

Update to Copper Criteria for Aquatic Life Use

Guidance Development

Rule Docket No. 58-0102-1502

December 20, 2016

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

Purpose

- Background
- Idaho Aquatic Life Criteria for Copper
- General Implementation Requirements
- Biotic Ligand Model
- Data Requirements- Spatial and Temporal Representation

Purpose (cont'd)

- Reconciling multiple Instantaneous Water Quality Criteria
- Estimating Criteria when data are absent
- Determination of criteria for NPDES Permit Limits
- Identifying impairments for the Integrated Report and targets for TMDL development

1. Introduction



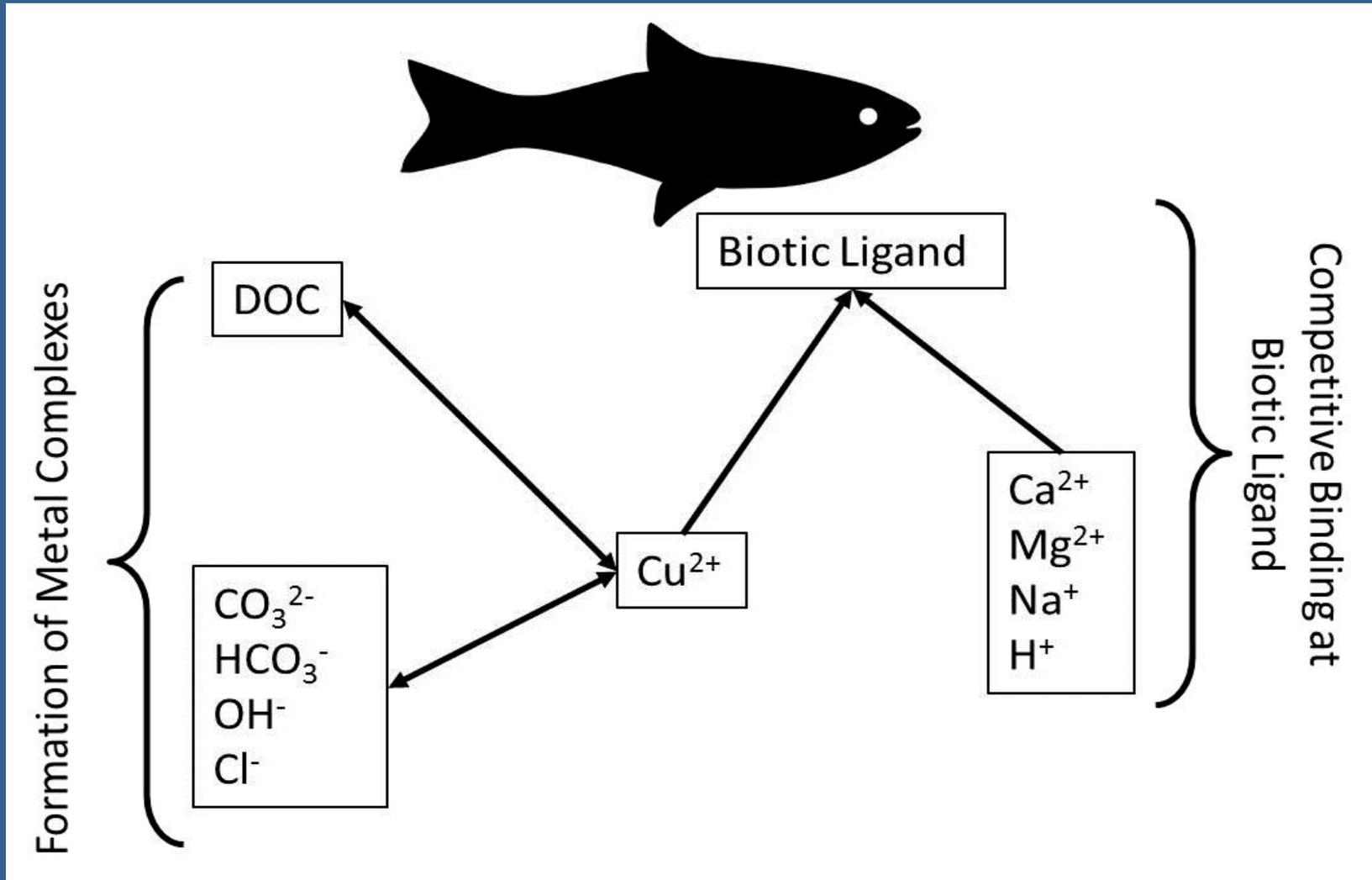
http://www.americanvintagehome.com/plumbing_heating_air_conditioning_information/tag/copper-pipe/

