Statewide Monitoring for Inputs to the Copper Biotic Ligand Model



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August 2017

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List of Acronyms

BLM	biotic ligand model
CV	coefficient of variation
DEQ	Idaho Department of Environmental Quality
DOC	dissolved organic carbon
EPA	United States Environmental Protection Agency
IWQC	instantaneous water quality criterion
MDL	method detection limit
µg/L	microgram per liter
µm	micrometer
mg/L	milligram per liter
PPBV	Plains, Plateaus, and Broad Valleys
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RPD	relative percent difference
SD	standard deviation
USGS	United States Geological Survey

1 Introduction

In 2015, the Idaho Department of Environmental Quality (DEQ) initiated rulemaking to update the existing hardness-dependent dissolved copper criteria by using the 2007 US Environmental Protection Agency (EPA) recommended copper criteria published pursuant to Section 304(a) of the Clean Water Act, which uses other physicochemical properties of the water (e.g., pH, dissolved organic carbon [DOC]) to predict water body-specific criteria using the biotic ligand model (BLM). This update is a reasonable and prudent alternative identified in the National Marine Fisheries Service biological opinion on Idaho's criteria for toxic substances to support aquatic life (NMFS 2014). To derive copper criteria using the BLM, inputs for the following physical and chemical characteristics of the water must be measured: temperature, pH, alkalinity, and the concentrations of copper, DOC, calcium, magnesium, sodium, potassium, sulfate, and chloride.

The data from state and national monitoring efforts are not geographically representative and include limited DOC data in Idaho. Therefore, when evaluating and implementing the BLM, DEQ needs to have some information on basic defaults that can be used when data are unavailable for a site.

Like all equation- or model-based criteria, BLM-derived criteria are site and time specific. The model calculates both acute and chronic criteria based on site-specific physical and chemical inputs. The criterion calculated from a single set of inputs is referred to as an instantaneous water quality criterion (IWQC) and would be protective of aquatic life at the time the data were collected.

Because any single IWQC is time- and place-specific, it will not necessarily be protective of aquatic life at any given site; if site chemistry changes, individual IWQCs will change. However, because the BLM is particularly sensitive to DOC and pH, it may be possible to identify the critical time period for copper toxicity (i.e., when DOC is expected to be at its lowest concentrations).

To inform guidance development, DEQ conducted surface water monitoring and determined the model inputs described in this report to identify conservative criteria estimates for copper that can be used for implementing the copper criteria when site-specific data are not available. The following questions will be addressed:

- What are the current copper and BLM conditions at locations throughout the state?
- Can Idaho waters be classified into regions based on physical and chemical properties, and can existing classifications be used to group waters (e.g., terrestrial ecoregions, basins, and stream order)?
- Can critical BLM conditions be identified for each classification, and can these be used in place of BLM-derived criteria when site-specific data are missing?

2 Methods

DEQ collected grab samples for dissolved copper and BLM input parameters from 200 surface water locations throughout Idaho from September 6 to October 27, 2016. Monitoring followed the procedures outlined in the *Quality Assurance Project Plan: Statewide Monitoring for Inputs to the Copper Biotic Ligand Model* (QAPP; DEQ 2016a).

2.1 Site Selection

Monitoring occurred upstream and downstream of minor industrial and municipal discharge facilities and upstream and downstream of dischargers with current copper limits. Sites were intended to provide DEQ with both ambient and mixed effluent water quality information at each facility, as well as provide data necessary for analysis and inform permit development after copper criteria are updated to the BLM. Downstream monitoring occurred far enough below the outfall to allow for sufficient mixing of effluent with the receiving water. Locations not associated with discharge facilities were added when there was significant regional interest in a particular water body. Monitoring locations targeted for sampling are displayed in Figure 1. Complete monitoring site information can be found in Appendix A.

Not all minor discharge facilities had flowing water both upstream and downstream at the time of monitoring. Crews noted on the field sheets when locations were not sampleable. A total of 200 sites were monitored in the fall between September 6 and October 27, 2016, to represent baseflow conditions. A total of 90 minor discharge facilities had paired, sampleable upstream and downstream locations, representing 180 sites.

Eleven sites were revisited in the spring between March 29 and April 24, 2017. Spring sample locations were selected based on geographic representation and accessibility. Results from spring monitoring were not used in analysis other than to compare to fall results.

2.2 Field Collection

Grab samples were collected following the procedures outlined in the QAPP (DEQ 2016a). Samples were collected from a well-mixed portion of the water body as close to the thalweg as could be safely accessed.

Physical parameters (temperature and pH) were collected facing upstream, with a calibrated multiparameter probe or sonde at 0.5-meter depth in a well-mixed portion of the stream. Measurements were allowed to equilibrate before results were recorded. Water samples were also collected facing upstream and were preserved according to the QAPP. All samples were placed in a cooler on ice and held at ≤4 °C for transport or shipment to the contract laboratory. Samples were delivered to the contract laboratory within 48 hours of collection.

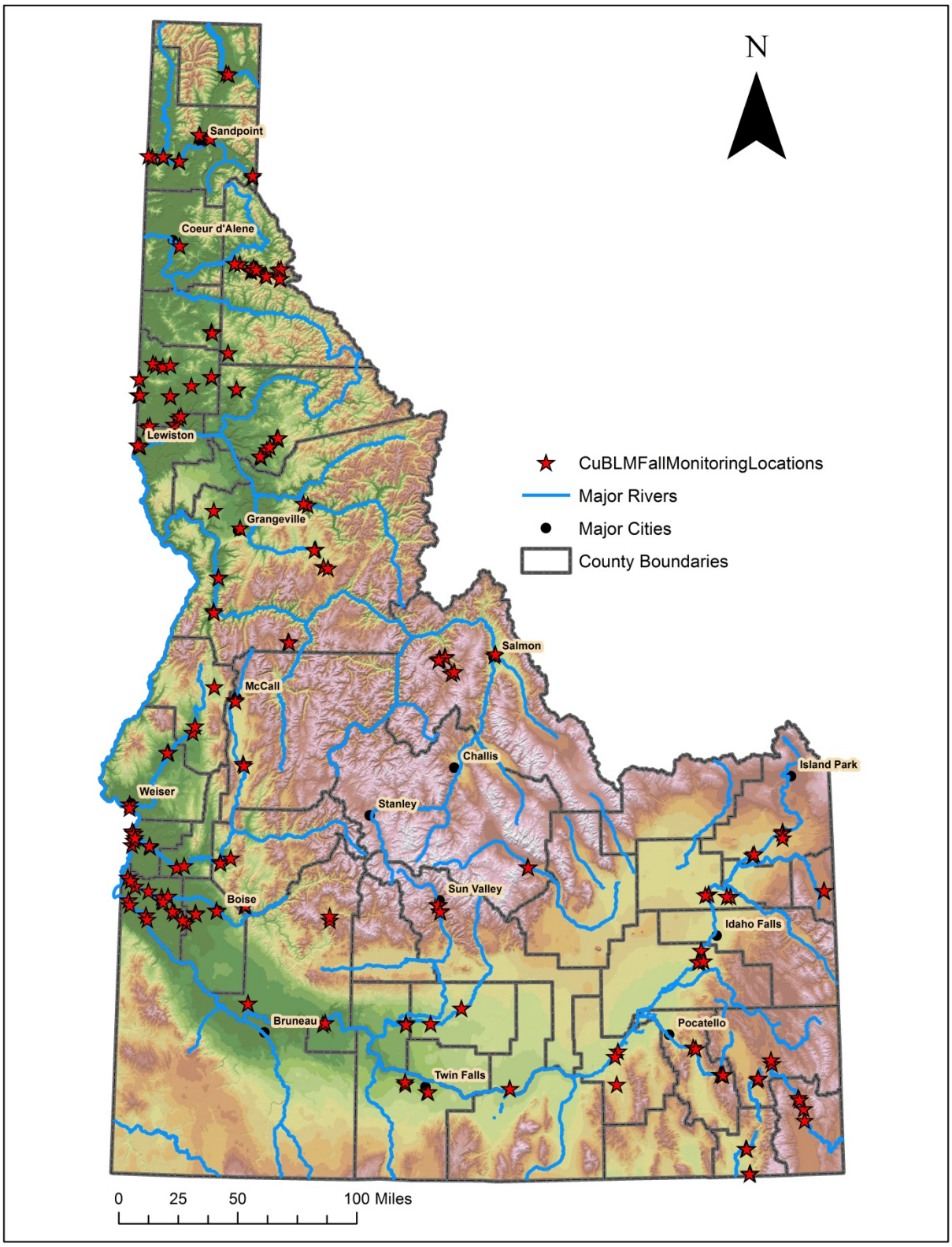


Figure 1. BLM input monitoring locations in Idaho.

2.3 Laboratory Methods

All samples were analyzed by Anatek Labs, Inc., of Moscow, Idaho.

Upon receipt, the laboratory filtered dissolved metals and DOC samples through 0.45-micrometer (µm) filters and preserved with acidification to pH <2. Analytical methods, preservatives, and holding times are presented in Table 1.

Table 1.Sample container, analytical method, preservation method, and sample holding times.

Sample Container	Parameter	Analytical Method	Preservation	Holding Time
500 mL HDPE	Dissolved calcium, magnesium, sodium, potassium	EPA 200.7	Cool to ≤4 °C. Filter with 0.45-µm filter as soon as practical. Acidify to pH <2 after filtration.	28 days unpreserved 6 months preserved
	Dissolved copper	EPA 200.8	Cool to ≤4 °C. Filter with 0.45-µm filter as soon as practical. Preserve with nitric acid within 2 weeks.	2 weeks unpreserved 6 months preserved
	Sulfate, chloride	EPA 300.0	Cool to ≤4 °C.	28 days
	Alkalinity	SM 2320 B	Cool to ≤4 °C.	14 days
40 mL amber glass vial	DOC	SM 5310 B	Cool to ≤4 °C. Filter with 0.45-µm filter within 48 hours. Acidify to pH <2 after filtration.	7 days

Note: HPDE = high-density polyethylene; mL = milliliter; SM = standard method

2.4 Data Handling

Analytes that were not detected at the laboratory method detection limit (MDL) were assigned a value equal to one-half the MDL. Analytical results that were greater than or equal to the MDL but less than the reporting limit (and are thus not quantifiable) were assigned the numeric value of the MDL, with the exception of dissolved copper results. All copper results were assigned reported values, regardless of whether or not they were below the analytical reporting limit. No copper results were below the MDL.

Analytical MDLs and reporting limits are presented in Table 2.

Table 2. Analytical MDLs and reporting limits.

Analyte	MDL (mg/L)	Reporting Limit (mg/L)
Dissolved calcium	0.01	0.1
Dissolved magnesium	0.0495	0.1
Dissolved sodium	0.0079	0.1
Dissolved potassium	0.0495	0.1
Dissolved copper	0.0001	0.001
DOC	0.04	0.2
Sulfate	0.047	10
Chloride	0.043	0.1
Alkalinity	2.78	10

Note: mg/L = milligram per liter

All reported summary statistics and BLM-derived criteria are based on data handled in this fashion.

2.5 Quality Assurance/Quality Control Analysis

All quality assurance (QA) and quality control (QC) procedures followed those outlined in the QAPP (DEQ 2016a). Data quality was evaluated by collecting field QC samples at ≥10% of sample sites (field duplicates represent ≥5% of sites, and field blanks represent ≥5% of sites). The data completeness goal was 80%; with 189 of the 200 samples (95%) having complete results, this goal was met.

2.5.1 Data Quality Objectives

A sample was considered complete only when valid results were obtained for all physical and chemical parameters required by the BLM (section 1). Data from sites that did not have a complete sample were excluded from BLM analyses.

Precision was measured as the relative percent difference (RPD) of field duplicates. The RPD was calculated using the following equation when both C_1 and C_2 were >5 times the laboratory MDL:

$$|\boldsymbol{RPD}| = \left|\frac{(\boldsymbol{C_1}-\boldsymbol{C_2})}{(\boldsymbol{C_1}+\boldsymbol{C_2})/\boldsymbol{2}}\right| \times \boldsymbol{100}$$

where

C_1 = concentration in first sample

C_2 = concentration in the second/duplicate sample

The data quality objective for precision for this project was an RPD ≤50%, with a goal of ≤20%.When C_1 and/or C_2 are ≤5 times the MDL, the results were considered within control limits.

2.5.2 Data Quality Assessment

A total of 15 sites were sampled for field duplicates, representing 8% of all sites sampled. Not all field duplicates included DOC samples; only 8 field sites had DOC duplicate results reported, representing 4% of all sites.

Calculated RPDs for field duplicates ranged from 0.0–48.3% (average 3.6%), meeting the objective outlined in section 2.5.1. Only 7 out of 135 field duplicate RPDs exceeded the goal of 20%. Calculated RPDs are presented in Table 3.

Table 3. Summary of field duplicate RPDs.

	Relative Percent Difference								
Site ID	**Dissolved Copper**	**DOC**	**Dissolved Calcium**	**Dissolved Magnesium**	**Dissolved Sodium**	**Dissolved Potassium**	**Sulfate**	**Chloride**	**Alkalinity**
ID0001155D	1.8	N/A	0.3	0.6	0.3	1.0	10.4	10.1	0.6
ID0020133D	27.3	2.2	0.3	0.0	0.0	0.4	4.8	6.9	2.4
ID0020133U	0.5	1.5	0.7	1.0	0.0	1.1	3.1	4.5	0.8
ID0020389U	7.3	N/A	2.1	0.4	0.9	1.5	0.0	1.0	1.4
ID0020753D	4.9	1.2	0.0	0.0	0.6	0.6	1.0	0.6	0.7
ID0020753U	18.0	1.2	2.8	3.7	2.9	4.5	0.7	0.6	2.8
ID0021822D	20.1	2.5	2.2	1.5	2.2	2.3	3.2	2.0	8.9
ID0021831U	3.6	N/A	3.7	2.8	2.1	2.5	1.7	3.4	0.6
ID0022501U	1.4	1.3	3.3	3.6	2.6	3.0	0.0	5.7	29.4
ID0023167U	3.1	N/A	3.6	1.4	0.8	3.9	0.0	6.6	7.9
ID0024988D	0.0	2.2	3.5	3.8	2.2	4.1	47.2	0.0	8.6
ID0024988U	13.6	2.2	0.2	1.0	0.0	0.0	2.1	1.8	1.6
ID0027383U	48.3	N/A	3.0	3.1	3.9	0.2	0.0	0.0	3.0
ID0027952D	4.2	N/A	0.7	0.9	2.0	6.3	0.0	2.0	2.2
ID0028355D	2.6	N/A	0.4	0.0	0.3	0.1	1.2	0.8	0.9
Min	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.6
Max	48.3	2.5	3.7	3.8	3.9	6.3	47.2	10.1	29.4

Note: N/A = no RPD available because analysis was not conducted

A total of 20 field blank samples were analyzed, representing 10% of all sites sampled. However, only 15 field blank samples were analyzed for DOC, representing 8% of all sites sampled. Each field blank was considered to represent a sample batch—all samples collected by each DEQ regional office since the last field blank.

Of the 175 field blank analyses, 154 were below MDLs and 21 were detected (Table 4). Detections in field blanks consisted of six dissolved copper results, three DOC results, four dissolved calcium results, and eight dissolved sodium results.

Dissolved copper blanks with detectable concentrations of dissolved copper ranged from 0.0001–0.0049 mg/L and are not considered to affect results because BLM criteria are not derived using this analyte. In addition, the only dissolved copper results that indicated exceedances of concurrent BLM criteria were well above the results reported in these blanks (section 3).

DOC blanks with detectable concentrations ranged from 0.208–0.236 mg/L. These blank results affected 3 sample batches and were considered to affect 16 samples. The DOC results from these 16 samples were reduced by the associated blank concentrations (Brumbaugh 2014). Results from affected DOC samples and the resulting DOC concentration adjustments are reported in Table 5.

Dissolved calcium and dissolved sodium field blanks with detectable concentrations ranged from 0.135–0.163 and 0.113–0.306 mg/L, respectively. These were well below the minimum concentrations reported from field samples (section 3) and did not affect BLM-derived criteria.

All fall sample results, including QC sample results, are available in Appendix B.

Table 4. Field blank results.

Site ID	Copper	DOC	Calcium	Magnesium	Sodium	Potassium	Sulfate	Chloride	Alkalinity (mg $CaCO_3$/L)
	(mg/L)								
ID0020117U	—	0.208	—	—	—	—	—	—	—
ID0020133D	0.0001	—	0.147	—	0.127	—	—	—	—
ID0020133U	—	—	0.163	—	0.122	—	—	—	—
ID0020338U	—	N/A	—	—	—	—	—	—	—
ID0020567D	0.0041	0.235	—	—	—	—	—	—	—
ID0020753D	—	0.236	—	—	—	—	—	—	—
ID0020753U	—	—	—	—	0.113	—	—	—	—
ID0021016U	—	N/A	—	—	—	—	—	—	—
ID0021024D	0.0001	N/A	—	—	—	—	—	—	—
ID0021229D2	—	—	—	—	—	—	—	—	—
ID0022004U	—	N/A	—	—	—	—	—	—	—
ID0022012U	—	—	—	—	0.281	—	—	—	—
ID0022047D	0.0004	—	—	—	—	—	—	—	—
ID0022501U	0.0049	—	—	—	0.284	—	—	—	—
ID0023604U	0.0003	—	—	—	0.306	—	—	—	—
ID0024350D	—	—	—	—	—	—	—	—	—
ID0024988D	—	—	0.135	—	0.119	—	—	—	—
ID0024988U	—	—	0.149	—	0.115	—	—	—	—
ID0025071D	—	—	—	—	—	—	—	—	—
ID0025488D	—	N/A	—	—	—	—	—	—	—

Note: — = result is below the MDL; N/A = analysis was not conducted

Table 5. Summary of samples affected by detectable DOC in blanks and adjustments.

Site ID	DEQ Regional Office	Date	Sample DOC	Blank DOC	Sample Adjusted DOC
			(mg/L)		
ID0000060D	Coeur d'Alene	10/4/2016	0.549	0.235	0.314
ID0000060U	Coeur d'Alene	10/4/2016	0.464	0.235	0.229
ID0000159D	Coeur d'Alene	10/4/2016	0.540	0.235	0.305
ID0000159U	Coeur d'Alene	10/4/2016	0.516	0.235	0.281
ID0000167D	Coeur d'Alene	10/4/2016	0.385	0.235	0.150
ID0000167U	Coeur d'Alene	10/4/2016	0.348	0.235	0.113
ID0020567D	Coeur d'Alene	10/4/2016	0.416	0.235	0.181
ID0020567U	Coeur d'Alene	10/4/2016	0.405	0.235	0.170
ID0021296D	Coeur d'Alene	10/4/2016	0.705	0.235	0.470
ID0021296U	Coeur d'Alene	10/4/2016	0.859	0.235	0.624
ID0025429D	Coeur d'Alene	10/4/2016	0.493	0.235	0.258
ID0025429U	Coeur d'Alene	10/4/2016	0.464	0.235	0.229
ID0020117D	Coeur d'Alene	10/5/2016	0.66	0.208	0.452
ID0020117U	Coeur d'Alene	10/5/2016	0.644	0.208	0.436
ID0022071D	Coeur d'Alene	10/5/2016	0.585	0.208	0.377
ID0022071U	Coeur d'Alene	10/5/2016	0.664	0.208	0.456
ID0020753D	Twin Falls	10/10/2016	1.620	0.236	1.384

2.6 Derivation of BLM Criteria

BLM criteria were derived using the BLM Freshwater version 3.1.2.37 (Windward 2015a). BLM criteria were calculated for copper using full site chemistry and the US EPA WQC calculation function of the BLM. Criteria were only calculated for sites with results for all required BLM input parameters with the exception of humic acid fraction and sulfide. For humic acid fraction, a default value of 10% was used for all samples; for sulfide, a default value of near-zero (1×10^{-8} mg/L) was used for all samples (Windward 2015b).

Differences between upstream and downstream locations from a given minor discharge facility were calculated as percent difference according to the following equation:

$$\boldsymbol{Percent\ Difference}\ (\%) = \frac{(C_D - C_U)}{(C_D + C_U)/2} \times 100$$

where

C_D = BLM-derived chronic criterion from downstream sample (microgram per lit [µg/L])

C_U = BLM-derived chronic criterion from upstream sample (µg/L)

Positive percent difference indicates that the downstream criterion is greater than the upstream criterion; negative percent difference indicates that the upstream criterion is greater than the downstream criterion.

2.7 Regional Classification

DEQ considered regional classification methods to decrease variability among BLM inputs and BLM-derived criteria. Appropriate regional classifications may be used to estimate protective criteria for waters where input data are not available or are incomplete. The following regional classification schemes were analyzed:

- Idaho administrative basins as described in Idaho water quality standards, hereafter referred to as basins (IDAPA 58.01.02.109–160)
- Level III ecoregions, hereafter referred to as ecoregions (EPA 2013)
- Stream order
- Water body assessment guidance site classes, hereafter referred to as site class (DEQ 2016b)
- Site class combined with stream size, where rivers are any water with stream order ≥5 and streams are any water with stream order <5, hereafter referred to as site class + river/stream

3 Results

Valid complete samples were collected from 189 discrete sampling locations throughout the state (Figure 1). All reported results from fall monitoring are available in Appendix B. For fall samples, the minimum, maximum, 10th percentile, mean, median, standard deviation (SD), and coefficient of variation (CV) for all sampled parameters are presented in Table 6.

Table 6. Summary statistics for sampled parameters.

Parameter	Min	Max	10th Percentile	Mean	Median	SD	CV (%)
	(Units match those defined per parameter)						
Temp (°C)	4.1	18.0	8.3	11.8	11.5	3.0	26
pH (s.u.)	5.5	9.4	7.4	7.9	8.0	0.5	7
Cu (mg/L)	0.0001	0.0067	0.0002	0.0007	0.0005	0.0008	120
DOC (mg/L)	0.35	14.20	0.66	2.21	1.86	1.66	75
Ca (mg/L)	1.6	88.0	4.8	26.1	18.6	20.7	79
Mg (mg/L)	0.3	71.0	0.9	9.4	5.0	11.4	122
Na (mg/L)	0.5	92.8	2.1	13.5	6.0	14.7	108
K (mg/L)	0.2	18.7	0.5	3.0	1.6	3.4	113
SO_4 (mg/L)	0.0	111.0	0.0	20.7	11.3	27.1	131
Cl (mg/L)	0.2	106.0	0.5	12.2	3.1	17.8	147
Alk (mg $CaCO_3$/L)	6.5	478.0	19.2	104.3	68.5	91.2	87

Notes: mg/L = milligram per liter; s.u. = standard unit

3.1 BLM Criteria

For fall samples, BLM-derived chronic copper criteria ranged from 0.24–52.2 µg/L. The 10th percentile for all chronic criteria was 1.3 µg/L. The mean chronic criterion was 9.1 µg/L, with a

standard deviation of 6.85 µg/L and a coefficient of variation of 75%. Complete model results from fall samples are available in Appendix C.

Of the 11 sites sampled in the spring, 6 had chronic criteria that were higher than the fall chronic criteria. The percent difference ranged from -130 to +146%. Fall and spring criteria results are presented in Table 7.

Table 7. Spring and fall BLM-derived chronic copper criteria and RPDs.

Site ID	Chronic Copper Criterion (µg/L)		Relative Percent Difference (%)
	Spring	Fall	
ID0020001U	7.6	6.8	-12
ID0020125D	21.6	6.9	-103
ID0020133U	9.9	3.7	-91
ID0020141U	3.9	2.0	-66
ID0020231D	1.4	9.1	146
ID0020451D	6.1	7.3	18
ID0020931U	4.6	6.9	41
ID0022845U	3.8	8.9	79
ID0025143D	21.5	4.6	-130
ID0027928U	2.0	1.9	-1
ID0027979U	0.9	4.3	129

Note: Negative RPD indicates fall criteria are lower than spring criteria.

Of the 90 minor discharge facilities where both upstream and downstream locations were sampleable, BLM-derived criteria were higher at the downstream location for 48 sites and lower at the downstream location for 42 sites. The mean percent difference between paired upstream and downstream samples was 0.08%.

In all, 78 of the 90 facilities had downstream criteria that were <10% different than their paired upstream criteria (Figure 2).

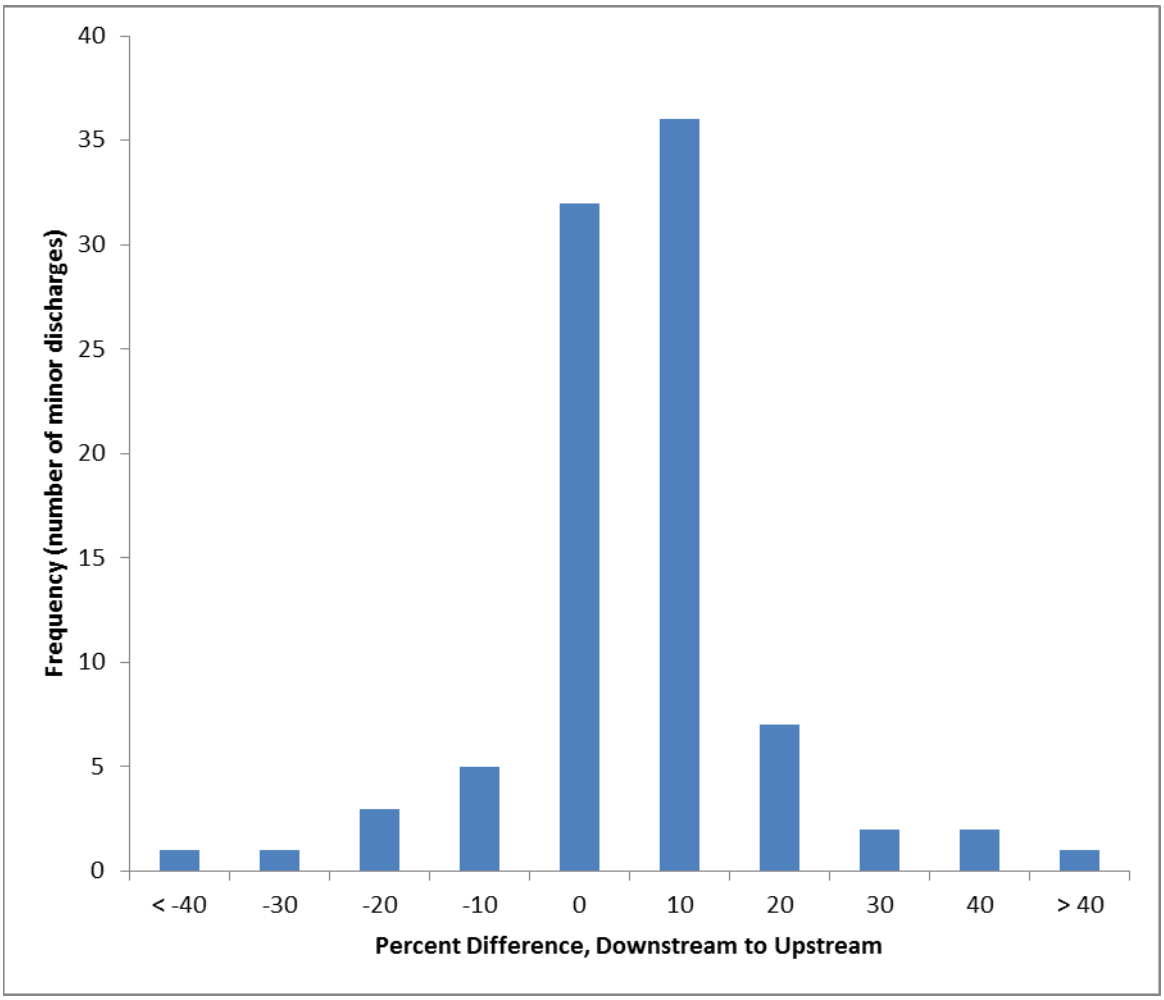


Figure 2. Distribution of percent difference between paired upstream and downstream BLM-derived chronic copper criteria from a given minor discharge location.

3.2 Copper Results

Only 5 of the 189 sites with complete samples had copper concentrations that exceeded BLM IWQC at the time of sampling. Two sites exceeded both acute and chronic criteria, and three sites exceeded only chronic criteria (Table 8).

Table 8. BLM-derived copper criteria and copper concentrations from the five sites that had copper results exceeding the acute or chronic IWQC at the time of sample collection.

