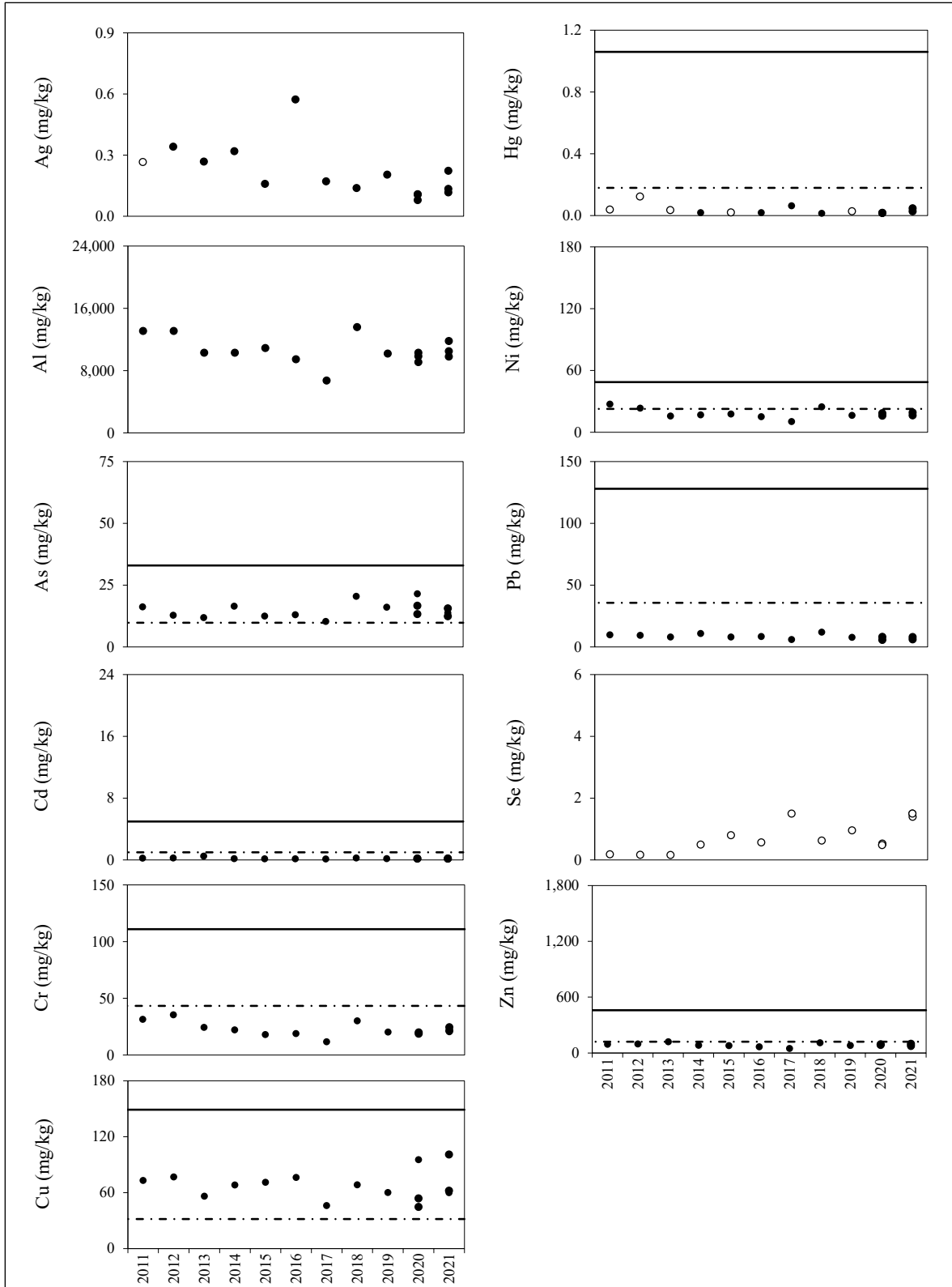


Figure 34.—Lower Johnson Creek sediment element concentrations, 2011–2021.

*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 2021 Upper Johnson Creek BMI samples, we identified 29 taxa and estimate mean density at 2,634 BMI/m<sup>2</sup>, of which 80% were EPT insects—the greatest proportion yet observed (Table 18; Figure 35). The Shannon Diversity and Evenness scores were consistent with most previous years and the dominant taxa were Ephemeroptera: *Baetis* and *Cinygmula*, composing 34% and 27% of the samples.

Table 18.—Upper Johnson Creek BMI data summaries, 2011–2021.

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

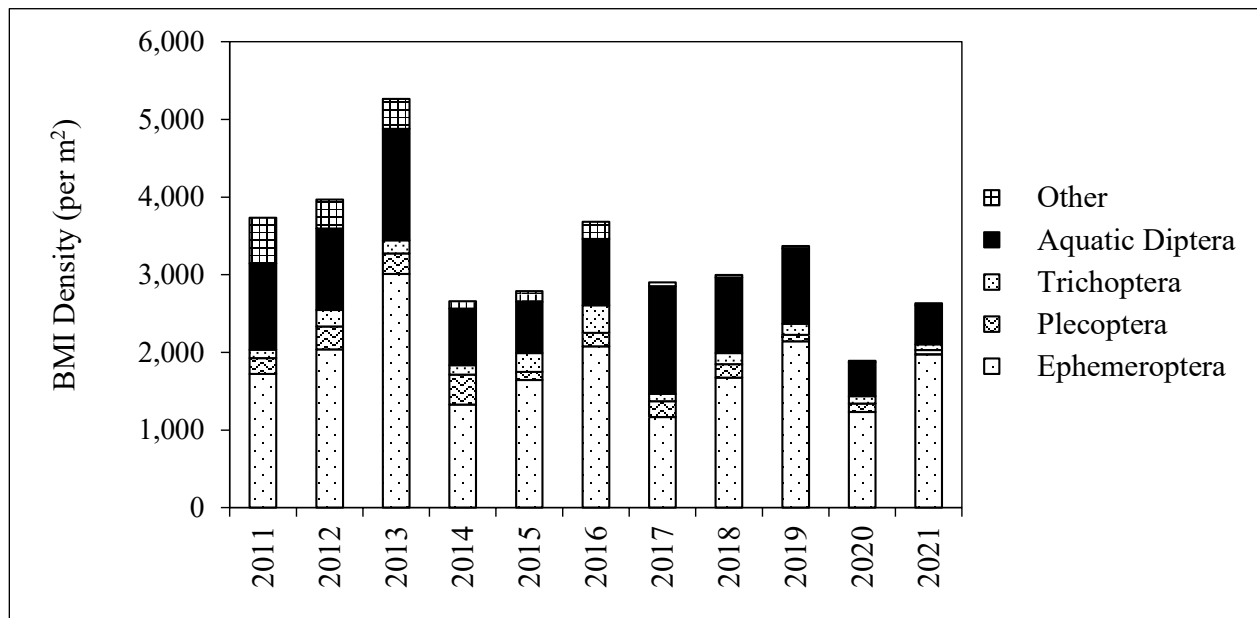


Figure 35.—Upper Johnson Creek mean BMI densities and community compositions, 2011–2021.

# SHERMAN CREEK

## Lower Sherman Creek

### *Periphyton: Chlorophyll Density and Composition*

#### Sample Point 1

In 2021, the Lower Sherman Creek SP1 mean chlorophyll *a* density was among the greatest previously observed (Table 19; Figure 36). The mean proportions of chlorophylls *a*, *b*, and *c* were similar to previous years (Figure 37).

Table 19.—Lower Sherman Creek SP1 mean chlorophylls *a*, *b*, and *c* densities, 2011–2021.

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

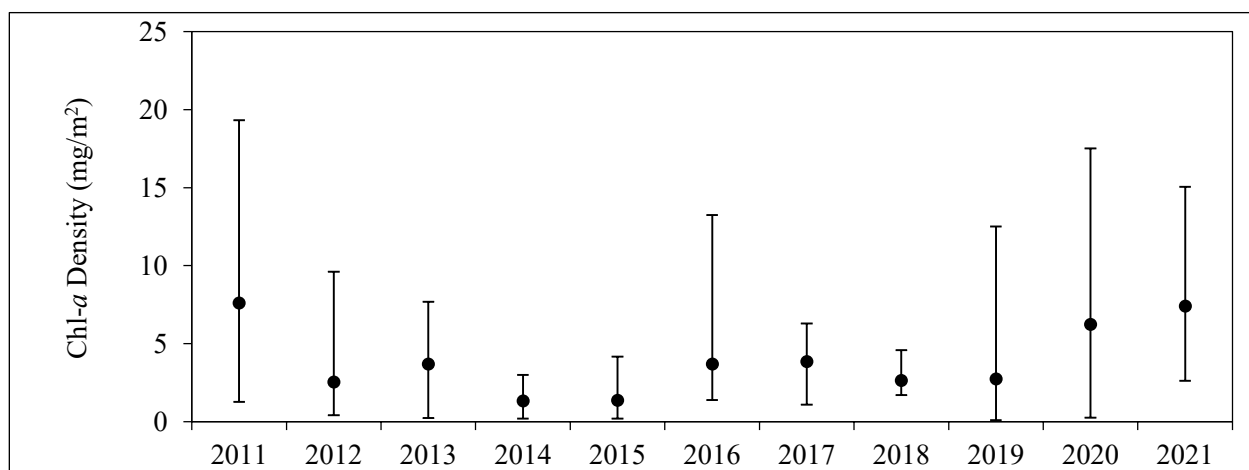


Figure 36.—Lower Sherman SP1 mean chlorophyll *a* densities, 2011–2021.

Note: Minimum, mean, and maximum values.

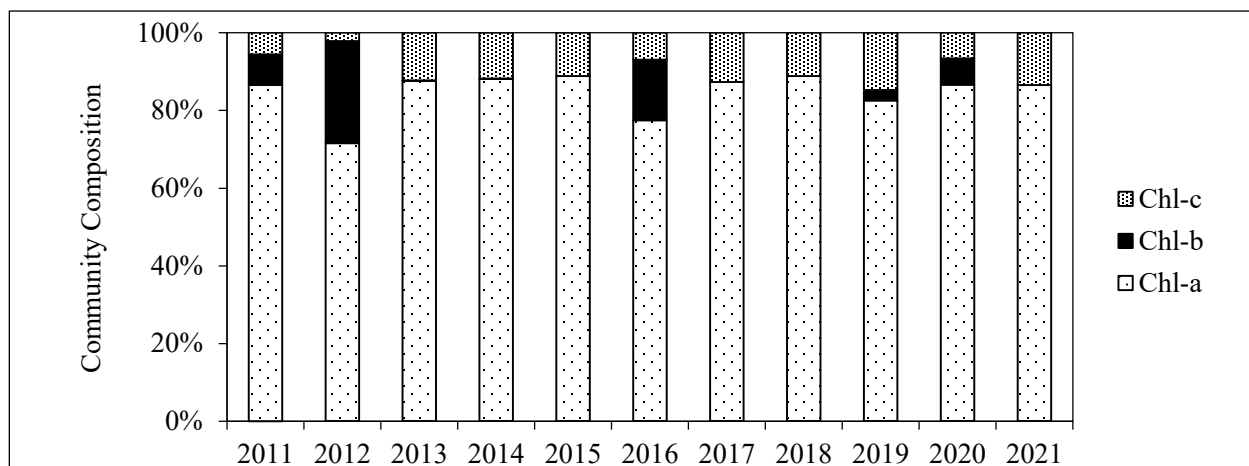


Figure 37.—Lower Sherman SP1 mean proportions of chlorophylls *a*, *b*, and *c*, 2011–2021.

## Sample Point 2

In 2021, Lower Sherman Creek SP2 mean density of chlorophyll *a* was among the greatest previously observed; the mean density of chlorophyll *c* was greater than previously observed. (Table 20; Figure 38). The mean proportions of chlorophylls *a*, *b*, and *c* were similar to previous years (Figure 39).

Table 20.—Lower Sherman Creek SP2 mean chlorophylls *a*, *b*, and *c* densities, 2011–2021.

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

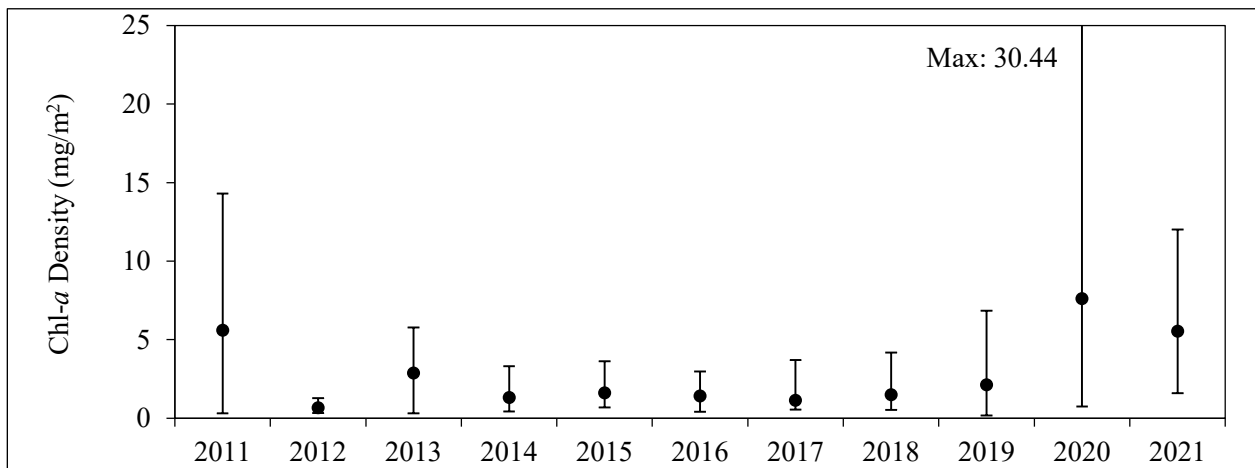


Figure 38.—Lower Sherman SP2 mean chlorophyll *a* densities, 2011–2021.

Note: Minimum, mean, and maximum values.

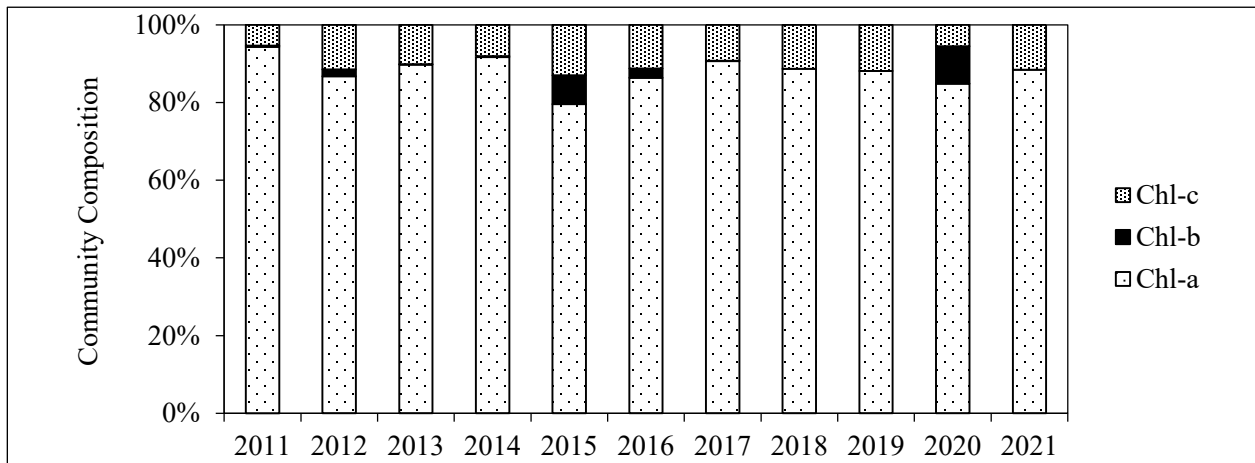


Figure 39.—Lower Sherman SP2 mean proportions of chlorophylls *a*, *b*, and *c*, 2011–2021.

## *Benthic Macroinvertebrate Density and Community Composition*

### Sample Point 1

Among the 2021 Lower Sherman Creek SP1 BMI samples, we identified 20 taxa and estimate mean density at 989 BMI/m<sup>2</sup>—both among the lowest yet observed (Table 21; Figure 40). EPT taxa composed 89% of the samples—the greatest observed. As in 2020, the Shannon Diversity and Evenness scores were among the lowest observed; the dominant taxon was Ephemeroptera: *Baetis*, composing 58% of the samples.

Table 21.—Lower Sherman Creek SP1 BMI data summaries, 2011–2021.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Mean BMI density (per m <sup>2</sup> )	1,118	2,733	1,796	3,023	1,651	6,839	1,009	912	1,263	1,272	989
Total BMI taxa	26	31	28	30	26	26	25	26	25	24	20
Number of EPT taxa	15	18	16	13	13	13	13	16	14	14	14
% EPT	32%	66%	64%	14%	27%	4%	31%	69%	64%	30%	89%
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
Evenness score	0.71	0.62	0.71	0.57	0.70	0.27	0.69	0.71	0.71	0.61	0.62

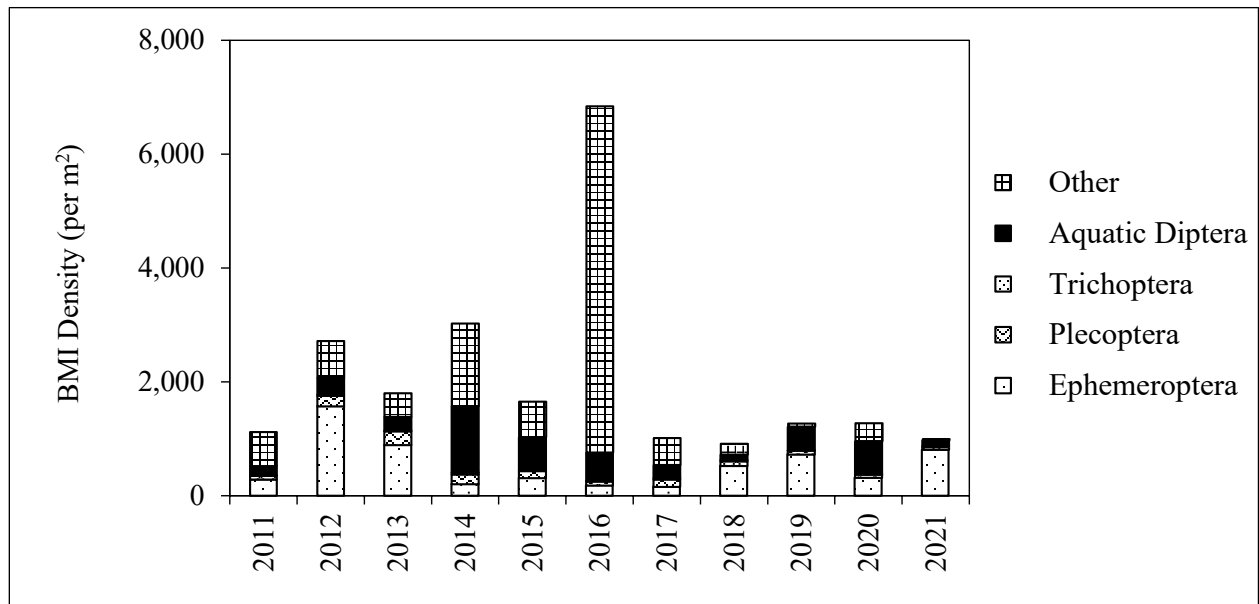


Figure 40.—Lower Sherman Creek SP1 mean BMI densities and community compositions, 2011–2021.



## Sample Point 2

Among the 2021 Lower Sherman Creek SP2 BMI samples, we identified 26 taxa and estimate mean density at 720 BMI/m<sup>2</sup>—among the lowest previously observed (Table 22; Figure 41). The Shannon Diversity and Evenness scores were consistent with most previous years and the dominant taxon was Ephemeroptera: *Baetis*, composing 48% of the samples.

Table 22.—Lower Sherman Creek SP2 BMI data summaries, 2011–2021.

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

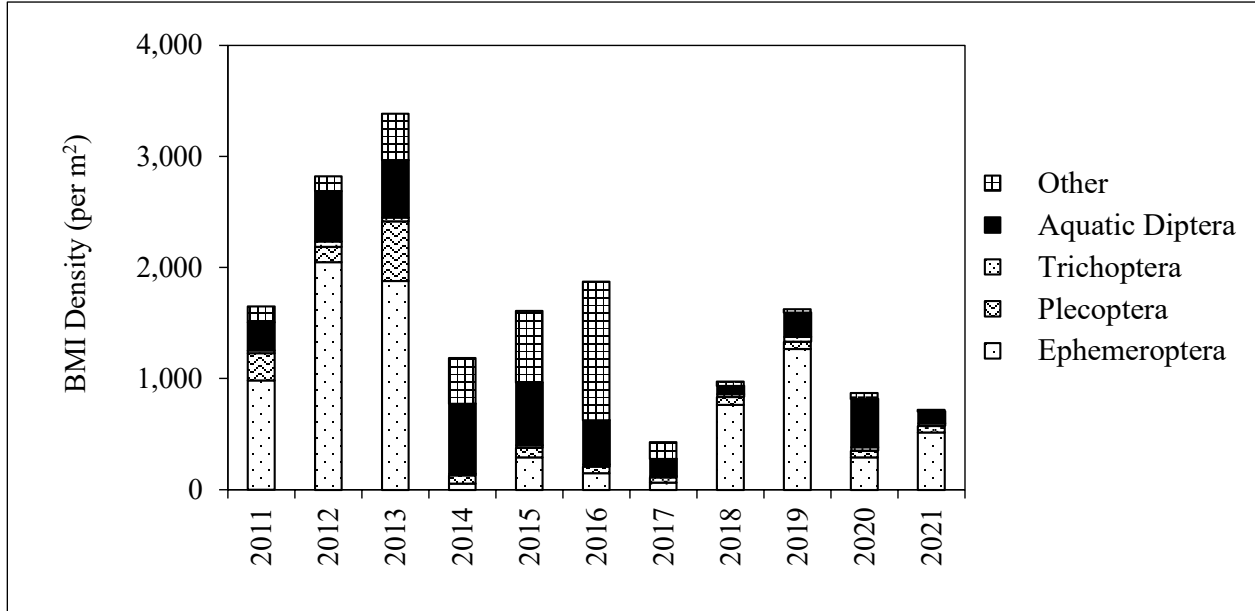


Figure 41.—Lower Sherman Creek SP2 mean BMI densities and community compositions, 2011–2021.

### ***Adult Salmon Counts***

In 2021, we counted 1,020 pink salmon in Lower Sherman Creek (Table 23; Figure 42). Since coho salmon do not use Sherman Creek, we did not survey for adults. We were unable to complete two intended surveys due to logistical constraints and safety precautions associated with the coronavirus pandemic.

Table 23.–Lower Sherman Creek adult salmon counts, 2011–2021.

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

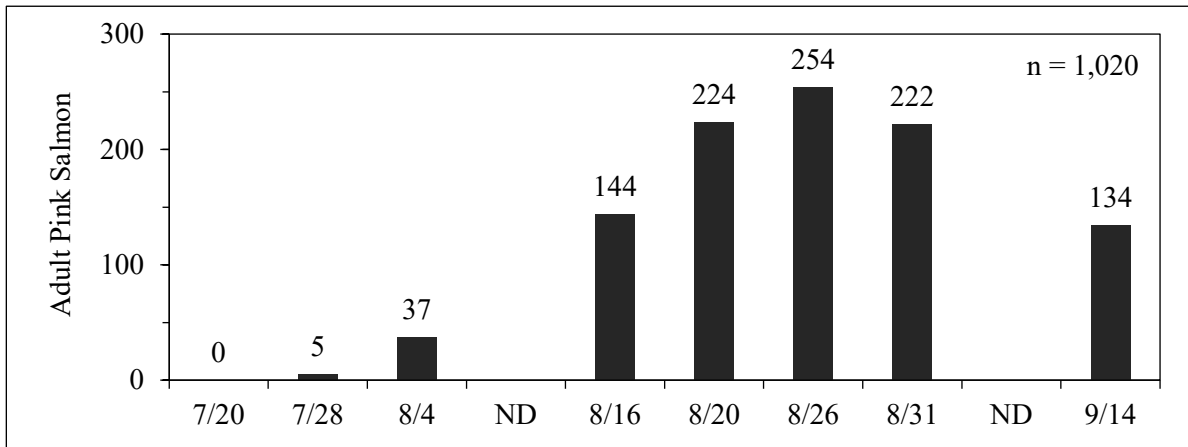


Figure 42.–Lower Sherman Creek weekly pink salmon count, 2021.