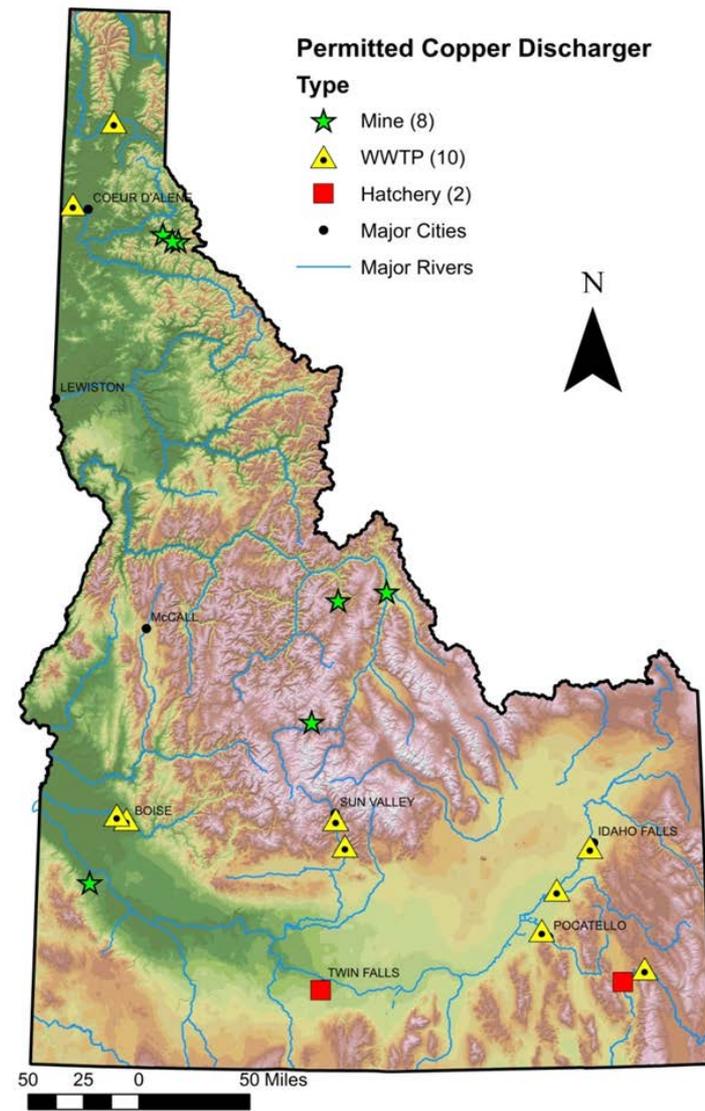
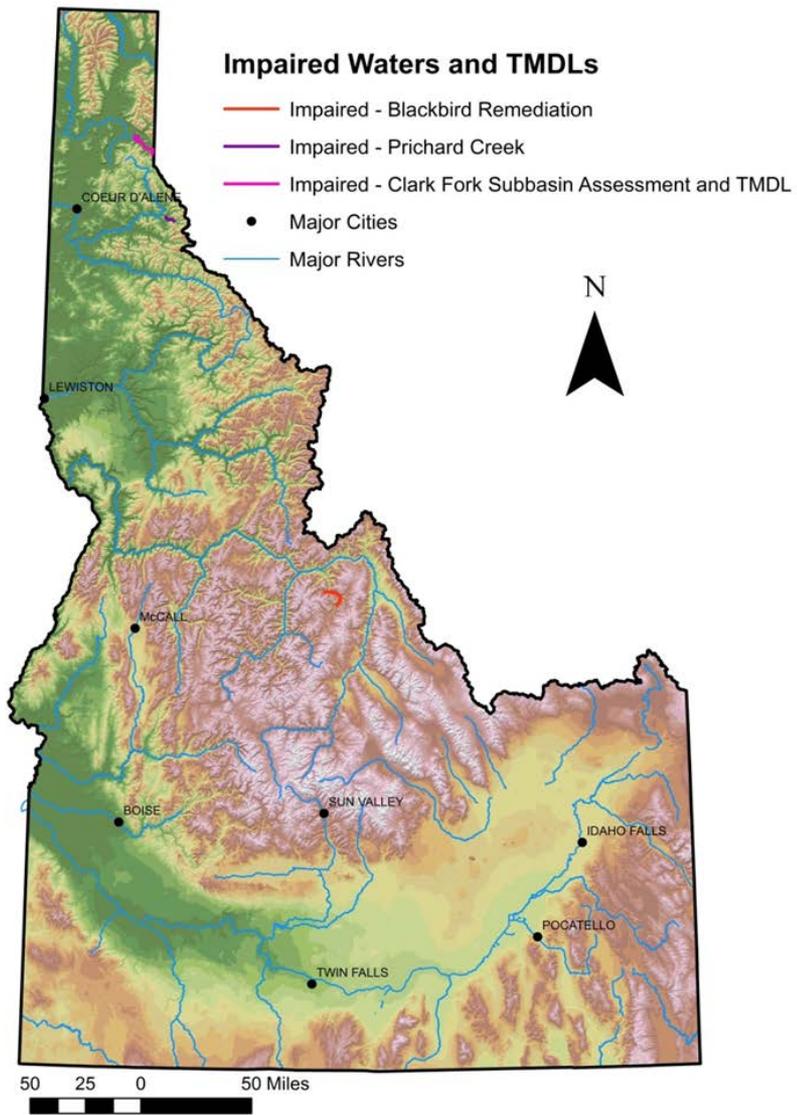


1. Introduction



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2. DRAFT Idaho Aquatic Life Criteria for Copper

A		B Aquatic life	
(Number) Compound	a	b	b
	CAS Number	CMC (µg/L) B1	CCC (µg/L) B2
6 Copper	7440508	19.4 r	12.0 r

Table Footnotes

r. Aquatic life criteria for copper are derived from the [Biotic Ligand Model, Version 3.1.2.37 \(October 2015\)](#), [US EPA WQC Calculation for Copper 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 = 72.6 mg/L, Chlorine = 54.5 mg/L, and alkalinity = 280 mg/L CaCO₃.

Table Footnote r. Effective on the date EPA issues written notification that the revisions adopted under Rule Docket No. 58-0102-1502 have been approved. See Subsection 210.01.d.iii.

