

Update to Copper Criteria for Aquatic Life Use

Guidance Development

Rule Docket No. 58-0102-1502

July 26, 2016



Outline

- Revised Schedule
- Review of Draft Rule
- Draft Guidance Outline
- Draft Monitoring Plan
- Discussion
- Next Steps

Revised Schedule

Guidance development meetings	Through Spring 2017
Deadline for submitting proposed rule to Office of Administrative Rules for publication in the August 2017 Idaho Administrative Bulletin	July 7, 2017
Proposed rule published in Idaho Administrative Bulletin; 30 day comment period begins	August 2, 2017
Comment period ends	September 1, 2017
Mail proposed rule docket to Board members	September 2017
Board meeting – consideration of proposed rule for adoption of pending rule	October 2017
Pending rule published in Idaho Administrative Bulletin	December 6, 2017
Pending rule reviewed by Legislature	January 2018
Pending rule becomes final if approved by Legislature.	Sine die 2018

Review of Draft Rule

- Language regarding effective dates to demonstrate which version of rule will be effective until EPA approval
- Addition of reference to Implementation Guidance

Negotiated Rule Draft No. 2

Questions?

Implementation Guidance for the Idaho Copper Criteria for Aquatic Life

Using the Biotic Ligand Model

June 2017

Prepared by
Idaho Department of Environmental Quality
Water Quality Division
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Boise, Idaho 83706

Draft Copper Criteria Guidance Outline

Purpose

- Describe issues with implementation of copper BLM

Effects of Copper on Aquatic Life

- Copper binds to organics (gills, other *biotic ligands*, dissolved organic carbon)
 - Gills- affects the ability to regulate salt transport
 - Olfaction- binds to odor receptors
 - Decreased reproduction
 - Effective algaecide

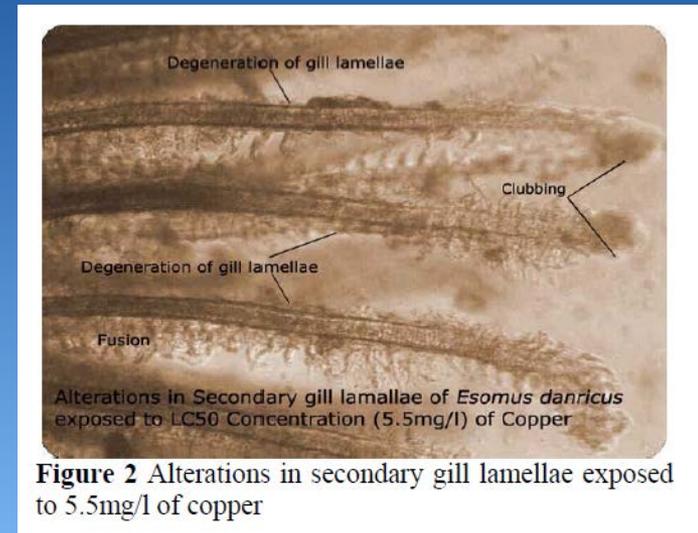
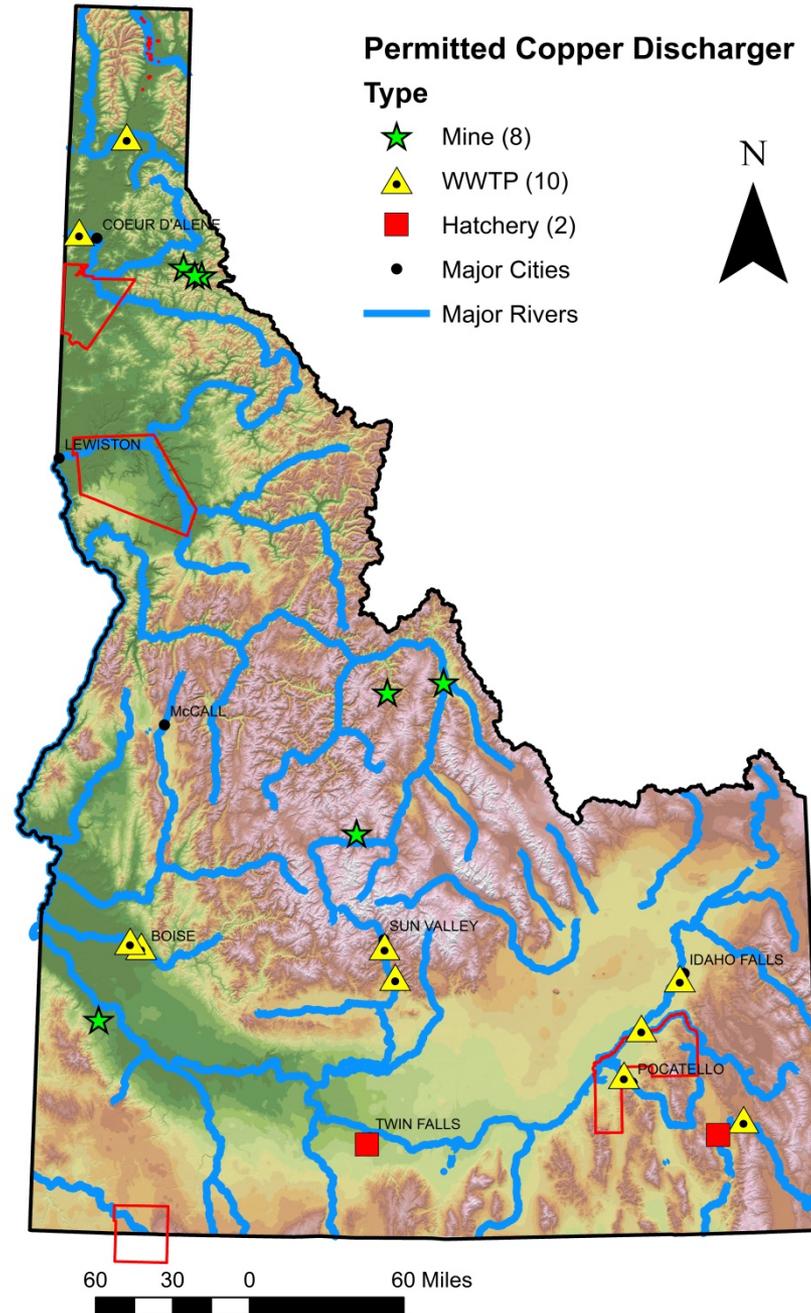


