Alaska Department of Environmental Conservation
Office of the State Veterinarian Fish Monitoring Program
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ANALYTICAL RESULTS FOR TRACE ELEMENTS AND PER- AND POLYFLUOROALKYL SUBSTANCES IN FISH TISSUE SAMPLES

Analytical Analysis for metals performed by:
Alaska State Environmental Health Laboratory
5251 Dr. Martin Luther King Jr. Avenue
Anchorage, AK 99507
http://dec.alaska.gov/eh/lab

Analytical Analysis for perfluorinated compounds performed by:
SGS AXYS Analytial Services ltd.
2045 Mills Road West
Sidney, BC, Canada V8L 5X2
https://www.axysanalytical.com/

Summary report prepared by:

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Report to: UAF

Sample Location(s): Chatanika River, Piledriver Slough, Moose Creek, Salcha River

Analytes: As, Cd, Cu, Pb, Hg, Se, PFAS (see below for list of compounds)

Date of Report: May 10, 2019

Narrative:

SAMPLES AND ANALYSIS:

Samples were received at the State Environmental Health Lab (EHL) on October 11, 2017. They were stored at -20°C and processed according to standard operation procedures (SOP) of the Fish Monitoring Program and EHL. Analytical analysis of total mercury in the fish tissue samples was performed according to EPA Method 7473 using a DMA-80 (Direct Mercury Analyzer). Arsenic, copper, selenium, cadmium and lead were analyzed using ICP/MS by EPA method 6020 after microwave assisted acid digestion (EPA 3051A). Standard EHL QA/QC procedures were followed.

Composite samples were made using 5 individuals from each species from each site for two tissues, whole body and liver. A total of 10 composite samples were shipped to SGS AXYS analytical on March 11, 2019 for PFAS analysis. Compounds reported by SGS AXYS include: PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFNA, PFDA, PFUnA, PFDoA, PFBS, PFHxS, PFOS, and PFOSA. Compounds in tissue were quantified using AXYS method MLA-043 which is an isotopic dilution method via HPLC/MS-MS. Detection limits range between 2.5 and 5 ng/g.

RESULTS:

A table of summary statistics is provided below. Results are reported in mg/Kg (parts per million) wet weight for metals and ng/g (parts per billion) wet weight for PFAS.

See our website: https://dec.alaska.gov/eh/vet/fish-monitoring-program for further information about contaminants in fish and shellfish from the State of Alaska.

Fish consumption guidelines for Alaska can be found at http://dhss.alaska.gov/dph/Epi/eph/Pages/fish/default.aspx

Table 1: Mean Length (cm) of Arctic Grayling and Least Cisco

Species	Site	Sex	n	Mean	SD
Arctic Grayling	Chatanika River	F	5	27.70	1.52
Arctic Grayling	Chatanika River	M	5	30.44	0.53
Arctic Grayling	Moose Creek	F	3	25.35	3.75
Arctic Grayling	Moose Creek	M	6	28.60	3.63
Arctic Grayling	Moose Creek	NA	1	20.80	NA
Arctic Grayling	Piledriver Slough	F	1	24.00	NA
Arctic Grayling	Piledriver Slough	M	9	27.24	2.02
Arctic Grayling	Salcha River	F	4	32.80	3.21
Arctic Grayling	Salcha River	M	3	30.10	1.35
Arctic Grayling	Salcha River	NA	3	26.13	1.78
Least Cisco	Chatanika River	F	5	31.44	0.94
Least Cisco	Chatanika River	M	4	27.52	2.66
Least Cisco	Chatanika River	NA	1	25.50	NA