Site ID	Stream Name	Acute Criterion	Chronic Criterion	Dissolved Copper
		(µg/L)		
ID0000167U	Canyon Creek	0.39	0.24	0.25
ID0027120D	Little Wood River	0.56	0.35	0.49
ID0028321D	Big Deer Creek	2.59	1.61	2.86
ID0028321U	Big Deer Creek	3.51	2.18	2.42
SFDeerCKD	South Fork Deer Creek	3.93	2.44	6.65

3.3 Regional Classification

Summary statistics (minimum, maximum, 10th percentile, mean, median, SD, and CV) for each input parameter and chronic copper criteria were calculated for each group for each regional classification scheme evaluated.

3.3.1 Basin

The number of sites sampled ranged from 12 in the Bear River basin to 49 in the Southwest basin. The distribution of input parameters by basin is presented in Figure 3.

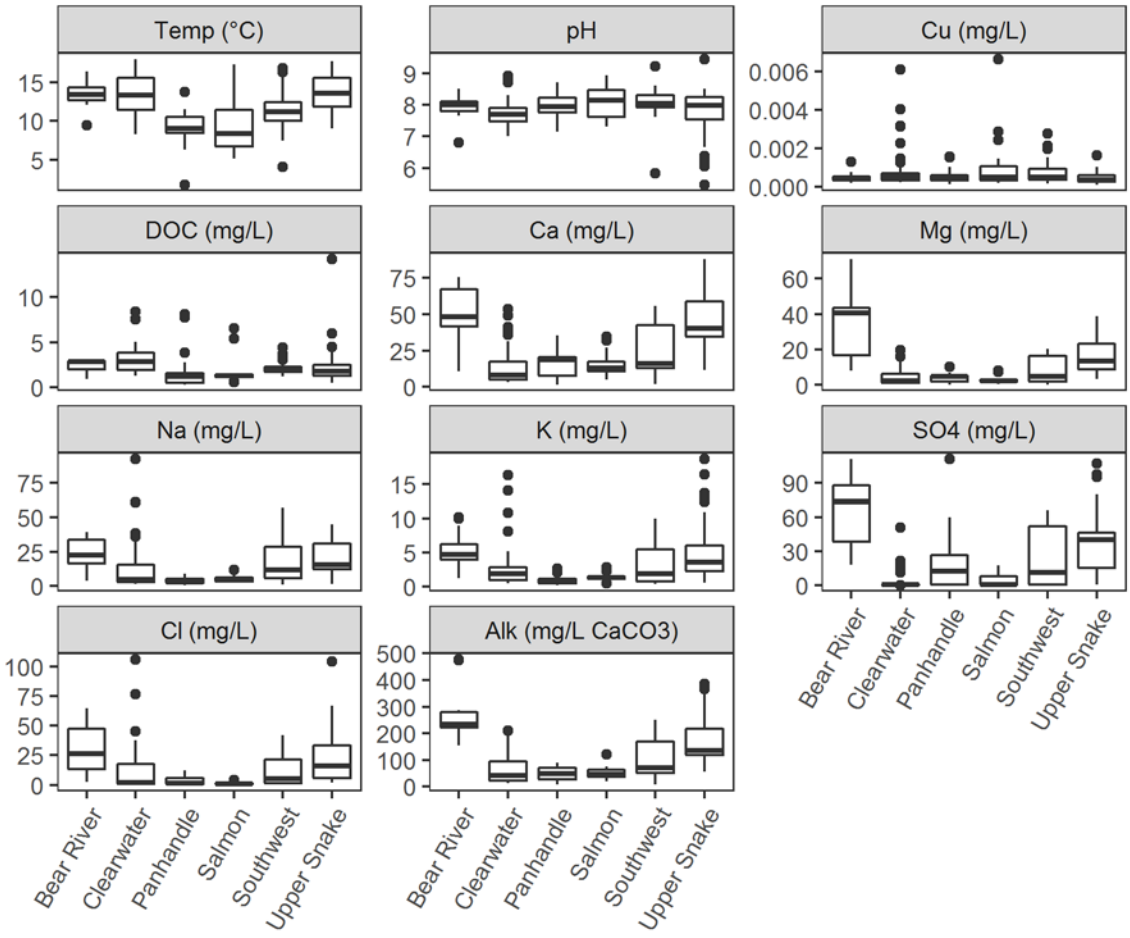


Figure 3. Distribution of BLM input parameters by basin.

CVs in the Salmon basin ranged across the following:

- Temperature: 13.3–42.1%
- pH: 4.7–10.9%
- Dissolved copper: 61.6–140.5%
- Ions (sulfate, chloride, and dissolved calcium, magnesium, sodium, and potassium) and alkalinity: 35.8–220.0%
- DOC: 28.8–111.2%

The distribution of BLM-derived chronic criteria by basin is presented in Figure 4.

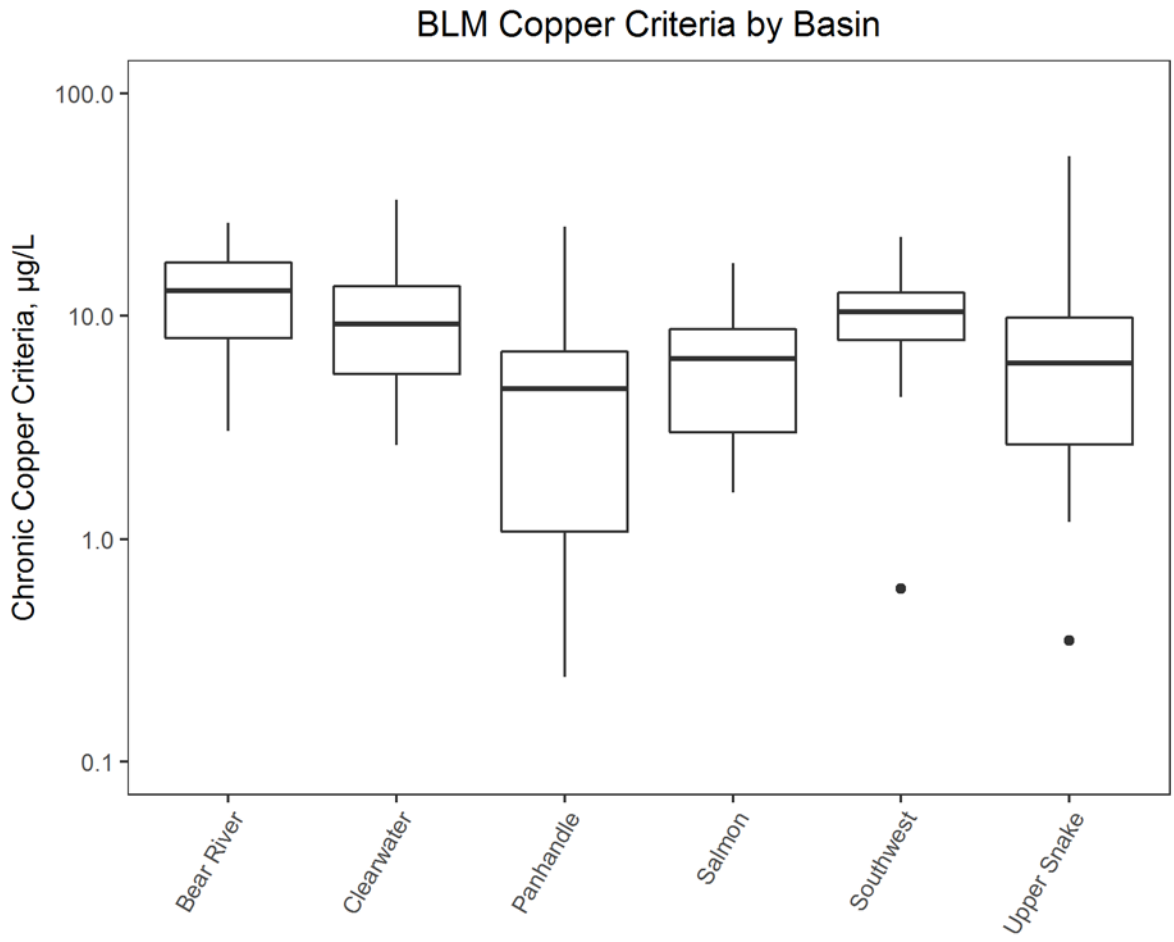


Figure 4. Distribution of BLM-derived chronic copper criteria by USGS hydrologic basin.

The lowest chronic copper criterion was in the Panhandle basin, while the highest was in the Upper Snake basin. The CV for chronic copper criteria ranged from a minimum of 40% in the Southwest basin to 113% in both the Panhandle and Upper Snake basins (Table 9).

Table 9. Summary statistics of BLM-derived chronic copper criteria by USGS hydrological basin.

Basin	N	Min	Max	10th Percentile	Mean	SD	CV
		(µg/L)					(%)
Bear River	12	3.0	26.1	4.9	13.6	7.25	53
Clearwater	40	2.6	33.2	4.7	10.4	6.21	60
Panhandle	37	0.2	25.1	0.7	5.5	6.17	113
Salmon	18	1.6	17.3	2.4	7.0	4.38	63
Southwest	49	0.6	22.7	5.8	10.5	4.17	40
Upper Snake	33	0.4	52.2	1.6	9.0	10.13	113

3.3.2 Level III Ecoregion

The number of sites ranged from 2 in the Wasatch and Uinta Mountains ecoregion to 58 in the Snake River Plain ecoregion. The distribution of input parameters by ecoregion are presented in Figure 5.

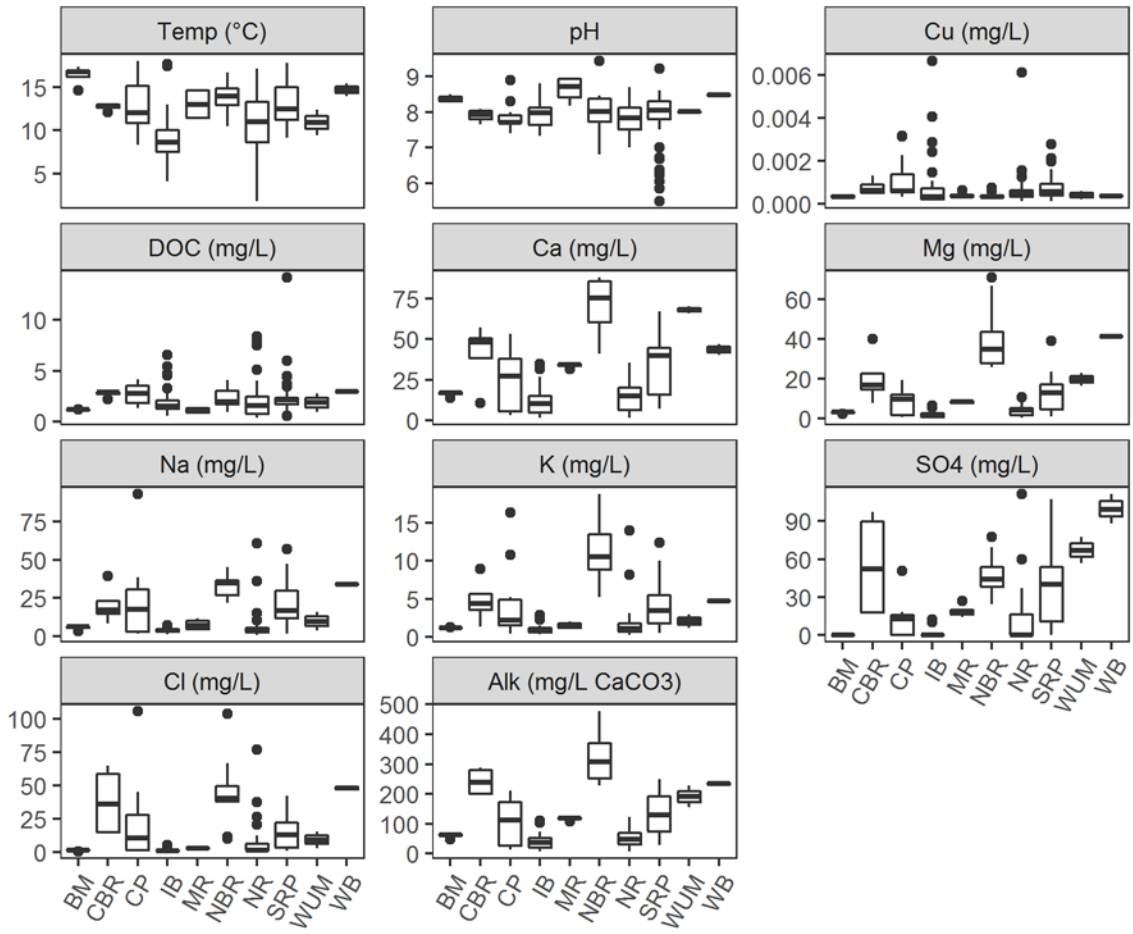


Figure 5. Distribution of BLM input parameters by ecoregion. BM = Blue Mountains; CBR = Central Basin and Range; CP = Columbia Plateau; IB = Idaho Batholith; MR = Middle Rockies; NBR = Northern Basin and Range; NR = Northern Rockies; SRP = Snake River Plain; WUM = Wasatch and Uinta Mountains; WB = Wyoming Basin.

CVs by ecoregion ranged across the following:

- Temperature: 3.2–34.5%
- pH: 0.1–9.5%
- Dissolved copper: 7.3–160.1%
- Ions (sulfate, chloride, and dissolved calcium, magnesium, sodium, and potassium) and alkalinity: 0.1–208.5%
- DOC: 1.4–93.5%

The distribution of BLM-derived chronic criteria by ecoregion is presented in Figure 6.

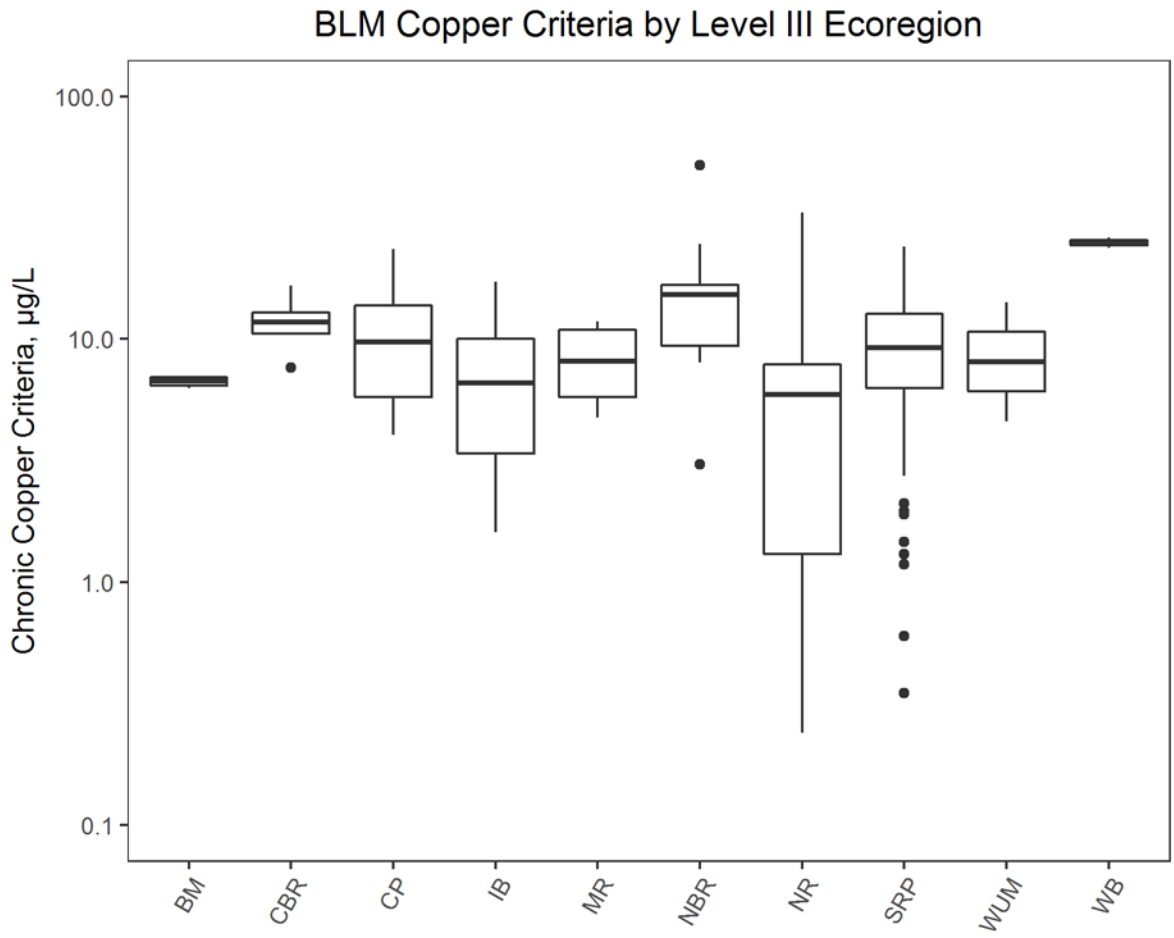


Figure 6. Distribution of BLM-derived chronic copper criteria by ecoregion.

The lowest chronic copper criterion was in the Northern Rockies ecoregion, while the highest was in the Northern Basin and Range ecoregion. The CV for chronic copper criteria ranged from a minimum of 6% in the Blue Mountains ecoregion to 92% in the Northern Rockies ecoregion (Table 10).

Table 10. Summary statistics of BLM-derived chronic copper criteria by ecoregion.

Ecoregion	N	Min	Max	10th Percentile	Mean	SD	CV (%)
		(µg/L)					
Blue Mountains	4	6.3	7.1	6.3	6.7	0.37	6
Central Basin and Range	4	7.7	16.6	8.9	11.9	3.65	31
Columbia Plateau	14	4.0	23.4	4.5	10.9	6.19	57
Idaho Batholith	32	1.6	17.3	2.4	7.3	4.26	58
Middle Rockies	4	4.7	11.8	5.2	8.3	3.43	41
Northern Basin and Range	12	3.0	52.2	8.1	16.4	12.67	77
Northern Rockies	57	0.2	33.2	0.9	6.9	6.74	97
Snake River Plain	58	0.4	24.0	2.0	9.7	5.50	57
Wasatch and Uinta Mountains	2	4.6	14.2	5.6	9.4	6.80	72
Wyoming Basin	2	23.7	26.1	24.0	24.9	1.70	7

3.3.3 Stream Order

The number of sites ranged from 7 in 8th-order waters to 36 in 6th-order waters, with 6 sites having unassigned stream order. The distribution of input parameters by stream order is presented in Figure 7.

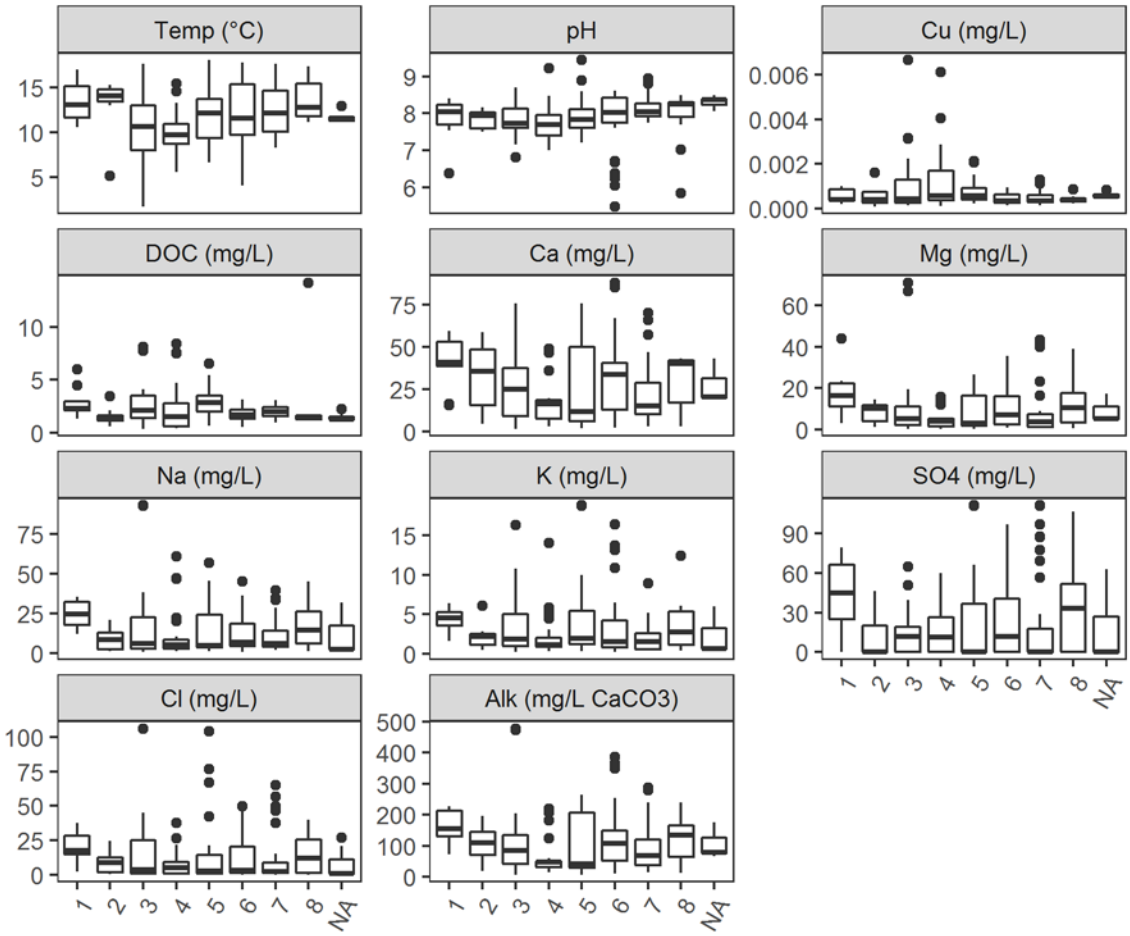


Figure 7. Distribution of BLM input parameters by stream order. Some sites were located in nonflowing or man-made waters that do not have a stream order, indicated by NA.

CVs by stream order ranged across the following:

- Temperature: 5.2–36.3%
- pH: 1.8–10.9%
- Dissolved copper: 22.6–138.0%
- Ions (sulfate, chloride, and dissolved calcium, magnesium, sodium, and potassium) and alkalinity: 33.4–175.9%
- DOC: 26.9–141.8%

The distribution of BLM-derived chronic criteria by stream order is presented in Figure 8.

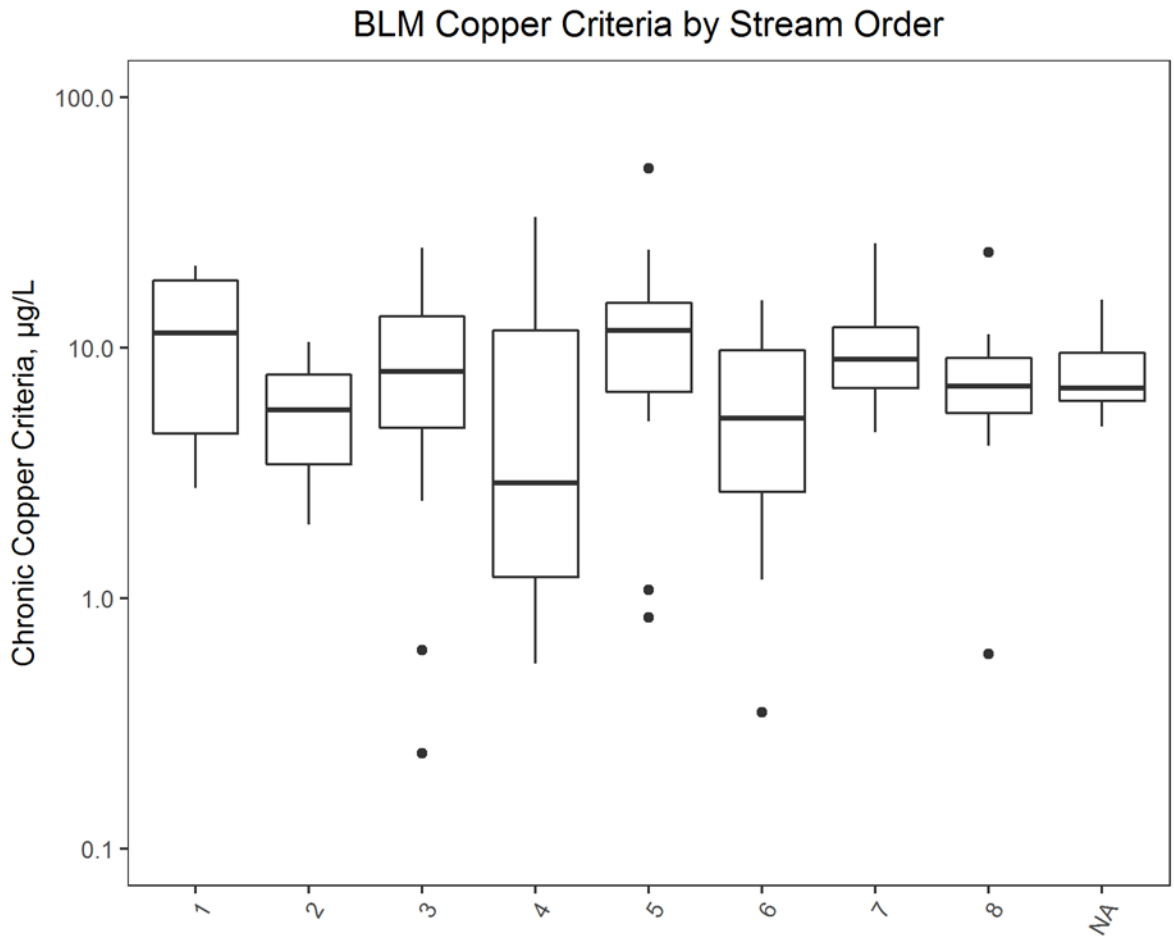


Figure 8. Distribution of BLM-derived chronic copper criteria by stream order. Some sites were located in non-flowing or manmade waters that do not have a stream order, indicated by NA.

The lowest chronic copper criterion was in 3rd-order water, while the highest was in 7th-order water. The CV for chronic copper criteria ranged from 46% in 7th-order and unassigned waters to 105% in 4th-order waters (Table 11).

Table 11. Summary statistics for BLM-derived chronic copper criteria by stream order.

Stream Order	N	Min	Max	10th percentile	Mean	SD	CV
				(µg/L)			(%)
1	8	2.7	21.2	3.2	11.9	8.1	68
2	23	2.0	10.5	2.3	5.8	3.0	52
3	31	0.2	25.1	2.5	10.1	7.5	74
4	31	0.6	33.2	1.0	6.9	7.5	105
5	29	0.8	52.2	5.5	12.4	9.3	75
6	36	0.4	15.5	1.4	6.6	4.6	69
7	18	4.6	26.1	6.3	10.5	4.8	46
8	7	0.6	24.0	4.7	7.9	4.9	61
Unassigned	6	4.8	15.5	5.6	8.4	3.9	46

3.3.4 Site Class

The number of sites ranged from 32 in the Foothills site class to 98 in Plains, Plateaus, and Broad Valleys (PPBV) site class. The distribution of input parameters by site class is presented in Figure 9.

