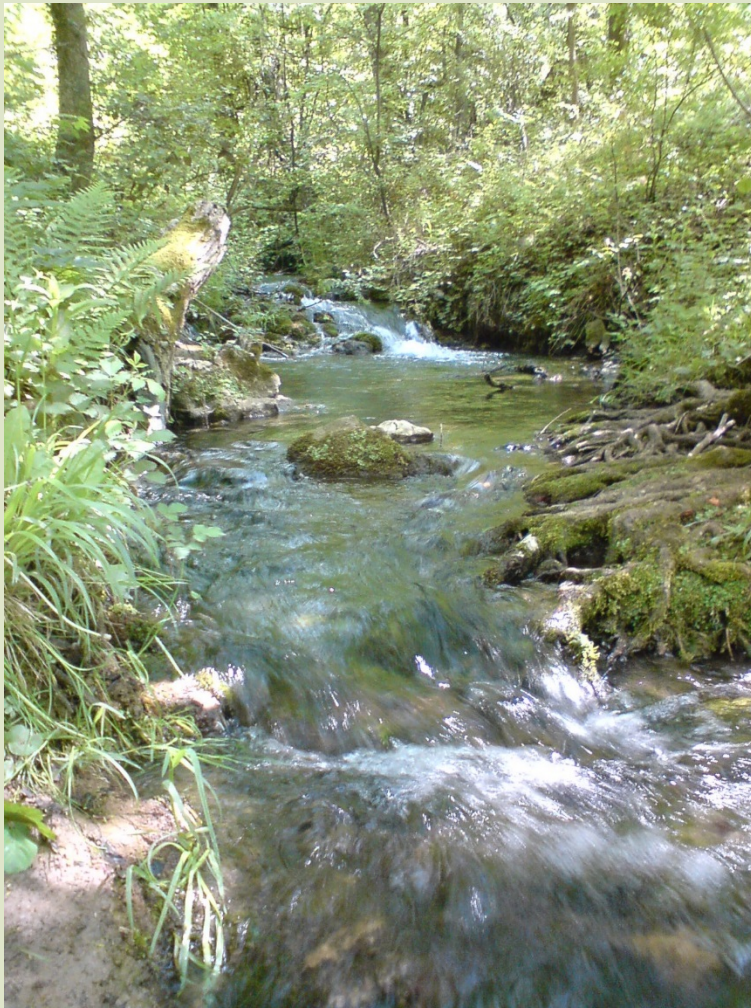


Copper Water Quality Criteria, Data Requirements and Reasonable Potential Analysis

April 6, 2017

Presentation Topics



- Review of Water Quality Standard
- Data Requirements
- Reasonable Potential Analysis

Why revise the copper standard?

The proposed copper standard:

- Will protect freshwater organisms
- Incorporates newer science and is more accurate – the Biotic Ligand Model
- Responds to EPA disapproval
- The Environmental Protection Agency and the National Marine Fisheries Service recommend the Biotic Ligand Model

EPA Disapproval: Jan. 2013

COPPER

- Hardness-dependent criteria are potentially under-protective or overly stringent, depending on ambient water chemistry
- 2004 criteria did not adequately protect some vulnerable salmon life stages

Remedy: Adopt 2007 recommended criteria: “acute and chronic criteria concentrations calculated by the Biotic Ligand Model”

Sources of Copper

- **Municipal wastewater**
 - Water distribution system pipes
 - Commercial / industrial inputs
- **Manufacturing wastewater**
 - Metal / electrical
- **Runoff**
 - Asphalt / Roofing materials
 - Roads (brake pads)
 - Agricultural / residential pesticides
 - Marine anti-fouling paint
 - Wood preservatives
- **Mining / erosion**
 - Naturally occurring earth metal

Performance-based criterion

- The BLM as performance-based approach
 - DEQ adopts the BLM and procedures
 - EPA approves the method
 - Results are predictable and repeatable
- Each model run derives acute and chronic instantaneous WQ criteria (IWQC) based on the water chemistry conditions at a particular site and time

