Developing a Selenium Criterion: Lake Koocanusa

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Meeting Objectives

1) Provide background on developing selenium criterion for Lake Koocanusa

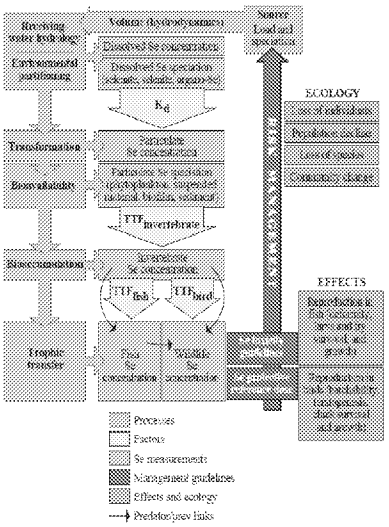
2) Present steps in selecting selenium egg/ovary levels of protection

3) Discuss and solicit feedback on selenium egg/ovary levels of protection

Data collected at Rexford and Tenmile (Forebay)

- Water chemistry
- Sediment
- Turbidity profiles
- Fish tissue
- Periphyton
- Zooplankton
- Benthic & surface insects
- Suspended particulate

Data collected by:
MFWP, USACE, USFWS, USGS



Workplan for Developing a Site-specific Se Water Column Criterion

Goal: to derive a site-specific water-column selenium criterion for Lake Koocanusa that protects all fish species in the ecosystem

The site-specific criterion will:

- Consider ecologically significant species and those important to stakeholders
- Protect 100 % of the fish species in the reservoir assuming a reproductive endpoint from reproductively mature females that are feeding in an ecosystem that functions as a lentic reservoir
- Provide long-term protection for fish in all parts of the reservoir
- Protect the ecosystem during maximum dietary exposure
- Protect downstream uses including protection of endangered Kootenai River white sturgeon

Developing a Site Specific Water Column Selenium Criterion

1) Establish an Egg/Ovary Concentration

Risk decision – what fish do you want to protect and at what level of protection?

2) Run the selenium model for various scenarios

Modeling process – i.e., identify appropriate data, evaluate data, run statistics, use the EPA/USGS selenium model

3) Develop a range of protective water column values

Statistics process – compile the results of the model runs and include uncertainty factors

4) Select a protective water column value

Policy decision – select a protective number to adopt as the selenium water column criterion

Considerations for Selecting an Egg/Ovary Value

- Egg/ovary selenium toxicity values are derived from laboratory toxicology studies, usually conducted to an Effect Concentration 10% (EC_{10})
- Studies are published in the literature for multiple fish species
- Regulators can use the literature to calculate protective selenium egg/ovary values to meet their specific goals

Peer reviewed Selenium Egg/Ovary values

- **EPA: 15.1 µg/g –** designed to protect 95% of fish and invertebrate populations in the U.S.
- **B.C.: 11 µg/g –** Designed to protect sensitive species populations in B.C., with an uncertainty factor of 2
- **Lemly: 10 µg/g**
- **USFWS: 11 µg/g –** Joe Skorupa recalculated the EPA criterion to protect 100% of populations and derived a number close to 11 µg/g (*note: unpublished document – publication pending*)
- *Note: there are many other recommended values in the literature*

Selecting a Protective Egg/Ovary Value

- U.S. Federal Partners and MDEQ's suggested FOUR selenium egg/ovary alternatives:
  - *Alternative 1:* the model-derived water-column criteria will provide a level of protection expected to ensure that **the maximum value of any individual of any species in the lake** will not exceed the BC egg-ovary criterion of 11.0 mg Se/kg.
  - *Alternative 2:* the model-derived water-column criteria will provide a level of protection ensuring that **the *population value for any species in the lake*** will not exceed the BC egg-ovary criterion of 11.0 mg Se/kg.
  - *Alternative 3:* the model-derived water-column criteria will provide a level of protection expected to ensure that **the maximum value of any individual of any species in the lake** will not exceed the USEPA egg-ovary criterion of 15.1 mg Se/kg.
  - *Alternative 4:* the model-derived water-column criteria will provide a level of protection expected to ensure that **the *population value of any species in the lake*** does not exceeds the USEPA egg-ovary criterion of 15.1 mg Se/kg.

Next Steps

- Discuss egg/ovary levels of protection and answer any questions
- Providing feedback to us on levels of protection
  - MDEQ will document any comments on the proposed levels of protection
  - Please provide feedback by May 3
  - If submitting feedback in a written format please send to: Lauren.Sullivan@mt.gov