### ***Sediment Element Concentrations***

Among the 2021 Lower Sherman Creek sediment samples, the mean Al, As, Cd, and Zn concentrations were lower than previously observed; the mean Pb concentrations was greater than previously observed (Figure 43). The mean As, Cu, and Ni concentrations remain above the TEC freshwater sediment toxicity guideline values.

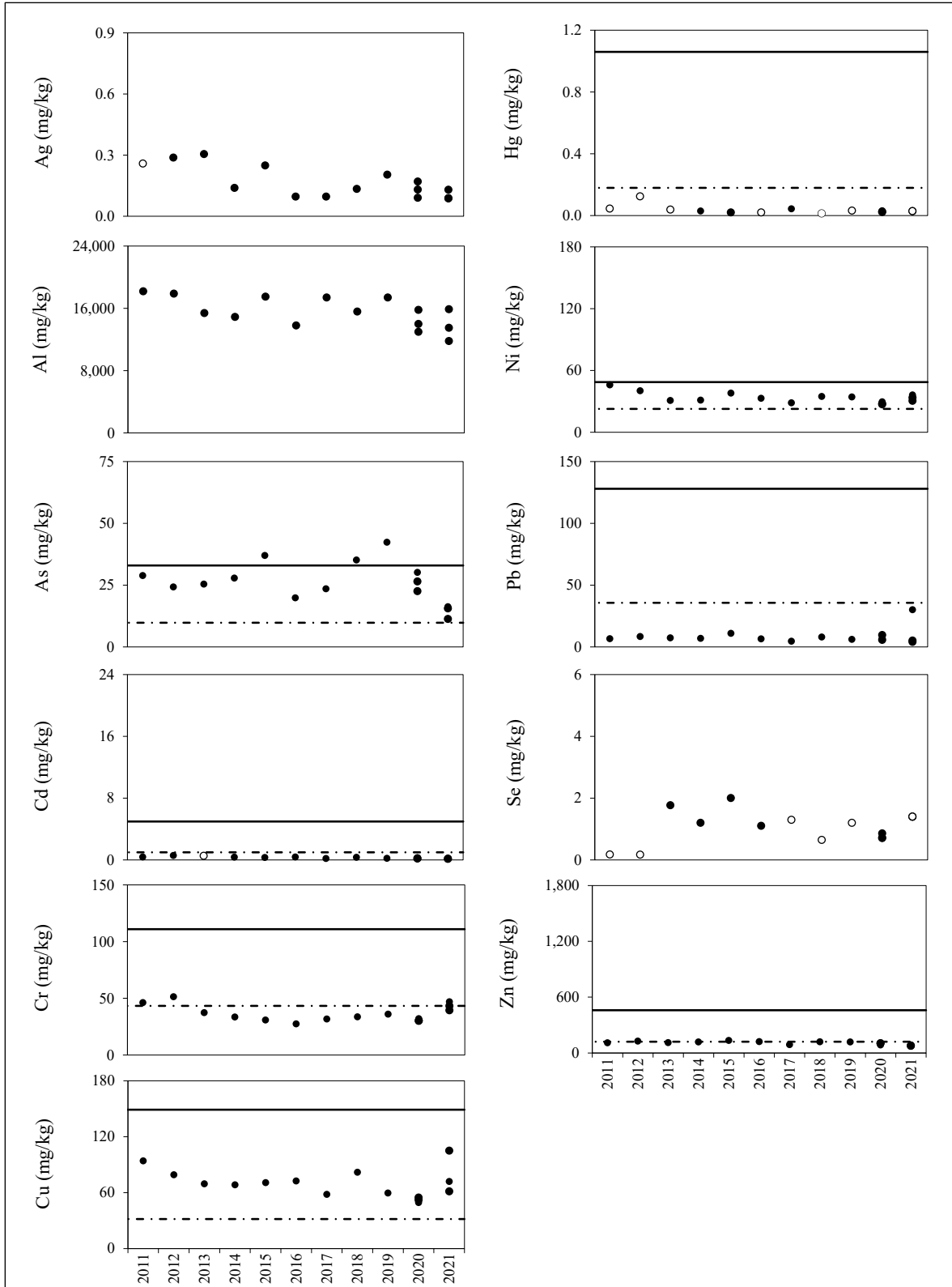


Figure 43.—Lower Sherman Creek sediment element concentrations, 2011–2021.

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).

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## **APPENDIX A: CHLOROPHYLL DATA**





Appendix A.1.–Lower Slate Creek chlorophylls *a*, *b*, and *c* densities, 2011–2021.

mg/m <sup>2</sup>	07/29/11			07/25/12		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	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
mg/m <sup>2</sup>	07/31/13			07/30/14		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	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
mg/m <sup>2</sup>	07/28/15			07/26/16		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	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
	<b>0.19</b>	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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Appendix A.1.–Page 2 of 2.

mg/m <sup>2</sup>	07/24/17			08/07/18		
	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
mg/m <sup>2</sup>	08/01/19			07/29/20		
	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
mg/m <sup>2</sup>	04/28/21			07/29/21		
	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	<b>0.29</b>	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.

Appendix A.2.—West Fork Slate Creek chlorophylls *a*, *b*, and *c* densities, 2011–2021.

mg/m <sup>2</sup>	07/29/11			07/25/12		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	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
mg/m <sup>2</sup>	07/31/13			07/30/14		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	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
mg/m <sup>2</sup>	07/28/15			07/26/16		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	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
	<b>0.19</b>	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

- continued -

Appendix A.2.–Page 2 of 2.

mg/m <sup>2</sup>	07/24/17			07/25/18		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	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
mg/m <sup>2</sup>	08/01/19			07/29/20		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	<b>0.10</b>	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
	<b>0.10</b>	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
mg/m <sup>2</sup>	07/29/21					
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>			
	15.38	0.00	3.12			
	15.27	0.00	2.99			
	12.07	0.00	2.19			
	13.95	0.00	2.38			
	17.71	0.00	2.99			
	10.93	0.00	2.03			
	19.86	0.00	3.39			
	15.56	0.00	2.49			
	19.70	0.00	3.25			
	16.13	0.00	2.76			
mean	15.66	0.00	2.76			
maximum	19.86	0.00	3.39			
minimum	10.93	0.00	2.03			

*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, 2011–2021.

mg/m <sup>2</sup>	07/28/11			07/24/12		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	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
mg/m <sup>2</sup>	07/30/13			07/30/14		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	8.12	0.00	0.67	0.14	0.00	0.00
	<b>0.24</b>	ND	ND	0.64	0.00	0.07
	1.07	0.03	0.07	<b>0.05</b>	ND	ND
	0.32	0.07	0.00	0.75	0.14	0.10
	0.64	0.10	0.00	<b>0.05</b>	ND	ND
	5.02	0.16	0.35	0.37	0.00	0.00
	0.43	0.00	0.03	<b>0.05</b>	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
	<b>0.24</b>	ND	ND	<b>0.05</b>	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
mg/m <sup>2</sup>	07/27/15			07/25/16		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	0.85	0.00	0.12	0.23	0.00	0.03
	<b>0.19</b>	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	<b>0.19</b>	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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mg/m <sup>2</sup>	07/25/17			07/24/18		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	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
mg/m <sup>2</sup>	08/01/19			07/30/20		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	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	<b>0.25</b>	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
mg/m <sup>2</sup>	04/28/21			07/29/21		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	0.73	0.00	0.07	1.92	0.00	0.25
	2.34	0.00	0.18	0.32	0.06	0.05
	<b>0.29</b>	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	<b>0.29</b>	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.

Appendix A.4.–Upper Slate Creek chlorophylls *a*, *b*, and *c* densities, 2011–2021.

mg/m <sup>2</sup>	07/29/11			07/24/12		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	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
mg/m <sup>2</sup>	07/30/13			07/30/14		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	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
mg/m <sup>2</sup>	07/27/15			07/25/16		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	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/m <sup>2</sup>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	
	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/m <sup>2</sup>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	
	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					
mg/m <sup>2</sup>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>				
	3.95	0.00	0.50				
	5.41	0.00	0.49				
	2.67	0.00	0.14				
	0.53	0.01	0.18				
	ND	ND	ND				
	4.04	0.00	0.57				
	<b>0.29</b>	ND	ND				
	3.44	0.00	0.72				
	1.60	0.00	0.25				
	4.06	0.00	0.83				
mean	2.89	0.00	0.46				
maximum	5.41	0.01	0.83				
minimum	0.29	0.00	0.14				

*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, 2011–2021.

mg/m <sup>2</sup>	07/28/11			07/26/12		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	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
mg/m <sup>2</sup>	07/29/13			07/28/14		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	4.06	0.00	0.38	2.46	0.00	0.30
	5.55	0.00	0.73	0.74	0.00	0.10
	<b>0.24</b>	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
	<b>0.24</b>	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
mg/m <sup>2</sup>	07/27/15			07/25/16		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	0.28	0.00	0.03	3.31	0.52	0.31
	<b>0.19</b>	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
	<b>0.19</b>	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/m <sup>2</sup>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	
	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/m <sup>2</sup>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	
	ND	ND	ND	17.52	0.00	1.73	
	<b>0.10</b>	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	
	<b>0.10</b>	ND	ND	13.67	4.03	0.31	
	5.66	0.47	0.45	<b>0.25</b>	ND	ND	
	<b>0.10</b>	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					
mg/m <sup>2</sup>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>				
	7.47	0.00	1.03				
	4.44	0.00	0.78				
	6.83	0.00	1.05				
	5.66	0.00	0.96				
	7.29	0.00	1.02				
	14.20	0.00	2.48				
	5.23	0.00	0.77				
	2.62	0.00	0.40				
	5.34	0.00	0.95				
	15.05	0.00	2.04				
mean	7.41	0.00	1.15				
maximum	15.05	0.00	2.48				
minimum	2.62	0.00	0.40				

*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, 2011–2021.

mg/m <sup>2</sup>	07/28/11			07/26/12		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	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	<b>0.34</b>	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	<b>0.34</b>	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
mg/m <sup>2</sup>	07/29/13			07/28/14		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	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
mg/m <sup>2</sup>	07/27/15			07/25/16		
	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>
	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

- continued -

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		07/25/17			07/24/18		
mg/m <sup>2</sup>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	
	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/m <sup>2</sup>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>	
	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					
mg/m <sup>2</sup>	Chl- <i>a</i>	Chl- <i>b</i>	Chl- <i>c</i>				
	4.50	0.00	0.71				
	3.76	0.00	0.51				
	1.60	0.00	0.14				
	12.02	0.00	1.66				
	4.17	0.00	0.50				
	3.17	0.00	0.43				
	5.73	0.00	0.77				
	6.55	0.00	0.83				
	5.34	0.00	0.72				
	8.53	0.00	0.95				
mean	5.54	0.00	0.72				
maximum	12.02	0.00	1.66				
minimum	1.60	0.00	0.14				

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, 2011–2021.

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





Appendix B.4.—Upper Slate Creek BMI data summary, 2011–2021.

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



Appendix B.6.–Lower Sherman Creek SP1 BMI data summary, 2011–2021.

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

Appendix B.7.–Lower Sherman Creek SP2 BMI data summary, 2011–2021.

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





## **APPENDIX C: ADULT SALMON DATA**



Appendix C.1.–Lower Slate Creek weekly adult pink salmon count by reach, 2021.

Stream Reach	07/20/21		07/29/21		08/04/21		08/16/21		08/20/21		08/26/21	
	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass
0-100 m	0	0	0	0	0	0	54	0	130	0	200	26
100-200 m	0	0	0	0	0	0	80	0	183	9	197	25
200-300 m	0	0	0	0	0	0	34	0	73	5	112	32
300-400 m	0	0	0	0	0	0	26	0	132	16	153	33
400-500 m	0	0	0	0	0	0	67	0	120	18	169	30
500-600 m	0	0	0	0	0	0	49	0	86	9	152	13
600-700 m	0	0	0	0	0	0	20	0	83	10	69	4
700-800 m	0	0	0	0	0	0	2	0	16	0	3	2
800-900 m	0	0	0	0	0	0	0	0	1	0	0	0
900-Falls	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	332	0	824	67	1,055	165

Stream Reach	08/31/21		09/14/21	
	Count	Carcass	Count	Carcass
0-100 m	210	16	30	51
100-200 m	200	30	21	31
200-300 m	190	29	7	33
300-400 m	205	27	8	53
400-500 m	197	20	11	31
500-600 m	138	10	7	21
600-700 m	158	13	24	7
700-800 m	34	0	6	5
800-900 m	4	0	0	0
900-Falls	0	0	0	0
Total	1,336	145	114	232

Appendix C.2.–Lower Slate Creek weekly adult coho salmon count by reach, 2021.

Stream Reach	09/29/21		10/07/21		10/19/21		10/26/21	
	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass
0-100 m	0	0	0	0	0	0	0	0
100-200 m	0	0	0	0	0	0	0	0
200-300 m	0	0	0	0	0	0	0	0
300-400 m	0	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	0	0	0	0	0	0	0	0

*Note:* A survey was not completed the week beginning October 11.



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Stream Reach	08/31/21		09/14/21	
	Count	Carcass	Count	Carcass
Con-Lace	0	0	0	0
Lace-JM	0	0	0	0
JM-Trap Site	0	0	0	0
Trap-Site #4	0	0	0	0
Site #4-Site #7	0	0	0	0
Site #7-Site #10	0	0	0	0
Site #10-PH	0	0	0	0
PH-LF	0	0	0	0
LF-Site #15	0	0	0	0
Site #15-Falls	0	0	0	0
Total	0	0	0	0

Appendix C.5.–Lower Johnson Creek weekly adult coho salmon count by reach, 2021.

Stream Reach	09/29/21		10/07/21		10/19/21		10/26/21	
	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass
Con-Lace	0	0	0	0	0	0	0	0
Lace-JM	17	0	1	0	0	0	0	0
JM-Trap Site	41	0	10	1	42	0	40	0
Trap-Site #4	46	0	3	0	70	0	48	0
Site #4-Site #7	6	0	3	0	16	0	13	0
Site #7-Site #10	0	0	0	0	39	0	21	0
Site #10-PH	2	0	0	0	65	0	25	0
PH-LF	0	0	0	0	7	0	1	0
LF-Site #15	1	0	0	0	16	0	8	0
Site #15-Falls	2	0	0	0	2	0	4	0
Total	115	0	17	1	257	0	160	0

*Note:* A survey was not completed the week beginning October 11.

Appendix C.6.–Lower Sherman Creek weekly adult pink salmon count by reach, 2021.

Stream Reach	07/20/21		07/28/21		08/04/21		08/16/21		08/20/21		08/26/21	
	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass
0-50 m	0	0	0	0	5	3	21	0	29	0	41	23
50-100 m	0	0	0	0	4	0	6	0	12	4	9	3
100-150 m	0	0	2	0	5	2	17	2	31	4	24	23
150-200 m	0	0	0	0	2	5	26	2	47	11	60	19
200-250 m	0	0	0	0	0	1	17	1	20	10	26	6
250-300 m	0	0	0	0	1	1	12	1	29	16	35	14
300-350 m	0	0	0	0	2	1	10	2	14	3	21	6
350-Falls	0	0	3	0	18	0	35	0	42	0	38	0
Total	0	0	5	0	37	13	144	8	224	48	254	94

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Stream Reach	08/31/21		09/14/21	
	Count	Carcass	Count	Carcass
0-50 m	25	4	16	12
50-100 m	47	3	1	3
100-150 m	20	0	30	13
150-200 m	11	2	37	10
200-250 m	36	0	15	8
250-300 m	22	1	13	3
300-350 m	30	0	9	2
350-Falls	31	0	13	0
Total	222	10	134	51

Appendix C.7.–Lower Slate Creek adult pink salmon count by statistical week, 2011–2021.

Statistical											
Week	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
29	ND	0	0	0	ND	ND	0	ND	ND	ND	ND
30	<b>0</b>	0	7	0	12	0	0	0	0	0	0
31	0	364	66	2	487	0	7	ND	0	1	0
32	369	1,106	604	14	1,769	1	386	0	0	0	0
33	763	3,152	864	13	1,783	0	<b>477</b>	<b>3</b>	200	ND	ND
34	1,394	2,331	1,199	12	1,543	64	2,818	<b>1</b>	11	4	1,156
35	1,646	318	472	0	850	12	<b>1,340</b>	ND	532	8	1,055
36	1,807	1	97	ND	527	<b>2</b>	1,811	ND	69	ND	1,336
37	229	0	27	ND	575	ND	577	ND	25	<b>2</b>	ND
38	46	ND	1	ND	32	ND	ND	ND	ND	ND	114
39	0	ND	ND	ND	2	ND	0	ND	ND	ND	ND
40	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

Note: Bold numbers indicate incomplete surveys.

Appendix C.8.–Lower Johnson Creek adult pink salmon count by statistical week, 2011–2021.

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

Note: Bold numbers indicate incomplete surveys.

Appendix C.9.–Lower Sherman Creek adult pink salmon count by statistical week, 2011–2021.

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

*Note:* Bold numbers indicate incomplete surveys.

## **APPENDIX D: SPAWNING SUBSTRATE DATA**





Appendix D.1.–Lower Slate Creek SP1 pink salmon spawning substrate data, 2011–2021.

Sample Date	Sample No.	Volume (mL) Retained Each Sieve (mm)								Imhoff	GMPS
		101.6	50.8	25.4	12.7	6.35	1.68	0.42	0.15		
08/17/11	1	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

Appendix D.2.–Lower Slate Creek SP2 pink salmon spawning substrate data, 2011–2021.

Sample Date	Sample No.	Volume (mL) Retained Each Sieve (mm)								Imhoff	GMPS
		101.6	50.8	25.4	12.7	6.35	1.68	0.42	0.15		
08/17/11	1	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



## **APPENDIX E: SEDIMENT DATA AND LAB REPORT**



Appendix E.1.–Lower Slate Creek sediment compositions, 2011–2021.

Sample Date	Particle Size Data				% Total Solids	% Total Volatile Solids	Total Sulfide (mg/kg)	% Total Organic Carbon
	% Clay	% Silt	% Sand	% Coarse material (> 2 mm)				
10/03/11	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	0.577
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

Appendix E.2.–East Fork Slate Creek sediment compositions, 2011–2021.

Sample Date	Particle Size Data				% Total Solids	% Total Volatile Solids	Total Sulfide (mg/kg)	% Total Organic Carbon
	% Clay	% Silt	% Sand	% Coarse material (> 2 mm)				
10/03/11	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

Appendix E.3.—Upper Slate Creek sediment compositions, 2011–2021.

Sample Date	Particle Size Data				% Total Solids	% Total Volatile Solids	Total Sulfide (mg/kg)	% Total Organic Carbon
	% Clay	% Silt	% Sand	% Coarse material (> 2 mm)				
10/06/11	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	0.868
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	0.843
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

Appendix E.4.—Lower Johnson Creek sediment compositions, 2011–2021.

Sample Date	Particle Size Data				% Total Solids	% Total Volatile Solids	Total Sulfide (mg/kg)	% Total Organic Carbon
	% Clay	% Silt	% Sand	% Coarse material (> 2 mm)				
10/03/11	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	0.263
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	1.60
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



Appendix E.5.–Lower Sherman Creek sediment compositions, 2011–2021.

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	0.354
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

Appendix E.6.–Lower Slate Creek sediment element concentrations, 2011–2021.

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

Appendix E.7.–East Fork Slate Creek sediment element concentrations, 2011–2021.

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

Appendix E.8.—Upper Slate Creek sediment element concentrations, 2011–2021.

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

Appendix E.9.—Lower Johnson Creek sediment element concentrations, 2011–2021.

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

Appendix E.10.–Lower Sherman Creek sediment element concentrations, 2011–2021.

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



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[www.alsglobal.com](http://www.alsglobal.com)

July 30, 2021

**Analytical Report for Service Request No: K2108011**

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, 2021  
For your reference, these analyses have been assigned our service request number **K2108011**.

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](http://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](mailto:Mark.Harris@alsglobal.com).

Respectfully submitted,

**ALS Group USA, Corp. dba ALS Environmental**

Mark Harris  
Project Manager



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## Acronyms

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

### **Inorganic Data Qualifiers**

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

### **Metals Data Qualifiers**

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

### **Organic Data Qualifiers**

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

### **Additional Petroleum Hydrocarbon Specific Qualifiers**

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



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

<b>Agency</b>	<b>Web Site</b>	<b>Number</b>
Alaska DEH	<a href="http://dec.alaska.gov/eh/lab/cs/csapproval.htm">http://dec.alaska.gov/eh/lab/cs/csapproval.htm</a>	UST-040
Arizona DHS	<a href="http://www.azdhs.gov/lab/license/env.htm">http://www.azdhs.gov/lab/license/env.htm</a>	AZ0339
Arkansas - DEQ	<a href="http://www.adeq.state.ar.us/techsvs/labcert.htm">http://www.adeq.state.ar.us/techsvs/labcert.htm</a>	88-0637
California DHS (ELAP)	<a href="http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx">http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx</a>	2795
DOD ELAP	<a href="http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm">http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm</a>	L16-58-R4
Florida DOH	<a href="http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm">http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm</a>	E87412
Hawaii DOH	<a href="http://health.hawaii.gov/">http://health.hawaii.gov/</a>	-
ISO 17025	<a href="http://www.pjllabs.com/">http://www.pjllabs.com/</a>	L16-57
Louisiana DEQ	<a href="http://www.deq.louisiana.gov/page/la-lab-accreditation">http://www.deq.louisiana.gov/page/la-lab-accreditation</a>	03016
Maine DHS	<a href="http://www.maine.gov/dhhs/">http://www.maine.gov/dhhs/</a>	WA01276
Minnesota DOH	<a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>	053-999-457
Nevada DEP	<a href="http://ndep.nv.gov/bsdwlabservice.htm">http://ndep.nv.gov/bsdwlabservice.htm</a>	WA01276
New Jersey DEP	<a href="http://www.nj.gov/dep/enforcement/oqa.html">http://www.nj.gov/dep/enforcement/oqa.html</a>	WA005
New York - DOH	<a href="https://www.wadsworth.org/regulatory/elap">https://www.wadsworth.org/regulatory/elap</a>	12060
North Carolina DEQ	<a href="https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification">https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification</a>	605
Oklahoma DEQ	<a href="http://www.deq.state.ok.us/CSDnew/labcert.htm">http://www.deq.state.ok.us/CSDnew/labcert.htm</a>	9801
Oregon – DEQ (NELAP)	<a href="http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>	WA100010
South Carolina DHEC	<a href="http://www.scdhec.gov/environment/EnvironmentalLabCertification/">http://www.scdhec.gov/environment/EnvironmentalLabCertification/</a>	61002
Texas CEQ	<a href="http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html</a>	T104704427
Washington DOE	<a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>	C544
Wyoming (EPA Region 8)	<a href="https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water">https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water</a>	-
Kelso Laboratory Website	<a href="http://www.alsglobal.com">www.alsglobal.com</a>	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](http://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/analyte is offered by that state.



## Case Narrative

**ALS Environmental—Kelso Laboratory**  
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**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil

**Service Request:** K2108011  
**Date Received:** 07/12/2021

### 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 07/12/2021. 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.

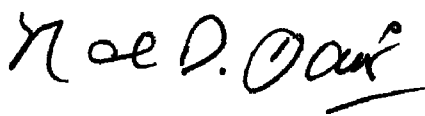
#### Metals:

Method 200.8, 07/27/2021: The Relative Percent Difference (RPD) for the replicate analysis of Cadmium, Copper, and Lead in sample 2021 KGM LSH S1 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.

Method 200.8, 07/27/2021: The matrix spike recoveries of Copper and Lead for sample 2021 KGM LSH S1 were outside the ALS control criteria as a result of the heterogeneous character of the sample. The Relative Percent Difference (RPD) for the replicate analysis supported this. The variability between replicates was sufficient to bias the percent recoveries outside normal ALS control criteria. The associated QA/QC results (e.g. control sample, calibration standards, etc.) indicated the analysis was in control. No further corrective action was appropriate.

#### General Chemistry:

No significant anomalies were noted with this analysis.