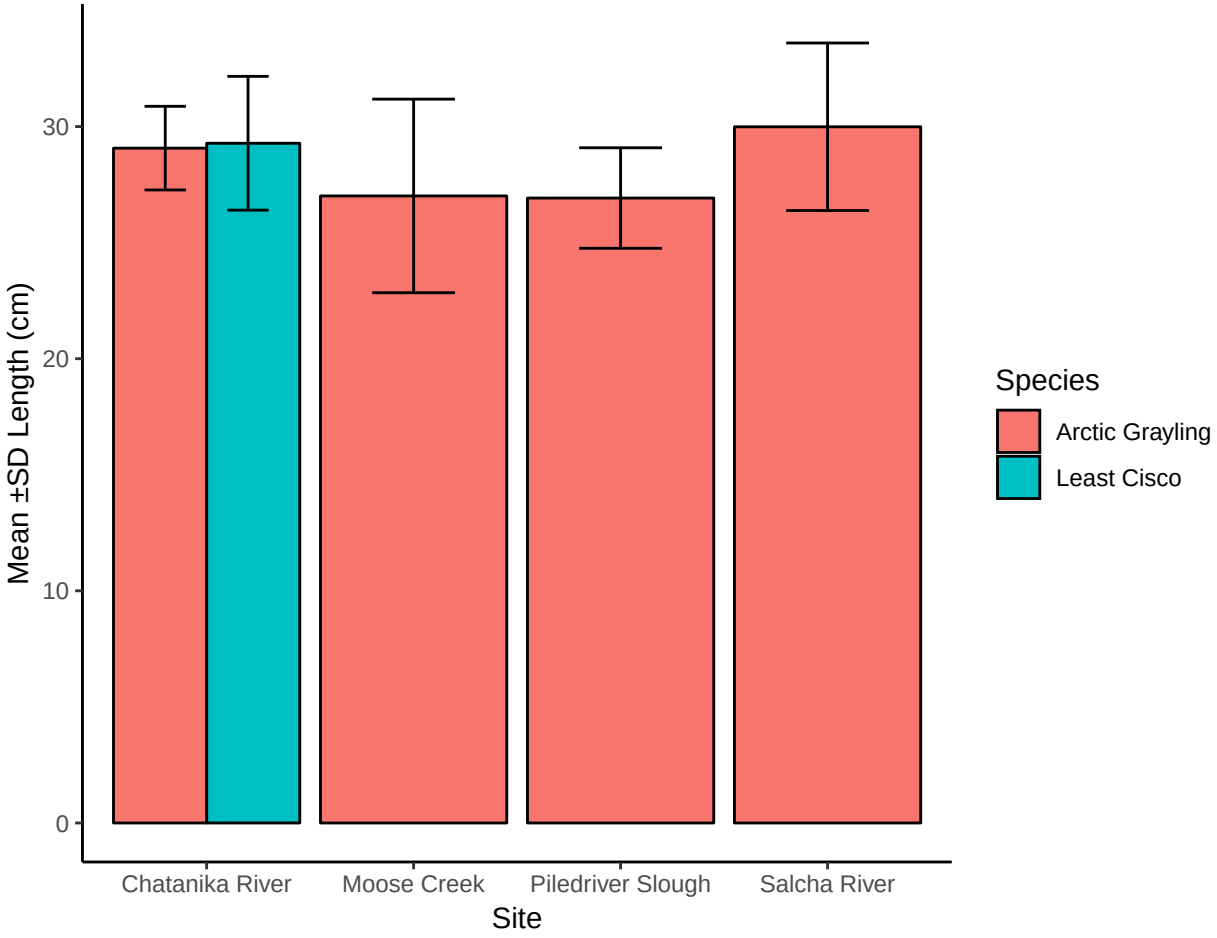

Figure 1: Mean Length by Site and Species

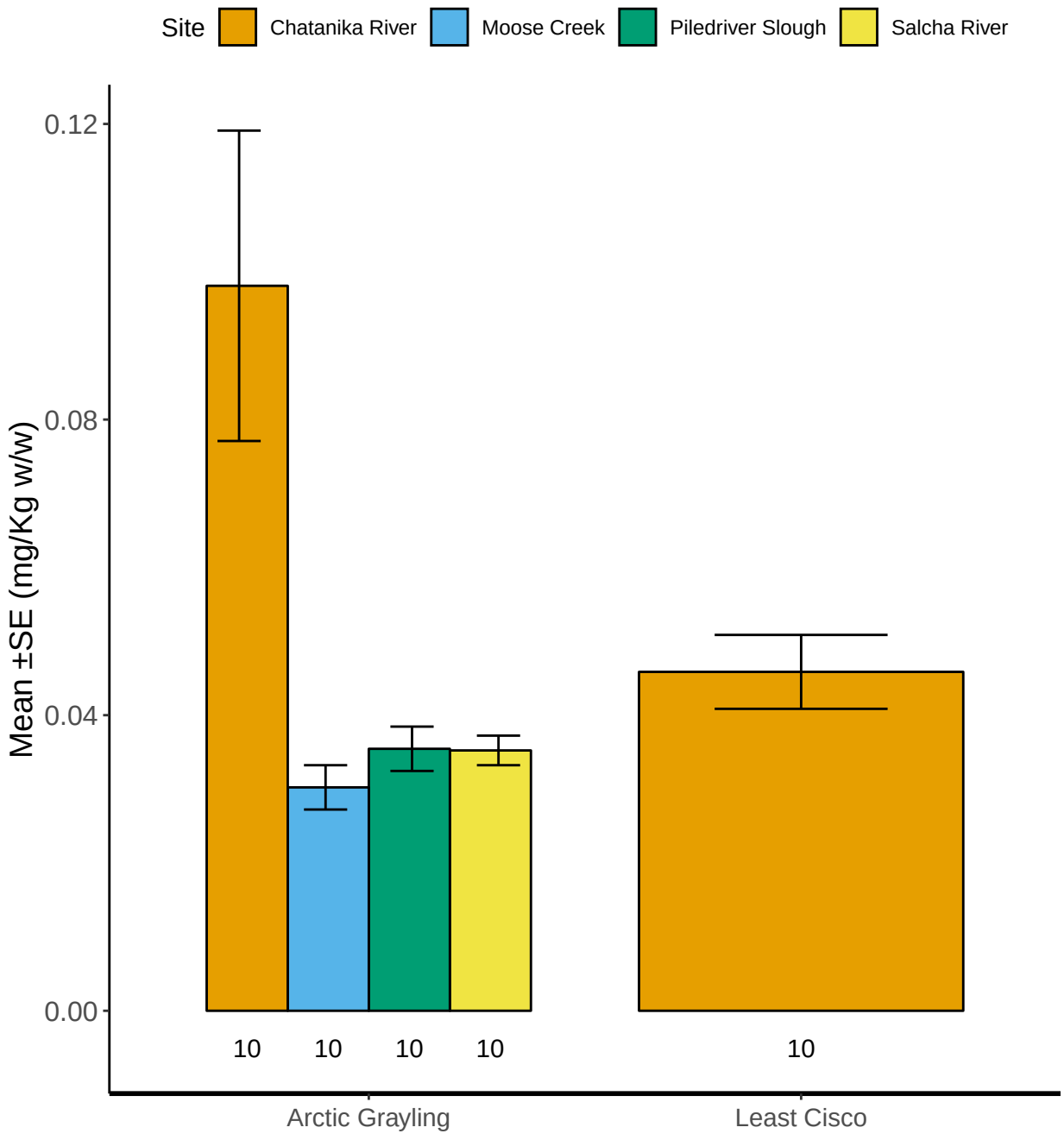

Figure 2: Arsenic