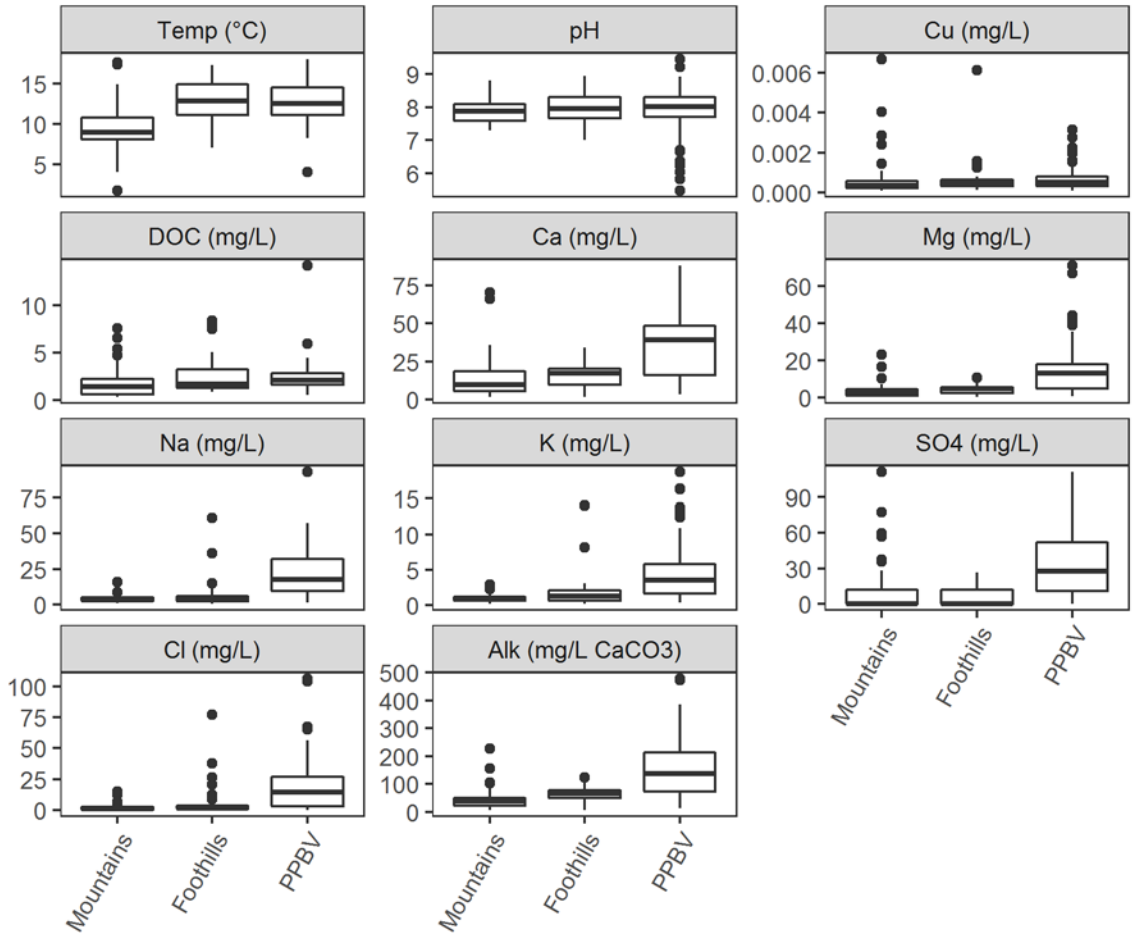


Figure 9. Distribution of BLM parameters by site class.

CVs by site class ranged across the following:

- Temperature: 19.3–30.9%
- pH: 4.8–8.1%
- Dissolved copper: 87.0–155.6%
- Ions (sulfate, chloride, and dissolved calcium, magnesium, sodium, and potassium) and alkalinity: 45.5–214.4%
- DOC: 63.6–85.6%

The distribution of BLM-derived chronic criteria by site class is presented in Figure 10.

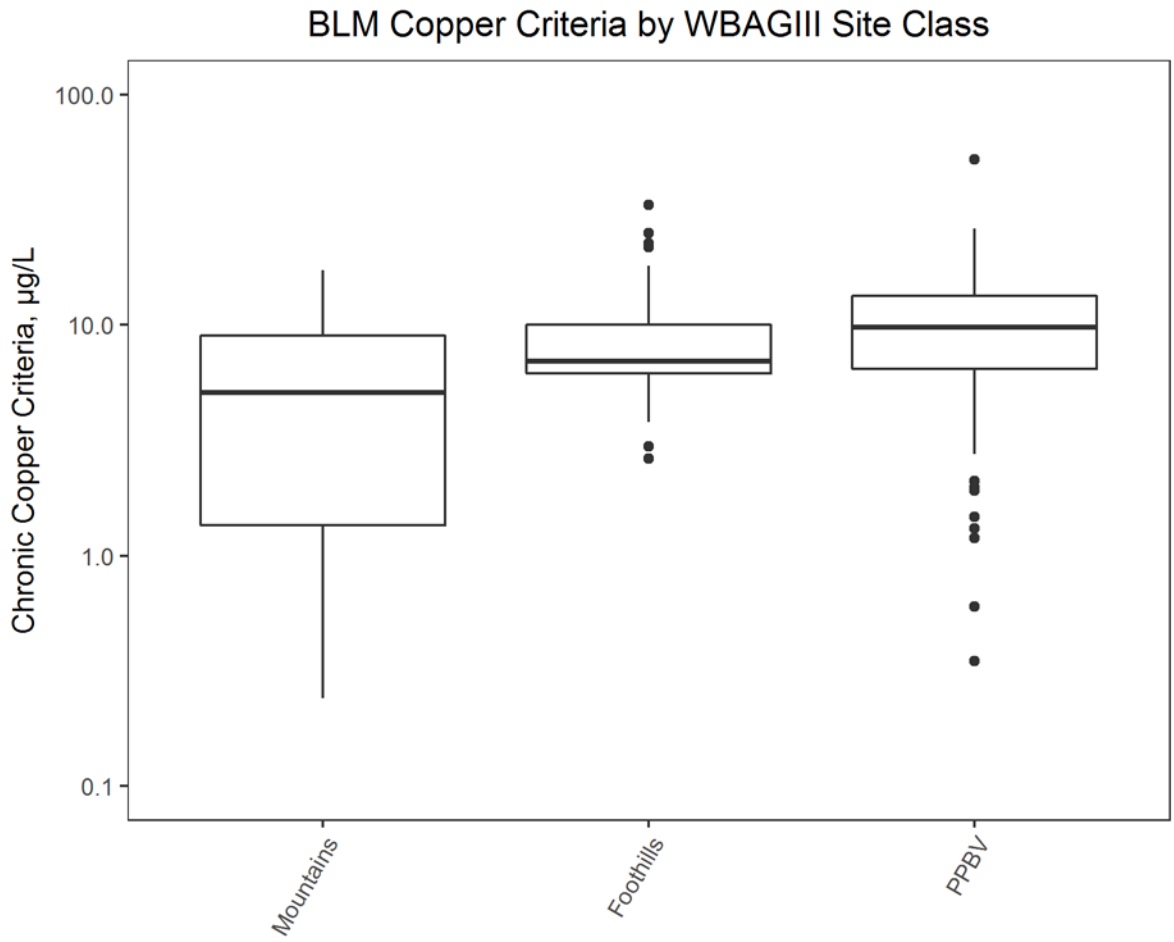


Figure 10. Distribution of BLM-derived chronic copper criteria by site class.

The lowest chronic criterion was in the Mountain site class, while the highest was in the PPBV site class. The CV for chronic copper criteria ranged from a minimum of 67% in the PPBV to 80% in the Mountains.

Table 12. Summary statistics for BLM-derived chronic copper criteria by site class.

DEQ Site Classes	N	Min	Max	10th Percentile	Mean	SD	CV
		(µg/L)					(%)
Mountains	59	0.2	17.3	0.9	5.8	4.70	80
Foothills	32	2.6	33.2	3.9	9.7	7.13	73
PPBV	98	0.4	52.2	3.3	10.8	7.23	67

3.3.5 Site Class + River/Stream

The number of sites ranged from 10 in Foothills Stream to 69 in PPBV River. The distribution of input parameters by site class + river/stream designations is presented in Figure 11. For purposes of this classification scheme, rivers are any water with stream order ≥5, while streams are any water with stream order <5.

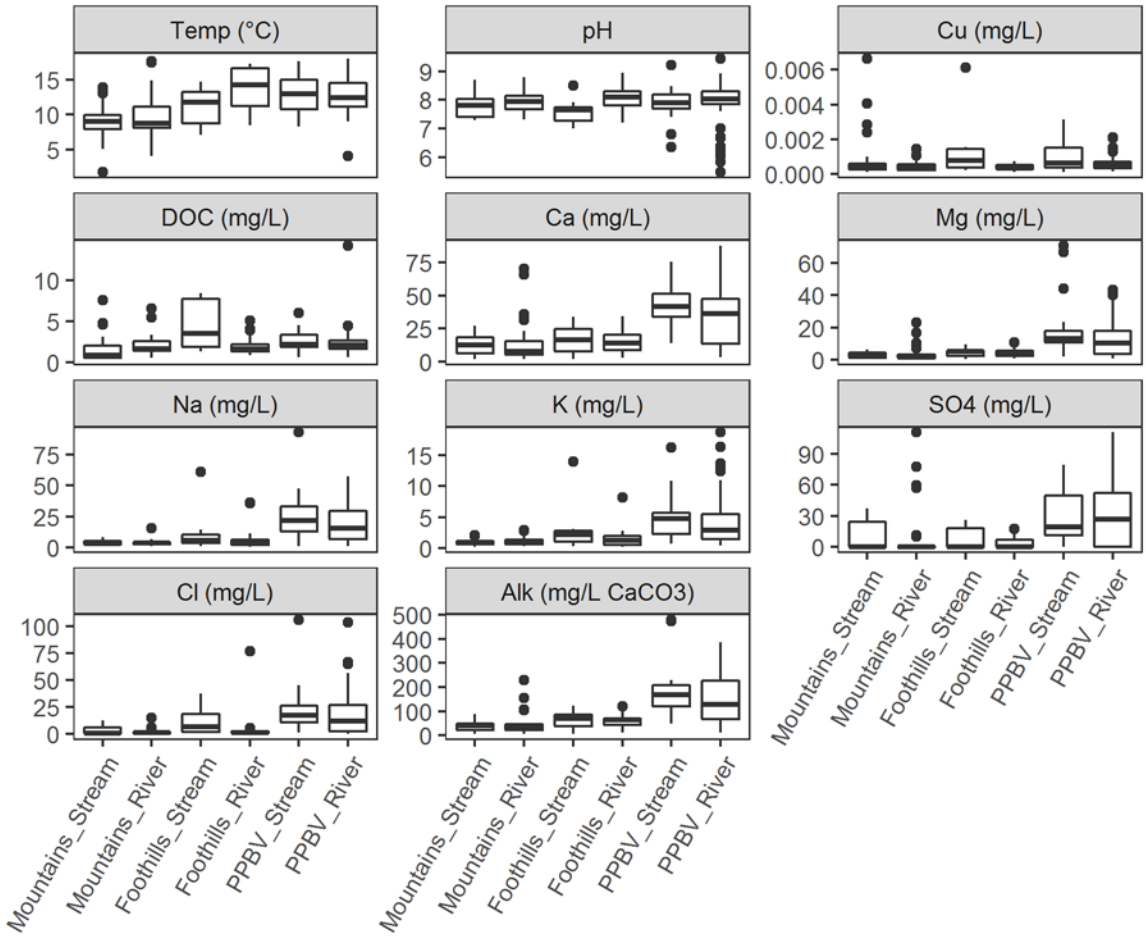


Figure 11. Distribution of BLM input parameters by site class + river/stream designation.

CVs by site class ranged across the following:

- Temperature: 18.6–32.0%
- pH 4.5–8.76%
- Dissolved copper: 39.7–158.2%
- Ions (sulfate, chloride, and dissolved calcium, magnesium, sodium and potassium) and alkalinity: 41.6–299.1%
- DOC: 46.8–104.9%

The distribution of BLM-derived chronic criteria by site class + river/stream designation is presented in Figure 12.

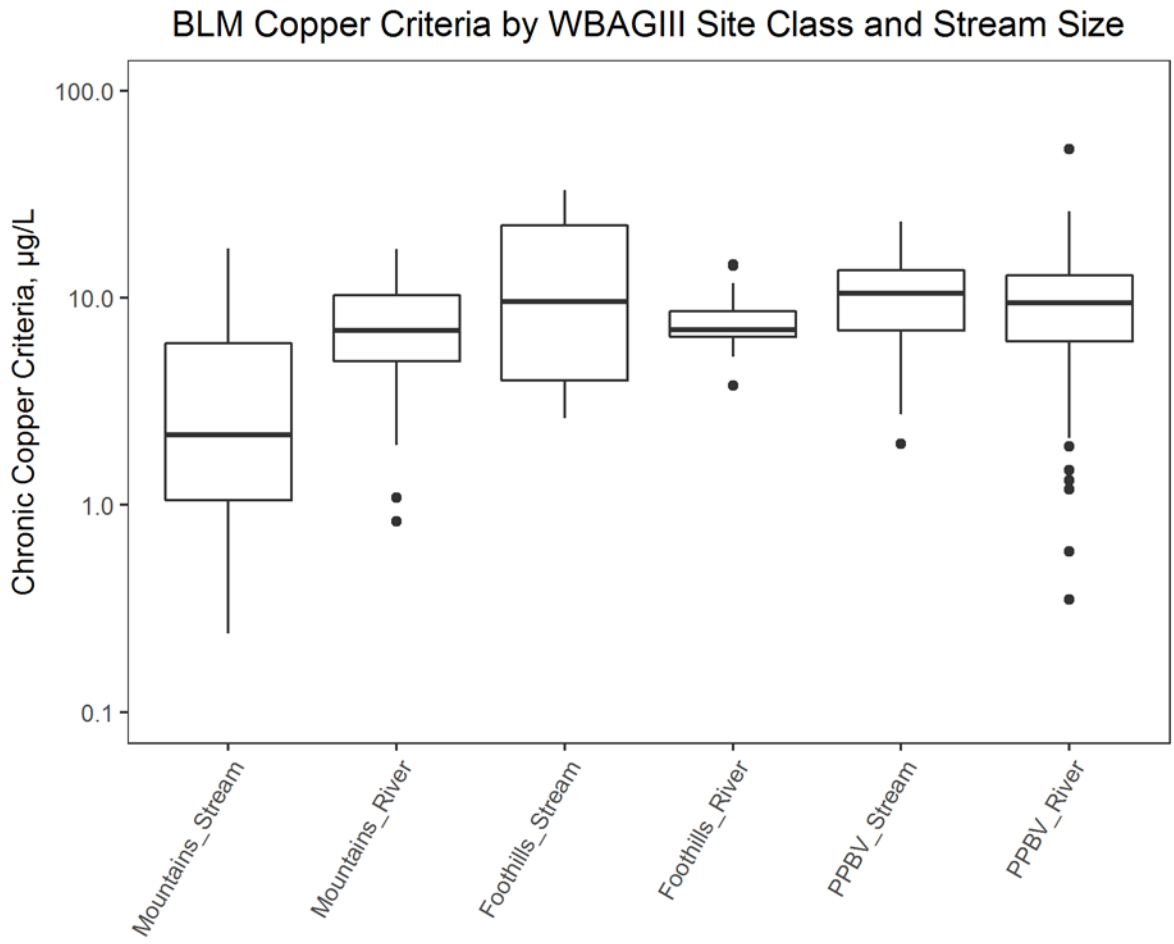


Figure 12. Distribution of BLM-derived chronic copper criteria by site class + river/stream.

The lowest chronic copper criterion was in the Mountains Stream class, while the highest was in the PPBV River class. The CV for chronic copper criteria ranged from a minimum of 36% in the Foothills River to 106% in the Mountains Stream class (Table 13).

Table 13 Summary statistics of BLM-derived chronic copper criteria by site class + river/stream.

DEQ Site Class + River/Stream Designation	N	Min	Max	10th Percentile	Mean	SD	CV
		(µg/L)					(%)
Foothills River	18	3.8	14.5	6.0	8.0	2.88	36
Foothills Stream	10	2.6	33.2	2.9	14.0	11.37	81
Mountains River	27	0.8	17.3	2.4	7.9	4.41	56
Mountains Stream	31	0.2	17.3	0.6	4.1	4.36	106
PPBV River	69	0.4	52.2	3.1	10.7	7.80	73
PPBV Stream	27	2.0	23.4	3.4	10.9	5.92	54

The distribution of CVs calculated for all BLM input parameters by regional classification system is presented in Figure 13.

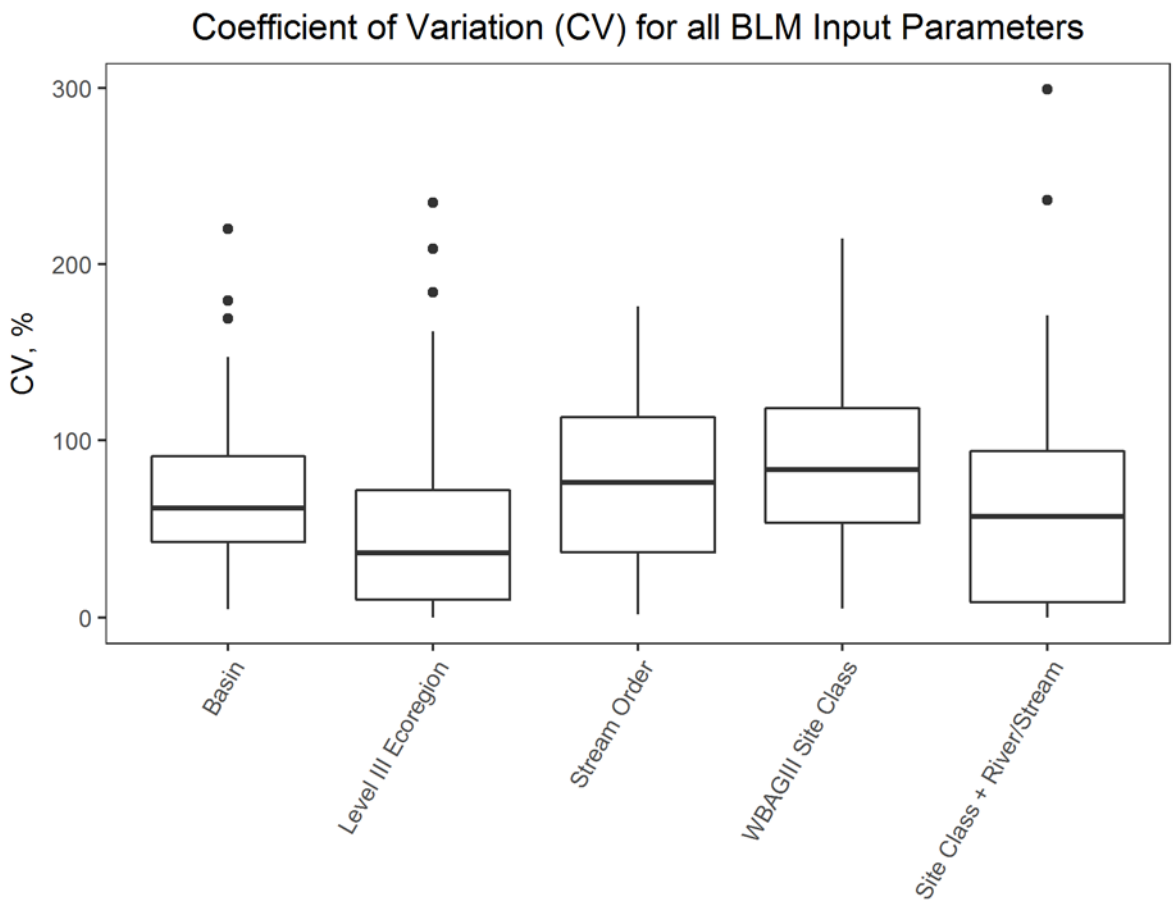


Figure 13. Distribution of calculated coefficient of variation for all BLM input parameters by site class system.

Summary statistics of CVs for all BLM inputs are presented in Table 14.

Table 14. Minimum, maximum, 10th percentile, 90th percentile, mean, and median of calculated CV (%) for all BLM input parameters.

Regional Classification System	Min	Max	10th Percentile	90th Percentile	Mean	Median
Basin	5	220	15	128	70	62
Ecoregion	0	235	3	99	48	37
Stream order	2	176	15	143	77	76
Site class	5	214	20	157	86	83
Site class + river/stream	0	299	3	132	61	57

4 Discussion

Fall and spring monitoring confirmed the high spatial and temporal variability of both BLM input parameters and the BLM-derived criteria. Variability, measured as the CV, was lowest for temperature and pH and greatest for the major ions (Table 6).

Five of the 189 sites with complete samples and BLM-derived criteria had dissolved copper concentrations that exceeded the acute or chronic BLM IWQC at the time of sampling (Table 8). Three of these five sites—ID0028321D, ID0028321U, and SFDeerCKD—are located in waters that are already considered to be impaired by copper and are under active remediation for copper and other metals as part of the Blackbird Mine Superfund site. The other two sites, ID0000167U and ID0027120D, had BLM IWQCs and copper concentrations that were detected below the reporting limit for copper (Table 2), meaning that while there was dissolved copper present in the sample, the result cannot be quantified.

4.1 Laboratory Processing

Collection and quantification of DOC from surface water is often difficult and obtaining reliable results can be problematic (Mebane 2017). However, QC results from this project indicate that many of the problems associated with meeting precision requirements from field duplicates can be allayed by filtering samples in an analytical laboratory as opposed to in the field, as is required by 40 CFR 136 for National Pollutant Discharge Elimination System compliance monitoring. The field duplicate RPD range for this project's DOC samples was 1.2–2.5%.

4.2 Estimating Conservative Criteria

Conservative criteria can be estimated for a site by applying the lowest of the 10th percentile criteri calculated from the five regional classifications. For example, Table 15 presents potential conservative criteria estimates based on the 10th percentile for each of the regional classification systems described in section 3.3.

Table 15. Potential conservative copper criteria estimates.

Regional Classification		10th Percentile (µg/L)	
		Acute	**Chronic**
Basins	Bear River	7.9	4.9
	Clearwater	7.6	4.7
	Panhandle	1.1	0.7
	Salmon	3.9	2.4
	Southwest	9.3	5.8
	Upper Snake	2.6	1.6
Ecoregion	Blue Mountains	10.1	6.3
	Central Basin and Range	14.3	8.9
	Columbia Plateau	7.2	4.5
	Idaho Batholith	3.9	2.4
	Middle Rockies	8.4	5.2
	Northern Basin and Range	13.0	8.1
	Northern Rockies	1.4	0.9
	Snake River Plain	3.2	2.0
	Wasatch and Uinta	9.0	5.6
	Wyoming Basin	38.6	24.0
Stream order	1	5.2	3.2
	2	3.7	2.3
	3	4.0	2.5
	4	1.6	1.0
	5	8.9	5.5
	6	2.3	1.4
	7	10.1	6.3
	8	7.6	4.7
	Unassigned	9.0	5.6
Site class	Mountains	1.4	0.9
	Foothills	6.3	3.9
	PPBV	5.3	3.3
Site class + river/stream	Foothills River	9.7	6.0
	Foothills Stream	4.7	2.9
	Mountains River	3.9	2.4
	Mountains Stream	1.0	0.6
	PPBV River	5.0	3.1
	PPBV Stream	5.5	3.4

Note: Values represent the 10th percentile of BLM criteria derived from statewide monitoring.

For example, the following scenario illustrates how conservative and protective criteria could be estimated for a site where BLM data are not available on a tributary to the Salmon River in central Idaho. The site is in the Salmon basin, in the Middle Rockies ecoregion, is a 3rd order stream, and is in the Foothills site class. Using this information, conservative acute and chronic copper criteria estimates would be 3.9 and 2.4 µg/L, respectively (Table 16).

Table 16. Example of conservative criteria estimates based on regional classification systems.

Regional Classification	Estimated Conservative Criteria	
	Acute (µg/L)	Chronic (µg/L)
Salmon basin	**3.9**	**2.4**
Middle Rockies ecoregion	8.4	5.2
3rd-rrder stream	4.0	2.5
Foothills site class	6.3	3.9
Foothills Stream site class + river/stream	4.7	2.9

Note: Values in bold indicate the minimum of these values and would serve as the estimated criteria in this example.

Conservative criteria estimates derived in this manner are lower than the calculated IWQC for all but 6 of the 189 sampled sites. Only 5 of the 189 sites with complete samples had copper concentrations that exceeded BLM IWQC at the time of sampling (Table 8). Of these 5, only 2 (ID0000167U and ID0027120D) would have met the conservative criteria estimate but would have exceeded the IWQC calculated at the time of sampling (

Table 17). Additionally, these 2 sites had copper concentrations that were detected below the reporting limit for copper (Table 2), meaning that while there was dissolved copper present in the sample the result cannot be quantified.

Table 17. Calculated BLM chronic criteria, estimated conservative criteria, and dissolved copper concentrations for the 5 sample locations where copper exceeded BLM derived IWQCs at the time of sampling.

Site ID	Stream Name	Chronic Criterion, Calculated	Chronic Criterion, Estimated	Dissolved Copper
ID0000167U	Canyon Creek	0.24	0.6	0.25
ID0027120D	Little Wood River	0.35	1.6	0.49
ID0028321D	Big Deer Creek	1.61	0.6	2.86
ID0028321U	Big Deer Creek	2.18	0.6	2.42
SFDeerCKD	South Fork Deer Creek	2.44	0.6	6.65

4.2.1 Comparison to Other Datasets

While data sufficient to calculate BLM criteria in Idaho waters are rare, there are limited independent datasets that can be used to assess the protectiveness of the recommended default criteria presented in Table 16.

Independent data for developing BLM criteria at sites in Idaho are rare. However, the US Geological Survey (USGS) does have data available from some sites throughout Idaho where complete BLM data are available (USGS 2016).

Table 18 presents a comparison of how minimum and 10th percentile values calculated for regional site classification systems based on fall monitoring data compare to the actual minimum

IWQCs calculated from nine USGS monitoring locations where complete BLM data are available. In most instances, criteria that represent the most bioavailable condition measured can be estimated by taking the 10th percentile of chronic criteria from one of the site classification systems. Furthermore, if we take into account reporting limits, and consider the reporting limit to be the effective criteria for waters where the BLM-derived criteria are below the reporting limit for dissolved copper, then the minimum of the regional classification 10th percentile values would be considered protective for each site where independent BLM criteria is available.

For example, both USGS sites 12413000 and 12413470 had a minimum chronic copper criterion of 0.6 µg/L. The minimum 10th percentile regional classification system estimate for these sites is based on the site class system and is 0.9 µg/L (Mountains). Although this is greater than the minimum chronic copper criterion, if we consider our ability to measure dissolved copper (the reporting limit is 1 µg/L), these concentrations could be considered equivalent when determining compliance (Table 2, Table 18).

A comparison of the 10th percentile BLM-derived chronic criteria estimates to actual IWQCs at USGS sites with complete BLM data can be found in Appendix D.

Table 18. Comparison of minimum chronic copper criteria measured at USGS sites to regional conservative criteria estimates based on minimum and 10th percentile values.

USGS Site ID	10068500	12392155	12413000	12413470	12413875	12419000	13056500	13092747	13154500
USGS Site Name	**Bear River at Pescadero**	**Lightning Creek at Clark Fork, Idaho**	**North Fork Coeur d'Alene at Enaville**	**South Fork Coeur d'Alene at Pinehurst**	**St Joe at Red Ives**	**Spokane near Post Falls**	**Henry's Fork near Rexburg**	**Rock Creek above highway 30/93 crossing, Twin Falls**	**Snake River at King Hill**
Min Chronic Criteria	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
	8.9	1.1	0.6	0.6	3.7	1.5	4.1	10.7	4.9
Basin	Bear River	Panhandle	Panhandle	Panhandle	Panhandle	Panhandle	Upper Snake	Upper Snake	Southwest
Min	**3.0**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.4**	**0.4**	**0.6**
10th %ile	**4.9**	**0.7**	0.7	0.7	**0.7**	**0.7**	**1.6**	**1.6**	5.8
Level III Ecoregion	Wyoming Basin	Northern Rockies	Northern Rockies	Northern Rockies	Northern Rockies	Northern Rockies	Snake River Plain	Snake River Plain	Snake River Plain
Min	23.7	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.4**	**0.4**	**0.4**
10th %ile	24	**0.9**	0.9	0.9	**0.9**	**0.9**	**2.0**	**2.0**	**2.0**
Stream Order	6th	4th	5th	5th	4th	7th	6th	5th	7th
Min	**0.4**	**0.6**	0.8	0.8	**0.6**	4.6	**0.4**	**0.8**	**4.6**
10th %ile	**1.4**	**1**	5.5	5.5	**1**	6.3	**1.4**	**5.5**	6.3
WBAGIII Site Class	PPBV	Foothills	Mountains	Mountains	Mountains	Foothills	PPBV	PPBV	PPBV
Min	**0.4**	2.6	**0.2**	**0.2**	**0.2**	2.6	**0.4**	**0.4**	**0.4**
10th %ile	**3.3**	3.9	0.9	0.9	**0.9**	3.9	**3.3**	**3.3**	**3.3**
WBAGIII Site Class + River/Stream	PPBV River	Foothills Stream	Mountains River	Mountains River	Mountains River	Foothills River	PPBV River	PPBV River	PPBV River
Min	**0.4**	2.6	0.8	**0.8**	**0.8**	3.8	**0.4**	**0.4**	**0.4**
10th %ile	**3.1**	2.9	2.4	2.4	**2.4**	6	**3.1**	**3.1**	**3.1**

Note: Values in bold indicate the estimate is below the minimum measured.

