

# **Selenium Water Quality Standards for the Protection of Aquatic Life Beneficial Use for Lake Koocanusa & the Kootenai River**

**Board of Environmental Review  
December 11, 2020**

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# Today's rulemaking

## ARM 17.30.602 DEFINITIONS

"Steady state" means, for the purposes of [NEW RULE I], conditions whereby there are no activities resulting in new, increasing, or changing selenium loads to the lake or river aquatic ecosystem, and selenium concentrations in fish living in the aquatic ecosystem have stabilized.

## NEW RULE I SELENIUM STANDARDS FOR LAKE KOOCANUSA AND THE KOOTENAI RIVER

### **Lake Koocanusa**

Fish Tissue (mg/kg dry weight (dw))

Egg ovary - 15.1

Muscle - 11.3

Whole body - 8.5

Water column - 0.8 µg/L  
(site-specific)

### **Kootenai River**

Fish Tissue (mg/kg dry weight (dw))

Egg ovary - 15.1

Muscle -11.3

Whole body - 8.5

Water column – 3.1 µg/L

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# Today's presentation

- Water Quality Standards
  - What are WQS - when and why are they set?
- Process
  - LKMRWG, public, MAPA, legislative, implementation/compliance
- Technical
  - Impacts, tributary and sediment data, model, consensus
- Summary of rule changes

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# Comments on Water Quality Standards

## Why Now? “Where is the crisis”

WQS are set to protect to protect beneficial use, to prevent a harm or ‘crisis’ from occurring

## What does site-specific mean?

Based on EPA guidance and site conditions; most accurate and applicable only to the site

## Protection of downstream use

Kootenai River impaired in Idaho based on elevated selenium in fish tissue

## Economic Considerations

No affected MPDES permits; applicability to Lake K and Kootenai mainstem only; impacts of an impairment listing

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# Comments on Process

- **LKMRWG**

Applauded for the transparent collaborative efforts with the bi-national, multi-stakeholder Lake Koocanusa Working Group over the last six years.

- **Public Outreach**

Extensive and beginning in 2015 has including public presentations and panels, access to technical meetings, fact sheets and public website

- **MAPA**

Met all the requirements of MAPA, which has included WPCAC, the BER, notices through the MAR and newspapers, and a robust public comment period.

- **Legislative**

Presentations, updates and timeline provided to both the Environmental Quality Council and the Water Policy Interim Committee (WPIC)

- **Implementation and Compliance**

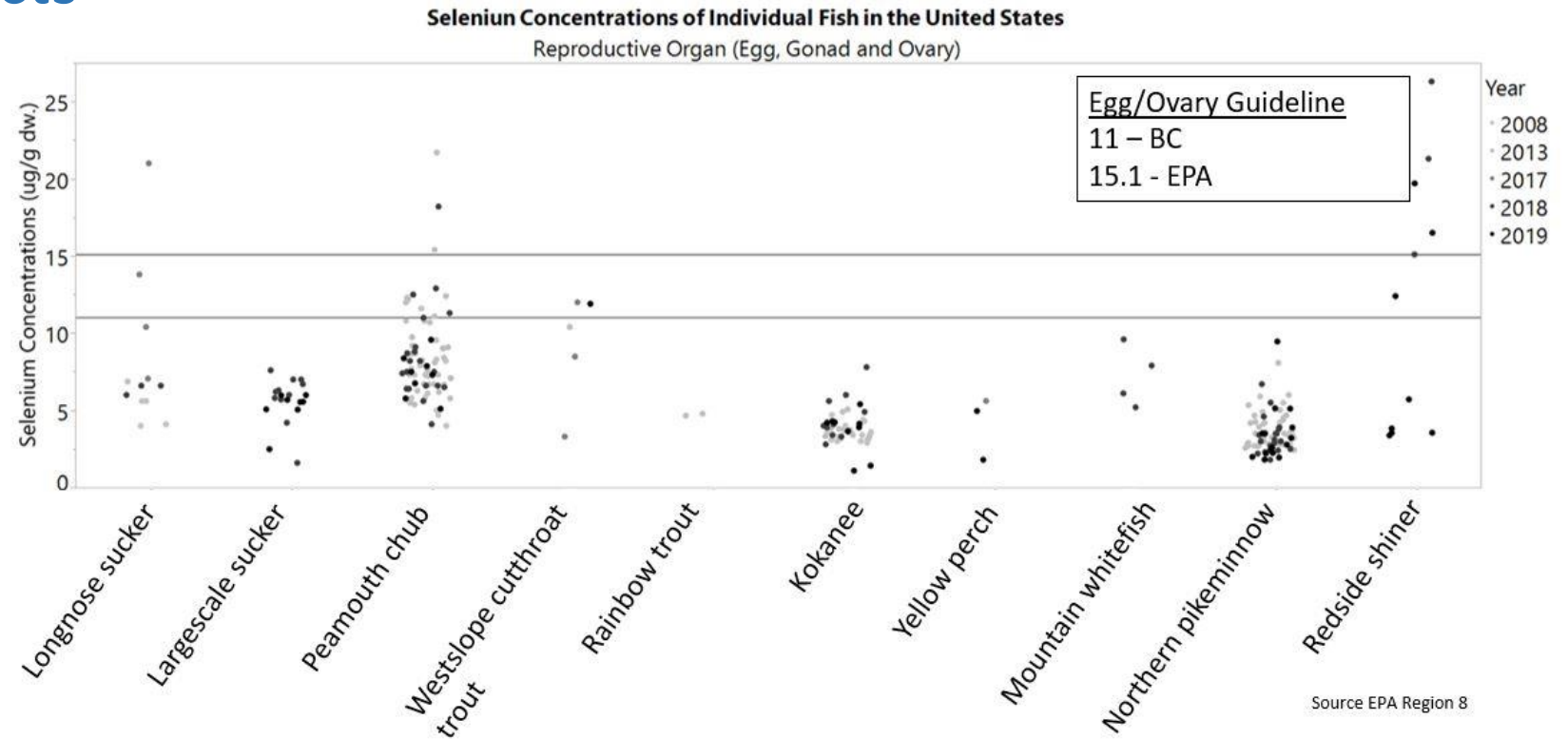
Fish tissue assessment method in development, trans-boundary coordination will continue at all levels