Figure 2 Alterations in secondary gill lamellae exposed to 5.5mg/l of copper

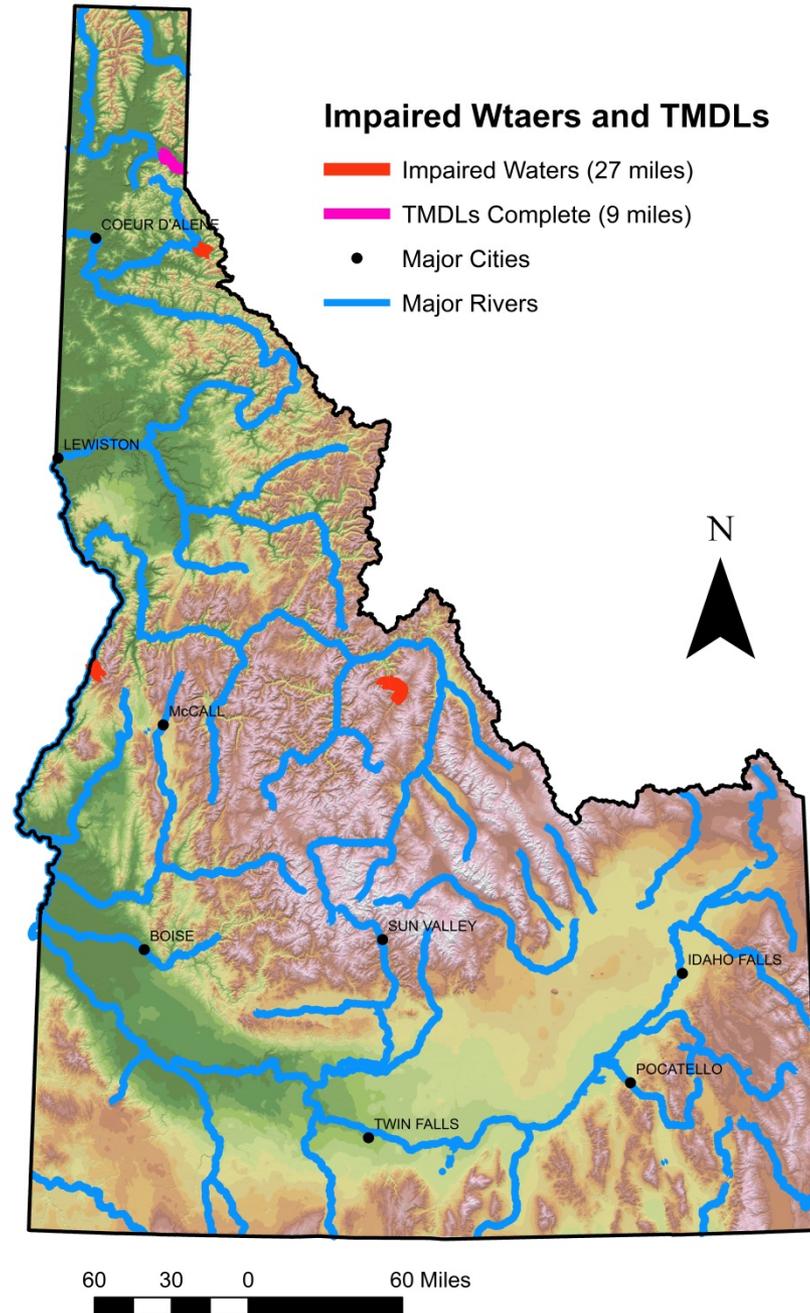
Vutukuru et al. 2005.