Approved by 

Date 07/30/2021



# Chain of Custody

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Project Name <u>Coeur AK Biomonitoring</u>		Project Number		NUMBER OF CONTAINERS	7D	14D	28D	180D	999D	Remarks						
Project Manager <u>Bill Kane</u>		Company <u>Coeur AK / ADF&amp;G</u>								160.4 Modified / TVS	PSEP Sulfide / PSEP Sulfide	PSEP TOC / PSEP TOC	7471B / Hg	200.8 / Metals T	ASTM D422M / Partsize	160.3 Modified / TS
Address <u>802 3rd St Douglas, AK 99824</u>		Phone # <u>(907) 465-6474</u>		Sampler Signature <u>[Signature]</u>		email <u>William.Kane@alaska.gov</u>		Sampler Printed Name <u>Evan Fritz</u>								
CLIENT SAMPLE ID	LABID	SAMPLING Date Time	Matrix													
1. <u>2021KAM LSH S1</u>		<u>7/6/2021 0900</u>	<u>Soil</u>	<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>						<u>Container 10/2</u>
2. <u>2021KAM LSH S2</u>		<u>7/6/2021 0900</u>	<u>Soil</u>	<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>						
3. <u>2021KAM LSH S3</u>		<u>7/6/2021 0900</u>	<u>Soil</u>	<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>						
4. <u>2021KAM LJC S1</u>		<u>7/6/2021 1200</u>	<u>Soil</u>	<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>						
5. <u>2021KAM LJC S2</u>		<u>7/6/2021 1200</u>	<u>Soil</u>	<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>						
6. <u>2021KAM LJC S3</u>		<u>7/6/2021 1200</u>	<u>Soil</u>	<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>						
7. <u>2021KAM EPSC S1</u>		<u>7/6/2021 1400</u>	<u>Soil</u>	<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>						
8. <u>2021KAM EPSC S2</u>		<u>7/6/2021 1400</u>	<u>Soil</u>	<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>						
9. <u>2021KAM EPSC S3</u>		<u>7/6/2021 1400</u>	<u>Soil</u>	<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>						
10.																

<b>Report Requirements</b> <input type="checkbox"/> I. Routine Report: Method Blank, Surrogate, as required <input checked="" type="checkbox"/> II. Report Dup., MS, MSD as required <input type="checkbox"/> III. CLP Like Summary (no raw data) <input type="checkbox"/> IV. Data Validation Report <input type="checkbox"/> V. EDD	<b>Invoice Information</b> P.O.# _____ Bill To: <u>Coeur AK</u> _____ <u>kefrs@coeur.com</u>	Circle which metals are to be analyzed Total Metals: <input checked="" type="checkbox"/> Al <input checked="" type="checkbox"/> As <input type="checkbox"/> Sb <input type="checkbox"/> Ba <input type="checkbox"/> Be <input type="checkbox"/> B <input type="checkbox"/> Ca <input checked="" type="checkbox"/> Cd <input checked="" type="checkbox"/> Co <input checked="" type="checkbox"/> Cr <input checked="" type="checkbox"/> Cu <input type="checkbox"/> Fe <input checked="" type="checkbox"/> Pb <input type="checkbox"/> Mg <input type="checkbox"/> Mn <input type="checkbox"/> Mo <input checked="" type="checkbox"/> Ni <input type="checkbox"/> K <input checked="" type="checkbox"/> Ag <input type="checkbox"/> Na <input checked="" type="checkbox"/> Se <input type="checkbox"/> Sr <input type="checkbox"/> Ti <input type="checkbox"/> Sn <input type="checkbox"/> V <input checked="" type="checkbox"/> Zn <input checked="" type="checkbox"/> 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 Ti Sn V Zn Hg
	<b>Turnaround Requirements</b> <input type="checkbox"/> 24 hr. _____ 48 hr <input checked="" type="checkbox"/> 5 Day <input checked="" type="checkbox"/> Standard	Special Instructions/Comments: _____ *Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other _____ (Circle One)

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature <u>[Signature]</u>	Signature <u>[Signature]</u>	Signature	Signature	Signature	Signature
Printed Name <u>Evan Fritz</u>	Printed Name <u>AS</u>	Printed Name	Printed Name	Printed Name	Printed Name
Firm <u>ADF&amp;G</u>	Firm <u>7/12/21 0900</u>	Firm	Firm	Firm	Firm
Date/Time <u>0730 7/7/21</u>	Date/Time	Date/Time	Date/Time	Date/Time	Date/Time

### Cooler Receipt and Preservation Form

Client Coeur AK Service Request K21 08011  
 Received: 7/12/24 Opened: 7/12/24 By: MP Unloaded: 7/12/24 By: MP

- Samples were received via?  USPS  Fed Ex  UPS  DHL  PDX  Courier  Hand Delivered
  - Samples were received in: (circle)  Cooler  Box  Envelope  Other  NA
  - 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
  - Was a Temperature Blank present in cooler? NA  Y  N If yes, notate the temperature in the appropriate column below:  
 If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
  - 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

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
<u>21.5</u>	<u>—</u>	<u>1R01</u>	<u>LF 2 11842</u>	<u>X</u>	<u>YES</u>	<u>2811 9314 7401</u>	

- Packing material: Inserts Baggies Bubble Wrap Gel-Packs Wet Ice Dry Ice Sleeves
- Were custody papers properly filled out (ink, signed, etc.)? NA  Y  N
- Were samples received in good condition (unbroken) NA  Y  N
- Were all sample labels complete (ie, analysis, preservation, etc.)? NA  Y  N
- Did all sample labels and tags agree with custody papers? NA  Y  N
- Were appropriate bottles/containers and volumes received for the tests indicated? NA  Y  N
- Were the pH-preserved bottles (see SMO GEN SOP) received at the appropriate pH? Indicate in the table below  NA  Y  N
- Were VOA vials received without headspace? Indicate in the table below.  NA  Y  N
- Was C12/Res negative?  NA  Y  N

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
<b>SHORT HOLD TIME</b>										

Notes, Discrepancies, Resolutions: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



# Total Solids

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

**ALS Group USA, Corp.**  
dba ALS Environmental

Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Analysis Method:** 160.3 Modified  
**Prep Method:** None

**Service Request:** K2108011  
**Date Collected:** 07/6/21  
**Date Received:** 07/12/21  
**Units:** Percent  
**Basis:** As Received

**Solids, Total**

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
2021 KGM LSH S1	K2108011-001	<b>70.7</b>	-	-	1	07/13/21 13:15	
2021 KGM LSH S2	K2108011-002	<b>67.8</b>	-	-	1	07/13/21 13:15	
2021 KGM LSH S3	K2108011-003	<b>68.5</b>	-	-	1	07/13/21 13:15	
2021 KGM LJC S1	K2108011-004	<b>65.4</b>	-	-	1	07/13/21 13:15	
2021 KGM LJC S2	K2108011-005	<b>72.1</b>	-	-	1	07/13/21 13:15	
2021 KGM LJC S3	K2108011-006	<b>62.5</b>	-	-	1	07/13/21 13:15	
2021 KGM EFSC S1	K2108011-007	<b>75.3</b>	-	-	1	07/13/21 13:15	
2021 KGM EFSC S2	K2108011-008	<b>72.7</b>	-	-	1	07/13/21 13:15	
2021 KGM EFSC S3	K2108011-009	<b>77.0</b>	-	-	1	07/13/21 13:15	
Method Blank	K2108011-MB	ND U	-	-	1	07/13/21 13:15	



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QA/QC Report

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21  
**Date Received:** 07/12/21  
**Date Analyzed:** 07/13/21

**Replicate Sample Summary**  
**Inorganic Parameters**

**Sample Name:** 2021 KGM LSH S1  
**Lab Code:** K2108011-001

**Units:** Percent  
**Basis:** As Received

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>MDL</u>	<u>Sample Result</u>	<u>Duplicate Sample K2108011-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Solids, Total	160.3 Modified	-	-	70.7	69.3	70.0	2	20

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

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

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

**ALS Group USA, Corp.**  
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Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Analysis Method:** 160.4 Modified  
**Prep Method:** None

**Service Request:** K2108011  
**Date Collected:** 07/6/21  
**Date Received:** 07/12/21

**Units:** Percent  
**Basis:** Dry, per Method

**Solids, Total Volatile**

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
2021 KGM LSH S1	K2108011-001	<b>2.50</b>	0.027	-	1	07/13/21 13:15	
2021 KGM LSH S2	K2108011-002	<b>2.10</b>	0.026	-	1	07/13/21 13:15	
2021 KGM LSH S3	K2108011-003	<b>2.30</b>	0.021	-	1	07/13/21 13:15	
2021 KGM LJC S1	K2108011-004	<b>2.20</b>	0.025	-	1	07/13/21 13:15	
2021 KGM LJC S2	K2108011-005	<b>2.40</b>	0.030	-	1	07/13/21 13:15	
2021 KGM LJC S3	K2108011-006	<b>3.40</b>	0.027	-	1	07/13/21 13:15	
2021 KGM EFSC S1	K2108011-007	<b>3.80</b>	0.032	-	1	07/13/21 13:15	
2021 KGM EFSC S2	K2108011-008	<b>3.50</b>	0.030	-	1	07/13/21 13:15	
2021 KGM EFSC S3	K2108011-009	<b>4.90</b>	0.032	-	1	07/13/21 13:15	
Method Blank	K2108011-MB	ND U	0.018	-	1	07/13/21 13:15	

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QA/QC Report

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21  
**Date Received:** 07/12/21  
**Date Analyzed:** 07/13/21

**Replicate Sample Summary**  
**General Chemistry Parameters**

**Sample Name:** 2021 KGM LSH S1  
**Lab Code:** K2108011-001

**Units:** Percent  
**Basis:** Dry, per Method

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>MDL</u>	<u>Sample Result</u>	<u>Duplicate Sample K2108011-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Solids, Total Volatile	160.4 Modified	0.027	-	2.50	2.60	2.55	4	20

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

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# General Chemistry

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**ALS Group USA, Corp.**  
dba ALS Environmental

Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Analysis Method:** PSEP Sulfide  
**Prep Method:** Method

**Service Request:** K2108011  
**Date Collected:** 07/6/21  
**Date Received:** 07/12/21  
**Units:** mg/Kg  
**Basis:** Dry

**Sulfide, Total**

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2021 KGM LSH S1	K2108011-001	ND U	1.4	0.5	1	07/13/21 17:14	7/13/21	
2021 KGM LSH S2	K2108011-002	<b>0.6 J</b>	1.4	0.5	1	07/13/21 17:14	7/13/21	
2021 KGM LSH S3	K2108011-003	<b>0.6 J</b>	1.4	0.5	1	07/13/21 17:14	7/13/21	
2021 KGM LJC S1	K2108011-004	<b>1.1 J</b>	1.4	0.5	1	07/13/21 17:14	7/13/21	
2021 KGM LJC S2	K2108011-005	<b>1.0 J</b>	1.3	0.5	1	07/13/21 17:14	7/13/21	
2021 KGM LJC S3	K2108011-006	<b>0.6 J</b>	1.5	0.5	1	07/13/21 17:14	7/13/21	
2021 KGM EFSC S1	K2108011-007	ND U	1.3	0.4	1	07/13/21 17:14	7/13/21	
2021 KGM EFSC S2	K2108011-008	ND U	1.3	0.4	1	07/13/21 17:14	7/13/21	
2021 KGM EFSC S3	K2108011-009	<b>0.6 J</b>	1.2	0.4	1	07/13/21 17:14	7/13/21	
Method Blank	K2108011-MB	ND U	1.0	0.3	1	07/13/21 17:14	7/13/21	

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QA/QC Report

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21  
**Date Received:** 07/12/21  
**Date Analyzed:** 07/13/21

**Triplicate Sample Summary**  
**General Chemistry Parameters**

**Sample Name:** 2021 KGM EFSC S3  
**Lab Code:** K2108011-009  
**Analysis Method:** PSEP Sulfide  
**Prep Method:** Method

**Units:** mg/Kg  
**Basis:** Dry

Analyte Name	MRL	MDL	Sample Result	Duplicate K2108011-009DUP Result	Triplicate K2108011-009TRP Result	Average	RSD	RSD Limit
Sulfide, Total	1.3	0.4	0.6	0.4	0.6	0.537	21 #	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 07/30/21 1:18:27 PM

SuperSet Reference:21-0000596874 rev 00

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21  
**Date Received:** 07/12/21  
**Date Analyzed:** 07/13/21  
**Date Extracted:** 07/13/21

**Duplicate Matrix Spike Summary  
Sulfide, Total**

**Sample Name:** 2021 KGM EFSC S3  
**Lab Code:** K2108011-009  
**Analysis Method:** PSEP Sulfide  
**Prep Method:** Method

**Units:** mg/Kg  
**Basis:** Dry

Analyte Name	Sample Result	Result	Matrix Spike K2108011-009MS		Result	Duplicate Matrix Spike K2108011-009DMS		% Rec Limits	RPD	RPD Limit
			Spike Amount	% Rec		Spike Amount	% Rec			
Sulfide, Total	0.6 J	850	1040	82	970	1020	96	28-175	13	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  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil

**Service Request:** K2108011  
**Date Analyzed:** 07/13/21  
**Date Extracted:** 07/13/21

**Lab Control Sample Summary**  
**Sulfide, Total**

**Analysis Method:** PSEP Sulfide  
**Prep Method:** Method

**Units:** mg/Kg  
**Basis:** Dry  
**Analysis Lot:** 730931

<b>Sample Name</b>	<b>Lab Code</b>	<b>Result</b>	<b>Spike Amount</b>	<b>% Rec</b>	<b>% Rec Limits</b>
Lab Control Sample	K2108011-LCS	441	410	107	39-166



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

**Service Request:** K2108011

### Continuing Calibration Verification (CCV) Summary

#### Sulfide, Total

**Analysis Method:** PSEP Sulfide

**Units:** mg/L

	Analysis		Date	True	Measured	Percent	Acceptance
	Lot	Lab Code	Analyzed	Value	Value	Recovery	Limits
CCV1	730931	KQ2112974-01	07/13/21 17:14	0.617	0.637	103	90-110
CCV2	730931	KQ2112974-02	07/13/21 17:14	0.617	0.625	101	90-110
CCV3	730931	KQ2112974-03	07/13/21 17:14	0.617	0.606	98	90-110

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

**Service Request:**K2108011

**Continuing Calibration Blank (CCB) Summary**  
**Sulfide, Total**

**Analysis Method:** PSEP Sulfide

**Units:**mg/Kg

	<b>Analysis Lot</b>	<b>Lab Code</b>	<b>Date Analyzed</b>	<b>MRL</b>	<b>MDL</b>	<b>Result</b>	<b>Q</b>
CCB1	730931	KQ2112974-04	07/13/21 17:14	1.0	0.3	ND	U
CCB2	730931	KQ2112974-05	07/13/21 17:14	1.0	0.3	ND	U
CCB3	730931	KQ2112974-06	07/13/21 17:14	1.0	0.3	ND	U

**ALS Group USA, Corp.**  
dba ALS Environmental

Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Analysis Method:** PSEP TOC  
**Prep Method:** ALS SOP

**Service Request:** K2108011  
**Date Collected:** 07/6/21  
**Date Received:** 07/12/21

**Units:** Percent  
**Basis:** Dry, per Method

**Carbon, Total Organic (TOC)**

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2021 KGM LSH S1	K2108011-001	<b>0.237</b>	0.050	0.020	1	07/16/21 14:30	7/16/21	
2021 KGM LSH S2	K2108011-002	<b>0.190</b>	0.050	0.020	1	07/16/21 14:30	7/16/21	
2021 KGM LSH S3	K2108011-003	<b>0.281</b>	0.050	0.020	1	07/16/21 14:30	7/16/21	
2021 KGM LJC S1	K2108011-004	<b>0.319</b>	0.050	0.020	1	07/16/21 14:30	7/16/21	
2021 KGM LJC S2	K2108011-005	<b>0.340</b>	0.050	0.020	1	07/16/21 14:30	7/16/21	
2021 KGM LJC S3	K2108011-006	<b>0.270</b>	0.050	0.020	1	07/16/21 14:30	7/16/21	
2021 KGM EFSC S1	K2108011-007	<b>0.307</b>	0.050	0.020	1	07/16/21 14:30	7/16/21	
2021 KGM EFSC S2	K2108011-008	<b>0.733</b>	0.050	0.020	1	07/16/21 14:30	7/16/21	
2021 KGM EFSC S3	K2108011-009	<b>5.36</b>	0.050	0.020	1	07/16/21 14:30	7/16/21	
Method Blank	K2108011-MB	ND U	0.050	0.020	1	07/16/21 14:30	7/16/21	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21  
**Date Received:** 07/12/21  
**Date Analyzed:** 07/16/21

**Triplicate Sample Summary**  
**General Chemistry Parameters**

**Sample Name:** 2021 KGM LSH S1  
**Lab Code:** K2108011-001  
**Analysis Method:** PSEP TOC  
**Prep Method:** ALS SOP

**Units:** Percent  
**Basis:** Dry, per Method

Analyte Name	MRL	MDL	Sample Result	Duplicate K2108011-001DUP Result	Triplicate K2108011-001TRP Result	Average	RSD	RSD Limit
Carbon, Total Organic (TOC)	0.050	0.020	0.237	0.256	0.261	0.252	5	27

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

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

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

ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21  
**Date Received:** 07/12/21  
**Date Analyzed:** 07/16/21  
**Date Extracted:** 07/16/21

**Duplicate Matrix Spike Summary**  
**Carbon, Total Organic (TOC)**

**Sample Name:** 2021 KGM LSH S1  
**Lab Code:** K2108011-001  
**Analysis Method:** PSEP TOC  
**Prep Method:** ALS SOP

**Units:** Percent  
**Basis:** Dry, per Method

Analyte Name	Sample Result	Matrix Spike K2108011-001MS			Duplicate Matrix Spike K2108011-001DMS			% Rec Limits	RPD	RPD Limit
		Result	Spike Amount	% Rec	Result	Spike Amount	% Rec			
Carbon, Total Organic (TOC)	0.237	4.07	3.86	99	4.81	4.63	99	69-123	<1	27

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

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

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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  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil

**Service Request:** K2108011  
**Date Analyzed:** 07/16/21  
**Date Extracted:** 07/16/21

**Lab Control Sample Summary**  
**Carbon, Total Organic (TOC)**

**Analysis Method:** PSEP TOC  
**Prep Method:** ALS SOP

**Units:** Percent  
**Basis:** Dry, per Method  
**Analysis Lot:** 731875

<b>Sample Name</b>	<b>Lab Code</b>	<b>Result</b>	<b>Spike Amount</b>	<b>% Rec</b>	<b>% Rec Limits</b>
Lab Control Sample	K2108011-LCS	0.426	0.430	99	74-118

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

**Service Request:** K2108011

### Continuing Calibration Verification (CCV) Summary

#### Carbon, Total Organic (TOC)

**Analysis Method:** PSEP TOC

**Units:** Percent

	<b>Analysis Lot</b>	<b>Lab Code</b>	<b>Date Analyzed</b>	<b>True Value</b>	<b>Measured Value</b>	<b>Percent Recovery</b>	<b>Acceptance Limits</b>
CCV1	731875	KQ2113537-01	07/16/21 14:30	20.0	19.9	100	90-110
CCV2	731875	KQ2113537-02	07/16/21 14:30	20.0	19.8	99	90-110
CCV3	731875	KQ2113537-03	07/16/21 14:30	20.0	20.0	100	90-110

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

**Service Request:**K2108011

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

**Analysis Method:** PSEP TOC

**Units:**Percent

	<b>Analysis Lot</b>	<b>Lab Code</b>	<b>Date Analyzed</b>	<b>MRL</b>	<b>MDL</b>	<b>Result</b>	<b>Q</b>
CCB1	731875	KQ2113537-04	07/16/21 14:30	0.050	0.020	ND	U
CCB2	731875	KQ2113537-05	07/16/21 14:30	0.050	0.020	ND	U
CCB3	731875	KQ2113537-06	07/16/21 14:30	0.050	0.020	ND	U



dba ALS Environmental  
Analytical Report

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21  
**Date Received:** 07/12/21  
**Date Analyzed:** 07/22/21

Particle Size Determination  
ASTM D422M

Sample Name: 2021 KGM LSH S1  
Lab Code: K2108011-001

Sand Fraction: Dry Weight (Grams) 23.5972  
Sand Fraction: Weight Recovered (Grams) 23.6536  
Sand Fraction: Percent Recovery 100.24

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	0.2238	1.04
Sand, Very Coarse	-1 to 0 Ø	3.1797	14.84
Sand, Coarse	0 to 1 Ø	11.5941	54.13
Sand, Medium	1 to 2 Ø	6.5493	30.58
Sand, Fine	2 to 3 Ø	1.9200	8.96
Sand, Very Fine	3 to 4 Ø	0.1456	0.68
75.0 µm	4 Ø	0.0150	0.07
31.3 µm	5 Ø	0.0350	0.16
15.6 µm	6 Ø	0.0000	0.00
7.8 µm	7 Ø	0.0050	0.02
3.9 µm	8 Ø	0.0500	0.23
1.95 µm	9 Ø	0.0050	0.02
0.98 µm	> 10 Ø	0.0000	0.00
		23.7225	110.75

dba ALS Environmental  
Analytical Report

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21  
**Date Received:** 07/12/21  
**Date Analyzed:** 07/22/21

Particle Size Determination  
ASTM D422M

Sample Name: 2021 KGM LSH S1  
Lab Code: K2108011-001 DUP

Sand Fraction: Dry Weight (Grams) 21.5345  
Sand Fraction: Weight Recovered (Grams) 21.5309  
Sand Fraction: Percent Recovery 99.98

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	0.2131	1.00
Sand, Very Coarse	-1 to 0 Ø	3.5656	16.79
Sand, Coarse	0 to 1 Ø	10.6355	50.09
Sand, Medium	1 to 2 Ø	5.4209	25.53
Sand, Fine	2 to 3 Ø	1.5239	7.18
Sand, Very Fine	3 to 4 Ø	0.1291	0.61
75.0 µm	4 Ø	0.0300	0.14
31.3 µm	5 Ø	0.0100	0.05
15.6 µm	6 Ø	0.0400	0.19
7.8 µm	7 Ø	0.0000	0.00
3.9 µm	8 Ø	0.0250	0.12
1.95 µm	9 Ø	0.0150	0.07
0.98 µm	> 10 Ø	0.0300	0.14
		21.6381	101.92

dba ALS Environmental  
Analytical Report

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21  
**Date Received:** 07/12/21  
**Date Analyzed:** 07/22/21

Particle Size Determination  
ASTM D422M

Sample Name: 2021 KGM LSH S2  
Lab Code: K2108011-002

Sand Fraction: Dry Weight (Grams) 21.7003  
Sand Fraction: Weight Recovered (Grams) 21.6137  
Sand Fraction: Percent Recovery 99.60

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	1.2620	6.15
Gravel, Fine	-2 Ø to -1 Ø	1.1759	5.73
Sand, Very Coarse	-1 to 0 Ø	4.6080	22.47
Sand, Coarse	0 to 1 Ø	10.7167	52.25
Sand, Medium	1 to 2 Ø	3.1323	15.27
Sand, Fine	2 to 3 Ø	0.6790	3.31
Sand, Very Fine	3 to 4 Ø	0.0323	0.16
75.0 µm	4 Ø	0.0000	0.00
31.3 µm	5 Ø	0.0000	0.00
15.6 µm	6 Ø	0.0000	0.00
7.8 µm	7 Ø	0.0100	0.05
3.9 µm	8 Ø	0.0150	0.07
1.95 µm	9 Ø	0.0150	0.07
0.98 µm	> 10 Ø	0.0250	0.12
		21.6712	105.66

dba ALS Environmental  
Analytical Report

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21  
**Date Received:** 07/12/21  
**Date Analyzed:** 07/22/21

Particle Size Determination  
ASTM D422M

Sample Name: 2021 KGM LSH S3  
Lab Code: K2108011-003

Sand Fraction: Dry Weight (Grams) 20.9854  
Sand Fraction: Weight Recovered (Grams) 20.9733  
Sand Fraction: Percent Recovery 99.94

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	0.1584	0.75
Gravel, Fine	-2 Ø to -1 Ø	2.1890	10.39
Sand, Very Coarse	-1 to 0 Ø	6.6192	31.41
Sand, Coarse	0 to 1 Ø	8.8216	41.87
Sand, Medium	1 to 2 Ø	2.7724	13.16
Sand, Fine	2 to 3 Ø	0.3754	1.78
Sand, Very Fine	3 to 4 Ø	0.0262	0.12
75.0 µm	4 Ø	0.0350	0.17
31.3 µm	5 Ø	0.0000	0.00
15.6 µm	6 Ø	0.0650	0.31
7.8 µm	7 Ø	0.0100	0.05
3.9 µm	8 Ø	0.0000	0.00
1.95 µm	9 Ø	0.0000	0.00
0.98 µm	> 10 Ø	0.0000	0.00
		21.0722	100.01

dba ALS Environmental  
Analytical Report

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21  
**Date Received:** 07/12/21  
**Date Analyzed:** 07/22/21