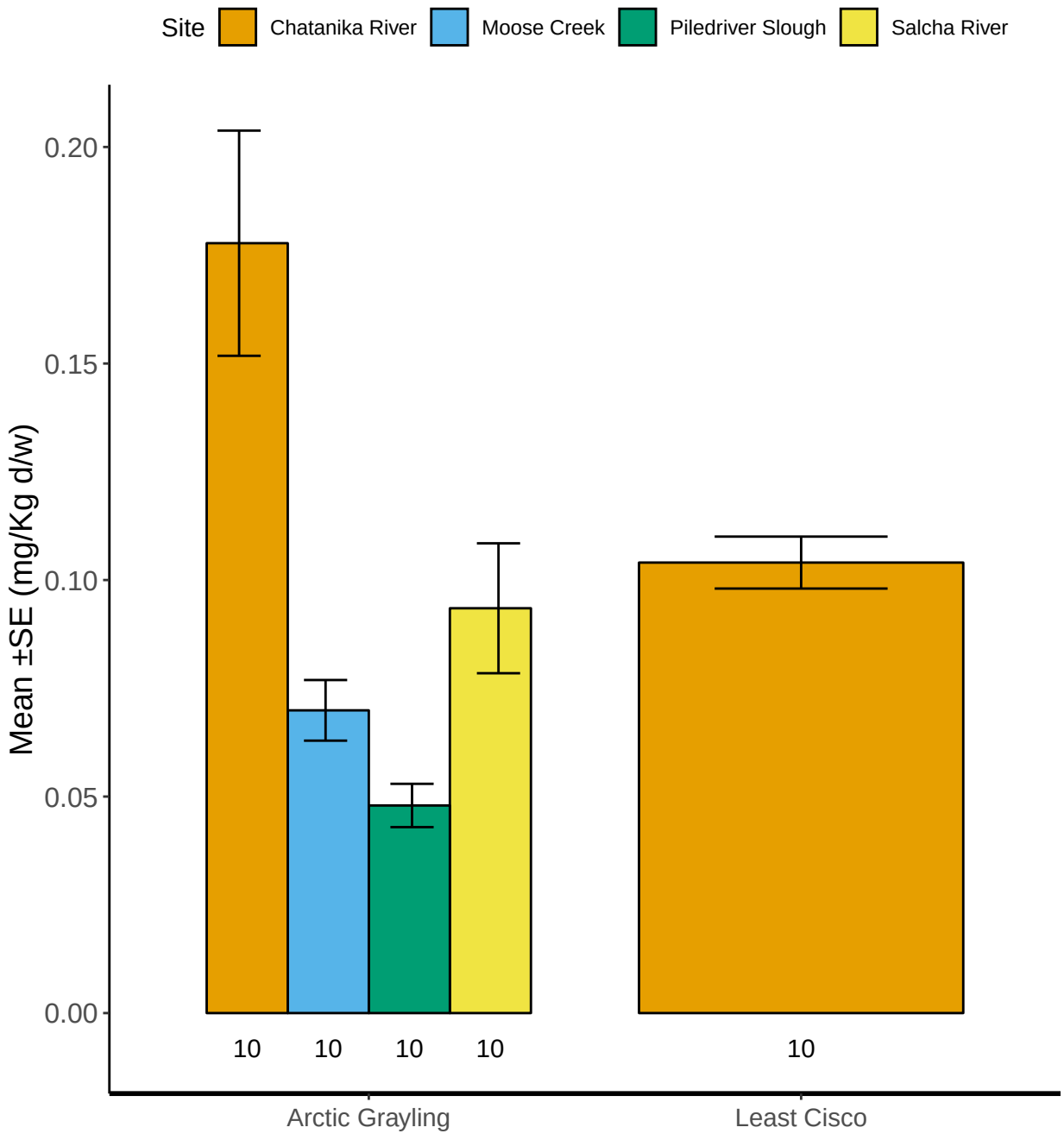

Figure 3: Total Mercury

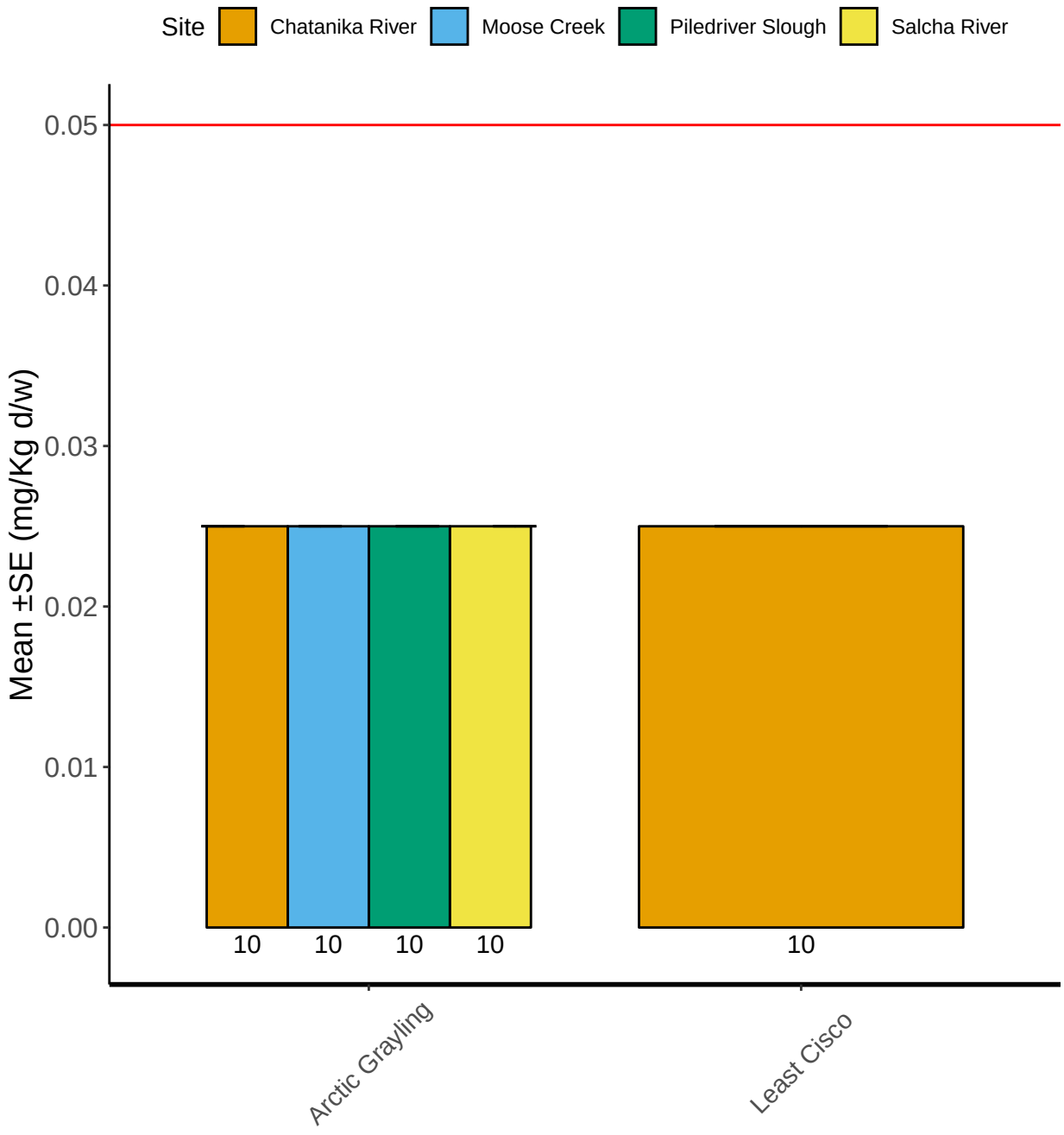

Figure 4: Lead - Detection limit = 0.05 mg/Kg

