Update to Copper Criteria
for Aquatic Life Use

Guidance Development

Rule Docket No. 58-0102-1502

April 25, 2017

Agenda

- Preliminary Results from Statewide Monitoring
- DRAFT Guidance Review
- Discussion

DRAFT
Statewide Monitoring for Inputs to the Copper Biotic Ligand Model

State of Idaho
Department of Environmental Quality

June 2017

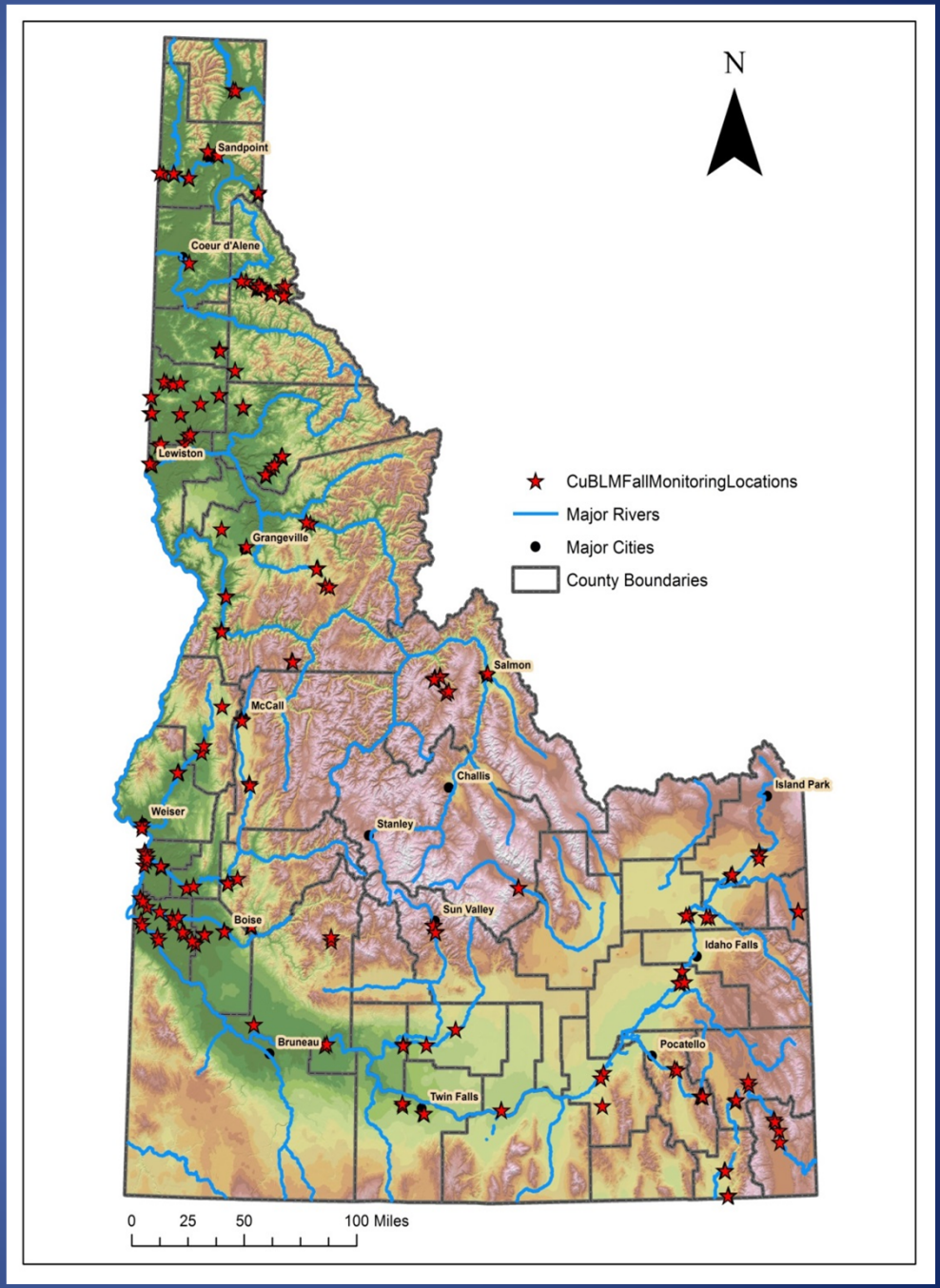
Table of Contents

1. Introduction

- What are the current copper and BLM conditions at locations throughout the state?
- Can Idaho waters be classified?
- Can critical BLM conditions be identified for each classification?

2. Methods

2.1 Site Selection



2.2 Field Collection

Quality Assurance Project Plan

Statewide Monitoring for Inputs to the Copper Biotic Ligand Model

State of Idaho
Department of Environmental Quality

Water Quality Division

Version 1.0

August 26, 2016

TRIM Record Number: 2016AKL63

2.3 Laboratory Methods

Table 1. Sample container, analytical method, preservation method, sampling holding times, and detection limits.

Sample Container	Parameter	Analytical Method	Preservative	Holding Time	Detection Limit
500 mL HDPE	Dissolved Ca, Mg, Na, K	EPA 200.7	4 °C. Filter with 0.45 µm filter as soon as practical. Acidify to pH <2 after filtration.	28 days unpreserved. 6 months preserved.	0.1 mg/L
	Cu	EPA 200.8	Filter with 0.45 µm filter as soon as practical. 4 °C. Nitric acid within 2 weeks.	2 weeks unpreserved. 6 months preserved.	0.001 mg/L
	SO_4, Cl	EPA 300.0	4 °C.	28 days.	0.1 mg/L
	Alkalinity	SM 2320 B	4 °C.	14 days.	10 mg/L
40 mL amber glass vial	DOC	SM 5310 B	4 °C. Filter with 0.45 µm filter within 48 hrs. Acidify to pH <2 after filtration.	7 days	0.1 mg/L

2.4 Quality Assurance

2.4.1 Field Sampling

- Duplicates collected at 5% of sites
- Field blanks collected at 5% of sites

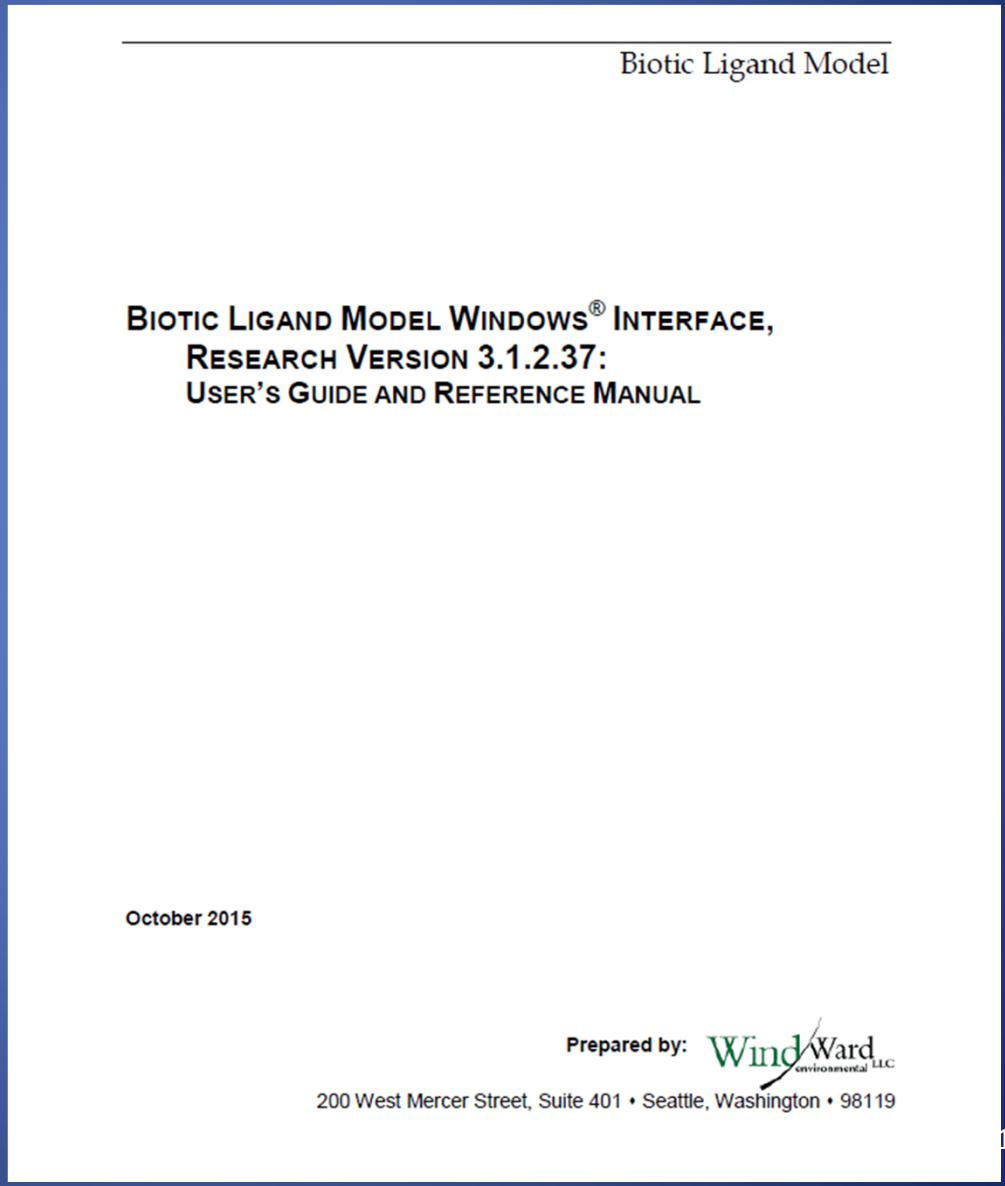
2.4.2 Data Handling

- Data handling followed procedure outlined in IPDES User's Guide
  - Samples < Detection Limit received value of 0
  - Samples > DL but < Reporting Limit received a value = DL

2.4.3 Data Quality Objectives

- Field Duplicates
  - RPD goal: ±20%, Max ±50%,
- Completeness
  - Only use data where all parameters were analyzed