Particle Size Determination  
ASTM D422M

Sample Name: 2021 KGM LJC S1  
Lab Code: K2108011-004

Sand Fraction: Dry Weight (Grams) 20.7694  
Sand Fraction: Weight Recovered (Grams) 20.8363  
Sand Fraction: Percent Recovery 100.32

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	0.1431	0.69
Gravel, Fine	-2 Ø to -1 Ø	0.2327	1.12
Sand, Very Coarse	-1 to 0 Ø	0.3679	1.76
Sand, Coarse	0 to 1 Ø	3.8192	18.31
Sand, Medium	1 to 2 Ø	8.2408	39.51
Sand, Fine	2 to 3 Ø	7.0313	33.71
Sand, Very Fine	3 to 4 Ø	0.8084	3.88
75.0 µm	4 Ø	0.6200	2.97
31.3 µm	5 Ø	0.0050	0.02
15.6 µm	6 Ø	0.1600	0.77
7.8 µm	7 Ø	0.0050	0.02
3.9 µm	8 Ø	0.0150	0.07
1.95 µm	9 Ø	0.0050	0.02
0.98 µm	> 10 Ø	0.0050	0.02
		21.4584	102.89

dba ALS Environmental  
Analytical Report

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21  
**Date Received:** 07/12/21  
**Date Analyzed:** 07/22/21

Particle Size Determination  
ASTM D422M

Sample Name: 2021 KGM LJC S2  
Lab Code: K2108011-005

Sand Fraction: Dry Weight (Grams) 21.4878  
Sand Fraction: Weight Recovered (Grams) 21.4743  
Sand Fraction: Percent Recovery 99.94

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	0.0963	0.41
Gravel, Fine	-2 Ø to -1 Ø	0.9872	4.25
Sand, Very Coarse	-1 to 0 Ø	2.7666	11.91
Sand, Coarse	0 to 1 Ø	5.5693	23.97
Sand, Medium	1 to 2 Ø	7.0081	30.17
Sand, Fine	2 to 3 Ø	4.5534	19.60
Sand, Very Fine	3 to 4 Ø	0.3924	1.69
75.0 µm	4 Ø	0.2450	1.05
31.3 µm	5 Ø	0.1100	0.47
15.6 µm	6 Ø	0.0500	0.22
7.8 µm	7 Ø	0.0850	0.37
3.9 µm	8 Ø	0.0050	0.02
1.95 µm	9 Ø	0.0100	0.04
0.98 µm	> 10 Ø	0.0350	0.15
		21.9133	94.33

dba ALS Environmental  
Analytical Report

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21  
**Date Received:** 07/12/21  
**Date Analyzed:** 07/22/21

Particle Size Determination  
ASTM D422M

Sample Name: 2021 KGM LJC S3  
Lab Code: K2108011-006

Sand Fraction: Dry Weight (Grams) 19.6903  
Sand Fraction: Weight Recovered (Grams) 19.6942  
Sand Fraction: Percent Recovery 100.02

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	0.0251	0.13
Sand, Very Coarse	-1 to 0 Ø	0.0995	0.52
Sand, Coarse	0 to 1 Ø	1.4203	7.40
Sand, Medium	1 to 2 Ø	7.9180	41.24
Sand, Fine	2 to 3 Ø	9.2307	48.08
Sand, Very Fine	3 to 4 Ø	0.8276	4.31
75.0 µm	4 Ø	0.3050	1.59
31.3 µm	5 Ø	0.1700	0.89
15.6 µm	6 Ø	0.0750	0.39
7.8 µm	7 Ø	0.0050	0.03
3.9 µm	8 Ø	0.0000	0.00
1.95 µm	9 Ø	0.0150	0.08
0.98 µm	> 10 Ø	0.0300	0.16
		20.1212	104.80

dba ALS Environmental  
Analytical Report

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21  
**Date Received:** 07/12/21  
**Date Analyzed:** 07/22/21

Particle Size Determination  
ASTM D422M

Sample Name: 2021 KGM EFSC S1  
Lab Code: K2108011-007

Sand Fraction: Dry Weight (Grams) 43.0099  
Sand Fraction: Weight Recovered (Grams) 43.0398  
Sand Fraction: Percent Recovery 100.07

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	17.0672	32.12
Gravel, Fine	-2 Ø to -1 Ø	16.4476	30.95
Sand, Very Coarse	-1 to 0 Ø	7.4765	14.07
Sand, Coarse	0 to 1 Ø	1.5077	2.84
Sand, Medium	1 to 2 Ø	0.3198	0.60
Sand, Fine	2 to 3 Ø	0.1807	0.34
Sand, Very Fine	3 to 4 Ø	0.0235	0.04
75.0 µm	4 Ø	0.1400	0.26
31.3 µm	5 Ø	0.0050	0.01
15.6 µm	6 Ø	0.0200	0.04
7.8 µm	7 Ø	0.0050	0.01
3.9 µm	8 Ø	0.0200	0.04
1.95 µm	9 Ø	0.0450	0.08
0.98 µm	> 10 Ø	0.0000	0.00
		43.2580	81.41



dba ALS Environmental  
Analytical Report

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21  
**Date Received:** 07/12/21  
**Date Analyzed:** 07/22/21

Particle Size Determination  
ASTM D422M

Sample Name: 2021 KGM EFSC S2  
Lab Code: K2108011-008

Sand Fraction: Dry Weight (Grams) 53.5316  
Sand Fraction: Weight Recovered (Grams) 53.1137  
Sand Fraction: Percent Recovery 99.22

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	17.9005	34.80
Gravel, Fine	-2 Ø to -1 Ø	16.7158	32.50
Sand, Very Coarse	-1 to 0 Ø	11.1130	21.61
Sand, Coarse	0 to 1 Ø	4.8602	9.45
Sand, Medium	1 to 2 Ø	1.3368	2.60
Sand, Fine	2 to 3 Ø	0.9998	1.94
Sand, Very Fine	3 to 4 Ø	0.1361	0.26
75.0 µm	4 Ø	0.1000	0.19
31.3 µm	5 Ø	0.0450	0.09
15.6 µm	6 Ø	0.0300	0.06
7.8 µm	7 Ø	0.0050	0.01
3.9 µm	8 Ø	0.0250	0.05
1.95 µm	9 Ø	0.0100	0.02
0.98 µm	> 10 Ø	0.0650	0.13
		53.3422	103.71

dba ALS Environmental  
Analytical Report

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21  
**Date Received:** 07/12/21  
**Date Analyzed:** 07/22/21

Particle Size Determination  
ASTM D422M

Sample Name: 2021 KGM EFSC S3  
Lab Code: K2108011-009

Sand Fraction: Dry Weight (Grams) 40.5945  
Sand Fraction: Weight Recovered (Grams) 40.5446  
Sand Fraction: Percent Recovery 99.88

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	12.4711	29.13
Gravel, Fine	-2 Ø to -1 Ø	12.4109	28.99
Sand, Very Coarse	-1 to 0 Ø	9.4352	22.04
Sand, Coarse	0 to 1 Ø	3.5462	8.28
Sand, Medium	1 to 2 Ø	1.3322	3.11
Sand, Fine	2 to 3 Ø	1.1420	2.67
Sand, Very Fine	3 to 4 Ø	0.1375	0.32
75.0 µm	4 Ø	0.0100	0.02
31.3 µm	5 Ø	0.0500	0.12
15.6 µm	6 Ø	0.0750	0.18
7.8 µm	7 Ø	0.0000	0.00
3.9 µm	8 Ø	0.0000	0.00
1.95 µm	9 Ø	0.0100	0.02
0.98 µm	> 10 Ø	0.0500	0.12
		40.6701	95.00



# Metals

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

ALS Group USA, Corp.  
dba ALS Environmental

Analytical Report

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21 09:00  
**Date Received:** 07/12/21 09:00

**Sample Name:** 2021 KGM LSH S1  
**Lab Code:** K2108011-001

**Basis:** Dry

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	<b>18200</b>	mg/Kg	2.7	0.8	5	07/27/21 12:10	07/16/21	
Arsenic	200.8	<b>17.0</b>	mg/Kg	0.68	0.08	5	07/27/21 12:10	07/16/21	
Cadmium	200.8	<b>0.199</b>	mg/Kg	0.027	0.010	5	07/27/21 12:10	07/16/21	
Chromium	200.8	<b>53.8</b>	mg/Kg	0.27	0.08	5	07/27/21 12:10	07/16/21	
Copper	200.8	<b>86.3</b>	mg/Kg	0.14	0.05	5	07/27/21 12:10	07/16/21	
Lead	200.8	<b>56.4</b>	mg/Kg	0.068	0.027	5	07/27/21 12:10	07/16/21	
Mercury	7471B	<b>0.023 J</b>	mg/Kg	0.028	0.003	1	07/19/21 10:31	07/16/21	
Nickel	200.8	<b>41.3</b>	mg/Kg	0.27	0.04	5	07/27/21 12:10	07/16/21	
Selenium	200.8	<b>1.0 J</b>	mg/Kg	1.4	0.1	5	07/27/21 12:10	07/16/21	
Silver	200.8	<b>0.102</b>	mg/Kg	0.027	0.005	5	07/27/21 12:10	07/16/21	
Zinc	200.8	<b>97.5</b>	mg/Kg	0.68	0.27	5	07/27/21 12:10	07/16/21	

**ALS Group USA, Corp.**  
dba ALS Environmental

Analytical Report

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21 09:00  
**Date Received:** 07/12/21 09:00

**Sample Name:** 2021 KGM LSH S2  
**Lab Code:** K2108011-002

**Basis:** Dry

**Total Metals**

<b>Analyte Name</b>	<b>Analysis Method</b>	<b>Result</b>	<b>Units</b>	<b>MRL</b>	<b>MDL</b>	<b>Dil.</b>	<b>Date Analyzed</b>	<b>Date Extracted</b>	<b>Q</b>
Aluminum	200.8	<b>11800</b>	mg/Kg	2.8	0.8	5	07/27/21 12:18	07/16/21	
Arsenic	200.8	<b>11.3</b>	mg/Kg	0.71	0.08	5	07/27/21 12:18	07/16/21	
Cadmium	200.8	<b>0.156</b>	mg/Kg	0.028	0.010	5	07/27/21 12:18	07/16/21	
Chromium	200.8	<b>39.5</b>	mg/Kg	0.28	0.08	5	07/27/21 12:18	07/16/21	
Copper	200.8	<b>61.4</b>	mg/Kg	0.14	0.06	5	07/27/21 12:18	07/16/21	
Lead	200.8	<b>5.16</b>	mg/Kg	0.071	0.028	5	07/27/21 12:18	07/16/21	
Mercury	7471B	<b>0.019 J</b>	mg/Kg	0.029	0.003	1	07/19/21 10:37	07/16/21	
Nickel	200.8	<b>33.6</b>	mg/Kg	0.28	0.04	5	07/27/21 12:18	07/16/21	
Selenium	200.8	<b>0.6 J</b>	mg/Kg	1.4	0.1	5	07/27/21 12:18	07/16/21	
Silver	200.8	<b>0.131</b>	mg/Kg	0.028	0.006	5	07/27/21 12:18	07/16/21	
Zinc	200.8	<b>77.8</b>	mg/Kg	0.71	0.28	5	07/27/21 12:18	07/16/21	

**ALS Group USA, Corp.**  
dba ALS Environmental

Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Sample Name:** 2021 KGM LSH S3  
**Lab Code:** K2108011-003

**Service Request:** K2108011  
**Date Collected:** 07/06/21 09:00  
**Date Received:** 07/12/21 09:00

**Basis:** Dry

**Total Metals**

<b>Analyte Name</b>	<b>Analysis Method</b>	<b>Result</b>	<b>Units</b>	<b>MRL</b>	<b>MDL</b>	<b>Dil.</b>	<b>Date Analyzed</b>	<b>Date Extracted</b>	<b>Q</b>
Aluminum	200.8	<b>13500</b>	mg/Kg	2.8	0.8	5	07/27/21 12:20	07/16/21	
Arsenic	200.8	<b>15.6</b>	mg/Kg	0.71	0.08	5	07/27/21 12:20	07/16/21	
Cadmium	200.8	<b>0.161</b>	mg/Kg	0.028	0.010	5	07/27/21 12:20	07/16/21	
Chromium	200.8	<b>43.3</b>	mg/Kg	0.28	0.08	5	07/27/21 12:20	07/16/21	
Copper	200.8	<b>105</b>	mg/Kg	0.14	0.06	5	07/27/21 12:20	07/16/21	
Lead	200.8	<b>4.10</b>	mg/Kg	0.071	0.028	5	07/27/21 12:20	07/16/21	
Mercury	7471B	<b>0.029</b>	mg/Kg	0.029	0.003	1	07/19/21 10:39	07/16/21	
Nickel	200.8	<b>30.5</b>	mg/Kg	0.28	0.04	5	07/27/21 12:20	07/16/21	
Selenium	200.8	<b>0.7 J</b>	mg/Kg	1.4	0.1	5	07/27/21 12:20	07/16/21	
Silver	200.8	<b>0.090</b>	mg/Kg	0.028	0.006	5	07/27/21 12:20	07/16/21	
Zinc	200.8	<b>79.2</b>	mg/Kg	0.71	0.28	5	07/27/21 12:20	07/16/21	

**ALS Group USA, Corp.**  
dba ALS Environmental

Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Sample Name:** 2021 KGM LJC S1  
**Lab Code:** K2108011-004

**Service Request:** K2108011  
**Date Collected:** 07/06/21 12:00  
**Date Received:** 07/12/21 09:00

**Basis:** Dry

**Total Metals**

<b>Analyte Name</b>	<b>Analysis Method</b>	<b>Result</b>	<b>Units</b>	<b>MRL</b>	<b>MDL</b>	<b>Dil.</b>	<b>Date Analyzed</b>	<b>Date Extracted</b>	<b>Q</b>
Aluminum	200.8	<b>9820</b>	mg/Kg	2.9	0.9	5	07/27/21 12:23	07/16/21	
Arsenic	200.8	<b>13.8</b>	mg/Kg	0.73	0.09	5	07/27/21 12:23	07/16/21	
Cadmium	200.8	<b>0.127</b>	mg/Kg	0.029	0.010	5	07/27/21 12:23	07/16/21	
Chromium	200.8	<b>20.5</b>	mg/Kg	0.29	0.09	5	07/27/21 12:23	07/16/21	
Copper	200.8	<b>60.0</b>	mg/Kg	0.15	0.06	5	07/27/21 12:23	07/16/21	
Lead	200.8	<b>6.16</b>	mg/Kg	0.073	0.029	5	07/27/21 12:23	07/16/21	
Mercury	7471B	<b>0.034</b>	mg/Kg	0.027	0.003	1	07/19/21 10:41	07/16/21	
Nickel	200.8	<b>16.4</b>	mg/Kg	0.29	0.04	5	07/27/21 12:23	07/16/21	
Selenium	200.8	<b>0.2 J</b>	mg/Kg	1.5	0.1	5	07/27/21 12:23	07/16/21	
Silver	200.8	<b>0.135</b>	mg/Kg	0.029	0.006	5	07/27/21 12:23	07/16/21	
Zinc	200.8	<b>70.3</b>	mg/Kg	0.73	0.29	5	07/27/21 12:23	07/16/21	

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Analytical Report

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21 12:00  
**Date Received:** 07/12/21 09:00

**Sample Name:** 2021 KGM LJC S2  
**Lab Code:** K2108011-005

**Basis:** Dry

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	<b>10500</b>	mg/Kg	2.7	0.8	5	07/27/21 12:25	07/16/21	
Arsenic	200.8	<b>12.4</b>	mg/Kg	0.68	0.08	5	07/27/21 12:25	07/16/21	
Cadmium	200.8	<b>0.161</b>	mg/Kg	0.027	0.010	5	07/27/21 12:25	07/16/21	
Chromium	200.8	<b>21.4</b>	mg/Kg	0.27	0.08	5	07/27/21 12:25	07/16/21	
Copper	200.8	<b>62.1</b>	mg/Kg	0.14	0.05	5	07/27/21 12:25	07/16/21	
Lead	200.8	<b>6.14</b>	mg/Kg	0.068	0.027	5	07/27/21 12:25	07/16/21	
Mercury	7471B	<b>0.028</b>	mg/Kg	0.025	0.003	1	07/19/21 10:42	07/16/21	
Nickel	200.8	<b>16.4</b>	mg/Kg	0.27	0.04	5	07/27/21 12:25	07/16/21	
Selenium	200.8	<b>0.3 J</b>	mg/Kg	1.4	0.1	5	07/27/21 12:25	07/16/21	
Silver	200.8	<b>0.118</b>	mg/Kg	0.027	0.005	5	07/27/21 12:25	07/16/21	
Zinc	200.8	<b>76.4</b>	mg/Kg	0.68	0.27	5	07/27/21 12:25	07/16/21	



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Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Sample Name:** 2021 KGM LJC S3  
**Lab Code:** K2108011-006

**Service Request:** K2108011  
**Date Collected:** 07/06/21 12:00  
**Date Received:** 07/12/21 09:00

**Basis:** Dry

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	<b>11800</b>	mg/Kg	3.0	0.9	5	07/27/21 12:28	07/16/21	
Arsenic	200.8	<b>15.6</b>	mg/Kg	0.75	0.09	5	07/27/21 12:28	07/16/21	
Cadmium	200.8	<b>0.188</b>	mg/Kg	0.030	0.010	5	07/27/21 12:28	07/16/21	
Chromium	200.8	<b>24.5</b>	mg/Kg	0.30	0.09	5	07/27/21 12:28	07/16/21	
Copper	200.8	<b>101</b>	mg/Kg	0.15	0.06	5	07/27/21 12:28	07/16/21	
Lead	200.8	<b>7.98</b>	mg/Kg	0.075	0.030	5	07/27/21 12:28	07/16/21	
Mercury	7471B	<b>0.048</b>	mg/Kg	0.028	0.003	1	07/19/21 10:47	07/16/21	
Nickel	200.8	<b>19.2</b>	mg/Kg	0.30	0.04	5	07/27/21 12:28	07/16/21	
Selenium	200.8	<b>0.3 J</b>	mg/Kg	1.5	0.1	5	07/27/21 12:28	07/16/21	
Silver	200.8	<b>0.224</b>	mg/Kg	0.030	0.006	5	07/27/21 12:28	07/16/21	
Zinc	200.8	<b>98.1</b>	mg/Kg	0.75	0.30	5	07/27/21 12:28	07/16/21	

**ALS Group USA, Corp.**  
dba ALS Environmental

Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Sample Name:** 2021 KGM EFSC S1  
**Lab Code:** K2108011-007

**Service Request:** K2108011  
**Date Collected:** 07/06/21 14:00  
**Date Received:** 07/12/21 09:00

**Basis:** Dry

**Total Metals**

<b>Analyte Name</b>	<b>Analysis Method</b>	<b>Result</b>	<b>Units</b>	<b>MRL</b>	<b>MDL</b>	<b>Dil.</b>	<b>Date Analyzed</b>	<b>Date Extracted</b>	<b>Q</b>
Aluminum	200.8	<b>7900</b>	mg/Kg	2.4	0.7	5	07/27/21 12:43	07/16/21	
Arsenic	200.8	<b>35.0</b>	mg/Kg	0.61	0.07	5	07/27/21 12:43	07/16/21	
Cadmium	200.8	<b>8.80</b>	mg/Kg	0.024	0.009	5	07/27/21 12:43	07/16/21	
Chromium	200.8	<b>3.10</b>	mg/Kg	0.24	0.07	5	07/27/21 12:43	07/16/21	
Copper	200.8	<b>34.3</b>	mg/Kg	0.12	0.05	5	07/27/21 12:43	07/16/21	
Lead	200.8	<b>7.50</b>	mg/Kg	0.061	0.024	5	07/27/21 12:43	07/16/21	
Mercury	7471B	<b>0.045</b>	mg/Kg	0.022	0.002	1	07/19/21 10:49	07/16/21	
Nickel	200.8	<b>51.6</b>	mg/Kg	0.24	0.04	5	07/27/21 12:43	07/16/21	
Selenium	200.8	<b>1.2</b>	mg/Kg	1.2	0.1	5	07/27/21 12:43	07/16/21	
Silver	200.8	<b>0.084</b>	mg/Kg	0.024	0.005	5	07/27/21 12:43	07/16/21	
Zinc	200.8	<b>477</b>	mg/Kg	0.61	0.24	5	07/27/21 12:43	07/16/21	

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Analytical Report

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21 14:00  
**Date Received:** 07/12/21 09:00

**Sample Name:** 2021 KGM EFSC S2  
**Lab Code:** K2108011-008

**Basis:** Dry

**Total Metals**

<b>Analyte Name</b>	<b>Analysis Method</b>	<b>Result</b>	<b>Units</b>	<b>MRL</b>	<b>MDL</b>	<b>Dil.</b>	<b>Date Analyzed</b>	<b>Date Extracted</b>	<b>Q</b>
Aluminum	200.8	<b>8770</b>	mg/Kg	2.7	0.8	5	07/27/21 12:46	07/16/21	
Arsenic	200.8	<b>39.3</b>	mg/Kg	0.67	0.08	5	07/27/21 12:46	07/16/21	
Cadmium	200.8	<b>7.39</b>	mg/Kg	0.027	0.009	5	07/27/21 12:46	07/16/21	
Chromium	200.8	<b>8.29</b>	mg/Kg	0.27	0.08	5	07/27/21 12:46	07/16/21	
Copper	200.8	<b>33.4</b>	mg/Kg	0.13	0.05	5	07/27/21 12:46	07/16/21	
Lead	200.8	<b>6.11</b>	mg/Kg	0.067	0.027	5	07/27/21 12:46	07/16/21	
Mercury	7471B	<b>0.046</b>	mg/Kg	0.024	0.002	1	07/19/21 10:50	07/16/21	
Nickel	200.8	<b>56.1</b>	mg/Kg	0.27	0.04	5	07/27/21 12:46	07/16/21	
Selenium	200.8	<b>4.0</b>	mg/Kg	1.3	0.1	5	07/27/21 12:46	07/16/21	
Silver	200.8	<b>0.275</b>	mg/Kg	0.027	0.005	5	07/27/21 12:46	07/16/21	
Zinc	200.8	<b>551</b>	mg/Kg	0.67	0.27	5	07/27/21 12:46	07/16/21	

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Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Sample Name:** 2021 KGM EFSC S3  
**Lab Code:** K2108011-009

**Service Request:** K2108011  
**Date Collected:** 07/06/21 14:00  
**Date Received:** 07/12/21 09:00

**Basis:** Dry

**Total Metals**

<b>Analyte Name</b>	<b>Analysis Method</b>	<b>Result</b>	<b>Units</b>	<b>MRL</b>	<b>MDL</b>	<b>Dil.</b>	<b>Date Analyzed</b>	<b>Date Extracted</b>	<b>Q</b>
Aluminum	200.8	<b>8050</b>	mg/Kg	2.5	0.7	5	07/27/21 12:48	07/16/21	
Arsenic	200.8	<b>23.3</b>	mg/Kg	0.62	0.07	5	07/27/21 12:48	07/16/21	
Cadmium	200.8	<b>5.81</b>	mg/Kg	0.025	0.009	5	07/27/21 12:48	07/16/21	
Chromium	200.8	<b>7.76</b>	mg/Kg	0.25	0.07	5	07/27/21 12:48	07/16/21	
Copper	200.8	<b>23.2</b>	mg/Kg	0.12	0.05	5	07/27/21 12:48	07/16/21	
Lead	200.8	<b>3.12</b>	mg/Kg	0.062	0.025	5	07/27/21 12:48	07/16/21	
Mercury	7471B	<b>0.090</b>	mg/Kg	0.025	0.003	1	07/19/21 10:52	07/16/21	
Nickel	200.8	<b>54.3</b>	mg/Kg	0.25	0.04	5	07/27/21 12:48	07/16/21	
Selenium	200.8	<b>1.6</b>	mg/Kg	1.2	0.1	5	07/27/21 12:48	07/16/21	
Silver	200.8	<b>0.086</b>	mg/Kg	0.025	0.005	5	07/27/21 12:48	07/16/21	
Zinc	200.8	<b>509</b>	mg/Kg	0.62	0.25	5	07/27/21 12:48	07/16/21	

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Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Sample Name:** Method Blank  
**Lab Code:** KQ2112951-03