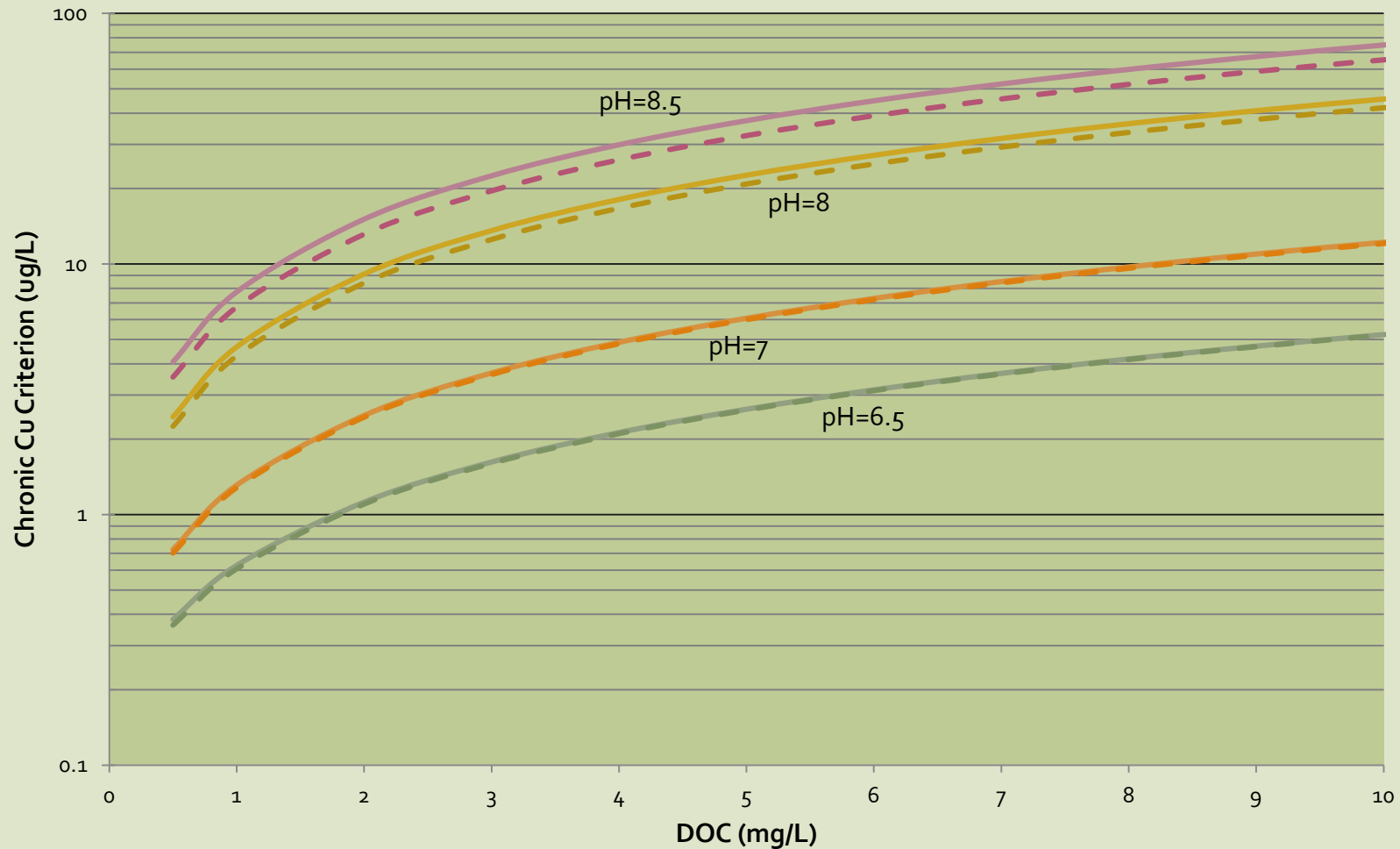
BLM Input Parameters

- Do not need Cu data to derive criteria
- Need measured values for 10 input parameters
- Based on dissolved parameters