2.5 Derivation of BLM Criteria



Biotic Ligand Model

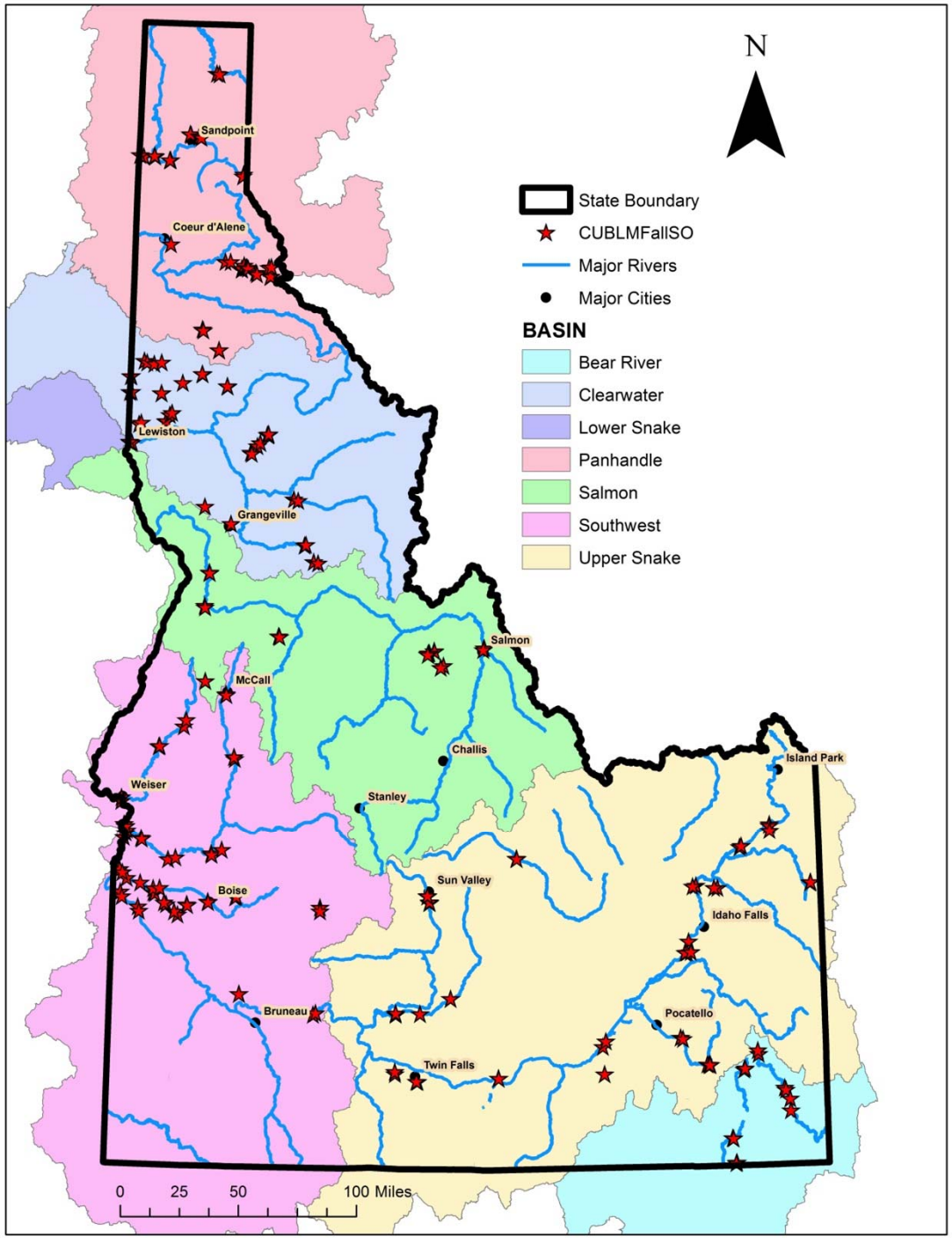
BIOTIC LIGAND MODEL WINDOWS® INTERFACE, RESEARCH VERSION 3.1.2.37: USER'S GUIDE AND REFERENCE MANUAL

October 2015

Prepared by: WindWard LLC environmental

200 West Mercer Street, Suite 401 • Seattle, Washington • 98119

2.6 Site Classification



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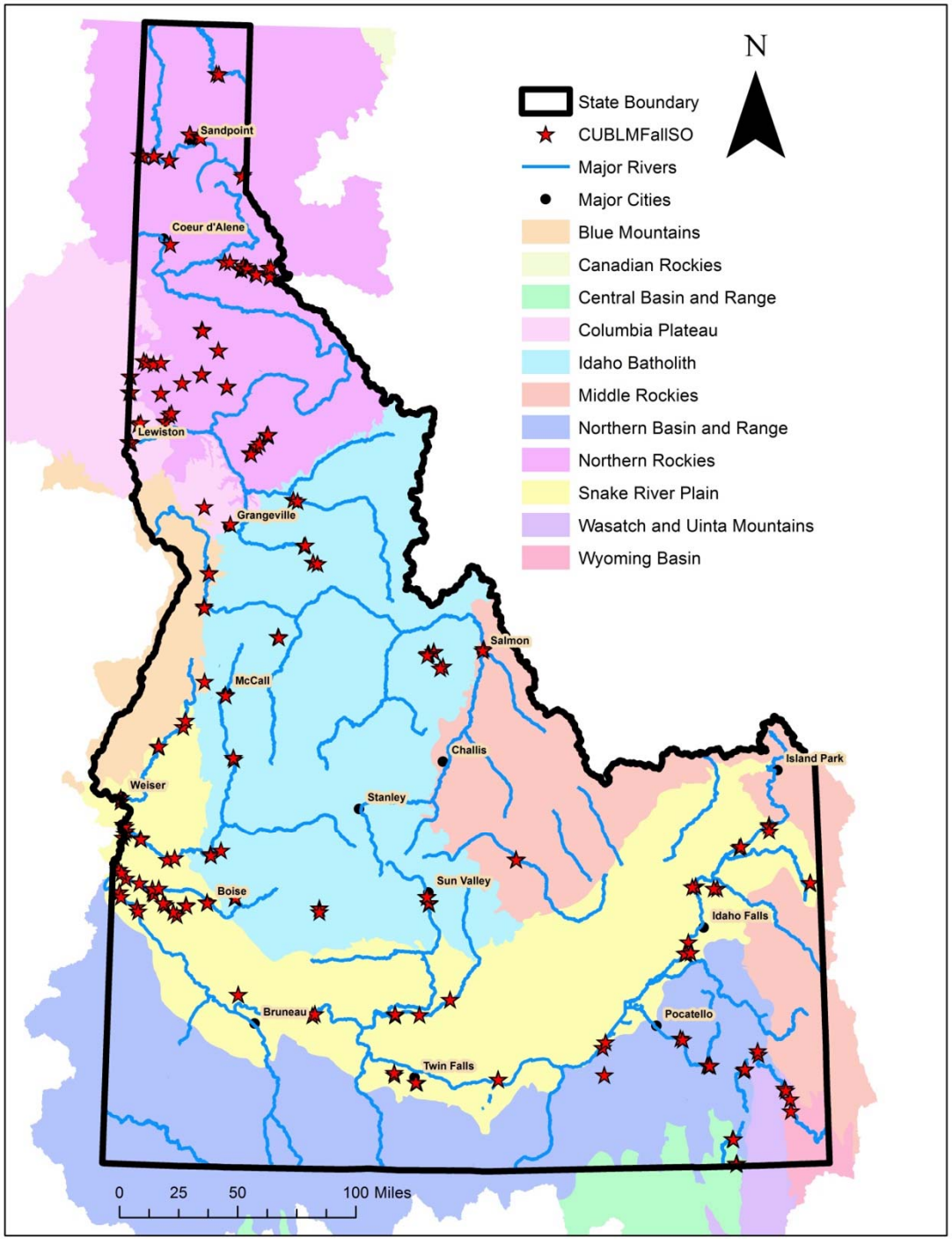

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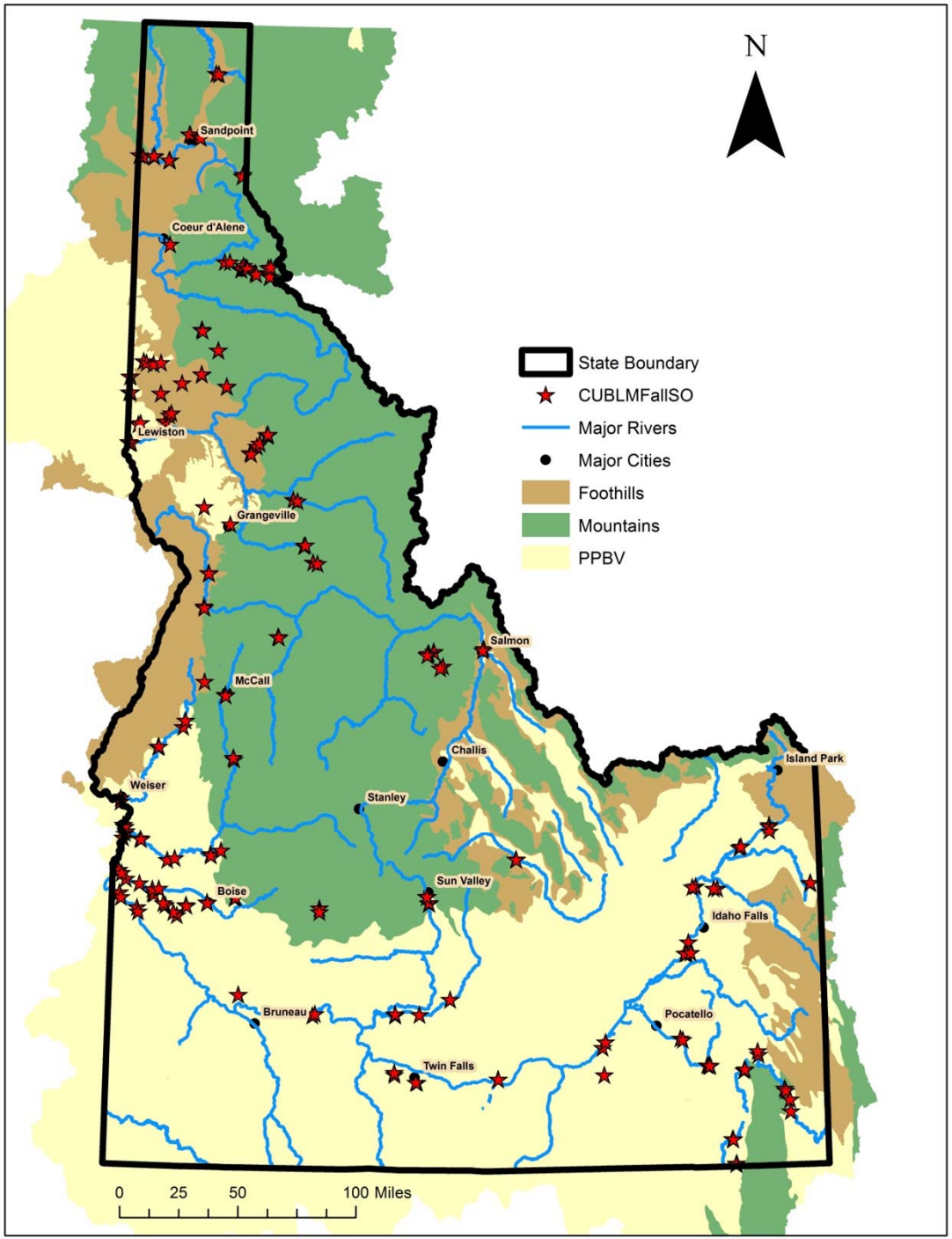