**Service Request:** K2108011  
**Date Collected:** NA  
**Date Received:** NA  
**Basis:** Dry

**Total Metals**

<b>Analyte Name</b>	<b>Analysis Method</b>	<b>Result</b>	<b>Units</b>	<b>MRL</b>	<b>MDL</b>	<b>Dil.</b>	<b>Date Analyzed</b>	<b>Date Extracted</b>	<b>Q</b>
Aluminum	200.8	<b>0.8 J</b>	mg/Kg	2.0	0.6	5	07/27/21 12:05	07/16/21	
Arsenic	200.8	ND U	mg/Kg	0.5	0.06	5	07/27/21 12:05	07/16/21	
Cadmium	200.8	ND U	mg/Kg	0.020	0.007	5	07/27/21 12:05	07/16/21	
Chromium	200.8	ND U	mg/Kg	0.20	0.06	5	07/27/21 12:05	07/16/21	
Copper	200.8	<b>0.04 J</b>	mg/Kg	0.10	0.04	5	07/27/21 12:05	07/16/21	
Lead	200.8	ND U	mg/Kg	0.05	0.020	5	07/27/21 12:05	07/16/21	
Nickel	200.8	<b>0.04 J</b>	mg/Kg	0.20	0.03	5	07/27/21 12:05	07/16/21	
Selenium	200.8	ND U	mg/Kg	1.0	0.09	5	07/27/21 12:05	07/16/21	
Silver	200.8	<b>0.004 J</b>	mg/Kg	0.020	0.004	5	07/27/21 12:05	07/16/21	
Zinc	200.8	ND U	mg/Kg	0.5	0.20	5	07/27/21 12:05	07/16/21	

ALS Group USA, Corp.  
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Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Sample Name:** Method Blank  
**Lab Code:** KQ2112952-03

**Service Request:** K2108011  
**Date Collected:** NA  
**Date Received:** NA  
**Basis:** Dry

Total Metals

<b>Analyte Name</b>	<b>Analysis Method</b>	<b>Result</b>	<b>Units</b>	<b>MRL</b>	<b>MDL</b>	<b>Dil.</b>	<b>Date Analyzed</b>	<b>Date Extracted</b>	<b>Q</b>
Mercury	7471B	<b>0.003 J</b>	mg/Kg	0.02	0.002	1	07/19/21 10:28	07/16/21	

**ALS Group USA, Corp.**

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QA/QC Report

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

**Service Request:** K2108011  
**Date Collected:** 07/06/21  
**Date Received:** 07/12/21  
**Date Analyzed:** 07/27/21

**Replicate Sample Summary****Total Metals**

**Sample Name:** 2021 KGM LSH S1  
**Lab Code:** K2108011-001

**Units:** mg/Kg  
**Basis:** Dry

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample	Average	RPD	RPD Limit
					KQ2112951-01 Result			
Aluminum	200.8	2.8	0.8	18200	13500	15900	29	30
Arsenic	200.8	0.70	0.08	17.0	15.5	16.3	9	30
Cadmium	200.8	0.028	0.010	0.199	0.143	0.171	33 *	30
Chromium	200.8	0.28	0.08	53.8	39.9	46.9	30	30
Copper	200.8	0.14	0.06	86.3	57.7	72.0	40 *	30
Lead	200.8	0.070	0.028	56.4	3.72	30.1	175 *	30
Nickel	200.8	0.28	0.04	41.3	31.1	36.2	28	30
Selenium	200.8	1.4	0.1	1.0 J	0.5 J	0.8	77 #	30
Silver	200.8	0.028	0.006	0.102	0.073	0.088	32 #	30
Zinc	200.8	0.70	0.28	97.5	76.4	87.0	24	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  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil

**Service Request:** K2108011  
**Date Collected:** 07/06/21  
**Date Received:** 07/12/21  
**Date Analyzed:** 07/19/21

Replicate Sample Summary

Total Metals

**Sample Name:** 2021 KGM LSH S1  
**Lab Code:** K2108011-001

**Units:** mg/Kg  
**Basis:** Dry

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate	Average	RPD	RPD Limit
					Sample KQ2112952-01 Result			
Mercury	7471B	0.028	0.003	0.023 J	0.025 J	0.024	12	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  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil

**Service Request:** K2108011  
**Date Collected:** 07/06/21  
**Date Received:** 07/12/21  
**Date Analyzed:** 07/27/21  
**Date Extracted:** 07/16/21

**Matrix Spike Summary**  
**Total Metals**

**Sample Name:** 2021 KGM LSH S1  
**Lab Code:** K2108011-001  
**Analysis Method:** 200.8  
**Prep Method:** EPA 3050B

**Units:** mg/Kg  
**Basis:** Dry

**Matrix Spike**  
KQ2112951-02

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Aluminum	18200	15600	526	-493 #	70-130
Arsenic	17.0	153	131	104	70-130
Cadmium	0.199	13.8	13.1	104	70-130
Chromium	53.8	102	52.6	92	70-130
Copper	86.3	132	65.8	69 N	70-130
Lead	56.4	139	131	63 N	70-130
Nickel	41.3	170	131	98	70-130
Selenium	1.0 J	130	131	98	70-130
Silver	0.102	13.0	13.1	98	70-130
Zinc	97.5	215	131	89	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  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil

**Service Request:** K2108011  
**Date Collected:** 07/06/21  
**Date Received:** 07/12/21  
**Date Analyzed:** 07/19/21  
**Date Extracted:** 07/16/21

**Matrix Spike Summary**  
**Total Metals**

**Sample Name:** 2021 KGM LSH S1  
**Lab Code:** K2108011-001  
**Analysis Method:** 7471B  
**Prep Method:** Method

**Units:** mg/Kg  
**Basis:** Dry

**Matrix Spike**  
KQ2112952-02

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Mercury	0.023 J	0.809	0.648	121 N	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:** Soil

**Service Request:** K2108011  
**Date Analyzed:** 07/27/21

**Lab Control Sample Summary**  
**Total Metals**

**Units:**mg/Kg  
**Basis:**Dry

**Lab Control Sample**  
KQ2112951-04

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Aluminum	200.8	7120	10100	70	41-122
Arsenic	200.8	166	178	93	64-119
Cadmium	200.8	144	151	95	67-111
Chromium	200.8	118	126	93	65-121
Copper	200.8	144	151	96	71-118
Lead	200.8	79.2	76.1	104	70-134
Nickel	200.8	86.3	89.2	97	63-117
Selenium	200.8	173	189	92	62-121
Silver	200.8	25.0	25.6	98	65-129
Zinc	200.8	323	335	97	65-121

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QA/QC Report

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

**Service Request:** K2108011  
**Date Analyzed:** 07/19/21

**Lab Control Sample Summary**  
**Total Metals**

**Units:**mg/Kg  
**Basis:**Dry

**Lab Control Sample**  
KQ2112952-04

<b>Analyte Name</b>	<b>Analytical Method</b>	<b>Result</b>	<b>Spike Amount</b>	<b>% Rec</b>	<b>% Rec Limits</b>
Mercury	7471B	24.0	26.6	90	41-110

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Prep Summary Report

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

**Service Request:** K2108011

**Metals**

**Prep Method:** EPA 3050B  
**Analytical Method:** 200.8

**Extraction Lot:** 383098  
**Extraction Date:** 07/16/21 07:45

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Amount	Percent Solids
2021 KGM LSH S1	K2108011-001	7/6/21	7/12/21	1.034 g	100 mL	
2021 KGM LSH S2	K2108011-002	7/6/21	7/12/21	1.046 g	100 mL	
2021 KGM LSH S3	K2108011-003	7/6/21	7/12/21	1.034 g	100 mL	
2021 KGM LJC S1	K2108011-004	7/6/21	7/12/21	1.045 g	100 mL	
2021 KGM LJC S2	K2108011-005	7/6/21	7/12/21	1.020 g	100 mL	
2021 KGM LJC S3	K2108011-006	7/6/21	7/12/21	1.068 g	100 mL	
2021 KGM EFSC S1	K2108011-007	7/6/21	7/12/21	1.090 g	100 mL	
2021 KGM EFSC S2	K2108011-008	7/6/21	7/12/21	1.021 g	100 mL	
2021 KGM EFSC S3	K2108011-009	7/6/21	7/12/21	1.053 g	100 mL	
Duplicate	KQ2112951-01DUP	7/6/21	7/12/21	1.015 g	100 mL	
Matrix Spike	KQ2112951-02MS	7/6/21	7/12/21	1.076 g	100 mL	
Method Blank	KQ2112951-03MB	NA	NA	1 g	100 mL	
Lab Control Sample	KQ2112951-04LCS	NA	NA	1.0200 g	100 mL	

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Prep Summary Report

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

**Service Request:**K2108011

**Metals**

**Prep Method:** Method  
**Analytical Method:** 7471B

**Extraction Lot:** 383101  
**Extraction Date:** 07/16/21 08:00

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Amount	Percent Solids
2021 KGM LSH S1	K2108011-001	7/6/21	7/12/21	0.504 g	50 mL	
2021 KGM LSH S2	K2108011-002	7/6/21	7/12/21	0.506 g	50 mL	
2021 KGM LSH S3	K2108011-003	7/6/21	7/12/21	0.509 g	50 mL	
2021 KGM LJC S1	K2108011-004	7/6/21	7/12/21	0.566 g	50 mL	
2021 KGM LJC S2	K2108011-005	7/6/21	7/12/21	0.552 g	50 mL	
2021 KGM LJC S3	K2108011-006	7/6/21	7/12/21	0.565 g	50 mL	
2021 KGM EFSC S1	K2108011-007	7/6/21	7/12/21	0.592 g	50 mL	
2021 KGM EFSC S2	K2108011-008	7/6/21	7/12/21	0.564 g	50 mL	
2021 KGM EFSC S3	K2108011-009	7/6/21	7/12/21	0.517 g	50 mL	
Duplicate	KQ2112952-01DUP	7/6/21	7/12/21	0.505 g	50 mL	
Matrix Spike	KQ2112952-02MS	7/6/21	7/12/21	0.546 g	50 mL	
Method Blank	KQ2112952-03MB	NA	NA	0.5 g	50 mL	
Lab Control Sample	KQ2112952-04LCS	NA	NA	0.2650 g	50 mL	

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

**Service Request:** K2108011

**INITIAL AND CONTINUING CALIBRATION VERIFICATION**

Concentration Units: ug/L

Sample ID	Analyte	Method	Analysis Batch:	Result	True Value	% Rec	% Rec. Limits
ICV 07/19/21 10:20	Mercury	7471B	731661	5.17	5.00	103	90-110
CCV 07/19/21 10:24	Mercury	7471B	731661	5.01	5.00	100	90-110
CCV 07/19/21 10:44	Mercury	7471B	731661	5.05	5.00	101	90-110
CCV 07/19/21 11:03	Mercury	7471B	731661	5.05	5.00	101	90-110
ICV 07/27/21 11:46	Aluminum	200.8	732748	108	100	108	90-110
	Arsenic	200.8	732748	25.3	25.0	101	90-110
	Cadmium	200.8	732748	13.6	12.5	109	90-110
	Chromium	200.8	732748	10.6	10.0	106	90-110
	Copper	200.8	732748	13.0	12.5	104	90-110
	Lead	200.8	732748	26.6	25.0	106	90-110
	Nickel	200.8	732748	26.3	25.0	105	90-110
	Selenium	200.8	732748	24.7	25.0	99	90-110
	Silver	200.8	732748	13.3	12.5	107	90-110
	Zinc	200.8	732748	26.2	25.0	105	90-110
CCV 07/27/21 11:52	Aluminum	200.8	732748	263	250	105	90-110
	Arsenic	200.8	732748	25.9	25.0	103	90-110
	Cadmium	200.8	732748	26.3	25.0	105	90-110
	Chromium	200.8	732748	26.5	25.0	106	90-110
	Copper	200.8	732748	26.3	25.0	105	90-110
	Lead	200.8	732748	26.2	25.0	105	90-110
	Nickel	200.8	732748	26.5	25.0	106	90-110
	Selenium	200.8	732748	25.6	25.0	103	90-110
	Silver	200.8	732748	13.1	12.5	105	90-110
	Zinc	200.8	732748	26.6	25.0	106	90-110
CCV 07/27/21 12:38	Aluminum	200.8	732748	266	250	106	90-110
	Arsenic	200.8	732748	26.4	25.0	106	90-110
	Cadmium	200.8	732748	26.3	25.0	105	90-110
	Chromium	200.8	732748	26.8	25.0	107	90-110
	Copper	200.8	732748	26.5	25.0	106	90-110
	Lead	200.8	732748	26.0	25.0	104	90-110

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

**Service Request:** K2108011

**INITIAL AND CONTINUING CALIBRATION VERIFICATION**

Concentration Units: ug/L

Sample ID	Analyte	Method	Analysis Batch:	Result	True Value	% Rec	% Rec. Limits
CCV 07/27/21 12:38	Nickel	200.8	732748	26.6	25.0	106	90-110
	Selenium	200.8	732748	24.5	25.0	98	90-110
	Silver	200.8	732748	13.1	12.5	105	90-110
	Zinc	200.8	732748	26.4	25.0	106	90-110
CCV 07/27/21 12:53	Aluminum	200.8	732748	246	250	98	90-110
	Arsenic	200.8	732748	26.3	25.0	105	90-110
	Cadmium	200.8	732748	26.1	25.0	105	90-110
	Chromium	200.8	732748	26.9	25.0	107	90-110
	Copper	200.8	732748	26.8	25.0	107	90-110
	Lead	200.8	732748	26.0	25.0	104	90-110
	Nickel	200.8	732748	26.5	25.0	106	90-110
	Selenium	200.8	732748	25.1	25.0	100	90-110
	Silver	200.8	732748	12.9	12.5	103	90-110
	Zinc	200.8	732748	26.8	25.0	107	90-110



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

**Service Request:** K2108011

**INITIAL AND CONTINUING CALIBRATION BLANKS**

**Concentration Units:** ug/L

Sample ID	Analyte	Method	Analysis Batch:	Result	C
ICB 07/19/21 10:21	Mercury	7471B	731661	0.02	J
CCB 07/19/21 10:26	Mercury	7471B	731661	0.02	U
CCB 07/19/21 10:46	Mercury	7471B	731661	0.02	J
CCB 07/19/21 11:05	Mercury	7471B	731661	0.02	U
ICB 07/27/21 11:55	Aluminum	200.8	732748	1.2	U
	Arsenic	200.8	732748	0.1	U
	Cadmium	200.8	732748	0.014	U
	Chromium	200.8	732748	0.12	U
	Copper	200.8	732748	0.08	U
	Lead	200.8	732748	0.04	U
	Nickel	200.8	732748	0.06	U
	Selenium	200.8	732748	0.2	U
	Silver	200.8	732748	0.008	U
	Zinc	200.8	732748	0.4	U
CCB 07/27/21 11:57	Aluminum	200.8	732748	1.2	U
	Arsenic	200.8	732748	0.1	U
	Cadmium	200.8	732748	0.014	U
	Chromium	200.8	732748	0.12	U
	Copper	200.8	732748	0.08	U
	Lead	200.8	732748	0.04	U
	Nickel	200.8	732748	0.06	U
	Selenium	200.8	732748	0.2	U
	Silver	200.8	732748	0.008	U
	Zinc	200.8	732748	0.4	U
CCB 07/27/21 12:41	Aluminum	200.8	732748	1.2	U
	Arsenic	200.8	732748	0.1	U
	Cadmium	200.8	732748	0.014	U
	Chromium	200.8	732748	0.12	U
	Copper	200.8	732748	0.08	U
	Lead	200.8	732748	0.04	U

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

**Service Request:** K2108011

**INITIAL AND CONTINUING CALIBRATION BLANKS**

**Concentration Units:** ug/L

<b>Sample ID</b>	<b>Analyte</b>	<b>Method</b>	<b>Analysis Batch:</b>	<b>Result</b>	<b>C</b>
CCB 07/27/21 12:41	Nickel	200.8	732748	0.06	U
	Selenium	200.8	732748	0.2	U
	Silver	200.8	732748	0.008	U
	Zinc	200.8	732748	0.4	U
CCB 07/27/21 12:56	Aluminum	200.8	732748	1.2	U
	Arsenic	200.8	732748	0.1	U
	Cadmium	200.8	732748	0.014	U
	Chromium	200.8	732748	0.12	U
	Copper	200.8	732748	0.08	U
	Lead	200.8	732748	0.04	U
	Nickel	200.8	732748	0.06	U
	Selenium	200.8	732748	0.2	U
	Silver	200.8	732748	0.008	U
	Zinc	200.8	732748	0.4	U

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

**Service Request:** K2108011

**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
LLICV								
	Mercury	7471B	731661	0.22	0.2	111	50-150	07/19/21 10:23
LLICVS								
	Aluminum	200.8	732748	4.4	4.0	111	50-199	07/27/21 12:00
	Arsenic	200.8	732748	1.0	1.0	104	50-199	07/27/21 12:00
	Cadmium	200.8	732748	0.041	0.04	102	50-199	07/27/21 12:00
	Chromium	200.8	732748	0.43	0.4	106	50-199	07/27/21 12:00
	Copper	200.8	732748	0.16	0.2	82	50-199	07/27/21 12:00
	Lead	200.8	732748	0.099	0.1	99	50-199	07/27/21 12:00
	Nickel	200.8	732748	0.42	0.4	105	50-199	07/27/21 12:00
	Selenium	200.8	732748	2.0	2.0	98	50-199	07/27/21 12:00
	Silver	200.8	732748	0.041	0.04	102	50-199	07/27/21 12:00
	Zinc	200.8	732748	1.1	1.0	110	50-199	07/27/21 12:00

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

**Service Request:** K2108011

**POST SPIKE SAMPLE RECOVERY**

Concentration Units: ppb

Sample ID	Analyte	Method	Analysis Batch:	Initial Sample Result	Post Spike Result	True Value	% Rec	% Rec. Limits	Analysis Date
K2108011-001A	Mercury	7471B	731661	0.16 J	5.15	5.00	100	80-120	07/19/21 10:36

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

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

**Service Request:** K2108011

**Detection Limits**

**Instrument:** K-CVAA-02

**Matrix:** Soil

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

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QA/QC Report

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

**Service Request:** K2108011

**Detection Limits**

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

**Matrix:** Soil

<b>Analyte</b>	<b>Mass</b>	<b>Units</b>	<b>MRL</b>	<b>MDL</b>	<b>Method</b>
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

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QA/QC Report

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

**Service Request:** K2108011

**ICP Linear Range (Quarterly)**

**Instrument:** K-CVAA-02

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

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QA/QC Report

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

**Service Request:** K2108011

**ICP Linear Range (Quarterly)**

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

Analyte	Concentration (ug/L)	Method
Aluminum 27	45000	200.8
Arsenic 75	3000	200.8
Cadmium 111	3000	200.8
Chromium 52	3000	200.8
Copper 65	3000	200.8
Lead 208	3000	200.8
Nickel 60	3000	200.8
Selenium 78	3000	200.8
Silver 107	180	200.8
Zinc 66	3000	200.8



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

**Service Request:** K2108011

**Analysis Run Log**

**Instrument ID:** K-CVAA-02

**Analytical BatchID:** 731661

Sample	Dilution Factor	Date/Time	H g
ZZZZZZ	1	07/19/21 10:09	
ZZZZZZ	1	07/19/21 10:11	
ZZZZZZ	1	07/19/21 10:12	
ZZZZZZ	1	07/19/21 10:14	
ZZZZZZ	1	07/19/21 10:16	
ZZZZZZ	1	07/19/21 10:18	
ICV1	1	07/19/21 10:20	X
ICB1	1	07/19/21 10:21	X
LLICV1	1	07/19/21 10:23	X
CCV1	1	07/19/21 10:24	X
CCB1	1	07/19/21 10:26	X
KQ2112952-03MB	1	07/19/21 10:28	X
KQ2112952-04LCS1	25	07/19/21 10:29	X
K2108011-001	1	07/19/21 10:31	X
K2108011-001DUP	1	07/19/21 10:32	X
K2108011-001MS	1	07/19/21 10:34	X
K2108011-001PS	1	07/19/21 10:36	X
K2108011-002	1	07/19/21 10:37	X
K2108011-003	1	07/19/21 10:39	X
K2108011-004	1	07/19/21 10:41	X
K2108011-005	1	07/19/21 10:42	X
CCV2	1	07/19/21 10:44	X
CCB2	1	07/19/21 10:46	X
K2108011-006	1	07/19/21 10:47	X
K2108011-007	1	07/19/21 10:49	X
K2108011-008	1	07/19/21 10:50	X
K2108011-009	1	07/19/21 10:52	X
ZZZZZZ	1	07/19/21 10:54	
ZZZZZZ	25	07/19/21 10:55	
ZZZZZZ	1	07/19/21 10:57	
ZZZZZZ	1	07/19/21 10:59	
ZZZZZZ	1	07/19/21 11:00	
ZZZZZZ	1	07/19/21 11:02	
CCV3	1	07/19/21 11:03	X
CCB3	1	07/19/21 11:05	X
ZZZZZZ	1	07/19/21 11:07	
ZZZZZZ	1	07/19/21 11:08	

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

**Service Request:** K2108011

**Analysis Run Log**

**Instrument ID:** K-CVAA-02

**Analytical BatchID:** 731661

Sample	Dilution Factor	Date/Time	H g
ZZZZZZ	1	07/19/21 11:10	
ZZZZZZ	1	07/19/21 11:12	
ZZZZZZ	1	07/19/21 11:13	
ZZZZZZ	1	07/19/21 11:15	
ZZZZZZ	1	07/19/21 11:16	
ZZZZZZ	1	07/19/21 11:18	
ZZZZZZ	1	07/19/21 11:20	
ZZZZZZ	1	07/19/21 11:21	
ZZZZZZ	1	07/19/21 11:23	
ZZZZZZ	1	07/19/21 11:35	
ZZZZZZ	1	07/19/21 11:36	
ZZZZZZ	1	07/19/21 11:38	
ZZZZZZ	1	07/19/21 11:39	
ZZZZZZ	1	07/19/21 11:41	
ZZZZZZ	1	07/19/21 11:43	
ZZZZZZ	1	07/19/21 11:44	
ZZZZZZ	1	07/19/21 11:46	
ZZZZZZ	1	07/19/21 11:48	
ZZZZZZ	1	07/19/21 11:49	
ZZZZZZ	1	07/19/21 11:51	
ZZZZZZ	1	07/19/21 11:52	
ZZZZZZ	1	07/19/21 11:54	
ZZZZZZ	1	07/19/21 11:56	
ZZZZZZ	1	07/19/21 11:57	
ZZZZZZ	1	07/19/21 11:59	
ZZZZZZ	1	07/19/21 12:01	
ZZZZZZ	1	07/19/21 12:02	
ZZZZZZ	1	07/19/21 12:04	
ZZZZZZ	1	07/19/21 12:11	
ZZZZZZ	1	07/19/21 12:32	
ZZZZZZ	1	07/19/21 12:34	
ZZZZZZ	1	07/19/21 12:35	
ZZZZZZ	1	07/19/21 12:37	
ZZZZZZ	1	07/19/21 12:38	
ZZZZZZ	1	07/19/21 12:40	
ZZZZZZ	1	07/19/21 12:42	
ZZZZZZ	1	07/19/21 12:43	

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

**Service Request:** K2108011

**Analysis Run Log**

**Instrument ID:** K-CVAA-02

**Analytical BatchID:** 731661

<b>Sample</b>	<b>Dilution Factor</b>	<b>Date/Time</b>	<b>H g</b>
ZZZZZZ	1	07/19/21 12:45	
ZZZZZZ	1	07/19/21 12:46	
ZZZZZZ	1	07/19/21 12:48	
ZZZZZZ	5	07/19/21 12:51	
ZZZZZZ	2	07/19/21 12:53	
ZZZZZZ	1	07/19/21 13:01	
ZZZZZZ	1	07/19/21 13:05	
ZZZZZZ	1	07/19/21 13:06	

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QA/QC Report

Client: Alaska Department of Fish and Game  
Project: Coeur AK Biomonitoring/

Service Request: K2108011

Analysis Run Log

Instrument ID: K-ICP-MS-05

Analytical BatchID: 732748

Sample	Dilution Factor	Date/Time	A	A	C	C	C	P	N	S	A	Z
			l	s	d	r	u	b	i	e	g	n
ZZZZZZ	1	07/27/21 11:41										
ZZZZZZ	1	07/27/21 11:43										
ICV	1	07/27/21 11:46	X	X	X	X	X	X	X	X	X	X
CCV	1	07/27/21 11:52	X	X	X	X	X	X	X	X	X	X
ICB	1	07/27/21 11:55	X	X	X	X	X	X	X	X	X	X
CCB	1	07/27/21 11:57	X	X	X	X	X	X	X	X	X	X
LLICVS	1	07/27/21 12:00	X	X	X	X	X	X	X	X	X	X
ZZZZZZ	1	07/27/21 12:03										
KQ2112951-03MB	5	07/27/21 12:05	X	X	X	X	X	X	X	X	X	X
KQ2112951-04LCS1	20	07/27/21 12:08	X	X	X	X	X	X	X	X	X	X
K2108011-001	5	07/27/21 12:10	X	X	X	X	X	X	X	X	X	X
K2108011-001DUP	5	07/27/21 12:13	X	X	X	X	X	X	X	X	X	X
K2108011-001MS	5	07/27/21 12:15	X	X	X	X	X	X	X	X	X	X
K2108011-002	5	07/27/21 12:18	X	X	X	X	X	X	X	X	X	X
K2108011-003	5	07/27/21 12:20	X	X	X	X	X	X	X	X	X	X
K2108011-004	5	07/27/21 12:23	X	X	X	X	X	X	X	X	X	X
K2108011-005	5	07/27/21 12:25	X	X	X	X	X	X	X	X	X	X
K2108011-006	5	07/27/21 12:28	X	X	X	X	X	X	X	X	X	X
ZZZZZZ	1	07/27/21 12:30										
CCV	1	07/27/21 12:38	X	X	X	X	X	X	X	X	X	X
CCB	1	07/27/21 12:41	X	X	X	X	X	X	X	X	X	X
K2108011-007	5	07/27/21 12:43	X	X	X	X	X	X	X	X	X	X
K2108011-008	5	07/27/21 12:46	X	X	X	X	X	X	X	X	X	X
K2108011-009	5	07/27/21 12:48	X	X	X	X	X	X	X	X	X	X
CCV	1	07/27/21 12:53	X	X	X	X	X	X	X	X	X	X
CCB	1	07/27/21 12:56	X	X	X	X	X	X	X	X	X	X

**ALS Group USA, Corp.**  
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QA/QC Report

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

**Service Request:** K2108011

**ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY**

**Instrument ID:** K-ICP-MS-05

**Analytical BatchID:** 732748

Sample	Date/Time	Sc45NG	Ge72H2	Ge72He	In115He	Lu175He
ZZZZZZ	07/27/21 11:41					
ZZZZZZ	07/27/21 11:43					
ICV	07/27/21 11:46	93	104	103	100	98
CCV	07/27/21 11:52	94	99	100	100	98
ICB	07/27/21 11:55	94	99	90	87	87
CCB	07/27/21 11:57	102	99	100	100	100
LLICVS	07/27/21 12:00	98	99	101	100	100
ZZZZZZ	07/27/21 12:03					
KQ2112951-03MB	07/27/21 12:05	99	100	101	102	100
KQ2112951-04LCS1	07/27/21 12:08	100	102	101	99	97
K2108011-001	07/27/21 12:10	105	103	102	100	101
K2108011-001DUP	07/27/21 12:13	108	105	101	100	98
K2108011-001MS	07/27/21 12:15	105	103	102	100	102
K2108011-002	07/27/21 12:18	106	105	104	104	101
K2108011-003	07/27/21 12:20	106	104	105	102	101
K2108011-004	07/27/21 12:23	105	106	105	103	102
K2108011-005	07/27/21 12:25	105	105	105	104	102
K2108011-006	07/27/21 12:28	105	105	100	98	98
ZZZZZZ	07/27/21 12:30					
CCV	07/27/21 12:38	99	104	103	102	99
CCB	07/27/21 12:41	102	104	101	102	99
K2108011-007	07/27/21 12:43	105	108	107	103	102
K2108011-008	07/27/21 12:46	107	108	106	103	103
K2108011-009	07/27/21 12:48	103	105	105	102	102
CCV	07/27/21 12:53	105	104	103	103	99
CCB	07/27/21 12:56	103	103	103	104	100



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August 09, 2021

**Analytical Report for Service Request No: K2108146**

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 14, 2021  
For your reference, these analyses have been assigned our service request number **K2108146**.