NPDES Permits in Idaho

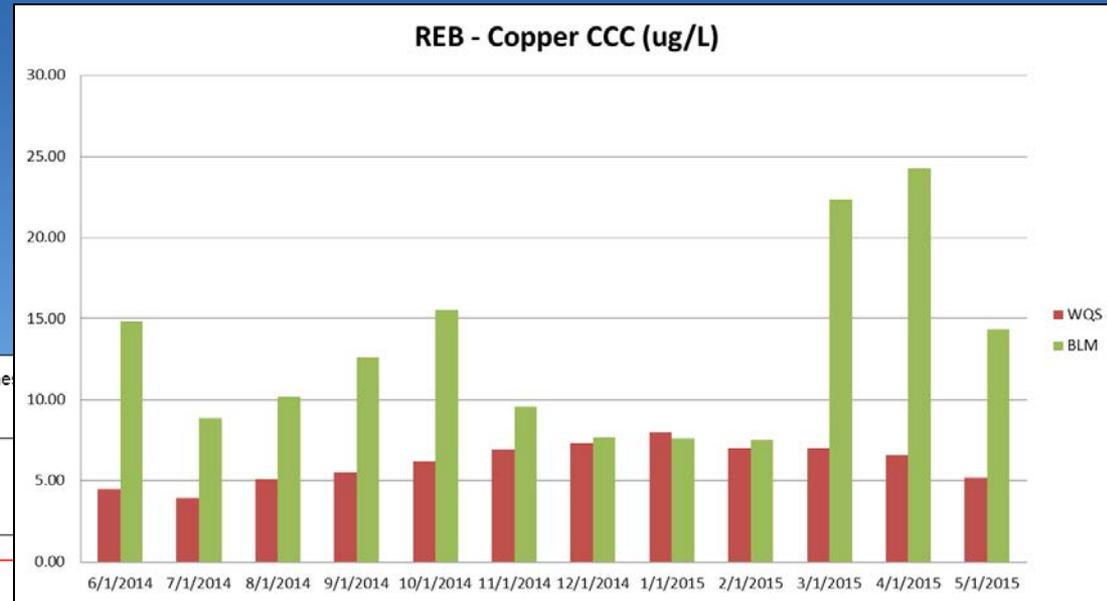
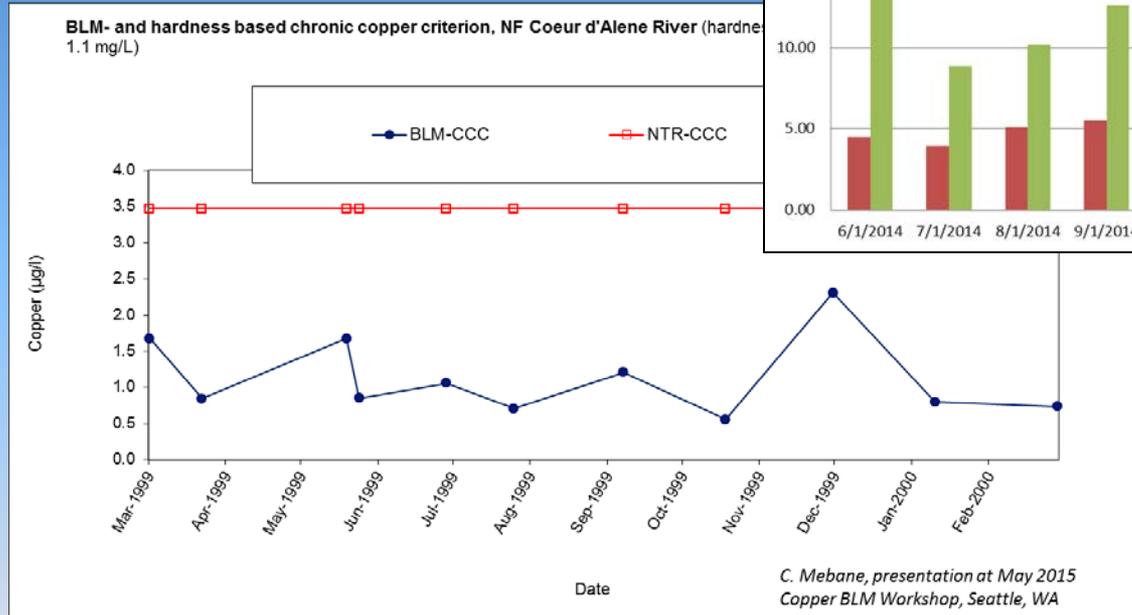


Impaired Waters and TMDLs



Biotic Ligand Model

Comparison to Hardness-Based



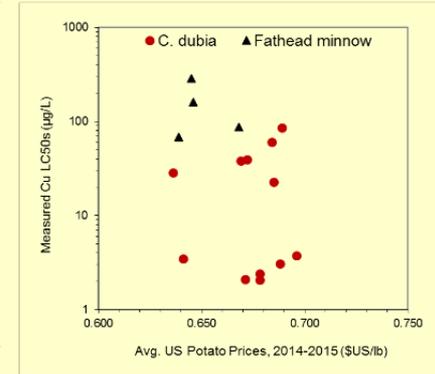
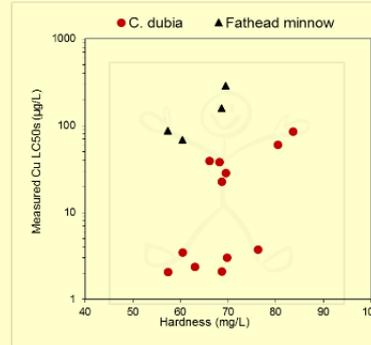
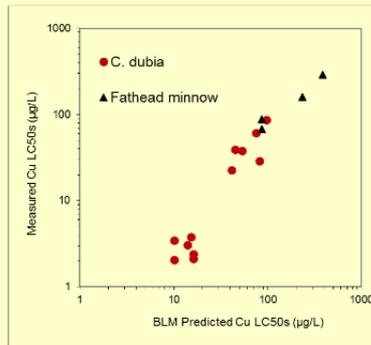
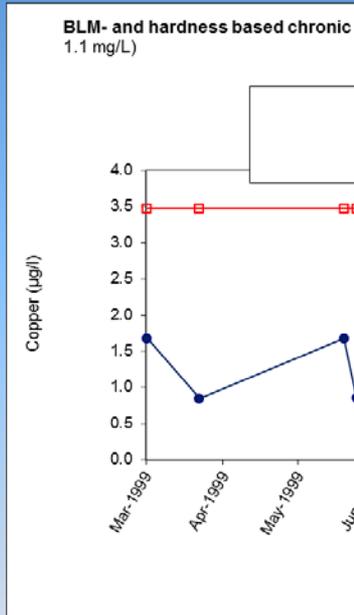
Biotic Ligand Model

Comparison to Hardness-Based

REB - Copper CCC (ug/L)



Performance of Cu BLM & hardness for predicting toxicity to fish and invertebrates in Boise River study