3. General Implementation for Aquatic Life Criteria

IDAPA 58.01.02.210.03

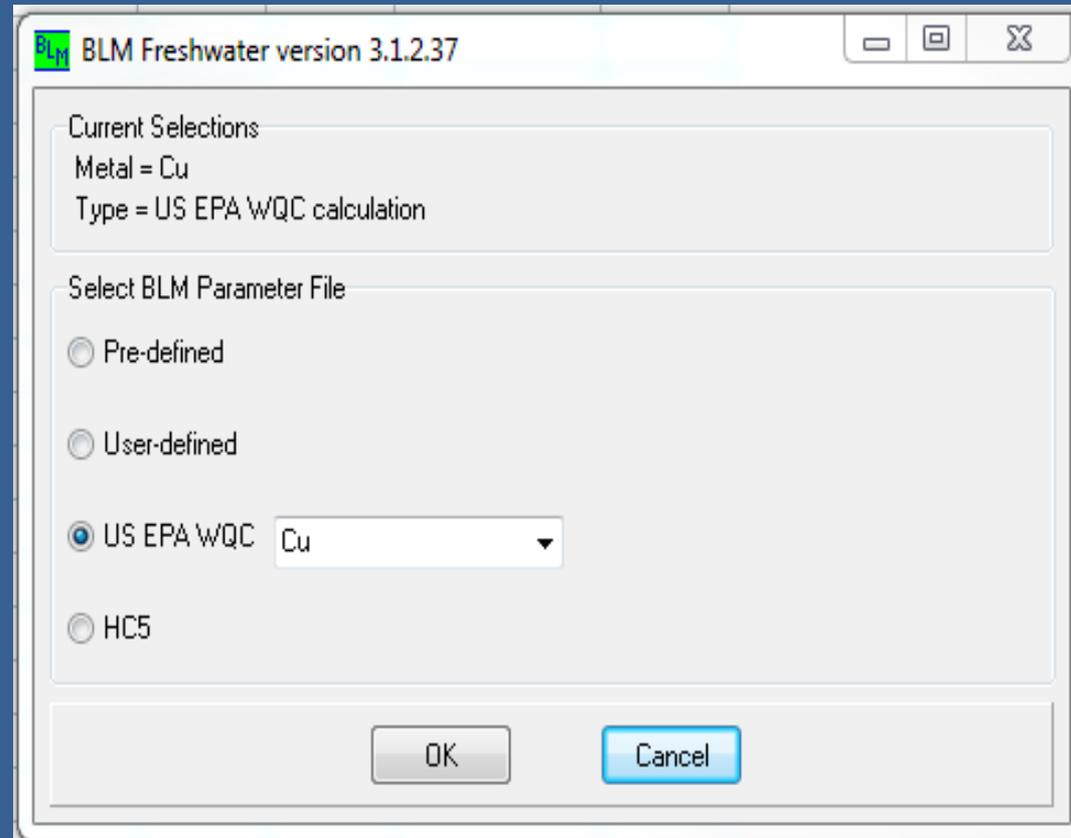
- Criteria apply beyond boundary of regulatory mixing zone (210.03.a)
- Low flow conditions for WQBEL (210.03.b):
 - Acute: 1Q10 / 1B3
 - Chronic: 7Q10 / 4B3
- Criteria expressed as dissolved Cu (210.03.c.iii)
- Duration and Frequency (210.d.i):
 - Acute: 1 hr average, once in three years
 - Chronic: 4 d average, once in three years

3. General Implementation for Aquatic Life Criteria (cont'd)

- Flow tiered limits (400.05)
- Intake credits (400.06)

4. The Biotic Ligand Model

- Overview of use
 - Version 3.1.2.37
 - Set to US EPA WQC



4. The Biotic Ligand Model (cont'd)

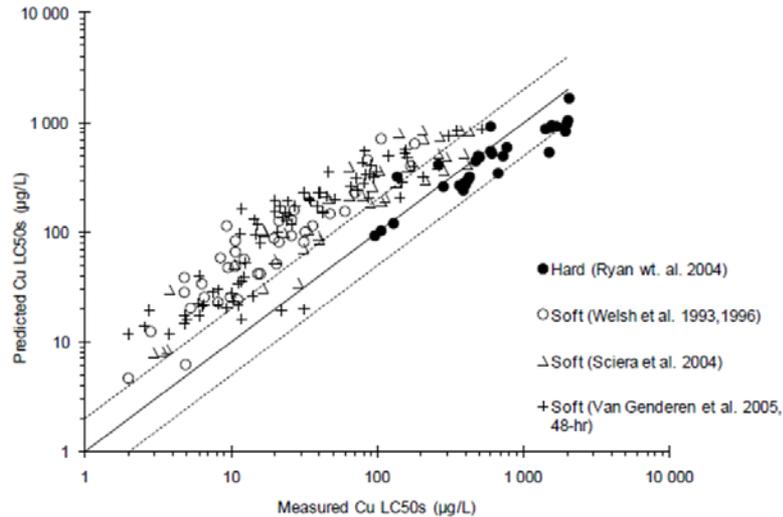


Figure 7. BLM predicted and measured copper LC50s for Fathead Minnows in soft and hard waters (from Appendix C of NMFS 2014).

Comparison to hardness-based: protectiveness

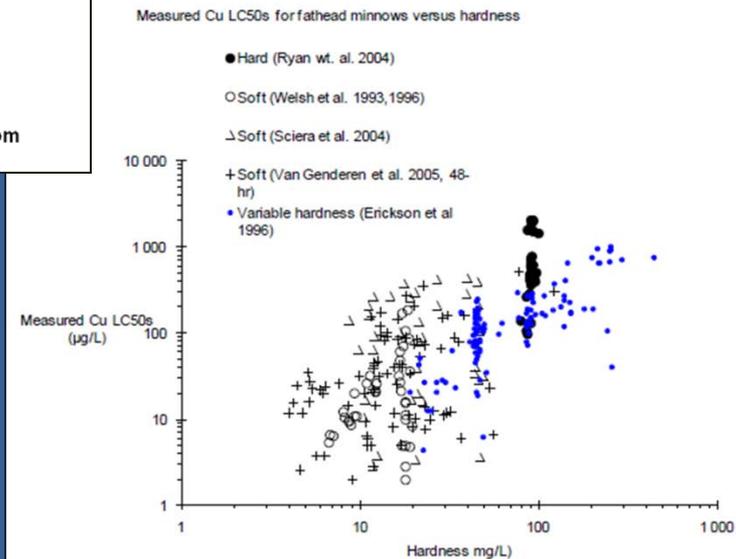
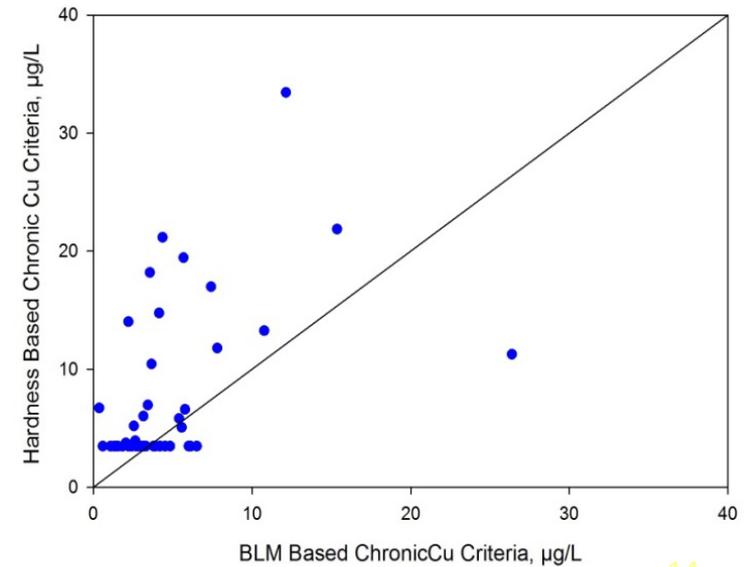
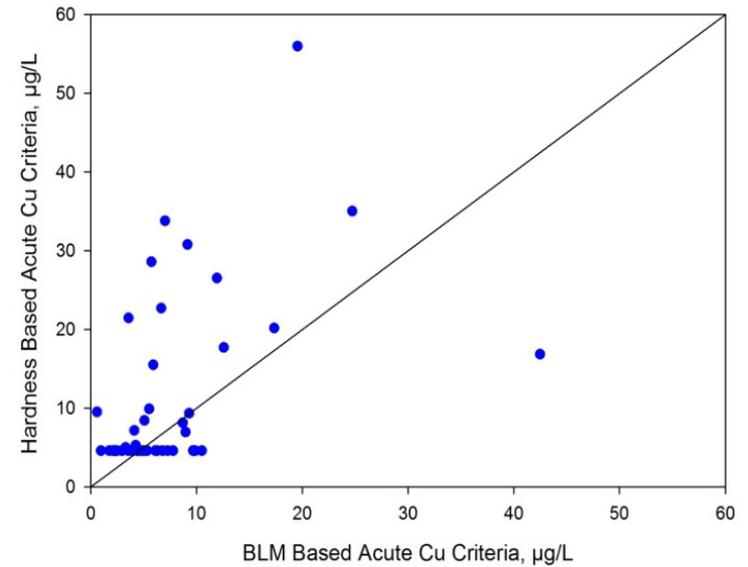