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](http://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](mailto: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

Qualifiers

State Certifications, Accreditations, And Licenses

Case Narrative

Chain of Custody

Total Solids

General Chemistry

Metals

Raw Data

Total Solids

General Chemistry

Metals

## Acronyms

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



### **Inorganic Data Qualifiers**

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

### **Metals Data Qualifiers**

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

### **Organic Data Qualifiers**

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

### **Additional Petroleum Hydrocarbon Specific Qualifiers**

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

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

<b>Agency</b>	<b>Web Site</b>	<b>Number</b>
Alaska DEH	<a href="http://dec.alaska.gov/eh/lab/cs/csapproval.htm">http://dec.alaska.gov/eh/lab/cs/csapproval.htm</a>	UST-040
Arizona DHS	<a href="http://www.azdhs.gov/lab/license/env.htm">http://www.azdhs.gov/lab/license/env.htm</a>	AZ0339
Arkansas - DEQ	<a href="http://www.adeq.state.ar.us/techsvs/labcert.htm">http://www.adeq.state.ar.us/techsvs/labcert.htm</a>	88-0637
California DHS (ELAP)	<a href="http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx">http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx</a>	2795
DOD ELAP	<a href="http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm">http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm</a>	L16-58-R4
Florida DOH	<a href="http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm">http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm</a>	E87412
Hawaii DOH	<a href="http://health.hawaii.gov/">http://health.hawaii.gov/</a>	-
ISO 17025	<a href="http://www.pjllabs.com/">http://www.pjllabs.com/</a>	L16-57
Louisiana DEQ	<a href="http://www.deq.louisiana.gov/page/la-lab-accreditation">http://www.deq.louisiana.gov/page/la-lab-accreditation</a>	03016
Maine DHS	<a href="http://www.maine.gov/dhhs/">http://www.maine.gov/dhhs/</a>	WA01276
Minnesota DOH	<a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>	053-999-457
Nevada DEP	<a href="http://ndep.nv.gov/bsdw/labservice.htm">http://ndep.nv.gov/bsdw/labservice.htm</a>	WA01276
New Jersey DEP	<a href="http://www.nj.gov/dep/enforcement/oqa.html">http://www.nj.gov/dep/enforcement/oqa.html</a>	WA005
New York - DOH	<a href="https://www.wadsworth.org/regulatory/elap">https://www.wadsworth.org/regulatory/elap</a>	12060
North Carolina DEQ	<a href="https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification">https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification</a>	605
Oklahoma DEQ	<a href="http://www.deq.state.ok.us/CSDnew/labcert.htm">http://www.deq.state.ok.us/CSDnew/labcert.htm</a>	9801
Oregon – DEQ (NELAP)	<a href="http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>	WA100010
South Carolina DHEC	<a href="http://www.scdhec.gov/environment/EnvironmentalLabCertification/">http://www.scdhec.gov/environment/EnvironmentalLabCertification/</a>	61002
Texas CEQ	<a href="http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html</a>	T104704427
Washington DOE	<a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>	C544
Wyoming (EPA Region 8)	<a href="https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water">https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water</a>	-
Kelso Laboratory Website	<a href="http://www.alsglobal.com">www.alsglobal.com</a>	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](http://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/analyte is offered by that state.



## Case Narrative

**ALS Environmental—Kelso Laboratory**  
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[www.alsglobal.com](http://www.alsglobal.com)

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

**Service Request:** K2108146  
**Date Received:** 07/14/2021

### 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:

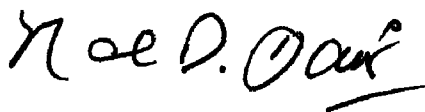
Six soil samples were received for analysis at ALS Environmental on 07/14/2021. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

#### Metals:

Method 200.8, 08/09/2021: The Relative Percent Difference (RPD) for the replicate analysis of Copper in sample 2021KGMLSCS1 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:

Method PSEP Sulfide, 07/15/2021: All samples in this delivery group were received with insufficient holding time remaining. The analysis was performed as soon as possible after receipt by the laboratory. The data was flagged to indicate the holding time violation.

Approved by 

Date 08/09/2021



## Chain of Custody

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CHAIN OF CUSTODY

117842

001

SR# K2-108146

COC Set \_\_\_ of \_\_\_

COC# \_\_\_\_\_

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www.alsglobal.com

Page 1 of 1  
Page 2 of 2

Project Name <u>Coeur AK Biomonitoring</u>		Project Number:		NUMBER OF CONTAINERS	7D	14D	28D	180D	999D	Remarks
Project Manager <u>Bill Kane</u>					160.4 Modified / TVS					
Company <u>Coeur AK / ADF&amp;G</u>					PSEP Sulfide / PSEP Sulfide					
Address <u>802 3rd St. Douglas, AK 99824</u>					PSEP TOC / PSEP TOC					
Phone # <u>907.465.6474</u>		email <u>William.Kane@alaska.gov</u>			74718 / Hg					
Sampler Signature <u>[Signature]</u>		Sampler Printed Name <u>William J. Kane</u>		200.8 / Metals T						
				ASTM D422M / Parisize						
				160.3 Modified / TS						
CLIENT SAMPLE ID	LABID	SAMPLING Date	Time	Matrix	1	2	3	4	5	
1. <u>2021KGM LSC S1</u>		<u>7/7/21</u>	<u>0900</u>	<u>Soil</u>	<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>
2. <u>2021KGM LSC S2</u>		<u>7/7/21</u>	<u>0900</u>	<u>Soil</u>	<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>
3. <u>2021KGM LSC S3</u>		<u>7/7/21</u>	<u>0900</u>	<u>Soil</u>	<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>
4. <u>2021KGM USC S1</u>		<u>7/7/21</u>	<u>1345</u>	<u>Soil</u>	<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>
5. <u>2021KGM USC S2</u>		<u>7/7/21</u>	<u>1345</u>	<u>Soil</u>	<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>
6. <u>2021KGM USC S3</u>		<u>7/7/21</u>	<u>1345</u>	<u>Soil</u>	<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>
7.										
8.										
9.										
10.										

<b>Report Requirements</b> <input type="checkbox"/> I. Routine Report: Method Blank, Surrogate, as required <input checked="" type="checkbox"/> II. Report Dup., MS, MSD as required <input type="checkbox"/> III. CLP Like Summary (no raw data) <input type="checkbox"/> IV. Data Validation Report <input type="checkbox"/> V. EDD	<b>Invoice Information</b> P.O.# _____ Bill To: <u>Coeur, AK</u> <u>Kevin Eppers</u> <u>keppers@coeur.com</u>	Circle which metals are to be analyzed Total Metals: <u>(Al)</u> <u>(As)</u> Sb Ba Be B Ca <u>(Cd)</u> <u>(Co)</u> <u>(Cr)</u> <u>(Cu)</u> Fe <u>(Pb)</u> Mg Mn Mo <u>(Ni)</u> K <u>(Ag)</u> Na <u>(Se)</u> Sr Ti Sn V <u>(Zn)</u> <u>(Hg)</u> Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Ti Sn V Zn Hg			
	<b>Turnaround Requirements</b> <input type="checkbox"/> 24 hr. _____ 48 hr. <input type="checkbox"/> 5 Day <input checked="" type="checkbox"/> Standard	Special Instructions/Comments: _____ *Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other _____ (Circle One)			
	Requested Report Date _____				
Relinquished By: <u>[Signature]</u> Signature <u>Jesse Lindgren</u> Printed Name Firm <u>ADF&amp;G</u> Date/Time <u>7/12/21 8:49AM</u>	Received By: <u>[Signature]</u> Signature <u>[Signature]</u> Printed Name <u>ALS</u> Firm <u>7-14-21/00</u> Date/Time	Relinquished By: Signature Printed Name Firm Date/Time	Received By: Signature Printed Name Firm Date/Time	Relinquished By: Signature Printed Name Firm Date/Time	Received By: Signature Printed Name Firm Date/Time

**Cooler Receipt and Preservation Form**

Client Alaska Dept of Fish + Game Service Request K21 08146  
 Received: 7/14/21 Opened: 7/14/21 By: [Signature] Unloaded: 7/14/21 By: [Signature]

- Samples were received via?  USPS  Fed Ex  UPS  DHL  PDX  Courier  Hand Delivered
  - Samples were received in: (circle)  Cooler  Box  Envelope  Other  NA
  - 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
  - Was a Temperature Blank present in cooler? NA  Y  N If yes, notate the temperature in the appropriate column below:  
 If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
  - 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

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
<u>15.6</u>	<u>15.8</u>	<u>IK01</u>		<u>X</u>	<u>X</u>	<u>201354064524</u>	<u>4</u>

- Packing material: Inserts Baggies  Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves Melted Blue ice Box
- Were custody papers properly filled out (ink, signed, etc.)? NA  Y  N
- Were samples received in good condition (unbroken) NA  Y  N
- Were all sample labels complete (ie, analysis, preservation, etc.)? NA  Y  N
- Did all sample labels and tags agree with custody papers? NA  Y  N
- Were appropriate bottles/containers and volumes received for the tests indicated? NA  Y  N
- Were the pH-preserved bottles (see SMO GEN SOP) received at the appropriate pH? Indicate in the table below  NA  Y  N
- Were VOA vials received without headspace? Indicate in the table below.  NA  Y  N
- Was C12/Res negative?  NA  Y  N

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: Rec'd out of temp and at Hold



# Total Solids

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**ALS Group USA, Corp.**  
dba ALS Environmental

Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Analysis Method:** 160.3 Modified  
**Prep Method:** None

**Service Request:** K2108146  
**Date Collected:** 07/7/21  
**Date Received:** 07/14/21  
**Units:** Percent  
**Basis:** As Received

**Solids, Total**

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
2021KGMLSCS1	K2108146-001	<b>74.8</b>	-	-	1	07/15/21 14:15	*
2021KGMLSCS2	K2108146-002	<b>68.6</b>	-	-	1	07/15/21 14:15	*
2021KGMLSCS3	K2108146-003	<b>68.4</b>	-	-	1	07/15/21 14:15	*
2021KGMUSCS1	K2108146-004	<b>68.2</b>	-	-	1	07/15/21 14:15	*
2021KGMUSCS2	K2108146-005	<b>67.7</b>	-	-	1	07/15/21 14:15	*
2021KGMUSCS3	K2108146-006	<b>63.7</b>	-	-	1	07/15/21 14:15	*
Method Blank	K2108146-MB	ND U	-	-	1	07/15/21 14:15	

ALS Group USA, Corp.

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QA/QC Report

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

**Service Request:** K2108146  
**Date Collected:** 07/07/21  
**Date Received:** 07/14/21  
**Date Analyzed:** 07/15/21

Replicate Sample Summary

Inorganic Parameters

**Sample Name:** 2021KGMLSCS1  
**Lab Code:** K2108146-001

**Units:** Percent  
**Basis:** As Received

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>MDL</u>	<u>Sample Result</u>	<u>Duplicate Sample K2108146-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Solids, Total	160.3 Modified	-	-	74.8	73.1	74.0	2	20

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

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

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

**ALS Group USA, Corp.**  
dba ALS Environmental

Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Analysis Method:** 160.4 Modified  
**Prep Method:** None

**Service Request:** K2108146  
**Date Collected:** 07/7/21  
**Date Received:** 07/14/21

**Units:** Percent  
**Basis:** Dry, per Method

**Solids, Total Volatile**

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
2021KGMLSCS1	K2108146-001	<b>2.70</b>	0.031	-	1	07/15/21 14:15	*
2021KGMLSCS2	K2108146-002	<b>3.50</b>	0.026	-	1	07/15/21 14:15	*
2021KGMLSCS3	K2108146-003	<b>3.20</b>	0.031	-	1	07/15/21 14:15	*
2021KGMUSCS1	K2108146-004	<b>3.90</b>	0.028	-	1	07/15/21 14:15	*
2021KGMUSCS2	K2108146-005	<b>3.70</b>	0.028	-	1	07/15/21 14:15	*
2021KGMUSCS3	K2108146-006	<b>4.40</b>	0.029	-	1	07/15/21 14:15	*
Method Blank	K2108146-MB	ND U	0.020	-	1	07/15/21 14:15	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

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

**Service Request:** K2108146  
**Date Collected:** 07/07/21  
**Date Received:** 07/14/21  
**Date Analyzed:** 07/15/21

**Replicate Sample Summary**  
**General Chemistry Parameters**

**Sample Name:** 2021KGMLSCS1  
**Lab Code:** K2108146-001

**Units:** Percent  
**Basis:** Dry, per Method

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>MDL</u>	<u>Sample Result</u>	<u>Duplicate Sample K2108146-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Solids, Total Volatile	160.4 Modified	0.024	-	2.70	2.80	2.75	4	20

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

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

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



# General Chemistry

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**ALS Group USA, Corp.**  
 dba ALS Environmental

Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Analysis Method:** PSEP Sulfide  
**Prep Method:** Method

**Service Request:** K2108146  
**Date Collected:** 07/7/21  
**Date Received:** 07/14/21  
**Units:** mg/Kg  
**Basis:** Dry

**Sulfide, Total**

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2021KGMLSCS1	K2108146-001	ND U	4.3	1.3	1	07/15/21 19:53	7/15/21	*
2021KGMLSCS2	K2108146-002	ND U	4.8	1.5	1	07/15/21 19:53	7/15/21	*
2021KGMLSCS3	K2108146-003	<b>1.6 J</b>	4.8	1.5	1	07/15/21 19:53	7/15/21	*
2021KGMUSCS1	K2108146-004	ND U	4.7	1.5	1	07/15/21 19:53	7/15/21	*
2021KGMUSCS2	K2108146-005	ND U	4.7	1.5	1	07/15/21 19:53	7/15/21	*
2021KGMUSCS3	K2108146-006	<b>1.7 J</b>	5.2	1.6	1	07/15/21 19:53	7/15/21	*
Method Blank	K2108146-MB	ND U	1.0	0.3	1	07/15/21 19:53	7/15/21	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

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

**Service Request:** K2108146  
**Date Collected:** 07/07/21  
**Date Received:** 07/14/21  
**Date Analyzed:** 07/15/21

**Triplicate Sample Summary**  
**General Chemistry Parameters**

**Sample Name:** 2021KGMUSCS3  
**Lab Code:** K2108146-006  
**Analysis Method:** PSEP Sulfide  
**Prep Method:** Method

**Units:** mg/Kg  
**Basis:** Dry

Analyte Name	MRL	MDL	Sample Result	Duplicate K2108146-006DUP Result	Triplicate K2108146-006TRP Result	Average	RSD	RSD Limit
Sulfide, Total	5.1	1.6	1.7	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.

ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

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

**Service Request:** K2108146  
**Date Collected:** 07/07/21  
**Date Received:** 07/14/21  
**Date Analyzed:** 07/15/21  
**Date Extracted:** 07/15/21

**Duplicate Matrix Spike Summary**  
**Sulfide, Total**

**Sample Name:** 2021KGMUSCS3  
**Lab Code:** K2108146-006  
**Analysis Method:** PSEP Sulfide  
**Prep Method:** Method

**Units:** mg/Kg  
**Basis:** Dry

Analyte Name	Sample Result	Result	Matrix Spike K2108146-006MS		Duplicate Matrix Spike K2108146-006DMS		% Rec Limits	RPD	RPD Limit	
			Spike Amount	% Rec	Result	Spike Amount				% Rec
Sulfide, Total	1.7 J	1900	2100	90	1860	1910	97	28-175	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.

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  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil

**Service Request:** K2108146  
**Date Analyzed:** 07/15/21  
**Date Extracted:** 07/15/21

**Lab Control Sample Summary**  
**Sulfide, Total**

**Analysis Method:** PSEP Sulfide  
**Prep Method:** Method

**Units:** mg/Kg  
**Basis:** Dry  
**Analysis Lot:** 731308

<b>Sample Name</b>	<b>Lab Code</b>	<b>Result</b>	<b>Spike Amount</b>	<b>% Rec</b>	<b>% Rec Limits</b>
Lab Control Sample	K2108146-LCS	437	410	107	39-166

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

**Service Request:** K2108146

### Continuing Calibration Verification (CCV) Summary

#### Sulfide, Total

**Analysis Method:** PSEP Sulfide

**Units:** mg/L

	Analysis		Date	True	Measured	Percent	Acceptance
	Lot	Lab Code	Analyzed	Value	Value	Recovery	Limits
CCV1	731308	KQ2113248-01	07/15/21 19:53	0.615	0.622	101	90-110
CCV2	731308	KQ2113248-02	07/15/21 19:53	0.615	0.605	98	90-110
CCV3	731308	KQ2113248-03	07/15/21 19:53	0.615	0.604	98	90-110

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

**Service Request:**K2108146

**Continuing Calibration Blank (CCB) Summary**  
**Sulfide, Total**

**Analysis Method:** PSEP Sulfide

**Units:**mg/Kg

	<b>Analysis Lot</b>	<b>Lab Code</b>	<b>Date Analyzed</b>	<b>MRL</b>	<b>MDL</b>	<b>Result</b>	<b>Q</b>
CCB1	731308	KQ2113248-04	07/15/21 19:53	1.0	0.3	ND	U
CCB2	731308	KQ2113248-05	07/15/21 19:53	1.0	0.3	ND	U
CCB3	731308	KQ2113248-06	07/15/21 19:53	1.0	0.3	ND	U

**ALS Group USA, Corp.**  
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Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Analysis Method:** PSEP TOC  
**Prep Method:** ALS SOP

**Service Request:** K2108146  
**Date Collected:** 07/7/21  
**Date Received:** 07/14/21

**Units:** Percent  
**Basis:** Dry, per Method

**Carbon, Total Organic (TOC)**

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2021KGMLSCS1	K2108146-001	<b>0.341</b>	0.050	0.020	1	07/21/21 15:00	7/21/21	
2021KGMLSCS2	K2108146-002	<b>0.563</b>	0.050	0.020	1	07/21/21 15:00	7/21/21	
2021KGMLSCS3	K2108146-003	<b>0.586</b>	0.050	0.020	1	07/21/21 15:00	7/21/21	
2021KGMUSCS1	K2108146-004	<b>0.871</b>	0.050	0.020	1	07/21/21 15:00	7/21/21	
2021KGMUSCS2	K2108146-005	<b>0.585</b>	0.050	0.020	1	07/21/21 15:00	7/21/21	
2021KGMUSCS3	K2108146-006	<b>0.818</b>	0.050	0.020	1	07/21/21 15:00	7/21/21	
Method Blank	K2108146-MB	ND U	0.050	0.020	1	07/21/21 15:00	7/21/21	

ALS Group USA, Corp.

