Technical Report No. 21-03

Aquatic Studies at Kensington Gold Mine, 2020

by

William J. Kane

February 2021

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

Symbols and Abbreviations

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

Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Measures (fisheries)

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

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	E
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
no data	ND
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

TECHNICAL REPORT NO. 21-03

AQUATIC STUDIES AT KENSINGTON GOLD MINE, 2020

by

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This investigation was fully financed by Coeur Alaska, Inc.

Cover: Adult coho salmon (*Oncorhynchus kisutch*) observed in Lower Johnson Creek, October 29, 2020.

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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 Gold 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 (2021) reports the Juneau area experienced the fifth wettest year since records began in 1936, with annual precipitation (197 cm) about 25% above normal and snowfall (232 cm) about 6% above normal.

The summer 2020 mean chlorophyll *a* density among periphyton samples collected at Lower Slate Creek was lower than values observed 2011–2019 and the mean chlorophyll *a* densities at Lower Sherman Creek Sample Points 1 and 2 were greater than observed most previous years. 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 spring to continue monitoring for changes that may occur from the tailings treatment facility; in spring 2020, the mean chlorophyll *a* density at East Fork Slate Creek was greater than observed since 2012 and the mean chlorophyll *a* density at Lower Slate Creek was similar to values previously observed.

The spring 2020 mean benthic macroinvertebrate density was the lowest observed at the Upper Slate Creek and Upper Johnson Creek sampling sites and among the lowest observed at Lower Slate Creek and Lower Sherman Creek Sample Point 2; mean densities at other sampling sites were similar to results previously observed.

In 2020, we observed a weak pink salmon *Oncorhynchus gorbuscha* return in Lower Slate, Johnson, and Sherman Creeks—consistent with the trend of dominant odd-year returns observed in the Northern Southeast Inside Subregion since 2006 (Piston and Heinl 2018)—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 Gold Mine.

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

To investigate element concentration variability, we collected three sediment samples at each site in 2020; in previous years, we collected one sample at each site. Most element concentrations in the 2020 sediment samples were within the ranges observed at each site since 2011; however, at each site, concentrations of at least one element were below the range previously observed. In Lower Slate Creek, we observed the lowest concentrations of silver, aluminum, copper, lead, and zinc. In East Fork Slate Creek, we observed the lowest concentrations of aluminum, cadmium, chromium, copper, nickel, and lead. Arsenic, copper, nickel, and zinc concentrations at each site 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.

INTRODUCTION

The Kensington Gold 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 Gold 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.[a] 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).

Habitat Section staff completed the aquatic studies required for the Kensington Gold 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 2020 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.

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

Figure 1.–Kensington Gold Mine project area map.

AQUATIC STUDIES

We completed the Kensington Gold Mine aquatic studies required in the project Plan of Operations (Coeur 2005) and APDES Permit AK0050571 (Table 1).

Table 1.–Aquatic studies required by the Plan of Operations and APDES permit, 2020.

Location	Description	Aquatic Study	Frequency
Lower Slate Creek	1 km reach between the stream mouth in Slate Cove and a 25 m waterfall.	Chlorophyll density and composition Benthic macroinvertebrate density and composition Adult salmon counts Spawning substrate composition Sediment composition and element concentrations	1/year 1/year Seasonally 1/year 1/year
West Fork Slate Creek	A tributary to Lower Slate Creek, upstream of a waterfall and mine influence.	Chlorophyll density and composition Benthic macroinvertebrate density and composition	1/year 1/year
East Fork Slate Creek	A tributary to Lower Slate Creek, 1 km reach between the TTF dam plunge pool and waterfall at Lower Slate Creek.	Chlorophyll density and composition Benthic macroinvertebrate density and composition Sediment composition and element concentrations	1/year 1/year 1/year
Upper Slate Creek	A tributary to Upper Slate Lake and upstream of mine influence.	Chlorophyll density and composition Benthic macroinvertebrate density and composition Sediment composition and element concentrations	1/year 1/year 1/year
Lower Johnson Creek	1.5 km reach between the stream mouth in Berners Bay and a 30 m waterfall.	Adult salmon counts Sediment composition and element concentrations	Seasonally 1/year
Upper Johnson Creek	Upstream of Bridge #2 to the headwaters, adjacent to the upper camp and mill bench.	Benthic macroinvertebrate density and composition	1/year
Lower Sherman Creek	360 m reach between the stream mouth in Lynn Canal and a 15 m waterfall.	Chlorophyll density and composition Benthic macroinvertebrate density and composition Adult salmon counts Sediment composition and element concentrations	1/year 1/year Seasonally 1/year

STUDY AREA

Slate Creek Drainage

Slate Creek drains a 10.5 km^2 watershed into Slate Cove on the northwest side of Berners Bay (Coeur 2005; Figure 2). Two waterfalls at the confluence of the East and West Forks, about 1 km upstream of the mouth of Lower Slate Creek, prevent upstream fish migration. East Fork Slate Creek flows between the TTF dam plunge pool and the waterfall at Lower Slate Creek. Coeur operates the TTF in Lower Slate Lake and discharges TTF water treatment plant effluent (Outfall 002) [b] to East Fork Slate Creek. Upstream of the TTF, a concrete dam diverts water from Upper Slate Lake and adjacent drainages through a diversion pipeline and into East Fork Slate Creek at the TTF dam plunge pool, bypassing the TTF. Upper Slate Creek is an inlet stream to Upper Slate Lake.

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

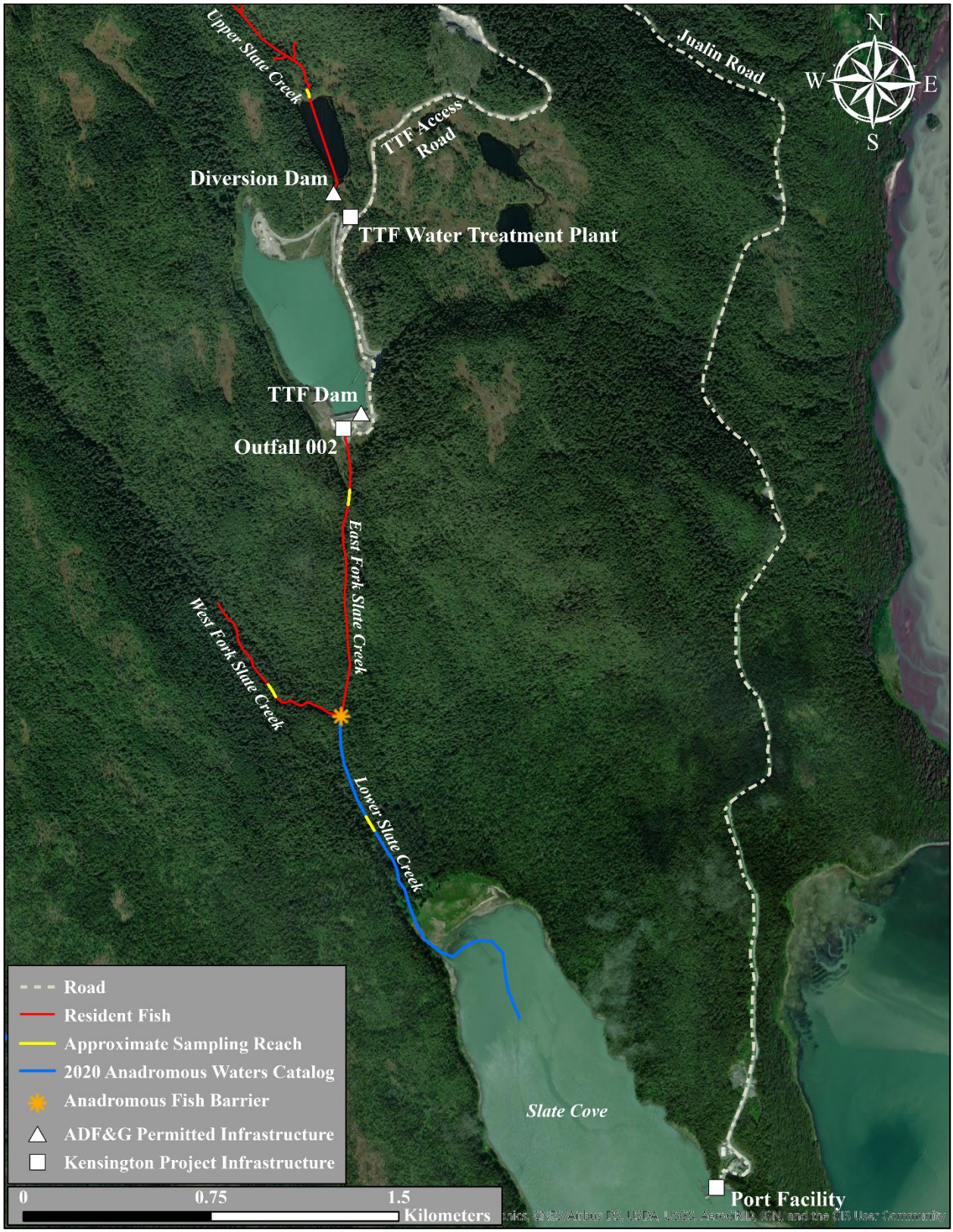

Figure 2.–Slate Creek map.

Lower Slate Creek

Lower Slate Creek provides spawning habitat for chum *O. keta*, coho *O. kisutch*, and pink salmon, and eulachon *Thaleichthys pacificus*, and rearing habitat for coho salmon (Stream No. 115-20-10030; Geifer and Blossom 2020). We also have documented juvenile Dolly Varden char *Salvelinus malma* and adult cutthroat trout *O. clarkii* in the system (Timothy and Kanouse 2012).

Lower Slate Creek is a mixture of water from the East and West Forks, Outfall 002, and Upper Slate Lake. We sample periphyton, BMIs, pink salmon spawning substrate, and sediment at Sample Point 1 (SP1; Figure 3) and pink salmon spawning substrate at Sample Point 2 (SP2; Figure 4)—both a moderate gradient (2–6%) mixed control channel type (Paustian 2010)—and count adult salmon throughout Lower Slate Creek.

Figure 3.–Lower Slate Creek at SP1, May 6, 2020.

Figure 4.–Lower Slate Creek at SP2, July 8, 2020.

West Fork Slate Creek

West Fork Slate Creek (Figure 5) provides habitat for Dolly Varden char (Timothy and Kanouse 2014) and is not influenced by mine activities. We sample periphyton and BMIs about 600 m upstream of the waterfall at Lower Slate Creek in a cobble-dominated moderate gradient mixed control channel (Paustian 2010).

Figure 5.–West Fork Slate Creek, May 4, 2020.

East Fork Slate Creek

East Fork Slate Creek (Figure 6) 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. East Fork Slate Creek discharge is dependent on Upper Slate Lake discharge, routed through the diversion pipeline bypassing the TTF, and Outfall 002 effluent discharge from the TTF water treatment plant.[c] We sample periphyton, BMIs, and sediments in East Fork Slate Creek within 200 m downstream of the TTF in a moderate gradient bedrock contained channel (Paustian 2010) where angular cobble substrate is dominant.

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

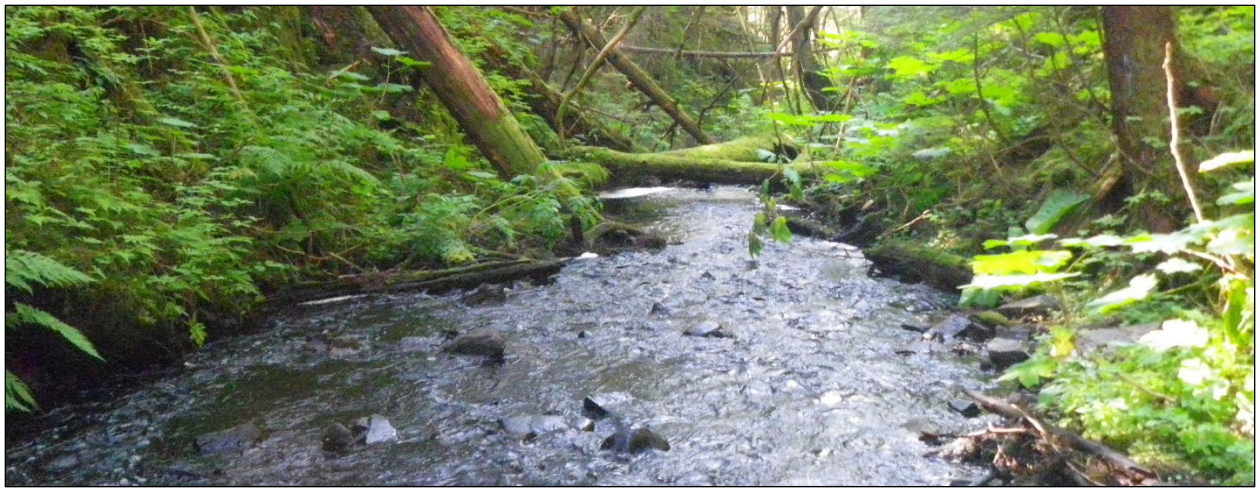

Figure 6.–East Fork Slate Creek, July 30, 2020.

Upper Slate Creek

Upper Slate Creek (Figure 7) provides habitat for Dolly Varden char (Albrecht 2018) and is not influenced by mine operations. 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 7.–Upper Slate Creek, May 5, 2020.

Johnson Creek Drainage

Johnson Creek drains a 14.6 km^2 watershed to the Lace River on the northwest shore of Berners Bay (Coeur 2005; Figure 8). A 30 m waterfall about 1.5 km upstream of the Lower Johnson Creek mouth prevents upstream fish migration. Middle Johnson Creek is the 2.5 km reach between the waterfall and Jualin Road Bridge #2. Upper Johnson Creek is the reach upstream of the Jualin Road Bridge #2 to the headwaters.

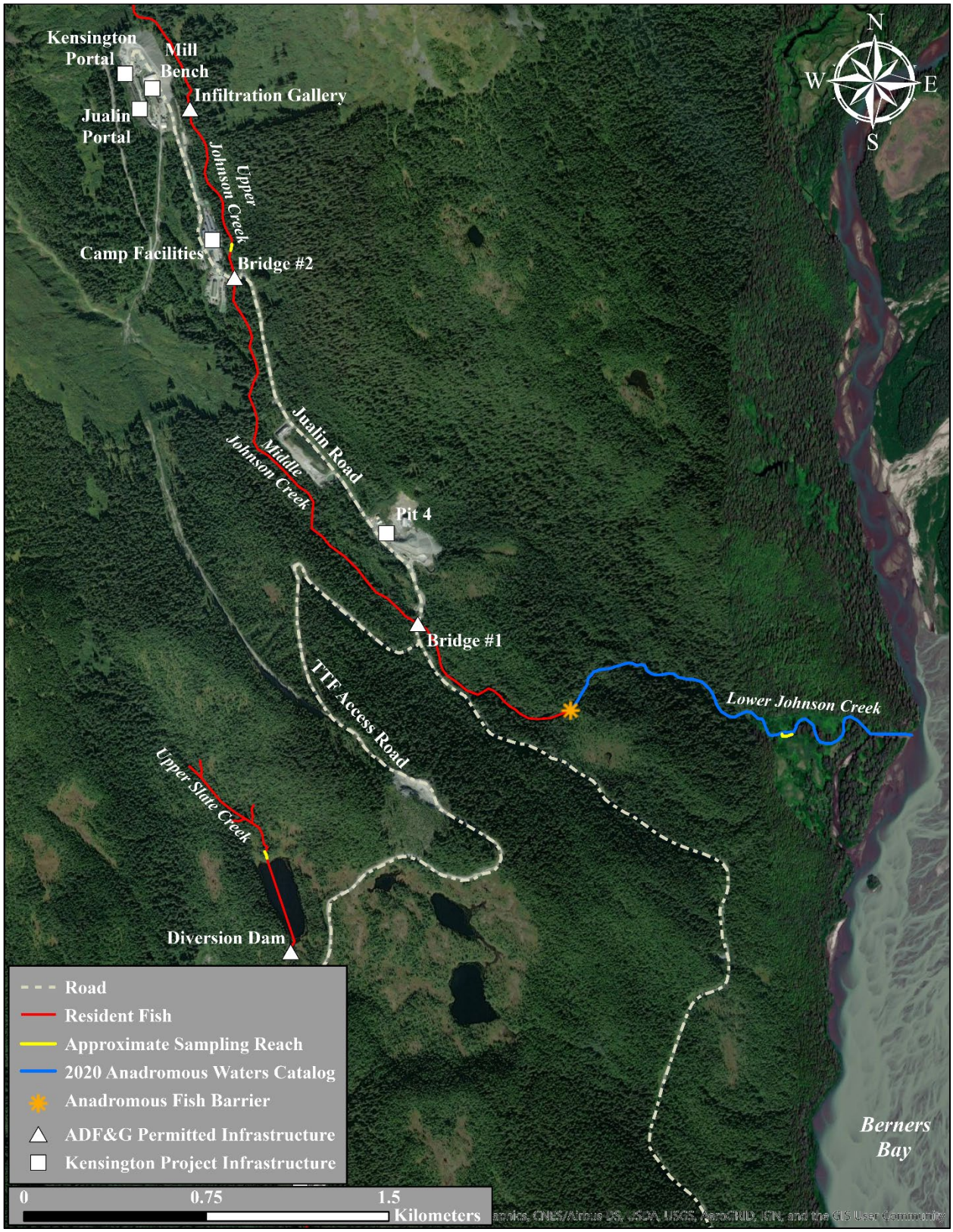

Figure 8.–Johnson Creek map.

Lower Johnson Creek

Lower Johnson Creek provides spawning habitat for chum, coho, and pink salmon, and rearing habitat for coho salmon (Stream No. 115-20-10030; Geifer and Blossom 2020). We also have documented Dolly Varden char and cutthroat trout in the system (Timothy and Kanouse 2012). Lower Johnson Creek is a mixture of drainages near and from mine infrastructure in Middle[d] and Upper Johnson Creeks. 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 9).

Figure 9.–Adult salmon survey in Lower Johnson Creek, October 29, 2020.

Upper Johnson Creek

Upper Johnson Creek provides habitat for Dolly Varden char (Timothy and Kanouse 2012) and flows adjacent to the camp facilities, mill bench, Kensington and Jualin portals, 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. We sample BMIs about 50 m upstream of the Jualin Road Bridge #2 (Figure 10) where the stream is a medium width mixed control channel (Paustian 2010) with boulder and cobble substrate.

Figure 10.–Benthic macroinvertebrate sample collection in Upper Johnson Creek, May 5, 2020.

[d] 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; aquatic studies are not required in Middle Johnson Creek.

Sherman Creek Drainage

Sherman Creek drains a 10.84 km^2 watershed to the east shore of Lynn Canal (Coeur 2005; Figure 11). A 15 m waterfall about 360 m upstream from the Lower Sherman Creek mouth prevents upstream fish migration. Middle Sherman Creek is the 2 km reach between the waterfall and the Comet Beach Road bridge. Upper Sherman Creek is the reach upstream of the bridge to the headwaters.

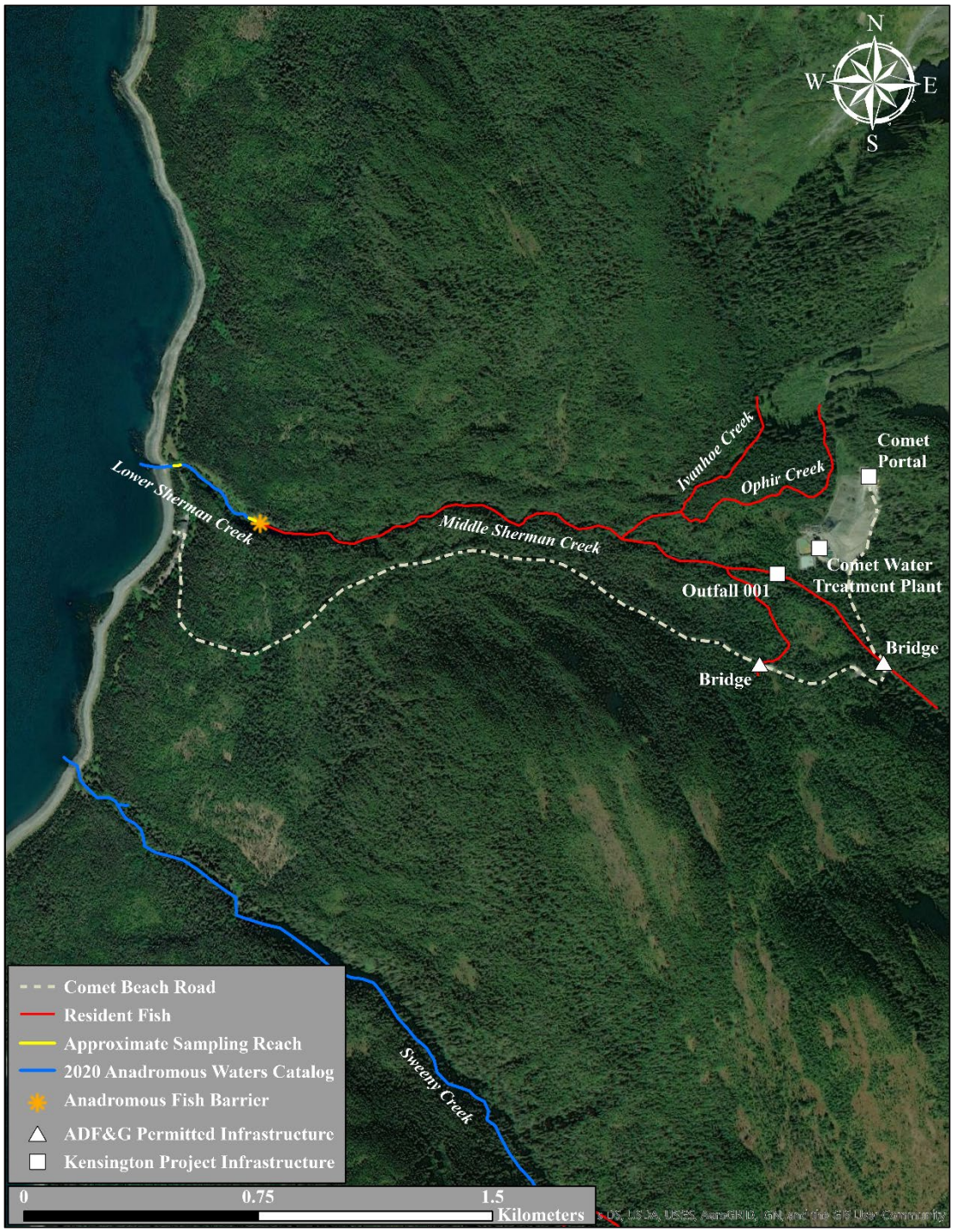

Figure 11.–Sherman Creek map.

Lower Sherman Creek

Lower Sherman Creek provides spawning habitat for chum and pink salmon (Stream No. 115-31-10330; Giefer and Blossom 2020). We also have documented Dolly Varden char in the system (Timothy and Kanouse 2012). Lower Sherman Creek is a mixture of drainages near and from mine infrastructure in Middle Sherman Creek[e] and its tributaries. We sample periphyton, BMIs, and sediment in a moderate gradient medium width mixed control channel (Paustian 2010) at Sample Point 1 (SP1; Figure 12), and periphyton and BMIs at Sample Point 2 (SP2; Figure 13), a similar channel type. We count adult salmon throughout Lower Sherman Creek.

Figure 12.–Lower Sherman Creek at SP1, July 29, 2020.

Figure 13.–Benthic macroinvertebrate sample collection in Lower Sherman Creek at SP2, May 4, 2020.

[e] Mine facilities 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 are not required in Middle or Upper Sherman Creeks.

SAMPLING SCHEDULE

In 2020, we collected data between May 4 and October 29 (Table 2).

Table 2.–Aquatic studies sampling schedule, 2020.

Aquatic Study	Lower Slate	West Fork Slate	East Fork Slate	Upper Slate	Lower Johnson	Upper Johnson	Lower Sherman
	5/6[a]	---	5/5[a]	---	---	---	---
Periphyton	7/29	7/29	7/30	7/30	---	---	7/29
Benthic macroinvertebrates	5/6	5/4	5/5	5/5	---	5/5	5/4
Adult salmon counts	7/22–10/29	---	---	---	7/22–10/29	---	7/24–8/25
Spawning substrate	7/8	---	---	---	---	---	---
concentrations	7/8	---	7/9	7/9	7/9	---	7/9

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

SAMPLING LOCATIONS

We recorded coordinates for each sample site (Table 3) and adult salmon count reach markers in Lower Slate Creek, Lower Johnson Creek, and Lower Sherman Creek (Tables 4–6).

Table 3.–Aquatic study sample sites, 2020.

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 4.–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 5.–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 6.–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 µm glass fiber filter was placed into a Nalgene® filter receptacle attached to a vacuum pump with a gauge. The foam square was removed and the underside of the foam and the sample area were gently scrubbed in a circular pattern with the toothbrush into the filter receptacle. Stream water in a wash bottle was used to rinse loosened periphyton from the foam, rock, toothbrush, and the inside of the filter receptacle onto the filter. The sample area was scrubbed a second time and the rinse cycle was repeated. With most of the water pumped through the filter, maintaining pressure less than 34 kPa, a few drops[f] of saturated magnesium carbonate solution was added to the filter[g]. After all the water was pumped through the glass fiber filter, it was removed from the receptacle, folded in half with the sample inside, and wrapped in a white coffee filter for additional moisture absorption. The samples were placed in a sealed, labeled plastic bag with desiccant and stored in a light-proof cooler containing frozen icepacks during transportation; samples were stored in a -20°C freezer in the ADF&G Douglas laboratory until processing.

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

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

Trichromatic equations were used to estimate Chl-*a*, Chl-*b*, and Chl-*c* concentrations, correcting for turbidity using the 750 nm absorbance value (APHA 2012, USEPA 1997). Chl-*a* concentrations were corrected when phaeophytin was detected. When Chl-*a* was not detected in a sample, the concentration is reported as the spectrophotometer estimated detection limit and the values for Chl-*b* or Chl-*c* were excluded. The 2020 estimated detection limit for Chl-*a* concentration was 0.25 mg/m^2.

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[f] This measurement is not exact as the amount of water and $MgCO_3$ used to create a saturated solution varies and does not affect sample integrity; supernatant solution was used to avoid $MgCO_3$ solids.

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

[h] 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 2020 are provided in Appendix A.

BENTHIC MACROINVERTEBRATE DENSITY AND COMMUNITY COMPOSITION

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

Requirement APDES 1.5.3.2

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

Sample Collection and Analysis

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

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

Contractor Matt Kern of Alder Grove Farm used an elutriator system and 0.5 mm and 0.3 mm sieves to sort macroinvertebrates from debris,[i] and identified organisms to the lowest practical taxonomic level[j] 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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[i] Gordon Willson-Naranjo and Greg Albrecht, Habitat Biologists, to Jackie Timothy, Southeast Regional Supervisor, ADF&G Division of Habitat. Memorandum: Benthic macroinvertebrate elutriation trials amendment; dated 12/17/2013. Unpublished document can be obtained from the Southeast Regional Supervisor, ADF&G Division of Habitat, 802 3rd Street, Douglas, AK.

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

BMI density (per m^2) for each sample was calculated by dividing the number of macroinvertebrates by 0.093 m^2—the Surber sampling area. Mean density was estimated for each site by calculating the mean density among the six samples. Taxa richness is reported as the number of taxonomic groups identified to the lowest practical level; terrestrial[k] 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.[l] 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 2020 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

Stream surveys were conducted by foot on Slate, Johnson, and Sherman Creeks downstream of fish migration barriers once per week between mid-July and late-August; adult pink and chum salmon and carcasses were enumerated. Slate and Johnson Creeks were also surveyed once per week from late-September through October to enumerate adult coho salmon and carcasses. To improve coho salmon observations, biologists conducted snorkel surveys and recorded underwater videos with a GoPro in large pools and around large woody debris—habitats where adult coho salmon tend to concentrate.

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

[l] Assuming all taxonomic groups are represented.

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 and; the 2011–2020 counts by species are presented in a table. Compiled 2020 data for each species by reach and the 2011–2020 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

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%.[m] The McNeil sampler was worked into the substrate until the sample core was buried, and sediments were transferred to the upper barrel portion of the sampler. Samples were wet-sieved onsite using sieve sizes 101.6, 50.8, 25.4, 12.7, 6.35, 1.68, 0.42, and 0.15 mm. The contents of each sieve were measured to the nearest 25 mL via volume of water displaced in 600 mL and 1 L plastic beakers; fines that passed through the 0.15 mm sieve were transferred to Imhoff cones and allowed to settle for 10 min; sediment volume was measured to the nearest 1 mL using cone gradations.

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

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

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

[m] Valentine, B. E. 2001. Unpublished. Stream substrate quality for salmonids: Guidelines for Sampling, Processing, and Analysis. California Department of Forestry and Fire Protection, Coast Cascade Regional Office, Santa Rosa, CA.

Data Presentation

Geometric mean particle sizes are presented in a table for the 2011–2020 data at each site. Annual data from 2011 through 2020 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 sampling of fine sediments in Lower Slate, East Fork Slate, Upper Slate, Lower Johnson, and Lower Sherman Creeks for particle size, total solids, total volatile solids, total sulfide, total organic carbon, and total concentrations of silver (Ag), aluminum (Al), arsenic (As) cadmium (Cd), chromium (Cr), copper (Cu), mercury (Hg), nickel (Ni), lead (Pb), selenium (Se), and zinc (Zn).

Sample Collection and Analysis

Wearing latex gloves, one sample of submerged sand and silt was collected at each site within actively flowing channels. For each sample, the top 4 cm of sediment was retained in three glass jars provided by the laboratory[n]; to preserve sulfide in the sample jar designated for sulfide analyses, 5–10 mL of zinc acetate was added immediately after sample collection.[o] 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 7).[p] 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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[n] In 2015, sieving sediments during collection was discontinued to avoid sample bias.