Figure 8. Hardness predicted and measured copper LC50s for Fathead Minnows in soft and hard waters (from Appendix C of NMFS 2014).

4. The Biotic Ligand Model (cont'd)

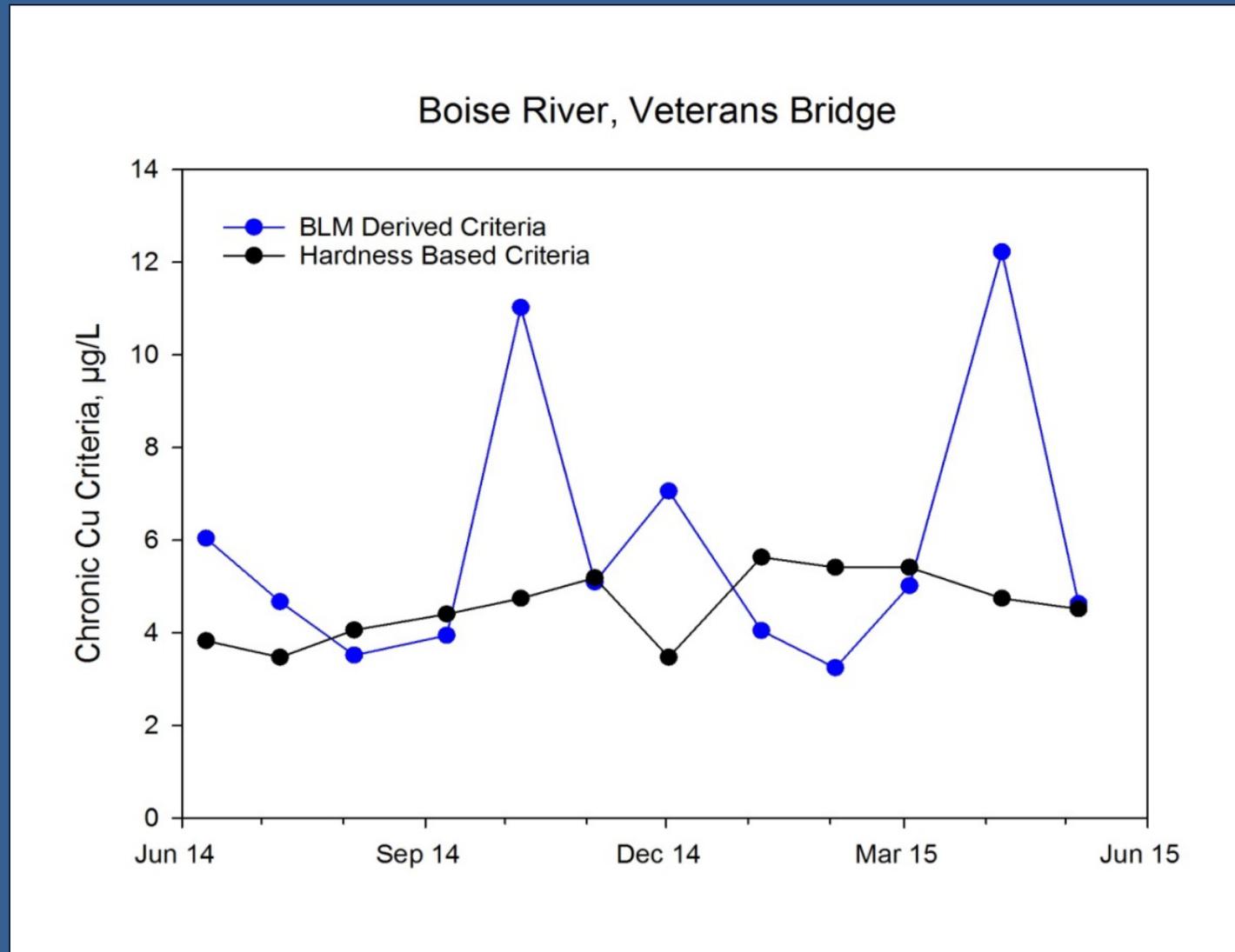
Comparison to hardness-based: stringency

Idaho Statewide Stream Data, Wadeable Stream Assessment



4. The Biotic Ligand Model (cont'd)

BLM vs.
Hardness



5. Data Requirements for Application of the BLM

Parameter	Analytical Method	Preservative	Holding Time	Detection Limit
Temperature and pH	Measured in situ, using properly calibrated equipment	N/A	N/A	N/A
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
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 0.45 µm filter within 48 hrs. Acidify to pH <2 after filtration.	7 days	0.1 mg/L