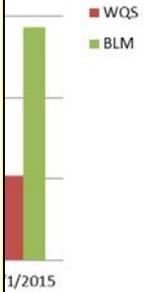
Ceriodaphnia dubia



Fathead Minnow

- BLM predicted actual results fairly well
- Hardness-predicted copper toxicity produced spurious patterns;
- Hardness little better than using a nonsense predictor variable

Data source: Boise River Water Effect Ratio Study, City of Boise, 2002



Biotic Ligand Model

Model overview

Biotic Ligand Model, Version 2.2.4 - Instantaneous WQC and FMB Calculation:

File Edit View Inputs Help

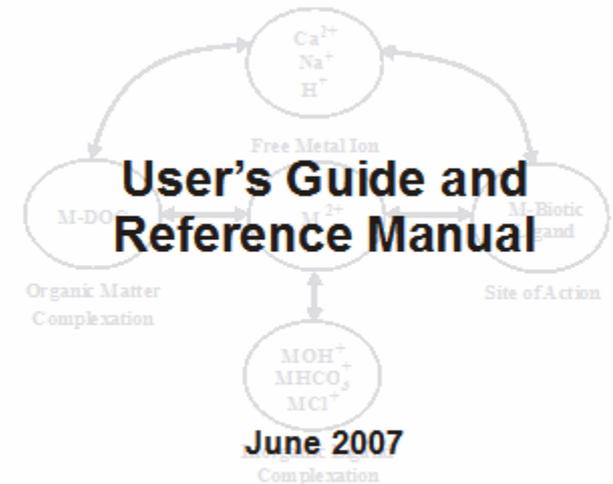
Current Selections
Metal: Copper Prediction Mode: Instantaneous WQC Calculation

	Site Label	Sample Label	Temp. C	pH	Cu ug/L	DOC mg C/L	HA %	Ca mg/L
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
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Input_chemstru

Temperature	pH	Cu
DOC	humic acid*	Ca
Mg	Na	K
SO ₄	Cl	Alkalinity
S*		

Biotic Ligand Model Windows Interface, Version 2.2.3



June 2007
HydroQual, Inc.
10 MacArthur Blvd.
Mahwah, NJ 07430
(201) 529-5151

Criteria

- Draft Rule

Proposed Rule 58.01.02.210.01.

- r. Aquatic life criteria for copper are derived from the Biotic Ligand Model, Version 2.2.3 (June 2007) available at www.deq.idaho.gov, For comparative purposes only, the example values displayed in this table correspond to the model output based on the following inputs: temperature = 15.2°C, pH = 7.9, dissolved organic carbon = 1.9 mg/L, humic acid fraction = 10%, Calcium = 68.9 mg/L, Magnesium = 44.2 mg/L, Sodium = 65.5 mg/L, Potassium = 1.9 mg/L, Sulfate = 2.6 mg/L, Chlorine = 54.5 mg/L, and Hardness = 280 mg/L CaCO₃.

Additional Language to add 58.01.02.210.03.c. Application of aquatic life metals criteria

- Add reference to Implementation Guidance for the Idaho Copper Criteria

June 2, 2016

25

24

Data Requirements

Temperature	pH	Cu
DOC	humic acid*	Ca
Mg	Na	K
SO₄	Cl	Alkalinity
S*		

Data Requirements

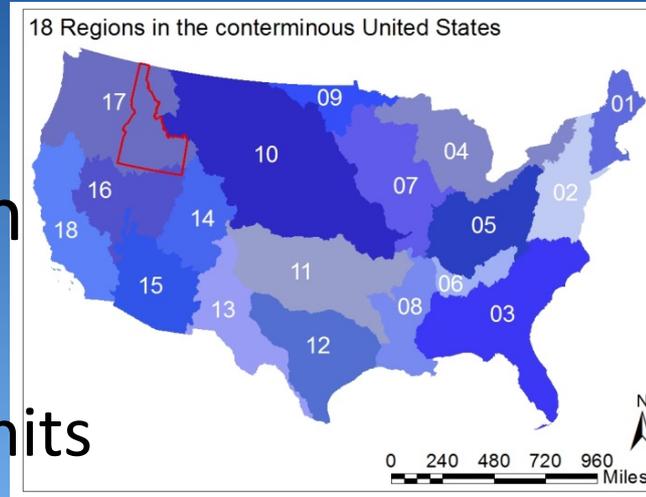
Temperature	pH	Cu
DOC	humic acid*	Ca

Parameter	Analytical Method	Preservative	Holding Time	MDL
Ca, Mg, Na, K	EPA 200.7	4 °C Filter with 0.45 µm filter within 48 hrs Acidify to pH <2 after filtration	6 months preserved	0.1 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
DOC	SM 5310 B	4 °C Filter with 0.45µm filter within 48 hrs Acidify to pH <2 after filtration	7 days	0.1 mg/L
Copper	EPA 200.8	Filter with 0.45µm filter within 48 hrs 4 °C Nitric acid within 2 weeks	6 months preserved	0.001 mg/L

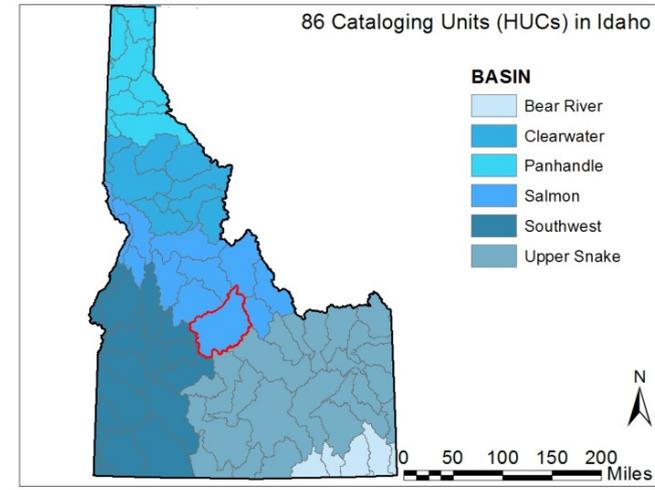
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Data Requirements