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QA/QC Report

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

**Service Request:** K2108146  
**Date Collected:** 07/07/21  
**Date Received:** 07/14/21  
**Date Analyzed:** 07/21/21

**Triplicate Sample Summary**  
**General Chemistry Parameters**

**Sample Name:** 2021KGMLSCS1  
**Lab Code:** K2108146-001  
**Analysis Method:** PSEP TOC  
**Prep Method:** ALS SOP

**Units:** Percent  
**Basis:** Dry, per Method

Analyte Name	MRL	MDL	Sample Result	Duplicate K2108146-001DUP Result	Triplicate K2108146-001TRP Result	Average	RSD	RSD Limit
Carbon, Total Organic (TOC)	0.050	0.020	0.341	0.354	0.361	0.352	3	27

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

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

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

ALS Group USA, Corp.  
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QA/QC Report

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

**Service Request:** K2108146  
**Date Collected:** 07/07/21  
**Date Received:** 07/14/21  
**Date Analyzed:** 07/21/21  
**Date Extracted:** 07/21/21

**Duplicate Matrix Spike Summary**  
**Carbon, Total Organic (TOC)**

**Sample Name:** 2021KGMLSCS1  
**Lab Code:** K2108146-001  
**Analysis Method:** PSEP TOC  
**Prep Method:** ALS SOP

**Units:** Percent  
**Basis:** Dry, per Method

Analyte Name	Sample Result	Matrix Spike K2108146-001MS			Duplicate Matrix Spike K2108146-001DMS			% Rec Limits	RPD	RPD Limit
		Result	Spike Amount	% Rec	Result	Spike Amount	% Rec			
Carbon, Total Organic (TOC)	0.341	4.85	4.46	101	3.96	3.56	102	69-123	<1	27

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

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

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

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.  
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QA/QC Report

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

**Service Request:** K2108146  
**Date Analyzed:** 07/21/21  
**Date Extracted:** 07/21/21

**Lab Control Sample Summary**  
**Carbon, Total Organic (TOC)**

**Analysis Method:** PSEP TOC  
**Prep Method:** ALS SOP

**Units:** Percent  
**Basis:** Dry, per Method  
**Analysis Lot:** 732062

<b>Sample Name</b>	<b>Lab Code</b>	<b>Result</b>	<b>Spike Amount</b>	<b>% Rec</b>	<b>% Rec Limits</b>
Lab Control Sample	K2108146-LCS	0.457	0.430	106	74-118

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

**Service Request:** K2108146

### Continuing Calibration Verification (CCV) Summary

#### Carbon, Total Organic (TOC)

**Analysis Method:** PSEP TOC

**Units:** Percent

	<b>Analysis Lot</b>	<b>Lab Code</b>	<b>Date Analyzed</b>	<b>True Value</b>	<b>Measured Value</b>	<b>Percent Recovery</b>	<b>Acceptance Limits</b>
CCV1	732062	KQ2113682-01	07/21/21 15:00	20.0	19.7	99	90-110
CCV2	732062	KQ2113682-02	07/21/21 15:00	20.0	19.7	99	90-110
CCV3	732062	KQ2113682-03	07/21/21 15:00	20.0	19.7	99	90-110



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

**Service Request:**K2108146

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

**Analysis Method:** PSEP TOC

**Units:**Percent

	<b>Analysis Lot</b>	<b>Lab Code</b>	<b>Date Analyzed</b>	<b>MRL</b>	<b>MDL</b>	<b>Result</b>	<b>Q</b>
CCB1	732062	KQ2113682-04	07/21/21 15:00	0.050	0.020	ND	U
CCB2	732062	KQ2113682-05	07/21/21 15:00	0.050	0.020	ND	U
CCB3	732062	KQ2113682-06	07/21/21 15:00	0.050	0.020	ND	U

dba ALS Environmental  
Analytical Report

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

**Service Request:** K2108146  
**Date Collected:** 07/07/21  
**Date Received:** 07/14/21  
**Date Analyzed:** 07/22/21

Particle Size Determination  
ASTM D422M

Sample Name: 2021KGMLSCS1  
Lab Code: K2108146-001

Sand Fraction: Dry Weight (Grams) 48.1428  
Sand Fraction: Weight Recovered (Grams) 47.9159  
Sand Fraction: Percent Recovery 99.53

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	2.9119	5.94
Gravel, Fine	-2 Ø to -1 Ø	8.4671	17.27
Sand, Very Coarse	-1 to 0 Ø	23.1371	47.20
Sand, Coarse	0 to 1 Ø	10.1864	20.78
Sand, Medium	1 to 2 Ø	2.2491	4.59
Sand, Fine	2 to 3 Ø	0.8780	1.79
Sand, Very Fine	3 to 4 Ø	0.0687	0.14
75.0 µm	4 Ø	0.1050	0.21
31.3 µm	5 Ø	0.0400	0.08
15.6 µm	6 Ø	0.0050	0.01
7.8 µm	7 Ø	0.0350	0.07
3.9 µm	8 Ø	0.0050	0.01
1.95 µm	9 Ø	0.0100	0.02
0.98 µm	> 10 Ø	0.0000	0.00
		48.0983	98.11

dba ALS Environmental  
Analytical Report

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

**Service Request:** K2108146  
**Date Collected:** 07/07/21  
**Date Received:** 07/14/21  
**Date Analyzed:** 07/22/21

Particle Size Determination  
ASTM D422M

Sample Name: 2021KGMLSCS1  
Lab Code: K2108146-001 DUP

Sand Fraction: Dry Weight (Grams) 48.2088  
Sand Fraction: Weight Recovered (Grams) 48.0620  
Sand Fraction: Percent Recovery 99.70

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	0.4943	1.01
Gravel, Fine	-2 Ø to -1 Ø	9.2722	18.98
Sand, Very Coarse	-1 to 0 Ø	23.4466	47.99
Sand, Coarse	0 to 1 Ø	11.2934	23.11
Sand, Medium	1 to 2 Ø	2.5859	5.29
Sand, Fine	2 to 3 Ø	0.8959	1.83
Sand, Very Fine	3 to 4 Ø	0.0435	0.09
75.0 µm	4 Ø	0.0250	0.05
31.3 µm	5 Ø	0.0300	0.06
15.6 µm	6 Ø	0.0200	0.04
7.8 µm	7 Ø	0.0300	0.06
3.9 µm	8 Ø	0.0000	0.00
1.95 µm	9 Ø	0.0200	0.04
0.98 µm	> 10 Ø	0.0350	0.07
		48.1918	98.64

dba ALS Environmental  
Analytical Report

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

**Service Request:** K2108146  
**Date Collected:** 07/07/21  
**Date Received:** 07/14/21  
**Date Analyzed:** 07/22/21

Particle Size Determination  
ASTM D422M

Sample Name: 2021KGMLSCS2  
Lab Code: K2108146-002

Sand Fraction: Dry Weight (Grams) 39.8271  
Sand Fraction: Weight Recovered (Grams) 39.8842  
Sand Fraction: Percent Recovery 100.14

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	1.9611	4.73
Gravel, Fine	-2 Ø to -1 Ø	1.7316	4.18
Sand, Very Coarse	-1 to 0 Ø	3.0192	7.28
Sand, Coarse	0 to 1 Ø	9.8771	23.82
Sand, Medium	1 to 2 Ø	12.7671	30.79
Sand, Fine	2 to 3 Ø	9.2439	22.29
Sand, Very Fine	3 to 4 Ø	0.9514	2.29
75.0 µm	4 Ø	0.6450	1.56
31.3 µm	5 Ø	0.1900	0.46
15.6 µm	6 Ø	0.1300	0.31
7.8 µm	7 Ø	0.0550	0.13
3.9 µm	8 Ø	0.0500	0.12
1.95 µm	9 Ø	0.0400	0.10
0.98 µm	> 10 Ø	0.0000	0.00
		40.6614	98.06

dba ALS Environmental  
Analytical Report

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

**Service Request:** K2108146  
**Date Collected:** 07/07/21  
**Date Received:** 07/14/21  
**Date Analyzed:** 07/22/21

Particle Size Determination  
ASTM D422M

Sample Name: 2021KGMLSCS3  
Lab Code: K2108146-003

Sand Fraction: Dry Weight (Grams) 43.0302  
Sand Fraction: Weight Recovered (Grams) 42.9331  
Sand Fraction: Percent Recovery 99.77

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	1.9041	5.03
Gravel, Fine	-2 Ø to -1 Ø	2.9392	7.77
Sand, Very Coarse	-1 to 0 Ø	6.1619	16.29
Sand, Coarse	0 to 1 Ø	8.1996	21.68
Sand, Medium	1 to 2 Ø	12.6513	33.45
Sand, Fine	2 to 3 Ø	9.7096	25.67
Sand, Very Fine	3 to 4 Ø	0.9374	2.48
75.0 µm	4 Ø	0.8100	2.14
31.3 µm	5 Ø	0.1750	0.46
15.6 µm	6 Ø	0.1400	0.37
7.8 µm	7 Ø	0.1100	0.29
3.9 µm	8 Ø	0.0265	0.07
1.95 µm	9 Ø	0.0435	0.12
0.98 µm	> 10 Ø	0.0400	0.11
		43.8481	115.94

dba ALS Environmental  
Analytical Report

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

**Service Request:** K2108146  
**Date Collected:** 07/07/21  
**Date Received:** 07/14/21  
**Date Analyzed:** 07/22/21

Particle Size Determination  
ASTM D422M

Sample Name: 2021KGMUSCS1  
Lab Code: K2108146-004

Sand Fraction: Dry Weight (Grams) 42.4503  
Sand Fraction: Weight Recovered (Grams) 42.3980  
Sand Fraction: Percent Recovery 99.88

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	0.5286	1.19
Gravel, Fine	-2 Ø to -1 Ø	1.4531	3.27
Sand, Very Coarse	-1 to 0 Ø	5.2381	11.80
Sand, Coarse	0 to 1 Ø	17.7654	40.02
Sand, Medium	1 to 2 Ø	13.1466	29.61
Sand, Fine	2 to 3 Ø	3.9618	8.92
Sand, Very Fine	3 to 4 Ø	0.2380	0.54
75.0 µm	4 Ø	0.2000	0.45
31.3 µm	5 Ø	0.0800	0.18
15.6 µm	6 Ø	0.1050	0.24
7.8 µm	7 Ø	0.0050	0.01
3.9 µm	8 Ø	0.0100	0.02
1.95 µm	9 Ø	0.0300	0.07
0.98 µm	> 10 Ø	0.0050	0.01
		42.7666	96.33

dba ALS Environmental  
Analytical Report

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

**Service Request:** K2108146  
**Date Collected:** 07/07/21  
**Date Received:** 07/14/21  
**Date Analyzed:** 07/22/21

Particle Size Determination  
ASTM D422M

Sample Name: 2021KGMUSCS2  
Lab Code: K2108146-005

Sand Fraction: Dry Weight (Grams) 44.2647  
Sand Fraction: Weight Recovered (Grams) 44.1240  
Sand Fraction: Percent Recovery 99.68

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	2.9791	6.76
Sand, Very Coarse	-1 to 0 Ø	17.9872	40.83
Sand, Coarse	0 to 1 Ø	17.0052	38.60
Sand, Medium	1 to 2 Ø	4.9032	11.13
Sand, Fine	2 to 3 Ø	1.1443	2.60
Sand, Very Fine	3 to 4 Ø	0.0718	0.16
75.0 µm	4 Ø	0.0550	0.12
31.3 µm	5 Ø	0.0550	0.12
15.6 µm	6 Ø	0.0250	0.06
7.8 µm	7 Ø	0.0150	0.03
3.9 µm	8 Ø	0.0150	0.03
1.95 µm	9 Ø	0.0000	0.00
0.98 µm	> 10 Ø	0.0000	0.00
		44.2558	100.46

dba ALS Environmental  
Analytical Report

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

**Service Request:** K2108146  
**Date Collected:** 07/07/21  
**Date Received:** 07/14/21  
**Date Analyzed:** 07/22/21

Particle Size Determination  
ASTM D422M

Sample Name: 2021KGMUSCS3  
Lab Code: K2108146-006

Sand Fraction: Dry Weight (Grams) 41.3190  
Sand Fraction: Weight Recovered (Grams) 41.1908  
Sand Fraction: Percent Recovery 99.69

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	0.6221	1.50
Gravel, Fine	-2 Ø to -1 Ø	1.5730	3.79
Sand, Very Coarse	-1 to 0 Ø	9.6009	23.16
Sand, Coarse	0 to 1 Ø	17.4635	42.12
Sand, Medium	1 to 2 Ø	8.5434	20.61
Sand, Fine	2 to 3 Ø	3.1044	7.49
Sand, Very Fine	3 to 4 Ø	0.2180	0.53
75.0 µm	4 Ø	0.1700	0.41
31.3 µm	5 Ø	0.0050	0.01
15.6 µm	6 Ø	0.1150	0.28
7.8 µm	7 Ø	0.0150	0.04
3.9 µm	8 Ø	0.0100	0.02
1.95 µm	9 Ø	0.0350	0.08
0.98 µm	> 10 Ø	0.0300	0.07
		41.5053	100.11





# Metals

**ALS Environmental—Kelso Laboratory**  
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**ALS Group USA, Corp.**  
dba ALS Environmental

Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Sample Name:** 2021KGMLSCS1  
**Lab Code:** K2108146-001

**Service Request:** K2108146  
**Date Collected:** 07/07/21 09:00  
**Date Received:** 07/14/21 09:00

**Basis:** Dry

**Total Metals**

<b>Analyte Name</b>	<b>Analysis Method</b>	<b>Result</b>	<b>Units</b>	<b>MRL</b>	<b>MDL</b>	<b>Dil.</b>	<b>Date Analyzed</b>	<b>Date Extracted</b>	<b>Q</b>
Aluminum	200.8	<b>10600</b>	mg/Kg	2.6	0.8	5	08/09/21 08:58	07/27/21	
Arsenic	200.8	<b>14.6</b>	mg/Kg	0.65	0.08	5	08/09/21 08:58	07/27/21	
Cadmium	200.8	<b>0.636</b>	mg/Kg	0.026	0.009	5	08/09/21 08:58	07/27/21	
Chromium	200.8	<b>18.1</b>	mg/Kg	0.26	0.08	5	08/09/21 08:58	07/27/21	
Copper	200.8	<b>46.5</b>	mg/Kg	0.13	0.05	5	08/09/21 08:58	07/27/21	
Lead	200.8	<b>7.79</b>	mg/Kg	0.065	0.026	5	08/09/21 08:58	07/27/21	
Mercury	7471B	<b>0.060</b>	mg/Kg	0.024	0.002	1	07/16/21 10:46	07/15/21	
Nickel	200.8	<b>31.4</b>	mg/Kg	0.26	0.04	5	08/09/21 08:58	07/27/21	
Selenium	200.8	<b>1.0 J</b>	mg/Kg	1.3	0.1	5	08/09/21 08:58	07/27/21	
Silver	200.8	<b>0.085</b>	mg/Kg	0.026	0.005	5	08/09/21 08:58	07/27/21	
Zinc	200.8	<b>129</b>	mg/Kg	0.65	0.26	5	08/09/21 08:58	07/27/21	

**ALS Group USA, Corp.**  
dba ALS Environmental

Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Sample Name:** 2021KGMLSCS2  
**Lab Code:** K2108146-002

**Service Request:** K2108146  
**Date Collected:** 07/07/21 09:00  
**Date Received:** 07/14/21 09:00  
**Basis:** Dry

**Total Metals**

<b>Analyte Name</b>	<b>Analysis Method</b>	<b>Result</b>	<b>Units</b>	<b>MRL</b>	<b>MDL</b>	<b>Dil.</b>	<b>Date Analyzed</b>	<b>Date Extracted</b>	<b>Q</b>
Aluminum	200.8	<b>12600</b>	mg/Kg	2.7	0.8	5	08/09/21 09:05	07/27/21	
Arsenic	200.8	<b>20.3</b>	mg/Kg	0.66	0.08	5	08/09/21 09:05	07/27/21	
Cadmium	200.8	<b>0.811</b>	mg/Kg	0.027	0.009	5	08/09/21 09:05	07/27/21	
Chromium	200.8	<b>19.7</b>	mg/Kg	0.27	0.08	5	08/09/21 09:05	07/27/21	
Copper	200.8	<b>50.9</b>	mg/Kg	0.13	0.05	5	08/09/21 09:05	07/27/21	
Lead	200.8	<b>8.07</b>	mg/Kg	0.066	0.027	5	08/09/21 09:05	07/27/21	
Mercury	7471B	<b>0.067</b>	mg/Kg	0.028	0.003	1	07/16/21 10:58	07/15/21	
Nickel	200.8	<b>38.6</b>	mg/Kg	0.27	0.04	5	08/09/21 09:05	07/27/21	
Selenium	200.8	<b>1.5</b>	mg/Kg	1.3	0.1	5	08/09/21 09:05	07/27/21	
Silver	200.8	<b>0.109</b>	mg/Kg	0.027	0.005	5	08/09/21 09:05	07/27/21	
Zinc	200.8	<b>168</b>	mg/Kg	0.66	0.27	5	08/09/21 09:05	07/27/21	

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Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Sample Name:** 2021KGMLSCS3  
**Lab Code:** K2108146-003

**Service Request:** K2108146  
**Date Collected:** 07/07/21 09:00  
**Date Received:** 07/14/21 09:00

**Basis:** Dry

**Total Metals**

<b>Analyte Name</b>	<b>Analysis Method</b>	<b>Result</b>	<b>Units</b>	<b>MRL</b>	<b>MDL</b>	<b>Dil.</b>	<b>Date Analyzed</b>	<b>Date Extracted</b>	<b>Q</b>
Aluminum	200.8	<b>11300</b>	mg/Kg	2.7	0.8	5	08/09/21 09:08	07/27/21	
Arsenic	200.8	<b>22.2</b>	mg/Kg	0.68	0.08	5	08/09/21 09:08	07/27/21	
Cadmium	200.8	<b>0.838</b>	mg/Kg	0.027	0.010	5	08/09/21 09:08	07/27/21	
Chromium	200.8	<b>18.3</b>	mg/Kg	0.27	0.08	5	08/09/21 09:08	07/27/21	
Copper	200.8	<b>48.9</b>	mg/Kg	0.14	0.05	5	08/09/21 09:08	07/27/21	
Lead	200.8	<b>8.43</b>	mg/Kg	0.068	0.027	5	08/09/21 09:08	07/27/21	
Mercury	7471B	<b>0.078</b>	mg/Kg	0.028	0.003	1	07/16/21 10:59	07/15/21	
Nickel	200.8	<b>36.5</b>	mg/Kg	0.27	0.04	5	08/09/21 09:08	07/27/21	
Selenium	200.8	<b>1.6</b>	mg/Kg	1.4	0.1	5	08/09/21 09:08	07/27/21	
Silver	200.8	<b>0.110</b>	mg/Kg	0.027	0.005	5	08/09/21 09:08	07/27/21	
Zinc	200.8	<b>160</b>	mg/Kg	0.68	0.27	5	08/09/21 09:08	07/27/21	

**ALS Group USA, Corp.**  
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Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Sample Name:** 2021KGMUSCS1  
**Lab Code:** K2108146-004

**Service Request:** K2108146  
**Date Collected:** 07/07/21 13:45  
**Date Received:** 07/14/21 09:00

**Basis:** Dry

**Total Metals**

<b>Analyte Name</b>	<b>Analysis Method</b>	<b>Result</b>	<b>Units</b>	<b>MRL</b>	<b>MDL</b>	<b>Dil.</b>	<b>Date Analyzed</b>	<b>Date Extracted</b>	<b>Q</b>
Aluminum	200.8	<b>15600</b>	mg/Kg	2.2	0.7	5	08/09/21 09:10	07/27/21	
Arsenic	200.8	<b>14.8</b>	mg/Kg	0.56	0.07	5	08/09/21 09:10	07/27/21	
Cadmium	200.8	<b>0.609</b>	mg/Kg	0.022	0.008	5	08/09/21 09:10	07/27/21	
Chromium	200.8	<b>83.7</b>	mg/Kg	0.22	0.07	5	08/09/21 09:10	07/27/21	
Copper	200.8	<b>47.7</b>	mg/Kg	0.11	0.04	5	08/09/21 09:10	07/27/21	
Lead	200.8	<b>3.04</b>	mg/Kg	0.056	0.022	5	08/09/21 09:10	07/27/21	
Mercury	7471B	<b>0.050</b>	mg/Kg	0.027	0.003	1	07/16/21 11:01	07/15/21	
Nickel	200.8	<b>58.3</b>	mg/Kg	0.22	0.03	5	08/09/21 09:10	07/27/21	
Selenium	200.8	<b>1.8</b>	mg/Kg	1.1	0.1	5	08/09/21 09:10	07/27/21	
Silver	200.8	<b>0.080</b>	mg/Kg	0.022	0.004	5	08/09/21 09:10	07/27/21	
Zinc	200.8	<b>117</b>	mg/Kg	0.56	0.22	5	08/09/21 09:10	07/27/21	

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Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Sample Name:** 2021KGMUSCS2  
**Lab Code:** K2108146-005

**Service Request:** K2108146  
**Date Collected:** 07/07/21 13:45  
**Date Received:** 07/14/21 09:00

**Basis:** Dry

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	<b>13700</b>	mg/Kg	21	6	50	08/09/21 13:17	07/27/21	
Arsenic	200.8	<b>13.5</b>	mg/Kg	0.52	0.06	5	08/09/21 09:13	07/27/21	
Cadmium	200.8	<b>0.611</b>	mg/Kg	0.021	0.007	5	08/09/21 09:13	07/27/21	
Chromium	200.8	<b>71.1</b>	mg/Kg	0.21	0.06	5	08/09/21 09:13	07/27/21	
Copper	200.8	<b>44.7</b>	mg/Kg	0.10	0.04	5	08/09/21 09:13	07/27/21	
Lead	200.8	<b>3.75</b>	mg/Kg	0.052	0.021	5	08/09/21 09:13	07/27/21	
Mercury	7471B	<b>0.049</b>	mg/Kg	0.029	0.003	1	07/16/21 11:03	07/15/21	
Nickel	200.8	<b>53.9</b>	mg/Kg	0.21	0.03	5	08/09/21 09:13	07/27/21	
Selenium	200.8	<b>1.8</b>	mg/Kg	1.0	0.09	5	08/09/21 09:13	07/27/21	
Silver	200.8	<b>0.076</b>	mg/Kg	0.021	0.004	5	08/09/21 09:13	07/27/21	
Zinc	200.8	<b>118</b>	mg/Kg	0.52	0.21	5	08/09/21 09:13	07/27/21	

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Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Sample Name:** 2021KGMUSCS3  
**Lab Code:** K2108146-006

**Service Request:** K2108146  
**Date Collected:** 07/07/21 13:45  
**Date Received:** 07/14/21 09:00

**Basis:** Dry

**Total Metals**

<b>Analyte Name</b>	<b>Analysis Method</b>	<b>Result</b>	<b>Units</b>	<b>MRL</b>	<b>MDL</b>	<b>Dil.</b>	<b>Date Analyzed</b>	<b>Date Extracted</b>	<b>Q</b>
Aluminum	200.8	<b>15200</b>	mg/Kg	2.5	0.7	5	08/09/21 09:15	07/27/21	
Arsenic	200.8	<b>19.2</b>	mg/Kg	0.62	0.07	5	08/09/21 09:15	07/27/21	
Cadmium	200.8	<b>0.730</b>	mg/Kg	0.025	0.009	5	08/09/21 09:15	07/27/21	
Chromium	200.8	<b>84.1</b>	mg/Kg	0.25	0.07	5	08/09/21 09:15	07/27/21	
Copper	200.8	<b>57.1</b>	mg/Kg	0.12	0.05	5	08/09/21 09:15	07/27/21	
Lead	200.8	<b>3.94</b>	mg/Kg	0.062	0.025	5	08/09/21 09:15	07/27/21	
Mercury	7471B	<b>0.051</b>	mg/Kg	0.027	0.003	1	07/16/21 11:04	07/15/21	
Nickel	200.8	<b>63.7</b>	mg/Kg	0.25	0.04	5	08/09/21 09:15	07/27/21	
Selenium	200.8	<b>2.2</b>	mg/Kg	1.2	0.1	5	08/09/21 09:15	07/27/21	
Silver	200.8	<b>0.100</b>	mg/Kg	0.025	0.005	5	08/09/21 09:15	07/27/21	
Zinc	200.8	<b>131</b>	mg/Kg	0.62	0.25	5	08/09/21 09:15	07/27/21	

**ALS Group USA, Corp.**  
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Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Sample Name:** Method Blank  
**Lab Code:** KQ2113133-03

**Service Request:** K2108146  
**Date Collected:** NA  
**Date Received:** NA  
**Basis:** Dry

**Total Metals**

<b>Analyte Name</b>	<b>Analysis Method</b>	<b>Result</b>	<b>Units</b>	<b>MRL</b>	<b>MDL</b>	<b>Dil.</b>	<b>Date Analyzed</b>	<b>Date Extracted</b>	<b>Q</b>
Aluminum	200.8	ND U	mg/Kg	2.0	0.6	5	08/09/21 08:53	07/27/21	
Arsenic	200.8	ND U	mg/Kg	0.5	0.06	5	08/09/21 08:53	07/27/21	
Cadmium	200.8	ND U	mg/Kg	0.020	0.007	5	08/09/21 08:53	07/27/21	
Chromium	200.8	ND U	mg/Kg	0.20	0.06	5	08/09/21 08:53	07/27/21	
Copper	200.8	ND U	mg/Kg	0.10	0.04	5	08/09/21 08:53	07/27/21	
Lead	200.8	ND U	mg/Kg	0.05	0.020	5	08/09/21 08:53	07/27/21	
Nickel	200.8	ND U	mg/Kg	0.20	0.03	5	08/09/21 08:53	07/27/21	
Selenium	200.8	ND U	mg/Kg	1.0	0.09	5	08/09/21 08:53	07/27/21	
Silver	200.8	ND U	mg/Kg	0.020	0.004	5	08/09/21 08:53	07/27/21	
Zinc	200.8	ND U	mg/Kg	0.5	0.20	5	08/09/21 08:53	07/27/21	



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Analytical Report

**Client:** Alaska Department of Fish and Game  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil  
**Sample Name:** Method Blank  
**Lab Code:** KQ2113132-03

**Service Request:** K2108146  
**Date Collected:** NA  
**Date Received:** NA  
**Basis:** Dry

Total Metals

<b>Analyte Name</b>	<b>Analysis Method</b>	<b>Result</b>	<b>Units</b>	<b>MRL</b>	<b>MDL</b>	<b>Dil.</b>	<b>Date Analyzed</b>	<b>Date Extracted</b>	<b>Q</b>
Mercury	7471B	ND U	mg/Kg	0.02	0.002	1	07/16/21 10:38	07/15/21	