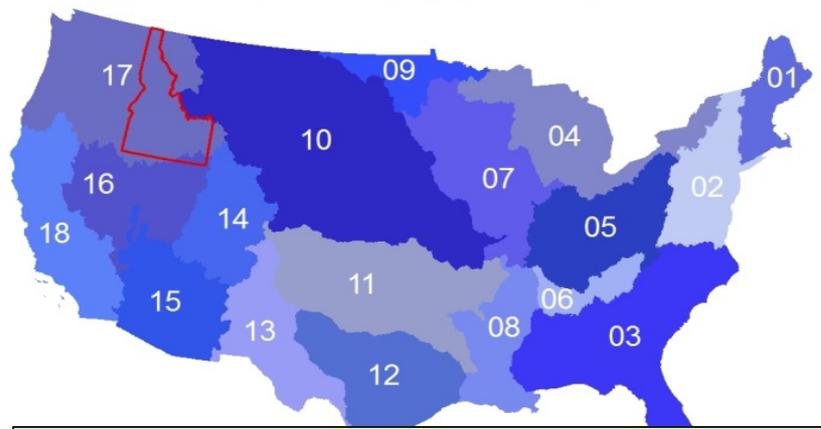
5. Data Requirements for Application of the BLM (cont'd)

- Sulfide and Humic Acid:
 - Default values - near zero (e.g., 1×10^{-10}) and 10%

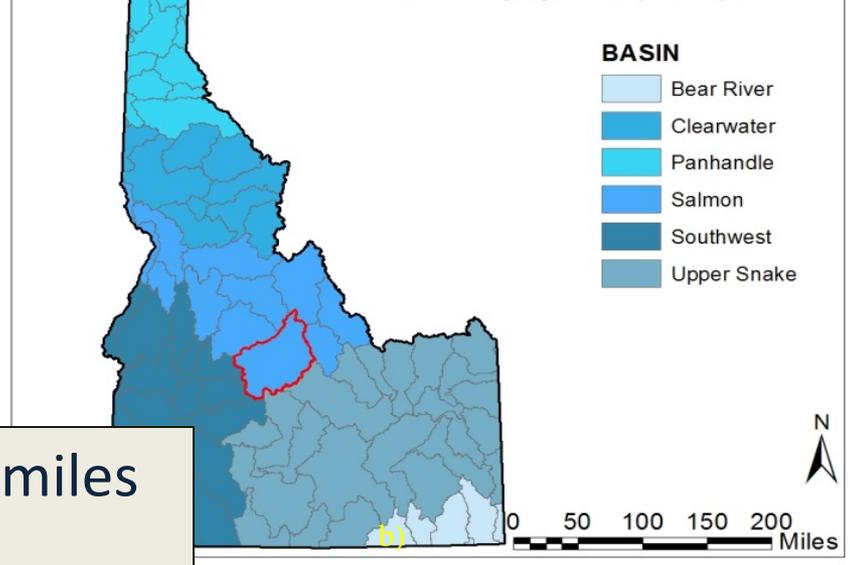
5. Data Requirements for Application of the BLM (cont'd)

- Spatial Representation
 - IR and TMDL- samples will represent Assessment Unit (AU)

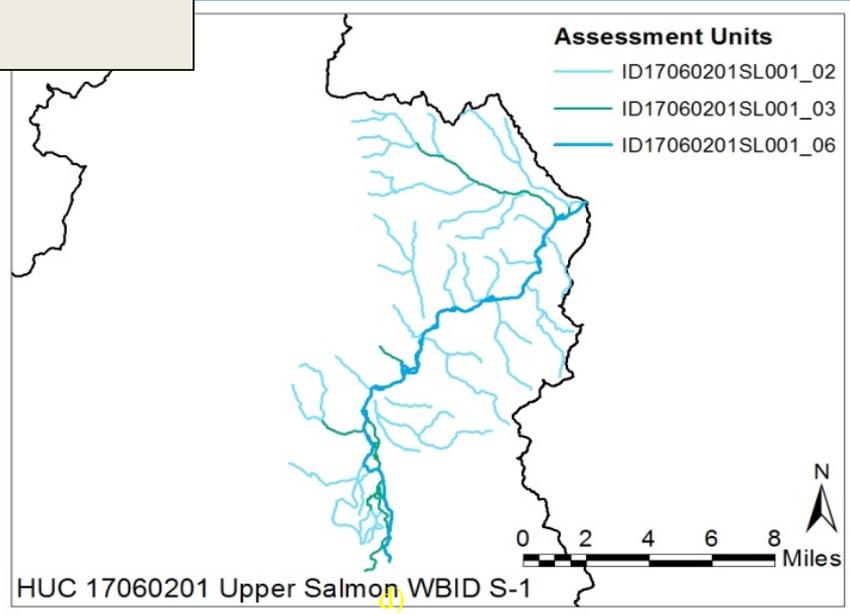
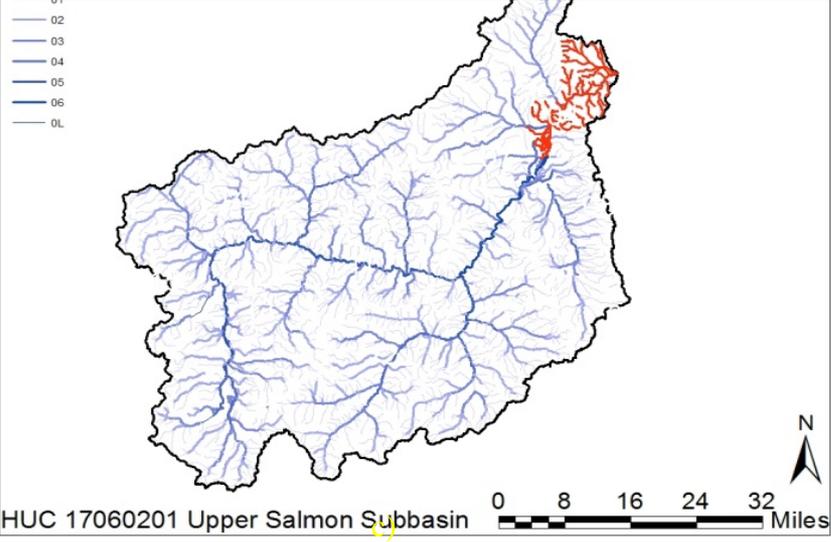
Regions in the conterminous United States