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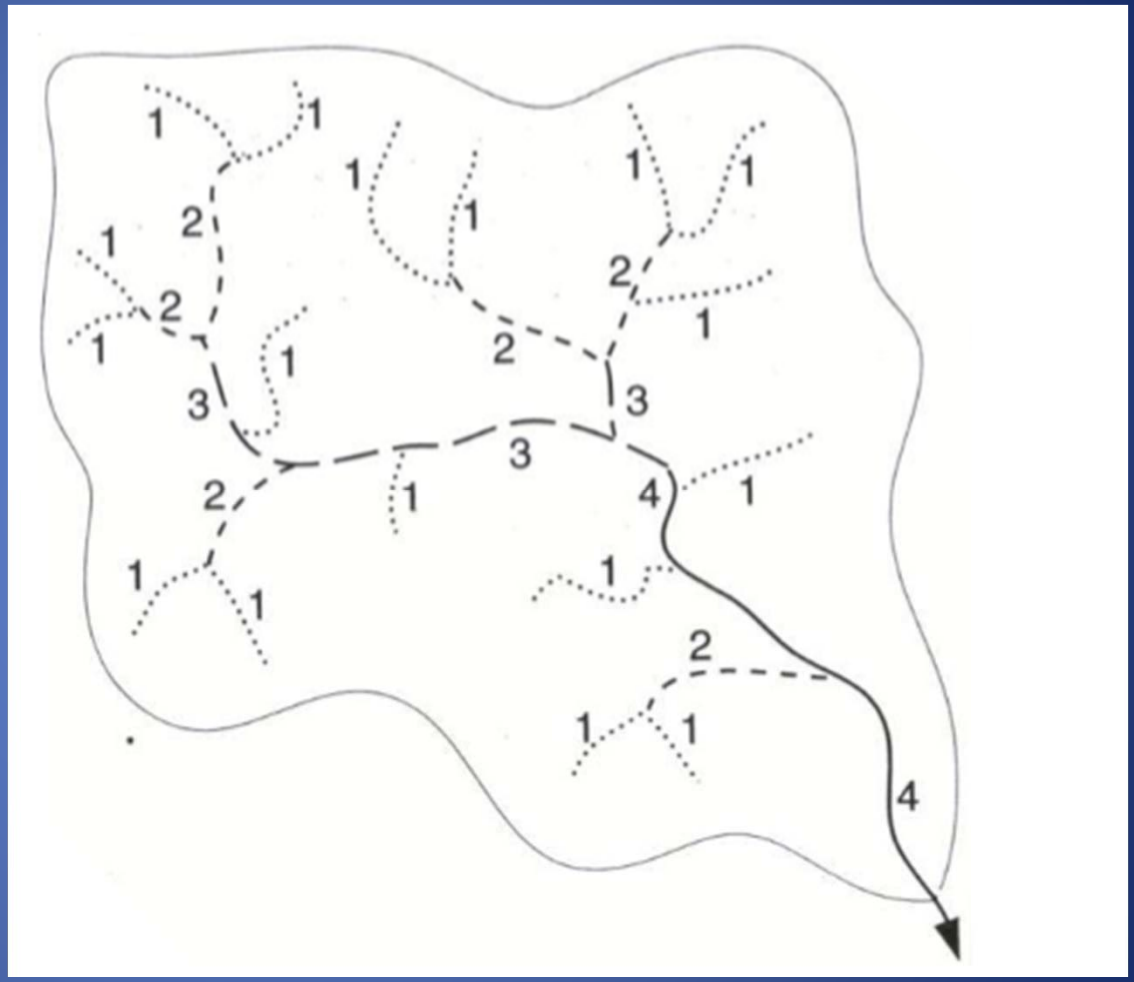

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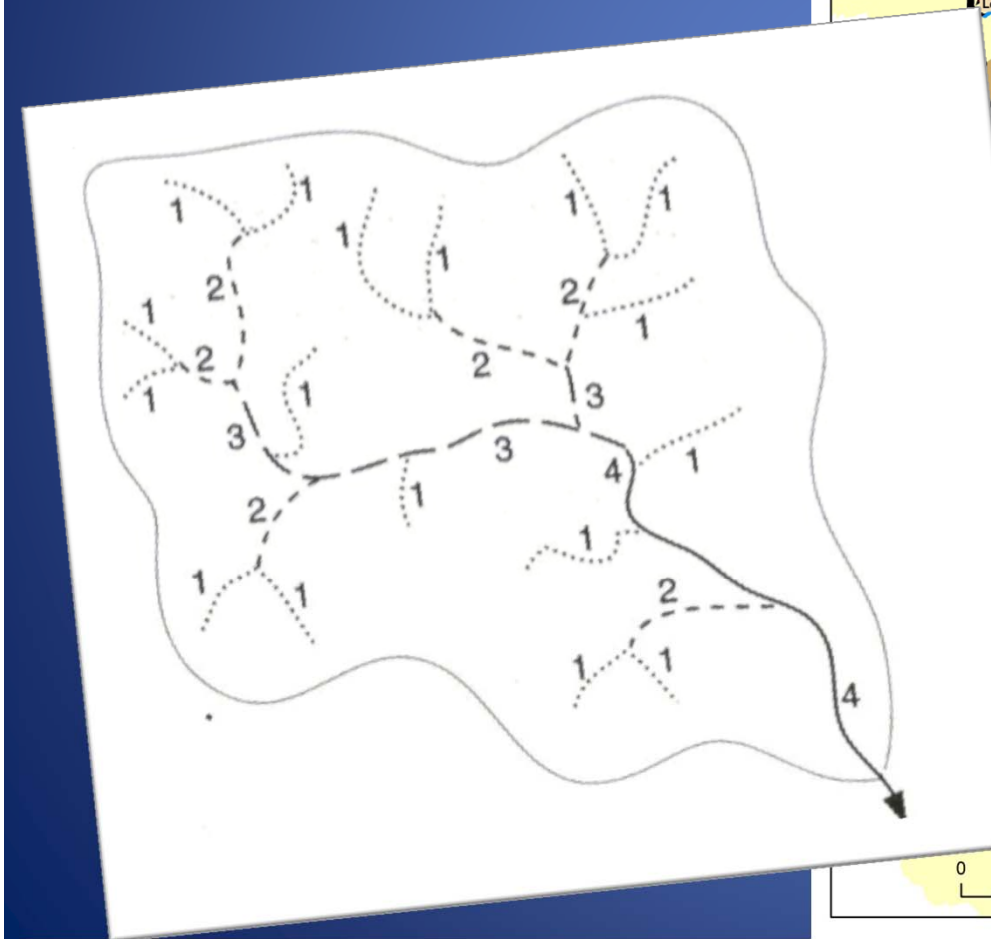
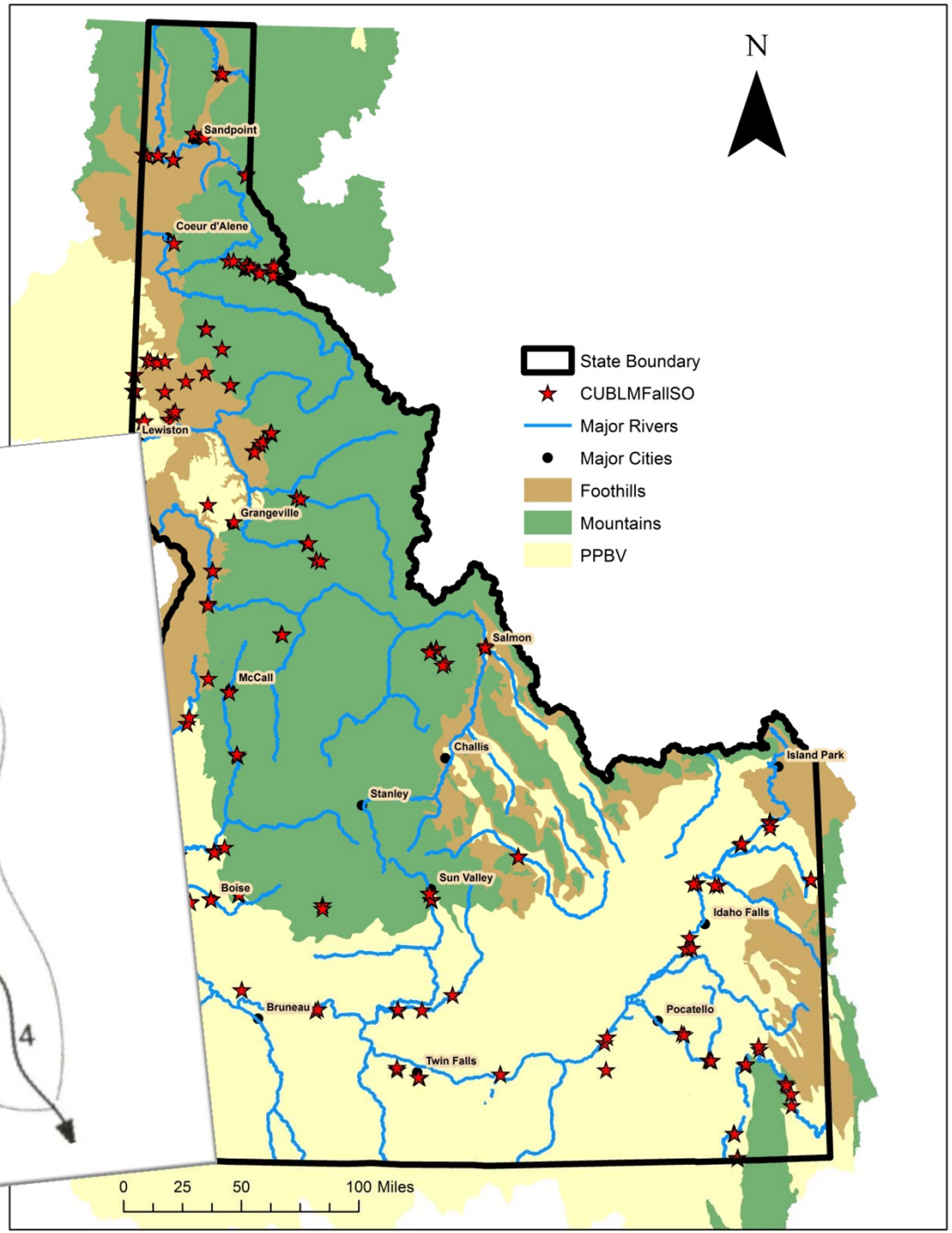




3. Results

3.1 Data Quality Assessment

- 189 of 204 sites had complete suite of BLM parameters
- Preliminary QC results indicate that DQOs were met

3.2 Analytical Results

- Detection Limit: 0.0001 mg/L
- Reporting Limit: 0.001 mg/L

- 201 samples analyzed for dissolved copper
  - 2 below detection limit
  - 169 below reporting limit