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QA/QC Report

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

**Service Request:** K2108146  
**Date Collected:** 07/07/21  
**Date Received:** 07/14/21  
**Date Analyzed:** 08/09/21

**Replicate Sample Summary**  
**Total Metals**

**Sample Name:** 2021KGMLSCS1  
**Lab Code:** K2108146-001

**Units:** mg/Kg  
**Basis:** Dry

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample	Average	RPD	RPD Limit
					KQ2113133-01 Result			
Aluminum	200.8	4.6	1.4	10600	10600	10600	<1	30
Arsenic	200.8	1.1	0.1	14.6	10.9	12.8	29	30
Cadmium	200.8	0.046	0.016	0.636	0.523	0.580	20	30
Chromium	200.8	0.46	0.14	18.1	16.1	17.1	11	30
Copper	200.8	0.23	0.09	46.5	33.3	39.9	33 *	30
Lead	200.8	0.11	0.05	7.79	5.97	6.88	27	30
Nickel	200.8	0.46	0.07	31.4	33.0	32.2	5	30
Selenium	200.8	2.3	0.2	1.0 J	0.7 J	0.9	41 #	30
Silver	200.8	0.046	0.009	0.085	0.061	0.073	33 #	30
Zinc	200.8	1.1	0.5	129	119	124	7	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  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil

**Service Request:** K2108146  
**Date Collected:** 07/07/21  
**Date Received:** 07/14/21  
**Date Analyzed:** 07/16/21

Replicate Sample Summary

Total Metals

**Sample Name:** 2021KGMLSCS1  
**Lab Code:** K2108146-001

**Units:** mg/Kg  
**Basis:** Dry

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate	Average	RPD	RPD Limit
					Sample KQ2113132-01 Result			
Mercury	7471B	0.024	0.002	0.060	0.055	0.058	9	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  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil

**Service Request:** K2108146  
**Date Collected:** 07/07/21  
**Date Received:** 07/14/21  
**Date Analyzed:** 08/9/21  
**Date Extracted:** 07/27/21

**Matrix Spike Summary**  
**Total Metals**

**Sample Name:** 2021KGMLSCS1  
**Lab Code:** K2108146-001  
**Analysis Method:** 200.8  
**Prep Method:** EPA 3050B

**Units:** mg/Kg  
**Basis:** Dry

**Matrix Spike**  
KQ2113133-02

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Aluminum	10600	9770	444	-194 #	70-130
Arsenic	14.6	126	111	101	70-130
Cadmium	0.636	11.3	11.1	97	70-130
Chromium	18.1	58.3	44.4	91	70-130
Copper	46.5	90.3	55.5	79	70-130
Lead	7.79	119	111	100	70-130
Nickel	31.4	138	111	96	70-130
Selenium	1.0 J	110	111	98	70-130
Silver	0.085	10.2	11.1	91	70-130
Zinc	129	219	111	82	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  
**Project:** Coeur AK Biomonitoring  
**Sample Matrix:** Soil

**Service Request:** K2108146  
**Date Collected:** 07/07/21  
**Date Received:** 07/14/21  
**Date Analyzed:** 07/16/21  
**Date Extracted:** 07/15/21

**Matrix Spike Summary**  
**Total Metals**

**Sample Name:** 2021KGMLSCS1  
**Lab Code:** K2108146-001  
**Analysis Method:** 7471B  
**Prep Method:** Method

**Units:** mg/Kg  
**Basis:** Dry

**Matrix Spike**  
KQ2113132-02

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Mercury	0.060	0.770	0.662	107	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:** Soil

**Service Request:** K2108146  
**Date Analyzed:** 08/09/21

**Lab Control Sample Summary**  
**Total Metals**

**Units:**mg/Kg  
**Basis:**Dry

**Lab Control Sample**  
KQ2113133-04

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Aluminum	200.8	6530	10100	65	41-122
Arsenic	200.8	153	178	86	64-119
Cadmium	200.8	145	151	96	67-111
Chromium	200.8	112	126	89	65-121
Copper	200.8	135	151	89	71-118
Lead	200.8	69.1	76.1	91	70-134
Nickel	200.8	83.6	89.2	94	63-117
Selenium	200.8	169	189	89	62-121
Silver	200.8	23.0	25.6	90	65-129
Zinc	200.8	299	335	89	65-121

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QA/QC Report

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

**Service Request:** K2108146  
**Date Analyzed:** 07/16/21

**Lab Control Sample Summary**  
**Total Metals**

**Units:**mg/Kg  
**Basis:**Dry

**Lab Control Sample**  
KQ2113132-04

<b>Analyte Name</b>	<b>Analytical Method</b>	<b>Result</b>	<b>Spike Amount</b>	<b>% Rec</b>	<b>% Rec Limits</b>
Mercury	7471B	20.2	26.6	76	41-110

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Prep Summary Report

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

**Service Request:** K2108146

**Metals**

**Prep Method:** EPA 3050B  
**Analytical Method:** 200.8

**Extraction Lot:** 383241  
**Extraction Date:** 07/27/21 07:56

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Amount	Percent Solids
2021KGMLSCS1	K2108146-001	7/7/21	7/14/21	1.029 g	100 mL	
2021KGMLSCS2	K2108146-002	7/7/21	7/14/21	1.098 g	100 mL	
2021KGMLSCS3	K2108146-003	7/7/21	7/14/21	1.072 g	100 mL	
2021KGMUSCS1	K2108146-004	7/7/21	7/14/21	1.314 g	100 mL	
2021KGMUSCS2	K2108146-005	7/7/21	7/14/21	1.430 g	100 mL	
2021KGMUSCS3	K2108146-006	7/7/21	7/14/21	1.275 g	100 mL	
Duplicate	KQ2113133-01DUP	7/7/21	7/14/21	0.585 g	100 mL	
Matrix Spike	KQ2113133-02MS	7/7/21	7/14/21	1.206 g	100 mL	
Method Blank	KQ2113133-03MB	NA	NA	1 g	100 mL	
Lab Control Sample	KQ2113133-04LCS	NA	NA	1.0100 g	100 mL	



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Prep Summary Report

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

**Service Request:**K2108146

**Metals**

**Prep Method:** Method  
**Analytical Method:** 7471B

**Extraction Lot:** 383240  
**Extraction Date:** 07/15/21 10:05

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Amount	Percent Solids
2021KGMLSCS1	K2108146-001	7/7/21	7/14/21	0.550 g	50 mL	
2021KGMLSCS2	K2108146-002	7/7/21	7/14/21	0.523 g	50 mL	
2021KGMLSCS3	K2108146-003	7/7/21	7/14/21	0.526 g	50 mL	
2021KGMUSCS1	K2108146-004	7/7/21	7/14/21	0.536 g	50 mL	
2021KGMUSCS2	K2108146-005	7/7/21	7/14/21	0.507 g	50 mL	
2021KGMUSCS3	K2108146-006	7/7/21	7/14/21	0.585 g	50 mL	
Duplicate	KQ2113132-01DUP	7/7/21	7/14/21	0.562 g	50 mL	
Matrix Spike	KQ2113132-02MS	7/7/21	7/14/21	0.505 g	50 mL	
Method Blank	KQ2113132-03MB	NA	NA	0.5 g	50 mL	
Lab Control Sample	KQ2113132-04LCS	NA	NA	0.2520 g	50 mL	

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

**Service Request:** K2108146

**INITIAL AND CONTINUING CALIBRATION VERIFICATION**

Concentration Units: ug/L

Sample ID	Analyte	Method	Analysis Batch:	Result	True Value	% Rec	% Rec. Limits
ICV 07/16/21 09:20	Mercury	7471B	731343	4.60	5.00	92	90-110
CCV 07/16/21 09:25	Mercury	7471B	731343	5.13	5.00	103	90-110
CCV 07/16/21 09:48	Mercury	7471B	731343	5.18	5.00	104	90-110
CCV 07/16/21 10:29	Mercury	7471B	731343	5.13	5.00	103	90-110
CCV 07/16/21 10:55	Mercury	7471B	731343	5.24	5.00	105	90-110
CCV 07/16/21 11:14	Mercury	7471B	731343	5.30	5.00	106	90-110
ICV 08/09/21 08:37	Aluminum	200.8	734194	97.4	100	97	90-110
	Arsenic	200.8	734194	24.0	25.0	96	90-110
	Cadmium	200.8	734194	12.1	12.5	97	90-110
	Chromium	200.8	734194	9.52	10.0	95	90-110
	Copper	200.8	734194	12.0	12.5	96	90-110
	Lead	200.8	734194	23.9	25.0	95	90-110
	Nickel	200.8	734194	24.0	25.0	96	90-110
	Selenium	200.8	734194	24.1	25.0	96	90-110
	Silver	200.8	734194	11.9	12.5	95	90-110
	Zinc	200.8	734194	24.2	25.0	97	90-110
CCV 08/09/21 08:40	Aluminum	200.8	734194	251	250	100	90-110
	Arsenic	200.8	734194	24.9	25.0	100	90-110
	Cadmium	200.8	734194	24.9	25.0	100	90-110
	Chromium	200.8	734194	24.8	25.0	99	90-110
	Copper	200.8	734194	25.0	25.0	100	90-110
	Lead	200.8	734194	24.4	25.0	98	90-110
	Nickel	200.8	734194	24.8	25.0	99	90-110
	Selenium	200.8	734194	24.9	25.0	100	90-110
	Silver	200.8	734194	12.5	12.5	100	90-110
	Zinc	200.8	734194	24.7	25.0	99	90-110
CCV 08/09/21 09:18	Aluminum	200.8	734194	255	250	102	90-110
	Arsenic	200.8	734194	25.1	25.0	100	90-110

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

**Service Request:** K2108146

**INITIAL AND CONTINUING CALIBRATION VERIFICATION**

Concentration Units: ug/L

Sample ID	Analyte	Method	Analysis Batch:	Result	True Value	% Rec	% Rec. Limits
CCV	08/09/21 09:18						
	Cadmium	200.8	734194	24.7	25.0	99	90-110
	Chromium	200.8	734194	25.2	25.0	101	90-110
	Copper	200.8	734194	25.1	25.0	101	90-110
	Lead	200.8	734194	23.9	25.0	96	90-110
	Nickel	200.8	734194	25.3	25.0	101	90-110
	Selenium	200.8	734194	24.4	25.0	98	90-110
	Silver	200.8	734194	12.3	12.5	99	90-110
	Zinc	200.8	734194	24.8	25.0	99	90-110
ICV	08/09/21 13:03						
	Aluminum	200.8	734276	104	100	104	90-110
CCV	08/09/21 13:05						
	Aluminum	200.8	734276	250	250	100	90-110
CCV	08/09/21 13:19						
	Aluminum	200.8	734276	256	250	102	90-110

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QA/QC Report

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

**Service Request:** K2108146

**INITIAL AND CONTINUING CALIBRATION BLANKS**

**Concentration Units:** ug/L

Sample ID	Analyte	Method	Analysis Batch:	Result	C
ICB 07/16/21 09:22	Mercury	7471B	731343	0.02	U
CCB 07/16/21 09:26	Mercury	7471B	731343	0.02	U
CCB 07/16/21 09:50	Mercury	7471B	731343	0.02	U
CCB 07/16/21 10:30	Mercury	7471B	731343	0.02	U
CCB 07/16/21 10:56	Mercury	7471B	731343	0.02	U
CCB 07/16/21 11:16	Mercury	7471B	731343	0.02	U
ICB 08/09/21 08:42	Aluminum	200.8	734194	1.2	U
	Arsenic	200.8	734194	0.1	U
	Cadmium	200.8	734194	0.014	U
	Chromium	200.8	734194	0.12	U
	Copper	200.8	734194	0.08	U
	Lead	200.8	734194	0.04	U
	Nickel	200.8	734194	0.06	U
	Selenium	200.8	734194	0.2	U
	Silver	200.8	734194	0.008	U
	Zinc	200.8	734194	0.4	U
CCB 08/09/21 08:45	Aluminum	200.8	734194	1.2	U
	Arsenic	200.8	734194	0.1	U
	Cadmium	200.8	734194	0.014	U
	Chromium	200.8	734194	0.12	U
	Copper	200.8	734194	0.08	U
	Lead	200.8	734194	0.04	U
	Nickel	200.8	734194	0.06	U
	Selenium	200.8	734194	0.2	U
	Silver	200.8	734194	0.008	U
	Zinc	200.8	734194	0.4	U
CCB 08/09/21 09:20	Aluminum	200.8	734194	1.2	U
	Arsenic	200.8	734194	0.1	U

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

**Service Request:** K2108146

**INITIAL AND CONTINUING CALIBRATION BLANKS**

**Concentration Units:** ug/L

<b>Sample ID</b>	<b>Analyte</b>	<b>Method</b>	<b>Analysis Batch:</b>	<b>Result</b>	<b>C</b>
CCB 08/09/21 09:20	Cadmium	200.8	734194	0.014	U
	Chromium	200.8	734194	0.12	U
	Copper	200.8	734194	0.08	U
	Lead	200.8	734194	0.04	U
	Nickel	200.8	734194	0.06	U
	Selenium	200.8	734194	0.2	U
	Silver	200.8	734194	0.008	U
	Zinc	200.8	734194	0.4	U
ICB 08/09/21 13:07	Aluminum	200.8	734276	1.2	U
CCB 08/09/21 13:09	Aluminum	200.8	734276	1.2	U
CCB 08/09/21 13:21	Aluminum	200.8	734276	1.2	U

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

**Service Request:** K2108146

**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
LLICV	Mercury	7471B	731343	0.19	0.2	95	50-150	07/16/21 09:23
LLICVS	Aluminum	200.8	734194	4.0	4.0	99	50-199	08/09/21 08:48
	Arsenic	200.8	734194	0.98	1.0	98	50-199	08/09/21 08:48
	Cadmium	200.8	734194	0.037	0.04	92	50-199	08/09/21 08:48
	Chromium	200.8	734194	0.38	0.4	94	50-199	08/09/21 08:48
	Copper	200.8	734194	0.18	0.2	92	50-199	08/09/21 08:48
	Lead	200.8	734194	0.088	0.1	88	50-199	08/09/21 08:48
	Nickel	200.8	734194	0.37	0.4	91	50-199	08/09/21 08:48
	Selenium	200.8	734194	1.9	2.0	96	50-199	08/09/21 08:48
	Silver	200.8	734194	0.037	0.04	93	50-199	08/09/21 08:48
	Zinc	200.8	734194	1.0	1.0	102	50-199	08/09/21 08:48
LLICVS	Aluminum	200.8	734276	4.0	4.0	101	50-199	08/09/21 13:11

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

**Service Request:** K2108146

**POST SPIKE SAMPLE RECOVERY**

Concentration Units: ppb

Sample ID	Analyte	Method	Analysis Batch:	Initial Sample Result	Post Spike Result	True Value	% Rec	% Rec. Limits	Analysis Date
K2108146-001A	Mercury	7471B	731343	0.49	6.12	5.00	113	80-120	07/16/21 10:51

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

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

**Service Request:** K2108146

**Detection Limits**

**Instrument:** K-CVAA-02

**Matrix:** Soil

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



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QA/QC Report

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

**Service Request:** K2108146

**Detection Limits**

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

**Matrix:** Soil

<b>Analyte</b>	<b>Mass</b>	<b>Units</b>	<b>MRL</b>	<b>MDL</b>	<b>Method</b>
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

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

**Service Request:** K2108146

**ICP Linear Range (Quarterly)**

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

<b>Analyte</b>	<b>Concentration (ug/L)</b>	<b>Method</b>
Aluminum 27	45000	200.8
Arsenic 75	3000	200.8
Cadmium 111	3000	200.8
Chromium 52	3000	200.8
Copper 65	3000	200.8
Lead 208	3000	200.8
Nickel 60	3000	200.8
Selenium 78	3000	200.8
Silver 107	180	200.8
Zinc 66	3000	200.8

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

**Service Request:** K2108146

**Analysis Run Log**

**Instrument ID:** K-CVAA-02

**Analytical BatchID:** 731343

Sample	Dilution Factor	Date/Time	H g
ZZZZZZ	1	07/16/21 09:06	
ZZZZZZ	1	07/16/21 09:07	
ZZZZZZ	1	07/16/21 09:09	
ZZZZZZ	1	07/16/21 09:13	
ZZZZZZ	1	07/16/21 09:14	
ZZZZZZ	1	07/16/21 09:18	
ICV1	1	07/16/21 09:20	X
ICB1	1	07/16/21 09:22	X
LLICV1	1	07/16/21 09:23	X
CCV1	1	07/16/21 09:25	X
CCB1	1	07/16/21 09:26	X
ZZZZZZ	1	07/16/21 09:28	
ZZZZZZ	25	07/16/21 09:30	
ZZZZZZ	1	07/16/21 09:31	
ZZZZZZ	1	07/16/21 09:33	
ZZZZZZ	1	07/16/21 09:34	
ZZZZZZ	1	07/16/21 09:36	
ZZZZZZ	1	07/16/21 09:38	
ZZZZZZ	1	07/16/21 09:39	
ZZZZZZ	1	07/16/21 09:41	
ZZZZZZ	1	07/16/21 09:43	
CCV2	1	07/16/21 09:48	X
CCB2	1	07/16/21 09:50	X
ZZZZZZ	1	07/16/21 09:51	
ZZZZZZ	1	07/16/21 09:53	
ZZZZZZ	1	07/16/21 09:55	
ZZZZZZ	1	07/16/21 09:56	
ZZZZZZ	1	07/16/21 09:58	
ZZZZZZ	1	07/16/21 10:00	
ZZZZZZ	1	07/16/21 10:01	
ZZZZZZ	1	07/16/21 10:03	
ZZZZZZ	1	07/16/21 10:04	
ZZZZZZ	1	07/16/21 10:06	
ZZZZZZ	1	07/16/21 10:08	
CCV3	1	07/16/21 10:29	X
CCB3	1	07/16/21 10:30	X
ZZZZZZ	1	07/16/21 10:32	

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

**Service Request:** K2108146

**Analysis Run Log**

**Instrument ID:** K-CVAA-02

**Analytical BatchID:** 731343

Sample	Dilution Factor	Date/Time	H g
ZZZZZZ	1	07/16/21 10:34	
ZZZZZZ	1	07/16/21 10:35	
ZZZZZZ	1	07/16/21 10:37	
KQ2113132-03MB	1	07/16/21 10:38	X
KQ2113132-04LCS1	25	07/16/21 10:45	X
K2108146-001	1	07/16/21 10:46	X
K2108146-001DUP	1	07/16/21 10:48	X
K2108146-001MS	1	07/16/21 10:50	X
K2108146-001PS	1	07/16/21 10:51	X
CCV4	1	07/16/21 10:55	X
CCB4	1	07/16/21 10:56	X
K2108146-002	1	07/16/21 10:58	X
K2108146-003	1	07/16/21 10:59	X
K2108146-004	1	07/16/21 11:01	X
K2108146-005	1	07/16/21 11:03	X
K2108146-006	1	07/16/21 11:04	X
ZZZZZZ	1	07/16/21 11:06	
ZZZZZZ	1	07/16/21 11:08	
ZZZZZZ	1	07/16/21 11:09	
ZZZZZZ	1	07/16/21 11:11	
ZZZZZZ	1	07/16/21 11:12	
CCV5	1	07/16/21 11:14	X
CCB5	1	07/16/21 11:16	X
ZZZZZZ	1	07/16/21 11:17	
ZZZZZZ	1	07/16/21 11:19	
ZZZZZZ	1	07/16/21 11:21	
ZZZZZZ	1	07/16/21 11:22	
ZZZZZZ	1	07/16/21 11:24	
ZZZZZZ	1	07/16/21 11:25	
ZZZZZZ	1	07/16/21 11:27	
ZZZZZZ	1	07/16/21 11:29	
ZZZZZZ	1	07/16/21 11:30	
ZZZZZZ	1	07/16/21 11:32	
ZZZZZZ	1	07/16/21 11:36	
ZZZZZZ	1	07/16/21 11:38	
ZZZZZZ	1	07/16/21 11:39	
ZZZZZZ	1	07/16/21 11:41	

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QA/QC Report

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

**Service Request:** K2108146

**Analysis Run Log**

**Instrument ID:** K-ICP-MS-05

**Analytical BatchID:** 734194

Sample	Dilution Factor	Date/Time	A l	A s	C d	C r	C u	P b	N i	S e	A g	Z n
ZZZZZZ	1	08/09/21 08:31										
ZZZZZZ	1	08/09/21 08:34										
ICV	1	08/09/21 08:37	X	X	X	X	X	X	X	X	X	X
CCV	1	08/09/21 08:40	X	X	X	X	X	X	X	X	X	X
ICB	1	08/09/21 08:42	X	X	X	X	X	X	X	X	X	X
CCB	1	08/09/21 08:45	X	X	X	X	X	X	X	X	X	X
LLICVS	1	08/09/21 08:48	X	X	X	X	X	X	X	X	X	X
ZZZZZZ	1	08/09/21 08:50										
KQ2113133-03MB	5	08/09/21 08:53	X	X	X	X	X	X	X	X	X	X
KQ2113133-04LCS1	20	08/09/21 08:55	X	X	X	X	X	X	X	X	X	X
K2108146-001	5	08/09/21 08:58	X	X	X	X	X	X	X	X	X	X
K2108146-001DUP	5	08/09/21 09:00	X	X	X	X	X	X	X	X	X	X
K2108146-001MS	5	08/09/21 09:03	X	X	X	X	X	X	X	X	X	X
K2108146-002	5	08/09/21 09:05	X	X	X	X	X	X	X	X	X	X
K2108146-003	5	08/09/21 09:08	X	X	X	X	X	X	X	X	X	X
K2108146-004	5	08/09/21 09:10	X	X	X	X	X	X	X	X	X	X
K2108146-005	5	08/09/21 09:13		X	X	X	X	X	X	X	X	X
K2108146-006	5	08/09/21 09:15	X	X	X	X	X	X	X	X	X	X
CCV	1	08/09/21 09:18	X	X	X	X	X	X	X	X	X	X
CCB	1	08/09/21 09:20	X	X	X	X	X	X	X	X	X	X

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

**Service Request:** K2108146

**Analysis Run Log**

**Instrument ID:** K-ICP-MS-05

**Analytical BatchID:** 734276

Sample	Dilution Factor	Date/Time	A I
ZZZZZZ	1	08/09/21 12:59	
ZZZZZZ	1	08/09/21 13:01	
ICV	1	08/09/21 13:03	X
CCV	1	08/09/21 13:05	X
ICB	1	08/09/21 13:07	X
CCB	1	08/09/21 13:09	X
LLICVS	1	08/09/21 13:11	X
ZZZZZZ	5	08/09/21 13:12	
K2108146-005	50	08/09/21 13:17	X
CCV	1	08/09/21 13:19	X
CCB	1	08/09/21 13:21	X

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

**Service Request:** K2108146

**ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY**

**Instrument ID:** K-ICP-MS-05

**Analytical BatchID:** 734194

Sample	Date/Time	Sc45NG	Ge72H2	Ge72He	In115He	Lu175He
ZZZZZZ	08/09/21 08:31					
ZZZZZZ	08/09/21 08:34					
ICV	08/09/21 08:37	100	104	102	99	100
CCV	08/09/21 08:40	101	103	103	100	102
ICB	08/09/21 08:42	104	103	103	101	104
CCB	08/09/21 08:45	105	101	101	102	102
LLICVS	08/09/21 08:48	100	103	100	99	98
ZZZZZZ	08/09/21 08:50					
KQ2113133-03MB	08/09/21 08:53	107	107	104	102	102
KQ2113133-04LCS1	08/09/21 08:55	100	106	104	98	100
K2108146-001	08/09/21 08:58	107	104	106	102	104
K2108146-001DUP	08/09/21 09:00	108	103	104	103	102
K2108146-001MS	08/09/21 09:03	114	107	107	104	104
K2108146-002	08/09/21 09:05	112	108	103	100	102
K2108146-003	08/09/21 09:08	110	102	107	103	102
K2108146-004	08/09/21 09:10	105	104	107	104	106
K2108146-005	08/09/21 09:13	132	112	108	105	104
K2108146-006	08/09/21 09:15	119	113	109	107	106
CCV	08/09/21 09:18	109	113	110	107	106
CCB	08/09/21 09:20	115	110	109	109	109

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

**Service Request:** K2108146

**ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY**

**Instrument ID:** K-ICP-MS-05

**Analytical BatchID:** 734276

<b>Sample</b>	<b>Date/Time</b>	<b>Sc45NG</b>
ZZZZZZ	08/09/21 12:59	
ZZZZZZ	08/09/21 13:01	
ICV	08/09/21 13:03	107
CCV	08/09/21 13:05	104
ICB	08/09/21 13:07	109
CCB	08/09/21 13:09	109
LLICVS	08/09/21 13:11	111
ZZZZZZ	08/09/21 13:12	
K2108146-005	08/09/21 13:17	108
CCV	08/09/21 13:19	104
CCB	08/09/21 13:21	105