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

[p] 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 7.–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 2011–2020 and the 2020 laboratory report are provided in Appendix E.

RESULTS

SLATE CREEK

Lower Slate Creek

Periphyton: Chlorophyll Density and Composition

In 2020, the Lower Slate Creek mean chlorophyll *a* density was lower than observed 2011–2019 (Table 8; Figure 14). The mean proportions of chlorophylls *a*, *b*, and *c* were similar to previous years (Figure 15).

Table 8.–Lower Slate Creek mean chlorophylls *a*, *b*, and *c* densities, 2011–2020.

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

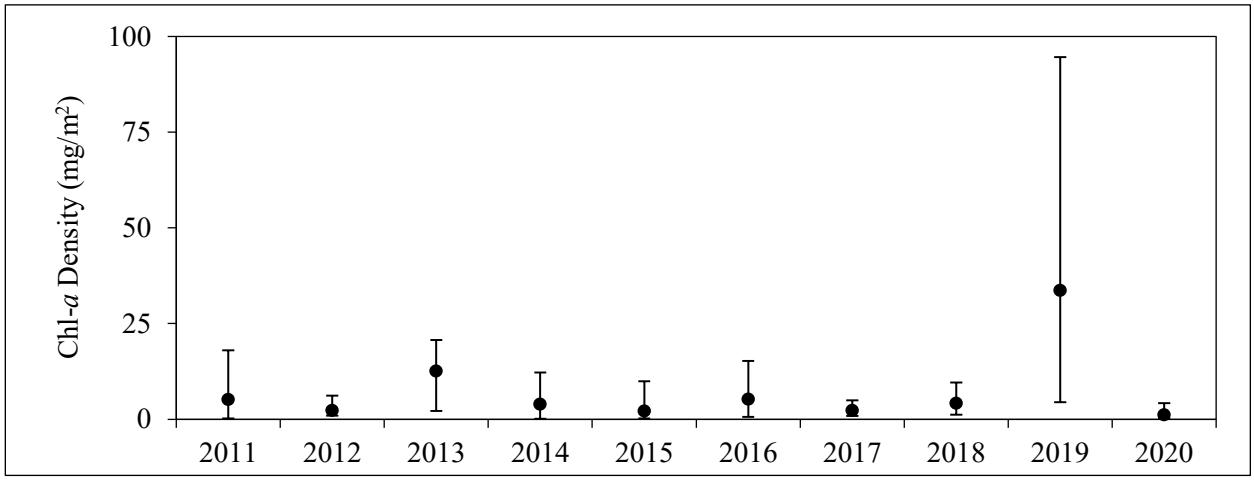

Figure 14.–Lower Slate Creek mean chlorophyll *a* densities, 2011–2020.
Note: Minimum, mean, and maximum values.

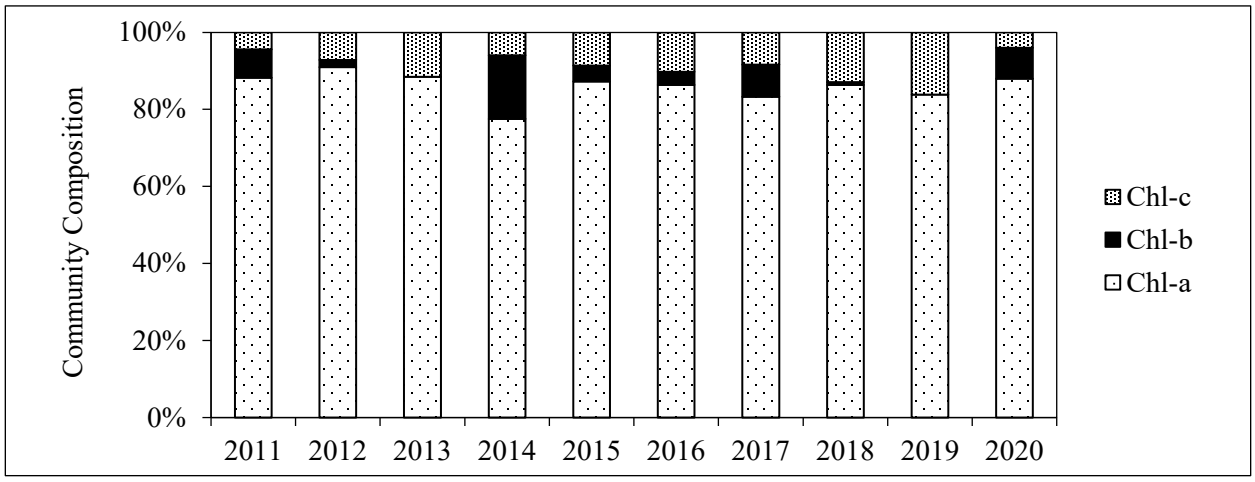

Figure 15.–Lower Slate Creek mean proportions of chlorophylls *a*, *b*, and *c*, 2011–2020.

Benthic Macroinvertebrate Density and Community Composition

Among the 2020 Lower Slate Creek BMI samples, we identified 24 taxa and estimate mean density at 1,208 BMI/m^2 (Table 9; Figure 16). Since 2017, the annual estimated mean BMI density was lower than observed 2011–2016 and the 2020 mean Shannon Diversity score was among the lowest observed since 2011. The dominant taxon was Diptera: Chironomidae (nonbiting midges), composing 57% of the samples.

Table 9.–Lower Slate Creek BMI data summaries, 2011–2020.

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

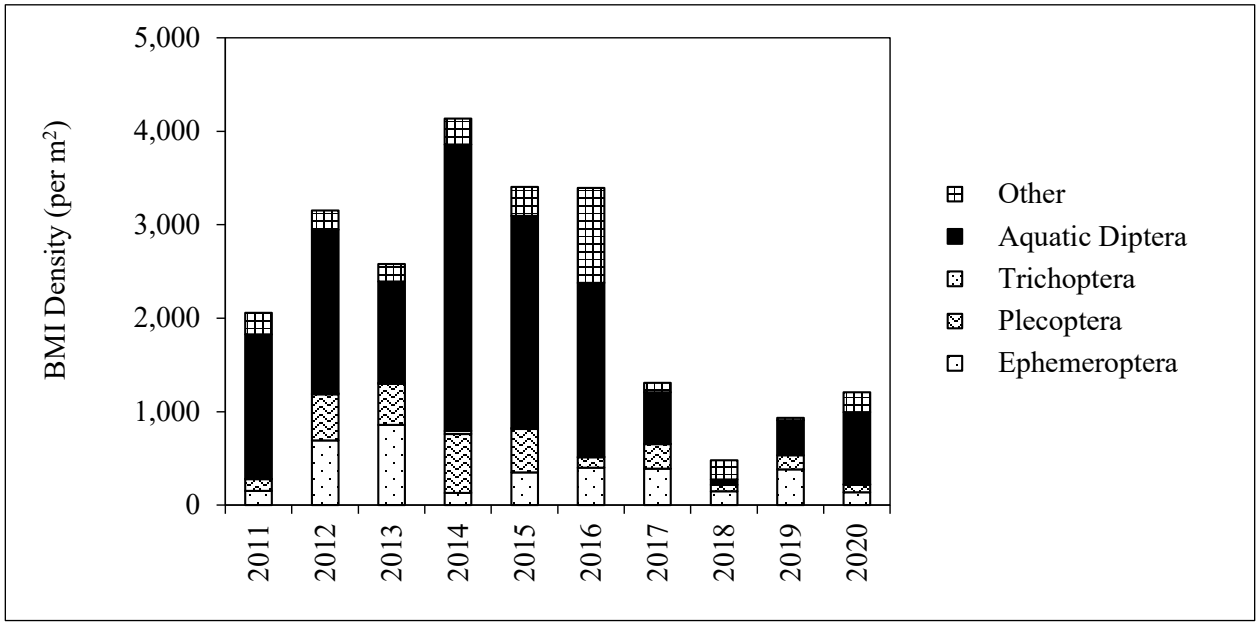

Figure 16.–Lower Slate Creek mean BMI densities and community compositions, 2011–2020.

Adult Salmon Counts

In 2020, we counted 15 pink salmon and 4 coho salmon in Lower Slate Creek (Table 10; Figure 17).

Table 10.–Lower Slate Creek adult salmon counts, 2011–2020.

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

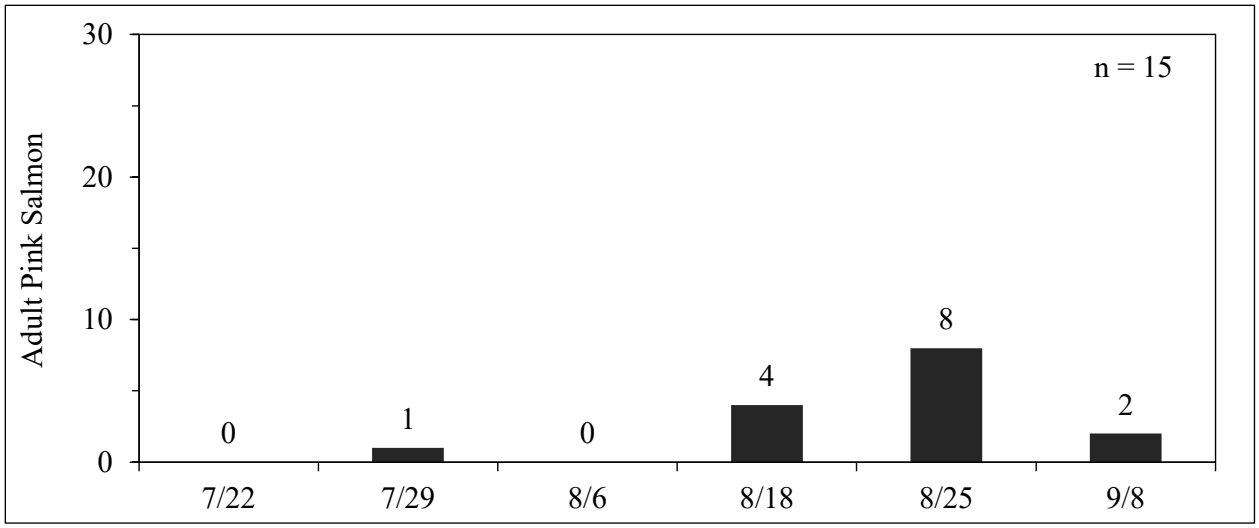

Figure 17.–Lower Slate Creek weekly adult pink salmon counts, 2020.
Note: Surveys were not completed the weeks beginning August 10 and August 31.

Spawning Substrate Composition

At Sample Point 1, the GMPS was 8.5 mm—the smallest observed 2011–2020. The GMPS at Sample Point 2 was 14.1 mm—within the range previously observed and lower than in 2019 (Table 11).

Table 11.–Lower Slate Creek spawning substrate geometric mean particle sizes (mm), 2011–2020.

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

Sediment Element Concentrations

The APDES permit requires collecting one sample; in 2020, we collected three samples to investigate concentration variability. Among the 2020 Lower Slate Creek sediment samples, the range of Ag, Al, Cu, Pb, and Zn concentrations included values lower than observed 2011–2019; the remaining element concentrations were within the ranges previously observed (Figure 18). The As, Cu, and Ni values remain above the TEC freshwater sediment toxicity guidelines (Buchman 2008). Since 2011, Zn concentrations have been consistently above the TEC; in 2020, Zn concentrations were below the TEC.

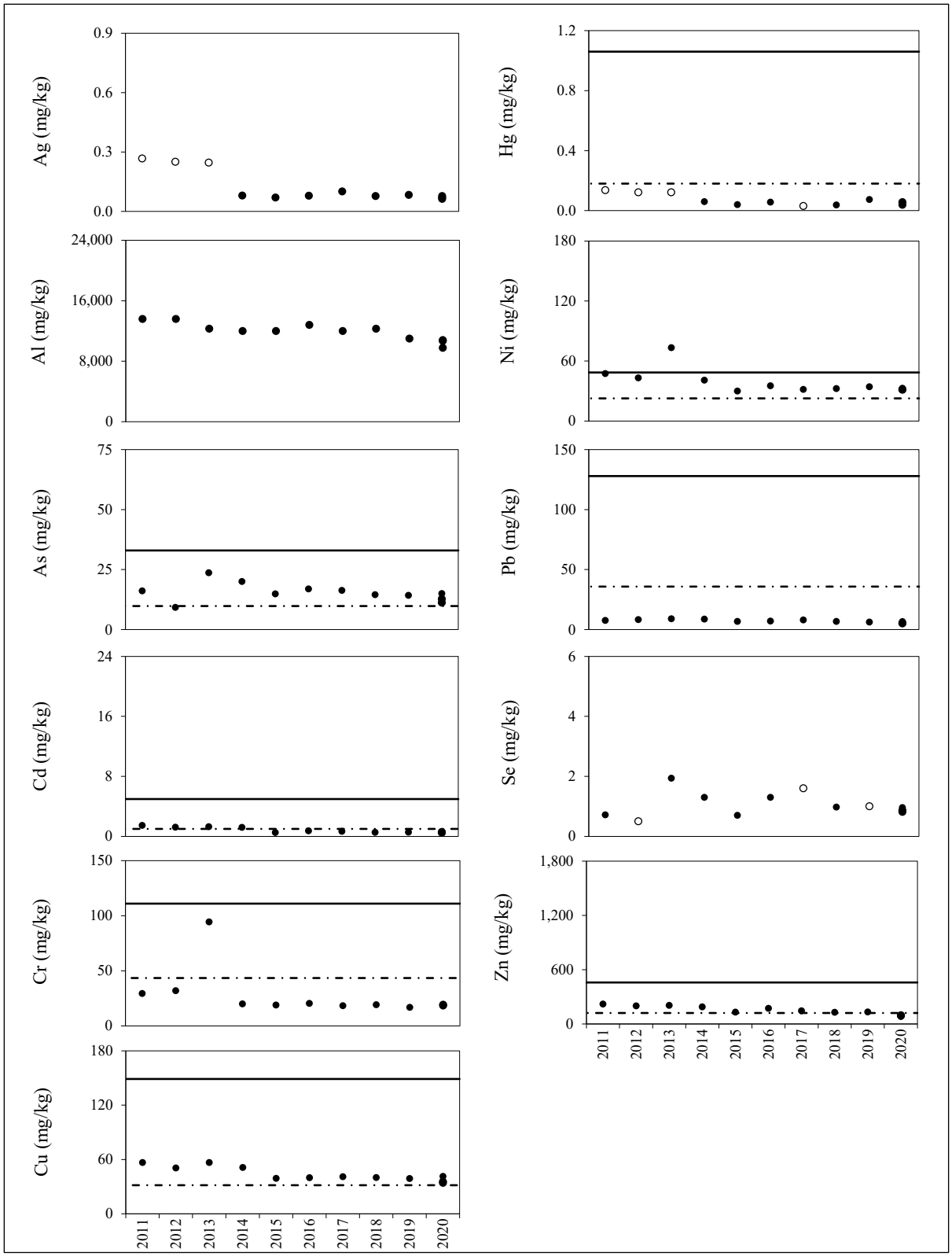

Figure 18.–Lower Slate Creek sediment element concentrations, 2011–2020.

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 2020, the West Fork Slate Creek mean chlorophyll *a* density was lower than observed 2016–2019 (Table 12; Figure 19). The mean proportions of chlorophylls *a*, *b*, and *c* were similar to previous years (Figure 20).

Table 12.–West Fork Slate Creek mean chlorophylls *a*, *b*, and *c* densities, 2011–2020.

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

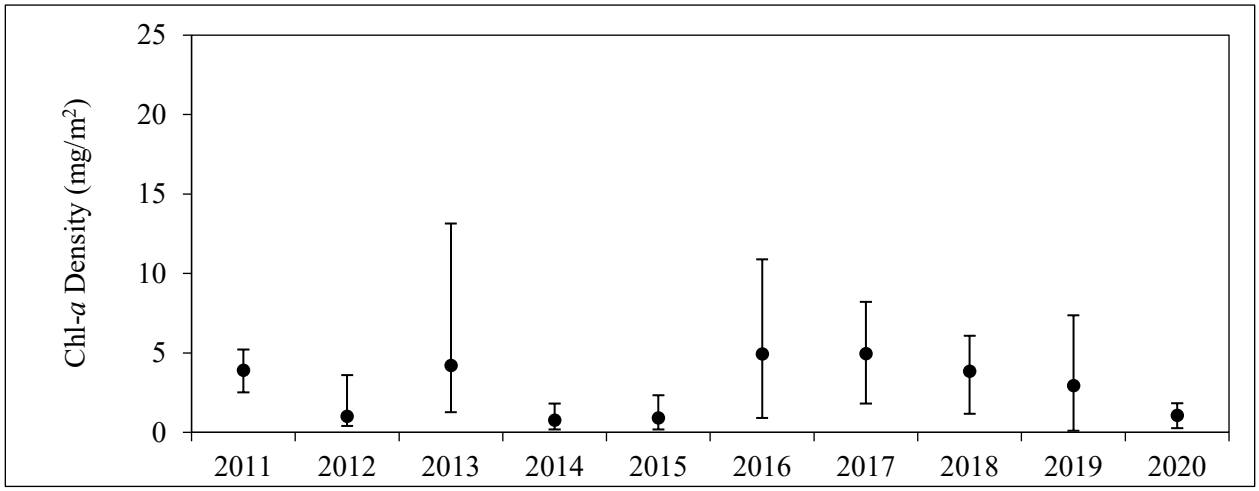

Figure 19.–West Fork Slate Creek mean chlorophyll *a* densities, 2011–2020.
Note: Minimum, mean, and maximum values.

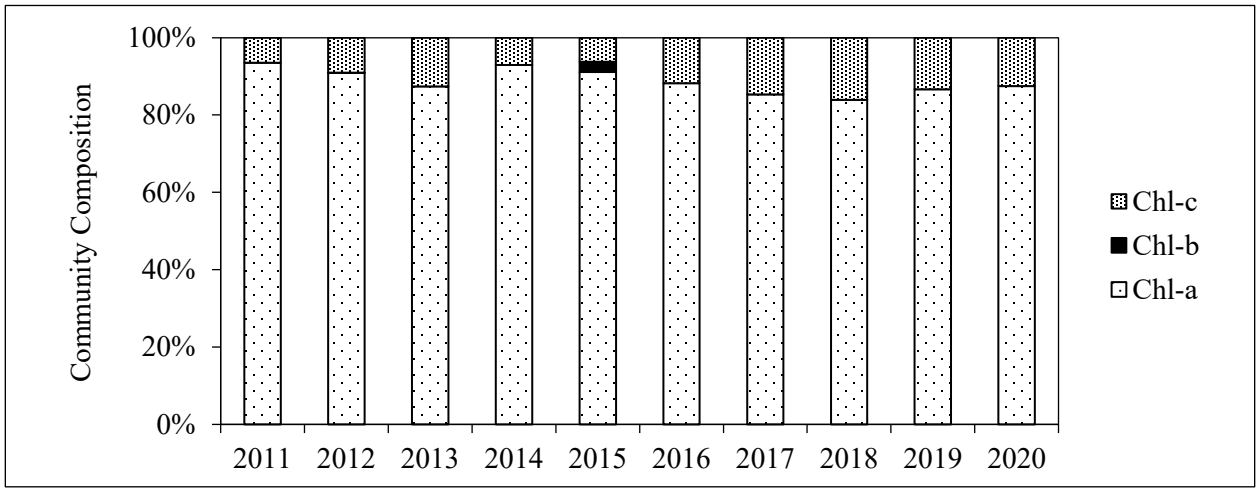

Figure 20.–West Fork Slate Creek mean proportions of chlorophylls *a*, *b*, and *c*, 2011–2020.

Benthic Macroinvertebrate Density and Community Composition

Among the 2020 West Fork Slate Creek BMI samples, we identified 18 taxa and estimate mean density at 1,358 BMI/m^2, of which 78% were EPT insects—all within ranges observed 2011–2019 (Table 13; Figure 21). The dominant taxa were Ephemeroptera: *Cinygmula* and *Baetis*, composing 31% and 25% of the samples.

Table 13.–West Fork Slate Creek BMI data summaries, 2011–2020.

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

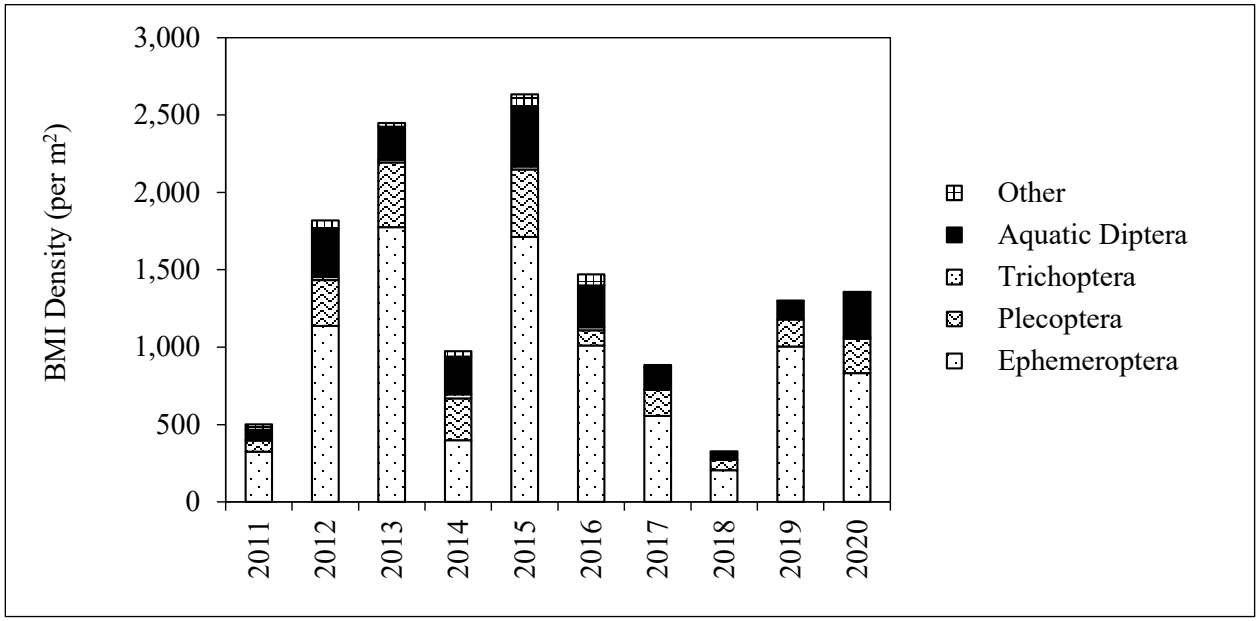

Figure 21.–West Fork Slate Creek mean BMI densities and community compositions, 2011–2020.

East Fork Slate Creek

Periphyton: Chlorophyll Density and Composition

In 2020, the East Fork Slate Creek mean chlorophyll *a* density was within the range observed since 2011 (Table 14; Figure 22). The mean proportions of chlorophylls *a*, *b*, and *c* also were similar to previous years (Figure 23).

Table 14.–East Fork Slate Creek mean chlorophylls *a*, *b*, and *c* densities, 2011–2020.

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

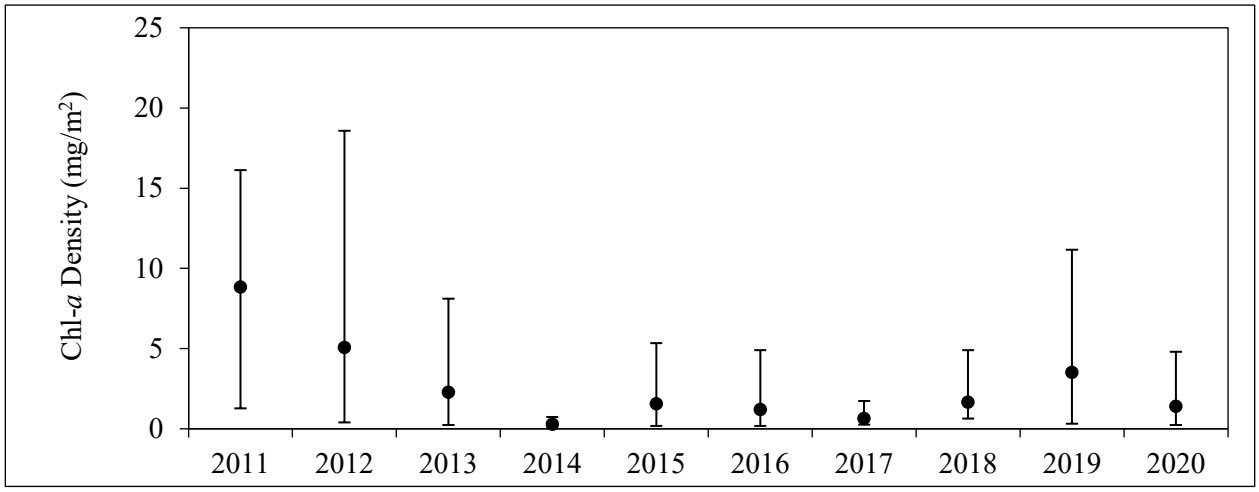

Figure 22.–East Fork Slate Creek mean chlorophyll *a* densities, 2011–2020.
Note: Minimum, mean, and maximum values.

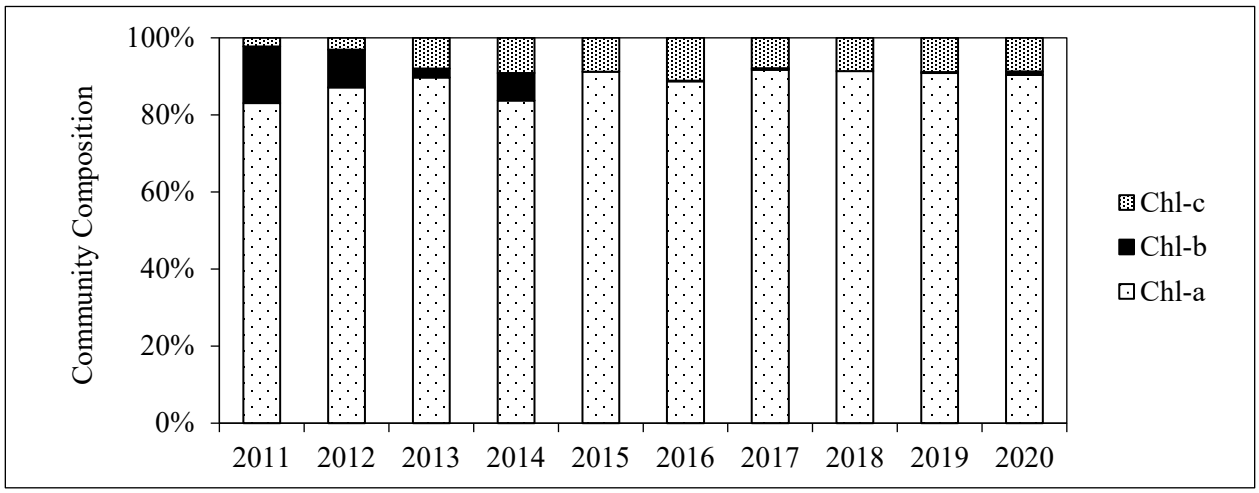

Figure 23.–East Fork Slate Creek mean proportions of chlorophylls *a*, *b*, and *c*, 2011–2020.

Benthic Macroinvertebrate Density and Community Composition

Among the 2020 East Fork Slate Creek BMI samples, we identified 26 taxa and estimate mean density at 5,496 BMI/m^2, of which 13% were EPT insects, all within ranges observed 2011–2019 (Table 15; Figure 24). The Shannon Diversity and Evenness scores were consistent with most previous years, and the dominant taxon was Bivalvia: *Pisidium* (pea clams), composing 59% of the samples, as in most previous years.

Table 15.–East Fork Slate Creek BMI data summaries, 2011–2020.

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

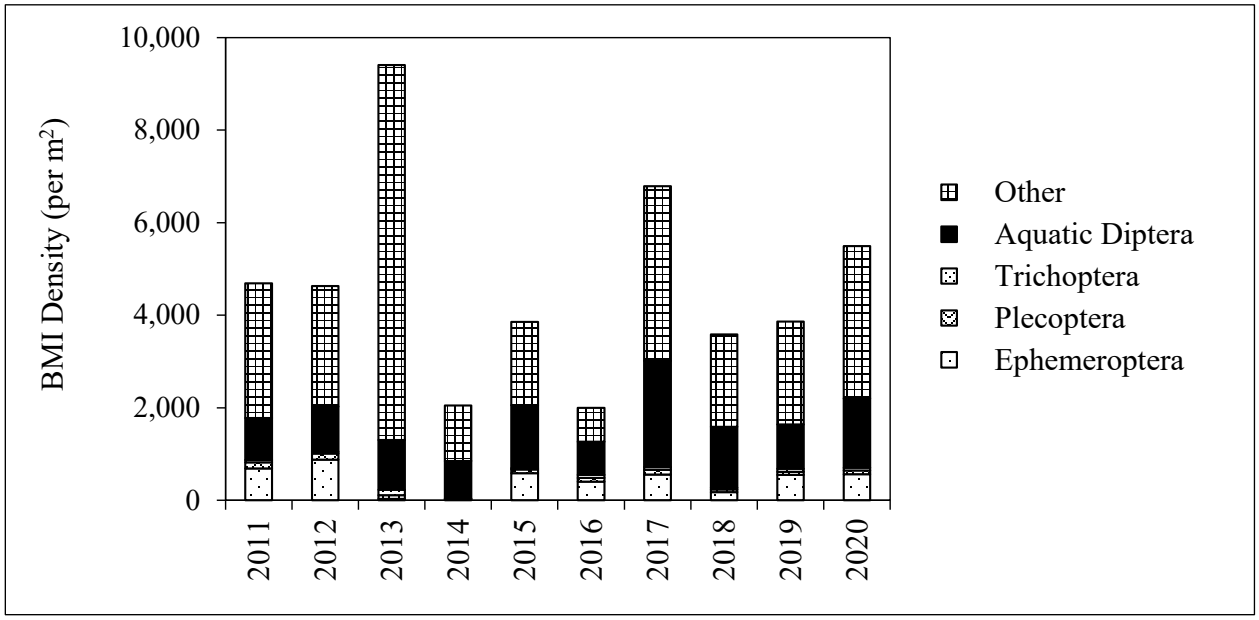

Figure 24.–East Fork Slate Creek mean BMI densities and community compositions, 2011–2020.