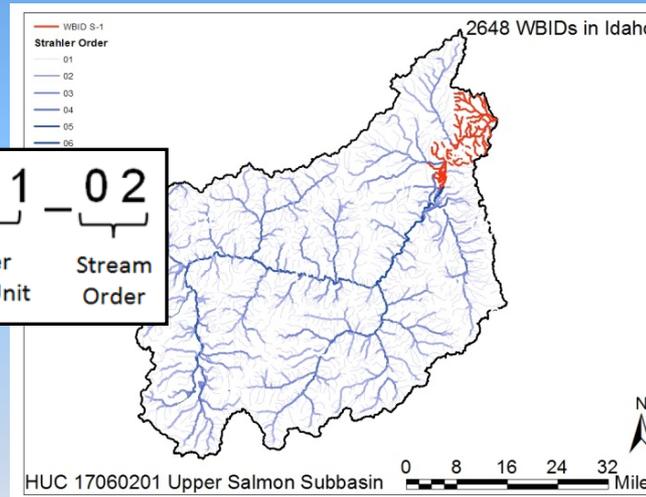
- Spatial Representation
- Propose
- Assessment Units



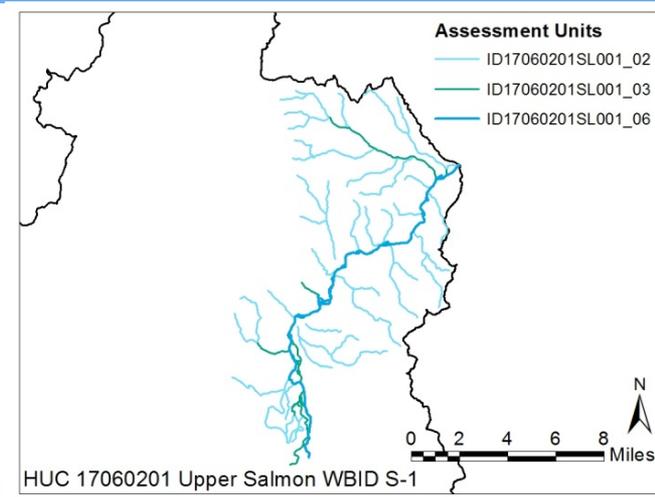
a)



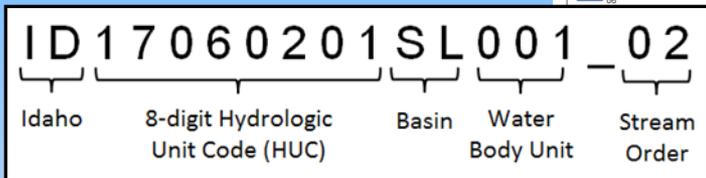
b)



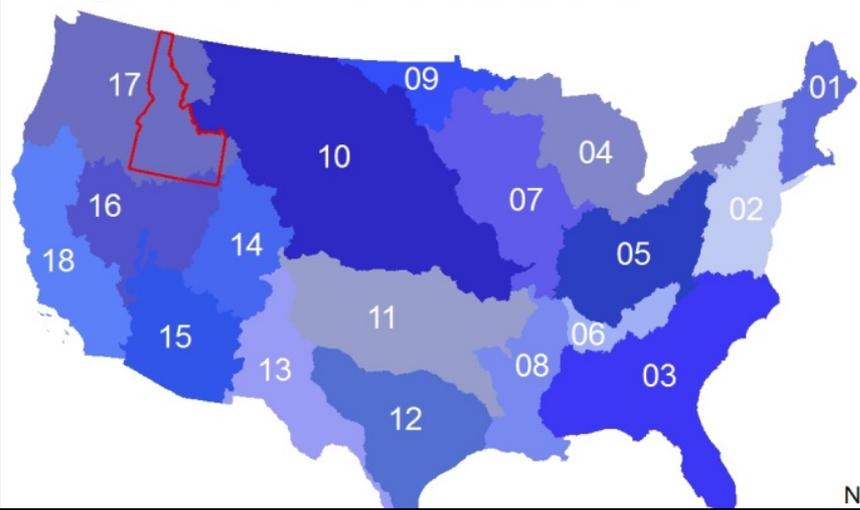
c)



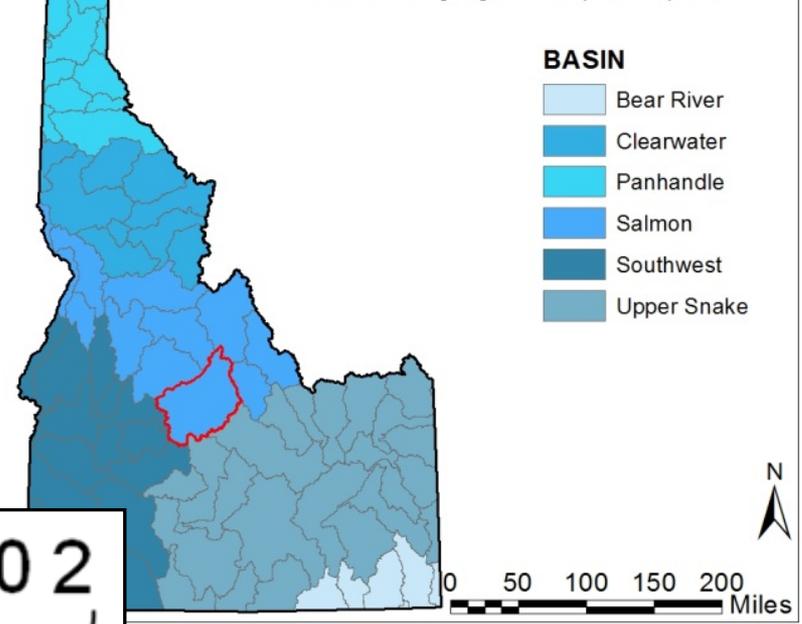
d)