Similarly, although not all spring samples resulted in higher chronic copper criteria than the fall samples collected at the same locations (Table 7), application of the minimum estimated criteria by regional classification system for each site would provide criteria that are lower than the lowest criteria derived from measured inputs (Table 19).

Table 19. Comparison of spring copper criteria measured at sites where spring BLM criteria were lower than fall criteria, compared to regional conservative criteria estimates based on 10th percentile values.

Site ID	Spring Chronic Copper Criteria (µg/L)	10th Percentile Criteria (µg/L)				
		Basin	Ecoregion	Stream Order	Site Class	Site Class+ River/Stream
ID0020231D	1.4	5.8	2.4	5.5	**0.9**	2.4
ID0020451D	6.1	**0.7**	**0.9**	6.3	**3.9**	**6.0**
ID0020931U	4.6	**2.4**	6.3	4.7	**3.9**	6.0
ID0022845U	3.8	**0.7**	**0.9**	**1.4**	**0.9**	**2.4**
ID0027979U	0.9	5.8	2.4	1.4	**0.9**	2.4

Note: Values in bold indicate the estimate is below the minimum measured.

4.3 Effects of Point Source Discharges on BLM Criteria

While point source discharges to surface waters can have significant effects on receiving water quality and BLM input parameters, our results indicate that these changes are relatively insignificant and are unlikely to bias estimates of conservative criteria (section 3.1; Figure 2).

4.4 Effects of Blank Correction for DOC

Blank correction was applied to samples affected by blanks with DOC contamination.

Samples that were affected by DOC blank corrections (section 2.5.2) could potentially bias resulting BLM-derived criteria estimates. Blank correction, where the concentration of an analyte detected in a blank sample is subtracted from the results of the analysis batch, is a common laboratory procedure and is used to ensure accurate analytical results. While field blank correction is less common, it has been found to be effective for dealing with the difficulties of DOC contamination. For example, Brumbaugh (2014) found that blank correction improved DOC results agreement and comparability in an interlaboratory comparison of DOC sample analysis.

Another option for reconciling data affected by detectable DOC in blanks is to remove all affected samples from the analysis. Removing these 16 samples from analysis would reduce the N (number of samples) used in regional classification analysis for the Panhandle basin; Northern Rockies ecoregion; 2nd, 3rd, and 4th stream orders; Mountains site class; and Mountains River site class + river/stream regional classifications accordingly (section 3.3). The number of sites affected for each regional classification is presented in Table 20.

Table 20. Regional classifications affected by removal of samples affected by DOC in blanks.

Regional Classification		Number Samples Removed
Basin	Panhandle	16
Ecoregion	Northern Mountains	16
Stream order	2nd	2
	3rd	12
	4th	2
Site class	Mountains	16
Site class + river/stream	Mountains River	16

If the 16 samples affected by blanks with detectable DOC are removed from the analysis, 7 of the 34 regional classifications would be affected (Table 20), subsequently leading to higher 10th percentile values for BLM-derived copper criteria (Table 21).

Table 21. Differences in 10th percentile of BLM criteria derived from statewide monitoring when sites with detectable DOC in blanks are adjusted (with correction) or removed (without correction) from regional classification analysis.

Regional Class	10th Percentile Chronic Copper Criterion (µg/L)	
	With Correction	Without Correction
Panhandle basin	0.7	4.7
Norther Rockies ecoregion	0.9	4.7
3rd-order streams	2.5	3.0
4th-order streams	1.0	2.5
5th-order streams	5.5	5.9
Mountains site class	0.9	2.5
Mountains River	2.4	4.4

While removing results from samples affected by blanks with detectable DOC would reduce the likelihood of bias, it would have the additional effect of changing criteria estimates into values that might not be protective in waters in northern Idaho.

For example, the minimum BLM-derived chronic copper criterion for Lightning Creek at Clark Fork, Idaho, was 1.1 µg/L. With blank correction, the lowest 10th percentile conservative criterion estimate was 0.7 µg/L in the Panhandle basin. However, removing data affected by blank contamination would increase the lowest estimate to 2.5 µg/L, resulting in criteria estimates that would not be protective of the most bioavailable conditions at that site (Table 18).

5 Conclusion

Current copper and BLM conditions throughout Idaho indicate that impairment of aquatic life by copper pollution is not a concern. Only 5 of 189 sites with complete samples and BLM-derived criteria had dissolved copper concentrations that exceeded the BLM-derived criteria. Three of these sites are in waters that are under active remediation for copper and other metals as part of the Blackbird Mine Superfund site. In general, copper pollution is rare in Idaho.

Based on this analysis, using existing classification systems can effectively reduce variability of BLM parameters; Idaho waters can be classified into regions based on physical and chemical properties.

Critical BLM conditions can be identified for each classification and can be used to estimate protective copper criteria in the absence of BLM input data.

To ensure that a regional classification system is appropriate, it must have sufficient sites to make it likely that critical conditions are represented and that the estimated criteria are not under protective, and it must have relatively low variability to ensure that estimated criteria are not overprotective.

Ecoregions have relatively low variability in BLM input parameters (Figure 13, Table 14), as well as in chronic copper criteria. However, some ecoregions are represented by relatively few sites (Table 10).

Site classes provide the benefit of having only three site classes and relatively low variability in chronic copper criteria (Table 12). However, BLM input parameter variability is relatively high compared to other classification systems (Figure 13).

Site class + river/stream regional classification system provides a good balance of relatively low variability in BLM input parameters (Figure 13, Table 14) and sites represented per classification (Table 13).

Although no single regional classification system provided consistently lower criteria estimates, data indicate that protective conservative criteria can be estimated at any site by taking the lowest of the 10th percentile criteria calculated from the five regional site classes.

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Appendix A. Monitoring Locations

Table A-1. Monitoring locations coordinates, stream order, and basin.

Site ID	Water Body Name	Latitude	Longitude	Stream Order	Basin
ID0000060D	South Fork Coeur d'Alene River	47.515726	-116.026546	4	Panhandle
ID0000060U	South Fork Coeur d'Alene River	47.5111	-116.015106	4	Panhandle
ID0000159D	South Fork Coeur d'Alene River	47.515765	-116.026424	4	Panhandle
ID0000159U	South Fork Coeur d'Alene River	47.511057	-116.015071	4	Panhandle
ID0000167D	Canyon Creek	47.518162	-115.826794	3	Panhandle
ID0000167U	Canyon Creek	47.523335	-115.804234	3	Panhandle
ID0000213D	Payette River	44.08218	-116.951	7	Southwest
ID0000213U	Forty-nine Slough	44.07064	-116.93891	3	Southwest
ID0000388D	Rock Creek	42.5337	-114.4519	6	Upper Snake
ID0000388U	Rock Creek	42.5321	-114.4413	6	Upper Snake
ID0001155D	Snake River	44.24546	-116.9814	NA	Southwest
ID0001155U		44.22164	-116.98206	1	Southwest
ID0001198D	Soda Creek	42.67949	-111.60477	3	Bear River
ID0001198U	Soda Creek	42.7027	-111.6119	3	Bear River
ID0020001D	Salmon River	45.19766	-113.88321	7	Salmon
ID0020001U	Salmon River	45.18774	-113.89179	7	Salmon
ID0020010D		43.70391	-111.94346	2	Upper Snake
ID0020010U	Dry Bed	43.70324	-111.91339	2	Upper Snake
ID0020036D	Threemile Creek	45.9427	-116.1086	3	Clearwater
ID0020036U		43.9358	-116.115	2	Southwest
ID0020061D		42.5935	-114.6314	1	Upper Snake
ID0020061U		42.57948	-114.63026	1	Upper Snake
ID0020087D	Weiser River	44.69212	-116.46835	6	Southwest
ID0020087U	Weiser River	44.73202	-116.44953	5	Southwest
ID0020117D	South Fork Coeur d'Alene River	47.548656	-116.222499	5	Panhandle
ID0020117U	South Fork Coeur d'Alene River	47.547933	-116.174871	5	Panhandle

Site ID	Water Body Name	Latitude	Longitude	Stream Order	Basin
ID0020125D	Cow Creek	46.5369	-116.9474	4	Clearwater
ID0020125U	Cow Creek	46.5467	-116.9283	4	Clearwater
ID0020133D	Snake River	43.37943	-112.16838	8	Upper Snake
ID0020133U	—	43.31446	-112.15069	1	Upper Snake
ID0020141D	Woods Creek	43.71952	-111.1304	2	Upper Snake
ID0020141U	Woods Creek	43.72236	-111.12591	2	Upper Snake
ID0020206D	Orofino Creek	46.4931	-115.8057	5	Clearwater
ID0020206U	Orofino Creek	46.4908	-115.8009	5	Clearwater
ID0020222D	Kootenai River	48.700673	-116.350134	7	Panhandle
ID0020222U	Kootenai River	48.696432	-116.326528	7	Panhandle
ID0020231D	North Fork Payette River	44.89125	-116.10965	5	Southwest
ID0020231U	North Fork Payette River	44.8979	-116.11332	5	Southwest
ID0020249D	Portneuf River	42.79186	-112.25204	6	Upper Snake
ID0020249U	Portneuf River	42.7822	-112.2313	6	Upper Snake
ID0020311D	Payette River	43.86983	-116.56841	7	Southwest
ID0020311U	Payette River	43.88186	-116.50546	7	Southwest
ID0020338D	Snake River	44.02511	-116.93455	N/A	Southwest
ID0020338U	—	43.9976	-116.94984	3	Southwest
ID0020354D	Jim Ford Creek	46.3832	-115.9492	5	Clearwater
ID0020354U	Jim Ford Creek	46.3758	-115.9412	4	Clearwater
ID0020362D	Elk Creek	46.7832	-116.171	4	Clearwater
ID0020362U	Elk Creek	46.7869	-116.1736	4	Clearwater
ID0020389D	Payette River	43.99702	-116.80302	7	Southwest
ID0020389U	Payette River	43.99009	-116.79641	7	Southwest
ID0020401D	Henrys Fork	43.94997	-111.71759	7	Upper Snake
ID0020401U	Henrys Fork	43.95734	-111.70393	7	Upper Snake
ID0020427D	Snake River	43.66218	-116.96336	8	Southwest
ID0020427U	Snake River	43.63369	-116.95025	8	Southwest
ID0020451D	Kootenai River	48.700932	-116.350472	7	Panhandle
ID0020451U	Kootenai River	48.696514	-116.326553	7	Panhandle

Site ID	Water Body Name	Latitude	Longitude	Stream Order	Basin
ID0020532D	Palouse River	46.909	-116.8329	5	Clearwater
ID0020532U	Palouse River	46.9188	-116.7666	5	Clearwater
ID0020567D	Big Creek	47.510318	-116.071676	4	Panhandle
ID0020567U	Big Creek	47.503762	-116.071701	4	Panhandle
ID0020681D	Pend Oreille River	48.185321	-117.032602	N/A	Panhandle
ID0020681U	—	48.177035	-116.997319	N/A	Panhandle
ID0020699D	Red River	45.7197	-115.3751	5	Clearwater
ID0020699U	Red River	45.7109	-115.337	4	Clearwater
ID0020711D	Selway River	46.1016	-115.5596	7	Clearwater
ID0020711U	Selway River	46.0927	-115.5224	7	Clearwater
ID0020737D	Salmon River	45.6416	-116.286	8	Salmon
ID0020737U	Salmon River	45.6375	-116.2832	8	Salmon
ID0020753D	Snake River	42.74242	-112.89973	8	Upper Snake
ID0020753U	Snake River	42.7757	-112.8749	8	Upper Snake
ID0020788D	Mount Deary Creek	46.7987	-116.5727	2	Clearwater
ID0020800D	Priest River	48.179707	-116.893627	6	Panhandle
ID0020800U	Priest River	48.183772	-116.898412	6	Panhandle
ID0020893D	Canal Gulch Creek	46.4931	-115.7988	3	Clearwater
ID0020893U	Canal Gulch Creek	46.4971	-115.796	3	Clearwater
ID0020931D	Salmon River	45.4365	-116.3183	8	Salmon
ID0020931U	Salmon River	45.4255	-116.3155	8	Salmon
ID0020940D	D-Fifteen Drain	42.5533	-113.7704	1	Upper Snake
ID0020940U	D-Fifteen Drain	42.5522	-113.7687	1	Upper Snake
ID0021016D	Boise River	43.74754	-116.91249	7	Southwest
ID0021016U	Boise River	43.72079	-116.79806	7	Southwest
ID0021024D	Payette River	43.91355	-116.2036	7	Southwest
ID0021024U	Payette River	43.90433	-116.20142	7	Southwest
ID0021199D	—	44.06777	-116.93834	1	Southwest
ID0021199U	Payette River	44.0424	-116.92568	7	Southwest
ID0021202D	Snake River	43.57519	-116.81154	8	Southwest

Site ID	Water Body Name	Latitude	Longitude	Stream Order	Basin
ID0021202U	Snake River	43.54826	-116.80135	8	Southwest
ID0021211D	Little Wood River	43.0412	-114.1692	6	Upper Snake
ID0021211U	Little Wood River	43.0421	-114.1692	6	Upper Snake
ID0021229D	Boyer Slough	48.304527	-116.475747	3	Panhandle
ID0021229D2	Boyer Slough	48.309375	-116.491864	3	Panhandle
ID0021229U	Boyer Slough	48.314988	-116.494562	3	Panhandle
ID0021296D	South Fork Coeur d'Alene River	47.465643	-115.811999	4	Panhandle
ID0021296U	South Fork Coeur d'Alene River	47.463505	-115.808568	4	Panhandle
ID0021776D	Sand Hollow Creek	43.79974	-116.97533	4	Southwest
ID0021776U	Sand Hollow Creek	43.78137	-116.95174	4	Southwest
ID0021806D	Weiser River	44.56448	-116.67768	6	Southwest
ID0021806U	Weiser River	44.56824	-116.66988	6	Southwest
ID0021822D	Portneuf River	42.62307	-112.03386	6	Upper Snake
ID0021822U	Portneuf River	42.62251	-112.01952	6	Upper Snake
ID0021831D	Boise River	43.68873	-116.68615	7	Southwest
ID0021831U	Boise River	43.6925	-116.63273	7	Southwest
ID0021849U	Cottonwood Creek	46.0442	-116.3427	3	Clearwater
ID0022004D	Snake River	42.93744	-115.3185	8	Southwest
ID0022004U	Snake River	42.9469	-115.29747	8	Southwest
ID0022012D	Elk Creek	45.8188	-115.45862	4	Clearwater
ID0022012U	Elk Creek	45.82366	-115.4469	4	Clearwater
ID0022047D	South Fork Rock Creek	42.57412	-112.8883	5	Upper Snake
ID0022047U	South Fork Rock Creek	42.57412	-112.8883	5	Upper Snake
ID0022071D	Big Creek	47.529174	-116.051552	4	Panhandle
ID0022071U	South Fork Coeur d'Alene River	47.516874	-116.035194	4	Panhandle
ID0022501D	Palouse River	46.9252	-116.9218	5	Clearwater
ID0022501U	Palouse River	46.9161	-116.8959	5	Clearwater
ID0022845D	Saint Maries River	47.130926	-116.41146	6	Panhandle
ID0022845U	Saint Maries River	47.123012	-116.403117	6	Panhandle
ID0022861D	Potlatch River	46.8542	-116.3978	5	Clearwater

Site ID	Water Body Name	Latitude	Longitude	Stream Order	Basin
ID0022861U	Potlatch River	46.8572	-116.3998	5	Clearwater
ID0023027D	Big Lost River	43.89843	-113.60995	6	Upper Snake
ID0023027U	Big Lost River	43.90118	-113.6135	6	Upper Snake
ID0023159D	Little Salmon River	44.97366	-116.29453	5	Salmon
ID0023159U	Little Salmon River	44.97352	-116.2945	5	Salmon
ID0023167D	North Fork Payette River	44.50063	-116.02311	7	Southwest
ID0023167U	North Fork Payette River	44.512053	-116.0314	7	Southwest
ID0023604D	West Fork Little Bear Creek	46.7291	-116.7576	4	Clearwater
ID0023604U	West Fork Little Bear Creek	46.7321	-116.7577	4	Clearwater
ID0023710D	Farmers Own Canal	44.0495	-111.46033	1	Upper Snake
ID0023710D2	—	44.08959	-111.45874	1	Upper Snake
ID0023728D	Little Wood River	42.9477	-114.4245	6	Upper Snake
ID0023728U	Little Wood River	42.9477	-114.4245	6	Upper Snake
ID0023761D	Potlatch River	46.5583	-116.7111	7	Clearwater
ID0023761U	Potlatch River	46.5612	-116.7093	7	Clearwater
ID0023825D	—	42.58577	-111.72945	1	Bear River
ID0023825U	Bear River	42.59351	-111.7202	7	Bear River
ID0023914D	Grasshopper Creek	46.4226	-115.8919	4	Clearwater
ID0023914U	Grasshopper Creek	46.442	-115.867	3	Clearwater
ID0024350D	Little Sand Creek	48.318947	-116.569486	3	Panhandle
ID0024350U	Little Sand Creek	48.325258	-116.577875	3	Panhandle
ID0024422D	Big Wood River	43.6286	-114.3487	6	Upper Snake
ID0024422D2	Big Wood River	43.6288	-114.3487	6	Upper Snake
ID0024422U	Big Wood River	43.6344	-114.3495	6	Upper Snake
ID0024554D	Potlatch River	46.5989	-116.678	7	Clearwater
ID0024554U	Potlatch River	46.6124	-116.658	7	Clearwater
ID0024627D	—	47.645726	-116.720738	2	Panhandle
ID0024988D	Snake River	43.30951	-112.19685	8	Upper Snake
ID0024988U	Snake River	43.31203	-112.18351	8	Upper Snake
ID0025071D	West Fork Saint Maries River	47.005926	-116.256966	5	Panhandle

Site ID	Water Body Name	Latitude	Longitude	Stream Order	Basin
ID0025071U	West Fork Saint Maries River	47.00413	-116.25819	5	Panhandle
ID0025143D	Bear River	42.4559	-111.3874	7	Bear River
ID0025143U	Bear River	42.469	-111.3976	7	Bear River
ID0025194D	Portneuf River	42.6201	-112.012	6	Upper Snake
ID0025194U	Portneuf River	42.62	-112.0083	6	Upper Snake
ID0025429D	South Fork Coeur d'Alene River	47.487037	-115.944175	4	Panhandle
ID0025429U	South Fork Coeur d'Alene River	47.477346	-115.934144	4	Panhandle
ID0025488D	Boise River	43.61693	-116.2228	7	Southwest
ID0025488U	Boise River	43.61311	-116.21918	7	Southwest
ID0025569D	Cub River	42.0181	-111.808	5	Bear River
ID0025569U	Cub River	42.0139	-111.8139	5	Bear River
ID0025585D	Bear River	42.40115	-111.3546	7	Bear River
ID0025585U	Bear River	42.3286	-111.3512	7	Bear River
ID0025607U	Clearwater River	46.4205	-117.0162	8	Clearwater
ID0026077D	Warren Creek	45.2595	-115.6695	4	Salmon
ID0026077U	Warren Creek	45.2549	-115.6605	4	Salmon
ID0026085D	Bear River	42.1683	-111.8384	7	Bear River
ID0026085U	Bear River	42.1663	-111.8314	7	Bear River
ID0026310D	Fourmile Creek	46.8274	-117.0373	3	Clearwater
ID0026310U	Fourmile Creek	46.8296	-117.0341	3	Clearwater
ID0026531D	Clearwater River	46.4269	-117.0263	8	Clearwater
ID0026531U	Clearwater River	46.421	-117.0052	8	Clearwater
ID0026913D	Snake River	43.72094	-112.09633	8	Upper Snake
ID0026913U	Butte Market Lake Canal	43.71576	-112.12337	1	Upper Snake
ID0026964D	Indian Creek	43.60406	-116.5915	5	Southwest
ID0026964U	Indian Creek	43.59455	-116.57313	5	Southwest
ID0027120D	Little Wood River	42.94238	-114.6282	6	Upper Snake
ID0027120U	Little Wood River	42.95151	-114.62791	6	Upper Snake
ID0027154D	Paradise Creek	46.7309	-117.0395	3	Clearwater
ID0027154U	Paradise Creek	46.732	-117.0245	3	Clearwater

Site ID	Water Body Name	Latitude	Longitude	Stream Order	Basin
ID0027383D	Indian Creek	43.66322	-116.68353	5	Southwest
ID0027383U	Indian Creek	43.65867	-116.67167	5	Southwest
ID0027928D	Big Wood River	43.669	-114.3667	6	Upper Snake
ID0027928U	Big Wood River	43.672	-114.367	6	Upper Snake
ID0027944D	—	48.160395	-116.758009	N/A	Panhandle
ID0027944U	—	48.161098	-116.749746	N/A	Panhandle
ID0027952D	Tenmile Creek	43.5973	-116.39912	4	Southwest
ID0027952U	Tenmile Creek	43.59184	-116.39533	4	Southwest
ID0027979D	—	43.57099	-115.27245	3	Southwest
ID0027979U	South Fork Boise River	43.59459	-115.27346	6	Southwest
ID0027995D	Clark Fork	48.086713	-116.079872	N/A	Panhandle
ID0027995U	Dry Creek	48.075433	-116.083616	3	Panhandle
ID0028312D	Mores Creek	43.64747	-115.99103	6	Southwest
ID0028312U	Mores Creek	43.65147	-115.98079	6	Southwest
ID0028321D	Big Deer Creek	45.16761	-114.36046	4	Salmon
ID0028321U	Big Deer Creek	45.16662	-114.36622	4	Salmon
ID0028355D	Indian Creek	43.55133	-116.50368	5	Southwest
ID0028355U	Indian Creek	43.53292	-116.47351	5	Southwest
PantherCKD	Panther Creek	45.08977	-114.2373	5	Salmon
PantherCKD2	Panther Creek	45.18056	-114.3179	6	Salmon
PantherCKU	Panther Creek	45.07751	-114.26009	5	Salmon
PantherCKU2	Panther Creek	45.17689	-114.31431	6	Salmon
SFDeerCKD	South Fork Big Deer Creek	45.16101	-114.36993	3	Salmon
SFDeerCKU	South Fork Big Deer Creek	45.1573	-114.37328	2	Salmon

Notes: — = no name associated with water body; N/A = unassigned stream order

Table A-2. Monitoring location classifications.

Site ID	Level III Ecoregion Name	Level IV Ecoregion	Level IV Ecoregion Name	WBAG III Site Class	River/Stream
ID0000060D	Northern Rockies	15o	Coeur d'Alene Metasedimentary Zone	Mountains	Stream
ID0000060U	Northern Rockies	15o	Coeur d'Alene Metasedimentary Zone	Mountains	Stream
ID0000159D	Northern Rockies	15o	Coeur d'Alene Metasedimentary Zone	Mountains	Stream
ID0000159U	Northern Rockies	15o	Coeur d'Alene Metasedimentary Zone	Mountains	Stream
ID0000167D	Northern Rockies	15o	Coeur d'Alene Metasedimentary Zone	Mountains	Stream
ID0000167U	Northern Rockies	15o	Coeur d'Alene Metasedimentary Zone	Mountains	Stream
ID0000213D	Snake River Plain	12a	Treasure Valley	PPBV	River
ID0000213U	Snake River Plain	12a	Treasure Valley	PPBV	Stream
ID0000388D	Snake River Plain	12i	Magic Valley	PPBV	River
ID0000388U	Snake River Plain	12i	Magic Valley	PPBV	River
ID0001155D	Snake River Plain	12a	Treasure Valley	PPBV	Other
ID0001155U	Snake River Plain	12a	Treasure Valley	PPBV	Stream
ID0001198D	Northern Basin and Range	80i	Sagebrush Steppe Valleys	PPBV	Stream
ID0001198U	Northern Basin and Range	80i	Sagebrush Steppe Valleys	PPBV	Stream
ID0020001D	Middle Rockies	17ab	Dry Gneissic-Schistose-Volcanic Hills	Foothills	River
ID0020001U	Middle Rockies	17aa	Dry Intermontane Sagebrush Valleys	PPBV	River
ID0020010D	Snake River Plain	12e	Upper Snake River Plain	PPBV	Stream
ID0020010U	Snake River Plain	12e	Upper Snake River Plain	PPBV	Stream
ID0020036D	Columbia Plateau	10j	Nez Perce Prairie	PPBV	Stream
ID0020036U	Idaho Batholith	16f	Foothill Shrublands-Grasslands	PPBV	Stream
ID0020061D	Snake River Plain	12i	Magic Valley	PPBV	Stream
ID0020061U	Snake River Plain	12i	Magic Valley	PPBV	Stream
ID0020087D	Snake River Plain	12f	Semiarid Foothills	PPBV	River
ID0020087U	Snake River Plain	12f	Semiarid Foothills	PPBV	River
ID0020117D	Northern Rockies	15o	Coeur d Alene Metasedimentary Zone	Mountains	River
ID0020117U	Northern Rockies	15o	Coeur d Alene Metasedimentary Zone	Mountains	River
ID0020125D	Columbia Plateau	10h	Palouse Hills	PPBV	Stream
ID0020125U	Columbia Plateau	10h	Palouse Hills	PPBV	Stream

Site ID	Level III Ecoregion Name	Level IV Ecoregion	Level IV Ecoregion Name	WBAG III Site Class	River/Stream
ID0020133D	Snake River Plain	12e	Upper Snake River Plain	PPBV	River
ID0020133U	Snake River Plain	12e	Upper Snake River Plain	PPBV	Stream
ID0020141D	Snake River Plain	12d	Dissected Plateaus and Teton Basin	PPBV	Stream
ID0020141U	Snake River Plain	12d	Dissected Plateaus and Teton Basin	PPBV	Stream
ID0020206D	Northern Rockies	15i	Clearwater Mountains and Breaks	Mountains	River
ID0020206U	Northern Rockies	15i	Clearwater Mountains and Breaks	Mountains	River
ID0020222D	Northern Rockies	15m	Kootenai Valley	Foothills	River
ID0020222U	Northern Rockies	15m	Kootenai Valley	Foothills	River
ID0020231D	Idaho Batholith	16g	High Glacial Drift-Filled Valleys	Mountains	River
ID0020231U	Idaho Batholith	16g	High Glacial Drift-Filled Valleys	Mountains	River
ID0020249D	Northern Basin and Range	80b	Semiarid Hills and Low Mountains	PPBV	River
ID0020249U	Northern Basin and Range	80b	Semiarid Hills and Low Mountains	PPBV	River
ID0020311D	Snake River Plain	12a	Treasure Valley	PPBV	River
ID0020311U	Snake River Plain	12a	Treasure Valley	PPBV	River
ID0020338D	Snake River Plain	12a	Treasure Valley	PPBV	Other
ID0020338U	Snake River Plain	12a	Treasure Valley	PPBV	Stream
ID0020354D	Northern Rockies	15n	Weippe Prairie	Foothills	River
ID0020354U	Northern Rockies	15n	Weippe Prairie	Foothills	Stream
ID0020362D	Northern Rockies	15p	St. Joe Schist-Gneiss Zone	Mountains	Stream
ID0020362U	Northern Rockies	15p	St. Joe Schist-Gneiss Zone	Mountains	Stream
ID0020389D	Snake River Plain	12a	Treasure Valley	PPBV	River
ID0020389U	Snake River Plain	12a	Treasure Valley	PPBV	River
ID0020401D	Snake River Plain	12e	Upper Snake River Plain	PPBV	River
ID0020401U	Snake River Plain	12e	Upper Snake River Plain	PPBV	River
ID0020427D	Snake River Plain	12a	Treasure Valley	PPBV	River
ID0020427U	Snake River Plain	12a	Treasure Valley	PPBV	River
ID0020451D	Northern Rockies	15m	Kootenai Valley	Foothills	River
ID0020451U	Northern Rockies	15m	Kootenai Valley	Foothills	River
ID0020532D	Northern Rockies	15v	Northern Idaho Hills and Low Relief Mountains	Foothills	River