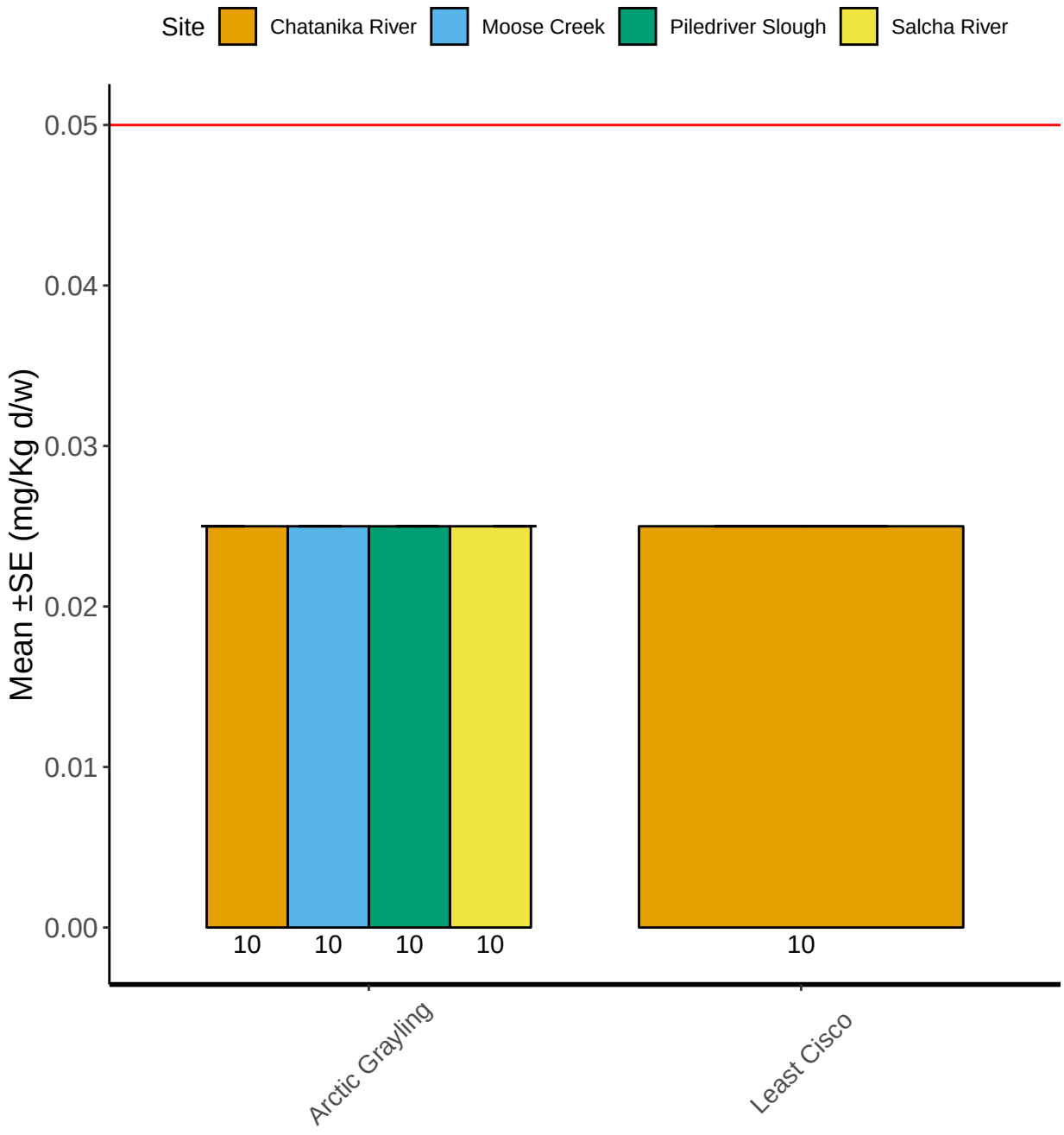

Figure 5: Cadmium - Detection Limit = 0.05 mg/Kg

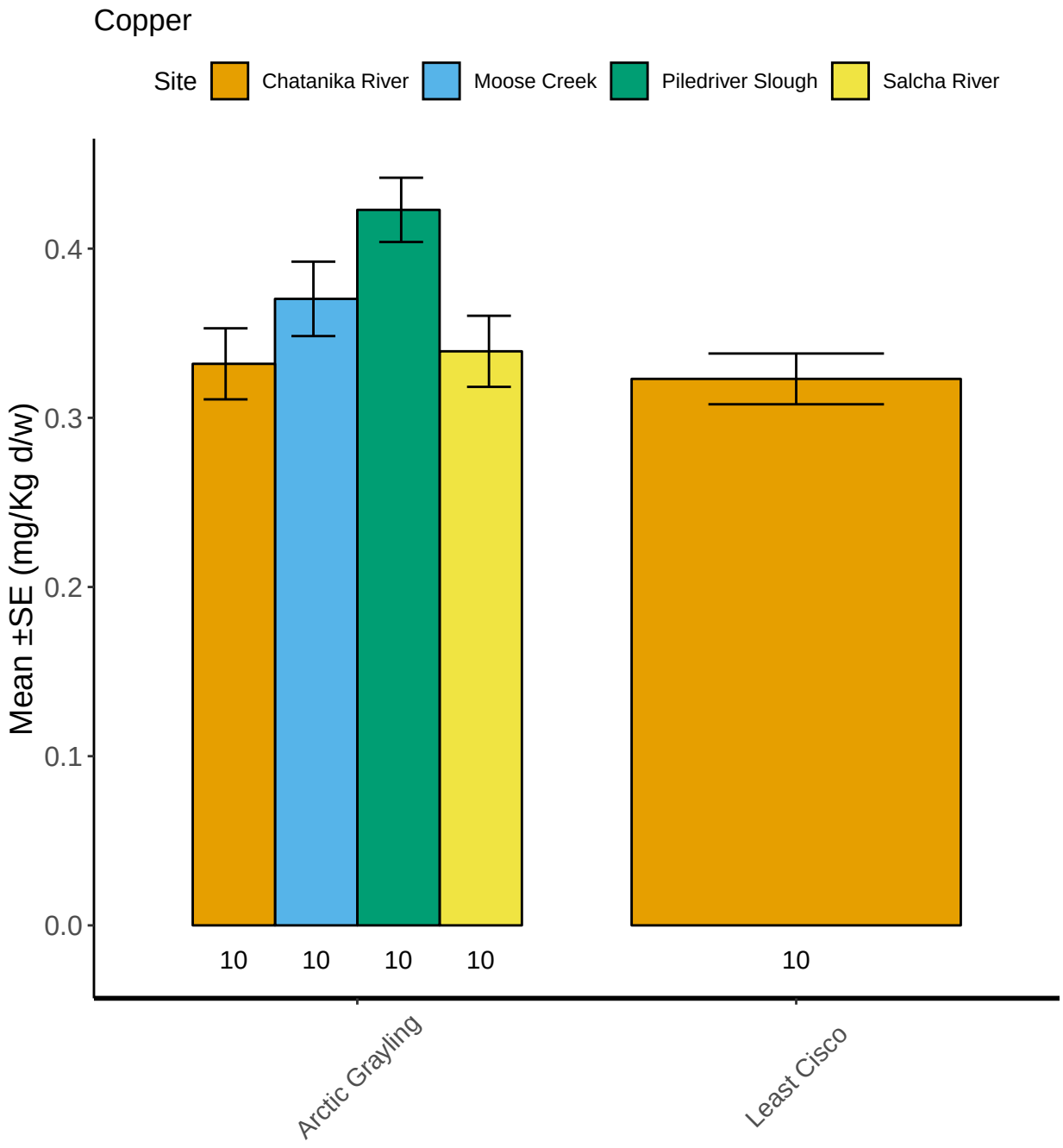

Figure 6: Copper

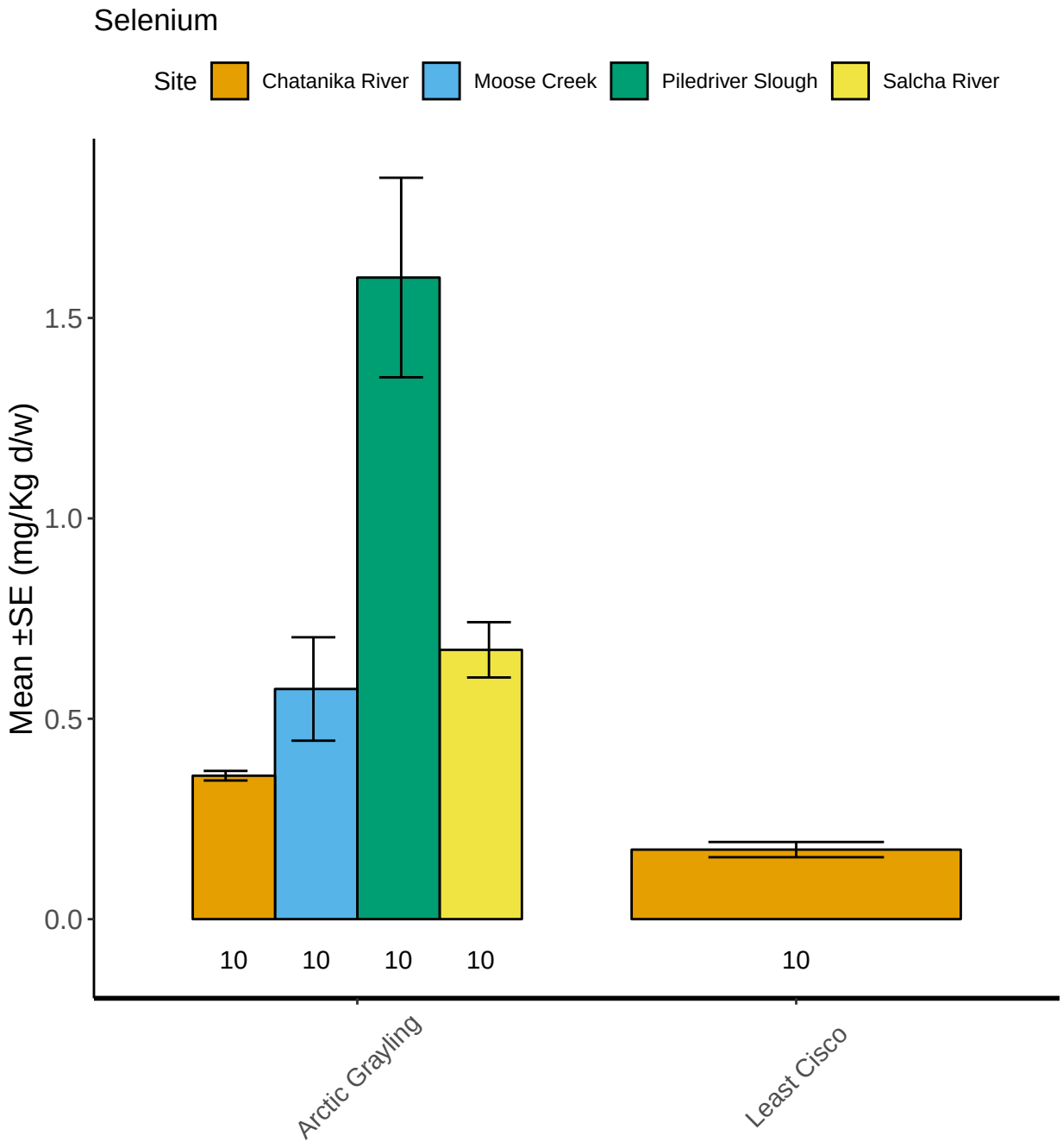