- 85% of samples were below reporting limit

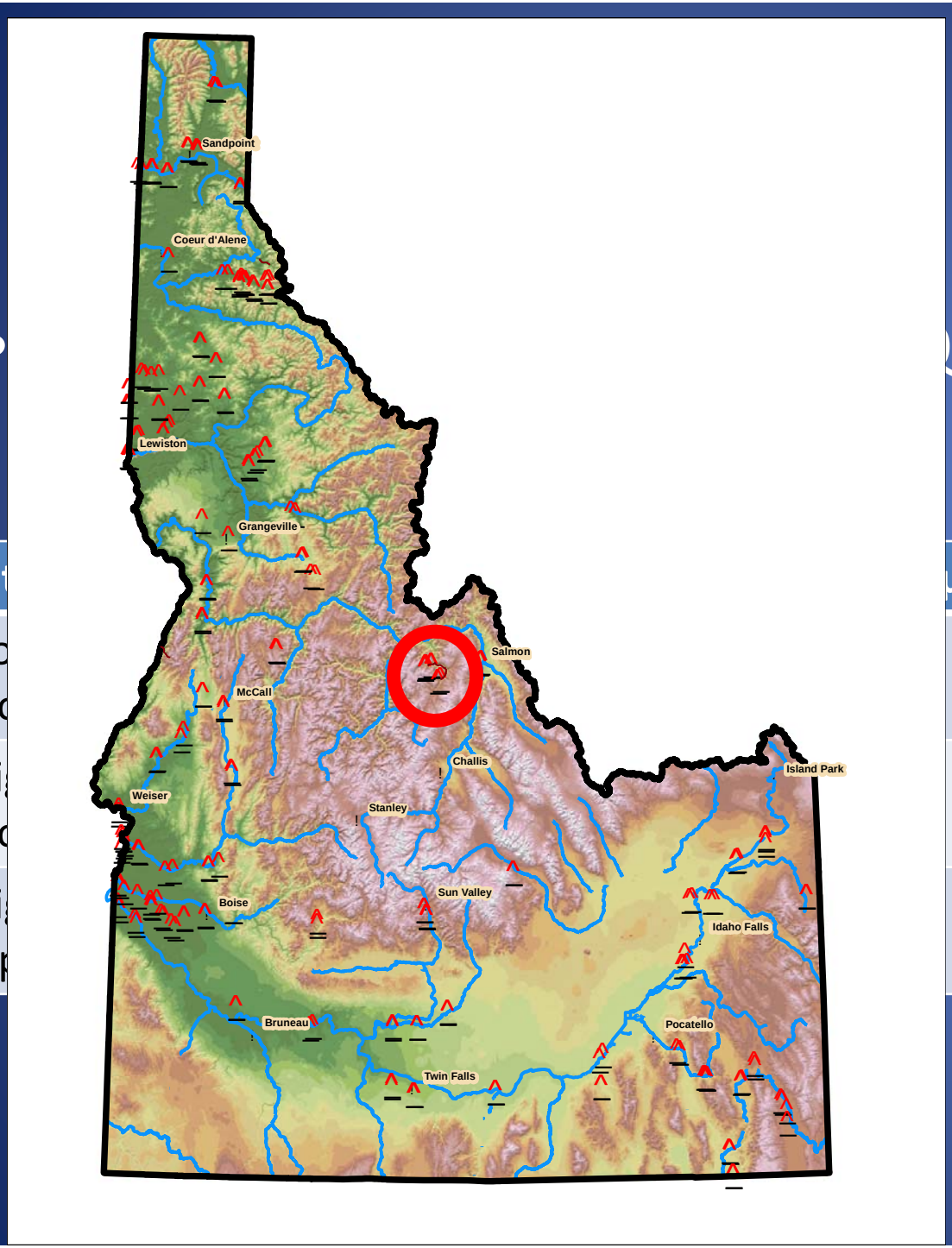
3.3 BLM Criteria

	Acute (µg/L)	Chronic (µg/L)
min	0.56	0.35
max	84.04	52.20
mean	14.75	9.16
median	12.39	7.70
sd	10.96	6.81
CV	74.28	74.28

Copper

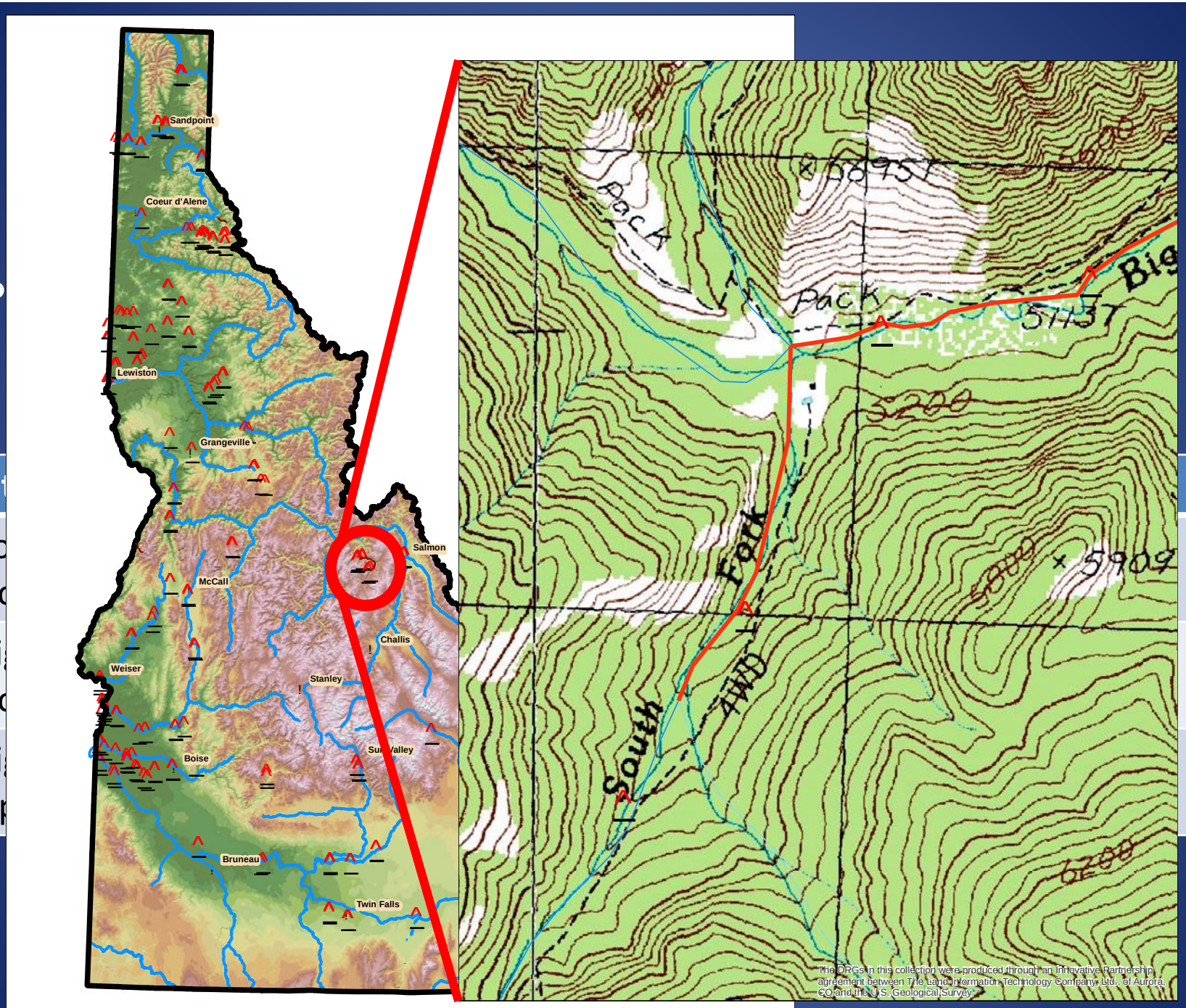
- 3 samples exceed chronic IWQC, 2 exceed acute

Site	CMC (µg/L)	CCC (µg/L)	Cu (µg/L)
South Fork Deer Creek, Downstream	**3.93**	**2.44**	6.65
Big Deer Creek, Downstream	**2.59**	**1.61**	2.86
Big Deer Creek, Upstream	3.52	**2.18**	2.42

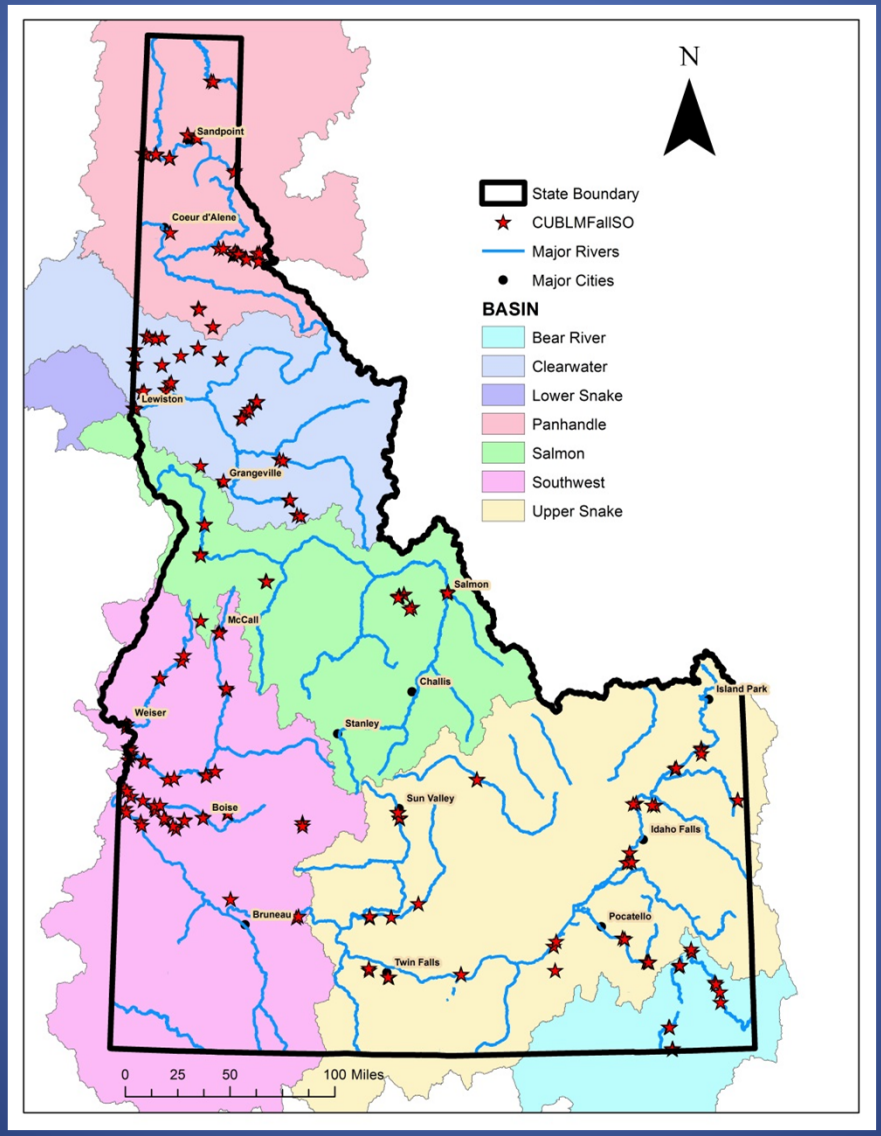


- QC, 2 exceed

Si	µg/L)	Cu (µg/L)
So Do		6.65
Bi Do		2.86
Bi Up		2.42


Sandpoint
Coeur d'Alene
Lewiston
Grangeville
Salmon
McCall
Challis
Weiser
Stanley
Boise
Bruneau
Twin Falls
Pack
Pack
South
Fork
4WD
5909
5737
6200
The DRGs in this collection were produced through an Innovative Partnership agreement between The Land Information Technology Company, Ltd., of Aurora, CO and the U.S. Geological Survey.