Site ID	Level III Ecoregion Name	Level IV Ecoregion	Level IV Ecoregion Name	WBAG III Site Class	River/Stream
ID0020532U	Columbia Plateau	10h	Palouse Hills	PPBV	River
ID0020567D	Northern Rockies	15o	Coeur d'Alene Metasedimentary Zone	Mountains	Stream
ID0020567U	Northern Rockies	15o	Coeur d'Alene Metasedimentary Zone	Mountains	Stream
ID0020681D	Northern Rockies	15u	Inland Maritime Foothills and Valleys	Foothills	Other
ID0020681U	Northern Rockies	15u	Inland Maritime Foothills and Valleys	Foothills	Other
ID0020699D	Idaho Batholith	16i	South Clearwater Forested Mountains	Mountains	River
ID0020699U	Idaho Batholith	16i	South Clearwater Forested Mountains	Mountains	Stream
ID0020711D	Idaho Batholith	16c	Lochsa-Selway-Clearwater Canyons	Mountains	River
ID0020711U	Idaho Batholith	16c	Lochsa-Selway-Clearwater Canyons	Mountains	River
ID0020737D	Blue Mountains	11g	Canyons and Dissected Uplands	Foothills	River
ID0020737U	Blue Mountains	11g	Canyons and Dissected Uplands	Foothills	River
ID0020753D	Snake River Plain	12e	Upper Snake River Plain	PPBV	River
ID0020753U	Snake River Plain	12e	Upper Snake River Plain	PPBV	River
ID0020788D	Northern Rockies	15f	Grassy Potlatch Ridges	Foothills	Stream
ID0020800D	Northern Rockies	15u	Inland Maritime Foothills and Valleys	Foothills	River
ID0020800U	Northern Rockies	15u	Inland Maritime Foothills and Valleys	Foothills	River
ID0020893D	Northern Rockies	15i	Clearwater Mountains and Breaks	Mountains	Stream
ID0020893U	Northern Rockies	15i	Clearwater Mountains and Breaks	Mountains	Stream
ID0020931D	Blue Mountains	11g	Canyons and Dissected Uplands	Foothills	River
ID0020931U	Blue Mountains	11g	Canyons and Dissected Uplands	Foothills	River
ID0020940D	Snake River Plain	12i	Magic Valley	PPBV	Stream
ID0020940U	Snake River Plain	12i	Magic Valley	PPBV	Stream
ID0021016D	Snake River Plain	12a	Treasure Valley	PPBV	River
ID0021016U	Snake River Plain	12a	Treasure Valley	PPBV	River
ID0021024D	Idaho Batholith	16f	Foothill Shrublands-Grasslands	PPBV	River
ID0021024U	Idaho Batholith	16f	Foothill Shrublands-Grasslands	PPBV	River
ID0021199D	Snake River Plain	12a	Treasure Valley	PPBV	Stream
ID0021199U	Snake River Plain	12a	Treasure Valley	PPBV	River
ID0021202D	Snake River Plain	12a	Treasure Valley	PPBV	River

Site ID	Level III Ecoregion Name	Level IV Ecoregion	Level IV Ecoregion Name	WBAG III Site Class	River/Stream
ID0021202U	Snake River Plain	12a	Treasure Valley	PPBV	River
ID0021211D	Snake River Plain	12i	Magic Valley	PPBV	River
ID0021211U	Snake River Plain	12i	Magic Valley	PPBV	River
ID0021229D	Northern Rockies	15u	Inland Maritime Foothills and Valleys	Foothills	Stream
ID0021229D2	Northern Rockies	15u	Inland Maritime Foothills and Valleys	Foothills	Stream
ID0021229U	Northern Rockies	15u	Inland Maritime Foothills and Valleys	Foothills	Stream
ID0021296D	Northern Rockies	15o	Coeur d Alene Metasedimentary Zone	Mountains	Stream
ID0021296U	Northern Rockies	15o	Coeur d Alene Metasedimentary Zone	Mountains	Stream
ID0021776D	Snake River Plain	12a	Treasure Valley	PPBV	Stream
ID0021776U	Snake River Plain	12a	Treasure Valley	PPBV	Stream
ID0021806D	Snake River Plain	12f	Semiarid Foothills	PPBV	River
ID0021806U	Snake River Plain	12f	Semiarid Foothills	PPBV	River
ID0021822D	Northern Basin and Range	80b	Semiarid Hills and Low Mountains	PPBV	River
ID0021822U	Northern Basin and Range	80b	Semiarid Hills and Low Mountains	PPBV	River
ID0021831D	Snake River Plain	12a	Treasure Valley	PPBV	River
ID0021831U	Snake River Plain	12a	Treasure Valley	PPBV	River
ID0021849U	Columbia Plateau	10j	Nez Perce Prairie	PPBV	Stream
ID0022004D	Snake River Plain	12h	Mountain Home Uplands	PPBV	River
ID0022004U	Snake River Plain	12h	Mountain Home Uplands	PPBV	River
ID0022012D	Idaho Batholith	16i	South Clearwater Forested Mountains	Mountains	Stream
ID0022012U	Idaho Batholith	16i	South Clearwater Forested Mountains	Mountains	Stream
ID0022047D	Northern Basin and Range	80i	Sagebrush Steppe Valleys	PPBV	River
ID0022047U	Northern Basin and Range	80i	Sagebrush Steppe Valleys	PPBV	River
ID0022071D	Northern Rockies	15o	Coeur d Alene Metasedimentary Zone	Mountains	Stream
ID0022071U	Northern Rockies	15o	Coeur d Alene Metasedimentary Zone	Mountains	Stream
ID0022501D	Columbia Plateau	10h	Palouse Hills	PPBV	River
ID0022501U	Columbia Plateau	10h	Palouse Hills	PPBV	River
ID0022845D	Northern Rockies	15p	St. Joe Schist-Gneiss Zone	Mountains	River
ID0022845U	Northern Rockies	15p	St. Joe Schist-Gneiss Zone	Mountains	River

Site ID	Level III Ecoregion Name	Level IV Ecoregion	Level IV Ecoregion Name	WBAG III Site Class	River/Stream
ID0022861D	Northern Rockies	15v	Northern Idaho Hills and Low Relief Mountains	Foothills	River
ID0022861U	Northern Rockies	15v	Northern Idaho Hills and Low Relief Mountains	Foothills	River
ID0023027D	Middle Rockies	17aa	Dry Intermontane Sagebrush Valleys	PPBV	River
ID0023027U	Middle Rockies	17aa	Dry Intermontane Sagebrush Valleys	PPBV	River
ID0023159D	Idaho Batholith	16g	High Glacial Drift-Filled Valleys	Mountains	River
ID0023159U	Idaho Batholith	16g	High Glacial Drift-Filled Valleys	Mountains	River
ID0023167D	Idaho Batholith	16g	High Glacial Drift-Filled Valleys	Mountains	River
ID0023167U	Idaho Batholith	16g	High Glacial Drift-Filled Valleys	Mountains	River
ID0023604D	Northern Rockies	15j	Lower Clearwater Canyons	Foothills	Stream
ID0023604U	Northern Rockies	15j	Lower Clearwater Canyons	Foothills	Stream
ID0023710D	Snake River Plain	12d	Dissected Plateaus and Teton Basin	PPBV	Stream
ID0023710D2	Snake River Plain	12d	Dissected Plateaus and Teton Basin	PPBV	Stream
ID0023728D	Snake River Plain	12i	Magic Valley	PPBV	River
ID0023728U	Snake River Plain	12i	Magic Valley	PPBV	River
ID0023761D	Northern Rockies	15j	Lower Clearwater Canyons	Foothills	River
ID0023761U	Northern Rockies	15j	Lower Clearwater Canyons	Foothills	River
ID0023825D	Northern Basin and Range	80i	Sagebrush Steppe Valleys	PPBV	Stream
ID0023825U	Northern Basin and Range	80i	Sagebrush Steppe Valleys	PPBV	River
ID0023914D	Northern Rockies	15n	Weippe Prairie	Foothills	Stream
ID0023914U	Northern Rockies	15i	Clearwater Mountains and Breaks	Mountains	Stream
ID0024350D	Northern Rockies	15u	Inland Maritime Foothills and Valleys	Foothills	Stream
ID0024350U	Northern Rockies	15y	Selkirk Mountains	Mountains	Stream
ID0024422D	Idaho Batholith	16f	Foothill Shrublands-Grasslands	PPBV	River
ID0024422D2	Idaho Batholith	16f	Foothill Shrublands-Grasslands	PPBV	River
ID0024422U	Idaho Batholith	16f	Foothill Shrublands-Grasslands	PPBV	River
ID0024554D	Northern Rockies	15j	Lower Clearwater Canyons	Foothills	River
ID0024554U	Northern Rockies	15j	Lower Clearwater Canyons	Foothills	River
ID0024627D	Northern Rockies	15v	Northern Idaho Hills and Low Relief Mountains	Foothills	Stream
ID0024988D	Snake River Plain	12e	Upper Snake River Plain	PPBV	River

Site ID	Level III Ecoregion Name	Level IV Ecoregion	Level IV Ecoregion Name	WBAG III Site Class	River/Stream
ID0024988U	Snake River Plain	12e	Upper Snake River Plain	PPBV	River
ID0025071D	Northern Rockies	15p	St. Joe Schist-Gneiss Zone	Mountains	River
ID0025071U	Northern Rockies	15p	St. Joe Schist-Gneiss Zone	Mountains	River
ID0025143D	Wasatch and Uinta Mountains	19f	Semiarid Foothills	Mountains	River
ID0025143U	Wasatch and Uinta Mountains	19f	Semiarid Foothills	Mountains	River
ID0025194D	Northern Basin and Range	80b	Semiarid Hills and Low Mountains	PPBV	River
ID0025194U	Northern Basin and Range	80b	Semiarid Hills and Low Mountains	PPBV	River
ID0025429D	Northern Rockies	15o	Coeur d'Alene Metasedimentary Zone	Mountains	Stream
ID0025429U	Northern Rockies	15o	Coeur d'Alene Metasedimentary Zone	Mountains	Stream
ID0025488D	Snake River Plain	12a	Treasure Valley	PPBV	River
ID0025488U	Snake River Plain	12a	Treasure Valley	PPBV	River
ID0025569D	Central Basin and Range	13i	Malad and Cache Valleys	PPBV	River
ID0025569U	Central Basin and Range	13i	Malad and Cache Valleys	PPBV	River
ID0025585D	Wyoming Basin	18c	Sub-Irrigated High Valleys	PPBV	River
ID0025585U	Wyoming Basin	18c	Sub-Irrigated High Valleys	PPBV	River
ID0025607U	Columbia Plateau	10l	Lower Snake and Clearwater Canyons	PPBV	River
ID0026077D	Idaho Batholith	16k	Southern Forested Mountains	Mountains	Stream
ID0026077U	Idaho Batholith	16k	Southern Forested Mountains	Mountains	Stream
ID0026085D	Central Basin and Range	13i	Malad and Cache Valleys	PPBV	River
ID0026085U	Central Basin and Range	13i	Malad and Cache Valleys	PPBV	River
ID0026310D	Columbia Plateau	10h	Palouse Hills	PPBV	Stream
ID0026310U	Columbia Plateau	10h	Palouse Hills	PPBV	Stream
ID0026531D	Columbia Plateau	10l	Lower Snake and Clearwater Canyons	PPBV	River
ID0026531U	Columbia Plateau	10l	Lower Snake and Clearwater Canyons	PPBV	River
ID0026913D	Snake River Plain	12e	Upper Snake River Plain	PPBV	River
ID0026913U	Snake River Plain	12e	Upper Snake River Plain	PPBV	Stream
ID0026964D	Snake River Plain	12a	Treasure Valley	PPBV	River
ID0026964U	Snake River Plain	12a	Treasure Valley	PPBV	River
ID0027120D	Snake River Plain	12i	Magic Valley	PPBV	River

Site ID	Level III Ecoregion Name	Level IV Ecoregion	Level IV Ecoregion Name	WBAG III Site Class	River/Stream
ID0027120U	Snake River Plain	12i	Magic Valley	PPBV	River
ID0027154D	Columbia Plateau	10h	Palouse Hills	PPBV	Stream
ID0027154U	Columbia Plateau	10h	Palouse Hills	PPBV	Stream
ID0027383D	Snake River Plain	12a	Treasure Valley	PPBV	River
ID0027383U	Snake River Plain	12a	Treasure Valley	PPBV	River
ID0027928D	Idaho Batholith	16d	Dry Partly Wooded Mountains	Mountains	River
ID0027928U	Idaho Batholith	16d	Dry Partly Wooded Mountains	Mountains	River
ID0027944D	Northern Rockies	15u	Inland Maritime Foothills and Valleys	Foothills	Other
ID0027944U	Northern Rockies	15u	Inland Maritime Foothills and Valleys	Foothills	Other
ID0027952D	Snake River Plain	12a	Treasure Valley	PPBV	Stream
ID0027952U	Snake River Plain	12a	Treasure Valley	PPBV	Stream
ID0027979D	Idaho Batholith	16k	Southern Forested Mountains	Mountains	Stream
ID0027979U	Idaho Batholith	16k	Southern Forested Mountains	Mountains	River
ID0027995D	Northern Rockies	15q	Purcell-Cabinet-North Bitterroot Mountains	Mountains	Other
ID0027995U	Northern Rockies	15o	Coeur d Alene Metasedimentary Zone	Mountains	Stream
ID0028312D	Idaho Batholith	16f	Foothill Shrublands-Grasslands	PPBV	River
ID0028312U	Idaho Batholith	16k	Southern Forested Mountains	Mountains	River
ID0028321D	Idaho Batholith	16k	Southern Forested Mountains	Mountains	Stream
ID0028321U	Idaho Batholith	16k	Southern Forested Mountains	Mountains	Stream
ID0028355D	Snake River Plain	12a	Treasure Valley	PPBV	River
ID0028355U	Snake River Plain	12a	Treasure Valley	PPBV	River
PantherCKD	Idaho Batholith	16k	Southern Forested Mountains	Mountains	River
PantherCKD2	Idaho Batholith	16k	Southern Forested Mountains	Mountains	River
PantherCKU	Idaho Batholith	16k	Southern Forested Mountains	Mountains	River
PantherCKU2	Idaho Batholith	16k	Southern Forested Mountains	Mountains	River
SFDeerCKD	Idaho Batholith	16k	Southern Forested Mountains	Mountains	Stream
SFDeerCKU	Idaho Batholith	16k	Southern Forested Mountains	Mountains	Stream

Appendix B. Sample Results

Table B-1. BLM-derived criteria for each sample.

Site ID	CMC (µg/L)	CCC (µg/L)	Acute Toxic Units	Chronic Toxic Units	Sample Collection Date
ID0020036U	13.3	8.26	0.06	0.1	9/25/2016
ID0027952D	21.05	13.08	0.09	0.15	9/28/2016
ID0027952U	31.19	19.37	0.06	0.1	9/28/2016
ID0020427U	18.23	11.32	0.02	0.04	9/29/2016
ID0021016D	25.78	16.01	0.04	0.06	9/29/2016
ID0021016U	23.05	14.32	0.05	0.08	9/29/2016
ID0021202D	0.96	0.6	0.38	0.62	9/29/2016
ID0021202U	17.51	10.88	0.02	0.04	9/29/2016
ID0001155D	24.97	15.51	0.03	0.05	10/4/2016
ID0001155U	24.92	15.48	0.03	0.04	10/4/2016
ID0020087D	20.77	12.9	0.03	0.05	10/4/2016
ID0020087U	20.2	12.54	0.03	0.06	10/4/2016
ID0021806D	17.41	10.81	0.04	0.07	10/4/2016
ID0021806U	18.73	11.63	0.04	0.06	10/4/2016
ID0020311D	15.66	9.73	0.02	0.02	10/5/2016
ID0020311U	13.36	8.3	0.02	0.03	10/5/2016
ID0021024D	11.03	6.85	0.02	0.03	10/5/2016
ID0021024U	11.29	7.01	0.02	0.03	10/5/2016
ID0021831D	14.5	9.01	0.06	0.1	10/5/2016
ID0021831U	16.76	10.41	0.05	0.07	10/5/2016
ID0025488D	10.22	6.35	0.02	0.04	10/13/2016
ID0025488U	10.1	6.27	0.03	0.05	10/13/2016
ID0028312D	8.1	5.03	0.02	0.04	10/13/2016
ID0028312U	7.81	4.85	0.03	0.05	10/13/2016
ID0021776D	21.18	13.15	0.09	0.15	10/18/2016
ID0021776U	19.77	12.28	0.14	0.23	10/18/2016

Site ID	CMC (µg/L)	CCC (µg/L)	Acute Toxic Units	Chronic Toxic Units	Sample Collection Date
ID0026964D	25.92	16.1	0.08	0.13	10/18/2016
ID0026964U	19.5	12.11	0.07	0.11	10/18/2016
ID0027383D	20.65	12.83	0.05	0.09	10/18/2016
ID0027383U	20.39	12.66	0.06	0.1	10/18/2016
ID0028355D	29.49	18.32	0.05	0.08	10/18/2016
ID0028355U	36.52	22.68	0.06	0.09	10/18/2016
ID0020231D	14.69	9.13	0.02	0.03	10/19/2016
ID0020231U	9.33	5.8	0.03	0.04	10/19/2016
ID0023167D	17.57	10.91	0.02	0.03	10/19/2016
ID0023167U	15.75	9.78	0.02	0.04	10/19/2016
ID0022004D	12.94	8.04	0.04	0.07	10/20/2016
ID0022004U	13.04	8.1	0.04	0.07	10/20/2016
ID0000213D	14.26	8.86	0.03	0.05	10/25/2016
ID0000213U	13.2	8.2	0.03	0.05	10/25/2016
ID0020338D	19.28	11.97	0.03	0.04	10/25/2016
ID0020338U	20.51	12.74	0.03	0.04	10/25/2016
ID0020389D	11.05	6.87	0.04	0.06	10/25/2016
ID0020389U	12.53	7.78	0.03	0.05	10/25/2016
ID0020427D	17.95	11.15	0.03	0.04	10/25/2016
ID0021199D	13.66	8.48	0.03	0.05	10/25/2016
ID0021199U	12.09	7.51	0.03	0.05	10/25/2016
ID0027979D	9.33	5.79	0.02	0.03	10/26/2016
ID0027979U	6.95	4.32	0.02	0.04	10/26/2016
ID0023159D	23.06	14.32	0.05	0.08	10/19/2016
ID0023159U	27.77	17.25	0.05	0.08	10/19/2016
ID0000060D	2.1	1.31	0.3	0.48	10/4/2016
ID0000060U	1.31	0.81	0.42	0.67	10/4/2016
ID0000159D	2.01	1.25	0.28	0.46	10/4/2016
ID0000159U	1.56	0.97	0.38	0.62	10/4/2016

Site ID	CMC (µg/L)	CCC (µg/L)	Acute Toxic Units	Chronic Toxic Units	Sample Collection Date
ID0000167D	1	0.62	0.32	0.52	10/4/2016
ID0000167U	0.39	0.24	0.64	1.04	10/4/2016
ID0020567D	0.98	0.61	0.22	0.36	10/4/2016
ID0020567U	0.88	0.55	0.13	0.2	10/4/2016
ID0021296D	1.6	1	0.46	0.74	10/4/2016
ID0021296U	1.93	1.2	0.52	0.84	10/4/2016
ID0025429D	1.99	1.24	0.29	0.46	10/4/2016
ID0025429U	1.78	1.11	0.28	0.44	10/4/2016
ID0020117D	1.35	0.84	0.46	0.74	10/5/2016
ID0020117U	1.73	1.08	0.33	0.53	10/5/2016
ID0022071D	1.61	1	0.3	0.48	10/5/2016
ID0022071U	2.25	1.4	0.26	0.42	10/5/2016
ID0022845D	9.54	5.92	0.03	0.05	10/6/2016
ID0025071D	11.18	6.95	0.04	0.07	10/6/2016
ID0025071U	13.29	8.25	0.03	0.05	10/6/2016
ID0022845U	14.25	8.85	0.02	0.03	10/6/2016
ID0024627D	7.58	4.71	0.06	0.1	10/19/2016
ID0020681D	9.95	6.18	0.05	0.08	10/25/2016
ID0020681U	9.72	6.04	0.06	0.1	10/25/2016
ID0020800D	8.38	5.21	0.03	0.06	10/25/2016
ID0020800U	6.09	3.78	0.02	0.03	10/25/2016
ID0021229D	34.93	21.7	0.02	0.04	10/25/2016
ID0027944D	11.11	6.9	0.06	0.1	10/25/2016
ID0027944U	12.2	7.58	0.05	0.07	10/25/2016
ID0020451D	11.81	7.33	0.03	0.04	10/26/2016
ID0020222D	10.65	6.61	0.03	0.05	10/26/2016
ID0020222U	11.15	6.92	0.03	0.05	10/26/2016
ID0024350D	4.76	2.96	0.05	0.08	10/26/2016
ID0024350U	20.2	12.55	0.01	0.01	10/26/2016

Site ID	CMC (µg/L)	CCC (µg/L)	Acute Toxic Units	Chronic Toxic Units	Sample Collection Date
ID0020451U	N/A	N/A	N/A	N/A	10/26/2016
ID0021229D2	40.4	25.09	0.04	0.06	10/27/2016
ID0021229U	36.45	22.64	0.04	0.07	10/27/2016
ID0027995D	7.79	4.84	0.05	0.09	10/27/2016
ID0027995U	10.4	6.46	0.04	0.07	10/27/2016
ID0028321D	2.59	1.61	1.1	1.78	9/13/2016
PantherCKD	9.59	5.96	0.05	0.09	9/13/2016
PantherCKD2	13.93	8.65	0.07	0.11	9/13/2016
PantherCKU	10.24	6.36	0.04	0.06	9/13/2016
PantherCKU2	14.07	8.74	0.05	0.08	9/13/2016
SFDeerCKD	3.93	2.44	1.69	2.73	9/13/2016
SFDeerCKU	4.02	2.49	0.18	0.28	9/13/2016
ID0020001D	19.07	11.84	0.02	0.03	9/14/2016
ID0020001U	17.12	10.63	0.02	0.03	9/14/2016
ID0023027U	7.63	4.74	0.08	0.13	9/16/2016
ID0028321U	3.51	2.18	0.69	1.11	9/16/2016
ID0020010U	10.9	6.77	0.02	0.04	9/19/2016
ID0020010D	12.32	7.65	0.02	0.03	9/19/2016
ID0020401D	9.89	6.15	0.02	0.03	9/19/2016
ID0020401U	9.02	5.61	0.02	0.04	9/19/2016
ID0026913D	38.7	24.04	0.02	0.04	9/19/2016
ID0026913U	4.42	2.74	0.07	0.12	9/19/2016
ID0020141U	3.17	1.97	0.03	0.05	9/21/2016
ID0020141D	16.96	10.53	0.09	0.15	9/21/2016
ID0023710D	N/A	N/A	N/A	N/A	9/21/2016
ID0023710D2	N/A	N/A	N/A	N/A	9/21/2016
ID0023027D	9.92	6.16	0.03	0.05	9/26/2016
ID0020737D	11.39	7.07	0.03	0.04	9/6/2016
ID0020737U	10.4	6.46	0.03	0.05	9/6/2016

Site ID	CMC (µg/L)	CCC (µg/L)	Acute Toxic Units	Chronic Toxic Units	Sample Collection Date
ID0020931D	10.14	6.3	0.03	0.05	9/6/2016
ID0026077D	4.63	2.87	0.04	0.06	9/6/2016
ID0026077U	5.44	3.38	0.04	0.06	9/6/2016
ID0020931U	11.18	6.94	0.04	0.06	9/6/2016
ID0020362D	7.64	4.74	0.03	0.05	9/7/2016
ID0020362U	27.82	17.28	0.01	0.02	9/7/2016
ID0020532D	15.21	9.44	0.03	0.05	9/7/2016
ID0020532U	31.97	19.85	0.02	0.03	9/7/2016
ID0020788D	6.11	3.79	0.05	0.09	9/7/2016
ID0022861D	10.09	6.27	0.05	0.08	9/7/2016
ID0022861U	12.59	7.82	0.03	0.04	9/7/2016
ID0023761D	14.33	8.9	0.04	0.07	9/7/2016
ID0023761U	12.64	7.85	0.05	0.08	9/7/2016
ID0024554D	11.06	6.87	0.07	0.11	9/7/2016
ID0024554U	23.33	14.49	0.03	0.05	9/7/2016
ID0020206D	8.82	5.48	0.03	0.05	9/8/2016
ID0020206U	8.17	5.07	0.03	0.04	9/8/2016
ID0020354D	23.09	14.34	0.03	0.04	9/8/2016
ID0020354U	29.14	18.1	0.04	0.07	9/8/2016
ID0020893D	10.1	6.27	0.02	0.03	9/8/2016
ID0020893U	15.24	9.47	0.02	0.03	9/8/2016
ID0023914D	8.15	5.06	0.04	0.07	9/8/2016
ID0023914U	8.62	5.36	0.04	0.06	9/8/2016
ID0020125D	11.15	6.93	0.04	0.07	9/9/2016
ID0020125U	21.64	13.44	0.07	0.11	9/9/2016
ID0023604D	53.39	33.16	0.11	0.18	9/9/2016
ID0023604U	4.24	2.63	0.17	0.28	9/9/2016
ID0022501D	13.56	8.42	0.04	0.07	9/12/2016
ID0022501U	18.86	11.71	0.03	0.05	9/12/2016

Site ID	CMC (µg/L)	CCC (µg/L)	Acute Toxic Units	Chronic Toxic Units	Sample Collection Date
ID0025607U	6.5	4.04	0.05	0.09	9/12/2016
ID0026310D	11.32	7.03	0.06	0.09	9/12/2016
ID0026310U	6.89	4.28	0.08	0.12	9/12/2016
ID0026531D	8.29	5.15	0.04	0.06	9/12/2016
ID0026531U	8.72	5.42	0.06	0.1	9/12/2016
ID0027154D	29.41	18.26	0.11	0.17	9/12/2016
ID0027154U	18.21	11.31	0.06	0.09	9/12/2016
ID0020036D	22.32	13.87	0.14	0.23	9/25/2016
ID0020699D	25.46	15.81	0.01	0.02	9/25/2016
ID0020699U	17.96	11.16	0.02	0.03	9/25/2016
ID0021849U	37.72	23.43	0.06	0.1	9/25/2016
ID0022012D	16.67	10.35	0.24	0.39	9/25/2016
ID0022012U	16.03	9.96	0.02	0.04	9/25/2016
ID0020711D	18.9	11.74	0.01	0.02	10/5/2016
ID0020711U	20.39	12.66	0.01	0.02	10/5/2016
ID0020249D	24.9	15.47	0.02	0.03	9/15/2016
ID0020249U	15.7	9.75	0.02	0.03	9/15/2016
ID0001198D	12.9	8.02	0.02	0.04	9/19/2016
ID0001198U	4.89	3.04	0.05	0.08	9/19/2016
ID0025585D	42.09	26.14	0.01	0.01	9/19/2016
ID0025585U	38.22	23.74	0.01	0.01	9/19/2016
ID0023825D	31.8	19.75	0.01	0.02	9/26/2016
ID0023825U	25.36	15.75	0.01	0.02	9/26/2016
ID0025143U	22.86	14.2	0.03	0.04	9/26/2016
ID0025194D	15.82	9.82	0.02	0.03	9/26/2016
ID0025194U	13.42	8.33	0.02	0.04	9/26/2016
ID0025143D	7.38	4.59	0.03	0.04	9/26/2016
ID0025569D	19.09	11.86	0.04	0.06	10/3/2016
ID0025569U	12.31	7.65	0.04	0.06	10/3/2016

Site ID	CMC (µg/L)	CCC (µg/L)	Acute Toxic Units	Chronic Toxic Units	Sample Collection Date
ID0026085D	18.82	11.69	0.07	0.11	10/3/2016
ID0026085U	26.67	16.57	0.02	0.03	10/3/2016
ID0020133U	5.94	3.69	0.03	0.06	10/10/2016
ID0020133D	8.11	5.03	0.04	0.07	10/10/2016
ID0024988D	11.92	7.4	0.02	0.03	10/10/2016
ID0024988U	9	5.59	0.03	0.05	10/10/2016
ID0021822D	24.9	15.47	0.01	0.02	10/25/2016
ID0021822U	24.26	15.07	0.01	0.02	10/25/2016
ID0024422U	5.47	3.39	0.06	0.1	9/6/2016
ID0024422D	N/A	N/A	N/A	N/A	9/6/2016
ID0020061D	34.16	21.22	0.03	0.05	9/8/2016
ID0027928D	4.26	2.65	0.04	0.07	9/8/2016
ID0027928U	3.12	1.94	0.08	0.12	9/8/2016
ID0021211U	N/A	N/A	N/A	N/A	9/12/2016
ID0021211D	N/A	N/A	N/A	N/A	9/12/2016
ID0020940U	N/A	N/A	N/A	N/A	9/12/2016
ID0020940D	N/A	N/A	N/A	N/A	9/12/2016
ID0027120D	0.56	0.35	0.87	1.39	9/19/2016
ID0027120U	2.11	1.31	0.25	0.4	9/19/2016
ID0020061U	N/A	N/A	N/A	N/A	9/19/2016
ID0024422D2	N/A	N/A	N/A	N/A	9/19/2016
ID0000388D	2.37	1.47	0.36	0.57	9/20/2016
ID0000388U	1.91	1.19	0.35	0.56	9/20/2016
ID0023728D	3.39	2.1	0.22	0.35	9/20/2016
ID0023728U	3.08	1.91	0.19	0.3	9/20/2016
ID0020753U	N/A	N/A	N/A	N/A	10/10/2016
ID0020753D	15.21	9.45	0.02	0.03	10/10/2016
ID0022047D	39.67	24.64	0.01	0.02	10/25/2016
ID0022047U	84.04	52.2	0.01	0.01	10/25/2016

Site ID	CMC (µg/L)	CCC (µg/L)	Acute Toxic Units	Chronic Toxic Units	Sample Collection Date

Note: CCC = criterion continuous concentration (chronic); CMC = criterion maximum concentration (acute); N/A = criteria not derived

Table B-2. Field and lab-reported analytical data for parent samples.