Figure 7: Selenium

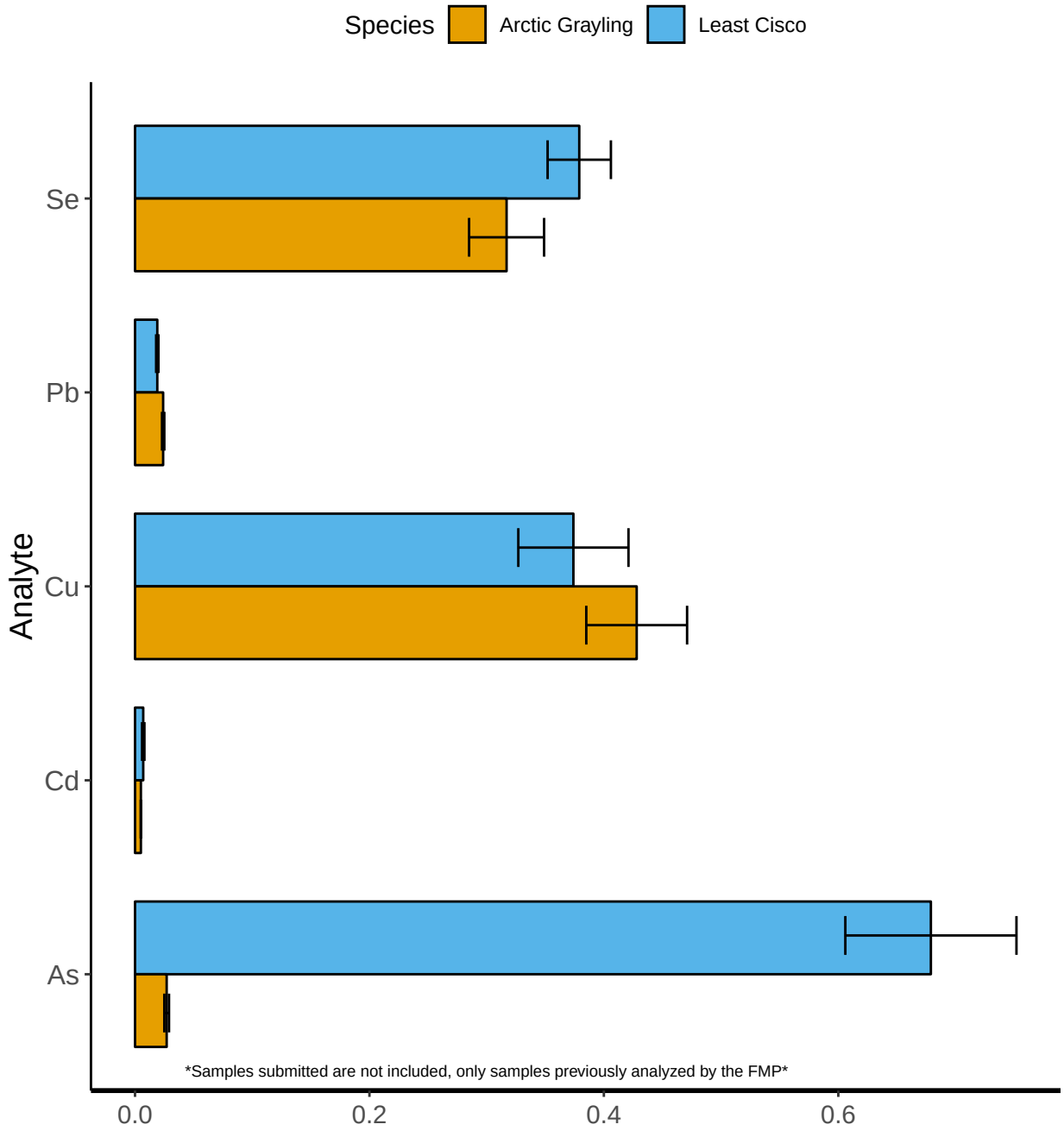

Figure 8: Heavy Metals in FMP Samples of Arctic Grayling and Least Cisco