Sediment Element Concentrations

Among the 2020 East Fork Slate Creek sediment samples[q], the range of Al, Cd, Cr, Cu, Ni, and Pb concentrations included values lower than observed 2011–2019; the remaining element concentrations were generally within the ranges previously observed (Figure 25). Concentrations of As, Cd, Ni, and Zn were lower than most previous years and above the TEC freshwater sediment toxicity guidelines. Since 2011, Cd concentrations have been consistently above the PEC and the Cu concentrations above the TEC; in 2020, Cd concentrations were below the PEC and Cu concentrations were below the TEC for the first time.

[q] In 2020, three sediment samples were collected to investigate concentration variability.

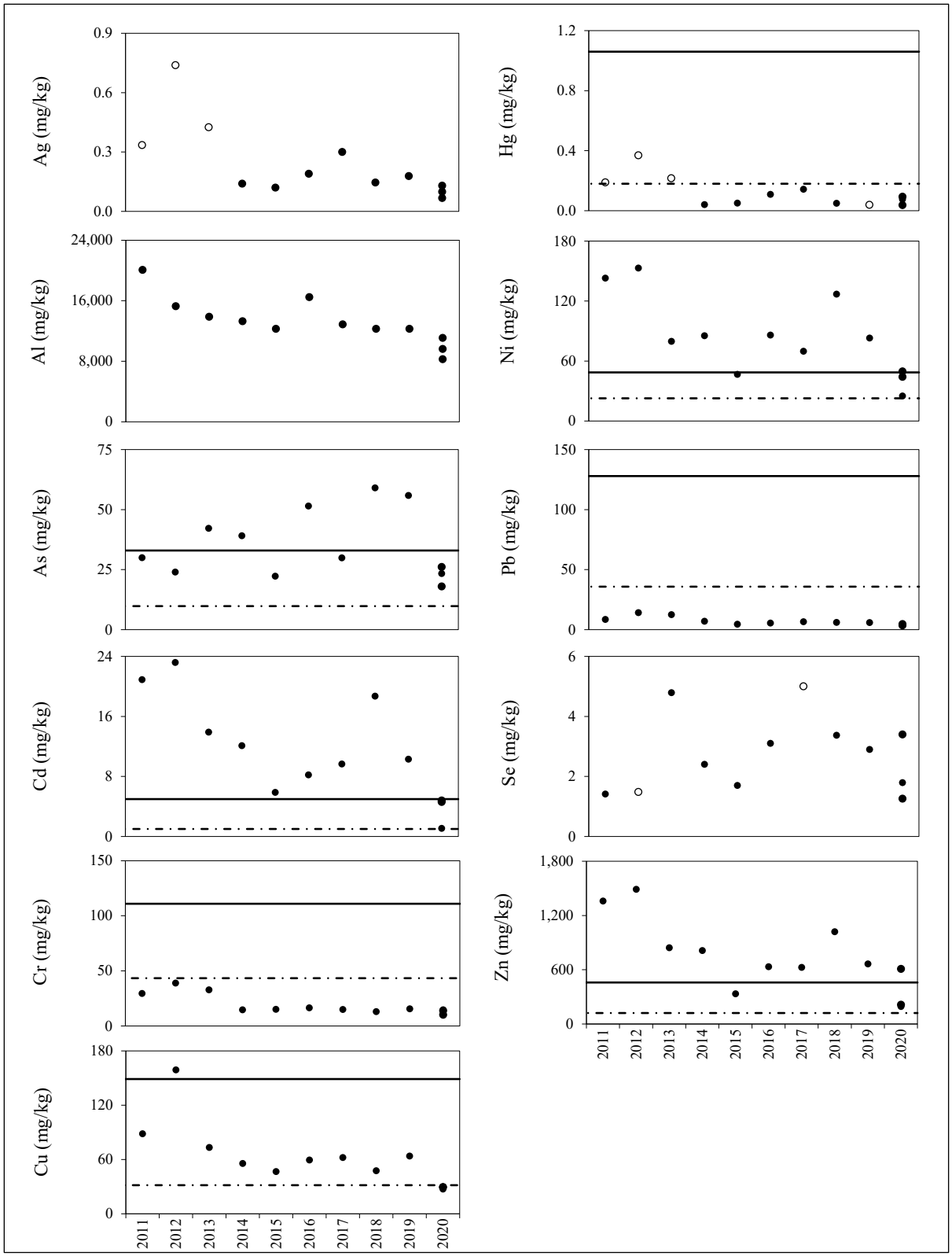

Figure 25.–East Fork Slate Creek sediment element concentrations, 2011–2020.

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 2020, the Upper Slate Creek mean chlorophyll *a* density was within the range observed since 2011 (Table 16; Figure 26). The mean proportions of chlorophylls *a*, *b*, and *c* also were similar to previous years (Figure 27).

Table 16.–Upper Slate Creek mean chlorophylls *a, b,* and *c* densities, 2011–2020.

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

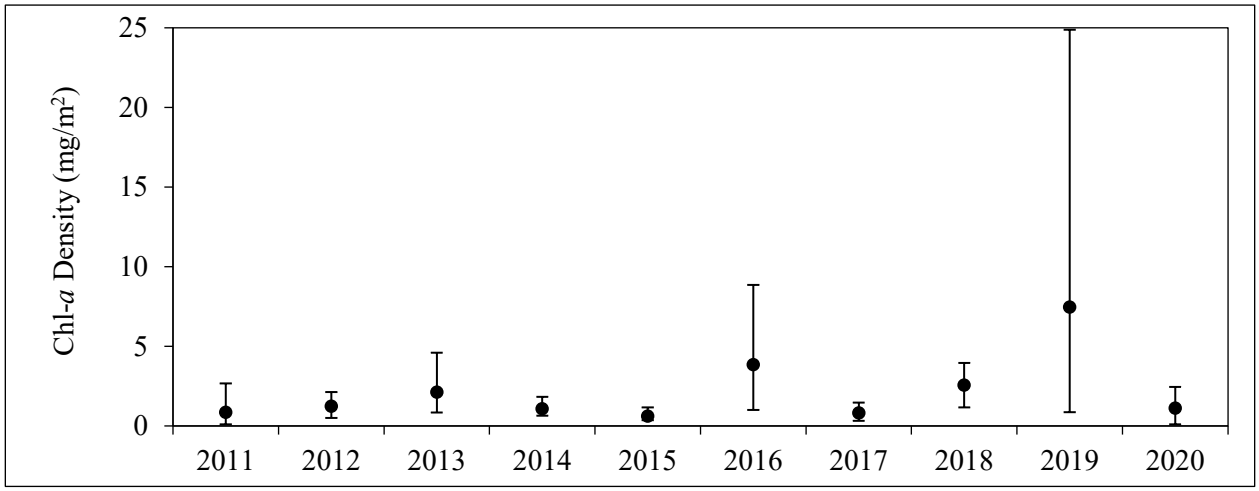

Figure 26.–Upper Slate Creek mean chlorophyll *a* densities, 2011–2020.
Note: Minimum, mean, and maximum values.

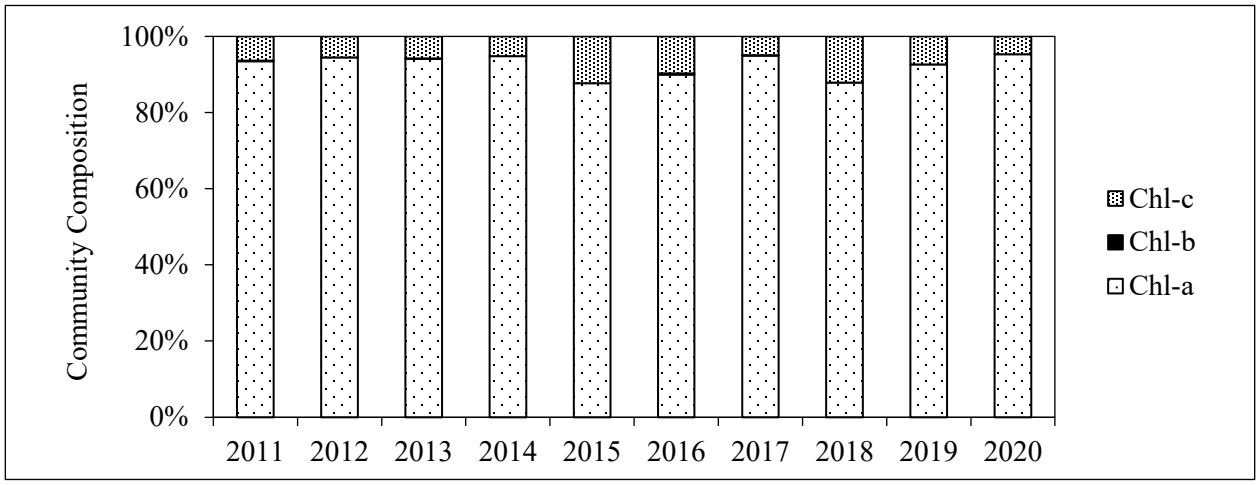

Figure 27.–Upper Slate Creek mean proportions of chlorophylls *a*, *b*, and *c*, 2011–2020.

Benthic Macroinvertebrate Density and Community Composition

Among the 2020 Upper Slate Creek BMI samples, we identified 25 taxa and estimate mean density at 973 BMI/m^2—the lowest observed since 2011 (Table 17; Figure 28). The dominant taxa were Ephemeroptera: *Cinygmula* and Diptera: Chironmidae composing 23% and 22% of the samples.

Table 17.–Upper Slate Creek BMI data summaries, 2011–2020.

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

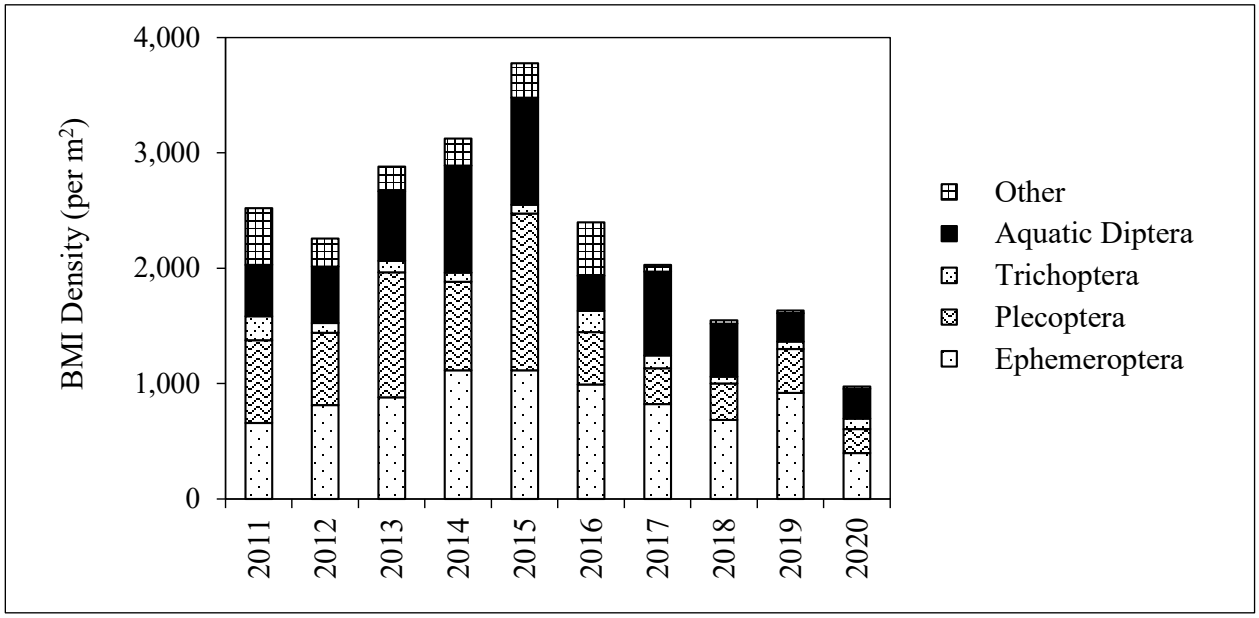

Figure 28.–Upper Slate Creek mean BMI densities and community compositions, 2011–2020.

Sediment Element Concentrations

Among the 2020 Upper Slate Creek sediment samples[r], Al concentrations were lower than observed 2011–2019; the remaining element concentrations were within the ranges previously observed (Figure 29). The As, Cr, and Cu concentrations remain above the TEC and the mean Ni concentrations remain near or above the PEC freshwater sediment toxicity guidelines.

[r] In 2020, three sediment samples were collected to investigate concentration variability.

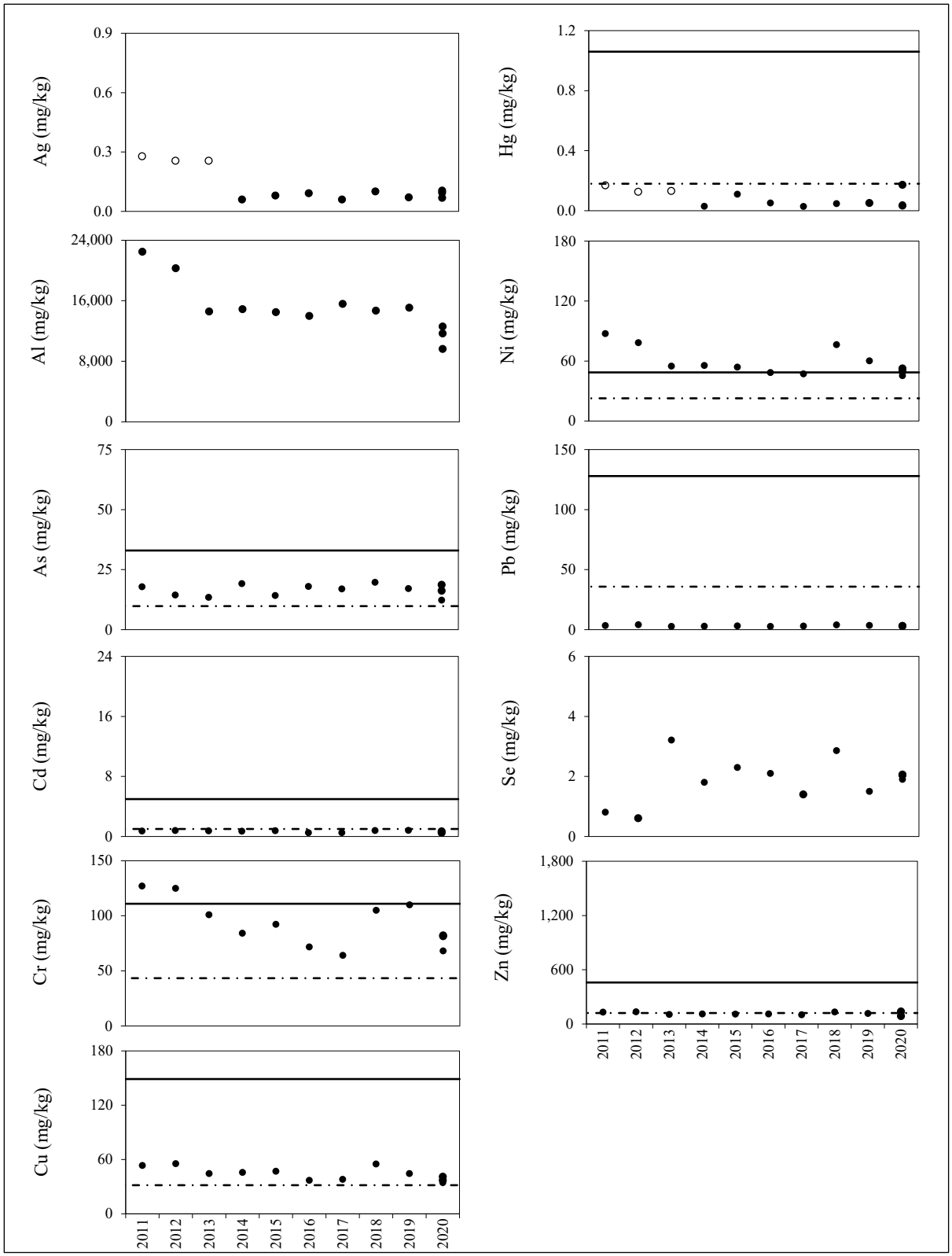

Figure 29.–Upper Slate Creek sediment element concentrations, 2011–2020.

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 2020, we counted 2,737 pink salmon, 5 chum salmon, and 49 coho salmon in Lower Johnson Creek (Table 18; Figure 30). We were unable to complete three intended surveys due to logistical constraints and safety precautions associated with the coronavirus pandemic.

Table 18.–Lower Johnson Creek adult salmon counts, 2011–2020.

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

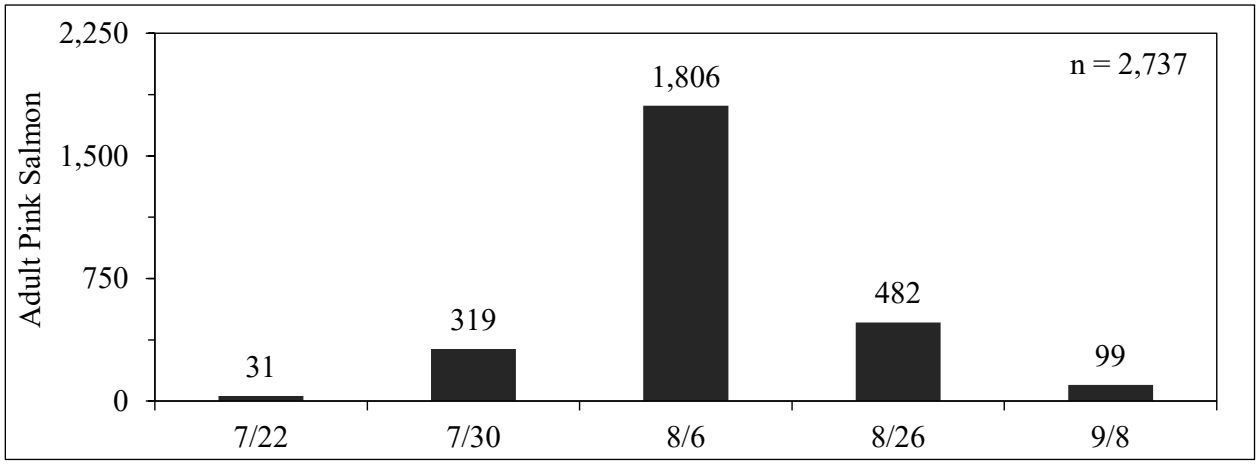

Figure 30.–Lower Johnson Creek weekly pink salmon count, 2020.
Note: Surveys were not completed the weeks beginning August 10, August 17, and August 31.

Sediment Element Concentrations

Among the 2020 Lower Johnson Creek sediment samples, Ag concentrations were lower than observed 2011–2019; the remaining element concentrations were within the ranges previously observed (Figure 31). The As and Cu concentrations remain above the TEC freshwater sediment toxicity guidelines.

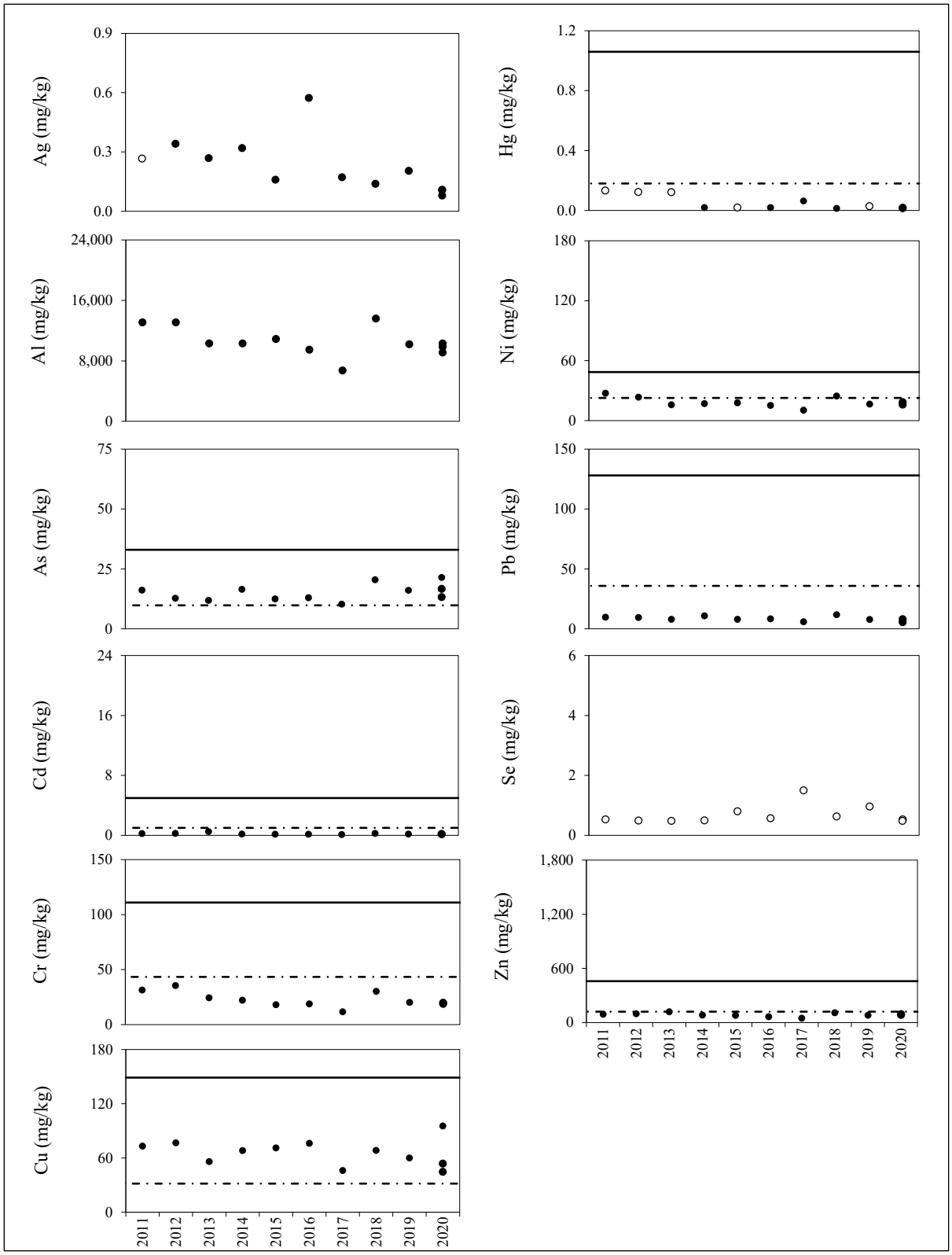

Figure 31.–Lower Johnson Creek sediment element concentrations, 2011–2020.

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 2020 Upper Johnson Creek BMI samples, we identified 31 taxa and estimate mean density at 1,892 BMI/m^2—the lowest observed since 2011 (Table 19; Figure 32). EPT taxa composed a greater proportion of the samples than observed since 2011. The dominant taxa were Ephemeroptera: *Baetis* and *Cinygmula*, composing 31% and 23% of the samples.

Table 19.–Upper Johnson Creek BMI data summaries, 2011–2020.

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

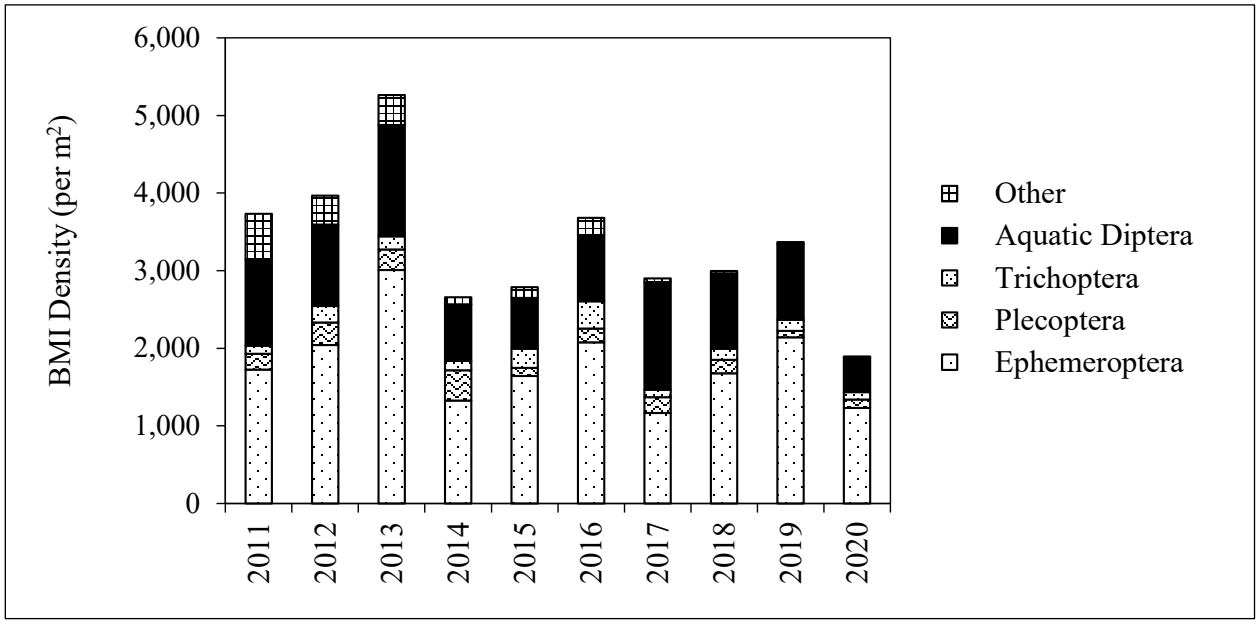

Figure 32.–Upper Johnson Creek mean BMI densities and community compositions, 2011–2020.

SHERMAN CREEK

Lower Sherman Creek

Periphyton: Chlorophyll Density and Composition

Sample Point 1

In 2020, the Lower Sherman Creek SP1 mean chlorophyll *a* density was greater than observed 2012–2019 (Table 20; Figure 33). The mean proportions of chlorophylls *a*, *b*, and *c* were similar to previous years (Figure 34).

Table 20.–Lower Sherman Creek SP1 mean chlorophylls *a, b,* and *c* densities, 2011–2020.

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

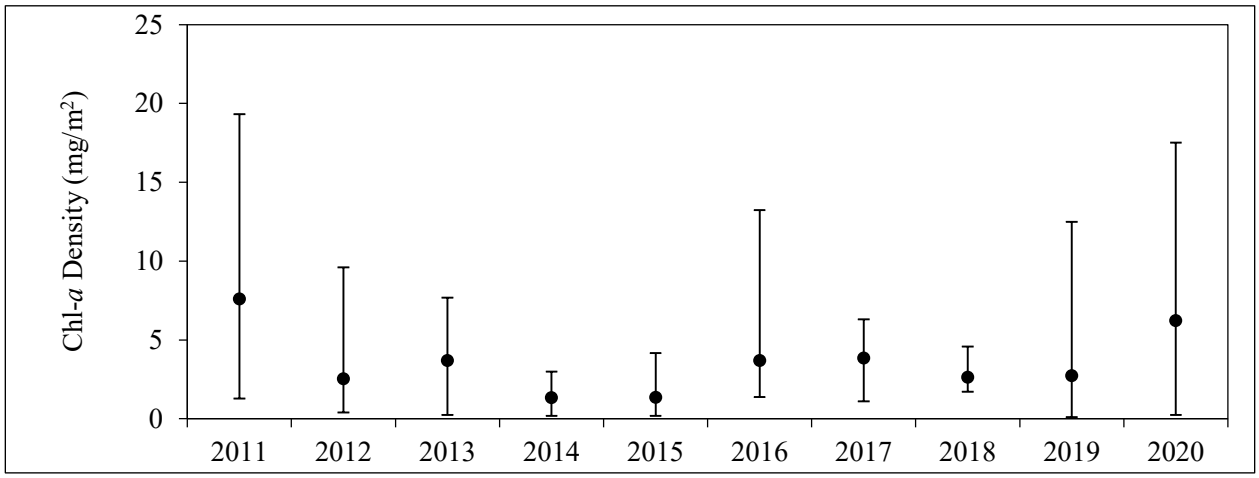

Figure 33.–Lower Sherman SP1 mean chlorophyll *a* densities, 2011–2020.
Note: Minimum, mean, and maximum values.