Site ID	Temp (ºC)	pH (s.u.)	Cu	DOC	Ca	Mg	Na	K	SO_4	Cl	Alk
			(mg/L)								(mg $CaCO_3$/L)
ID0020036U	13.0	8.00	0.000805	2.080	14.40	4.82	5.42	2.84	0.05	5.200	59.1
ID0027952D	15.4	8.48	0.001950	2.140	13.90	2.17	6.24	1.32	0.05	2.580	50.7
ID0027952U	14.6	9.22	0.001960	2.080	13.70	2.11	5.41	1.18	0.05	0.973	48.9
ID0020427U	15.4	8.26	0.000434	1.730	41.30	18.00	26.70	5.34	51.40	23.700	158.0
ID0021016D	16.1	8.20	0.000958	2.720	33.50	8.85	28.70	3.95	29.10	12.500	137.0
ID0021016U	16.3	8.23	0.001110	2.440	28.90	7.38	23.70	3.29	23.70	10.900	115.0
ID0021202D	16.8	5.84	0.000370	1.710	42.40	18.30	27.20	5.50	51.60	24.400	163.0
ID0021202U	15.2	8.25	0.000425	1.640	42.50	18.60	27.10	5.46	60.80	29.100	226.0
ID0001155D	12.9	8.39	0.000827	2.250	38.60	15.90	31.80	5.70	53.80	20.900	164.0
ID0001155U	13.0	8.41	0.000673	2.150	42.30	17.80	35.30	6.41	60.80	23.800	167.0
ID0020087D	9.2	8.56	0.000699	2.150	13.20	5.03	9.18	1.85	0.05	2.310	67.3
ID0020087U	10.0	8.60	0.000690	2.010	13.10	4.89	10.10	1.83	11.10	2.470	66.0
ID0021806D	10.3	8.54	0.000767	1.780	12.80	4.71	10.80	1.69	11.20	5.100	61.2
ID0021806U	10.6	8.61	0.000748	1.830	12.30	4.54	10.70	1.63	11.50	5.130	60.0
ID0020311D	12.3	8.25	0.000235	1.980	8.42	1.18	5.39	0.74	0.05	1.360	34.4
ID0020311U	12.6	8.05	0.000234	2.000	7.46	1.02	4.42	0.63	0.05	1.050	29.0
ID0021024D	9.3	7.88	0.000196	1.970	6.51	0.76	3.80	0.56	0.05	0.955	25.9
ID0021024U	9.2	7.92	0.000194	1.940	6.58	0.77	3.81	0.56	0.05	0.908	26.2
ID0021831D	11.5	7.92	0.000927	2.270	23.70	5.47	18.10	2.42	15.30	9.630	96.8
ID0021831U	12.0	8.14	0.000769	2.210	19.10	3.61	14.40	2.02	11.70	8.790	70.2
ID0025488D	11.2	8.03	0.000232	1.620	10.90	1.32	3.87	0.55	0.05	1.020	37.4
ID0025488U	11.2	8.03	0.000301	1.600	10.90	1.31	3.88	0.54	0.05	0.895	37.5

Site ID	Temp (ºC)	pH (s.u.)	Cu	DOC	Ca	Mg	Na	K	SO_4	Cl	Alk
			(mg/L)								(mg $CaCO_3$/L)
ID0028312D	4.1	8.02	0.000198	1.320	15.30	2.17	6.80	0.79	0.05	1.440	51.4
ID0028312U	4.1	7.98	0.000243	1.320	15.20	2.16	6.65	0.76	0.05	1.270	51.7
ID0021776D	10.8	8.11	0.002010	2.340	46.80	13.30	47.00	5.83	60.00	21.800	206.0
ID0021776U	10.8	8.01	0.002770	2.380	46.80	13.00	47.30	5.45	60.20	21.500	220.0
ID0026964D	13.8	7.62	0.002070	4.420	52.10	15.30	57.10	10.00	66.20	42.200	212.0
ID0026964U	12.2	7.87	0.001310	2.620	55.60	17.10	39.90	6.84	54.60	16.000	250.0
ID0027383D	12.5	8.08	0.001120	2.240	53.60	16.20	44.90	6.39	61.80	21.600	245.0
ID0027383U	12.4	8.05	0.001240	2.270	54.60	16.50	45.60	6.26	62.10	21.600	229.0
ID0028355D	12.1	8.00	0.001530	3.690	51.40	17.20	31.60	6.68	43.50	12.800	226.0
ID0028355U	11.0	8.41	0.002120	3.330	54.00	20.40	21.80	2.91	33.40	6.210	230.0
ID0020231D	8.6	8.09	0.000273	1.850	1.86	0.31	0.96	0.36	0.05	0.452	7.6
ID0020231U	8.7	7.64	0.000244	1.850	1.86	0.28	0.94	0.32	0.05	0.325	7.2
ID0023167D	8.3	7.82	0.000354	3.060	3.10	0.60	2.90	0.71	0.05	1.800	15.7
ID0023167U	8.6	7.75	0.000360	2.960	3.09	0.59	2.48	0.66	0.05	1.320	14.6
ID0022004D	11.2	8.30	0.000553	1.250	41.90	17.40	26.00	5.37	51.90	26.800	169.0
ID0022004U	11.2	8.26	0.000551	1.310	41.60	17.20	25.90	5.13	51.80	26.900	167.0
ID0000213D	10.9	8.02	0.000418	2.140	16.00	3.00	12.00	1.66	0.05	2.610	74.8
ID0000213U	10.6	7.91	0.000405	2.210	16.00	2.91	11.60	1.53	0.05	2.210	73.1
ID0020338D	11.8	8.37	0.000491	1.750	43.30	17.40	31.90	6.03	63.20	27.200	176.0
ID0020338U	12.0	8.40	0.000520	1.790	44.00	17.90	33.80	6.30	64.80	27.200	191.0
ID0020389D	10.1	7.80	0.000390	2.110	15.10	2.51	9.70	1.33	0.05	2.060	66.4
ID0020389U	10.0	7.94	0.000385	2.080	14.40	2.38	9.65	1.30	0.05	1.930	64.1
ID0020427D	11.9	8.41	0.000486	1.570	43.40	18.00	29.50	6.08	57.30	26.800	178.0
ID0021199D	10.6	7.90	0.000390	2.300	16.50	2.99	12.00	1.61	0.05	2.260	73.0
ID0021199U	10.4	7.85	0.000381	2.150	16.30	2.92	11.60	1.55	0.05	2.190	71.3
ID0027979D	7.7	8.12	0.000200	1.410	15.00	1.28	4.13	0.53	0.05	0.848	49.3
ID0027979U	7.5	7.90	0.000155	1.280	15.80	1.27	4.17	0.51	0.05	0.799	51.2
ID0023159D	7.5	7.61	0.001080	5.430	7.60	2.52	5.92	2.29	0.05	4.080	36.6

Site ID	Temp (ºC)	pH (s.u.)	Cu	DOC	Ca	Mg	Na	K	SO_4	Cl	Alk
						(mg/L)					(mg $CaCO_3$/L)
ID0023159U	6.7	7.61	0.001450	6.550	8.69	3.08	6.19	2.86	0.05	2.420	45.6
ID0000060D	10.0	8.04	0.000621	***0.314***	18.40	4.98	5.23	1.12	26.50	6.530	49.0
ID0000060U	9.7	7.85	0.000547	***0.229***	18.50	4.96	5.34	1.13	27.00	6.660	48.5
ID0000159D	10.0	8.02	0.000572	***0.305***	18.40	4.95	5.24	1.12	26.80	6.580	50.1
ID0000159U	9.8	7.83	0.000598	***0.281***	18.50	5.00	5.38	1.12	26.40	6.510	50.0
ID0000167D	1.8	8.12	0.000319	***0.150***	9.72	2.66	1.10	0.35	0.05	0.192	35.5
ID0000167U	6.3	7.44	0.000252	***0.113***	3.46	1.04	0.88	0.23	0.05	0.159	14.4
ID0020567D	9.0	7.87	0.000216	***0.181***	9.58	3.58	1.12	0.38	11.80	0.326	30.4
ID0020567U	8.8	7.81	0.000111	***0.405***	9.10	3.35	1.08	0.38	0.05	0.304	30.3
ID0021296D	8.5	7.43	0.000739	***0.470***	19.70	3.93	8.57	2.06	36.00	12.400	40.0
ID0021296U	8.6	7.36	0.001010	***0.624***	19.30	3.92	8.48	1.99	37.30	12.300	40.8
ID0025429D	9.0	8.21	0.000574	***0.258***	17.20	4.33	4.66	0.89	17.10	5.040	48.6
ID0025429U	8.7	8.22	0.000491	***0.229***	17.30	4.38	4.85	0.97	23.10	6.430	46.8
ID0020117D	10.5	7.31	0.000620	***0.452***	23.20	7.10	5.09	1.35	59.70	5.910	41.4
ID0020117U	10.5	7.51	0.000571	***0.436***	35.60	10.30	4.37	1.49	111.00	4.270	39.2
ID0022071D	9.4	7.61	0.000477	***0.377***	18.60	5.25	4.97	1.06	28.00	5.880	50.0
ID0022071U	9.2	7.76	0.000582	***0.456***	17.40	4.80	4.94	1.09	25.30	6.160	49.1
ID0022845D	8.5	7.94	0.000309	1.650	6.34	1.25	2.06	1.02	0.05	0.719	24.0
ID0025071D	8.4	7.57	0.000496	2.810	5.36	1.61	3.02	1.14	0.05	1.430	25.3
ID0025071U	8.4	7.93	0.000380	2.270	5.47	1.63	3.11	1.12	0.05	1.270	25.8
ID0022845U	8.0	8.54	0.000249	1.600	7.35	1.39	2.07	1.11	0.05	0.732	26.1
ID0024627D	13.7	7.92	0.000490	1.290	4.82	1.34	1.29	0.49	0.05	0.858	17.8
ID0020681D	11.5	8.25	0.000524	1.280	19.10	4.96	2.24	0.64	0.05	0.960	65.3
ID0020681U	11.6	8.23	0.000611	1.260	20.30	5.25	2.34	0.68	0.05	1.030	78.0
ID0020800D	11.2	7.78	0.000289	1.680	5.15	1.50	1.26	0.44	0.05	0.305	20.9
ID0020800U	11.2	8.05	0.000132	0.865	2.52	0.74	0.53	0.24	0.04	0.160	11.1
ID0021229D	9.6	8.49	0.000819	3.840	26.30	5.12	4.28	1.58	12.10	3.870	85.8
ID0027944D	11.3	8.40	0.000658	1.270	20.40	5.27	2.32	0.65	0.05	1.030	77.0

Site ID	Temp (ºC)	pH (s.u.)	Cu	DOC	Ca	Mg	Na	K	SO_4	Cl	Alk
			(mg/L)								(mg $CaCO_3$/L)
ID0027944U	11.3	8.49	0.000558	1.310	20.20	5.19	2.33	0.65	0.05	1.040	77.7
ID0020451D	8.6	8.29	0.000316	1.540	20.20	5.46	2.14	0.49	14.00	1.320	69.2
ID0020222D	8.6	8.13	0.000311	1.570	20.40	5.51	2.16	0.49	14.10	1.340	69.1
ID0020222U	8.5	8.19	0.000326	1.560	21.20	5.90	2.09	0.48	14.10	1.350	68.7
ID0024350D	7.1	7.15	0.000238	1.770	1.63	0.30	1.63	0.31	0.05	1.290	6.5
ID0024350U	7.0	8.70	0.000134	1.740	1.65	0.31	1.59	0.31	0.05	1.250	6.5
ID0020451U	N/A	N/A	0.000316	1.580	20.30	5.49	2.15	0.49	14.20	1.330	69.0
ID0021229D2	8.5	7.75	0.001520	8.110	33.90	5.09	6.19	2.67	26.50	8.710	84.2
ID0021229U	8.3	7.72	0.001560	7.740	31.60	4.71	3.10	2.08	20.30	4.010	80.8
ID0027995D	11.2	8.05	0.000422	1.150	24.60	6.41	2.60	0.75	0.05	1.160	87.4
ID0027995U	11.2	8.23	0.000430	1.330	23.70	6.15	2.52	0.71	0.05	1.110	88.3
ID0028321D	5.8	7.32	0.002860	0.939	12.60	1.47	3.09	0.90	0.05	0.722	39.4
PantherCKD	7.5	8.12	0.000511	1.460	13.10	2.94	3.65	1.34	11.50	0.967	42.3
PantherCKD2	10.6	8.57	0.000952	1.470	11.10	2.26	4.16	1.34	0.05	1.040	36.8
PantherCKU	7.0	8.15	0.000375	1.510	11.80	2.57	3.70	1.07	0.05	0.801	45.5
PantherCKU2	10.5	8.55	0.000674	1.520	10.60	2.32	4.14	1.39	10.30	1.320	37.0
SFDeerCKD	5.3	8.02	0.006650	0.642	25.20	2.21	2.66	1.53	10.20	0.867	69.8
SFDeerCKU	5.2	8.07	0.000710	0.621	26.90	1.90	2.65	1.34	0.05	0.703	74.0
ID0020001D	11.5	8.94	0.000317	1.370	34.30	8.00	11.40	2.00	17.50	3.820	120.0
ID0020001U	11.4	8.93	0.000347	1.260	31.80	7.17	9.56	1.69	14.50	3.100	121.0
ID0023027U	14.7	8.17	0.000615	0.895	34.40	8.89	4.62	1.18	16.70	2.460	119.0
ID0028321U	5.6	7.59	0.002420	0.911	12.60	1.43	3.19	0.87	0.05	0.663	39.3
ID0020010U	15.3	7.97	0.000260	1.470	45.40	11.50	12.20	2.23	46.10	12.700	130.0
ID0020010D	14.9	8.16	0.000226	1.400	44.60	11.00	11.70	2.12	46.20	12.700	123.0
ID0020401D	14.3	8.38	0.000157	1.040	11.60	3.30	14.00	2.52	15.30	5.850	54.7
ID0020401U	13.5	8.23	0.000223	1.070	11.80	3.42	14.20	2.60	0.05	5.640	62.0
ID0026913D	13.6	7.01	0.000869	14.200	38.40	38.90	45.00	12.40	107.00	40.000	240.0
ID0026913U	13.1	6.37	0.000322	4.500	57.70	18.70	22.90	3.91	47.40	17.400	216.0

Site ID	Temp (ºC)	pH (s.u.)	Cu	DOC	Ca	Mg	Na	K	SO_4	Cl	Alk
			(mg/L)								(mg $CaCO_3$/L)
ID0020141U	14.4	7.50	0.000100	0.584	58.40	12.90	1.31	0.74	0.05	2.090	189.0
ID0020141D	13.6	7.54	0.001610	3.450	58.80	14.40	20.80	6.05	11.80	24.500	196.0
ID0023710D	11.8	7.74	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ID0023710D2	N/A	N/A	0.000915	5.980	15.50	3.62	26.60	5.64	0.05	14.500	99.2
ID0023027D	14.5	8.50	0.000336	0.887	35.40	8.87	4.63	1.18	26.90	2.480	107.0
ID0020737D	14.6	8.50	0.000306	1.180	14.10	2.31	3.33	1.27	0.05	0.358	48.7
ID0020737U	17.3	8.30	0.000351	1.160	17.40	3.31	6.02	1.14	0.05	1.510	64.0
ID0020931D	16.8	8.30	0.000300	1.140	17.50	3.30	6.09	1.15	0.05	1.400	63.9
ID0026077D	8.2	7.40	0.000184	1.440	5.37	0.36	2.62	0.46	0.05	0.361	19.8
ID0026077U	8.5	7.50	0.000217	1.470	4.78	0.37	2.53	0.46	0.05	0.403	19.4
ID0020931U	16.7	8.40	0.000442	1.160	17.10	3.22	5.91	1.14	0.05	1.440	63.7
ID0020362D	13.1	7.40	0.000248	2.240	3.12	0.83	2.17	0.86	0.05	0.856	15.8
ID0020362U	12.3	7.40	0.000290	7.580	3.17	0.84	2.19	0.86	0.05	0.931	16.7
ID0020532D	16.2	7.70	0.000427	3.250	7.48	2.22	3.68	2.09	0.05	1.820	35.1
ID0020532U	18.0	8.90	0.000544	2.370	5.32	1.40	2.50	1.32	0.05	1.030	23.7
ID0020788D	14.7	7.60	0.000333	1.300	15.80	9.61	14.80	2.37	0.05	12.300	94.2
ID0022861D	13.6	7.20	0.000489	4.050	6.61	2.33	4.74	1.53	0.05	5.650	30.4
ID0022861U	13.8	7.40	0.000323	3.850	6.66	2.34	4.60	1.46	0.05	3.070	31.7
ID0023761D	15.9	8.00	0.000617	2.180	12.90	4.62	6.00	2.65	0.05	2.300	68.2
ID0023761U	15.7	7.90	0.000659	2.130	13.40	4.88	6.04	2.82	0.05	2.350	68.2
ID0024554D	17.1	7.90	0.000750	1.870	10.30	3.69	5.07	2.05	0.05	1.890	52.0
ID0024554U	17.1	8.70	0.000665	1.970	9.45	3.40	4.75	1.90	0.05	1.350	48.9
ID0020206D	14.9	7.70	0.000265	1.880	5.17	1.38	2.85	0.92	0.05	1.140	25.1
ID0020206U	14.8	7.60	0.000224	1.950	4.85	1.27	2.61	0.81	0.05	0.931	22.5
ID0020354D	13.4	7.50	0.000588	5.080	23.60	10.80	36.10	8.14	0.05	76.800	98.5
ID0020354U	13.3	7.50	0.001250	7.510	14.30	5.28	10.40	2.89	0.05	26.500	52.6
ID0020893D	13.9	7.60	0.000211	2.490	8.64	2.39	3.33	1.31	0.05	0.467	40.5
ID0020893U	13.7	7.90	0.000243	2.680	8.12	2.23	3.20	1.26	0.05	0.369	40.0

Site ID	Temp (ºC)	pH (s.u.)	Cu	DOC	Ca	Mg	Na	K	SO_4	Cl	Alk
			(mg/L)								(mg $CaCO_3$/L)
ID0023914D	13.2	7.20	0.000331	3.190	5.11	1.43	5.69	0.94	0.02	1.240	32.9
ID0023914U	11.5	7.30	0.000339	3.050	8.31	2.10	5.84	1.85	0.05	2.530	42.5
ID0020125D	8.3	7.70	0.000464	1.920	49.10	15.90	22.30	4.44	14.70	17.000	210.0
ID0020125U	10.7	7.70	0.001460	4.000	36.00	12.10	20.30	4.92	11.30	4.220	182.0
ID0023604D	12.5	7.70	0.006120	8.410	18.80	5.52	60.90	14.00	21.40	37.600	123.0
ID0023604U	11.0	7.00	0.000741	2.175	16.55	5.61	10.10	3.13	0.05	20.550	60.0
ID0022501D	13.9	7.60	0.000591	3.280	8.20	2.48	4.68	2.09	0.05	2.210	41.0
ID0022501U	15.5	7.90	0.000588	3.220	7.40	2.19	4.19	1.96	0.05	2.040	36.7
ID0025607U	12.0	7.70	0.000347	1.340	3.32	0.68	1.36	0.43	0.05	0.430	12.3
ID0026310D	10.2	7.70	0.000631	2.100	38.10	11.30	17.90	2.33	15.90	25.100	129.0
ID0026310U	10.6	7.40	0.000526	1.800	37.00	10.80	17.10	1.93	15.30	25.400	110.0
ID0026531D	12.0	7.90	0.000325	1.370	3.27	0.67	1.60	0.45	0.05	0.462	13.9
ID0026531U	11.7	8.00	0.000537	1.310	3.24	0.65	1.29	0.44	0.05	0.321	13.6
ID0027154D	17.6	7.70	0.003140	4.130	31.40	11.20	92.80	16.30	50.80	106.000	141.0
ID0027154U	12.3	7.60	0.001060	3.440	41.20	13.20	36.30	5.20	15.10	35.900	191.0
ID0020036D	16.2	7.70	0.003150	3.910	23.50	8.55	33.10	10.80	18.40	28.500	115.0
ID0020699D	11.0	8.20	0.000319	3.300	5.49	0.97	3.19	0.72	0.05	0.569	21.7
ID0020699U	9.0	7.90	0.000304	3.120	6.58	1.06	3.63	0.67	0.05	0.474	23.6
ID0021849U	11.3	8.30	0.002250	3.580	53.50	19.50	38.50	4.85	18.30	45.100	204.0
ID0022012D	10.0	7.40	0.004050	4.740	3.24	0.99	2.68	1.17	0.05	0.989	15.0
ID0022012U	9.4	7.40	0.000389	4.545	3.07	0.94	2.54	1.09	0.05	0.882	15.2
ID0020711D	17.4	8.70	0.000214	1.580	3.80	0.62	1.97	0.49	0.05	0.325	16.0
ID0020711U	17.6	8.80	0.000295	1.600	3.87	0.63	2.00	0.49	0.05	0.318	17.8
ID0020249D	12.8	8.00	0.000480	2.850	63.40	28.00	35.10	10.90	39.80	49.500	255.0
ID0020249U	14.1	8.03	0.000326	1.730	50.90	26.40	26.80	6.48	28.00	40.900	233.0
ID0001198D	14.2	7.70	0.000312	1.360	75.30	71.00	23.40	10.20	34.20	11.100	474.0
ID0001198U	16.4	6.80	0.000236	0.924	75.70	66.80	21.70	10.00	39.60	9.950	478.0
ID0025585D	15.4	8.51	0.000385	2.980	47.10	41.40	33.40	4.75	111.00	46.400	230.0

Site ID	Temp (ºC)	pH (s.u.)	Cu	DOC	Ca	Mg	Na	K	SO_4	Cl	Alk
			(mg/L)								(mg $CaCO_3$/L)
ID0025585U	13.9	8.46	0.000347	2.910	40.30	41.30	34.70	4.74	88.00	49.500	239.0
ID0023825D	14.5	8.19	0.000366	2.980	41.60	44.00	33.90	5.29	77.70	37.900	228.0
ID0023825U	13.8	7.93	0.000305	3.050	41.20	43.50	33.60	5.23	69.50	37.800	240.0
ID0025143U	12.4	8.01	0.000600	2.780	70.30	23.10	15.70	2.91	56.70	15.200	228.0
ID0025194D	16.7	7.74	0.000337	1.950	85.40	35.40	35.50	13.40	47.80	38.100	350.0
ID0025194U	15.5	7.61	0.000298	1.900	86.00	35.60	36.30	13.70	49.00	39.500	350.0
ID0025143D	9.4	8.00	0.000195	0.954	66.00	16.50	3.63	1.21	77.60	2.780	155.0
ID0025569D	12.1	7.84	0.000750	2.900	47.50	16.90	17.70	4.57	17.70	14.900	195.0
ID0025569U	13.0	7.65	0.000479	2.230	48.60	16.90	16.50	4.24	17.70	13.900	201.0
ID0026085D	12.8	8.08	0.001300	2.890	10.80	7.90	8.31	1.37	87.20	64.900	288.0
ID0026085U	12.9	8.02	0.000519	2.910	57.20	40.10	39.40	8.92	97.10	56.500	278.0
ID0020133U	11.2	7.54	0.000208	1.300	40.20	10.30	13.70	2.67	19.50	11.300	128.0
ID0020133D	11.4	7.80	0.000345	1.340	39.90	10.30	14.40	2.78	19.20	12.000	128.0
ID0024988D	12.4	8.19	0.000224	1.360	40.50	10.60	14.00	2.77	31.70	11.100	134.0
ID0024988U	11.6	7.90	0.000283	1.360	40.10	10.30	13.70	2.71	33.20	11.500	125.0
ID0021822D	12.9	8.45	0.000246	1.630	88.00	34.40	36.40	13.10	57.90	45.900	366.0
ID0021822U	13.2	8.34	0.000268	1.710	86.40	32.80	45.10	16.40	52.40	49.800	386.0
ID0024422U	9.0	8.29	0.000327	0.625	34.20	6.52	4.95	0.77	12.30	3.140	111.0
ID0024422D	N/A	N/A	0.000294	N/A	34.70	6.65	5.06	0.79	12.50	3.300	108.0
ID0020061D	16.9	8.30	0.001010	2.890	59.70	23.60	32.70	5.14	68.10	31.100	213.0
ID0027928D	11.9	8.11	0.000178	0.539	34.00	5.50	4.83	0.62	0.05	1.910	103.0
ID0027928U	11.2	7.82	0.000238	0.532	31.60	4.99	4.24	0.56	0.05	2.020	106.0
ID0021211U	N/A	N/A	0.000551	2.990	29.80	7.54	5.64	1.45	11.00	2.950	111.0
ID0021211D	N/A	N/A	0.000560	3.160	30.20	7.59	5.68	1.79	10.90	3.240	108.0
ID0020940U	N/A	N/A	0.000403	2.120	40.40	14.70	17.20	3.65	42.30	16.200	136.0
ID0020940D	N/A	N/A	0.000385	2.080	38.10	14.10	18.50	3.55	41.30	18.100	144.0
ID0027120D	16.3	5.48	0.000487	2.350	36.10	13.30	15.40	3.58	40.60	15.900	127.0
ID0027120U	17.3	6.38	0.000518	2.390	36.70	13.40	15.30	3.52	40.30	15.700	120.0

Site ID	Temp (ºC)	pH (s.u.)	Cu	DOC	Ca	Mg	Na	K	SO_4	Cl	Alk
			(mg/L)								(mg $CaCO_3$/L)
ID0020061U	16.9	8.21	0.000966	N/A	56.90	23.30	31.60	5.31	79.50	29.800	209.0
ID0024422D2	9.5	8.17	N/A	0.675	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ID0000388D	15.8	6.23	0.000844	2.280	66.50	23.40	31.80	6.05	97.10	34.400	213.0
ID0000388U	15.7	6.05	0.000665	2.270	67.10	22.70	31.00	6.19	94.80	33.400	224.0
ID0023728D	17.8	6.71	0.000732	2.250	33.70	13.80	15.40	3.57	41.70	16.100	127.0
ID0023728U	17.7	6.67	0.000574	2.130	37.20	13.80	15.60	3.59	41.40	15.900	126.0
ID0020753U	N/A	N/A	0.000382	1.680	42.30	13.20	16.70	3.24	39.90	15.900	143.0
ID0020753D	13.1	8.41	0.000315	***1.384***	42.90	13.70	17.30	3.43	40.00	16.700	140.0
ID0022047D	10.8	8.47	0.000582	3.270	70.50	25.90	26.30	9.61	24.20	67.000	265.0
ID0022047U	10.4	9.44	0.000751	4.090	75.90	26.60	45.20	18.70	40.40	104.000	258.0

Note: N/A = parameter not analyzed
DOC values in ***bold*** are blank-corrected values

Table B-3. Site ID's and associated field blank Sample ID.