13 BLM Input Parameters
temperature
pH
dissolved organic carbon (DOC)
calcium (Ca)
magnesium (Mg)
sodium (Na)
potassium (K)
sulfate (SO ₄)
chloride (Cl)
alkalinity
<i>humic acid fraction (model default value)</i>
<i>sulfide (model default value)</i>
<i>inorganic carbon (model default value)</i>

BLM Input Parameters

Chronic Copper Criterion



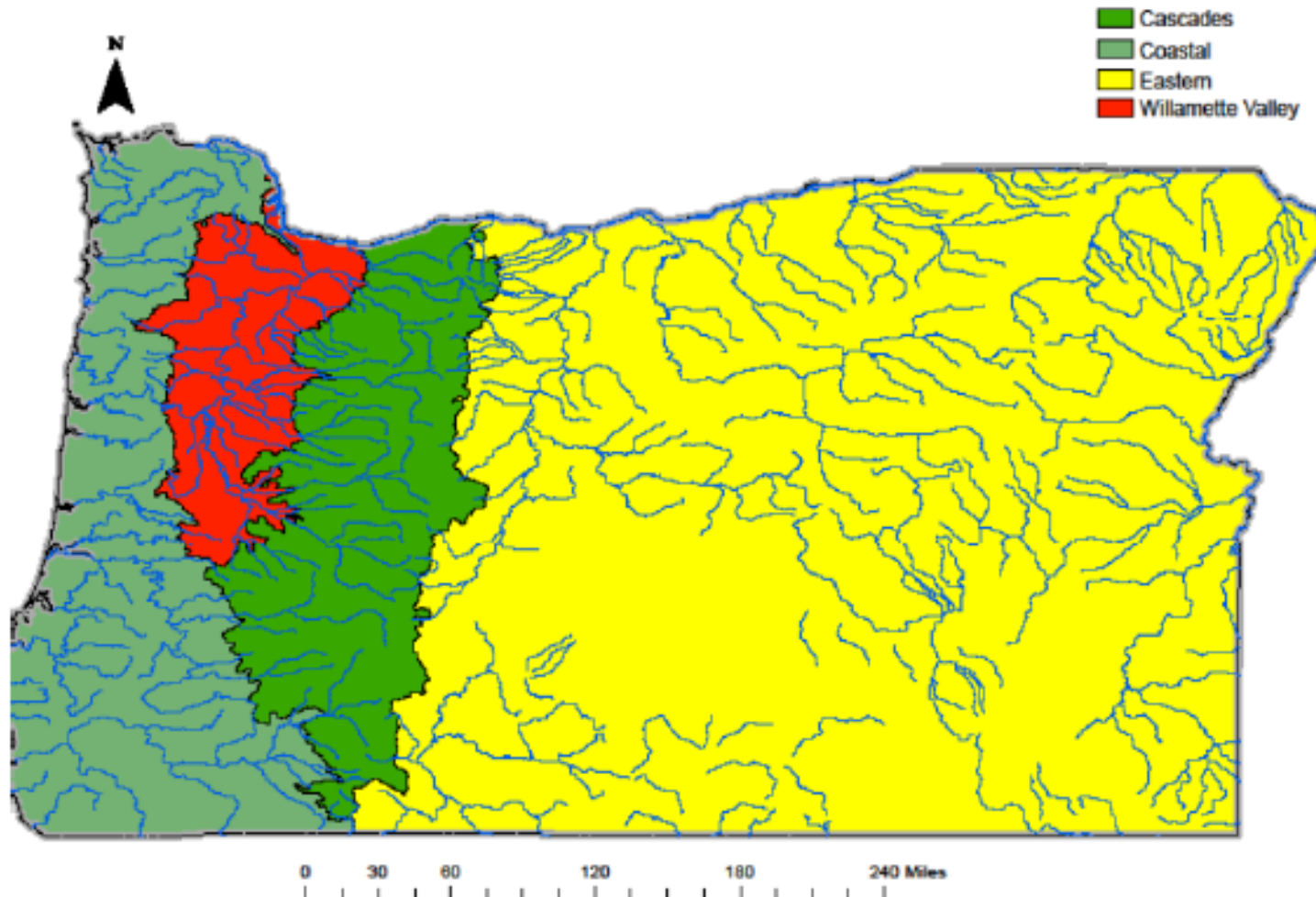


Input Parameter Substitution

- DOC: $DOC = 0.83 \times TOC$ or site specific DOC/TOC conversion
- Conductivity regression equations (alkalinity, calcium, chloride, magnesium, potassium, sodium, sulfate)
 - EPA still recommends the use and collection of all ions as approved in the Oregon standard
- pH: use a representative pH value
- Temperature: – use a monthly mean temperature
- Humic Acid: can use site specific rather than default 10 percent

Default Action Values

Regional Map for copper biotic ligand model default values



Default Action Values

DOC, Alkalinity and Ions