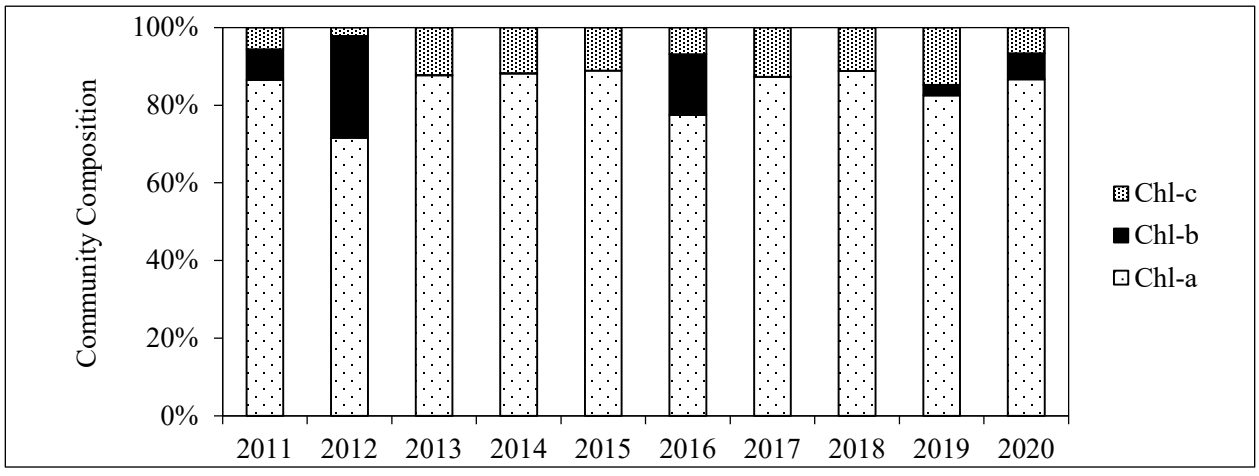

Figure 34.–Lower Sherman SP1 mean proportions of chlorophylls *a*, *b*, and *c*, 2011–2020.

Sample Point 2

In 2020, Lower Sherman Creek SP2 mean densities of chlorophylls *a*, *b*, and *c* were greater than ranges observed 2011–2019 (Table 21; Figure 35). The mean proportion of chlorophyll *b* also was greater than previously observed (Figure 36).

Table 21.–Lower Sherman Creek SP2 mean chlorophylls *a, b,* and *c* densities, 2011–2020.

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

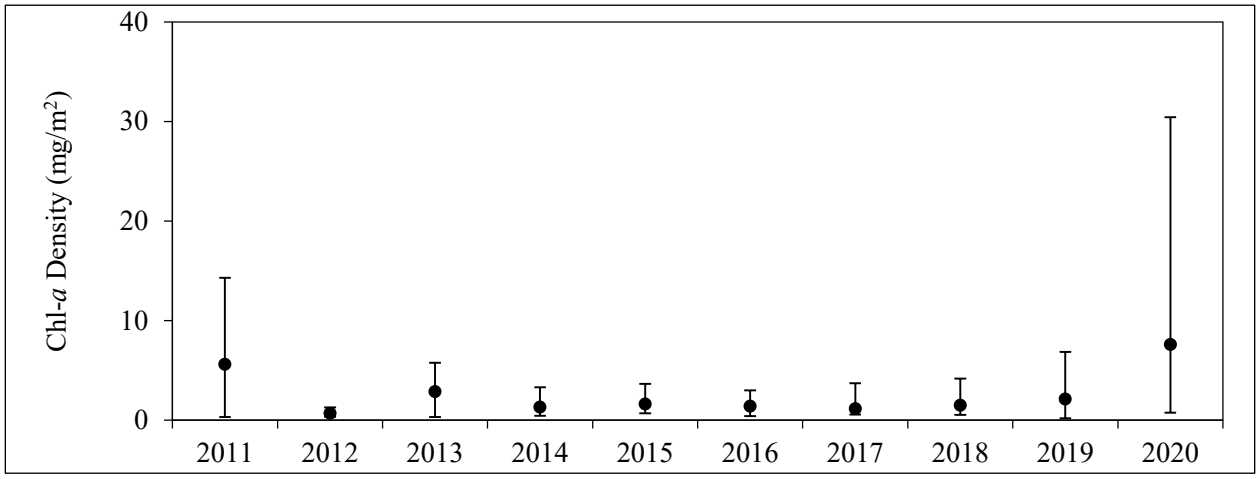

Figure 35.–Lower Sherman SP2 mean chlorophyll *a* densities, 2011–2020.
Note: Minimum, mean, and maximum values.

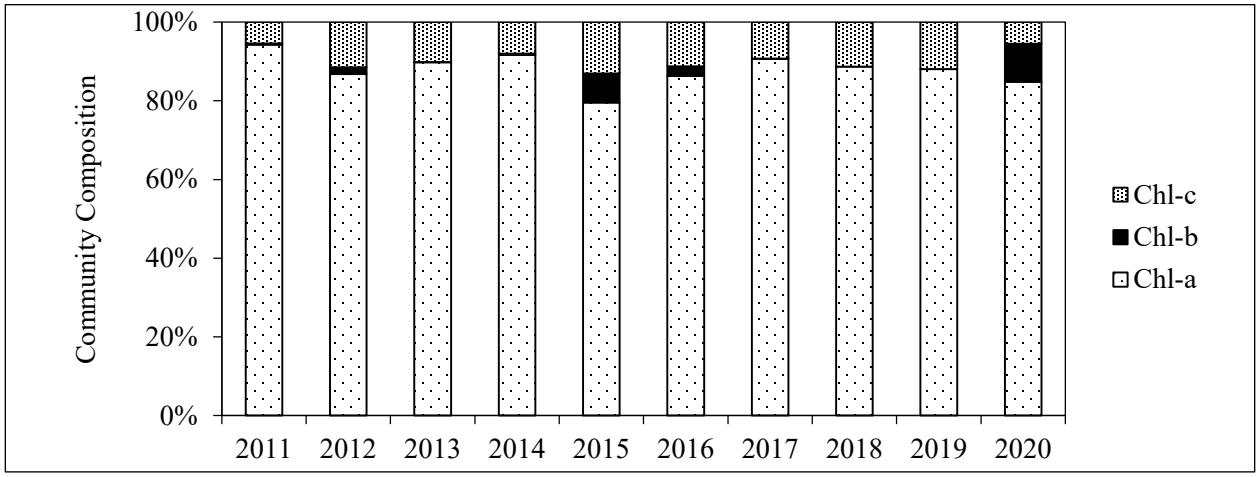

Figure 36.–Lower Sherman SP2 mean proportions of chlorophylls *a*, *b*, and *c*, 2011–2020.

Benthic Macroinvertebrate Density and Community Composition

Sample Point 1

Among the 2020 Lower Sherman Creek SP1 BMI samples, we identified 24 taxa (Table 22; Figure 37). The estimated mean density and proportion of EPT taxa were within ranges observed in previous years. The dominant taxon was Diptera: Chironomidae, composing 42% of the samples. The Shannon Diversity and Evenness scores were among the lowest observed.

Table 22.–Lower Sherman Creek SP1 BMI data summaries, 2011–2020.

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

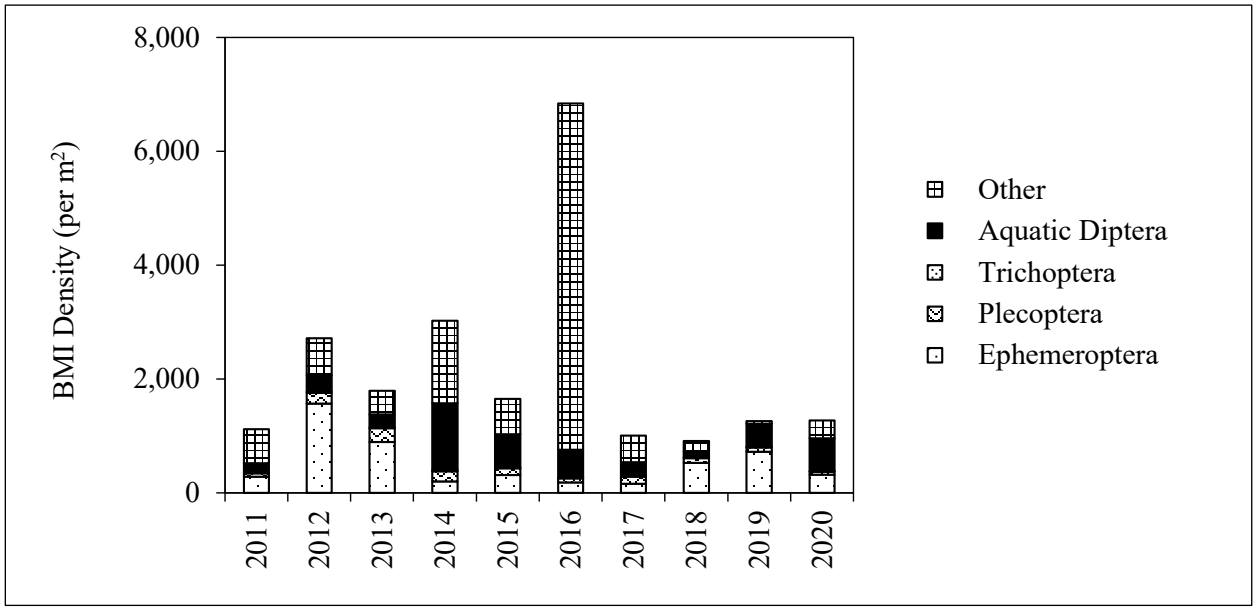

Figure 37.–Lower Sherman Creek SP1 mean BMI densities and community compositions, 2011–2020.

Sample Point 2

Among the 2020 Lower Sherman Creek SP2 BMI samples, we identified 23 taxa and estimate mean density at 871 BMI/m^2—among the lowest observed (Table 23; Figure 38). The dominant taxon was Diptera: Chironomidae, composing 44% of the samples.

Table 23.–Lower Sherman Creek SP2 BMI data summaries, 2011–2020.

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

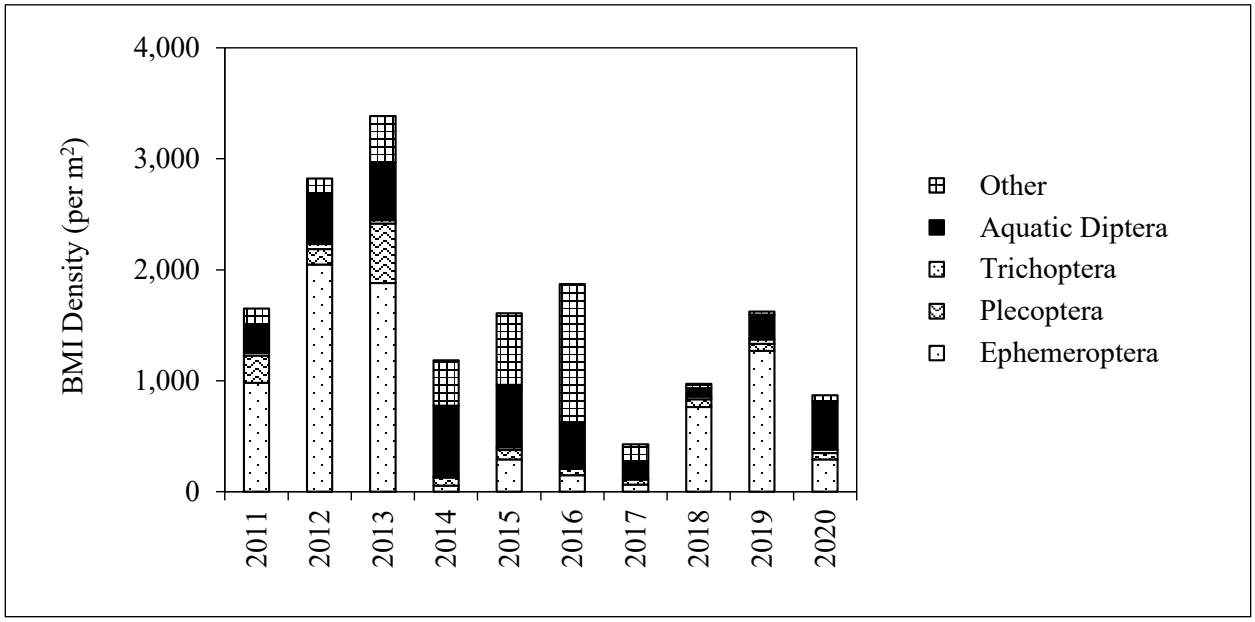

Figure 38.–Lower Sherman Creek SP2 mean BMI densities and community compositions, 2011–2020.

Adult Salmon Counts

In 2020, we counted 190 pink salmon in Lower Sherman Creek (Table 24; Figure 39). Since coho salmon do not use Sherman Creek, we did not survey for adults.

Table 24.–Lower Sherman Creek adult salmon counts, 2011–2020.

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

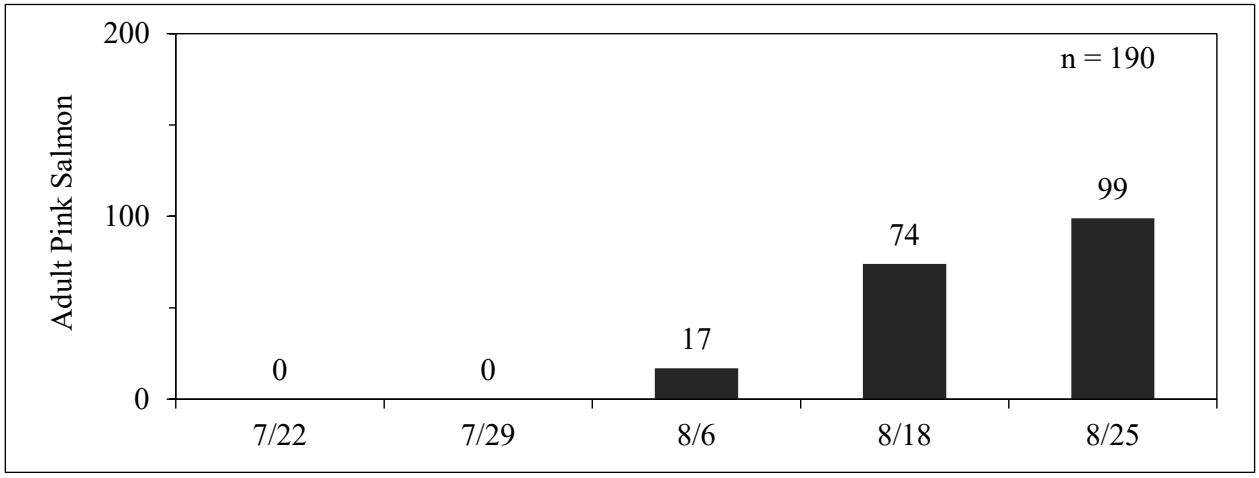

Figure 39.–Lower Sherman Creek weekly pink salmon count, 2020.
Note: Surveys were not completed the weeks beginning August 10 and August 31.

Sediment Element Concentrations

Among the 2020 Lower Sherman Creek sediment samples, Cu and Ni concentrations were lower than observed 2011–2019; the remaining element concentrations were within the ranges previously observed (Figure 40). The As, Cu, and Ni concentrations remain above the TEC freshwater sediment toxicity guidelines.

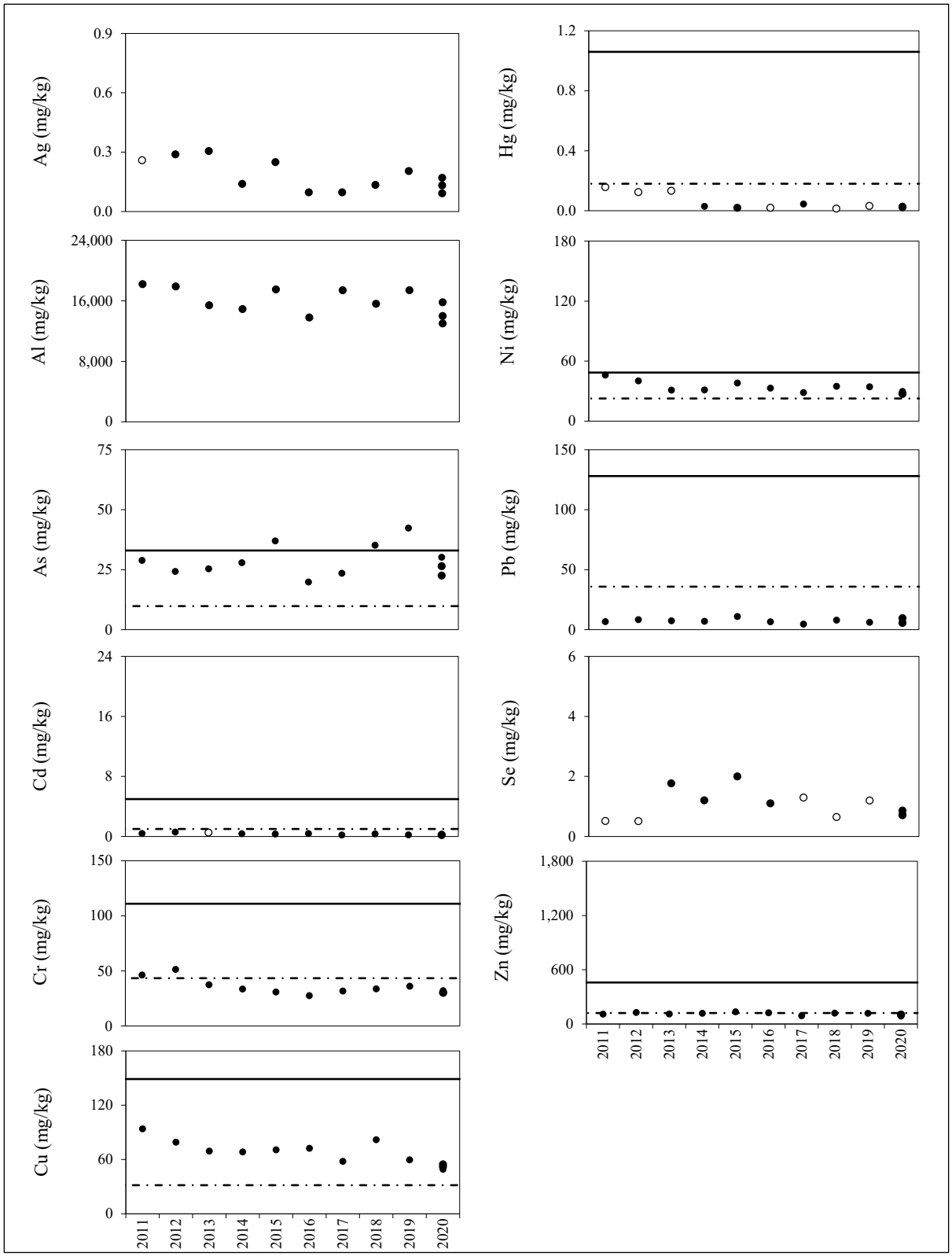

Figure 40.–Lower Sherman Creek sediment element concentrations, 2011–2020.

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, 2011–2020.

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

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

	08/01/19			05/06/20		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	6.73	0.00	1.02	0.85	0.08	0.14
	66.22	0.00	12.14	1.51	0.00	0.09
	4.49	0.00	0.71	**0.25**	ND	ND
	22.11	0.00	3.96	1.97	0.00	0.26
	15.38	0.00	3.57	**0.25**	ND	ND
	94.62	0.00	17.74	1.39	0.00	0.12
	8.12	0.00	1.59	2.15	0.00	0.30
	39.41	0.00	6.52	0.33	0.00	0.00
	14.95	0.00	2.64	**0.25**	ND	ND
	65.04	0.00	15.02	2.14	0.00	0.34
mean	33.71	0.00	6.49	1.11	0.01	0.18
maximum	94.62	0.00	17.74	2.15	0.08	0.34
minimum	4.49	0.00	0.71	0.25	0.00	0.00

	07/29/20		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*
	0.55	0.00	0.02
	0.28	0.00	0.00
	0.96	0.07	0.03
	1.71	0.00	0.12
	0.73	0.04	0.04
	0.64	0.00	0.01
	2.15	0.00	0.20
	0.27	0.03	0.00
	4.17	0.98	0.13
	0.73	0.00	0.00
mean	1.22	0.11	0.06
maximum	4.17	0.98	0.20
minimum	0.27	0.00	0.00

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

Appendix A.2.–West Fork Slate Creek chlorophylls *a*, *b*, and *c* densities, 2011–2020.

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

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	07/24/17			07/25/18		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	5.13	0.00	0.60	1.17	0.00	0.22
	5.13	0.00	0.96	4.17	0.00	0.86
	1.82	0.00	0.19	2.35	0.00	0.32
	3.95	0.00	0.83	5.02	0.00	0.93
	5.87	0.00	1.22	5.55	0.00	1.22
	8.22	0.00	1.38	4.91	0.00	1.12
	8.22	0.00	1.58	3.10	0.00	0.53
	3.74	0.00	0.53	1.71	0.00	0.24
	2.78	0.00	0.33	4.38	0.00	0.75
	4.70	0.00	0.92	6.09	0.00	1.16
mean	4.96	0.00	0.85	3.85	0.00	0.74
maximum	8.22	0.00	1.58	6.09	0.00	1.22
minimum	1.82	0.00	0.19	1.17	0.00	0.22
	08/01/19			07/29/20		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	0.10	ND	ND	1.84	0.00	0.24
	4.17	0.00	0.49	1.65	0.00	0.27
	6.15	0.00	0.88	1.65	0.00	0.27
	1.28	0.00	0.14	ND	ND	ND
	3.42	0.00	0.27	1.42	0.00	0.17
	7.38	0.00	1.17	0.50	0.00	0.13
	4.04	0.00	0.34	0.28	0.00	0.03
	0.73	0.00	0.16	0.78	0.00	0.06
	2.14	0.00	0.19	0.96	0.00	0.10
	0.10	ND	ND	0.60	0.00	0.12
mean	2.95	0.00	0.46	1.08	0.00	0.15
maximum	7.38	0.00	1.17	1.84	0.00	0.27
minimum	0.10	0.00	0.14	0.28	0.00	0.03

Note: Bold values are the spectrophotometer estimated detection limit; chlorophyll *a* not detected. One sample in 2020 was excluded from analysis due to a processing error.

Appendix A.3.–East Fork Slate Creek chlorophylls *a*, *b*, and *c* densities, 2011–2020.

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

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

	08/01/19			05/05/20		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	0.75	0.00	0.02	0.75	0.07	0.09
	1.92	0.00	0.33	0.00	0.01	0.00
	5.07	0.00	0.31	0.85	0.17	0.01
	1.60	0.00	0.19	2.12	0.00	0.27
	0.63	0.07	0.15	0.41	0.00	0.08
	9.51	0.00	1.15	7.26	0.00	1.40
	0.32	0.00	0.08	16.45	0.00	1.86
	0.85	0.01	0.07	0.96	0.00	0.04
	11.17	0.00	0.80	17.30	6.46	0.45
	3.30	0.00	0.34	0.85	0.00	0.04
mean	3.51	0.01	0.34	4.70	0.67	0.42
maximum	11.17	0.07	1.15	17.30	6.46	1.86
minimum	0.32	0.00	0.02	0.00	0.00	0.00

	07/30/20		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*
	1.60	0.07	0.00
	1.84	0.00	0.05
	4.81	0.00	0.80
	0.92	0.00	0.04
	0.25	ND	ND
	1.28	0.00	0.19
	0.50	0.00	0.00
	0.51	0.00	0.00
	0.60	0.00	0.02
	1.60	0.05	0.11
mean	1.39	0.01	0.13
maximum	4.81	0.07	0.80
minimum	0.25	0.00	0.00

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

Appendix A.4.–Upper Slate Creek chlorophylls *a*, *b*, and *c* densities, 2011–2020.

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

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

Appendix A.5.–Lower Sherman Creek SP1 chlorophylls *a*, *b*, and *c* densities, 2011–2020.

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

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	07/25/17			07/24/18		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	5.02	0.00	0.68	2.88	0.00	0.36
	5.13	0.00	0.93	3.95	0.00	0.50
	2.35	0.00	0.28	2.14	0.00	0.38
	2.99	0.00	0.40	2.43	0.00	0.23
	4.49	0.00	0.64	2.56	0.00	0.36
	3.84	0.00	0.55	2.06	0.00	0.15
	6.30	0.00	1.05	1.82	0.00	0.20
	4.06	0.00	0.63	4.58	0.00	0.63
	1.10	0.00	0.05	2.24	0.00	0.35
	3.31	0.00	0.39	1.71	0.00	0.15
mean	3.86	0.00	0.56	2.64	0.00	0.33
maximum	6.30	0.00	1.05	4.58	0.00	0.63
minimum	1.10	0.00	0.05	1.71	0.00	0.15
	08/02/19			07/29/20		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	ND	ND	ND	17.52	0.00	1.73
	0.10	ND	ND	8.01	0.00	0.80
	0.43	0.07	0.10	2.66	0.00	0.07
	0.50	0.00	0.13	5.55	0.35	0.29
	0.10	ND	ND	13.67	4.03	0.31
	5.66	0.47	0.45	**0.25**	ND	ND
	0.10	ND	ND	1.15	0.00	0.04
	5.02	0.00	0.66	6.51	0.00	0.48
	12.50	0.00	1.56	1.89	0.00	0.14
	0.21	0.00	0.03	5.13	0.00	0.41
mean	2.74	0.09	0.49	6.23	0.49	0.47
maximum	12.50	0.47	1.56	17.52	4.03	1.73
minimum	0.10	0.00	0.03	0.25	0.00	0.04

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, 2011–2020.

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

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	07/25/17			07/24/18		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	0.75	0.00	0.05	0.96	0.00	0.09
	0.85	0.01	0.07	1.38	0.00	0.21
	0.88	0.00	0.05	1.60	0.00	0.17
	0.69	0.00	0.07	0.53	0.00	0.02
	3.70	0.00	0.46	1.50	0.00	0.26
	0.69	0.00	0.07	1.60	0.00	0.23
	0.64	0.00	0.07	0.64	0.00	0.11
	1.82	0.00	0.20	4.17	0.00	0.58
	0.92	0.00	0.11	0.96	0.00	0.09
	0.55	0.00	0.02	1.60	0.00	0.15
mean	1.15	0.00	0.12	1.49	0.00	0.19
maximum	3.70	0.01	0.46	4.17	0.00	0.58
minimum	0.55	0.00	0.02	0.53	0.00	0.02
	08/02/19			07/29/20		
mg/m²	Chl-*a*	Chl-*b*	Chl-*c*	Chl-*a*	Chl-*b*	Chl-*c*
	0.43	0.00	0.03	5.42	0.04	0.33
	1.60	0.00	0.23	1.65	0.00	0.20
	6.84	0.00	1.07	2.78	0.29	0.20
	1.11	0.00	0.08	1.93	0.00	0.20
	1.33	0.00	0.18	4.38	0.48	0.25
	0.18	0.00	0.00	6.84	0.39	0.70
	5.02	0.00	0.63	5.18	0.00	0.45
	0.85	0.00	0.13	0.75	0.00	0.00
	2.14	0.00	0.31	30.44	5.80	1.15
	1.71	0.00	0.21	16.66	1.69	1.44
mean	2.12	0.00	0.29	7.60	0.87	0.49
maximum	6.84	0.00	1.07	30.44	5.80	1.44
minimum	0.18	0.00	0.00	0.75	0.00	0.00

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, 2011–2020.

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

Appendix B.2.–West Fork Slate Creek BMI data summary, 2011–2020.

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

Appendix B.3.–East Fork Slate Creek BMI data summary, 2011–2020.

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

Appendix B.4.–Upper Slate Creek BMI data summary, 2011–2020.

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

Appendix B.5.–Upper Johnson Creek BMI data summary, 2011–2020.

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

Appendix B.6.–Lower Sherman Creek SP1 BMI data summary, 2011–2020.

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

Appendix B.7.–Lower Sherman Creek SP2 BMI data summary, 2011–2020.

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

APPENDIX C: ADULT SALMON DATA

Appendix C.1.–Lower Slate Creek weekly adult pink salmon count by reach, 2020.

	07/22/20		07/29/20		08/06/20		08/18/20		08/25/20		09/08/20	
Stream Reach	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass
0-100 m	0	0	0	0	0	1	0	0	0	0	0	0
100-200 m	0	0	0	0	0	0	0	0	0	0	1	1
200-300 m	0	0	0	0	0	0	4	0	5	0	1	0
300-400 m	0	0	0	0	0	0	0	0	3	0	0	0
400-500 m	0	0	0	0	0	0	0	0	0	0	0	0
500-600 m	0	0	0	0	0	0	0	0	0	0	0	0
600-700 m	0	0	1	0	0	0	0	0	0	0	0	0
700-800 m	0	0	0	0	0	0	0	0	0	0	0	0
800-900 m	0	0	0	0	0	0	0	0	0	0	0	0
900-Falls	0	0	0	0	0	0	0	0	0	0	ND	ND
Total	0	0	1	0	0	1	4	0	8	0	**2**	**1**

Note: Bold values indicate incomplete surveys.

Appendix C.2.–Lower Slate Creek weekly adult coho salmon count by reach, 2020.

	09/24/20		10/01/20		10/07/20		10/13/20		10/29/20	
Stream Reach	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass
0-100 m	0	0	0	0	0	0	0	0	0	0
100-200 m	0	0	0	0	0	0	0	0	0	0
200-300 m	0	0	0	0	0	0	0	0	0	0
300-400 m	0	0	0	0	0	0	0	0	0	0
400-500 m	0	0	0	0	0	0	0	0	0	0
500-600 m	0	0	0	0	0	0	0	0	0	0
600-700 m	0	0	0	0	0	0	0	0	0	0
700-800 m	0	0	0	0	0	0	0	0	0	0
800-900 m	0	0	0	0	1	0	0	0	0	0
900-Falls	0	0	2	0	0	0	1	0	0	0
Total	0	0	2	0	1	0	1	0	0	0

Appendix C.3.–Lower Johnson Creek weekly adult pink salmon count by reach, 2020.

	07/22/20		07/30/20		08/06/20		08/26/20		09/08/20	
Stream Reach	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass
Con-Lace	0	0	0	0	52	0	0	0	0	0
Lace-JM	15	0	28	0	252	0	21	0	0	0
JM-Trap Site	0	0	29	0	570	0	120	2	24	0
Trap-Site #4	8	0	110	0	638	0	205	3	62	0
Site #4-Site #7	8	0	118	1	182	0	75	7	9	0
Site #7-Site #10	0	0	32	0	94	0	42	10	3	0
Site #10-PH	0	0	2	0	18	0	19	1	1	0
PH-LF	0	0	0	0	0	0	0	0	0	0
LF-Site #15	0	0	0	0	0	0	0	0	0	0
Site #15-Falls	0	0	0	0	0	0	0	0	ND	ND
Total	31	0	319	1	1,806	0	482	23	**99**	**0**

Note: Bold values indicate incomplete surveys.