Site ID	Blank Site ID	Sample Date
ID0020036U	ID0021016U	9/25/2016
ID0027952D	ID0021016U	9/28/2016
ID0027952U	ID0021016U	9/28/2016
ID0020427U	ID0021016U	9/29/2016
ID0021016D	ID0021016U	9/29/2016
ID0021016U	ID0021016U	9/29/2016
ID0021202D	ID0021016U	9/29/2016
ID0021202U	ID0021016U	9/29/2016
ID0001155D	ID0021024D	10/4/2016
ID0001155U	ID0021024D	10/4/2016
ID0020087D	ID0021024D	10/4/2016
ID0020087U	ID0021024D	10/4/2016

Site ID	Blank Site ID	Sample Date
ID0021806D	ID0021024D	10/4/2016
ID0021806U	ID0021024D	10/4/2016
ID0020311D	ID0021024D	10/5/2016
ID0020311U	ID0021024D	10/5/2016
ID0021024D	ID0021024D	10/5/2016
ID0021024U	ID0021024D	10/5/2016
ID0021831D	ID0021024D	10/5/2016
ID0021831U	ID0021024D	10/5/2016
ID0025488D	ID0025488D	10/13/2016
ID0025488U	ID0025488D	10/13/2016
ID0028312D	ID0025488D	10/13/2016
ID0028312U	ID0025488D	10/13/2016
ID0021776D	ID0022004U	10/18/2016
ID0021776U	ID0022004U	10/18/2016
ID0026964D	ID0022004U	10/18/2016
ID0026964U	ID0022004U	10/18/2016
ID0027383D	ID0022004U	10/18/2016
ID0027383U	ID0022004U	10/18/2016
ID0028355D	ID0022004U	10/18/2016
ID0028355U	ID0022004U	10/18/2016
ID0020231D	ID0022004U	10/19/2016
ID0020231U	ID0022004U	10/19/2016
ID0023167D	ID0022004U	10/19/2016
ID0023167U	ID0022004U	10/19/2016
ID0022004D	ID0022004U	10/20/2016
ID0022004U	ID0022004U	10/20/2016
ID0000213D	ID0020338U	10/25/2016
ID0000213U	ID0020338U	10/25/2016
ID0020338D	ID0020338U	10/25/2016
ID0020338U	ID0020338U	10/25/2016

Site ID	Blank Site ID	Sample Date
ID0020389D	ID0020338U	10/25/2016
ID0020389U	ID0020338U	10/25/2016
ID0020427D	ID0020338U	10/25/2016
ID0021199D	ID0020338U	10/25/2016
ID0021199U	ID0020338U	10/25/2016
ID0027979D	ID0020338U	10/26/2016
ID0027979U	ID0020338U	10/26/2016
ID0023159D	ID0022012U	10/19/2016
ID0023159U	ID0022012U	10/19/2016
ID0000060D	ID0020567D	10/4/2016
ID0000060U	ID0020567D	10/4/2016
ID0000159D	ID0020567D	10/4/2016
ID0000159U	ID0020567D	10/4/2016
ID0000167D	ID0020567D	10/4/2016
ID0000167U	ID0020567D	10/4/2016
ID0020567D	ID0020567D	10/4/2016
ID0020567U	ID0020567D	10/4/2016
ID0021296D	ID0020567D	10/4/2016
ID0021296U	ID0020567D	10/4/2016
ID0025429D	ID0020567D	10/4/2016
ID0025429U	ID0020567D	10/4/2016
ID0020117D	ID0020567D	10/5/2016
ID0020117U	ID0020567D	10/5/2016
ID0022071D	ID0020567D	10/5/2016
ID0022071U	ID0020567D	10/5/2016
ID0022845D	ID0020567D	10/6/2016
ID0022845U	ID0020567D	10/6/2016
ID0025071D	ID0020567D	10/6/2016
ID0025071U	ID0020567D	10/6/2016
ID0024627D	ID0024350D	10/19/2016

Site ID	Blank Site ID	Sample Date
ID0020681D	ID0024350D	10/25/2016
ID0020681U	ID0024350D	10/25/2016
ID0020800D	ID0024350D	10/25/2016
ID0020800U	ID0024350D	10/25/2016
ID0021229D	ID0024350D	10/25/2016
ID0027944D	ID0024350D	10/25/2016
ID0027944U	ID0024350D	10/25/2016
ID0020222D	ID0024350D	10/26/2016
ID0020222U	ID0024350D	10/26/2016
ID0020451D	ID0024350D	10/26/2016
ID0020451U	ID0024350D	10/26/2016
ID0024350D	ID0024350D	10/26/2016
ID0024350U	ID0024350D	10/26/2016
ID0021229D2	ID0021229D2	10/27/2016
ID0021229U	ID0021229D2	10/27/2016
ID0027995D	ID0021229D2	10/27/2016
ID0027995U	ID0021229D2	10/27/2016
ID0028321D	ID0020133D	9/13/2016
PantherCKD	ID0020133D	9/13/2016
PantherCKD2	ID0020133D	9/13/2016
PantherCKU	ID0020133D	9/13/2016
PantherCKU2	ID0020133D	9/13/2016
SFDeerCKD	ID0020133D	9/13/2016
SFDeerCKU	ID0020133D	9/13/2016
ID0020001D	ID0020133D	9/14/2016
ID0020001U	ID0020133D	9/14/2016
ID0020249D	ID0020133D	9/15/2016
ID0020249U	ID0020133D	9/15/2016
ID0023027U	ID0020133D	9/16/2016
ID0028321U	ID0020133D	9/16/2016

Site ID	Blank Site ID	Sample Date
ID0020010D	ID0020133D	9/19/2016
ID0020010U	ID0020133D	9/19/2016
ID0020401D	ID0020133D	9/19/2016
ID0020401U	ID0020133D	9/19/2016
ID0026913D	ID0020133D	9/19/2016
ID0026913U	ID0020133D	9/19/2016
ID0001198D	ID0020133D	9/19/2016
ID0001198U	ID0020133D	9/19/2016
ID0025585D	ID0020133D	9/19/2016
ID0025585U	ID0020133D	9/19/2016
ID0020737D	ID0023604U	9/6/2016
ID0020737U	ID0023604U	9/6/2016
ID0020931D	ID0023604U	9/6/2016
ID0020931U	ID0023604U	9/6/2016
ID0026077D	ID0023604U	9/6/2016
ID0026077U	ID0023604U	9/6/2016
ID0020362D	ID0023604U	9/7/2016
ID0020362U	ID0023604U	9/7/2016
ID0020532D	ID0023604U	9/7/2016
ID0020532U	ID0023604U	9/7/2016
ID0020788D	ID0023604U	9/7/2016
ID0022861D	ID0023604U	9/7/2016
ID0022861U	ID0023604U	9/7/2016
ID0023761D	ID0023604U	9/7/2016
ID0023761U	ID0023604U	9/7/2016
ID0024554D	ID0023604U	9/7/2016
ID0024554U	ID0023604U	9/7/2016
ID0020206D	ID0023604U	9/8/2016
ID0020206U	ID0023604U	9/8/2016
ID0020354D	ID0023604U	9/8/2016

Site ID	Blank Site ID	Sample Date
ID0020354U	ID0023604U	9/8/2016
ID0020893D	ID0023604U	9/8/2016
ID0020893U	ID0023604U	9/8/2016
ID0023914D	ID0023604U	9/8/2016
ID0023914U	ID0023604U	9/8/2016
ID0020125D	ID0023604U	9/9/2016
ID0020125U	ID0023604U	9/9/2016
ID0023604D	ID0023604U	9/9/2016
ID0023604U	ID0023604U	9/9/2016
ID0022501D	ID0022501U	9/12/2016
ID0022501U	ID0022501U	9/12/2016
ID0025607U	ID0022501U	9/12/2016
ID0026310D	ID0022501U	9/12/2016
ID0026310U	ID0022501U	9/12/2016
ID0026531D	ID0022501U	9/12/2016
ID0026531U	ID0022501U	9/12/2016
ID0027154D	ID0022501U	9/12/2016
ID0027154U	ID0022501U	9/12/2016
ID0020036D	ID0022012U	9/25/2016
ID0020699D	ID0022012U	9/25/2016
ID0020699U	ID0022012U	9/25/2016
ID0021849U	ID0022012U	9/25/2016
ID0022012D	ID0022012U	9/25/2016
ID0022012U	ID0022012U	9/25/2016
ID0020711D	ID0022012U	10/5/2016
ID0020711U	ID0022012U	10/5/2016
ID0020141D	ID0020133D	9/21/2016
ID0020141U	ID0020133D	9/21/2016
ID0023710D	ID0020133D	9/21/2016
ID0023710D2	ID0020133D	9/21/2016

Site ID	Blank Site ID	Sample Date
ID0023027D	ID0020133D	9/26/2016
ID0023825D	ID0020133D	9/26/2016
ID0023825U	ID0020133D	9/26/2016
ID0025143D	ID0020133D	9/26/2016
ID0025143U	ID0020133D	9/26/2016
ID0025194D	ID0020133D	9/26/2016
ID0025194U	ID0020133D	9/26/2016
ID0025569D	ID0020133D	10/3/2016
ID0025569U	ID0020133D	10/3/2016
ID0026085D	ID0020133D	10/3/2016
ID0026085U	ID0020133D	10/3/2016
ID0020133D	ID0020133D	10/10/2016
ID0020133U	ID0020133U	10/10/2016
ID0024988D	ID0024988D	10/10/2016
ID0024988U	ID0024988U	10/10/2016
ID0021822D	ID0021822D	10/25/2016
ID0021822U	ID0021822U	10/25/2016
ID0024422D	ID0020753D	9/6/2016
ID0024422U	ID0020753D	9/6/2016
ID0020061D	ID0020753D	9/8/2016
ID0027928D	ID0020753D	9/8/2016
ID0027928U	ID0020753D	9/8/2016
ID0020940D	ID0020753D	9/12/2016
ID0020940U	ID0020753D	9/12/2016
ID0021211D	ID0020753D	9/12/2016
ID0021211U	ID0020753D	9/12/2016
ID0020061U	ID0020753D	9/19/2016
ID0024422D2	ID0020753D	9/19/2016
ID0027120D	ID0020753D	9/19/2016
ID0027120U	ID0020753D	9/19/2016

Site ID	Blank Site ID	Sample Date
ID0000388D	ID0020753D	9/20/2016
ID0000388U	ID0020753D	9/20/2016
ID0023728D	ID0020753D	9/20/2016
ID0023728U	ID0020753D	9/20/2016
ID0020753D	ID0020753D	10/10/2016
ID0020753U	ID0020753U	10/10/2016
ID0022047D	ID0022047D	10/25/2016
ID0022047U	ID0022047D	10/25/2016

Table B-4. Field duplicate results.

Site ID	Cu	DOC	Ca	Mg	Na	K	SO_4	Cl	Alk (mg $CaCO_3$/L)
	(mg/L)								
ID0027952D	0.00187	NA	13.8	2.2	6.12	1.24	0.0	2.53	50
ID0001155D	0.00081	NA	38.7	16.0	31.70	5.76	48.5	18.90	163
ID0021831U	0.00080	NA	18.4	3.5	14.10	1.97	11.9	9.09	71
ID0027383U	0.00203	NA	53.0	16.0	43.90	6.25	62.1	21.60	236
ID0028355D	0.00149	NA	51.2	17.2	31.70	6.67	43.0	12.70	224
ID0023167U	0.00035	NA	3.0	0.6	2.50	0.64	0.0	1.41	16
ID0020389U	0.00036	NA	14.7	2.4	9.74	1.32	0.0	1.91	65
ID0022501U	0.00058	3.18	7.7	2.3	4.30	2.02	0.0	2.16	27
ID0020133U	0.00021	1.32	40.5	10.4	13.70	2.70	18.9	10.80	127
ID0020133D	0.00026	1.37	39.8	10.3	14.40	2.79	18.3	11.20	125
ID0024988D	0.00022	1.39	39.1	10.2	13.70	2.66	19.6	11.10	123
ID0024988U	0.00025	1.33	40.2	10.4	13.70	2.71	32.5	11.30	127
ID0021822D	0.00030	1.59	86.1	33.9	35.60	13.40	56.1	45.00	400

ID0020753U	0.00032	1.66	43.5	13.7	17.20	3.39	40.2	16.00	147
ID0020753D	0.00030	1.60	42.9	13.7	17.20	3.41	40.4	16.80	141

Note: NA = no field duplicate collected at the site.

Appendix C. Biotic Ligand Model Inputs and Criteria Outputs

Site ID	Sample Label	Final Acute Value (FAV), µg/L	CMC (CMC=FAV/2), µg/L	CCC (CCC=FAV/ACR), µg/L	Cu µg/L	Acute Toxic Units (Acute TU=Cu/CMC)	Chronic Toxic Units (Chronic TU=Cu/CCC)	Censored Flag (0 = quantified, 1 = below reporting limit)
ID0020036U	9/25/2016	26.59	13.30	8.26	0.81	0.06	0.10	0
ID0027952D	9/28/2016	42.11	21.05	13.08	1.95	0.09	0.15	0
ID0027952U	9/28/2016	62.38	31.19	19.37	1.96	0.06	0.10	0
ID0020427U	9/29/2016	36.46	18.23	11.32	0.43	0.02	0.04	0
ID0021016D	9/29/2016	51.56	25.78	16.01	0.96	0.04	0.06	0
ID0021016U	9/29/2016	46.11	23.05	14.32	1.11	0.05	0.08	0
ID0021202D	9/29/2016	1.93	0.96	0.60	0.37	0.38	0.62	0
ID0021202U	9/29/2016	35.02	17.51	10.88	0.42	0.02	0.04	0
ID0001155D	10/4/2016	49.94	24.97	15.51	0.83	0.03	0.05	0
ID0001155U	10/4/2016	49.85	24.92	15.48	0.67	0.03	0.04	0
ID0020087D	10/4/2016	41.54	20.77	12.90	0.70	0.03	0.05	0
ID0020087U	10/4/2016	40.39	20.20	12.54	0.69	0.03	0.06	0
ID0021806D	10/4/2016	34.82	17.41	10.81	0.77	0.04	0.07	0
ID0021806U	10/4/2016	37.46	18.73	11.63	0.75	0.04	0.06	0
ID0020311D	10/5/2016	31.32	15.66	9.73	0.23	0.02	0.02	0
ID0020311U	10/5/2016	26.72	13.36	8.30	0.23	0.02	0.03	0
ID0021024D	10/5/2016	22.06	11.03	6.85	0.20	0.02	0.03	0
ID0021024U	10/5/2016	22.57	11.29	7.01	0.19	0.02	0.03	0
ID0021831D	10/5/2016	29.01	14.50	9.01	0.93	0.06	0.10	0
ID0021831U	10/5/2016	33.52	16.76	10.41	0.77	0.05	0.07	0
ID0025488D	10/13/2016	20.45	10.22	6.35	0.23	0.02	0.04	0
ID0025488U	10/13/2016	20.20	10.10	6.27	0.30	0.03	0.05	0
ID0028312D	10/13/2016	16.19	8.10	5.03	0.20	0.02	0.04	0
ID0028312U	10/13/2016	15.63	7.81	4.85	0.24	0.03	0.05	0

Site ID	Sample Label	Final Acute Value (FAV), µg/L	CMC (CMC=FAV/2), µg/L	CCC (CCC=FAV/ACR), µg/L	Cu µg/L	Acute Toxic Units (Acute TU=Cu/CMC)	Chronic Toxic Units (Chronic TU=Cu/CCC)	Censored Flag (0 = quantified, 1 = below reporting limit)
ID0021776D	10/18/2016	42.35	21.18	13.15	2.01	0.09	0.15	0
ID0021776U	10/18/2016	39.54	19.77	12.28	2.77	0.14	0.23	0
ID0026964D	10/18/2016	51.85	25.92	16.10	2.07	0.08	0.13	0
ID0026964U	10/18/2016	38.99	19.50	12.11	1.31	0.07	0.11	0
ID0027383D	10/18/2016	41.30	20.65	12.83	1.12	0.05	0.09	0
ID0027383U	10/18/2016	40.78	20.39	12.66	1.24	0.06	0.10	0
ID0028355D	10/18/2016	58.98	29.49	18.32	1.53	0.05	0.08	0
ID0028355U	10/18/2016	73.03	36.52	22.68	2.12	0.06	0.09	0
ID0020231D	10/19/2016	29.39	14.69	9.13	0.27	0.02	0.03	0
ID0020231U	10/19/2016	18.67	9.33	5.80	0.24	0.03	0.04	0
ID0023167D	10/19/2016	35.14	17.57	10.91	0.35	0.02	0.03	0
ID0023167U	10/19/2016	31.49	15.75	9.78	0.36	0.02	0.04	0
ID0022004D	10/20/2016	25.88	12.94	8.04	0.55	0.04	0.07	0
ID0022004U	10/20/2016	26.08	13.04	8.10	0.55	0.04	0.07	0
ID0000213D	10/25/2016	28.53	14.26	8.86	0.42	0.03	0.05	0
ID0000213U	10/25/2016	26.41	13.20	8.20	0.41	0.03	0.05	0
ID0020338D	10/25/2016	38.56	19.28	11.97	0.49	0.03	0.04	0
ID0020338U	10/25/2016	41.02	20.51	12.74	0.52	0.03	0.04	0
ID0020389D	10/25/2016	22.11	11.05	6.87	0.39	0.04	0.06	0
ID0020389U	10/25/2016	25.06	12.53	7.78	0.38	0.03	0.05	0
ID0020427D	10/25/2016	35.89	17.95	11.15	0.49	0.03	0.04	0
ID0021199D	10/25/2016	27.31	13.66	8.48	0.39	0.03	0.05	0
ID0021199U	10/25/2016	24.17	12.09	7.51	0.38	0.03	0.05	0
ID0027979D	10/26/2016	18.66	9.33	5.79	0.20	0.02	0.03	0
ID0027979U	10/26/2016	13.91	6.95	4.32	0.16	0.02	0.04	0
ID0023159D	10/19/2016	46.12	23.06	14.32	1.08	0.05	0.08	0

Site ID	Sample Label	Final Acute Value (FAV), µg/L	CMC (CMC=FAV/2), µg/L	CCC (CCC=FAV/ACR), µg/L	Cu µg/L	Acute Toxic Units (Acute TU=Cu/CMC)	Chronic Toxic Units (Chronic TU=Cu/CCC)	Censored Flag (0 = quantified, 1 = below reporting limit)
ID0023159U	10/19/2016	55.54	27.77	17.25	1.45	0.05	0.08	0
ID0000060D	10/4/2016	4.21	2.10	1.31	0.62	0.30	0.48	0
ID0000060U	10/4/2016	2.62	1.31	0.81	0.55	0.42	0.67	0
ID0000159D	10/4/2016	4.03	2.01	1.25	0.57	0.28	0.46	0
ID0000159U	10/4/2016	3.11	1.56	0.97	0.60	0.38	0.62	0
ID0000167D	10/4/2016	1.99	1.00	0.62	0.32	0.32	0.52	0
ID0000167U	10/4/2016	0.78	0.39	0.24	0.25	0.64	1.04	0
ID0020567D	10/4/2016	1.96	0.98	0.61	0.22	0.22	0.36	0
ID0020567U	10/4/2016	1.76	0.88	0.55	0.11	0.13	0.20	0
ID0021296D	10/4/2016	3.21	1.60	1.00	0.74	0.46	0.74	0
ID0021296U	10/4/2016	3.85	1.93	1.20	1.01	0.52	0.84	0
ID0025429D	10/4/2016	3.98	1.99	1.24	0.57	0.29	0.46	0
ID0025429U	10/4/2016	3.56	1.78	1.11	0.49	0.28	0.44	0
ID0020117D	10/5/2016	2.70	1.35	0.84	0.62	0.46	0.74	0
ID0020117U	10/5/2016	3.47	1.73	1.08	0.57	0.33	0.53	0
ID0022071D	10/5/2016	3.22	1.61	1.00	0.48	0.30	0.48	0
ID0022071U	10/5/2016	4.50	2.25	1.40	0.58	0.26	0.42	0
ID0022845D	10/6/2016	19.07	9.54	5.92	0.31	0.03	0.05	0
ID0022845U	10/6/2016	28.50	14.25	8.85	0.25	0.02	0.03	0
ID0025071D	10/6/2016	22.36	11.18	6.95	0.50	0.04	0.07	0
ID0025071U	10/6/2016	26.57	13.29	8.25	0.38	0.03	0.05	0
ID0024627D	10/19/2016	15.17	7.58	4.71	0.49	0.06	0.10	0
ID0020681D	10/25/2016	19.91	9.95	6.18	0.52	0.05	0.08	0
ID0020681U	10/25/2016	19.43	9.72	6.04	0.61	0.06	0.10	0
ID0020800D	10/25/2016	16.76	8.38	5.21	0.29	0.03	0.06	0
ID0020800U	10/25/2016	12.18	6.09	3.78	0.13	0.02	0.03	0

Site ID	Sample Label	Final Acute Value (FAV), µg/L	CMC (CMC=FAV/2), µg/L	CCC (CCC=FAV/ACR), µg/L	Cu µg/L	Acute Toxic Units (Acute TU=Cu/CMC)	Chronic Toxic Units (Chronic TU=Cu/CCC)	Censored Flag (0 = quantified, 1 = below reporting limit)
ID0021229D	10/25/2016	69.87	34.93	21.70	0.82	0.02	0.04	0
ID0027944D	10/25/2016	22.22	11.11	6.90	0.66	0.06	0.10	0
ID0027944U	10/25/2016	24.41	12.20	7.58	0.56	0.05	0.07	0
ID0020222D	10/26/2016	21.30	10.65	6.61	0.31	0.03	0.05	0
ID0020222U	10/26/2016	22.29	11.15	6.92	0.33	0.03	0.05	0
ID0020451D	10/26/2016	23.62	11.81	7.33	0.32	0.03	0.04	0
ID0024350D	10/26/2016	9.52	4.76	2.96	0.24	0.05	0.08	0
ID0024350U	10/26/2016	40.40	20.20	12.55	0.13	0.01	0.01	0
ID0021229D2	10/27/2016	80.80	40.40	25.09	1.52	0.04	0.06	0
ID0021229U	10/27/2016	72.91	36.45	22.64	1.56	0.04	0.07	0
ID0027995D	10/27/2016	15.57	7.79	4.84	0.42	0.05	0.09	0
ID0027995U	10/27/2016	20.80	10.40	6.46	0.43	0.04	0.07	0
ID0028321D	9/13/2016	5.18	2.59	1.61	2.86	1.10	1.78	0
PantherCKD	9/13/2016	19.18	9.59	5.96	0.51	0.05	0.09	0
PantherCKD2	9/13/2016	27.86	13.93	8.65	0.95	0.07	0.11	0
PantherCKU	9/13/2016	20.47	10.24	6.36	0.38	0.04	0.06	0
PantherCKU2	9/13/2016	28.14	14.07	8.74	0.67	0.05	0.08	0
SFDeerCKD	9/13/2016	7.86	3.93	2.44	6.65	1.69	2.73	0
SFDeerCKU	9/13/2016	8.03	4.02	2.49	0.71	0.18	0.28	0
ID0020001D	9/14/2016	38.13	19.07	11.84	0.32	0.02	0.03	0
ID0020001U	9/14/2016	34.24	17.12	10.63	0.35	0.02	0.03	0
ID0023027U	9/16/2016	15.26	7.63	4.74	0.62	0.08	0.13	0
ID0028321U	9/16/2016	7.03	3.51	2.18	2.42	0.69	1.11	0
ID0020010D	9/19/2016	24.64	12.32	7.65	0.23	0.02	0.03	0
ID0020010U	9/19/2016	21.81	10.90	6.77	0.26	0.02	0.04	0
ID0020401D	9/19/2016	19.79	9.89	6.15	0.16	0.02	0.03	0

Site ID	Sample Label	Final Acute Value (FAV), µg/L	CMC (CMC=FAV/2), µg/L	CCC (CCC=FAV/ACR), µg/L	Cu µg/L	Acute Toxic Units (Acute TU=Cu/CMC)	Chronic Toxic Units (Chronic TU=Cu/CCC)	Censored Flag (0 = quantified, 1 = below reporting limit)
ID0020401U	9/19/2016	18.05	9.02	5.61	0.22	0.02	0.04	0
ID0026913D	9/19/2016	77.39	38.70	24.04	0.87	0.02	0.04	0
ID0026913U	9/19/2016	8.84	4.42	2.74	0.32	0.07	0.12	0
ID0020141D	9/21/2016	33.92	16.96	10.53	1.61	0.09	0.15	0
ID0020141U	9/21/2016	6.34	3.17	1.97	0.10	0.03	0.05	0
ID0023027D	9/26/2016	19.85	9.92	6.16	0.34	0.03	0.05	0
ID0020737D	9/6/2016	22.78	11.39	7.07	0.31	0.03	0.04	0
ID0020737U	9/6/2016	20.79	10.40	6.46	0.35	0.03	0.05	0
ID0020931D	9/6/2016	20.28	10.14	6.30	0.30	0.03	0.05	0
ID0020931U	9/6/2016	22.35	11.18	6.94	0.44	0.04	0.06	0
ID0026077D	9/6/2016	9.26	4.63	2.87	0.18	0.04	0.06	0
ID0026077U	9/6/2016	10.87	5.44	3.38	0.22	0.04	0.06	0
ID0020362D	9/7/2016	15.27	7.64	4.74	0.25	0.03	0.05	0
ID0020362U	9/7/2016	55.63	27.82	17.28	0.29	0.01	0.02	0
ID0020532D	9/7/2016	30.41	15.21	9.44	0.43	0.03	0.05	0
ID0020532U	9/7/2016	63.93	31.97	19.85	0.54	0.02	0.03	0
ID0020788D	9/7/2016	12.21	6.11	3.79	0.33	0.05	0.09	0
ID0022861D	9/7/2016	20.19	10.09	6.27	0.49	0.05	0.08	0
ID0022861U	9/7/2016	25.18	12.59	7.82	0.32	0.03	0.04	0
ID0023761D	9/7/2016	28.65	14.33	8.90	0.62	0.04	0.07	0
ID0023761U	9/7/2016	25.29	12.64	7.85	0.66	0.05	0.08	0
ID0024554D	9/7/2016	22.12	11.06	6.87	0.75	0.07	0.11	0
ID0024554U	9/7/2016	46.67	23.33	14.49	0.67	0.03	0.05	0
ID0020206D	9/8/2016	17.64	8.82	5.48	0.26	0.03	0.05	0
ID0020206U	9/8/2016	16.33	8.17	5.07	0.22	0.03	0.04	0
ID0020354D	9/8/2016	46.18	23.09	14.34	0.59	0.03	0.04	0