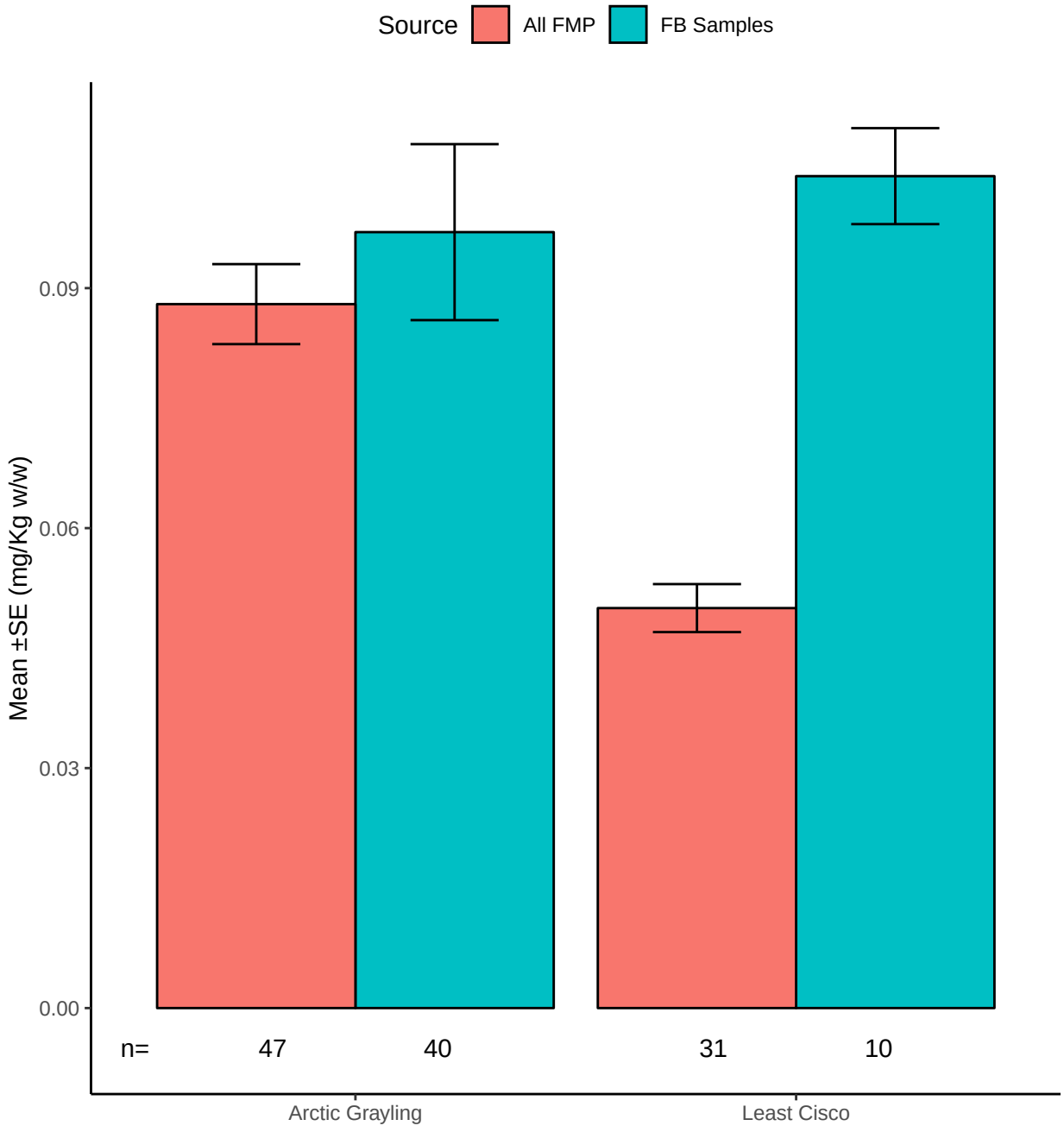

Figure 9: Total Mercury in FMP Samples and Samples Submitted

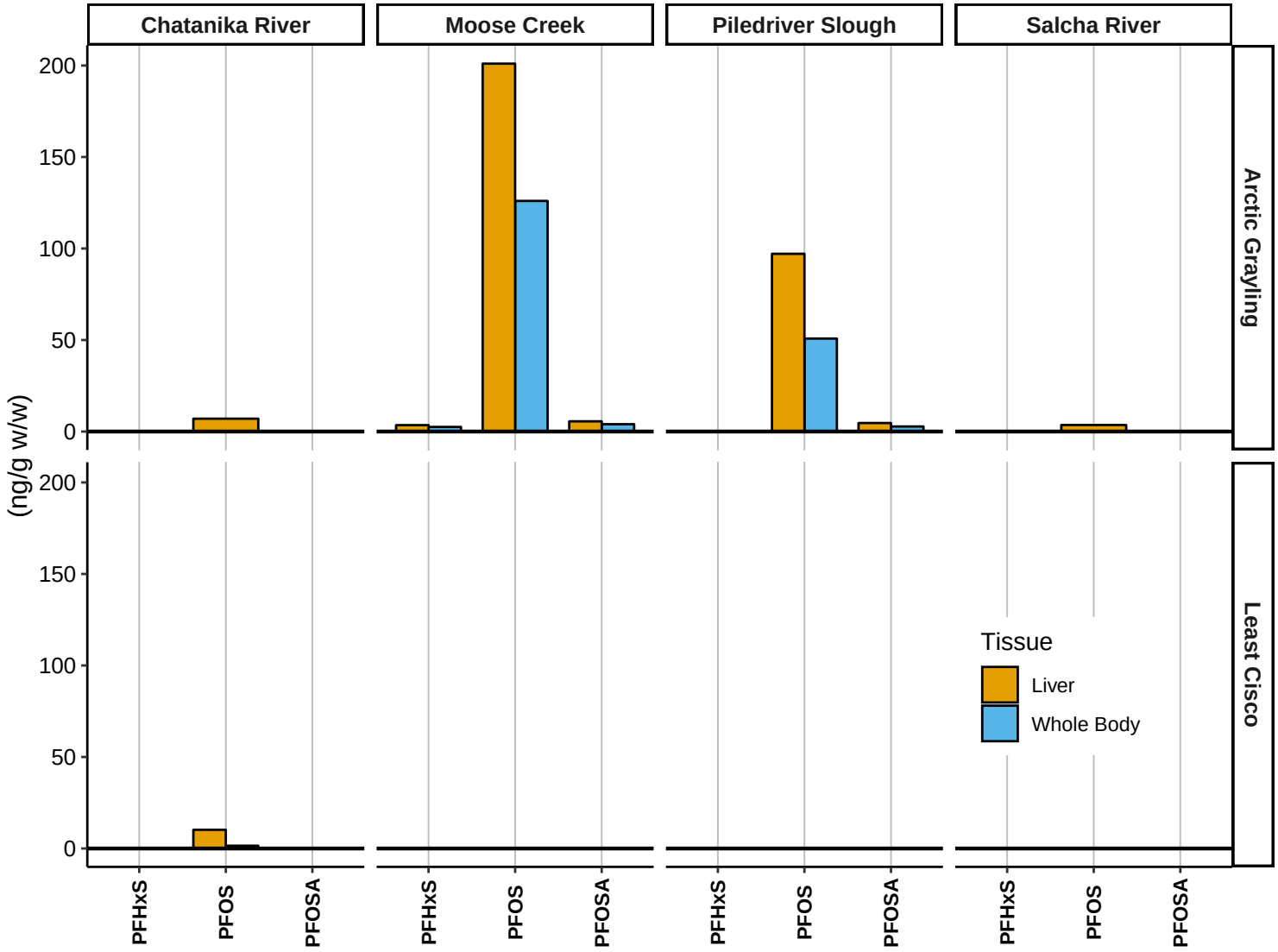

Figure 10: PFAS in composite samples of Arctic Grayling and Least Cisco. Each composite sample contains tissue from 5 individuals. Only detectable PFAS compounds are included.