Appendix C.4.–Lower Johnson Creek weekly adult chum salmon count by reach, 2020.

	07/22/20		07/30/20		08/06/20		08/26/20		09/08/20	
Stream Reach	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass
Con-Lace	0	0	0	0	0	0	0	0	0	0
Lace-JM	0	0	0	0	0	0	0	0	0	0
JM-Trap Site	0	0	0	0	0	0	0	0	0	0
Trap-Site #4	0	0	0	0	0	0	0	0	0	0
Site #4-Site #7	1	0	1	0	2	0	0	0	0	0
Site #7-Site #10	0	0	0	0	1	0	0	0	0	0
Site #10-PH	0	0	0	0	0	0	0	0	0	0
PH-LF	0	0	0	0	0	0	0	0	0	0
LF-Site #15	0	0	0	0	0	0	0	0	0	0
Site #15-Falls	0	0	0	0	0	0	0	0	ND	ND
Total	1	0	1	0	3	0	0	0	**0**	**0**

Note: Bold values indicate incomplete surveys.

Appendix C.5.–Lower Johnson Creek weekly adult coho salmon count by reach, 2020.

	09/24/20		10/01/20		10/07/20		10/13/20		10/29/20	
Stream Reach	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass
Con-Lace	0	0	0	0	0	0	0	0	0	0
Lace-JM	0	0	9	0	0	0	0	0	0	0
JM-Trap Site	0	0	0	0	2	0	0	0	0	0
Trap-Site #4	1	0	6	0	4	0	0	0	0	0
Site #4-Site #7	0	0	0	0	2	0	0	0	0	0
Site #7-Site #10	0	0	0	0	0	0	5	0	0	0
Site #10-PH	0	0	1	0	0	0	0	0	1	0
PH-LF	0	0	0	0	0	0	0	0	0	0
LF-Site #15	0	0	0	0	0	0	0	0	0	0
Site #15-Falls	0	0	6	0	3	0	9	0	0	0
Total	1	0	22	0	11	0	14	0	1	0

Note: A survey was not completed the week beginning October 19.

Appendix C.6.–Lower Sherman Creek weekly adult pink salmon count by reach, 2020.

	07/22/20		07/29/20		08/06/20		08/18/20		08/25/20	
Stream Reach	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass	Count	Carcass
0-50 m	0	0	0	0	7	0	6	1	7	6
50-100 m	0	0	0	0	0	0	9	1	0	5
100-150 m	0	0	0	0	0	0	14	0	1	4
150-200 m	0	0	0	0	4	0	24	0	76	17
200-250 m	0	0	0	0	0	0	5	0	0	2
250-300 m	0	0	0	0	2	0	1	1	0	3
300-350 m	0	0	0	0	0	0	3	0	0	8
350-Falls	0	0	0	0	4	0	12	0	15	0
Total	0	0	0	0	17	0	74	3	99	45

Appendix C.7.–Lower Slate Creek adult pink salmon count by statistical week, 2011–2020.

Statistical Week No.	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
29	ND	0	0	0	ND	ND	0	ND	ND	ND
30	**0**	0	7	0	12	0	0	0	0	0
31	0	364	66	2	487	0	7	ND	0	1
32	369	1,106	604	14	1,769	1	386	0	0	0
33	763	3,152	864	13	1,783	0	**477**	**3**	200	ND
34	1,394	2,331	1,199	12	1,543	64	2,818	**1**	11	4
35	1,646	318	472	0	850	12	**1,340**	ND	532	8
36	1,807	1	97	ND	527	**2**	1,811	ND	69	ND
37	229	0	27	ND	575	ND	577	ND	25	**2**
38	46	ND	1	ND	32	ND	ND	ND	ND	ND
39	0	ND	ND	ND	2	ND	0	ND	ND	ND
40	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

Note: Bold numbers indicate incomplete surveys.

Appendix C.8.–Lower Johnson Creek adult pink salmon count by statistical week, 2011–2020.

Statistical Week No.	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
29	ND	0	59	ND	ND	ND	109	ND	ND	ND
30	1	73	200	44	4,512	0	1,222	42	96	31
31	180	411	2,250	48	568	6	3,291	90	457	319
32	1,891	753	1,456	84	17,517	154	2,272	91	514	1,806
33	3,850	1,698	1,873	2	19,028	125	3,364	145	783	ND
34	5,264	1,816	1,557	11	5,444	15	4,010	**66**	976	ND
35	1,350	198	545	0	2,057	95	5,165	0	1,241	482
36	3,712	60	149	ND	1,238	33	1,775	0	574	ND
37	670	7	97	ND	702	ND	1,587	ND	337	**99**
38	436	0	ND	ND	249	ND	**288**	ND	18	ND
39	145	ND	ND	ND	10	ND	**156**	ND	ND	ND
40	ND	ND	ND	ND	ND	ND	**0**	ND	ND	ND
Total	17,499	5,016	8,186	189	51,325	428	23,239	434	4,996	2,737

Note: Bold numbers indicate incomplete surveys.

Appendix C.9.–Lower Sherman Creek adult pink salmon count by statistical week, 2011–2020.

Statistical Week No.	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
29	ND	0	2	ND	ND	ND	0	ND	ND	ND
30	1	2	164	0	120	0	4	0	0	0
31	298	9	860	6	38	0	61	0	214	0
32	773	97	979	40	348	0	778	4	438	17
33	1,049	285	765	10	723	0	1,076	81	850	0
34	397	521	549	4	334	**0**	730	1	460	74
35	157	521	785	10	ND	24	941	ND	220	99
36	870	145	624	0	413	**2**	781	ND	322	ND
37	**416**	25	232	ND	648	ND	841	ND	237	ND
38	609	3	21	ND	159	ND	478	ND	75	ND
39	**35**	ND	ND	ND	15	ND	ND	ND	ND	ND
40	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

Note: Bold numbers indicate incomplete surveys.

APPENDIX D: SPAWNING SUBSTRATE DATA

Appendix D.1.–Lower Slate Creek SP1 pink salmon spawning substrate data, 2011–2020.

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

Appendix D.2.–Lower Slate Creek SP2 pink salmon spawning substrate data, 2011–2020.

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

APPENDIX E: SEDIMENT DATA AND LAB REPORT

Appendix E.1.–Lower Slate Creek sediment compositions, 2011–2020.

	Particle Size Data							
Sample Date	% Clay	% Silt	% Sand	% Coarse material (> 2 mm)	% Total Solids	% Total Volatile Solids	Total Sulfide (mg/kg)	% Total Organic Carbon
10/03/11	2.0	4.0	94.0	0.4	78.00	3.38	ND	2.04
07/03/12	2.0	0.0	98.0	0.1	79.22	3.37	ND	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	75.3	3.28	<1.3	0.58
07/06/15	1.8	3.1	72.2	22.8	83.5	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

Appendix E.2.–East Fork Slate Creek sediment compositions, 2011–2020.

	Particle Size Data							
Sample Date	% Clay	% Silt	% Sand	% Coarse material (> 2 mm)	% Total Solids	% Total Volatile Solids	Total Sulfide (mg/kg)	% Total Organic Carbon
10/03/11	10.0	4.0	86.0	1.7	60.17	7.81	ND	11.00
07/10/12	40.0	34.0	26.0	0.0	23.72	28.54	ND	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

Appendix E.3.–Upper Slate Creek sediment compositions, 2011–2020.

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	ND	5.46
07/02/12	2.0	0.0	98.0	0.3	79.58	2.90	ND	3.74
07/01/13	4.0	0.0	96.0	0.2	74.21	2.73	ND	5.50
07/30/14	4.3	8.2	87.5	0.0	72.4	3.88	<1.4	0.87
07/07/15	1.5	0.2	31.9	66.3	76.5	ND	<1.3	1.04
07/06/16	0.0	2.9	73.1	24.0	62.9	5.00	<2.2	2.14
07/07/17	3.0	4.6	89.9	2.5	72.7	3.45	<2.4	0.84
06/28/18	2.7	5.3	80.6	11.4	67.6	4.10	<2.7	0.815
08/05/19	2.5	0.4	60.5	36.7	72.4	3.75	<2.4	0.676
07/09/20	0.6	0.3	12.4	97.4	76.9	3.50	2.5	0.328
07/09/20	0.7	0.5	74.4	22.4	70.6	4.10	1.8	0.734
07/09/20	0.6	0.5	52.3	41.0	75.5	4.50	2.9	1.05

Appendix E.4.–Lower Johnson Creek sediment compositions, 2011–2020.

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	ND	0.89
07/02/12	8.0	0.0	92.0	0.0	77.67	2.55	ND	1.19
07/01/13	2.0	2.0	96.0	0.3	73.21	0.90	ND	1.08
07/30/14	2.9	4.8	91.4	0.2	73.7	1.93	<1.4	0.26
07/06/15	0.4	1.1	41.9	56.6	80.0	ND	<1.3	0.376
08/08/16	5.1	25.4	69.4	0.0	71.9	2.40	<2.5	0.422
07/07/17	4.1	20.8	72.6	2.5	57.6	4.60	<3.3	1.6
06/29/18	2.8	5.6	89.4	2.2	77.6	2.35	<2.5	0.483
07/22/19	1.1	2.4	89.5	7.0	71.3	2.50	<2.8	0.452
07/09/20	0.2	1.1	80.8	15.2	77.4	2.20	2.5	0.298
07/09/20	0.6	1.7	88.2	6.5	74.2	2.40	3.6	0.341
07/09/20	0.7	0.8	84.1	3.2	78.8	2.10	1.4	0.269

Appendix E.5.–Lower Sherman Creek sediment compositions, 2011–2020.

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	ND	0.54
07/03/12	4.0	0.0	96.0	0.1	78.55	3.05	ND	0.82
07/01/13	2.0	2.0	96.0	0.6	75.66	0.75	ND	0.61
07/28/14	3.4	6.5	89.9	0.3	76.7	2.50	<1.3	0.35
07/07/15	1.8	3.0	86.1	9.0	76.2	ND	<1.3	0.399
07/06/16	0.1	0.9	71.2	27.8	80.5	3.10	<2.4	0.322
07/07/17	1.5	5.4	67.0	26.1	76.5	2.00	<2.5	0.288
06/29/18	2.3	2.5	88.9	6.3	69.3	2.50	<2.6	0.294
07/22/19	0.0	1.6	72.2	26.2	61.4	2.60	<3.2	0.317
07/09/20	1.0	1.1	87.3	10.7	68.4	3.20	1.5	0.443
07/09/20	0.2	1.3	97.7	14.5	70.1	2.60	3.5	0.417
07/09/20	0.4	0.9	89.0	14.5	70.5	2.80	3.0	0.417

Appendix E.6.–Lower Slate Creek sediment element concentrations, 2011–2020.

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	<0.500	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

Appendix E.7.–East Fork Slate Creek sediment element concentrations, 2011–2020.

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

Appendix E.8.–Upper Slate Creek sediment element concentrations, 2011–2020.

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	<0.169	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	<0.131	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

Appendix E.9.–Lower Johnson Creek sediment element concentrations, 2011–2020.

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	<0.133	27.3	9.76	<0.533	93.3
07/02/12	0.342	13,100	12.8	0.250	35.5	76.8	<0.123	23.4	9.45	<0.493	97.3
07/01/13	0.269	10,300	11.9	0.492	24.4	56.1	<0.122	15.7	8.00	<0.481	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

Appendix E.10.–Lower Sherman Creek sediment element concentrations, 2011–2020.

Sample	Concentration (mg/kg dry weight)										
Date	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	<0.157	45.9	6.70	<0.517	110
07/03/12	0.289	17,900	24.3	0.578	51.4	79.1	<0.124	40.2	8.43	<0.512	128
07/01/13	0.306	15,400	25.4	<0.520	37.4	69.4	<0.133	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

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December 29, 2020

Analytical Report for Service Request No: K2005968
Revised Service Request No: K2005968.01

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

RE: Couer AK Biomonitoring

Dear Bill,

Enclosed is the revised report for the sample(s) submitted to our laboratory July 15, 2020
For your reference, these analyses have been assigned our service request number **K2005968.**

The missing Grain Size data for samples -008, -009 and -010 are now included in the report.

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

We apologize for any inconvenience this may have created.

Please contact me if you have any questions. My extension is 3376. You may also contact me via email at Mark.Harris@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

for Mark Harris
Project Manager

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Table of Contents

Acronyms

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

Inorganic Data Qualifiers

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

Metals Data Qualifiers

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

Organic Data Qualifiers

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

Additional Petroleum Hydrocarbon Specific Qualifiers

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

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

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

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

Case Narrative

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

ALS Environmental

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

Service Request: K2005968
Date Received: 07/15/2020

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:

Fifteen soil samples were received for analysis at ALS Environmental on 07/15/2020. 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:

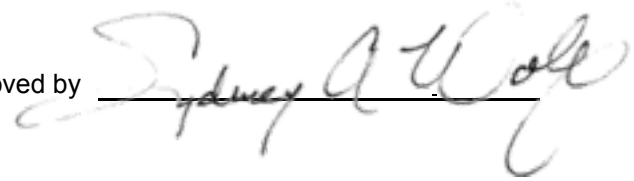
Method 200.8, 07/23/2020: The Relative Percent Difference (RPD) for the replicate analysis of Silver and Zinc in sample 2020KGMUSCS2 was outside the normal ALS control limits. The variability in the results was attributed to the heterogeneous character of the sample. Standard mixing techniques were used, but were not sufficient for complete homogenization of this sample.

Method 200.8, 07/23/2020: The matrix spike recovery of Chromium for sample 2020KGMUSCS2 was outside the ALS control criteria as a result of the heterogeneous character of the sample. Since the unspiked sample contained high analyte concentration relative to the amount spiked, the variability between replicates was sufficient to bias the percent recovery 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:

Method PSEP Sulfide, 07/24/2020: The Relative Percent Difference (RPD) for the replicate analysis of Total Sulfide in sample 2020KGMLSCS3 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 PSEP Sulfide, 07/24/2020: All samples in this delivery group were received past or 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 07/31/2020

Chain of Custody

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Phone (360)577-7222 Fax (360)636-1068
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ALS Environmental

CHAIN OF CUSTODY

110093

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SR# K2025968

COC Set____ of____

COC#_____

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~~Page 1 of 1~~
Page 1 of 2

Project Name	Coeur AK Biomonitoring
Project Number:	
Project Manager	Bill Kane
Company	Coeur AK / ADF&G
Address	802 3rd st. Douglas, AK 99824
Phone #	907.465.6474
email	William.Kane@alaska.gov
Sampler Signature	WK
Sampler Printed Name	William Kane

CLIENT SAMPLE ID	LABID	SAMPLING Date	Time	Matrix	NUMBER OF CONTAINERS	7D 160.4 Modified / TVS	7D PSEP Sulfide / PSEP Sulfide	14D PSEP TOC / PSEP TOC	28D 7471B / Hg	180D 200.8 / Metals T	180D ASTM D422M / Particle size	999D 160.3 Modified / TS	1	2	3	4	5	Remarks
1. 2020KGMLSCS1		7/8/2020	1115	Soil	3	X	X	X	X	X	X	X						Container 1 of 2
2. 2020KGMLSCS2		7/8/2020	1115	Soil	3	X	X	X	X	X	X	X						
3. 2020KGMLSCS3		7/8/2020	1115	Soil	3	X	X	X	X	X	X	X						
4. 2020KGMLSHS1		7/9/2020	0900	Soil	3	X	X	X	X	X	X	X						
5. 2020KGMLSHS2		7/9/2020	0900	Soil	3	X	X	X	X	X	X	X						
6. 2020KGMLSHS3		7/9/2020	0900	Soil	3	X	X	X	X	X	X	X						
7. 2020KGMEFSCS1		7/9/2020	1100	Soil	3	X	X	X	X	X	X	X						Container 2 of 2
8. 2020KGMEFSCS2		7/9/2020	1100	Soil	3	X	X	X	X	X	X	X						
9. 2020KGMEFSCS3		7/9/2020	1100	Soil	3	X	X	X	X	X	X	X						
10. 2020KGMUSCS1		7/9/2020	1215	Soil	3	X	X	X	X	X	X	X						

Report Requirements

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

Invoice Information

P.O.#_____

Bill To: Coeur AK

Keppers@coeur.com

Turnaround Requirements

- ___ 24 hr. ___ 48 hr.
- ___ 5 Day
- ✓ Standard

Requested Report Date

Circle which metals are to be analyzed

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

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

Special Instructions/Comments:

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

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature: WK	Signature: [signature]	Signature	Signature	Signature	Signature
Printed Name: William Kane	Printed Name: [illegible]	Printed Name	Printed Name	Printed Name	Printed Name
Firm: ADF&G	Firm: 7/15/20 1030	Firm	Firm	Firm	Firm
Date/Time: 0830 / 7/13/20	Date/Time	Date/Time	Date/Time	Date/Time	Date/Time

ALS Environmental

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SR# K2005968

COC Set____ of____

COC#_____

~~Page 1 of 1~~
Page 2 of 2

1317 South 13th Ave, Kelso, WA 98626 Phone (360) 577-7222 / 800-695-7222 / FAX (360) 636-1068
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Project Name: Coeur AK Biomonitoring	Project Number:
Project Manager: Bill Kane	
Company: Coeur AK / ADF&G	
Address: 302 3rd St. Douglas, AK 99824	
Phone #: 907.465.6474	email: William.Kane@akska.gov
Sampler Signature: WJK	Sampler Printed Name: William Kane

CLIENT SAMPLE ID	LABID	SAMPLING Date	SAMPLING Time	Matrix	NUMBER OF CONTAINERS	7D: 160.4 Modified / TVS	7D: PSEP Sulfide / PSEP Sulfide	14D: PSEP TOC / PSEP TOC	28D: 7471B / Hg	180D: 200.8 / Metals T	180D: ASTM D422M / Partsize	999D: 160.3 Modified / TS	1	2	3	4	5	Remarks
1. 2020KGMUSCS2		7/9/2020	1215	Soil	3	X	X	X	X	X	X	X						Continue 2of2
2. 2020 KGMUSCS3		7/9/2020	1215	Soil	3	X	X	X	X	X	X	X						
3. ~~2020KGM1~~																		
4. 2020KGMLJCS1		7/9/2020	1340	Soil	3	X	X	X	X	X	X	X						
5. 2020KGMLJCS2		7/9/2020	1340	Soil	3	X	X	X	X	X	X	X						
6. 2020KGMLJCS3		7/9/2020	1340	Soil	3	X	X	X	X	X	X	X						
7.																		
8.																		
9.																		
10.																		

Report Requirements

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

Invoice Information

P.O.#_____

Bill To: Coeur AK

_____

Keppers@Coeur.com

Turnaround Requirements

- ___ 24 hr.
- ___ 48 hr.
- ___ 5 Day
- ✓ Standard

Requested Report Date

Circle which metals are to be analyzed

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

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

Special Instructions/Comments:

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

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature: WJK	Signature:	Signature	Signature	Signature	Signature
Printed Name: William Kane	Printed Name:	Printed Name	Printed Name	Printed Name	Printed Name
Firm: ADF&G	Firm: 7/15/20 1030	Firm	Firm	Firm	Firm
Date/Time: 0830 / 7/13/20	Date/Time	Date/Time	Date/Time	Date/Time	Date/Time

PC MH

Cooler Receipt and Preservation Form

Client ADF+G Service Request K20 05968

Received: 7/15/20 Opened: 7/15/20 By: Unloaded: 7/15/20 By:

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

If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Temp Blank	Sample 1	Sample 2	Sample 3	Sample 4	IR GUN	Cooler / COC ID NA	Tracking Number NA	Filed
13.2	15.3	13.8	15.6	15.7	IR01	Container log 2	3947 7141 0779	
9.2	15.7	14.7	10.2	12.7	"	" 2982	" 7150 7804	

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

Sample ID on Bottle	Sample ID on COC	Identified by:

	Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time
*	2020KGMLSHS2	1602			X						
*	2020KGMLSCS1	40z ZnAcetate			X						

Notes, Discrepancies, & Resolutions: _____

* Transferred to new jars @ lab.

Total Solids

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/08/20 - 07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
Analysis Method:	160.3 Modified	**Units:**	Percent
Prep Method:	None	**Basis:**	As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
2020KGMLSCS1	K2005968-001	**72.7**	-	-	1	07/16/20 15:51	
2020KGMLSCS2	K2005968-002	**72.8**	-	-	1	07/16/20 15:51	
2020KGMLSCS3	K2005968-003	**74.1**	-	-	1	07/16/20 15:51	
2020KGMLSHS1	K2005968-004	**68.4**	-	-	1	07/16/20 15:51	
2020KGMLSHS2	K2005968-005	**70.1**	-	-	1	07/16/20 15:51	
2020KGMLSHS3	K2005968-006	**70.5**	-	-	1	07/16/20 15:51	
2020KGMEFSCS1	K2005968-007	**61.6**	-	-	1	07/16/20 15:51	
2020KGMEFSCS2	K2005968-008	**77.4**	-	-	1	07/16/20 15:51	
2020KGMEFSCS3	K2005968-009	**81.4**	-	-	1	07/16/20 15:51	
2020KGMUSCS1	K2005968-010	**76.9**	-	-	1	07/16/20 15:51	
2020KGMUSCS2	K2005968-011	**70.4**	-	-	1	07/16/20 15:51	
2020KGMUSCS3	K2005968-012	**75.5**	-	-	1	07/16/20 15:51	
2020KGMLJCS1	K2005968-013	**77.4**	-	-	1	07/16/20 15:51	
2020KGMLJCS2	K2005968-014	**74.2**	-	-	1	07/16/20 15:51	
2020KGMLJCS3	K2005968-015	**78.8**	-	-	1	07/16/20 15:51	
Method Blank	K2005968-MB	ND U	-	-	1	07/16/20 15:51	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project	Couer AK Biomonitoring	**Date Collected:**	07/08/20 - 07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
Analysis Method:	160.3 Modified	**Units:**	Percent
Prep Method:	None	**Basis:**	As Received

Replicate Sample Summary
Inorganic Parameters

Sample Name:	Lab Code:	MRL	MDL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
2020KGMLSCS1	K2005968-001DUP	-	-	72.7	74.8	73.8	3	20	07/16/20
2020KGMUSCS2	K2005968-011DUP	-	-	70.4	70.8	70.6	<1	20	07/16/20

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

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

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

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/08/20 - 07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
Analysis Method:	160.4 Modified	**Units:**	Percent
Prep Method:	None	**Basis:**	Dry, per Method

Solids, Total Volatile

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
2020KGMLSCS1	K2005968-001	**3.30**	0.022	-	1	07/16/20 15:51	
2020KGMLSCS2	K2005968-002	**2.90**	0.020	-	1	07/16/20 15:51	
2020KGMLSCS3	K2005968-003	**2.80**	0.022	-	1	07/16/20 15:51	
2020KGMLSHS1	K2005968-004	**3.20**	0.029	-	1	07/16/20 15:51	
2020KGMLSHS2	K2005968-005	**2.60**	0.028	-	1	07/16/20 15:51	
2020KGMLSHS3	K2005968-006	**2.80**	0.029	-	1	07/16/20 15:51	
2020KGMEFSCS1	K2005968-007	**7.60**	0.026	-	1	07/16/20 15:51	
2020KGMEFSCS2	K2005968-008	**3.20**	0.032	-	1	07/16/20 15:51	
2020KGMEFSCS3	K2005968-009	**3.80**	0.032	-	1	07/16/20 15:51	
2020KGMUSCS1	K2005968-010	**3.50**	0.033	-	1	07/16/20 15:51	
2020KGMUSCS2	K2005968-011	**4.10**	0.036	-	1	07/16/20 15:51	
2020KGMUSCS3	K2005968-012	**4.50**	0.033	-	1	07/16/20 15:51	
2020KGMLJCS1	K2005968-013	**2.20**	0.033	-	1	07/16/20 15:51	
2020KGMLJCS2	K2005968-014	**2.40**	0.033	-	1	07/16/20 15:51	
2020KGMLJCS3	K2005968-015	**2.10**	0.029	-	1	07/16/20 15:51	
Method Blank	K2005968-MB	ND U	0.020	-	1	07/16/20 15:51	

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project	Couer AK Biomonitoring	**Date Collected:**	07/08/20 - 07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
Analysis Method:	160.4 Modified	**Units:**	Percent
Prep Method:	None	**Basis:**	Dry, per Method

Replicate Sample Summary
Solids, Total Volatile

Sample Name:	Lab Code:	MRL	MDL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
2020KGMLSCS1	K2005968-001DUP	0.020	-	3.30	3.00	3.15	10	20	07/16/20
2020KGMUSCS2	K2005968-011DUP	0.036	-	4.10	4.10	4.10	<1	20	07/16/20

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

ALS Environmental—Kelso Laboratory
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www.alsglobal.com

REVISED
9:07 am, Dec 29, 2020

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/08/20 - 07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
Analysis Method:	PSEP Sulfide	**Units:**	mg/Kg
Prep Method:	Method	**Basis:**	Dry

Sulfide, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2020KGMLSCS1	K2005968-001	**1.1 J**	1.4	0.5	1	07/24/20 12:54	7/23/20	*
2020KGMLSCS2	K2005968-002	**1.7**	1.3	0.4	1	07/24/20 12:54	7/23/20	*
2020KGMLSCS3	K2005968-003	**1.6**	1.3	0.4	1	07/24/20 12:54	7/23/20	*
2020KGMLSHS1	K2005968-004	**1.5**	1.4	0.5	1	07/24/20 12:54	7/23/20	*
2020KGMLSHS2	K2005968-005	**3.5**	1.4	0.5	1	07/24/20 12:54	7/23/20	*
2020KGMLSHS3	K2005968-006	**3.0**	1.4	0.5	1	07/24/20 12:54	7/23/20	*
2020KGMEFSCS1	K2005968-007	**4.8**	1.5	0.5	1	07/24/20 12:54	7/23/20	*
2020KGMEFSCS2	K2005968-008	**2.1**	1.3	0.4	1	07/24/20 12:54	7/23/20	*
2020KGMEFSCS3	K2005968-009	**1.9**	1.2	0.4	1	07/24/20 12:54	7/23/20	*
2020KGMUSCS1	K2005968-010	**2.5**	1.3	0.4	1	07/24/20 12:54	7/23/20	*
2020KGMUSCS2	K2005968-011	**1.8**	1.4	0.5	1	07/24/20 12:54	7/23/20	*
2020KGMUSCS3	K2005968-012	**2.9**	1.3	0.4	1	07/24/20 12:54	7/23/20	*
2020KGMLJCS1	K2005968-013	**2.5**	1.3	0.4	1	07/24/20 12:54	7/23/20	*
2020KGMLJCS2	K2005968-014	**3.6**	1.3	0.4	1	07/24/20 12:54	7/23/20	*
2020KGMLJCS3	K2005968-015	**1.4**	1.2	0.4	1	07/24/20 12:54	7/23/20	*
Method Blank	K2005968-MB	**0.6 J**	1.0	0.3	1	07/24/20 12:54	7/23/20	

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project	Couer AK Biomonitoring	**Date Collected:**	07/08/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/24/20

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	2020KGMLSCS3	**Units:**	mg/Kg
Lab Code:	K2005968-003	**Basis:**	Dry

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample K2005968-003DUP Result	Average	RPD	RPD Limit
Sulfide, Total	PSEP Sulfide	1.3	0.4	1.6	1.0 J	1.33	47 #	20

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

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

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

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/08/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/24/20
		Date Extracted:	07/23/20

Duplicate Matrix Spike Summary
Sulfide, Total

Sample Name:	2020KGMLSCS3	**Units:**	mg/Kg
Lab Code:	K2005968-003	**Basis:**	Dry
Analysis Method:	PSEP Sulfide		
Prep Method:	Method		

		Matrix Spike			**Duplicate Matrix Spike**					
		K2005968-003MS			K2005968-003DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Sulfide, Total	1.6	1330	1070	124	720	940	77	28-175	59*	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.