3.4 Classification



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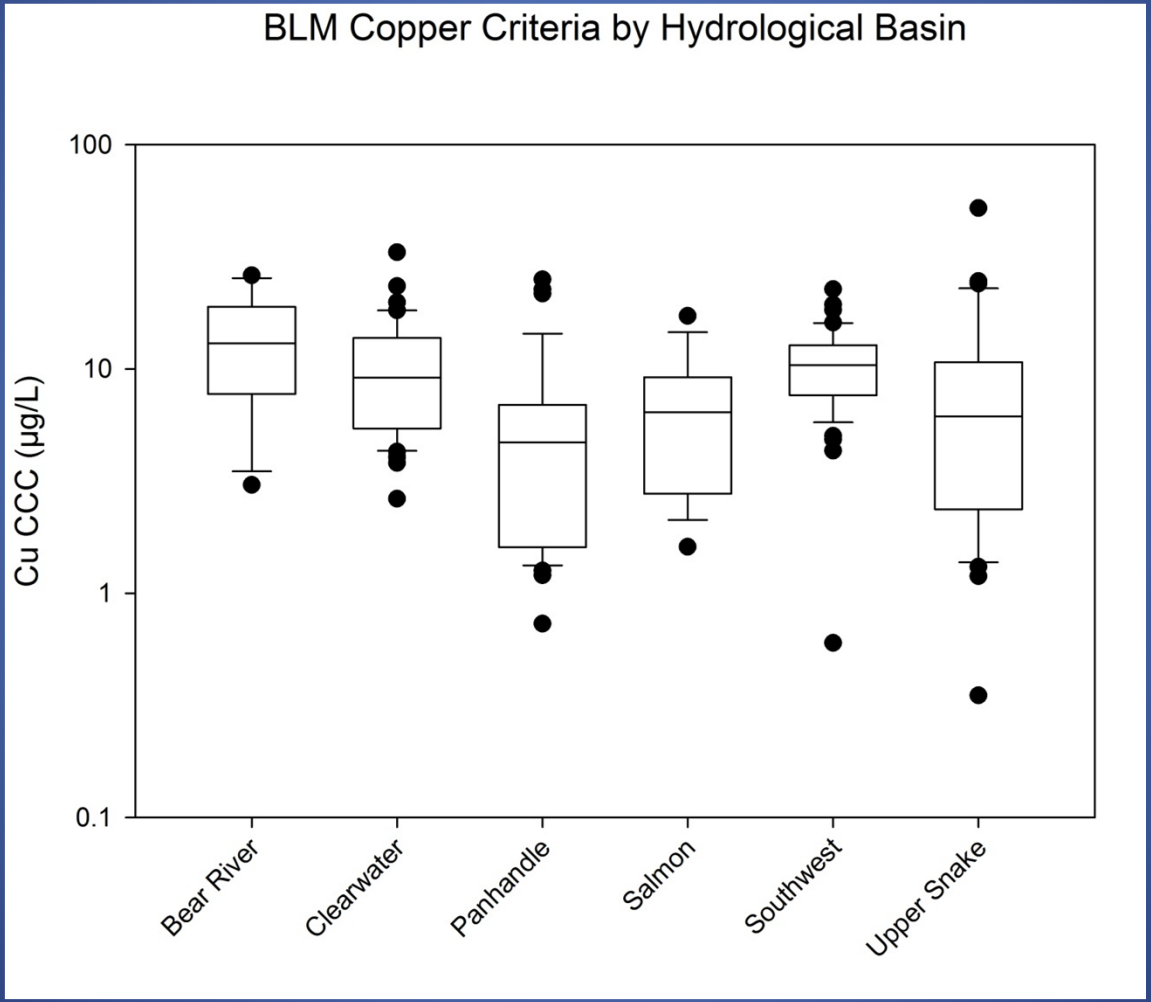

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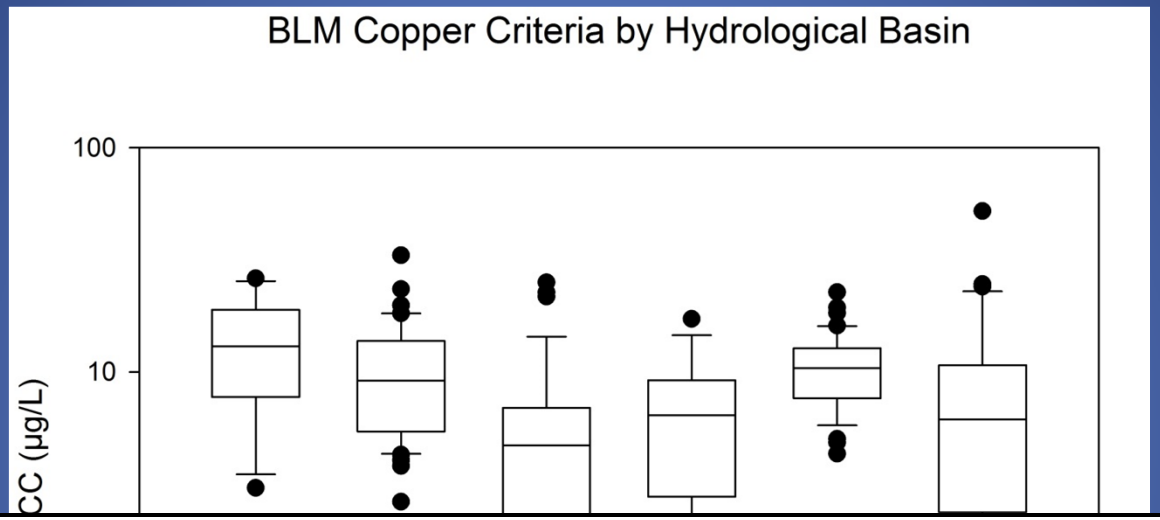
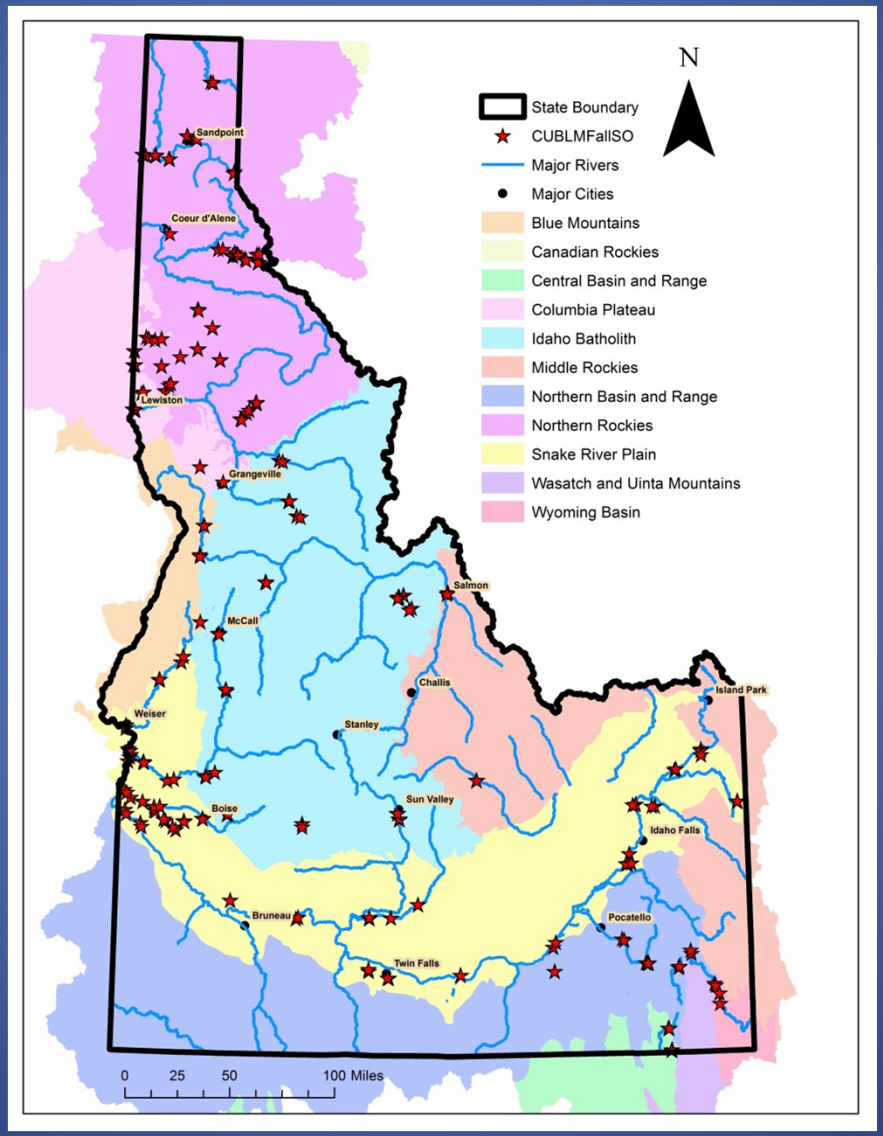


Basin	N	Min	Max	10%	Mean	Std Dev	CV
Bear River	12	3.0	26.2	3.5	13.6	7.3	53
Clearwater	40	2.6	33.2	4.3	10.4	6.2	59
Panhandle	37	0.7	25.1	1.3	5.8	5.9	103
Salmon	18	1.6	17.3	2.1	7.0	4.4	63
Southwest	49	0.6	22.7	5.8	10.5	4.2	40
Upper Snake	33	0.4	52.2	1.4	9.0	10.1	112