86 Cataloging Units (HUCs) in Idaho



5,754 AUs representing 95,119 miles
 Average- 17.5 miles
 Median- 8.9 miles

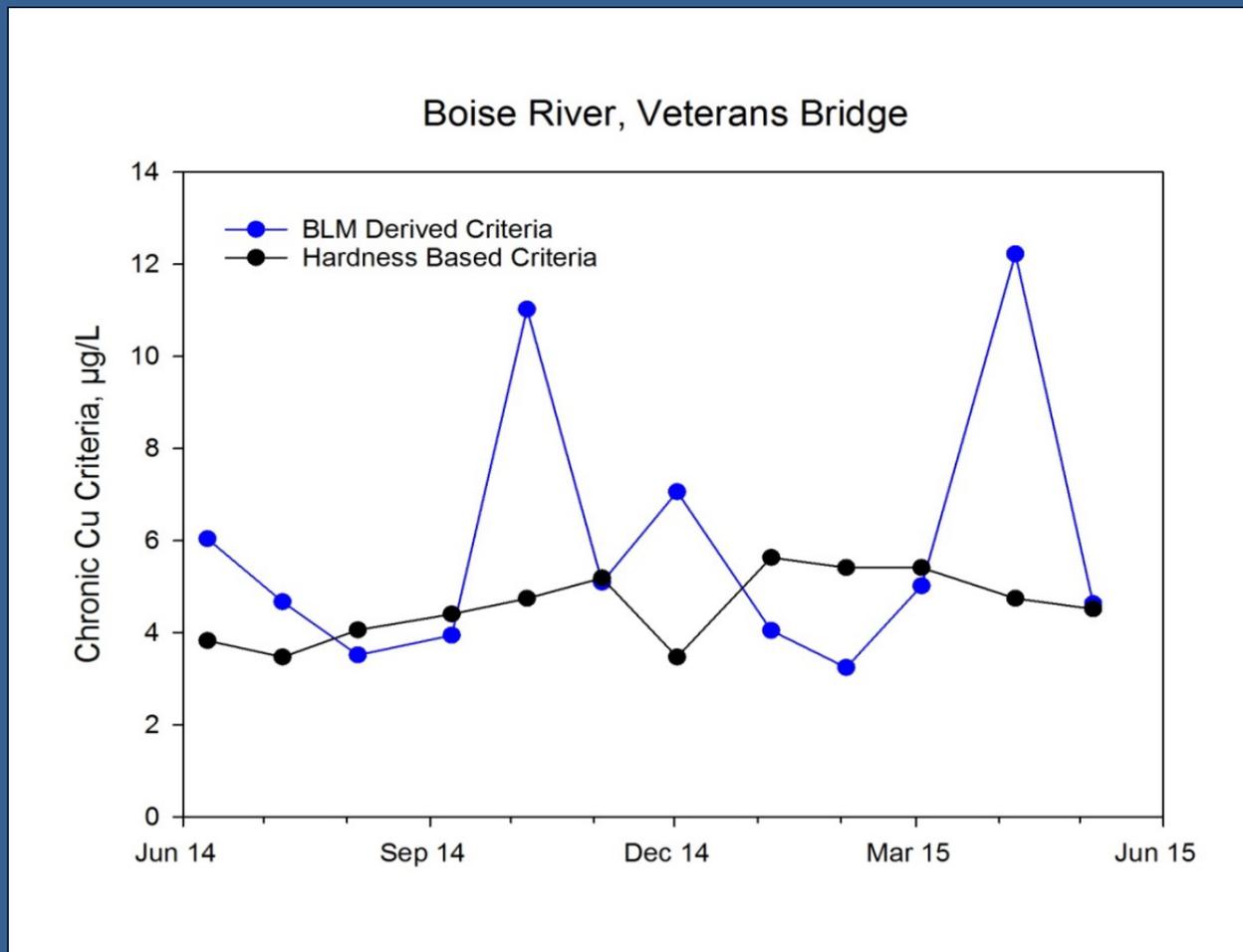


5. Data Requirements for Application of the BLM (cont'd)

- Spatial Representation
 - Calculating Criteria for Effluent Limit Development
 - Downstream of points of discharge, and below any regulatory mixing zone
 - May be used for IR/TMDL, provided they are representative of the AU