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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Analyzed:**	07/24/20
Sample Matrix:	Soil	**Date Extracted:**	07/23/20

Lab Control Sample Summary
Sulfide, Total

Analysis Method:	PSEP Sulfide	**Units:**	mg/Kg
Prep Method:	Method	**Basis:**	Dry
		Analysis Lot:	688585

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K2005968-LCS	779	810	97	39-166

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring

Continuing Calibration Verification (CCV) Summary

Sulfide, Total

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

	Analysis Lot	Lab Code	Date Analyzed	True Value	Measured Value	Percent Recovery	Acceptance Limits
CCV1	688585	KQ2010193-01	07/24/20 12:54	1.61	1.85	115	90-110
CCV2	688585	KQ2010193-02	07/24/20 12:54	1.61	1.81	113	90-110
CCV3	688585	KQ2010193-03	07/24/20 12:54	1.61	1.87	116	90-110

Client: Alaska Department of Fish and Game **Service Request:**K2005968
Project: Couer AK Biomonitoring

Continuing Calibration Blank (CCB) Summary
Sulfide, Total

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

	Analysis Lot	Lab Code	Date Analyzed	MRL	MDL	Result	Q
CCB1	688585	KQ2010193-04	07/24/20 12:54	1.0	0.3	ND	U
CCB2	688585	KQ2010193-05	07/24/20 12:54	1.0	0.3	ND	U
CCB3	688585	KQ2010193-06	07/24/20 12:54	1.0	0.3	ND	U

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/08/20 - 07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
Analysis Method:	PSEP TOC	**Units:**	Percent
Prep Method:	ALS SOP	**Basis:**	Dry, per Method

Carbon, Total Organic (TOC)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2020KGMLSCS1	K2005968-001	**0.615**	0.050	0.020	1	07/22/20 13:15	7/22/20	
2020KGMLSCS2	K2005968-002	**0.376**	0.050	0.020	1	07/22/20 13:15	7/22/20	
2020KGMLSCS3	K2005968-003	**0.402**	0.050	0.020	1	07/22/20 13:15	7/22/20	
2020KGMLSHS1	K2005968-004	**0.443**	0.050	0.020	1	07/22/20 13:15	7/22/20	
2020KGMLSHS2	K2005968-005	**0.417**	0.050	0.020	1	07/22/20 13:15	7/22/20	
2020KGMLSHS3	K2005968-006	**0.417**	0.050	0.020	1	07/22/20 13:15	7/22/20	
2020KGMEFSCS1	K2005968-007	**2.68**	0.050	0.020	1	07/22/20 13:15	7/22/20	
2020KGMEFSCS2	K2005968-008	**7.52**	0.050	0.020	1	07/22/20 13:15	7/22/20	
2020KGMEFSCS3	K2005968-009	**1.21**	0.050	0.020	1	07/22/20 13:15	7/22/20	
2020KGMUSCS1	K2005968-010	**0.328**	0.050	0.020	1	07/22/20 13:15	7/22/20	
2020KGMUSCS2	K2005968-011	**0.734**	0.050	0.020	1	07/22/20 13:15	7/22/20	
2020KGMUSCS3	K2005968-012	**1.05**	0.050	0.020	1	07/22/20 13:15	7/22/20	
2020KGMLJCS1	K2005968-013	**0.298**	0.050	0.020	1	07/22/20 13:15	7/22/20	
2020KGMLJCS2	K2005968-014	**0.341**	0.050	0.020	1	07/22/20 13:15	7/22/20	
2020KGMLJCS3	K2005968-015	**0.269**	0.050	0.020	1	07/22/20 13:15	7/22/20	
Method Blank	K2005968-MB	ND U	0.050	0.020	1	07/22/20 13:15	7/22/20	

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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project	Couer AK Biomonitoring	**Date Collected:**	07/08/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/22/20

Triplicate Sample Summary
General Chemistry Parameters

Sample Name:	2020KGMLSCS1	**Units:**	Percent
Lab Code:	K2005968-001	**Basis:**	Dry, per Method
Analysis Method:	PSEP TOC		
Prep Method:	ALS SOP		

Analyte Name	MRL	MDL	Sample Result	Duplicate K2005968-001DUP Result	Triplicate K2005968-001TRP Result	Average	RSD	RSD Limit
Carbon, Total Organic (TOC)	0.050	0.020	0.615	0.612	0.610	0.612	<1	27

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

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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.

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SuperSet Reference:20-0000556354 rev 00

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/08/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/22/20
		Date Extracted:	07/22/20

Duplicate Matrix Spike Summary
Carbon, Total Organic (TOC)

Sample Name:	2020KGMLSCS1	**Units:**	Percent
Lab Code:	K2005968-001	**Basis:**	Dry, per Method
Analysis Method:	PSEP TOC		
Prep Method:	ALS SOP		

		Matrix Spike			Duplicate Matrix Spike					
		K2005968-001MS			K2005968-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Carbon, Total Organic (TOC)	0.615	4.02	3.46	98	4.16	3.54	100	69-123	2	27

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

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

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

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

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Analyzed:**	07/22/20
Sample Matrix:	Soil	**Date Extracted:**	07/22/20

Lab Control Sample Summary
Carbon, Total Organic (TOC)

Analysis Method:	PSEP TOC	**Units:**	Percent
Prep Method:	ALS SOP	**Basis:**	Dry, per Method
		Analysis Lot:	688737

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K2005968-LCS	0.511	0.508	101	74-118

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring

Continuing Calibration Verification (CCV) Summary

Carbon, Total Organic (TOC)

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

	Analysis Lot	Lab Code	Date Analyzed	True Value	Measured Value	Percent Recovery	Acceptance Limits
CCV1	688737	KQ2010265-01	07/22/20 13:15	20.0	19.8	99	90-110
CCV2	688737	KQ2010265-02	07/22/20 13:15	20.0	19.8	99	90-110
CCV3	688737	KQ2010265-03	07/22/20 13:15	20.0	19.8	99	90-110
CCV4	688737	KQ2010265-04	07/22/20 13:15	20.0	19.8	99	90-110

Client: Alaska Department of Fish and Game **Service Request:**K2005968
Project: Couer AK Biomonitoring

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

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

	Analysis Lot	Lab Code	Date Analyzed	MRL	MDL	Result	Q
CCB1	688737	KQ2010265-05	07/22/20 13:15	0.050	0.020	ND	U
CCB2	688737	KQ2010265-06	07/22/20 13:15	0.050	0.020	ND	U
CCB3	688737	KQ2010265-07	07/22/20 13:15	0.050	0.020	ND	U
CCB4	688737	KQ2010265-08	07/22/20 13:15	0.050	0.020	ND	U

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/08/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/18/20

Particle Size Determination
ASTM D422M

Sample Name: 2020KGMLSCS1
Lab Code: K2005968-001

Sand Fraction: Dry Weight (Grams)	28.9883
Sand Fraction: Weight Recovered (Grams)	28.9124
Sand Fraction: Percent Recovery	99.74

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	0.3910	1.19
Sand, Very Coarse	-1 to 0 Ø	2.1390	6.49
Sand, Coarse	0 to 1 Ø	9.0045	27.31
Sand, Medium	1 to 2 Ø	10.3331	31.34
Sand, Fine	2 to 3 Ø	6.0956	18.49
Sand, Very Fine	3 to 4 Ø	0.6122	1.86
75.0 µm	4 Ø	0.5750	1.74
31.3 µm	5 Ø	0.1700	0.52
15.6 µm	6 Ø	0.1150	0.35
7.8 µm	7 Ø	0.0000	0.00
3.9 µm	8 Ø	0.0850	0.26
1.95 µm	9 Ø	0.0700	0.21
0.98 µm	> 10 Ø	0.1350	0.41
		29.7254	90.15

dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/08/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/18/20

Particle Size Determination
ASTM D422M

Sample Name: 2020KGMLSCS2
Lab Code: K2005968-002

Sand Fraction: Dry Weight (Grams)	31.9125
Sand Fraction: Weight Recovered (Grams)	31.9049
Sand Fraction: Percent Recovery	99.98

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	0.7709	2.35
Gravel, Fine	-2 Ø to -1 Ø	5.4968	16.74
Sand, Very Coarse	-1 to 0 Ø	9.8019	29.85
Sand, Coarse	0 to 1 Ø	8.9735	27.32
Sand, Medium	1 to 2 Ø	4.8159	14.66
Sand, Fine	2 to 3 Ø	1.8352	5.59
Sand, Very Fine	3 to 4 Ø	0.1344	0.41
75.0 µm	4 Ø	0.0050	0.02
31.3 µm	5 Ø	0.0650	0.20
15.6 µm	6 Ø	0.1300	0.40
7.8 µm	7 Ø	0.0200	0.06
3.9 µm	8 Ø	0.0150	0.05
1.95 µm	9 Ø	0.0150	0.05
0.98 µm	> 10 Ø	0.0750	0.23
		32.1536	97.91

dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/08/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/18/20

Particle Size Determination
ASTM D422M

Sample Name: 2020KGMLSCS3
Lab Code: K2005968-003

Sand Fraction: Dry Weight (Grams)	33.0522
Sand Fraction: Weight Recovered (Grams)	33.0085
Sand Fraction: Percent Recovery	99.87

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	0.5402	1.60
Gravel, Fine	-2 Ø to -1 Ø	3.8441	11.36
Sand, Very Coarse	-1 to 0 Ø	8.3010	24.52
Sand, Coarse	0 to 1 Ø	12.7201	37.58
Sand, Medium	1 to 2 Ø	6.0796	17.96
Sand, Fine	2 to 3 Ø	1.4110	4.17
Sand, Very Fine	3 to 4 Ø	0.0751	0.22
75.0 µm	4 Ø	0.0650	0.19
31.3 µm	5 Ø	0.0450	0.13
15.6 µm	6 Ø	0.0000	0.00
7.8 µm	7 Ø	0.0250	0.07
3.9 µm	8 Ø	0.0300	0.09
1.95 µm	9 Ø	0.0150	0.04
0.98 µm	> 10 Ø	0.0550	0.16
		33.2061	98.10

dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/18/20

Particle Size Determination
ASTM D422M

Sample Name: 2020KGMLSHS1
Lab Code: K2005968-004

Sand Fraction: Dry Weight (Grams)	31.4921
Sand Fraction: Weight Recovered (Grams)	31.4580
Sand Fraction: Percent Recovery	99.89

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	1.0930	3.41
Gravel, Fine	-2 Ø to -1 Ø	2.3270	7.27
Sand, Very Coarse	-1 to 0 Ø	8.6041	26.88
Sand, Coarse	0 to 1 Ø	11.0884	34.64
Sand, Medium	1 to 2 Ø	5.7690	18.02
Sand, Fine	2 to 3 Ø	2.2911	7.16
Sand, Very Fine	3 to 4 Ø	0.1998	0.62
75.0 µm	4 Ø	0.1650	0.52
31.3 µm	5 Ø	0.0750	0.23
15.6 µm	6 Ø	0.0850	0.27
7.8 µm	7 Ø	0.0100	0.03
3.9 µm	8 Ø	0.0500	0.16
1.95 µm	9 Ø	0.0050	0.02
0.98 µm	> 10 Ø	0.2700	0.84
		32.0324	100.07

dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/18/20

Particle Size Determination
ASTM D422M

Sample Name: 2020KGMLSHS2
Lab Code: K2005968-005

Sand Fraction: Dry Weight (Grams)	35.9133
Sand Fraction: Weight Recovered (Grams)	35.7967
Sand Fraction: Percent Recovery	99.68

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	2.0911	6.59
Gravel, Fine	-2 Ø to -1 Ø	2.5166	7.93
Sand, Very Coarse	-1 to 0 Ø	9.6720	30.47
Sand, Coarse	0 to 1 Ø	13.1878	41.55
Sand, Medium	1 to 2 Ø	5.5810	17.58
Sand, Fine	2 to 3 Ø	2.3023	7.25
Sand, Very Fine	3 to 4 Ø	0.2657	0.84
75.0 µm	4 Ø	0.3000	0.95
31.3 µm	5 Ø	0.0450	0.14
15.6 µm	6 Ø	0.0400	0.13
7.8 µm	7 Ø	0.0200	0.06
3.9 µm	8 Ø	0.0050	0.02
1.95 µm	9 Ø	0.0300	0.09
0.98 µm	> 10 Ø	0.0300	0.09
		36.0865	113.69

dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/18/20

Particle Size Determination
ASTM D422M

Sample Name: 2020KGMLSHS3
Lab Code: K2005968-006

Sand Fraction: Dry Weight (Grams)	32.4385
Sand Fraction: Weight Recovered (Grams)	32.3974
Sand Fraction: Percent Recovery	99.87

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	0.7958	2.55
Gravel, Fine	-2 Ø to -1 Ø	3.7347	11.99
Sand, Very Coarse	-1 to 0 Ø	9.8458	31.60
Sand, Coarse	0 to 1 Ø	9.5518	30.66
Sand, Medium	1 to 2 Ø	4.8805	15.67
Sand, Fine	2 to 3 Ø	3.0431	9.77
Sand, Very Fine	3 to 4 Ø	0.4041	1.30
75.0 µm	4 Ø	0.2450	0.79
31.3 µm	5 Ø	0.0000	0.00
15.6 µm	6 Ø	0.0150	0.05
7.8 µm	7 Ø	0.0250	0.08
3.9 µm	8 Ø	0.0250	0.08
1.95 µm	9 Ø	0.0650	0.21
0.98 µm	> 10 Ø	0.0200	0.06
		32.6508	104.81

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/18/20

Particle Size Determination
ASTM D422M

Sample Name: 2020KGMEFSCS1
Lab Code: K2005968-007

Sand Fraction: Dry Weight (Grams)	31.1399
Sand Fraction: Weight Recovered (Grams)	31.0538
Sand Fraction: Percent Recovery	99.72

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	9.0730	31.97
Gravel, Fine	-2 Ø to -1 Ø	4.7943	16.89
Sand, Very Coarse	-1 to 0 Ø	7.4926	26.40
Sand, Coarse	0 to 1 Ø	5.8932	20.77
Sand, Medium	1 to 2 Ø	2.1327	7.52
Sand, Fine	2 to 3 Ø	1.2274	4.33
Sand, Very Fine	3 to 4 Ø	0.2189	0.77
75.0 µm	4 Ø	0.4150	1.46
31.3 µm	5 Ø	0.1200	0.42
15.6 µm	6 Ø	0.1950	0.69
7.8 µm	7 Ø	0.0450	0.16
3.9 µm	8 Ø	0.0100	0.04
1.95 µm	9 Ø	0.0000	0.00
0.98 µm	> 10 Ø	0.2400	0.85
		31.8571	112.26

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/18/20

Particle Size Determination
ASTM D422M

Sample Name: 2020KGMEFSCS2
Lab Code: K2005968-008

Sand Fraction: Dry Weight (Grams)	30.3398
Sand Fraction: Weight Recovered (Grams)	30.2763
Sand Fraction: Percent Recovery	99.79

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	13.1921	36.47
Gravel, Fine	-2 Ø to -1 Ø	8.0003	22.11
Sand, Very Coarse	-1 to 0 Ø	5.1714	14.29
Sand, Coarse	0 to 1 Ø	1.9566	5.41
Sand, Medium	1 to 2 Ø	0.5910	1.63
Sand, Fine	2 to 3 Ø	0.9127	2.52
Sand, Very Fine	3 to 4 Ø	0.2897	0.80
75.0 µm	4 Ø	0.3900	1.08
31.3 µm	5 Ø	0.1400	0.39
15.6 µm	6 Ø	0.1750	0.48
7.8 µm	7 Ø	0.1050	0.29
3.9 µm	8 Ø	0.0350	0.10
1.95 µm	9 Ø	0.0000	0.00
0.98 µm	> 10 Ø	0.2850	0.79
		31.2438	86.36

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/18/20

Particle Size Determination
ASTM D422M

Sample Name: 2020KGMEFSCS3
Lab Code: K2005968-009

Sand Fraction: Dry Weight (Grams)	35.5438
Sand Fraction: Weight Recovered (Grams)	35.4723
Sand Fraction: Percent Recovery	99.80

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	11.4937	30.84
Gravel, Fine	-2 Ø to -1 Ø	12.2963	32.99
Sand, Very Coarse	-1 to 0 Ø	9.1547	24.56
Sand, Coarse	0 to 1 Ø	2.1676	5.82
Sand, Medium	1 to 2 Ø	0.2504	0.67
Sand, Fine	2 to 3 Ø	0.0923	0.25
Sand, Very Fine	3 to 4 Ø	0.0131	0.04
75.0 µm	4 Ø	0.0200	0.05
31.3 µm	5 Ø	0.0000	0.00
15.6 µm	6 Ø	0.0250	0.07
7.8 µm	7 Ø	0.0050	0.01
3.9 µm	8 Ø	0.0800	0.21
1.95 µm	9 Ø	0.0600	0.16
0.98 µm	> 10 Ø	0.0950	0.25
		35.7531	95.92

dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/18/20

Particle Size Determination
ASTM D422M

Sample Name: 2020KGMUSCS1
Lab Code: K2005968-010

Sand Fraction: Dry Weight (Grams)	39.0344
Sand Fraction: Weight Recovered (Grams)	38.9889
Sand Fraction: Percent Recovery	99.88

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	16.7134	47.04
Gravel, Fine	-2 Ø to -1 Ø	17.8837	50.33
Sand, Very Coarse	-1 to 0 Ø	4.0290	11.34
Sand, Coarse	0 to 1 Ø	0.3004	0.85
Sand, Medium	1 to 2 Ø	0.0395	0.11
Sand, Fine	2 to 3 Ø	0.0169	0.05
Sand, Very Fine	3 to 4 Ø	0.0034	0.01
75.0 µm	4 Ø	0.0300	0.08
31.3 µm	5 Ø	0.0350	0.10
15.6 µm	6 Ø	0.0100	0.03
7.8 µm	7 Ø	0.0250	0.07
3.9 µm	8 Ø	0.0050	0.01
1.95 µm	9 Ø	0.0250	0.07
0.98 µm	> 10 Ø	0.1850	0.52
		39.3013	110.60

dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/18/20

Particle Size Determination
ASTM D422M

Sample Name: 2020KGMUSCS2
Lab Code: K2005968-011

Sand Fraction: Dry Weight (Grams)	31.9675
Sand Fraction: Weight Recovered (Grams)	31.9188
Sand Fraction: Percent Recovery	99.85

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	1.1335	3.44
Gravel, Fine	-2 Ø to -1 Ø	6.2457	18.94
Sand, Very Coarse	-1 to 0 Ø	14.4125	43.70
Sand, Coarse	0 to 1 Ø	8.1397	24.68
Sand, Medium	1 to 2 Ø	1.4212	4.31
Sand, Fine	2 to 3 Ø	0.4922	1.49
Sand, Very Fine	3 to 4 Ø	0.0594	0.18
75.0 µm	4 Ø	0.0300	0.09
31.3 µm	5 Ø	0.0500	0.15
15.6 µm	6 Ø	0.0450	0.14
7.8 µm	7 Ø	0.0250	0.08
3.9 µm	8 Ø	0.0200	0.06
1.95 µm	9 Ø	0.1750	0.53
0.98 µm	> 10 Ø	0.0300	0.09
		32.2792	97.88

dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/18/20

Particle Size Determination
ASTM D422M

Sample Name: 2020KGMUSCS3
Lab Code: K2005968-012

Sand Fraction: Dry Weight (Grams)	32.5714
Sand Fraction: Weight Recovered (Grams)	32.5061
Sand Fraction: Percent Recovery	99.80

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	5.6368	16.20
Gravel, Fine	-2 Ø to -1 Ø	8.6131	24.75
Sand, Very Coarse	-1 to 0 Ø	8.0209	23.05
Sand, Coarse	0 to 1 Ø	6.4043	18.40
Sand, Medium	1 to 2 Ø	2.5579	7.35
Sand, Fine	2 to 3 Ø	1.1097	3.19
Sand, Very Fine	3 to 4 Ø	0.1170	0.34
75.0 µm	4 Ø	0.1050	0.30
31.3 µm	5 Ø	0.0200	0.06
15.6 µm	6 Ø	0.0800	0.23
7.8 µm	7 Ø	0.0450	0.13
3.9 µm	8 Ø	0.0100	0.03
1.95 µm	9 Ø	0.1600	0.46
0.98 µm	> 10 Ø	0.0450	0.13
		32.9247	94.60

dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/18/20

Particle Size Determination
ASTM D422M

Sample Name: 2020KGMLJCS1
Lab Code: K2005968-013

Sand Fraction: Dry Weight (Grams)	34.7899
Sand Fraction: Weight Recovered (Grams)	34.7198
Sand Fraction: Percent Recovery	99.80

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	5.4870	15.18
Sand, Very Coarse	-1 to 0 Ø	20.2214	55.95
Sand, Coarse	0 to 1 Ø	6.0359	16.70
Sand, Medium	1 to 2 Ø	1.6030	4.44
Sand, Fine	2 to 3 Ø	1.2249	3.39
Sand, Very Fine	3 to 4 Ø	0.1235	0.34
75.0 µm	4 Ø	0.2200	0.61
31.3 µm	5 Ø	0.0800	0.22
15.6 µm	6 Ø	0.0800	0.22
7.8 µm	7 Ø	0.0000	0.00
3.9 µm	8 Ø	0.0000	0.00
1.95 µm	9 Ø	0.0050	0.01
0.98 µm	> 10 Ø	0.0600	0.17
		35.1407	97.23

dba ALS Environmental
Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/18/20

Particle Size Determination
ASTM D422M

Sample Name: 2020KGMLJCS2
Lab Code: K2005968-014

Sand Fraction: Dry Weight (Grams)	32.1860
Sand Fraction: Weight Recovered (Grams)	32.1199
Sand Fraction: Percent Recovery	99.79

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	0.0650	0.19
Gravel, Fine	-2 Ø to -1 Ø	2.1296	6.29
Sand, Very Coarse	-1 to 0 Ø	12.1906	36.01
Sand, Coarse	0 to 1 Ø	10.9428	32.33
Sand, Medium	1 to 2 Ø	3.9362	11.63
Sand, Fine	2 to 3 Ø	2.5387	7.50
Sand, Very Fine	3 to 4 Ø	0.2620	0.77
75.0 µm	4 Ø	0.3300	0.97
31.3 µm	5 Ø	0.1150	0.34
15.6 µm	6 Ø	0.0800	0.24
7.8 µm	7 Ø	0.0500	0.15
3.9 µm	8 Ø	0.0650	0.19
1.95 µm	9 Ø	0.0900	0.27
0.98 µm	> 10 Ø	0.0450	0.13
		32.8399	97.01

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/18/20

Particle Size Determination
ASTM D422M

Sample Name: 2020KGMLJCS3
Lab Code: K2005968-015

Sand Fraction: Dry Weight (Grams)	31.6477
Sand Fraction: Weight Recovered (Grams)	31.6005
Sand Fraction: Percent Recovery	99.85

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	<-2 Ø	0.1035	0.29
Gravel, Fine	-2 Ø to -1 Ø	1.0681	2.95
Sand, Very Coarse	-1 to 0 Ø	3.3565	9.28
Sand, Coarse	0 to 1 Ø	12.8273	35.48
Sand, Medium	1 to 2 Ø	10.7532	29.74
Sand, Fine	2 to 3 Ø	3.2805	9.07
Sand, Very Fine	3 to 4 Ø	0.1762	0.49
75.0 µm	4 Ø	0.1000	0.28
31.3 µm	5 Ø	0.1350	0.37
15.6 µm	6 Ø	0.0150	0.04
7.8 µm	7 Ø	0.0550	0.15
3.9 µm	8 Ø	0.0850	0.24
1.95 µm	9 Ø	0.0100	0.03
0.98 µm	> 10 Ø	0.1500	0.41
		32.1153	88.82

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/18/20

Particle Size Determination
ASTM D422M

Sample Name: 2020KGMLJCS4
Lab Code: K2005968-015DUP

Sand Fraction: Dry Weight (Grams)	30.0297
Sand Fraction: Weight Recovered (Grams)	29.8395
Sand Fraction: Percent Recovery	99.37

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	0.2321	0.64
Sand, Very Coarse	-1 to 0 Ø	2.9056	7.99
Sand, Coarse	0 to 1 Ø	9.7557	26.84
Sand, Medium	1 to 2 Ø	9.1665	25.22
Sand, Fine	2 to 3 Ø	5.9789	16.45
Sand, Very Fine	3 to 4 Ø	0.8978	2.47
75.0 µm	4 Ø	1.2250	3.37
31.3 µm	5 Ø	0.5150	1.42
15.6 µm	6 Ø	0.3200	0.88
7.8 µm	7 Ø	0.0900	0.25
3.9 µm	8 Ø	0.0700	0.19
1.95 µm	9 Ø	0.0000	0.00
0.98 µm	> 10 Ø	0.0050	0.01
		31.1616	85.73

Metals

ALS Environmental—Kelso Laboratory
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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/08/20 11:15
Sample Matrix:	Soil	**Date Received:**	07/15/20 10:30
Sample Name:	2020KGMLSCS1	**Basis:**	Dry
Lab Code:	K2005968-001		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**10300**	mg/Kg	9.9	3.0	50	07/27/20 12:31	07/22/20	
Arsenic	200.8	**15.1**	mg/Kg	0.25	0.03	5	07/23/20 12:51	07/22/20	
Cadmium	200.8	**0.589**	mg/Kg	0.0099	0.0035	5	07/23/20 12:51	07/22/20	
Chromium	200.8	**18.0**	mg/Kg	0.099	0.030	5	07/23/20 12:51	07/22/20	
Copper	200.8	**39.0**	mg/Kg	0.050	0.020	5	07/23/20 12:51	07/22/20	
Lead	200.8	**6.75**	mg/Kg	0.025	0.010	5	07/23/20 12:51	07/22/20	
Mercury	7471B	**0.0465**	mg/Kg	0.0052	0.0005	1	07/24/20 08:50	07/23/20	
Nickel	200.8	**31.5**	mg/Kg	0.099	0.015	5	07/23/20 12:51	07/22/20	
Selenium	200.8	**0.94**	mg/Kg	0.50	0.04	5	07/23/20 12:51	07/22/20	
Silver	200.8	**0.0779**	mg/Kg	0.0099	0.0020	5	07/23/20 12:51	07/22/20	
Zinc	200.8	**3580**	mg/Kg	5.0	2.0	100	07/23/20 15:51	07/22/20	

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/08/20 11:15
Sample Matrix:	Soil	**Date Received:**	07/15/20 10:30
Sample Name:	2020KGMLSCS2	**Basis:**	Dry
Lab Code:	K2005968-002		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**10800**	mg/Kg	11	3	50	07/27/20 12:42	07/22/20	
Arsenic	200.8	**12.8**	mg/Kg	0.27	0.03	5	07/23/20 13:01	07/22/20	
Cadmium	200.8	**0.489**	mg/Kg	0.011	0.004	5	07/23/20 13:01	07/22/20	
Chromium	200.8	**19.3**	mg/Kg	0.11	0.03	5	07/23/20 13:01	07/22/20	
Copper	200.8	**35.5**	mg/Kg	0.053	0.021	5	07/23/20 13:01	07/22/20	
Lead	200.8	**5.57**	mg/Kg	0.027	0.011	5	07/23/20 13:01	07/22/20	
Mercury	7471B	**0.0565**	mg/Kg	0.0052	0.0005	1	07/24/20 08:57	07/23/20	
Nickel	200.8	**31.3**	mg/Kg	0.11	0.02	5	07/23/20 13:01	07/22/20	
Selenium	200.8	**0.82**	mg/Kg	0.53	0.05	5	07/23/20 13:01	07/22/20	
Silver	200.8	**0.063**	mg/Kg	0.011	0.002	5	07/23/20 13:01	07/22/20	
Zinc	200.8	**2570**	mg/Kg	5.3	2.1	100	07/23/20 16:01	07/22/20	

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/08/20 11:15
Sample Matrix:	Soil	**Date Received:**	07/15/20 10:30
Sample Name:	2020KGMLSCS3	**Basis:**	Dry
Lab Code:	K2005968-003		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**9770**	mg/Kg	9.8	2.9	50	07/27/20 12:44	07/22/20	
Arsenic	200.8	**11.3**	mg/Kg	0.25	0.03	5	07/23/20 13:04	07/22/20	
Cadmium	200.8	**0.587**	mg/Kg	0.0098	0.0034	5	07/23/20 13:04	07/22/20	
Chromium	200.8	**18.5**	mg/Kg	0.098	0.029	5	07/23/20 13:04	07/22/20	
Copper	200.8	**34.2**	mg/Kg	0.049	0.020	5	07/23/20 13:04	07/22/20	
Lead	200.8	**5.27**	mg/Kg	0.025	0.010	5	07/23/20 13:04	07/22/20	
Mercury	7471B	**0.0390**	mg/Kg	0.0050	0.0005	1	07/24/20 08:58	07/23/20	
Nickel	200.8	**31.7**	mg/Kg	0.098	0.015	5	07/23/20 13:04	07/22/20	
Selenium	200.8	**0.87**	mg/Kg	0.49	0.04	5	07/23/20 13:04	07/22/20	
Silver	200.8	**0.0688**	mg/Kg	0.0098	0.0020	5	07/23/20 13:04	07/22/20	
Zinc	200.8	**2640**	mg/Kg	4.9	2.0	100	07/23/20 16:04	07/22/20	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20 09:00
Sample Matrix:	Soil	**Date Received:**	07/15/20 10:30
Sample Name:	2020KGMLSHS1	**Basis:**	Dry
Lab Code:	K2005968-004		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**15800**	mg/Kg	11	3	50	07/27/20 12:49	07/22/20	
Arsenic	200.8	**30.2**	mg/Kg	0.28	0.03	5	07/23/20 13:07	07/22/20	
Cadmium	200.8	**0.276**	mg/Kg	0.011	0.004	5	07/23/20 13:07	07/22/20	
Chromium	200.8	**32.1**	mg/Kg	0.11	0.03	5	07/23/20 13:07	07/22/20	
Copper	200.8	**49.3**	mg/Kg	0.055	0.022	5	07/23/20 13:07	07/22/20	
Lead	200.8	**6.65**	mg/Kg	0.028	0.011	5	07/23/20 13:07	07/22/20	
Mercury	7471B	**0.0313**	mg/Kg	0.0056	0.0006	1	07/24/20 09:00	07/23/20	
Nickel	200.8	**29.6**	mg/Kg	0.11	0.02	5	07/23/20 13:07	07/22/20	
Selenium	200.8	**0.71**	mg/Kg	0.55	0.05	5	07/23/20 13:07	07/22/20	
Silver	200.8	**0.092**	mg/Kg	0.011	0.002	5	07/23/20 13:07	07/22/20	
Zinc	200.8	**4090**	mg/Kg	5.5	2.2	100	07/23/20 16:07	07/22/20	