18 Regions in the conterminous United States

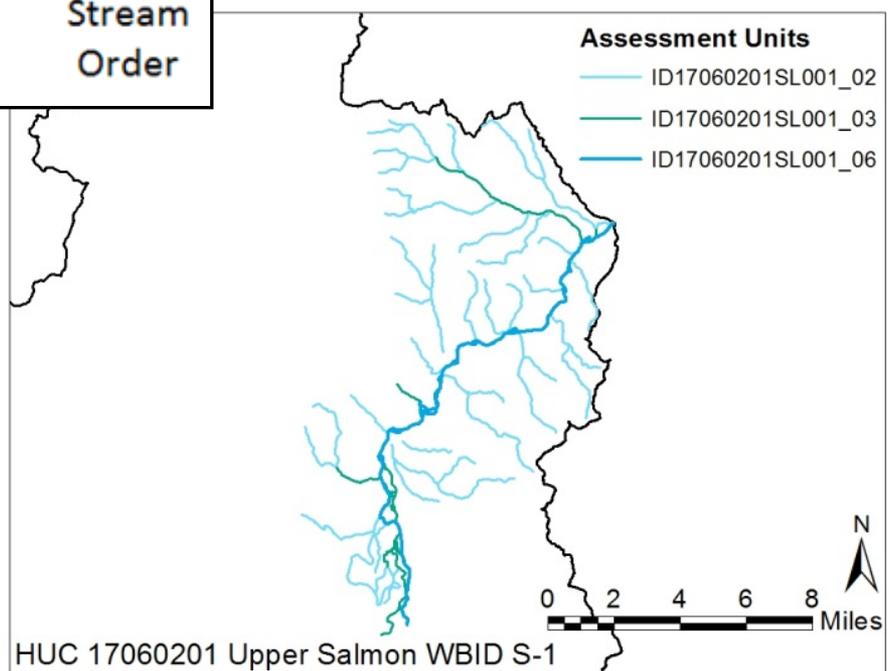
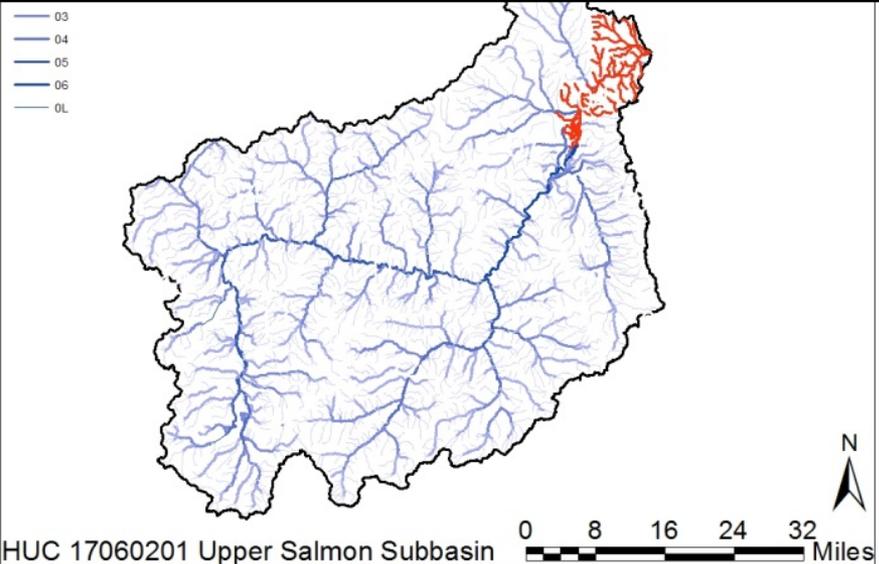