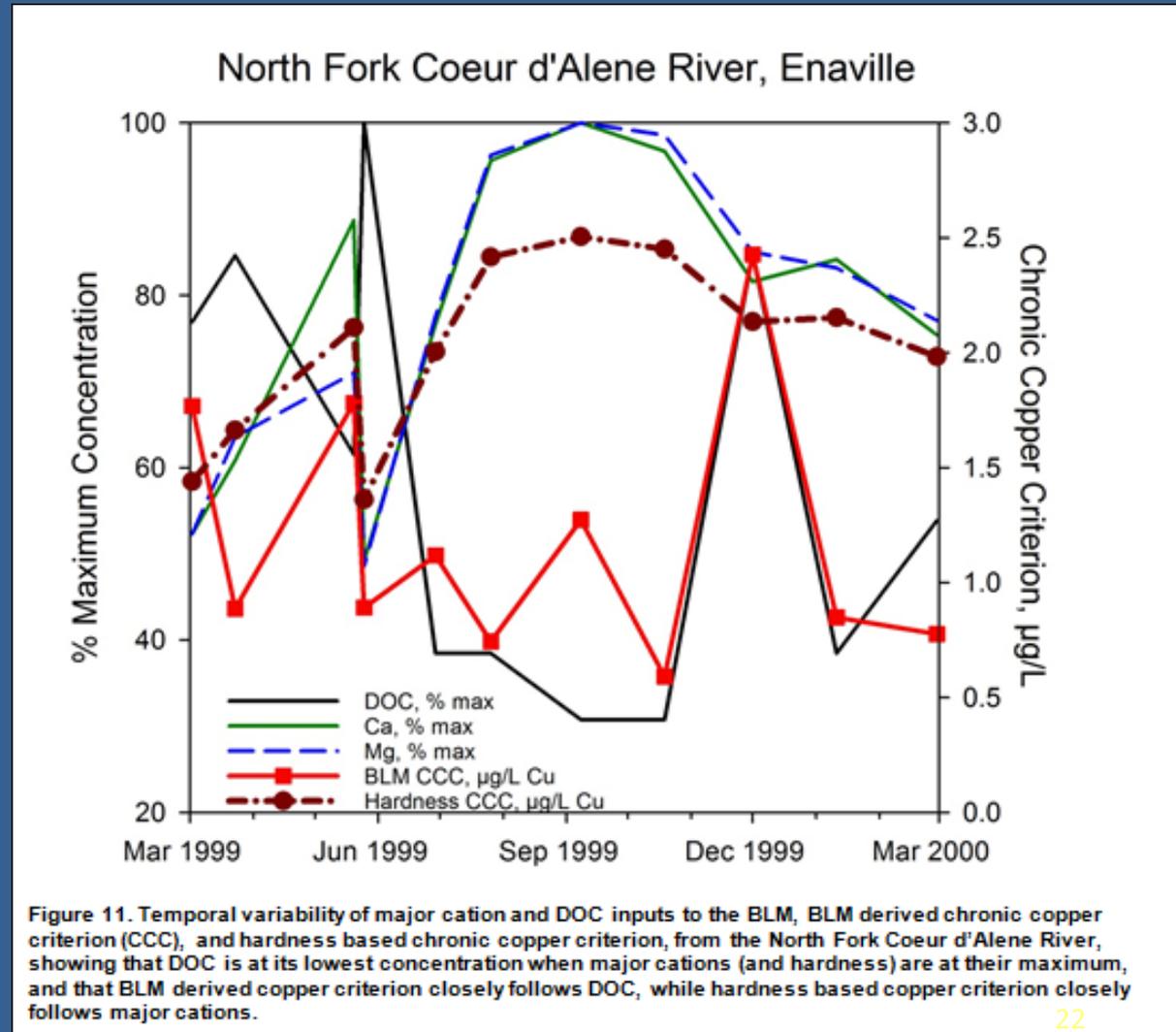
5. Data Requirements for Application of the BLM (cont'd)

- Temporal representation



5. Data Requirements for Application of the BLM (cont'd)

- Temporal representation – Variability of inputs

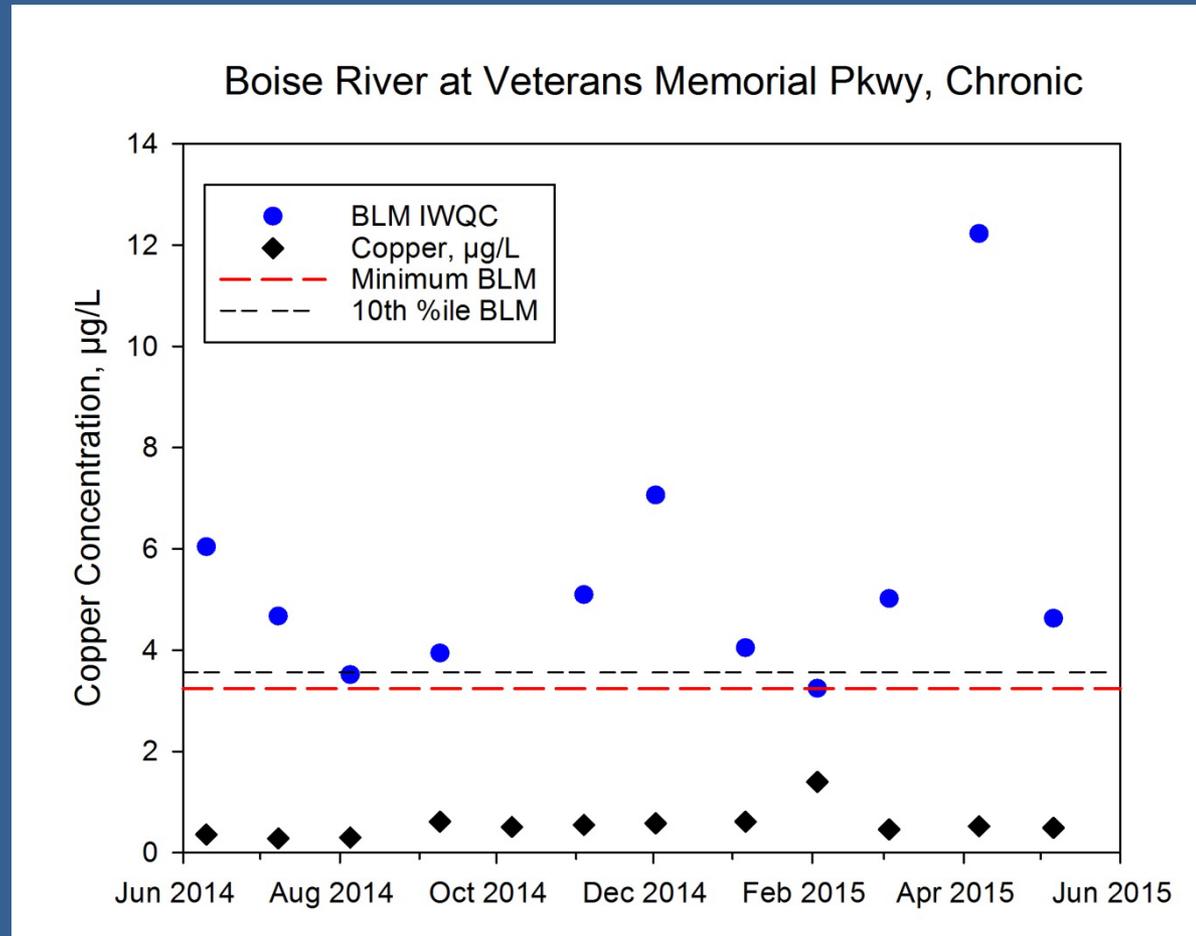


5. Data Requirements for Application of the BLM (cont'd)

- Diel variability: pH and temperature
- Seasonal variability: geochemical ions, DOC
- Critical conditions- lowest DOC
- Recommend at a minimum- 12 monthly samples