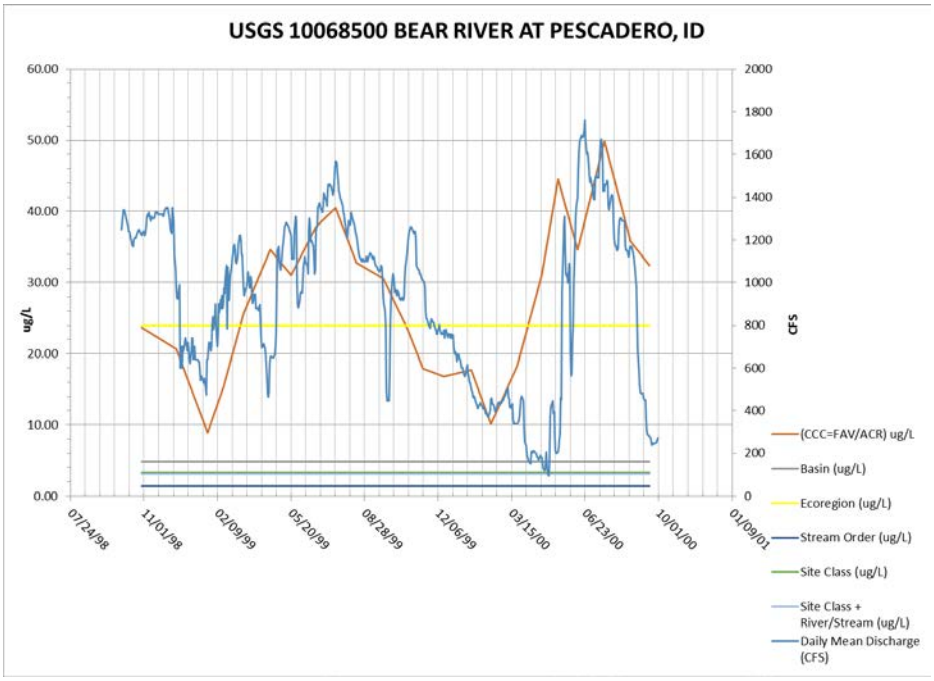
Site ID	Sample Label	Final Acute Value (FAV), µg/L	CMC (CMC=FAV/2), µg/L	CCC (CCC=FAV/ACR), µg/L	Cu µg/L	Acute Toxic Units (Acute TU=Cu/CMC)	Chronic Toxic Units (Chronic TU=Cu/CCC)	Censored Flag (0 = quantified, 1 = below reporting limit)
ID0020354U	9/8/2016	58.28	29.14	18.10	1.25	0.04	0.07	0
ID0020893D	9/8/2016	20.19	10.10	6.27	0.21	0.02	0.03	0
ID0020893U	9/8/2016	30.48	15.24	9.47	0.24	0.02	0.03	0
ID0023914D	9/8/2016	16.31	8.15	5.06	0.33	0.04	0.07	0
ID0023914U	9/8/2016	17.25	8.62	5.36	0.34	0.04	0.06	0
ID0020125D	9/9/2016	22.30	11.15	6.93	0.46	0.04	0.07	0
ID0020125U	9/9/2016	43.28	21.64	13.44	1.46	0.07	0.11	0
ID0023604D	9/9/2016	106.79	53.39	33.16	6.12	0.11	0.18	0
ID0023604U	9/9/2016	8.48	4.24	2.63	0.74	0.17	0.28	0
ID0022501D	9/12/2016	27.12	13.56	8.42	0.59	0.04	0.07	0
ID0022501U	9/12/2016	37.71	18.86	11.71	0.59	0.03	0.05	0
ID0025607U	9/12/2016	13.01	6.50	4.04	0.35	0.05	0.09	0
ID0026310D	9/12/2016	22.64	11.32	7.03	0.63	0.06	0.09	0
ID0026310U	9/12/2016	13.77	6.89	4.28	0.53	0.08	0.12	0
ID0026531D	9/12/2016	16.58	8.29	5.15	0.32	0.04	0.06	0
ID0026531U	9/12/2016	17.44	8.72	5.42	0.54	0.06	0.10	0
ID0027154D	9/12/2016	58.81	29.41	18.26	3.14	0.11	0.17	0
ID0027154U	9/12/2016	36.43	18.21	11.31	1.06	0.06	0.09	0
ID0020036D	9/25/2016	44.65	22.32	13.87	3.15	0.14	0.23	0
ID0020699D	9/25/2016	50.92	25.46	15.81	0.32	0.01	0.02	0
ID0020699U	9/25/2016	35.92	17.96	11.16	0.30	0.02	0.03	0
ID0021849U	9/25/2016	75.45	37.72	23.43	2.25	0.06	0.10	0
ID0022012D	9/25/2016	33.34	16.67	10.35	4.05	0.24	0.39	0
ID0022012U	9/25/2016	32.06	16.03	9.96	0.39	0.02	0.04	0
ID0020711D	10/5/2016	37.81	18.90	11.74	0.21	0.01	0.02	0
ID0020711U	10/5/2016	40.77	20.39	12.66	0.29	0.01	0.02	0

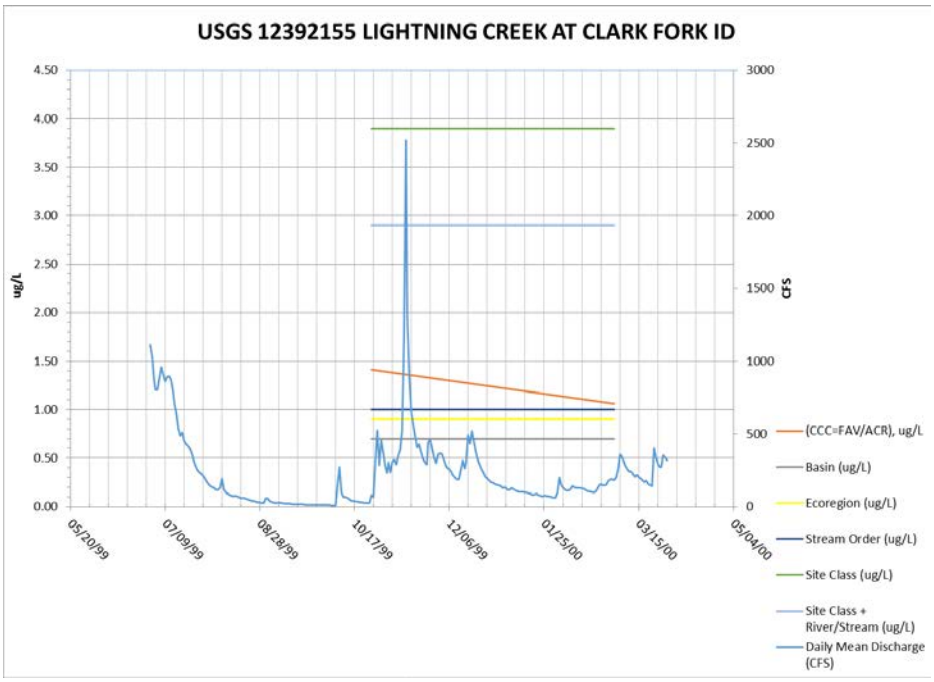
Site ID	Sample Label	Final Acute Value (FAV), µg/L	CMC (CMC=FAV/2), µg/L	CCC (CCC=FAV/ACR), µg/L	Cu µg/L	Acute Toxic Units (Acute TU=Cu/CMC)	Chronic Toxic Units (Chronic TU=Cu/CCC)	Censored Flag (0 = quantified, 1 = below reporting limit)
ID0020249D	9/15/2016	49.80	24.90	15.47	0.48	0.02	0.03	0
ID0020249U	9/15/2016	31.39	15.70	9.75	0.33	0.02	0.03	0
ID0001198D	9/19/2016	25.81	12.90	8.02	0.31	0.02	0.04	0
ID0001198U	9/19/2016	9.78	4.89	3.04	0.24	0.05	0.08	0
ID0025585D	9/19/2016	84.19	42.09	26.14	0.38	0.01	0.01	0
ID0025585U	9/19/2016	76.44	38.22	23.74	0.35	0.01	0.01	0
ID0023825D	9/26/2016	63.59	31.80	19.75	0.37	0.01	0.02	0
ID0023825U	9/26/2016	50.72	25.36	15.75	0.31	0.01	0.02	0
ID0025143D	9/26/2016	14.77	7.38	4.59	0.19	0.03	0.04	0
ID0025143U	9/26/2016	45.72	22.86	14.20	0.60	0.03	0.04	0
ID0025194D	9/26/2016	31.63	15.82	9.82	0.34	0.02	0.03	0
ID0025194U	9/26/2016	26.83	13.42	8.33	0.30	0.02	0.04	0
ID0025569D	10/3/2016	38.19	19.09	11.86	0.75	0.04	0.06	0
ID0025569U	10/3/2016	24.62	12.31	7.65	0.48	0.04	0.06	0
ID0026085D	10/3/2016	37.65	18.82	11.69	1.30	0.07	0.11	0
ID0026085U	10/3/2016	53.35	26.67	16.57	0.52	0.02	0.03	0
ID0020133D	10/10/2016	16.21	8.11	5.03	0.35	0.04	0.07	0
ID0020133U	10/10/2016	11.89	5.94	3.69	0.21	0.03	0.06	0
ID0024988D	10/10/2016	23.83	11.92	7.40	0.22	0.02	0.03	0
ID0024988U	10/10/2016	18.00	9.00	5.59	0.28	0.03	0.05	0
ID0021822D	10/25/2016	49.80	24.90	15.47	0.25	0.01	0.02	0
ID0021822U	10/25/2016	48.53	24.26	15.07	0.27	0.01	0.02	0
ID0024422U	9/6/2016	10.93	5.47	3.39	0.33	0.06	0.10	0
ID0020061D	9/8/2016	68.33	34.16	21.22	1.01	0.03	0.05	0
ID0027928D	9/8/2016	8.52	4.26	2.65	0.18	0.04	0.07	0
ID0027928U	9/8/2016	6.25	3.12	1.94	0.24	0.08	0.12	0

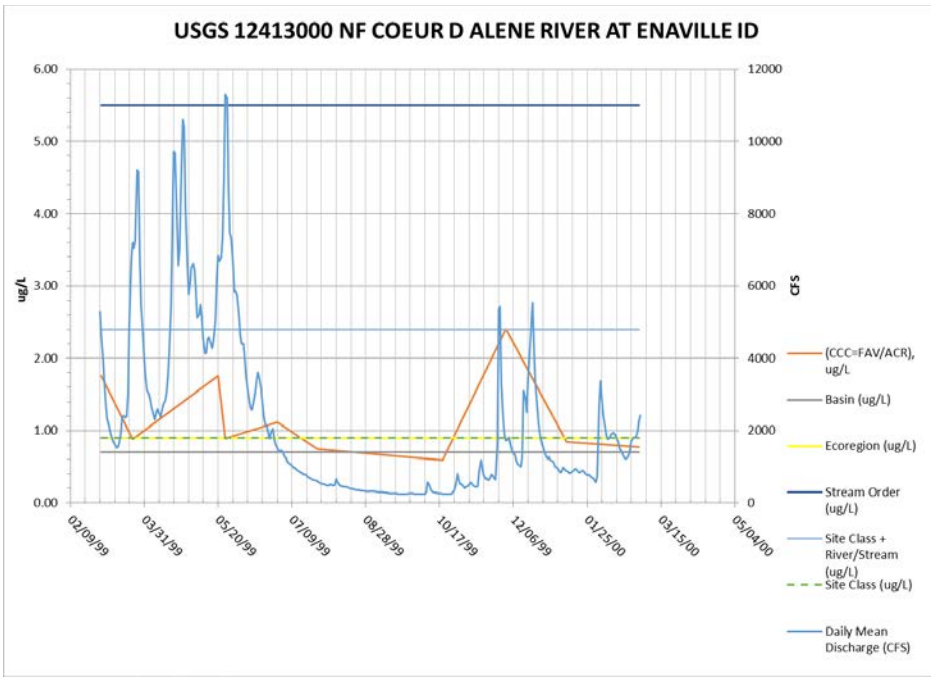
Site ID	Sample Label	Final Acute Value (FAV), µg/L	CMC (CMC=FAV/2), µg/L	CCC (CCC=FAV/ACR), µg/L	Cu µg/L	Acute Toxic Units (Acute TU=Cu/CMC)	Chronic Toxic Units (Chronic TU=Cu/CCC)	Censored Flag (0 = quantified, 1 = below reporting limit)
ID0027120D	9/19/2016	1.13	0.56	0.35	0.49	0.87	1.39	0
ID0027120U	9/19/2016	4.22	2.11	1.31	0.52	0.25	0.40	0
ID0000388D	9/20/2016	4.74	2.37	1.47	0.84	0.36	0.57	0
ID0000388U	9/20/2016	3.82	1.91	1.19	0.67	0.35	0.56	0
ID0023728D	9/20/2016	6.77	3.39	2.10	0.73	0.22	0.35	0
ID0023728U	9/20/2016	6.16	3.08	1.91	0.57	0.19	0.30	0
ID0020753D	10/10/2016	30.42	15.21	9.45	0.32	0.02	0.03	0
ID0022047D	10/25/2016	79.35	39.67	24.64	0.58	0.01	0.02	0
ID0022047U	10/25/2016	168.07	84.04	52.20	0.75	0.01	0.01	0

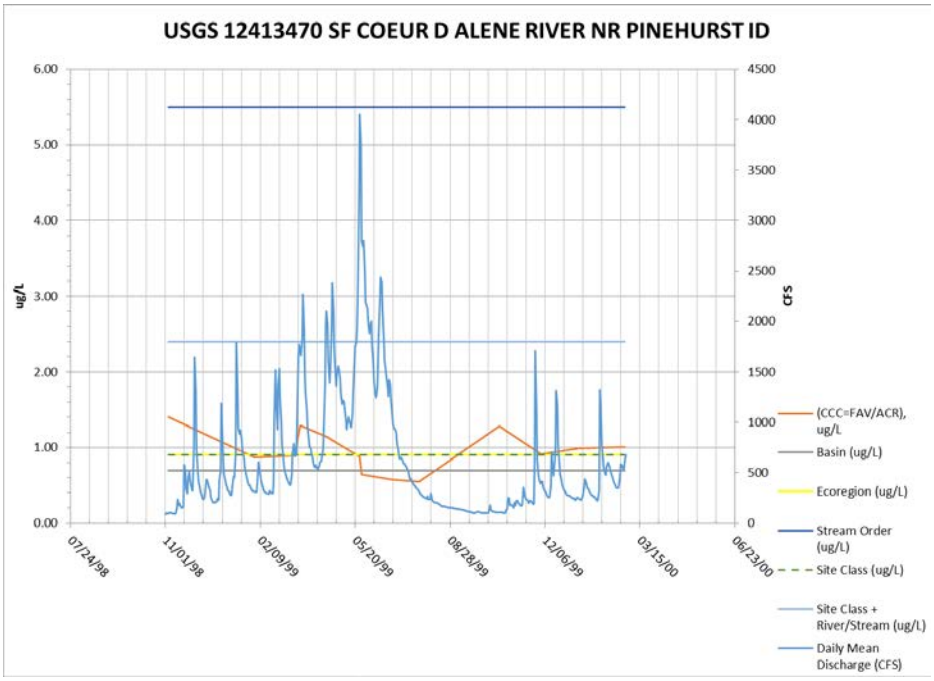
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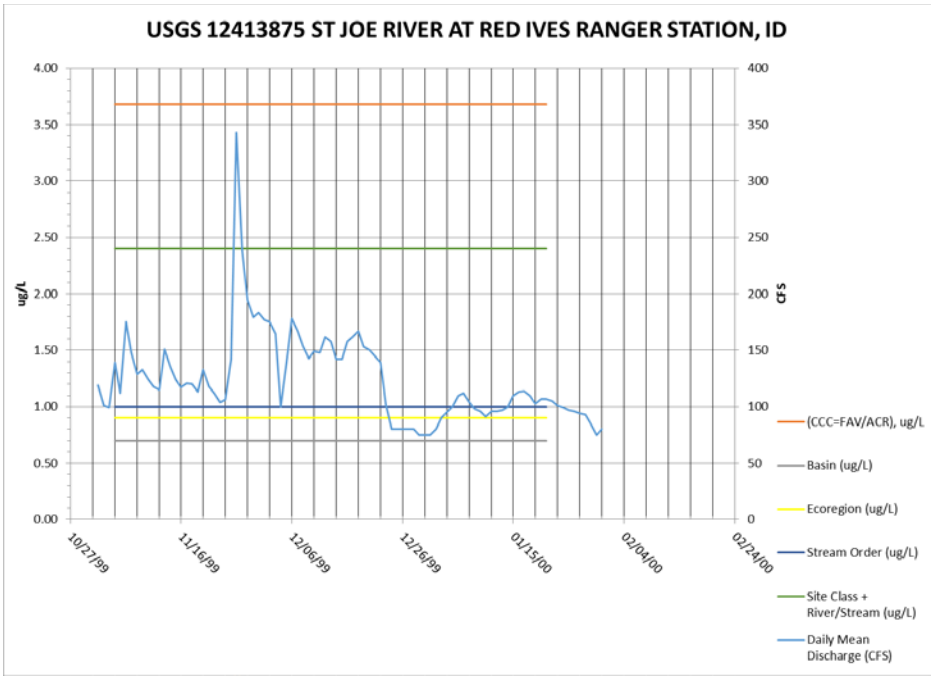
Appendix D. Comparison of Regional Classification 10th Percentile Criteria Estimates to BLM-Derived IWQCs and Discharge at USGS Sites

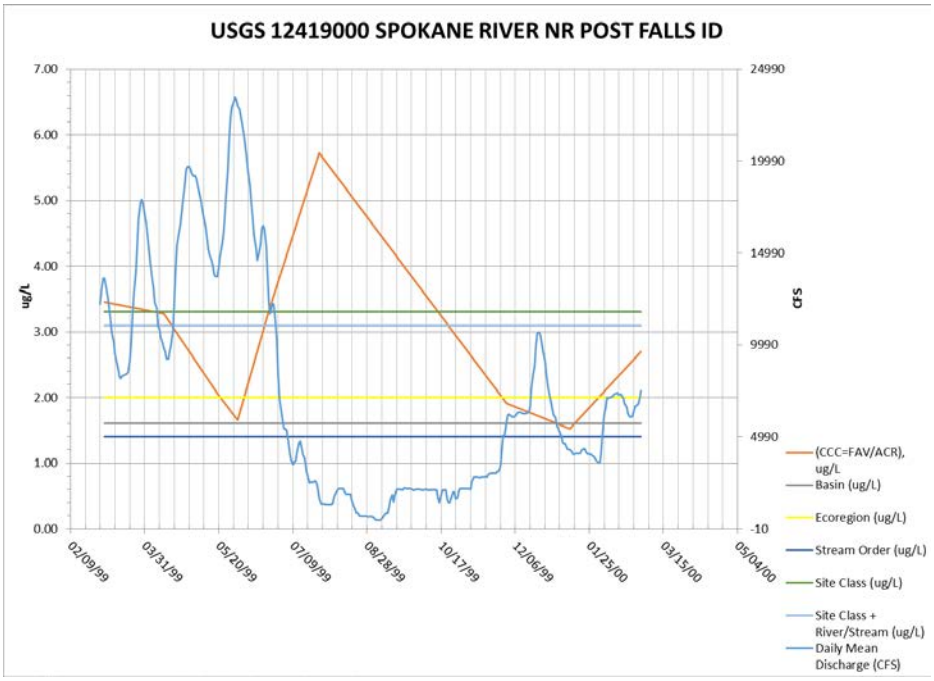


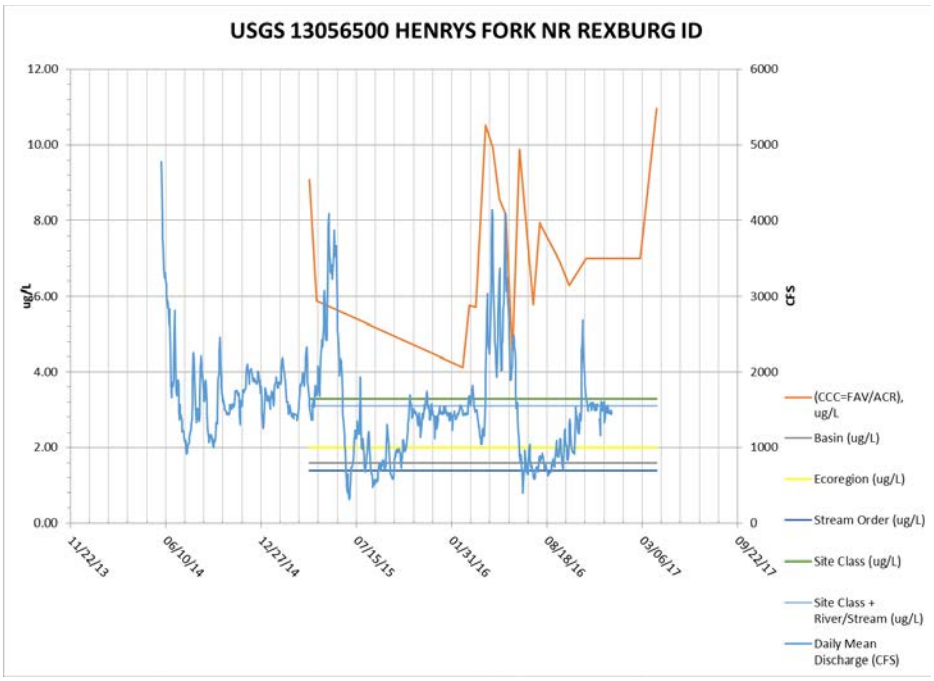


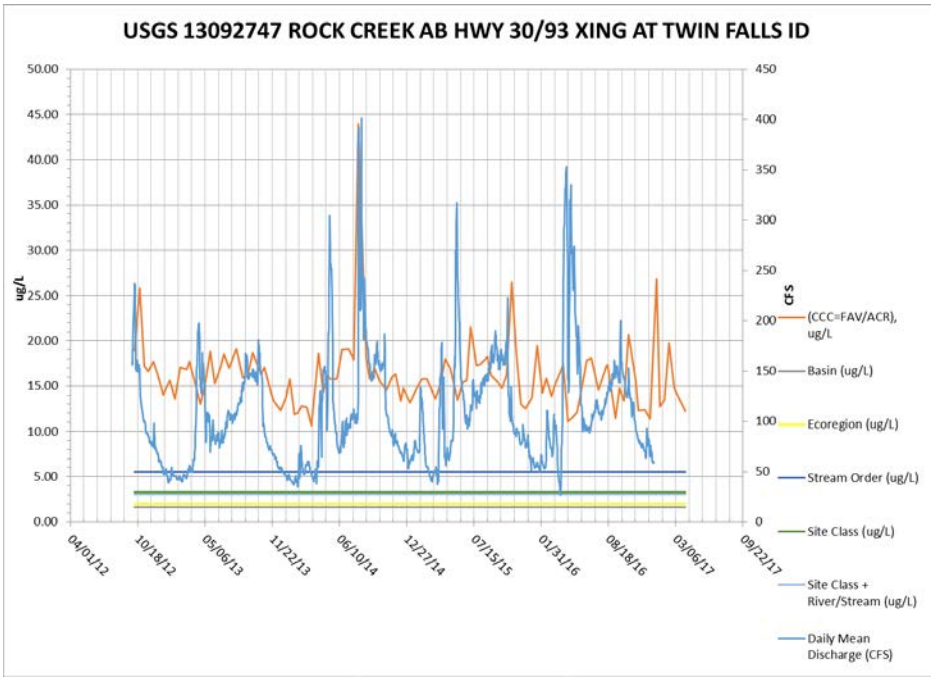

USGS 12413000 NF COEUR D ALENE RIVER AT ENAVILLE ID
ug/L
CFS
6.00
5.00
4.00
3.00
2.00
1.00
0.00
12000
10000
8000
6000
4000
2000
0
02/09/99
03/31/99
05/20/99
07/09/99
08/28/99
10/17/99
12/06/99
01/25/00
03/15/00
05/04/00
(CCC=FAV/ACR), ug/L
Basin (ug/L)
Ecoregion (ug/L)
Stream Order (ug/L)
Site Class + River/Stream (ug/L)
Site Class (ug/L)
Daily Mean Discharge (CFS)

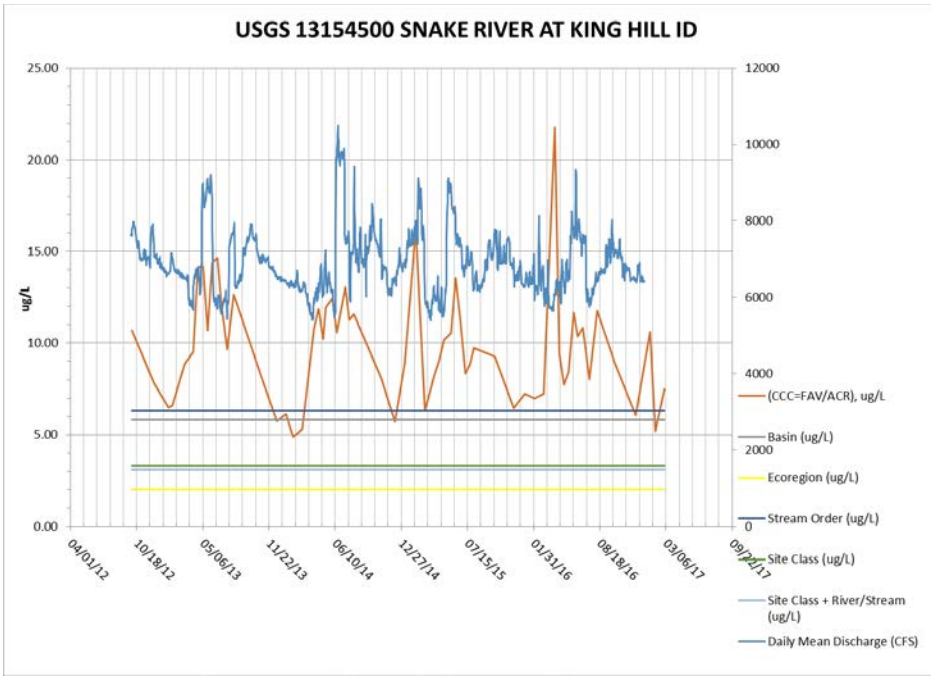

USGS 12413470 SF COEUR D ALENE RIVER NR PINEHURST ID
ug/L
CFS
6.00
5.00
4.00
3.00
2.00
1.00
0.00
4500
4000
3500
3000
2500
2000
1500
1000
500
0
07/24/98
11/01/98
02/09/99
05/20/99
08/28/99
12/06/99
03/15/00
06/23/00
(CCC=FAV/ACR), ug/L
Basin (ug/L)
Ecoregion (ug/L)
Stream Order (ug/L)
Site Class (ug/L)
Site Class + River/Stream (ug/L)
Daily Mean Discharge (CFS)


USGS 12413875 ST JOE RIVER AT RED IVES RANGER STATION, ID
ug/L
CFS
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
400
350
300
250
200
150
100
50
0
10/27/99
11/16/99
12/06/99
12/26/99
01/15/00
02/04/00
02/24/00
(CCC=FAV/ACR), ug/L
Basin (ug/L)
Ecoregion (ug/L)
Stream Order (ug/L)
Site Class + River/Stream (ug/L)
Daily Mean Discharge (CFS)


USGS 12419000 SPOKANE RIVER NR POST FALLS ID
ug/L
CFS
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
24990
19990
14990
9990
4990
-10
02/09/99
03/31/99
05/20/99
07/09/99
08/28/99
10/17/99
12/06/99
01/25/00
03/15/00
05/04/00
(CCC=FAV/ACR), ug/L
Basin (ug/L)
Ecoregion (ug/L)
Stream Order (ug/L)
Site Class (ug/L)
Site Class + River/Stream (ug/L)
Daily Mean Discharge (CFS)


USGS 13056500 HENRYS FORK NR REXBURG ID
ug/L
CFS
12.00
10.00
8.00
6.00
4.00
2.00
0.00
6000
5000
4000
3000
2000
1000
0
11/21/13
06/10/14
12/27/14
07/15/15
01/31/16
08/18/16
03/06/17
09/22/17
(CCC=FAV/ACR), ug/L
Basin (ug/L)
Ecoregion (ug/L)
Stream Order (ug/L)
Site Class (ug/L)
Site Class + River/Stream (ug/L)
Daily Mean Discharge (CFS)


USGS 13092747 ROCK CREEK AB HWY 30/93 XING AT TWIN FALLS ID
ug/L
CFS
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
450
400
350
300
250
200
150
100
50
0
04/01/12
10/18/12
05/06/13
11/22/13
06/10/14
12/27/14
07/15/15
01/31/16
08/18/16
03/06/17
09/22/17
(CCC=FAV/ACR), ug/L
Basin (ug/L)
Ecoregion (ug/L)
Stream Order (ug/L)
Site Class (ug/L)
Site Class + River/Stream (ug/L)
Daily Mean Discharge (CFS)


USGS 13154500 SNAKE RIVER AT KING HILL ID
25.00
20.00
15.00
10.00
5.00
0.00
ug/L
12000
10000
8000
6000
4000
2000
0
04/01/12
10/18/12
05/06/13
11/22/13
06/10/14
12/27/14
07/15/15
01/31/16
08/18/16
03/06/17
09/24/17
(CCC=FAV/ACR), ug/L
Basin (ug/L)
Ecoregion (ug/L)
Stream Order (ug/L)
Site Class (ug/L)
Site Class + River/Stream (ug/L)
Daily Mean Discharge (CFS)