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20 09:00
Sample Matrix:	Soil	**Date Received:**	07/15/20 10:30
Sample Name:	2020KGMLSHS2	**Basis:**	Dry
Lab Code:	K2005968-005		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**14000**	mg/Kg	11	3	50	07/27/20 12:51	07/22/20	
Arsenic	200.8	**22.6**	mg/Kg	0.27	0.03	5	07/23/20 13:11	07/22/20	
Cadmium	200.8	**0.223**	mg/Kg	0.011	0.004	5	07/23/20 13:11	07/22/20	
Chromium	200.8	**30.1**	mg/Kg	0.11	0.03	5	07/23/20 13:11	07/22/20	
Copper	200.8	**52.2**	mg/Kg	0.054	0.021	5	07/23/20 13:11	07/22/20	
Lead	200.8	**5.66**	mg/Kg	0.027	0.011	5	07/23/20 13:11	07/22/20	
Mercury	7471B	**0.0262**	mg/Kg	0.0054	0.0005	1	07/24/20 09:05	07/23/20	
Nickel	200.8	**27.7**	mg/Kg	0.11	0.02	5	07/23/20 13:11	07/22/20	
Selenium	200.8	**0.72**	mg/Kg	0.54	0.05	5	07/23/20 13:11	07/22/20	
Silver	200.8	**0.132**	mg/Kg	0.011	0.002	5	07/23/20 13:11	07/22/20	
Zinc	200.8	**3320**	mg/Kg	5.4	2.1	100	07/23/20 16:11	07/22/20	

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20 09:00
Sample Matrix:	Soil	**Date Received:**	07/15/20 10:30
Sample Name:	2020KGMLSHS3	**Basis:**	Dry
Lab Code:	K2005968-006		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**13000**	mg/Kg	10	3	50	07/27/20 12:53	07/22/20	
Arsenic	200.8	**26.5**	mg/Kg	0.26	0.03	5	07/23/20 13:14	07/22/20	
Cadmium	200.8	**0.201**	mg/Kg	0.010	0.004	5	07/23/20 13:14	07/22/20	
Chromium	200.8	**30.5**	mg/Kg	0.10	0.03	5	07/23/20 13:14	07/22/20	
Copper	200.8	**54.8**	mg/Kg	0.052	0.021	5	07/23/20 13:14	07/22/20	
Lead	200.8	**9.68**	mg/Kg	0.026	0.010	5	07/23/20 13:14	07/22/20	
Mercury	7471B	**0.0243**	mg/Kg	0.0053	0.0005	1	07/24/20 09:07	07/23/20	
Nickel	200.8	**27.1**	mg/Kg	0.10	0.02	5	07/23/20 13:14	07/22/20	
Selenium	200.8	**0.86**	mg/Kg	0.52	0.05	5	07/23/20 13:14	07/22/20	
Silver	200.8	**0.171**	mg/Kg	0.010	0.002	5	07/23/20 13:14	07/22/20	
Zinc	200.8	**2850**	mg/Kg	5.2	2.1	100	07/23/20 16:14	07/22/20	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20 11:00
Sample Matrix:	Soil	**Date Received:**	07/15/20 10:30
Sample Name:	2020KGMEFSCS1	**Basis:**	Dry
Lab Code:	K2005968-007		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**11100**	mg/Kg	13	4	50	07/27/20 12:55	07/22/20	
Arsenic	200.8	**23.4**	mg/Kg	0.32	0.04	5	07/23/20 13:48	07/22/20	
Cadmium	200.8	**1.06**	mg/Kg	0.013	0.005	5	07/23/20 13:48	07/22/20	
Chromium	200.8	**14.7**	mg/Kg	0.13	0.04	5	07/23/20 13:48	07/22/20	
Copper	200.8	**27.4**	mg/Kg	0.065	0.026	5	07/23/20 13:48	07/22/20	
Lead	200.8	**4.50**	mg/Kg	0.032	0.013	5	07/23/20 13:48	07/22/20	
Mercury	7471B	**0.0758**	mg/Kg	0.0061	0.0006	1	07/24/20 09:08	07/23/20	
Nickel	200.8	**25.1**	mg/Kg	0.13	0.02	5	07/23/20 13:48	07/22/20	
Selenium	200.8	**1.79**	mg/Kg	0.65	0.06	5	07/23/20 13:48	07/22/20	
Silver	200.8	**0.130**	mg/Kg	0.013	0.003	5	07/23/20 13:48	07/22/20	
Zinc	200.8	**4620**	mg/Kg	6.5	2.6	100	07/23/20 16:17	07/22/20	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20 11:00
Sample Matrix:	Soil	**Date Received:**	07/15/20 10:30
Sample Name:	2020KGMEFSCS2	**Basis:**	Dry
Lab Code:	K2005968-008		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**8290**	mg/Kg	8.9	2.7	50	07/27/20 12:57	07/22/20	
Arsenic	200.8	**18.0**	mg/Kg	0.22	0.03	5	07/23/20 13:51	07/22/20	
Cadmium	200.8	**4.58**	mg/Kg	0.0089	0.0031	5	07/23/20 13:51	07/22/20	
Chromium	200.8	**10.2**	mg/Kg	0.089	0.027	5	07/23/20 13:51	07/22/20	
Copper	200.8	**29.3**	mg/Kg	0.045	0.018	5	07/23/20 13:51	07/22/20	
Lead	200.8	**3.55**	mg/Kg	0.022	0.009	5	07/23/20 13:51	07/22/20	
Mercury	7471B	**0.0368**	mg/Kg	0.0046	0.0005	1	07/24/20 09:10	07/23/20	
Nickel	200.8	**44.3**	mg/Kg	0.089	0.013	5	07/23/20 13:51	07/22/20	
Selenium	200.8	**1.26**	mg/Kg	0.45	0.04	5	07/23/20 13:51	07/22/20	
Silver	200.8	**0.0674**	mg/Kg	0.0089	0.0018	5	07/23/20 13:51	07/22/20	
Zinc	200.8	**4500**	mg/Kg	4.5	1.8	100	07/23/20 16:21	07/22/20	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20 11:00
Sample Matrix:	Soil	**Date Received:**	07/15/20 10:30
Sample Name:	2020KGMEFSCS3	**Basis:**	Dry
Lab Code:	K2005968-009		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**9650**	mg/Kg	9.0	2.7	50	07/27/20 12:59	07/22/20	
Arsenic	200.8	**26.1**	mg/Kg	0.23	0.03	5	07/23/20 13:54	07/22/20	
Cadmium	200.8	**4.79**	mg/Kg	0.0090	0.0032	5	07/23/20 13:54	07/22/20	
Chromium	200.8	**13.9**	mg/Kg	0.090	0.027	5	07/23/20 13:54	07/22/20	
Copper	200.8	**29.6**	mg/Kg	0.045	0.018	5	07/23/20 13:54	07/22/20	
Lead	200.8	**4.66**	mg/Kg	0.023	0.009	5	07/23/20 13:54	07/22/20	
Mercury	7471B	**0.0932**	mg/Kg	0.0044	0.0004	1	07/24/20 09:11	07/23/20	
Nickel	200.8	**49.7**	mg/Kg	0.090	0.014	5	07/23/20 13:54	07/22/20	
Selenium	200.8	**3.40**	mg/Kg	0.45	0.04	5	07/23/20 13:54	07/22/20	
Silver	200.8	**0.0991**	mg/Kg	0.0090	0.0018	5	07/23/20 13:54	07/22/20	
Zinc	200.8	**3630**	mg/Kg	4.5	1.8	100	07/23/20 16:31	07/22/20	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20 12:15
Sample Matrix:	Soil	**Date Received:**	07/15/20 10:30
Sample Name:	2020KGMUSCS1	**Basis:**	Dry
Lab Code:	K2005968-010		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**9650**	mg/Kg	10	3	50	07/27/20 13:01	07/22/20	
Arsenic	200.8	**12.3**	mg/Kg	0.26	0.03	5	07/23/20 13:58	07/22/20	
Cadmium	200.8	**0.561**	mg/Kg	0.010	0.004	5	07/23/20 13:58	07/22/20	
Chromium	200.8	**68.2**	mg/Kg	0.10	0.03	5	07/23/20 13:58	07/22/20	
Copper	200.8	**34.5**	mg/Kg	0.051	0.021	5	07/23/20 13:58	07/22/20	
Lead	200.8	**2.93**	mg/Kg	0.026	0.010	5	07/23/20 13:58	07/22/20	
Mercury	7471B	**0.0393**	mg/Kg	0.0051	0.0005	1	07/24/20 09:13	07/23/20	
Nickel	200.8	**45.5**	mg/Kg	0.10	0.02	5	07/23/20 13:58	07/22/20	
Selenium	200.8	**1.90**	mg/Kg	0.51	0.05	5	07/23/20 13:58	07/22/20	
Silver	200.8	**0.105**	mg/Kg	0.010	0.002	5	07/23/20 13:58	07/22/20	
Zinc	200.8	**3300**	mg/Kg	5.1	2.1	100	07/23/20 16:34	07/22/20	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20 12:15
Sample Matrix:	Soil	**Date Received:**	07/15/20 10:30
Sample Name:	2020KGMUSCS2	**Basis:**	Dry
Lab Code:	K2005968-011		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**13200**	mg/Kg	11	3	50	07/27/20 12:36	07/22/20	
Arsenic	200.8	**17.6**	mg/Kg	0.27	0.03	5	07/23/20 14:01	07/22/20	
Cadmium	200.8	**0.485**	mg/Kg	0.011	0.004	5	07/23/20 14:01	07/22/20	
Chromium	200.8	**85.9**	mg/Kg	0.11	0.03	5	07/23/20 14:01	07/22/20	
Copper	200.8	**37.1**	mg/Kg	0.054	0.022	5	07/23/20 14:01	07/22/20	
Lead	200.8	**3.00**	mg/Kg	0.027	0.011	5	07/23/20 14:01	07/22/20	
Mercury	7471B	**0.173**	mg/Kg	0.0053	0.0005	1	07/24/20 09:15	07/23/20	
Nickel	200.8	**51.5**	mg/Kg	0.11	0.02	5	07/23/20 14:01	07/22/20	
Selenium	200.8	**2.45**	mg/Kg	0.54	0.05	5	07/23/20 14:01	07/22/20	
Silver	200.8	**0.121**	mg/Kg	0.011	0.002	5	07/23/20 14:01	07/22/20	
Zinc	200.8	**3080**	mg/Kg	5.4	2.2	100	07/23/20 16:37	07/22/20	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20 12:15
Sample Matrix:	Soil	**Date Received:**	07/15/20 10:30
Sample Name:	2020KGMUSCS3	**Basis:**	Dry
Lab Code:	K2005968-012		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**11700**	mg/Kg	9.9	3.0	50	07/27/20 13:03	07/22/20	
Arsenic	200.8	**18.7**	mg/Kg	0.25	0.03	5	07/23/20 14:11	07/22/20	
Cadmium	200.8	**0.672**	mg/Kg	0.0099	0.0035	5	07/23/20 14:11	07/22/20	
Chromium	200.8	**82.3**	mg/Kg	0.099	0.030	5	07/23/20 14:11	07/22/20	
Copper	200.8	**41.0**	mg/Kg	0.049	0.020	5	07/23/20 14:11	07/22/20	
Lead	200.8	**3.10**	mg/Kg	0.025	0.010	5	07/23/20 14:11	07/22/20	
Mercury	7471B	**0.0336**	mg/Kg	0.0051	0.0005	1	07/24/20 09:16	07/23/20	
Nickel	200.8	**52.7**	mg/Kg	0.099	0.015	5	07/23/20 14:11	07/22/20	
Selenium	200.8	**2.04**	mg/Kg	0.49	0.04	5	07/23/20 14:11	07/22/20	
Silver	200.8	**0.0687**	mg/Kg	0.0099	0.0020	5	07/23/20 14:11	07/22/20	
Zinc	200.8	**3590**	mg/Kg	4.9	2.0	100	07/23/20 16:47	07/22/20	

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20 13:40
Sample Matrix:	Soil	**Date Received:**	07/15/20 10:30
Sample Name:	2020KGMLJCS1	**Basis:**	Dry
Lab Code:	K2005968-013		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**10300**	mg/Kg	10	3	50	07/27/20 13:04	07/22/20	
Arsenic	200.8	**21.5**	mg/Kg	0.26	0.03	5	07/23/20 14:14	07/22/20	
Cadmium	200.8	**0.158**	mg/Kg	0.010	0.004	5	07/23/20 14:14	07/22/20	
Chromium	200.8	**19.8**	mg/Kg	0.10	0.03	5	07/23/20 14:14	07/22/20	
Copper	200.8	**95.4**	mg/Kg	0.051	0.021	5	07/23/20 14:14	07/22/20	
Lead	200.8	**5.44**	mg/Kg	0.026	0.010	5	07/23/20 14:14	07/22/20	
Mercury	7471B	**0.0137**	mg/Kg	0.0050	0.0005	1	07/24/20 09:18	07/23/20	
Nickel	200.8	**17.9**	mg/Kg	0.10	0.02	5	07/23/20 14:14	07/22/20	
Selenium	200.8	**0.28**	mg/Kg	0.51	0.05	5	07/23/20 14:14	07/22/20	**J**
Silver	200.8	**0.107**	mg/Kg	0.010	0.002	5	07/23/20 14:14	07/22/20	
Zinc	200.8	**86.6**	mg/Kg	5.1	2.1	100	07/23/20 16:51	07/22/20	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20 13:40
Sample Matrix:	Soil	**Date Received:**	07/15/20 10:30
Sample Name:	2020KGMLJCS2	**Basis:**	Dry
Lab Code:	K2005968-014		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**9850**	mg/Kg	11	3	50	07/27/20 13:06	07/22/20	
Arsenic	200.8	**16.7**	mg/Kg	0.26	0.03	5	07/23/20 14:18	07/22/20	
Cadmium	200.8	**0.181**	mg/Kg	0.011	0.004	5	07/23/20 14:18	07/22/20	
Chromium	200.8	**19.9**	mg/Kg	0.11	0.03	5	07/23/20 14:18	07/22/20	
Copper	200.8	**53.9**	mg/Kg	0.053	0.021	5	07/23/20 14:18	07/22/20	
Lead	200.8	**8.10**	mg/Kg	0.026	0.011	5	07/23/20 14:18	07/22/20	
Mercury	7471B	**0.0171**	mg/Kg	0.0050	0.0005	1	07/24/20 09:20	07/23/20	
Nickel	200.8	**18.4**	mg/Kg	0.11	0.02	5	07/23/20 14:18	07/22/20	
Selenium	200.8	**0.22**	mg/Kg	0.53	0.05	5	07/23/20 14:18	07/22/20	**J**
Silver	200.8	**0.080**	mg/Kg	0.011	0.002	5	07/23/20 14:18	07/22/20	
Zinc	200.8	**3330**	mg/Kg	5.3	2.1	100	07/23/20 16:54	07/22/20	

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20 13:40
Sample Matrix:	Soil	**Date Received:**	07/15/20 10:30
Sample Name:	2020KGMLJCS3	**Basis:**	Dry
Lab Code:	K2005968-015		

Total Metals

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**9110**		mg/Kg	9.6	2.9	50	07/27/20 13:12	07/22/20	
Arsenic	200.8	**13.3**		mg/Kg	0.24	0.03	5	07/23/20 14:50	07/22/20	
Cadmium	200.8	**0.164**		mg/Kg	0.0096	0.0034	5	07/23/20 14:50	07/22/20	
Chromium	200.8	**18.8**		mg/Kg	0.096	0.029	5	07/23/20 14:50	07/22/20	
Copper	200.8	**44.7**		mg/Kg	0.048	0.019	5	07/23/20 14:50	07/22/20	
Lead	200.8	**5.70**		mg/Kg	0.024	0.010	5	07/23/20 14:50	07/22/20	
Mercury	7471B	**0.0187**		mg/Kg	0.0049	0.0005	1	07/24/20 09:25	07/23/20	
Nickel	200.8	**16.0**		mg/Kg	0.096	0.014	5	07/23/20 14:50	07/22/20	
Selenium	200.8	**0.20**	**J**	mg/Kg	0.48	0.04	5	07/23/20 14:50	07/22/20	
Silver	200.8	**0.109**		mg/Kg	0.0096	0.0019	5	07/23/20 14:50	07/22/20	
Zinc	200.8	**2860**		mg/Kg	4.8	1.9	100	07/23/20 16:57	07/22/20	

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	Dry
Lab Code:	KQ2009623-07		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aluminum	200.8	**0.9 J**	mg/Kg	2.0	0.6	5	07/27/20 12:27	07/22/20	
Arsenic	200.8	ND U	mg/Kg	0.5	0.06	5	07/23/20 12:44	07/22/20	
Cadmium	200.8	ND U	mg/Kg	0.020	0.007	5	07/23/20 12:44	07/22/20	
Chromium	200.8	**0.18 J**	mg/Kg	0.20	0.06	5	07/23/20 12:44	07/22/20	
Copper	200.8	ND U	mg/Kg	0.10	0.04	5	07/23/20 12:44	07/22/20	
Lead	200.8	ND U	mg/Kg	0.05	0.020	5	07/23/20 12:44	07/22/20	
Nickel	200.8	**0.05 J**	mg/Kg	0.20	0.03	5	07/23/20 12:44	07/22/20	
Selenium	200.8	ND U	mg/Kg	1.0	0.09	5	07/23/20 12:44	07/22/20	
Silver	200.8	ND U	mg/Kg	0.020	0.004	5	07/23/20 12:44	07/22/20	
Zinc	200.8	**0.32 J**	mg/Kg	0.5	0.20	5	07/23/20 12:44	07/22/20	

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Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	Dry
Lab Code:	KQ2009625-03		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Mercury	7471B	**0.003 J**	mg/Kg	0.02	0.002	1	07/24/20 08:45	07/23/20	

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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project	Couer AK Biomonitoring	**Date Collected:**	07/08/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/23/20 - 07/27/20

Replicate Sample Summary

Total Metals

Sample Name:	2020KGMLSCS1	**Units:**	mg/Kg
Lab Code:	K2005968-001	**Basis:**	Dry

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample KQ2009623-03 Result	Average	RPD	RPD Limit
Aluminum	200.8	11	3	10300	11000	10700	7	30
Arsenic	200.8	0.27	0.03	15.1	15.0	15.1	<1	30
Cadmium	200.8	0.011	0.004	0.589	0.615	0.602	4	30
Chromium	200.8	0.11	0.03	18.0	20.1	19.1	11	30
Copper	200.8	0.054	0.022	39.0	43.5	41.3	11	30
Lead	200.8	0.027	0.011	6.75	6.85	6.80	1	30
Nickel	200.8	0.11	0.02	31.5	34.0	32.8	8	30
Selenium	200.8	0.54	0.05	0.94	0.97	0.96	3	30
Silver	200.8	0.011	0.002	0.078	0.075	0.077	4	30
Zinc	200.8	5.4	2.2	3580	3680	3630	3	30

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

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

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

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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project	Couer AK Biomonitoring	**Date Collected:**	07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/23/20 - 07/27/20

Replicate Sample Summary

Total Metals

Sample Name:	2020KGMUSCS2	**Units:**	mg/Kg
Lab Code:	K2005968-011	**Basis:**	Dry

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample KQ2009623-05 Result	Average	RPD	RPD Limit
Aluminum	200.8	11	3	13200	12000	12600	10	30
Arsenic	200.8	0.28	0.03	17.6	14.8	16.2	18	30
Cadmium	200.8	0.011	0.004	0.485	0.459	0.472	5	30
Chromium	200.8	0.11	0.03	85.9	77.0	81.5	11	30
Copper	200.8	0.056	0.022	37.1	37.1	37.1	<1	30
Lead	200.8	0.028	0.011	3.00	2.87	2.94	4	30
Nickel	200.8	0.11	0.02	51.5	47.5	49.5	8	30
Selenium	200.8	0.56	0.05	2.45	1.66	2.06	38 #	30
Silver	200.8	0.011	0.002	0.121	0.068	0.095	56 *	30
Zinc	200.8	5.6	2.2	3080	97.3	1590	188 *	30

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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project	Couer AK Biomonitoring	**Date Collected:**	07/08/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/24/20

Replicate Sample Summary

Total Metals

Sample Name:	2020KGMLSCS1	**Units:**	mg/Kg
Lab Code:	K2005968-001	**Basis:**	Dry

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample KQ2009625-01 Result	Average	RPD	RPD Limit
Mercury	7471B	0.0053	0.0005	0.0465	0.0560	0.0513	19	20

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

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

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

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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/08/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/23/20 - 07/27/20
		Date Extracted:	07/22/20

Matrix Spike Summary
Total Metals

Sample Name:	2020KGMLSCS1	**Units:**	mg/Kg
Lab Code:	K2005968-001	**Basis:**	Dry
Analysis Method:	200.8		
Prep Method:	EPA 3050B		

Matrix Spike
KQ2009623-04

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Aluminum	10300	10400	220	62 #	70-130
Arsenic	15.1	68.0	54.9	96	70-130
Cadmium	0.589	5.89	5.49	97	70-130
Chromium	18.0	40.2	22.0	101	70-130
Copper	39.0	62.2	27.4	85	70-130
Lead	6.75	57.1	54.9	92	70-130
Nickel	31.5	82.8	54.9	93	70-130
Selenium	0.94	53.8	54.9	96	70-130
Silver	0.078	5.26	5.49	94	70-130
Zinc	3580	3810	54.9	420 #	70-130

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

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

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

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

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QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/09/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/23/20 - 07/27/20
		Date Extracted:	07/22/20

Matrix Spike Summary
Total Metals

Sample Name:	2020KGMUSCS2	**Units:**	mg/Kg
Lab Code:	K2005968-011	**Basis:**	Dry
Analysis Method:	200.8		
Prep Method:	EPA 3050B		

Matrix Spike
KQ2009623-06

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Aluminum	13200	15000	224	787 #	70-130
Arsenic	17.6	69.2	56.3	92	70-130
Cadmium	0.485	5.87	5.63	96	70-130
Chromium	85.9	155	22.4	307 N	70-130
Copper	37.1	68.9	28.1	113	70-130
Lead	3.00	54.3	56.3	91	70-130
Nickel	51.5	124	56.3	129	70-130
Selenium	2.45	54.6	56.3	93	70-130
Silver	0.121	5.24	5.63	91	70-130
Zinc	3080	185	56.3	-5149 #	70-130

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

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

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

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

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Collected:**	07/08/20
Sample Matrix:	Soil	**Date Received:**	07/15/20
		Date Analyzed:	07/24/20
		Date Extracted:	07/23/20

Matrix Spike Summary
Total Metals

Sample Name:	2020KGMLSCS1	**Units:**	mg/Kg
Lab Code:	K2005968-001	**Basis:**	Dry
Analysis Method:	7471B		
Prep Method:	Method		

Matrix Spike
KQ2009625-02

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Mercury	0.0465	0.183	0.129	106	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.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

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

Service Request: K2005968
Date Analyzed: 07/23/20 - 07/27/20

Lab Control Sample Summary
Total Metals

Units:mg/Kg
Basis: Dry

Lab Control Sample
KQ2009623-08

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Aluminum	200.8	6580	10100	65	42-126
Arsenic	200.8	95.4	104	92	64-119
Cadmium	200.8	137	149	92	68-113
Chromium	200.8	145	155	94	66-123
Copper	200.8	142	156	91	72-121
Lead	200.8	89.8	92.4	97	70-130
Nickel	200.8	62.2	65.2	95	64-119
Selenium	200.8	41.3	45.1	92	52-135
Silver	200.8	39.8	41.0	97	68-129
Zinc	200.8	371	393	94	66-122

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Analyzed:**	07/24/20
Sample Matrix:	Soil		

Lab Control Sample Summary
Total Metals

Units:mg/Kg
Basis: Dry

Lab Control Sample
KQ2009625-04

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Mercury	7471B	0.507	0.500	101	80-120

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K2005968
Project:	Couer AK Biomonitoring	**Date Analyzed:**	07/24/20
Sample Matrix:	Soil		

Lab Control Sample Summary
Total Metals

Units:mg/Kg
Basis: Dry

Lab Control Sample
KQ2009625-05

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Mercury	7471B	18.0	26.6	67	41-110

Prep Summary Report

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring
Sample Matrix: Soil

Metals

Prep Method: EPA 3050B **Extraction Lot:** 361803
Analytical Method: 200.8 **Extraction Date:** 07/22/20 09:06

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Amount	Percent Solids
2020KGMLSCS1	K2005968-001	7/8/20	7/15/20	2.777 g	100 mL	
2020KGMLSCS2	K2005968-002	7/8/20	7/15/20	2.573 g	100 mL	
2020KGMLSCS3	K2005968-003	7/8/20	7/15/20	2.751 g	100 mL	
2020KGMLSHS1	K2005968-004	7/9/20	7/15/20	2.644 g	100 mL	
2020KGMLSHS2	K2005968-005	7/9/20	7/15/20	2.656 g	100 mL	
2020KGMLSHS3	K2005968-006	7/9/20	7/15/20	2.726 g	100 mL	
2020KGMEFSCS1	K2005968-007	7/9/20	7/15/20	2.506 g	100 mL	
2020KGMEFSCS2	K2005968-008	7/9/20	7/15/20	2.900 g	100 mL	
2020KGMEFSCS3	K2005968-009	7/9/20	7/15/20	2.724 g	100 mL	
2020KGMUSCS1	K2005968-010	7/9/20	7/15/20	2.532 g	100 mL	
2020KGMUSCS2	K2005968-011	7/9/20	7/15/20	2.616 g	100 mL	
2020KGMUSCS3	K2005968-012	7/9/20	7/15/20	2.679 g	100 mL	
2020KGMLJCS1	K2005968-013	7/9/20	7/15/20	2.516 g	100 mL	
2020KGMLJCS2	K2005968-014	7/9/20	7/15/20	2.565 g	100 mL	
2020KGMLJCS3	K2005968-015	7/9/20	7/15/20	2.636 g	100 mL	
Duplicate	KQ2009623-03DUP	7/8/20	7/15/20	2.540 g	100 mL	
Matrix Spike	KQ2009623-04MS	7/8/20	7/15/20	2.507 g	100 mL	
Duplicate	KQ2009623-05DUP	7/9/20	7/15/20	2.5500 g	100 mL	
Matrix Spike	KQ2009623-06MS	7/9/20	7/15/20	2.5280 g	100 mL	
Method Blank	KQ2009623-07MB	NA	NA	1.0000 g	100 mL	
Lab Control Sample	KQ2009623-08LCS	NA	NA	1.0100 g	100 mL	

Prep Summary Report

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring
Sample Matrix: Soil

Metals

Prep Method: Method **Extraction Lot:** 361806
Analytical Method: 7471B **Extraction Date:** 07/23/20 14:50

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Amount	Percent Solids
2020KGMLSCS1	K2005968-001	7/8/20	7/15/20	2.666 g	50 mL	
2020KGMLSCS2	K2005968-002	7/8/20	7/15/20	2.661 g	50 mL	
2020KGMLSCS3	K2005968-003	7/8/20	7/15/20	2.684 g	50 mL	
2020KGMLSHS1	K2005968-004	7/9/20	7/15/20	2.594 g	50 mL	
2020KGMLSHS2	K2005968-005	7/9/20	7/15/20	2.657 g	50 mL	
2020KGMLSHS3	K2005968-006	7/9/20	7/15/20	2.658 g	50 mL	
2020KGMEFSCS1	K2005968-007	7/9/20	7/15/20	2.674 g	50 mL	
2020KGMEFSCS2	K2005968-008	7/9/20	7/15/20	2.810 g	50 mL	
2020KGMEFSCS3	K2005968-009	7/9/20	7/15/20	2.798 g	50 mL	
2020KGMUSCS1	K2005968-010	7/9/20	7/15/20	2.548 g	50 mL	
2020KGMUSCS2	K2005968-011	7/9/20	7/15/20	2.656 g	50 mL	
2020KGMUSCS3	K2005968-012	7/9/20	7/15/20	2.600 g	50 mL	
2020KGMLJCS1	K2005968-013	7/9/20	7/15/20	2.607 g	50 mL	
2020KGMLJCS2	K2005968-014	7/9/20	7/15/20	2.677 g	50 mL	
2020KGMLJCS3	K2005968-015	7/9/20	7/15/20	2.597 g	50 mL	
Duplicate	KQ2009625-01DUP	7/8/20	7/15/20	2.591 g	50 mL	
Matrix Spike	KQ2009625-02MS	7/8/20	7/15/20	2.670 g	50 mL	
Method Blank	KQ2009625-03MB	NA	NA	0.5 g	50 mL	
Lab Control Sample	KQ2009625-04LCS	NA	NA	0.5 g	50 mL	
Lab Control Sample	KQ2009625-05LCS	NA	NA	0.2500 g	50 mL	

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Concentration Units: ug/L

Sample ID / Analyte	Method	Analysis Batch:	Result	True Value	% Rec	% Rec. Limits
ICV 07/23/20 11:42						
Arsenic	200.8	688227	23.7	25.0	95	90-110
Cadmium	200.8	688227	12.4	12.5	99	90-110
Chromium	200.8	688227	9.73	10.0	97	90-110
Copper	200.8	688227	11.8	12.5	95	90-110
Lead	200.8	688227	24.9	25.0	99	90-110
Nickel	200.8	688227	24.4	25.0	97	90-110
Selenium	200.8	688227	25.0	25.0	100	90-110
Silver	200.8	688227	12.2	12.5	98	90-110
Zinc	200.8	688227	25.5	25.0	102	90-110
CCV 07/23/20 11:45						
Arsenic	200.8	688227	25.1	25.0	101	90-110
Cadmium	200.8	688227	25.6	25.0	103	90-110
Chromium	200.8	688227	25.5	25.0	102	90-110
Copper	200.8	688227	25.2	25.0	101	90-110
Lead	200.8	688227	25.5	25.0	102	90-110
Nickel	200.8	688227	25.7	25.0	103	90-110
Selenium	200.8	688227	24.7	25.0	99	90-110
Silver	200.8	688227	12.9	12.5	103	90-110
Zinc	200.8	688227	26.1	25.0	104	90-110
CCV 07/23/20 12:19						
Arsenic	200.8	688227	25.1	25.0	101	90-110
Cadmium	200.8	688227	25.4	25.0	102	90-110
Chromium	200.8	688227	24.7	25.0	99	90-110
Copper	200.8	688227	24.8	25.0	99	90-110
Lead	200.8	688227	25.3	25.0	101	90-110
Nickel	200.8	688227	25.6	25.0	102	90-110
Selenium	200.8	688227	24.3	25.0	97	90-110
Silver	200.8	688227	12.7	12.5	101	90-110
Zinc	200.8	688227	24.8	25.0	99	90-110
CCV 07/23/20 13:40						
Arsenic	200.8	688227	25.8	25.0	103	90-110
Cadmium	200.8	688227	24.8	25.0	99	90-110
Chromium	200.8	688227	26.1	25.0	105	90-110
Copper	200.8	688227	26.1	25.0	104	90-110
Lead	200.8	688227	25.2	25.0	101	90-110
Nickel	200.8	688227	26.8	25.0	107	90-110