3.4 Classification



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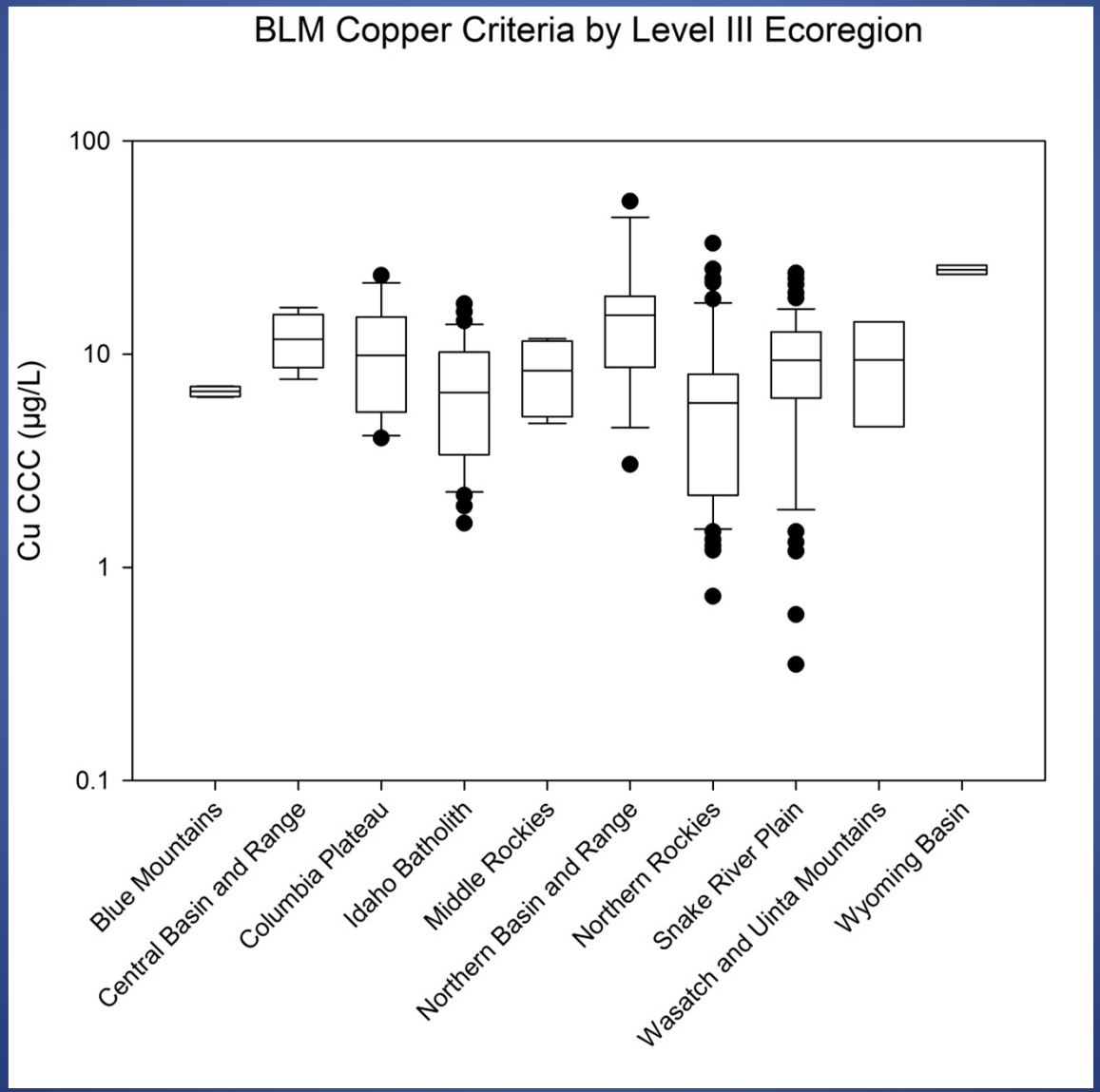

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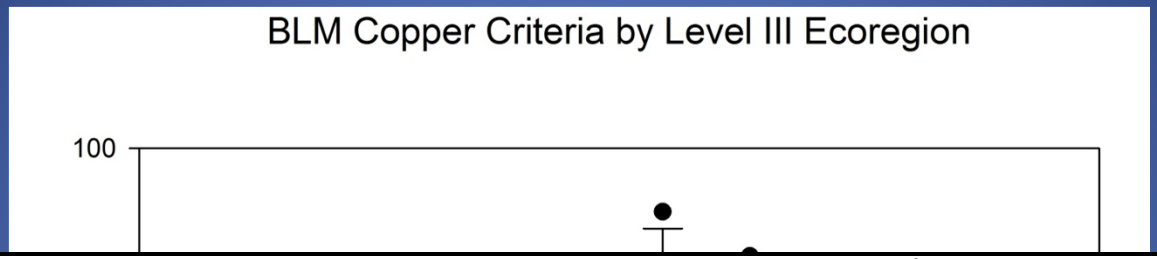
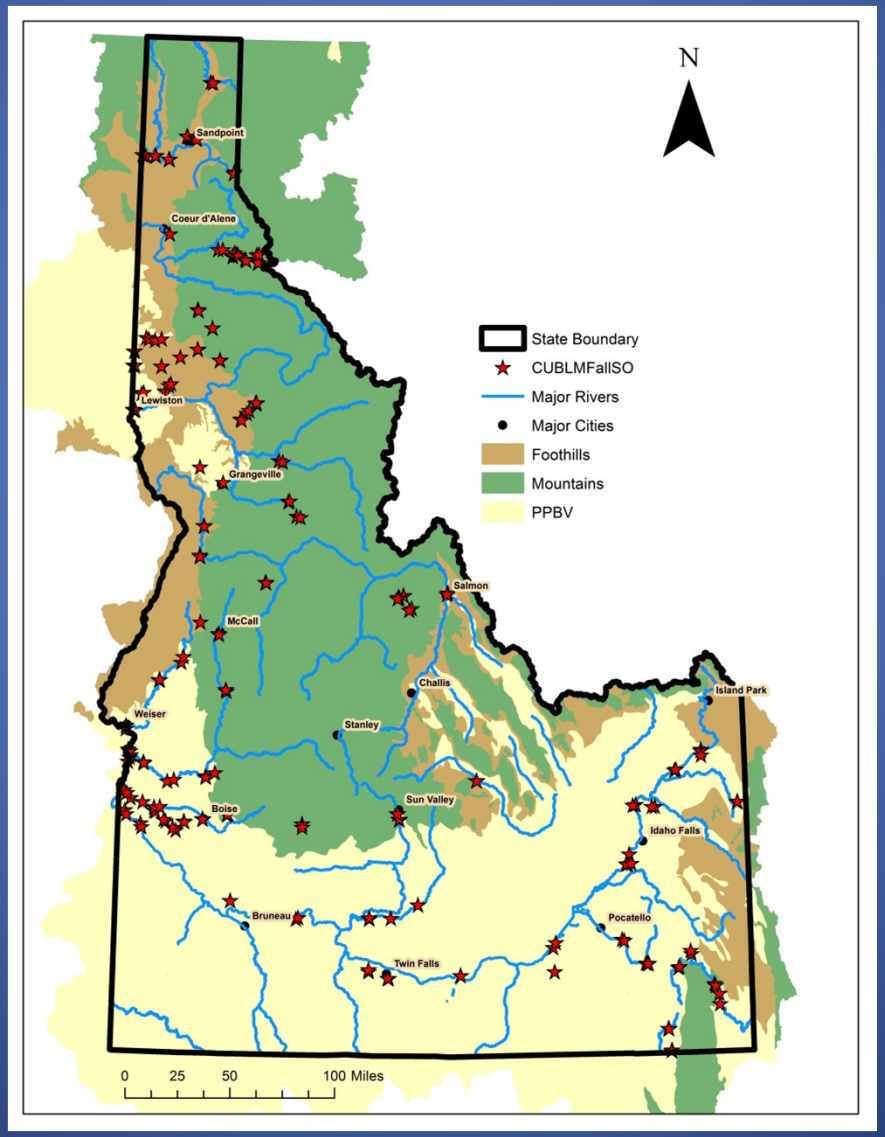


Level III Ecoregion	N	Min	Max	10th %ile	Mean	Std Dev	CV
Blue Mountains	4	6.3	7.1	6.3	6.7	0.4	6
Central Basin and Range	4	7.7	16.6	7.7	11.9	3.6	31
Columbia Plateau	14	4.0	23.4	4.2	10.9	6.2	57
Idaho Batholith	32	1.6	17.3	2.3	7.3	4.3	58
Middle Rockies	4	4.7	11.8	4.7	8.3	3.4	41
Northern Basin and Range	12	3.0	52.2	4.5	16.4	12.7	77
Northern Rockies	57	0.7	33.2	1.5	7.1	6.6	92
Snake River Plain	58	0.4	24.0	1.9	9.7	5.5	57
Wasatch and Uinta Mountains	2	4.6	14.2	4.6	9.4	6.8	72
Wyoming Basin	2	23.7	26.2	23.7	24.9	1.7	7

3.4 Classification



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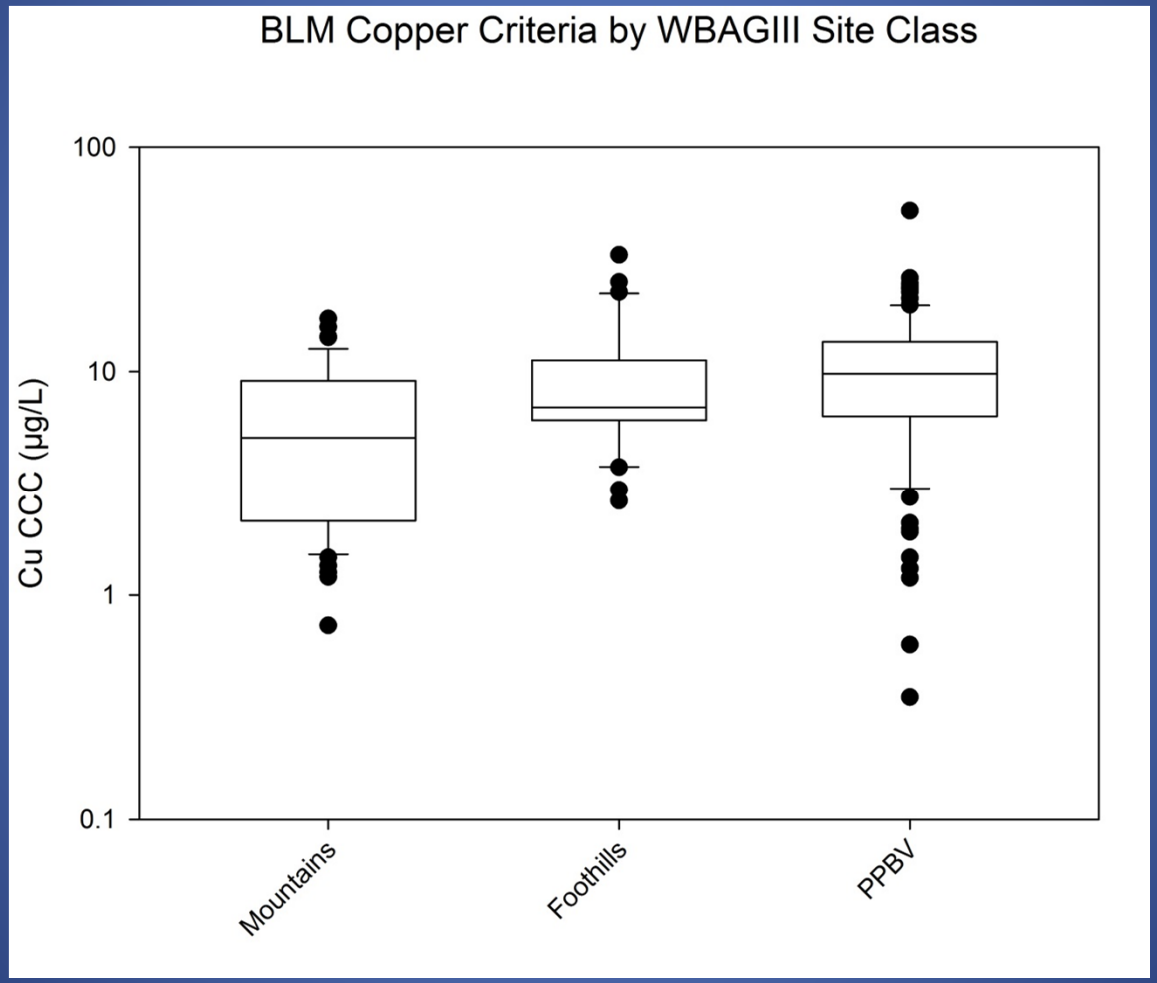