# Comments on current Se levels & impacts

“Don’t delay, already seeing elevated levels and downstream impacts”

“There are no current impacts”

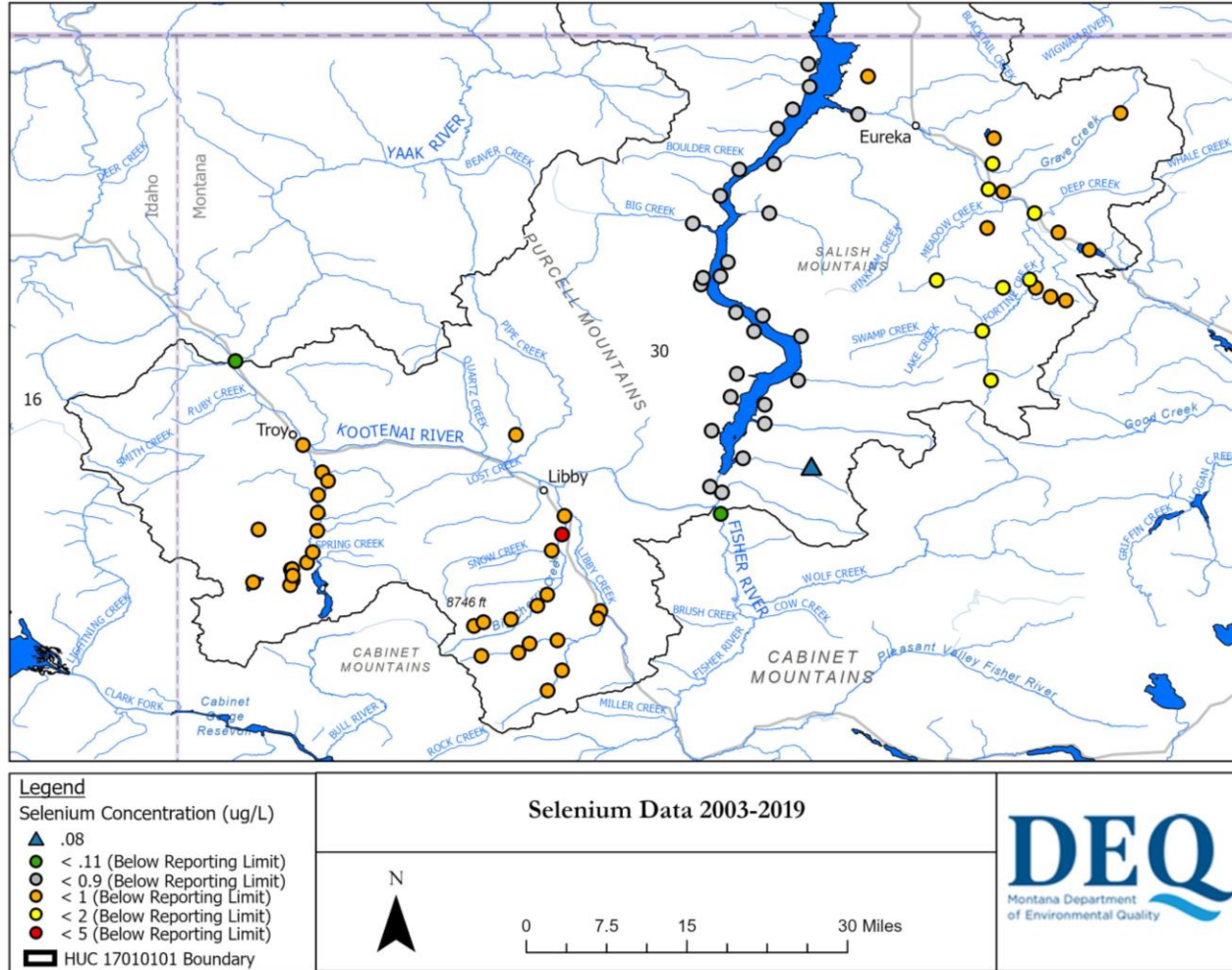
- 9 individual fish  $\geq 15.1$
- 3 species  $\geq 15.1$
- WQS to prevent impacts
  