86 Cataloging Units (HUCs) in Idaho

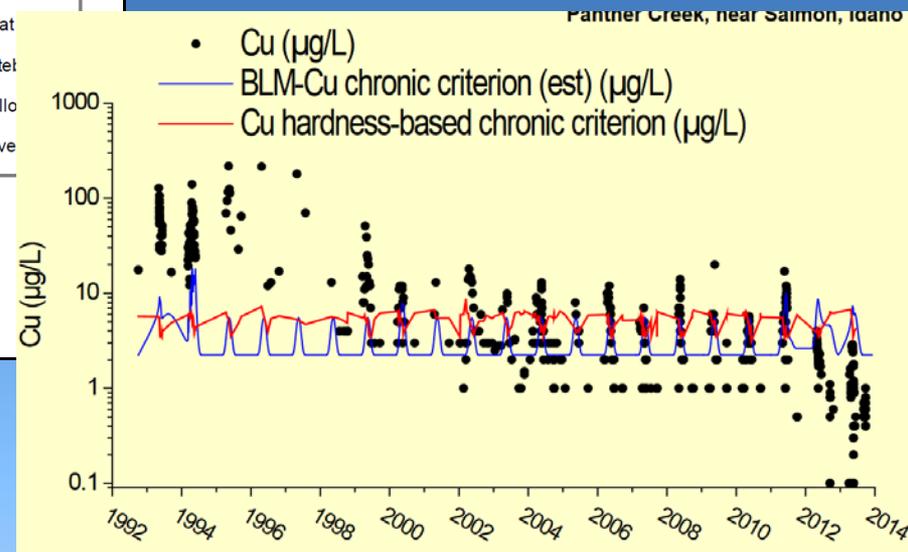
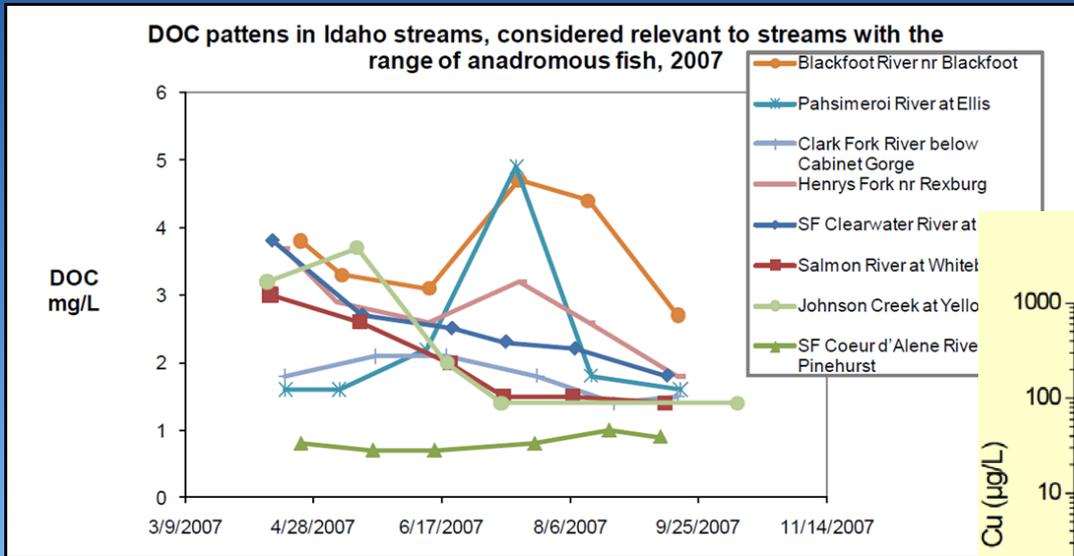


ID 17060201SL001_02

Idaho 8-digit Hydrologic Unit Code (HUC) Basin Water Body Unit Stream Order



Data Requirements



- Temporal Representation
 - Critical time
 - Seasonality

Estimating Criteria when Data are Absent

- Results of monitoring effort...

Calculating NPDES Permit Limits

PROPOSE

- If you have 12 monthly samples:
 - Permit limit based on 15th %ile of IWQCs
 - Allow for flow tiered limits provided sufficient data are available
- < 12 monthly samples:
 - Minimum of IWQCs, require monitoring and revisit when sufficient
- No data:
 - Critical input values based on 2016 monitoring

Assessments - Integrated Report

PROPOSE

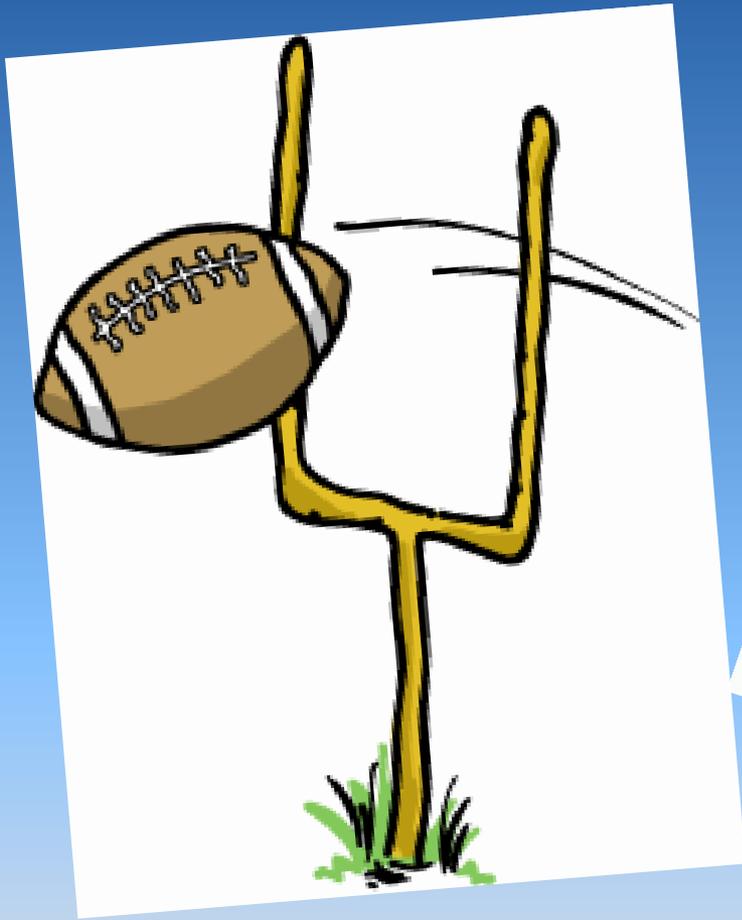
- For any single Cu sample, 1st compare to associated IWQC
- If Cu concentrations are not associated with appropriate BLM data:
 - If reach (Assessment Unit) has sufficient BLM data to derive 12 monthly IWQCs, use statistical method (FMB) to determine if there is a likelihood of exceeding IWQC
 - Collect samples to determine if Cu concentration exceeds any IWQC

Questions?