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Concentration Units: ug/L

Sample ID / Analyte	Method	Analysis Batch:	Result	True Value	% Rec	% Rec. Limits
CCV 07/23/20 13:40						
Selenium	200.8	688227	24.3	25.0	97	90-110
Silver	200.8	688227	12.6	12.5	101	90-110
Zinc	200.8	688227	26.1	25.0	104	90-110
CCV 07/23/20 14:42						
Arsenic	200.8	688227	25.8	25.0	103	90-110
Cadmium	200.8	688227	24.4	25.0	98	90-110
Chromium	200.8	688227	25.9	25.0	103	90-110
Copper	200.8	688227	25.7	25.0	103	90-110
Lead	200.8	688227	25.6	25.0	102	90-110
Nickel	200.8	688227	26.3	25.0	105	90-110
Selenium	200.8	688227	24.1	25.0	97	90-110
Silver	200.8	688227	12.4	12.5	99	90-110
Zinc	200.8	688227	25.0	25.0	100	90-110
CCV 07/23/20 15:04						
Arsenic	200.8	688227	25.3	25.0	101	90-110
Cadmium	200.8	688227	24.2	25.0	97	90-110
Chromium	200.8	688227	25.8	25.0	103	90-110
Copper	200.8	688227	25.5	25.0	102	90-110
Lead	200.8	688227	25.4	25.0	101	90-110
Nickel	200.8	688227	26.2	25.0	105	90-110
Selenium	200.8	688227	23.9	25.0	96	90-110
Silver	200.8	688227	12.5	12.5	100	90-110
Zinc	200.8	688227	25.7	25.0	103	90-110
CCV 07/23/20 16:24						
Arsenic	200.8	688227	25.0	25.0	100	90-110
Cadmium	200.8	688227	24.8	25.0	99	90-110
Chromium	200.8	688227	26.5	25.0	106	90-110
Copper	200.8	688227	25.0	25.0	100	90-110
Lead	200.8	688227	24.8	25.0	99	90-110
Nickel	200.8	688227	26.8	25.0	107	90-110
Selenium	200.8	688227	24.6	25.0	98	90-110
Silver	200.8	688227	12.6	12.5	101	90-110
Zinc	200.8	688227	25.1	25.0	100	90-110
CCV 07/23/20 17:01						
Arsenic	200.8	688227	25.2	25.0	101	90-110
Cadmium	200.8	688227	24.7	25.0	99	90-110

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Concentration Units: ug/L

Sample ID / Analyte	Method	Analysis Batch:	Result	True Value	% Rec	% Rec. Limits
CCV 07/23/20 17:01						
Chromium	200.8	688227	26.2	25.0	105	90-110
Copper	200.8	688227	25.2	25.0	101	90-110
Lead	200.8	688227	25.3	25.0	101	90-110
Nickel	200.8	688227	26.1	25.0	105	90-110
Selenium	200.8	688227	24.9	25.0	100	90-110
Silver	200.8	688227	12.5	12.5	100	90-110
Zinc	200.8	688227	24.5	25.0	98	90-110
ICV 07/24/20 08:37						
Mercury	7471B	688335	4.98	5.00	100	90-110
CCV 07/24/20 08:42						
Mercury	7471B	688335	5.00	5.00	100	90-110
CCV 07/24/20 09:02						
Mercury	7471B	688335	5.08	5.00	102	90-110
CCV 07/24/20 09:21						
Mercury	7471B	688335	4.98	5.00	100	90-110
CCV 07/24/20 09:41						
Mercury	7471B	688335	5.09	5.00	102	90-110
ICV 07/27/20 12:17						
Aluminum	200.8	688487	93.6	100	94	90-110
CCV 07/27/20 12:19						
Aluminum	200.8	688487	25.3	25.0	101	90-110
CCV 07/27/20 12:46						
Aluminum	200.8	688487	25.5	25.0	102	90-110
CCV 07/27/20 13:08						
Aluminum	200.8	688487	25.6	25.0	102	90-110
CCV 07/27/20 13:14						
Aluminum	200.8	688487	25.7	25.0	103	90-110

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring

INITIAL AND CONTINUING CALIBRATION BLANKS

Concentration Units: ug/L

Sample ID / Analyte	Method	Analysis Batch:	Result	C
ICB 07/23/20 11:48				
Arsenic	200.8	688227	0.1	U
Cadmium	200.8	688227	0.014	U
Chromium	200.8	688227	0.12	U
Copper	200.8	688227	0.08	U
Lead	200.8	688227	0.04	U
Nickel	200.8	688227	0.06	U
Selenium	200.8	688227	0.2	U
Silver	200.8	688227	0.008	U
Zinc	200.8	688227	0.4	U
CCB 07/23/20 11:52				
Arsenic	200.8	688227	0.1	U
Cadmium	200.8	688227	0.014	U
Chromium	200.8	688227	0.12	U
Copper	200.8	688227	0.08	U
Lead	200.8	688227	0.04	U
Nickel	200.8	688227	0.06	U
Selenium	200.8	688227	0.2	U
Silver	200.8	688227	0.008	U
Zinc	200.8	688227	0.4	U
CCB 07/23/20 12:22				
Arsenic	200.8	688227	0.1	U
Cadmium	200.8	688227	0.014	U
Chromium	200.8	688227	0.12	U
Copper	200.8	688227	0.08	U
Lead	200.8	688227	0.04	U
Nickel	200.8	688227	0.06	U
Selenium	200.8	688227	0.2	U
Silver	200.8	688227	0.008	U
Zinc	200.8	688227	0.4	U
CCB 07/23/20 13:44				
Arsenic	200.8	688227	0.1	U
Cadmium	200.8	688227	0.014	U
Chromium	200.8	688227	0.12	U
Copper	200.8	688227	0.08	U
Lead	200.8	688227	0.04	U
Nickel	200.8	688227	0.06	U

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring

INITIAL AND CONTINUING CALIBRATION BLANKS

Concentration Units: ug/L

Sample ID / Analyte	Method	Analysis Batch:	Result	C
CCB 07/23/20 13:44				
Selenium	200.8	688227	0.2	U
Silver	200.8	688227	0.008	U
Zinc	200.8	688227	0.4	U
CCB 07/23/20 14:46				
Arsenic	200.8	688227	0.1	U
Cadmium	200.8	688227	0.016	J
Chromium	200.8	688227	0.12	U
Copper	200.8	688227	0.08	U
Lead	200.8	688227	0.04	U
Nickel	200.8	688227	0.06	U
Selenium	200.8	688227	0.2	U
Silver	200.8	688227	0.008	U
Zinc	200.8	688227	0.4	U
CCB 07/23/20 15:11				
Arsenic	200.8	688227	0.1	U
Cadmium	200.8	688227	0.014	U
Chromium	200.8	688227	0.12	U
Copper	200.8	688227	0.08	U
Lead	200.8	688227	0.04	U
Nickel	200.8	688227	0.06	U
Selenium	200.8	688227	0.2	U
Silver	200.8	688227	0.008	U
Zinc	200.8	688227	0.4	U
CCB 07/23/20 16:27				
Arsenic	200.8	688227	0.1	U
Cadmium	200.8	688227	0.014	U
Chromium	200.8	688227	0.12	U
Copper	200.8	688227	0.08	U
Lead	200.8	688227	0.04	U
Nickel	200.8	688227	0.06	U
Selenium	200.8	688227	0.2	U
Silver	200.8	688227	0.008	U
Zinc	200.8	688227	0.4	U
CCB 07/23/20 17:04				
Arsenic	200.8	688227	0.1	J
Cadmium	200.8	688227	0.014	U

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring

INITIAL AND CONTINUING CALIBRATION BLANKS

Concentration Units: ug/L

Sample ID / Analyte	Method	Analysis Batch:	Result	C
CCB 07/23/20 17:04				
Chromium	200.8	688227	0.12	U
Copper	200.8	688227	0.08	U
Lead	200.8	688227	0.04	U
Nickel	200.8	688227	0.06	U
Selenium	200.8	688227	0.2	U
Silver	200.8	688227	0.008	U
Zinc	200.8	688227	0.4	U
ICB 07/24/20 08:39				
Mercury	7471B	688335	0.02	U
CCB 07/24/20 08:44				
Mercury	7471B	688335	0.02	U
CCB 07/24/20 09:03				
Mercury	7471B	688335	-0.0280	J
CCB 07/24/20 09:23				
Mercury	7471B	688335	-0.0200	J
CCB 07/24/20 09:42				
Mercury	7471B	688335	-0.0260	J
ICB 07/27/20 12:21				
Aluminum	200.8	688487	1.2	U
CCB 07/27/20 12:23				
Aluminum	200.8	688487	1.2	U
CCB 07/27/20 12:48				
Aluminum	200.8	688487	1.2	U
CCB 07/27/20 13:10				
Aluminum	200.8	688487	1.2	U
CCB 07/27/20 13:16				
Aluminum	200.8	688487	1.2	U

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring

LOW LEVEL INITIAL AND LOW LEVEL CONTINUING CALIBRATION VERIFICATION

Concentration Units: ug/L

Sample ID / Analyte	Method	Analysis Batch:	Result	True Value	% Rec	% Rec. Limits	Analysis Date
LLICVS							
Arsenic	200.8	688227	1.0	1.0	100	50-199	07/23/20 11:55
Cadmium	200.8	688227	0.044	0.04	111	50-199	07/23/20 11:55
Chromium	200.8	688227	0.38	0.4	96	50-199	07/23/20 11:55
Copper	200.8	688227	0.20	0.2	102	50-199	07/23/20 11:55
Lead	200.8	688227	0.11	0.1	108	50-199	07/23/20 11:55
Nickel	200.8	688227	0.42	0.4	105	50-199	07/23/20 11:55
Selenium	200.8	688227	2.0	2.0	98	50-199	07/23/20 11:55
Silver	200.8	688227	0.039	0.04	98	50-199	07/23/20 11:55
Zinc	200.8	688227	1.1	1.0	110	50-199	07/23/20 11:55
LLICV							
Mercury	7471B	688335	0.20	0.2	98	50-150	07/24/20 08:41
LLICVS							
Aluminum	200.8	688487	3.7	4.0	93	50-199	07/27/20 12:25

QA/QC Report

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring

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
K2005968-001A								
Mercury	7471B	688335	1.80	6.53	5.00	95	80-120	07/24/20 08:55

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

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring/

Detection Limits

Instrument: K-CVAA-02 **Matrix:** Soil

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

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring/

Detection Limits

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

Analyte	Mass	Units	MRL	MDL	Method
Aluminum	27	ug/L	4	1.2	200.8

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring/

Detection Limits

Instrument: K-ICP-MS-04 **Matrix:** Soil

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

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring/

ICP Linear Range (Quarterly)

Instrument: K-CVAA-02

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

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring/

ICP Linear Range (Quarterly)

Instrument: K-ICP-MS-05

Analyte	Concentration (ug/L)	Method
Aluminum 27	45000	200.8

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring/

ICP Linear Range (Quarterly)

Instrument: K-ICP-MS-04

Analyte	Concentration (ug/L)	Method
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	900	200.8
Zinc 66	3000	200.8

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring/

Analysis Run Log

Instrument ID: **K-ICP-MS-04** **Analytical BatchID:** **688227**

Sample	Dilution Factor	Date/Time	As	Cd	Cr	Cu	Pb	Ni	Se	Ag	Zn
ZZZZZZ	1	07/23/20 11:35									
ZZZZZZ	1	07/23/20 11:38									
ICV	1	07/23/20 11:42	X	X	X	X	X	X	X	X	X
CCV	1	07/23/20 11:45	X	X	X	X	X	X	X	X	X
ICB	1	07/23/20 11:48	X	X	X	X	X	X	X	X	X
CCB	1	07/23/20 11:52	X	X	X	X	X	X	X	X	X
LLICVS	1	07/23/20 11:55	X	X	X	X	X	X	X	X	X
ZZZZZZ	1	07/23/20 11:59									
ZZZZZZ	5	07/23/20 12:02									
ZZZZZZ	20	07/23/20 12:05									
ZZZZZZ	5	07/23/20 12:09									
ZZZZZZ	5	07/23/20 12:12									
ZZZZZZ	5	07/23/20 12:15									
CCV	1	07/23/20 12:19	X	X	X	X	X	X	X	X	X
CCB	1	07/23/20 12:22	X	X	X	X	X	X	X	X	X
KQ2009623-07MB	5	07/23/20 12:44	X	X	X	X	X	X	X	X	X
KQ2009623-08LCS1	20	07/23/20 12:47	X	X	X	X	X	X	X	X	X
K2005968-001	5	07/23/20 12:51	X	X	X	X	X	X	X	X	
K2005968-001DUP	5	07/23/20 12:54	X	X	X	X	X	X	X	X	
K2005968-001MS	5	07/23/20 12:57	X	X	X	X	X	X	X	X	
K2005968-002	5	07/23/20 13:01	X	X	X	X	X	X	X	X	
K2005968-003	5	07/23/20 13:04	X	X	X	X	X	X	X	X	
K2005968-004	5	07/23/20 13:07	X	X	X	X	X	X	X	X	
K2005968-005	5	07/23/20 13:11	X	X	X	X	X	X	X	X	
K2005968-006	5	07/23/20 13:14	X	X	X	X	X	X	X	X	
ZZZZZZ	1	07/23/20 13:17									
CCV	1	07/23/20 13:40	X	X	X	X	X	X	X	X	X
CCB	1	07/23/20 13:44	X	X	X	X	X	X	X	X	X
K2005968-007	5	07/23/20 13:48	X	X	X	X	X	X	X	X	
K2005968-008	5	07/23/20 13:51	X	X	X	X	X	X	X	X	
K2005968-009	5	07/23/20 13:54	X	X	X	X	X	X	X	X	
K2005968-010	5	07/23/20 13:58	X	X	X	X	X	X	X	X	
K2005968-011	5	07/23/20 14:01	X	X	X	X	X	X	X	X	
K2005968-011DUP	5	07/23/20 14:04	X	X	X	X	X	X	X	X	
K2005968-011MS	5	07/23/20 14:08	X	X	X	X	X	X	X	X	
K2005968-012	5	07/23/20 14:11	X	X	X	X	X	X	X	X	
K2005968-013	5	07/23/20 14:14	X	X	X	X	X	X	X	X	

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring/

Analysis Run Log

Instrument ID: **K-ICP-MS-04** **Analytical BatchID:** **688227**

Sample	Dilution Factor	Date/Time	As	Cd	Cr	Cu	Pb	Ni	Se	Ag	Zn
K2005968-014	5	07/23/20 14:18	X	X	X	X	X	X	X	X	
ZZZZZZ	1	07/23/20 14:21									
CCV	1	07/23/20 14:42	X	X	X	X	X	X	X	X	X
CCB	1	07/23/20 14:46	X	X	X	X	X	X	X	X	X
K2005968-015	5	07/23/20 14:50	X	X	X	X	X	X	X	X	
ZZZZZZ	1	07/23/20 14:53									
CCV	1	07/23/20 15:04	X	X	X	X	X	X	X	X	X
CCB	1	07/23/20 15:11	X	X	X	X	X	X	X	X	X
K2005968-001	100	07/23/20 15:51									X
K2005968-001DUP	100	07/23/20 15:54									X
K2005968-001MS	100	07/23/20 15:57									X
K2005968-002	100	07/23/20 16:01									X
K2005968-003	100	07/23/20 16:04									X
K2005968-004	100	07/23/20 16:07									X
K2005968-005	100	07/23/20 16:11									X
K2005968-006	100	07/23/20 16:14									X
K2005968-007	100	07/23/20 16:17									X
K2005968-008	100	07/23/20 16:21									X
CCV	1	07/23/20 16:24	X	X	X	X	X	X	X	X	X
CCB	1	07/23/20 16:27	X	X	X	X	X	X	X	X	X
K2005968-009	100	07/23/20 16:31									X
K2005968-010	100	07/23/20 16:34									X
K2005968-011	100	07/23/20 16:37									X
K2005968-011DUP	100	07/23/20 16:41									X
K2005968-011MS	100	07/23/20 16:44									X
K2005968-012	100	07/23/20 16:47									X
K2005968-013	100	07/23/20 16:51									X
K2005968-014	100	07/23/20 16:54									X
K2005968-015	100	07/23/20 16:57									X
CCV	1	07/23/20 17:01	X	X	X	X	X	X	X	X	X
CCB	1	07/23/20 17:04	X	X	X	X	X	X	X	X	X

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring/

Analysis Run Log

Instrument ID: **K-CVAA-02** **Analytical BatchID:** **688335**

Sample	Dilution Factor	Date/Time	Hg
ZZZZZZ	1	07/24/20 08:27	
ZZZZZZ	1	07/24/20 08:29	
ZZZZZZ	1	07/24/20 08:31	
ZZZZZZ	1	07/24/20 08:32	
ZZZZZZ	1	07/24/20 08:34	
ZZZZZZ	1	07/24/20 08:36	
ICV1	1	07/24/20 08:37	X
ICB1	1	07/24/20 08:39	X
LLICV1	1	07/24/20 08:41	X
CCV1	1	07/24/20 08:42	X
CCB1	1	07/24/20 08:44	X
KQ2009625-03MB	1	07/24/20 08:45	X
KQ2009625-04LCS	1	07/24/20 08:47	X
KQ2009625-05LCS1	25	07/24/20 08:49	X
K2005968-001	1	07/24/20 08:50	X
K2005968-001DUP	1	07/24/20 08:52	X
K2005968-001MS	1	07/24/20 08:54	X
K2005968-001PS	1	07/24/20 08:55	X
K2005968-002	1	07/24/20 08:57	X
K2005968-003	1	07/24/20 08:58	X
K2005968-004	1	07/24/20 09:00	X
CCV2	1	07/24/20 09:02	X
CCB2	1	07/24/20 09:03	X
K2005968-005	1	07/24/20 09:05	X
K2005968-006	1	07/24/20 09:07	X
K2005968-007	1	07/24/20 09:08	X
K2005968-008	1	07/24/20 09:10	X
K2005968-009	1	07/24/20 09:11	X
K2005968-010	1	07/24/20 09:13	X
K2005968-011	1	07/24/20 09:15	X
K2005968-012	1	07/24/20 09:16	X
K2005968-013	1	07/24/20 09:18	X
K2005968-014	1	07/24/20 09:20	X
CCV3	1	07/24/20 09:21	X
CCB3	1	07/24/20 09:23	X
K2005968-015	1	07/24/20 09:25	X
ZZZZZZ	1	07/24/20 09:26	

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring/

Analysis Run Log

Instrument ID: **K-CVAA-02** **Analytical BatchID:** **688335**

Sample	Dilution Factor	Date/Time	Hg
ZZZZZZ	1	07/24/20 09:28	
ZZZZZZ	25	07/24/20 09:29	
ZZZZZZ	1	07/24/20 09:31	
ZZZZZZ	1	07/24/20 09:33	
ZZZZZZ	1	07/24/20 09:34	
ZZZZZZ	1	07/24/20 09:36	
ZZZZZZ	1	07/24/20 09:37	
ZZZZZZ	1	07/24/20 09:39	
CCV4	1	07/24/20 09:41	X
CCB4	1	07/24/20 09:42	X
ZZZZZZ	1	07/24/20 09:44	
ZZZZZZ	1	07/24/20 09:46	
ZZZZZZ	1	07/24/20 09:47	
ZZZZZZ	1	07/24/20 09:49	
ZZZZZZ	1	07/24/20 09:51	
ZZZZZZ	1	07/24/20 09:52	
ZZZZZZ	1	07/24/20 09:54	
ZZZZZZ	1	07/24/20 09:55	
ZZZZZZ	1	07/24/20 09:57	
ZZZZZZ	1	07/24/20 09:59	
ZZZZZZ	1	07/24/20 10:00	
ZZZZZZ	1	07/24/20 10:02	
ZZZZZZ	1	07/24/20 10:04	
ZZZZZZ	1	07/24/20 10:06	
ZZZZZZ	1	07/24/20 10:07	
ZZZZZZ	1	07/24/20 10:09	
ZZZZZZ	1	07/24/20 10:10	
ZZZZZZ	1	07/24/20 10:12	
ZZZZZZ	1	07/24/20 10:14	
ZZZZZZ	1	07/24/20 10:15	
ZZZZZZ	1	07/24/20 10:17	

QA/QC Report

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring/

Analysis Run Log

Instrument ID: **K-ICP-MS-05** **Analytical BatchID:** **688487**

Sample	Dilution Factor	Date/Time	Al
ZZZZZZ	1	07/27/20 12:14	
ZZZZZZ	1	07/27/20 12:15	
ICV	1	07/27/20 12:17	X
CCV	1	07/27/20 12:19	X
ICB	1	07/27/20 12:21	X
CCB	1	07/27/20 12:23	X
LLICVS	1	07/27/20 12:25	X
KQ2009623-07MB	5	07/27/20 12:27	X
KQ2009623-08LCS1	20	07/27/20 12:29	X
K2005968-001	50	07/27/20 12:31	X
K2005968-001DUP	50	07/27/20 12:33	X
K2005968-001MS	50	07/27/20 12:34	X
K2005968-011	50	07/27/20 12:36	X
K2005968-011DUP	50	07/27/20 12:38	X
K2005968-011MS	50	07/27/20 12:40	X
K2005968-002	50	07/27/20 12:42	X
K2005968-003	50	07/27/20 12:44	X
CCV	1	07/27/20 12:46	X
CCB	1	07/27/20 12:48	X
K2005968-004	50	07/27/20 12:49	X
K2005968-005	50	07/27/20 12:51	X
K2005968-006	50	07/27/20 12:53	X
K2005968-007	50	07/27/20 12:55	X
K2005968-008	50	07/27/20 12:57	X
K2005968-009	50	07/27/20 12:59	X
K2005968-010	50	07/27/20 13:01	X
K2005968-012	50	07/27/20 13:03	X
K2005968-013	50	07/27/20 13:04	X
K2005968-014	50	07/27/20 13:06	X
CCV	1	07/27/20 13:08	X
CCB	1	07/27/20 13:10	X
K2005968-015	50	07/27/20 13:12	X
CCV	1	07/27/20 13:14	X
CCB	1	07/27/20 13:16	X

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring/

ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY

Instrument ID: **K-ICP-MS-05** **Analytical BatchID:** **688487**

Sample	Date/Time	Sc45NG
ZZZZZZ	07/27/20 12:14	
ZZZZZZ	07/27/20 12:15	
ICV	07/27/20 12:17	111
CCV	07/27/20 12:19	94
ICB	07/27/20 12:21	95
CCB	07/27/20 12:23	110
LLICVS	07/27/20 12:25	111
KQ2009623-07MB	07/27/20 12:27	113
KQ2009623-08LCS1	07/27/20 12:29	110
K2005968-001	07/27/20 12:31	113
K2005968-001DUP	07/27/20 12:33	107
K2005968-001MS	07/27/20 12:34	104
K2005968-011	07/27/20 12:36	117
K2005968-011DUP	07/27/20 12:38	106
K2005968-011MS	07/27/20 12:40	102
K2005968-002	07/27/20 12:42	98
K2005968-003	07/27/20 12:44	99
CCV	07/27/20 12:46	97
CCB	07/27/20 12:48	100
K2005968-004	07/27/20 12:49	116
K2005968-005	07/27/20 12:51	115
K2005968-006	07/27/20 12:53	118
K2005968-007	07/27/20 12:55	115
K2005968-008	07/27/20 12:57	108
K2005968-009	07/27/20 12:59	119
K2005968-010	07/27/20 13:01	118
K2005968-012	07/27/20 13:03	115
K2005968-013	07/27/20 13:04	116
K2005968-014	07/27/20 13:06	117
CCV	07/27/20 13:08	117
CCB	07/27/20 13:10	104
K2005968-015	07/27/20 13:12	115
CCV	07/27/20 13:14	113
CCB	07/27/20 13:16	115

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring/

ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY

Instrument ID: **K-ICP-MS-04** **Analytical BatchID:** **688227**

Sample	Date/Time	ScKED2	GeKED3	GeKED2	GeKED1	RhKED2	LuKED2
ZZZZZZ	07/23/20 11:35						
ZZZZZZ	07/23/20 11:38						
ICV	07/23/20 11:42	103	104	102	101	102	103
CCV	07/23/20 11:45	103	100	102	100	100	102
ICB	07/23/20 11:48	100	101	99	99	99	100
CCB	07/23/20 11:52	100	99	100	100	98	100
LLICVS	07/23/20 11:55	102	101	101	102	101	102
ZZZZZZ	07/23/20 11:59						
ZZZZZZ	07/23/20 12:02						
ZZZZZZ	07/23/20 12:05						
ZZZZZZ	07/23/20 12:09						
ZZZZZZ	07/23/20 12:12						
ZZZZZZ	07/23/20 12:15						
CCV	07/23/20 12:19	103	101	101	99	101	104
CCB	07/23/20 12:22	103	101	101	99	102	103
KQ2009623-07MB	07/23/20 12:44	99	101	98	97	97	99
KQ2009623-08LCS1	07/23/20 12:47	113	104	105	102	104	108
K2005968-001	07/23/20 12:51	135	97	96	93	95	104
K2005968-001DUP	07/23/20 12:54	141	101	100	93	98	104
K2005968-001MS	07/23/20 12:57	142	103	101	96	100	105
K2005968-002	07/23/20 13:01	144	103	102	95	101	106
K2005968-003	07/23/20 13:04	147	102	103	95	102	107
K2005968-004	07/23/20 13:07	150	103	100	95	99	104
K2005968-005	07/23/20 13:11	155	104	103	95	100	106
K2005968-006	07/23/20 13:14	156	102	103	96	101	107
ZZZZZZ	07/23/20 13:17						
CCV	07/23/20 13:40	112	113	108	109	109	107
CCB	07/23/20 13:44	111	110	109	107	111	109
K2005968-007	07/23/20 13:48	138	108	108	100	106	113
K2005968-008	07/23/20 13:51	132	102	103	96	103	110
K2005968-009	07/23/20 13:54	138	104	104	96	103	111
K2005968-010	07/23/20 13:58	158	104	105	98	104	112
K2005968-011	07/23/20 14:01	173	103	104	96	103	109
K2005968-011DUP	07/23/20 14:04	162	103	103	95	102	109
K2005968-011MS	07/23/20 14:08	190	105	104	97	105	108
K2005968-012	07/23/20 14:11	168	103	104	94	104	110
K2005968-013	07/23/20 14:14	145	103	104	96	104	109

QA/QC Report

Client: Alaska Department of Fish and Game **Service Request:** K2005968
Project: Couer AK Biomonitoring/

ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY

Instrument ID: **K-ICP-MS-04** **Analytical BatchID:** **688227**

Sample	Date/Time	ScKED2	GeKED3	GeKED2	GeKED1	RhKED2	LuKED2
K2005968-014	07/23/20 14:18	137	103	105	97	105	110
ZZZZZZ	07/23/20 14:21						
CCV	07/23/20 14:42	113	114	108	107	112	106
CCB	07/23/20 14:46	116	110	111	104	113	111
K2005968-015	07/23/20 14:50	140	104	106	97	106	112
ZZZZZZ	07/23/20 14:53						
CCV	07/23/20 15:04	122	115	115	110	118	113
CCB	07/23/20 15:11	119	113	112	106	116	112
K2005968-001	07/23/20 15:51	126	121	115	111	116	112
K2005968-001DUP	07/23/20 15:54	128	119	119	110	121	113
K2005968-001MS	07/23/20 15:57	127	119	116	111	120	113
K2005968-002	07/23/20 16:01	127	117	117	110	119	114
K2005968-003	07/23/20 16:04	127	116	118	108	120	115
K2005968-004	07/23/20 16:07	126	115	114	109	121	115
K2005968-005	07/23/20 16:11	127	116	117	108	120	115
K2005968-006	07/23/20 16:14	127	117	115	108	118	114
K2005968-007	07/23/20 16:17	124	115	116	109	119	114
K2005968-008	07/23/20 16:21	125	116	115	107	119	115
CCV	07/23/20 16:24	122	119	117	109	119	115
CCB	07/23/20 16:27	122	115	115	107	118	114
K2005968-009	07/23/20 16:31	127	117	117	108	120	116
K2005968-010	07/23/20 16:34	125	117	116	107	119	114
K2005968-011	07/23/20 16:37	127	115	117	108	120	115
K2005968-011DUP	07/23/20 16:41	127	115	114	107	116	114
K2005968-011MS	07/23/20 16:44	123	116	113	106	116	113
K2005968-012	07/23/20 16:47	125	114	114	106	117	114
K2005968-013	07/23/20 16:51	123	115	115	107	117	115
K2005968-014	07/23/20 16:54	125	115	115	108	117	113
K2005968-015	07/23/20 16:57	122	114	114	107	118	113
CCV	07/23/20 17:01	122	115	114	107	119	112
CCB	07/23/20 17:04	119	113	112	106	116	108