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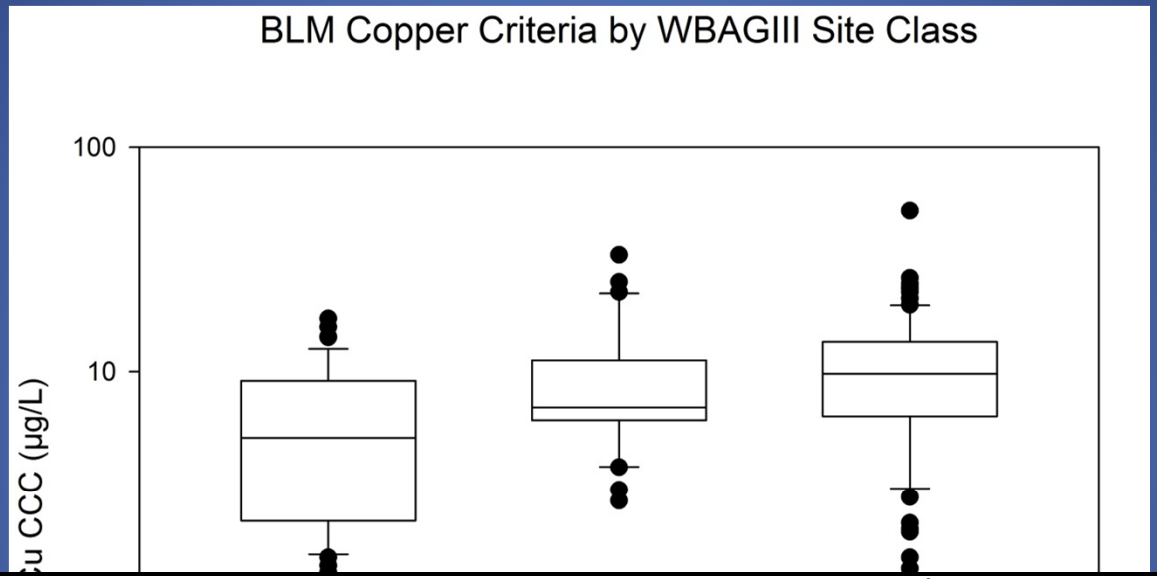
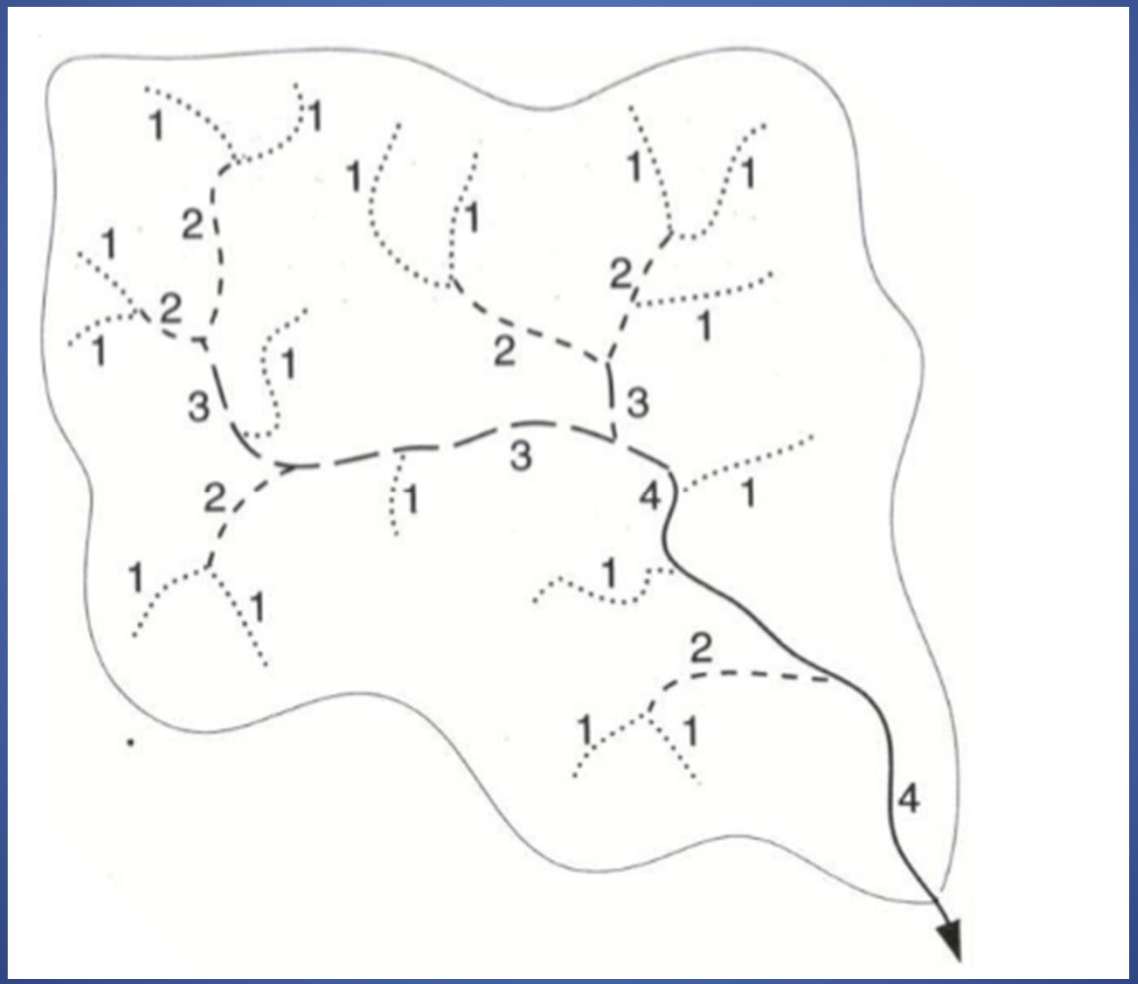


DEQ Site Classes	N	Min	Max	10th %ile	Mean	Std Dev	CV
Mountains	59	0.7	17.3	1.5	6.0	4.5	73
Foothills	32	2.6	33.2	3.8	9.7	7.1	75
PPBV	98	0.4	52.2	3.0	10.8	7.2	67

3.4 Classification



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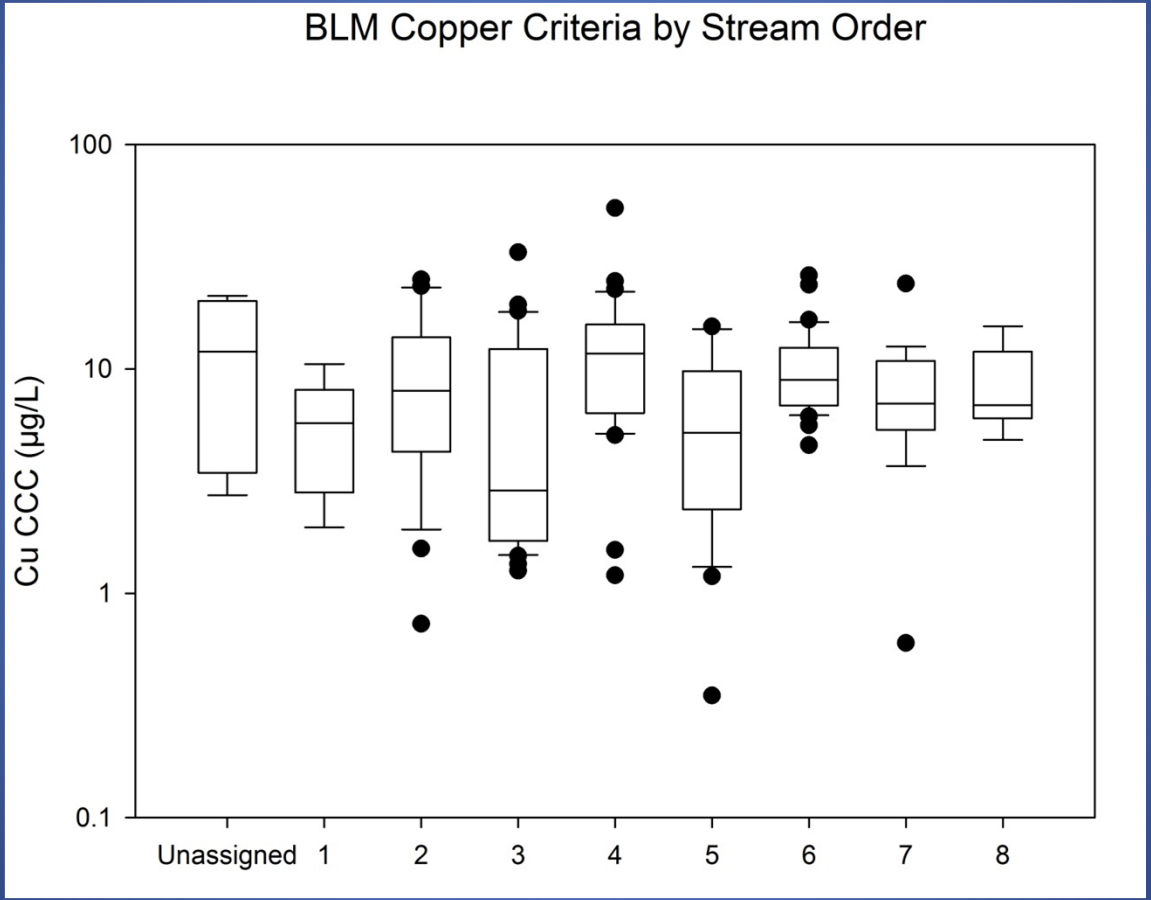