Table 2: Mean of Select Metals in Fish Collected from the Fairbanks Area

Species	Analyte	Tissue	n	ND	Mean	SD	SEM	Geo_Mean	Median	Min	Max
Arctic Grayling	As	Fillet	40	0	0.050	0.043	0.007	0.041	0.035	0.02	0.26
Arctic Grayling	Cd	Fillet	40	15	0.010	0.011	0.002	0.005	0.002	0.00	0.02
Arctic Grayling	Cu	Fillet	40	0	0.366	0.073	0.012	0.359	0.364	0.23	0.58
Arctic Grayling	Pb	Fillet	40	40	0.025	0.000	0.000	0.025	0.025	0.02	0.02
Arctic Grayling	Se	Fillet	40	0	0.801	0.652	0.103	0.634	0.587	0.20	3.45
Arctic Grayling	Hg	Fillet	40	0	0.097	0.069	0.011	0.080	0.069	0.02	0.32
Least Cisco	As	Fillet	10	0	0.046	0.016	0.005	0.043	0.042	0.02	0.07
Least Cisco	Cd	Fillet	10	7	0.018	0.011	0.004	0.011	0.025	0.00	0.02
Least Cisco	Cu	Fillet	10	0	0.323	0.046	0.015	0.320	0.320	0.26	0.41
Least Cisco	Pb	Fillet	10	10	0.025	0.000	0.000	0.025	0.025	0.02	0.02
Least Cisco	Se	Fillet	10	0	0.174	0.059	0.019	0.165	0.156	0.10	0.26
Least Cisco	Hg	Fillet	10	0	0.104	0.020	0.006	0.102	0.110	0.08	0.13

Note:
Mean = arithmetic mean
Geo_Mean = geometric mean
SD = standard deviation
SEM = standard error or mean
Reporting limit of Pb and Cd = 0.05 mg/Kg, 1/2 RL is reported

Table 3: PFAS in Composite Samples of Arctic Grayling and Least Cisco

Site	Species	Tissue	COMPOUND	n	Conc (ng/g)
Chatanika River	Arctic Grayling	Liver	PFOS	1	7.02
Chatanika River	Least Cisco	Liver	PFOS	1	10.20
Chatanika River	Least Cisco	Whole Body	PFOS	1	1.51
Moose Creek	Arctic Grayling	Liver	PFHxS	1	3.49
Moose Creek	Arctic Grayling	Liver	PFOS	1	201.00
Moose Creek	Arctic Grayling	Liver	PFOSA	1	5.57
Moose Creek	Arctic Grayling	Whole Body	PFHxS	1	2.51
Moose Creek	Arctic Grayling	Whole Body	PFOS	1	126.00
Moose Creek	Arctic Grayling	Whole Body	PFOSA	1	4.01
Piledriver Slough	Arctic Grayling	Liver	PFOS	1	97.10
Piledriver Slough	Arctic Grayling	Liver	PFOSA	1	4.65
Piledriver Slough	Arctic Grayling	Whole Body	PFOS	1	50.80
Piledriver Slough	Arctic Grayling	Whole Body	PFOSA	1	2.76
Salcha River	Arctic Grayling	Liver	PFOS	1	3.58

Note:
Composites of 5 fish each
Only samples with detectable levels are included in the table

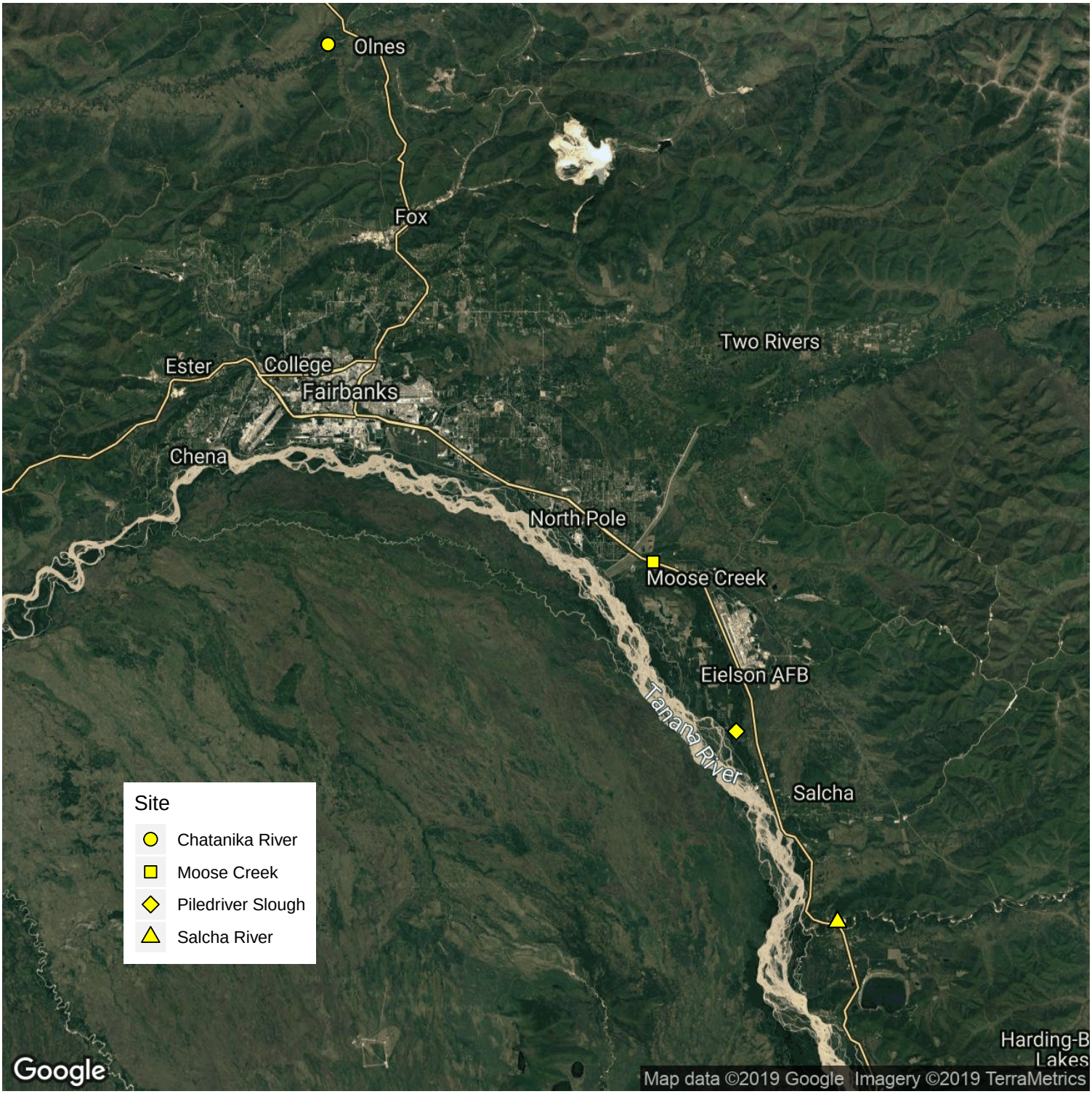

Figure 11: Sample Sites