Monitoring for Inputs to the Biotic Ligand Model—Draft Monitoring Plan



Goals



Parameters

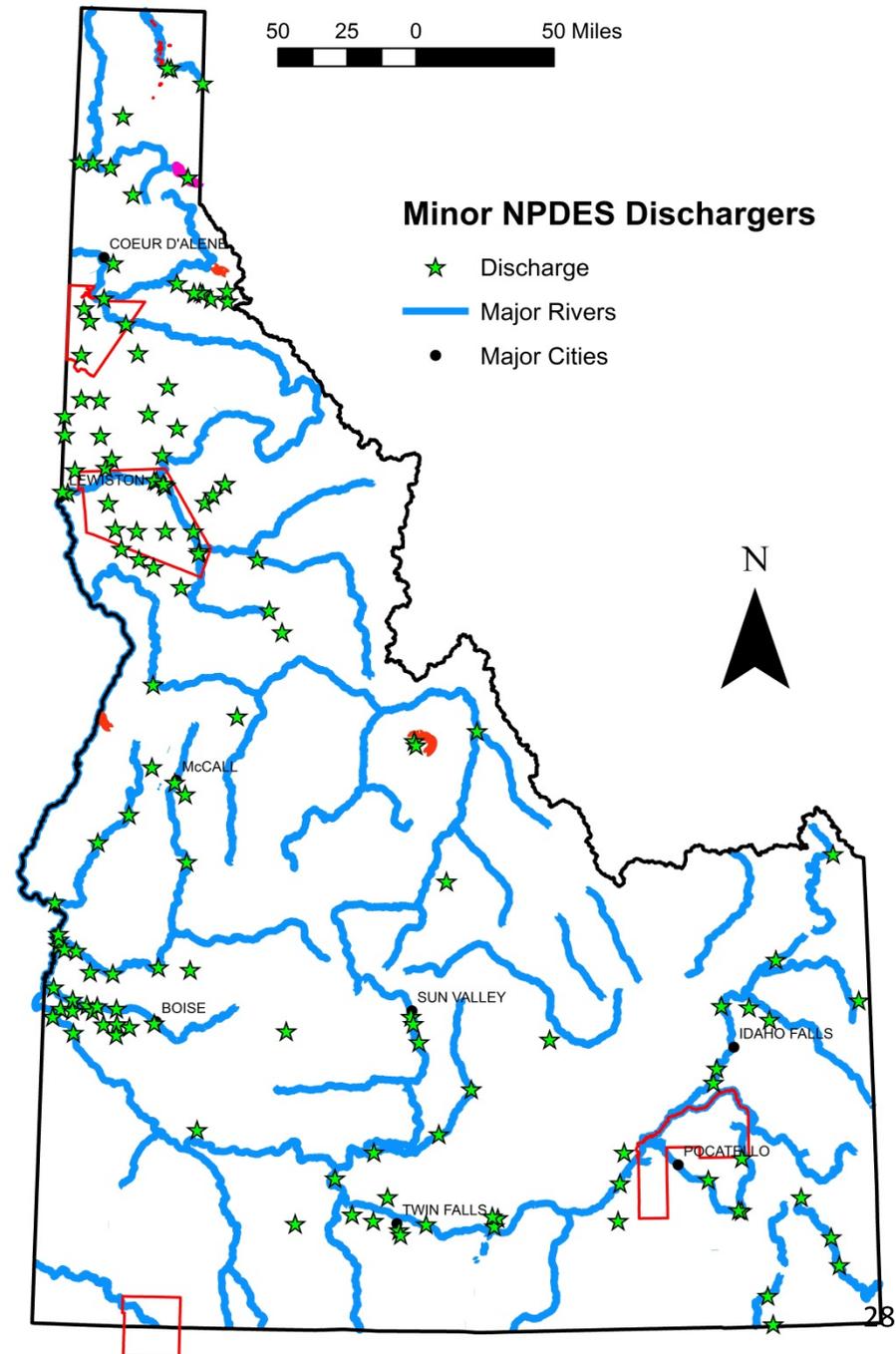
Physical Parameters	Chemical Parameters		
Temperature (°C)	Ca	Mg	Na
pH	K	SO ₄	Cl
Specific conductance ^a	Alkalinity	DOC	Cu
Dissolved oxygen ^a	TN* (TKN+NO ₃ +NO ₂)	TP*	

^a Not a BLM parameter

Site Selection

150 Minor Permits

Upstream and Downstream



Sampling Procedure

- QAPP currently under development
 - Grab sample, well-mixed

Sample Container	Parameter	Analytical Method	Preservative	Holding Time
1L Cubitainer	Ca, Mg, Na, K	EPA 200.7	4 °C Filter with 0.45 µm filter within 48 hrs Acidify to pH <2 after filtration	6 months preserved
	Total phosphorus	SM 4500 PF	4 °C Acidify to pH <2	48 hours
	Total nitrogen (TKN+NO ₃ +NO ₂)	SM 4500 NO/F	4 °C	7 days
	SO ₄ , Cl	EPA 300.0	4 °C	28 days
	Alkalinity	SM 2320 B	4 °C	14 days
250-mL amber glass with TFE septa	DOC	SM 5310 B	4 °C Filter with 0.45µm filter within 48 hrs Acidify to pH <2 after filtration	7 days
500-mL plastic bottle	Copper	EPA 200.8	Filter with 0.45µm filter within 48 hrs 4 °C Nitric acid within 2 weeks	6 months preserved

Questions?

Next Steps

- Finalization of QAPP for monitoring (Aug. 10)
- Monitoring to begin late summer
- Draft Guidance completed late fall, with placeholder for results from monitoring effort
- Data report completed late winter, integrated into guidance in Spring
- Rule and Guidance complete July 2017