Table N-2. Percentile of data distribution to be used as default value by region

Region	DOC percentile	Alkalinity and ions percentile
Willamette	20 th	20 th
Coastal	20 th	20 th
Cascades	20 th	20 th
Eastern	15 th	15 th
Columbia River	20 th	20 th

Regional default input values

PARAMETERS	Cascades	Coastal	Columbia River	Eastern	Willamette Valley
DOC (mg/L)	0.51	0.83	1.41	1.35	1.25
Calcium (mg/L)	2.6	4.2	15.9	5.5	6.3
Magnesium (mg/L)	0.88	1.48	4.06	2.36	2.20
Sodium (mg/L)	1.9	4.3	3.7	4.4	4.2
Potassium (mg/L)	0.39	0.46	0.93	1.43	0.70
Sulfate (mg/L)	0.25	1.90	9.88	1.31	2.02
Chloride (mg/L)	0.59	3.14	1.64	0.82	3.60
Alkalinity (mg/L)	13	29	55	48	30



Permittee Monitoring Requirements

- Paired Data Sets
- QA/QC
- Reasonable Potential Process



Permittee Monitoring Requirements

- Paired Data Set
 - Monthly monitoring for 2 years
 - Effluent and ambient
 - Same day collection
 - 24 monthly effluent and ambient paired data sets
 - Captures seasonal and annual variability