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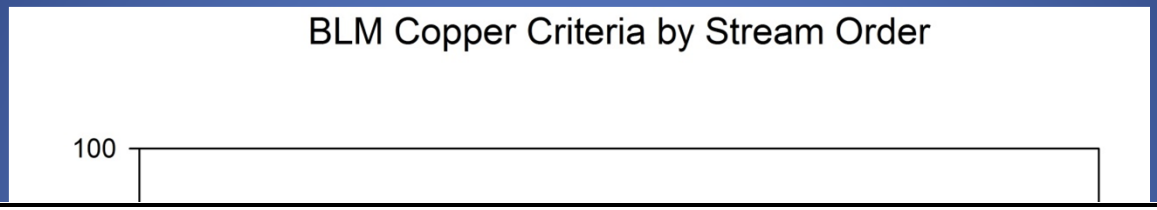
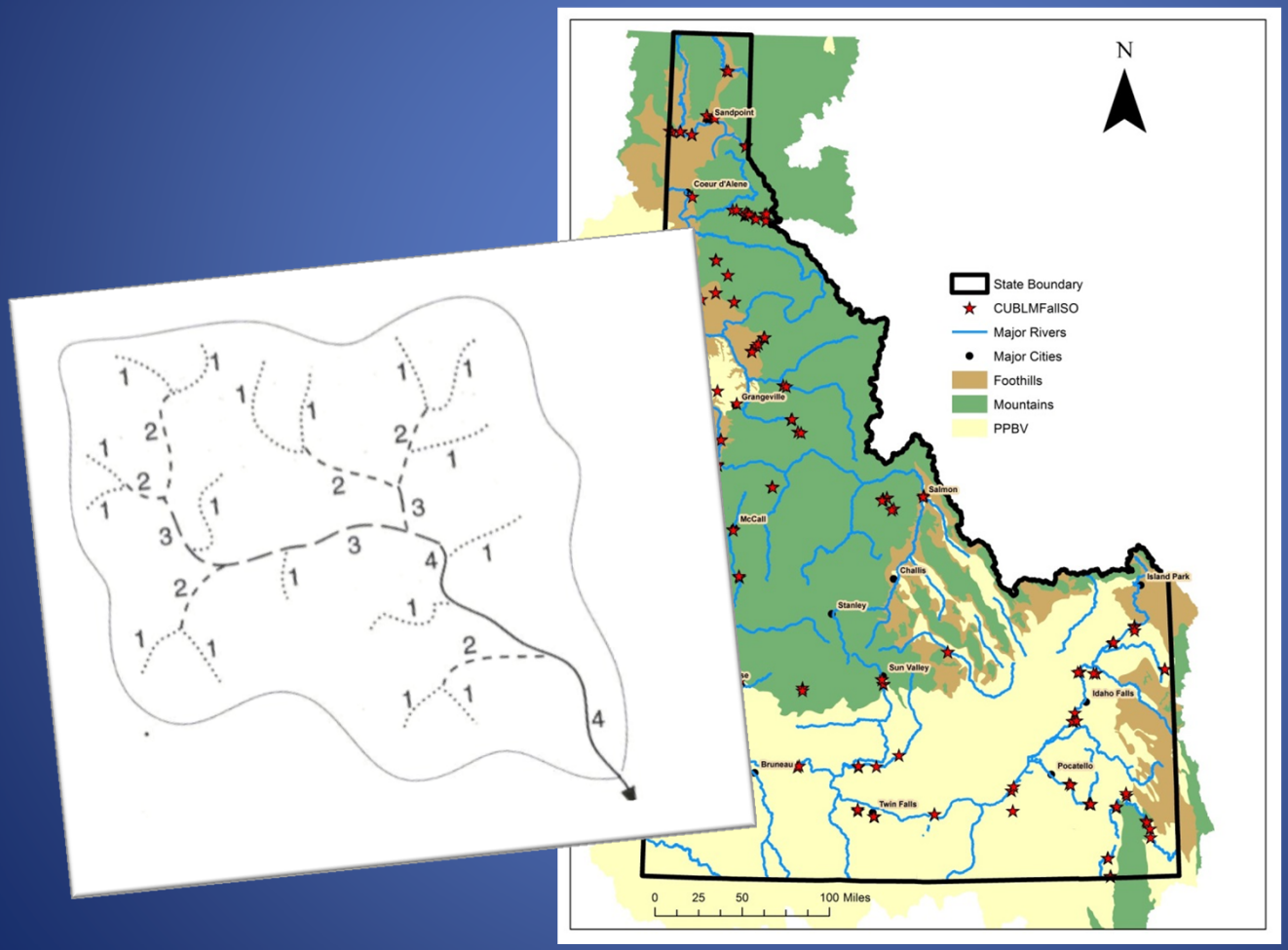


Stream Order	N	Min	Max	0.1	Mean	Std Dev	CV
Unassigned	6	2.7	21.2	2.7	11.9	8.1	68
1	8	2.0	10.5	2.0	5.8	3.0	52
2	23	0.7	25.1	1.9	10.1	7.5	74
3	31	1.3	33.2	1.5	7.2	7.5	105
4	31	1.2	52.2	5.2	12.4	9.3	75
5	29	0.4	15.5	1.3	6.6	4.6	69
6	36	4.6	26.2	6.2	10.5	4.8	46
7	18	0.6	24.0	3.7	8.0	4.9	61
8	7	4.8	15.5	4.8	8.4	3.9	46

3.4 Classification



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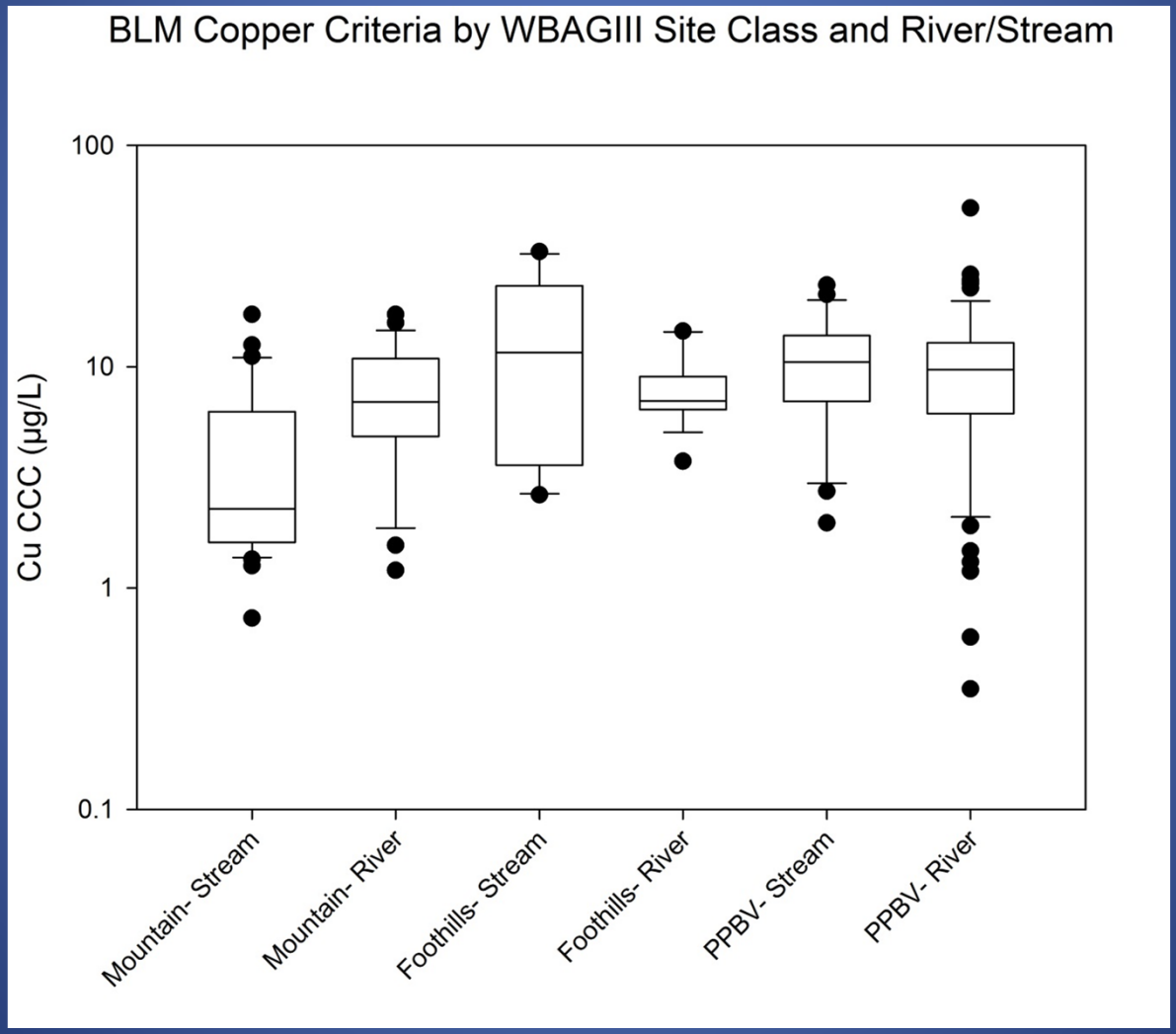

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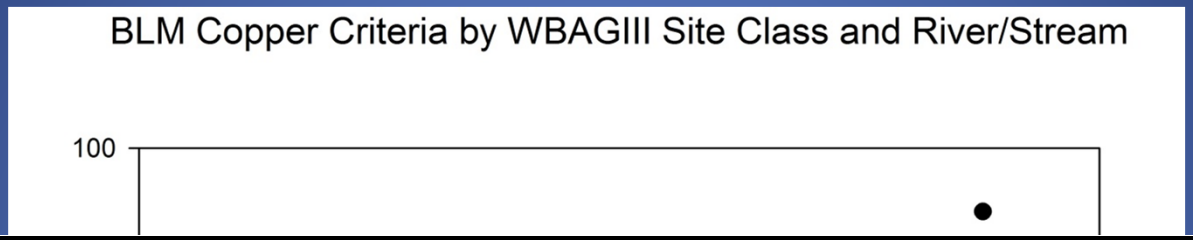
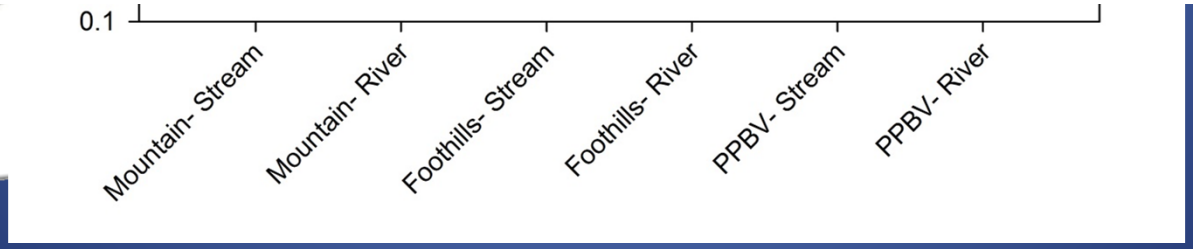


DEQ Site Class and River or Stream Designation	N	Min	Max	10th %ile	Mean	Std Dev	CV
Foothills River	18	3.7	14.5	5.1	8.0	2.9	36
Foothills Stream	10	2.6	33.2	2.7	14.0	11.4	81
Mountains River	27	1.2	17.3	1.9	7.9	4.4	55
Mountains Stream	31	0.7	17.2	1.4	4.5	4.1	93
PPBV River	69	0.4	52.2	2.1	10.7	7.8	73
PPBV Stream	27	2.0	23.4	3.0	10.9	5.9	54



4. Discussion

- Variability of inputs
- Limited copper issues
- Evaluation of classification

4. Discussion

Classification System	# Classes	N/Class	Range of CV
Basins	7 (6)	12 – 49	40 – 112
Level III Ecoregion	10	2 – 58	6 – 92
WBAGIII Site Classes	3	31 – 98	67 – 75
Stream Order	9	6 – 36	46 – 105
WBAG+RivStr	6(9)	10-69	36 – 93

Next Steps

- Additional samples collected in early April
- Add analysis
- Additional Synthesis

DRAFT Implementation Guidance for the Idaho Copper Criteria for Aquatic Life

Using the Biotic Ligand Model

State of Idaho
Department of Environmental Quality

June 2017

http://www.deq.idaho.gov/media/60179937/implementation-guidance-idaho-copper-criteria-aquatic-life-draft-0417.pdf