5. Data Requirements for Application of the BLM (cont'd)

- Reconciling multiple IWQCs
 - Minimum, low percentile, statistical approach



5. Data Requirements for Application of the BLM (cont'd)

- Seasonal Criteria
 - e.g., 10th %ile of wet season, 10th %ile of dry season IWQCs

6. Estimating Criteria when data are absent

- Estimating input parameters
 - Can be done for geochemical ions, not recommended for DOC or pH
- Critical Conditions
 - RESERVED will be completed based on results of 2016 monitoring effort

7. Calculation of *Criteria* for NPDES Permit Limits

- If you have at least 12 monthly IWQCs:
 - Permit limit based on 10th %ile of IWQCs, and allow for flow tiered limits provided sufficient data are available
- If less than 12 monthly IWQCs:
 - Minimum of IWQCs – critical conditions
- No data:
 - Monitor at least 12 months to characterize water body

8. Identifying Impairments for the Integrated Report

- For any single Cu sample, 1st compare to associated IWQC

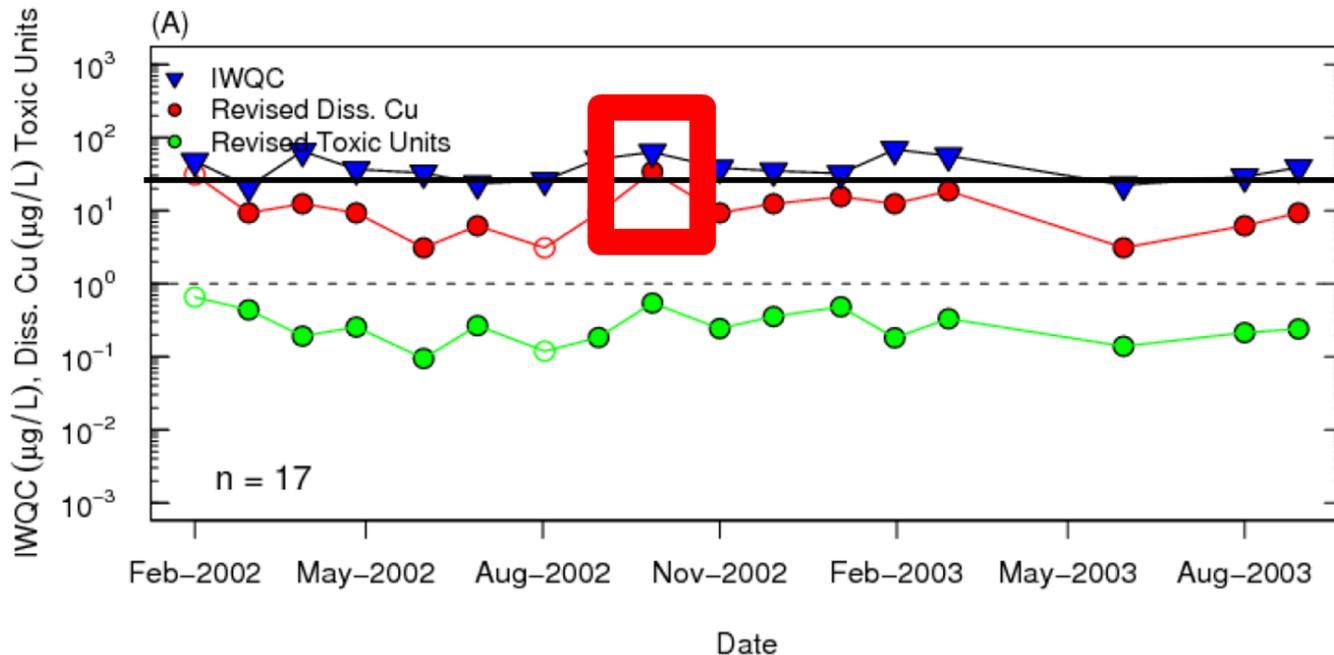


United States
Environmental Protection Agency

Office of Water
4304T

820R12009
April 2012

Calculation of BLM Fixed Monitoring Benchmarks for Copper at Selected Monitoring Sites in Colorado



8. Identifying Impairments for the Integrated Report

- If a single copper sample exceeds its associated IWQC- collect more paired data to determine frequency of exceedance $>1/3$ years
 - 1B3 / 4B3

8. Identifying Impairments for the Integrated Report

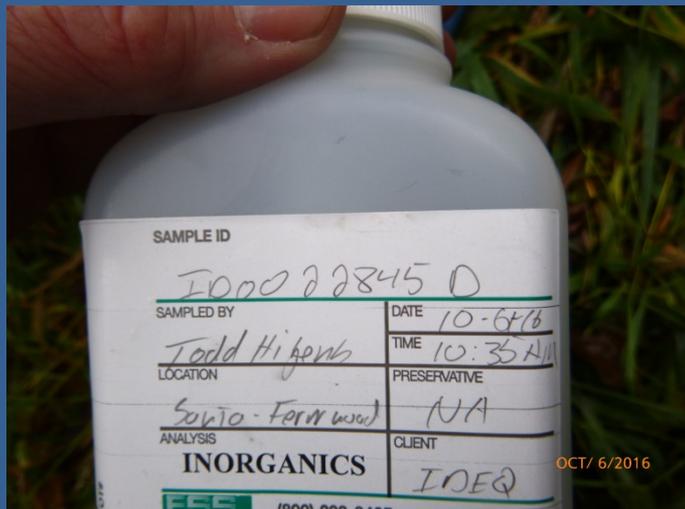
- If Cu concentrations are not associated with appropriate BLM data:
 - Collect samples to determine if Cu concentration exceeds any IWQC
 - Promote need to collect all input data if wanting to evaluate compliance with Cu-BLM criterion

Questions?



Monitoring Project

- Monitoring completed on 154 sites statewide
- Almost all results have been delivered
 - Entering data and results into database- January
 - QA/QC review of data- February
 - Data analysis and synthesis- March
 - Draft Report- April



- Comments on draft guidance:
 - February 3, 2017
- Next Meeting: April 25, 2017
 - Results of monitoring effort
 - Revisions to draft guidance

Questions?