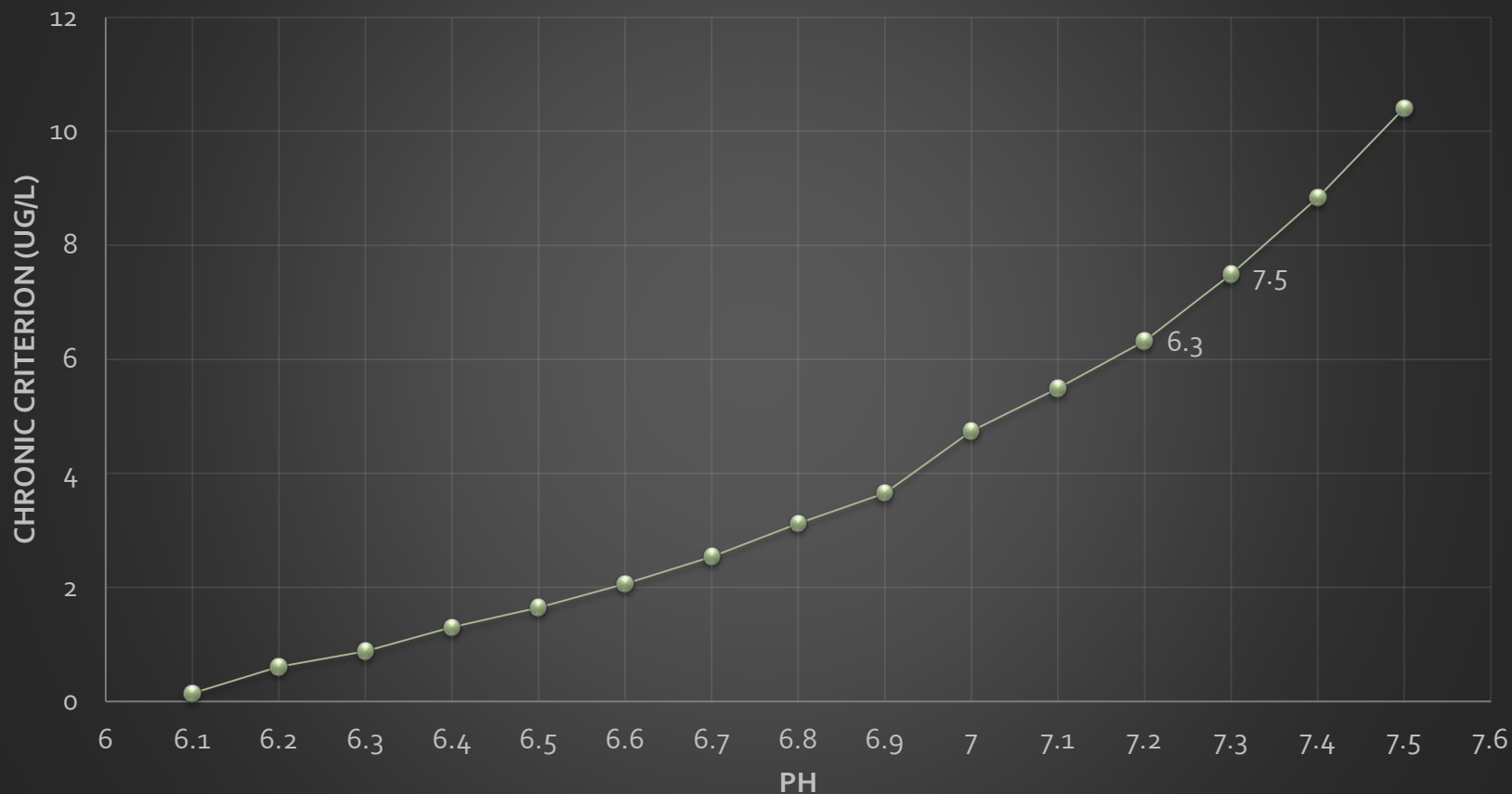


Permittee Monitoring Requirements

- QA/QC is Very Important
 - Ultra clean methodologies for copper sampling
 - Small changes in pH can alter the criterion

Permittee Monitoring Requirements

Chronic Criterion
pH vs Criterion







Reasonable Potential Analysis Process

- Interim Methodology – limited data sets
- Future Methodology– full paired data sets

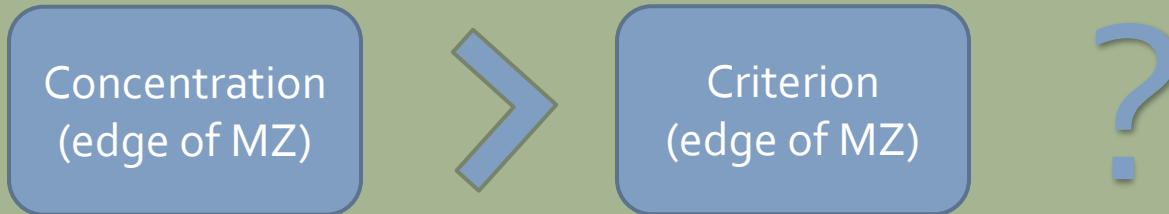


Reasonable Potential Analysis Process

- Interim Process – limited data sets
 - Similar to traditional RPA process based on EPA methodology
 - Critical case conditions
 - Compare worst-case effluent concentrations to lowest criterion

Reasonable Potential Analysis Process

- **PROPOSED** Future Methodology
 - Paired analysis



- 24 analyses



Key Takeaways

- BLM is most sensitive to pH and DOC
- Start collecting paired data sets
- Develop a strong QA/QC program
- DEQ is working with EPA on copper RPA methodology for paired data sets
- Permit issuance won't be delayed due to lack of data