- Downstream Kootenai River (ID) - listed as impaired for Se due to high levels of Se found in fish tissue



# Comments on background data

## Se concentrations in tributaries

- DEQ data: 149 samples from 44 streams and 7 lakes (2003-2018)
- USGS data: 6 samples from 2 streams (2018-2019)
- Only one sample detected (2018)
  - 0.08  $\mu\text{g/L}$  using modern protocol with a very low MDL.
- Selenium contribution from tributaries to Lake Koocanusa and the Kootenai River are very low

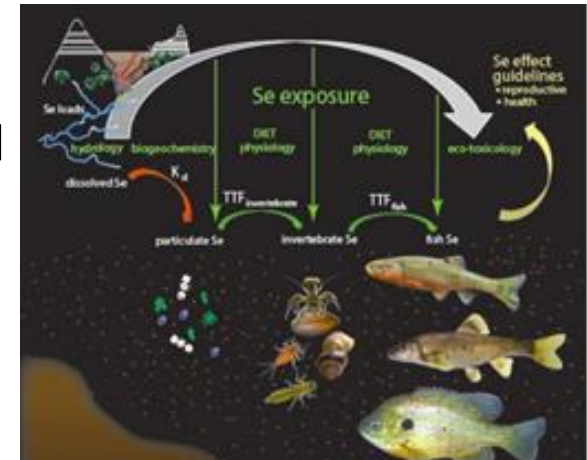


# Comment on sediment Se

"Long term sediment data sets show no settling"

- No long term data sets for sediment in Lake Koocanusa
- DEQ's 2013 Sediment study concluded that Se concentrations in the benthic sediment were statistically greater than adjacent shoreline soils and greater at the forebay (near the dam)

\*\*Important to remember that the process described in the Ecosystem-Scale model has little to do with direct selenium buildup in bottom sediments, and more to do with the amount of selenium in the water column and how readily it enriches suspended particulate matter, which is then transferred through the food chain





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# Comments on consensus

“0.8 µg/L is within range recommended by the majority of SeTSC”

“There was no consensus”

- DEQ and BC-ENV communicated the process for receiving SeTSC recommendations at the November 2019 LKMRWG in-person meeting
- Clear communication was provided to clarify consensus was not being sought and that all final decisions were to be made by DEQ/BC-ENV
- Verbal and written recommendations were provided by the SeTSC
- Those recommendations guided decisions made by the department

## Selenium Technical Subcommittee

- State and Provincial co-chairs
- Tribal and First Nations technical representatives
- Federal (EPA, USFWS, USGS)
- Academia
- Consulting Co.

# Comments on the model

## Best available science

- Ecosystem-Scale model is considered the state of the science
- Peer reviewed in the literature
- EPA recommended model

## Site-specific data

$$C_{target} = \frac{C_{tissue\ criterion\ element}}{TTF^{composite} \times K_d}$$

Literature TTFs  
calibrated to the site

Site-specific  
(most important)



# Comments on derivation of 0.8 µg/L

DEQ & BC-ENV co-developed

Scenario	Whole body tissue threshold (mg/kg dw)	Food Web	diet	TTF Aquatic Insect	TTF Zooplankton	Bioavailability	Kd percentile	Predicted dissolved water column Se (ug/L)
1	5.6	IFM	100% Aquatic Insects	2.8		45%	50th (median)	0.89
2	5.6	TFM TL3	75% Aquatic Insects/ 25% Zooplankton	2.8	1.5	45%	50th (median)	0.91
3	5.6	TFM TL3	100% Aquatic Insects	2.8		45%	50th (median)	0.8

DEQ developed - EPA fish tissue criteria

Whole body tissue threshold (mg/kg dw)	Food Web	diet	TTF Aquatic Insect	TTF Zooplankton	Bioavailability	Kd percentile	Predicted dissolved water column Se (ug/L)
8.5	TFM TL3	100% Aquatic Insects	2.8		60%	75th	0.8

**0.8 µg/L**  
**DEQ proposed Se standard**

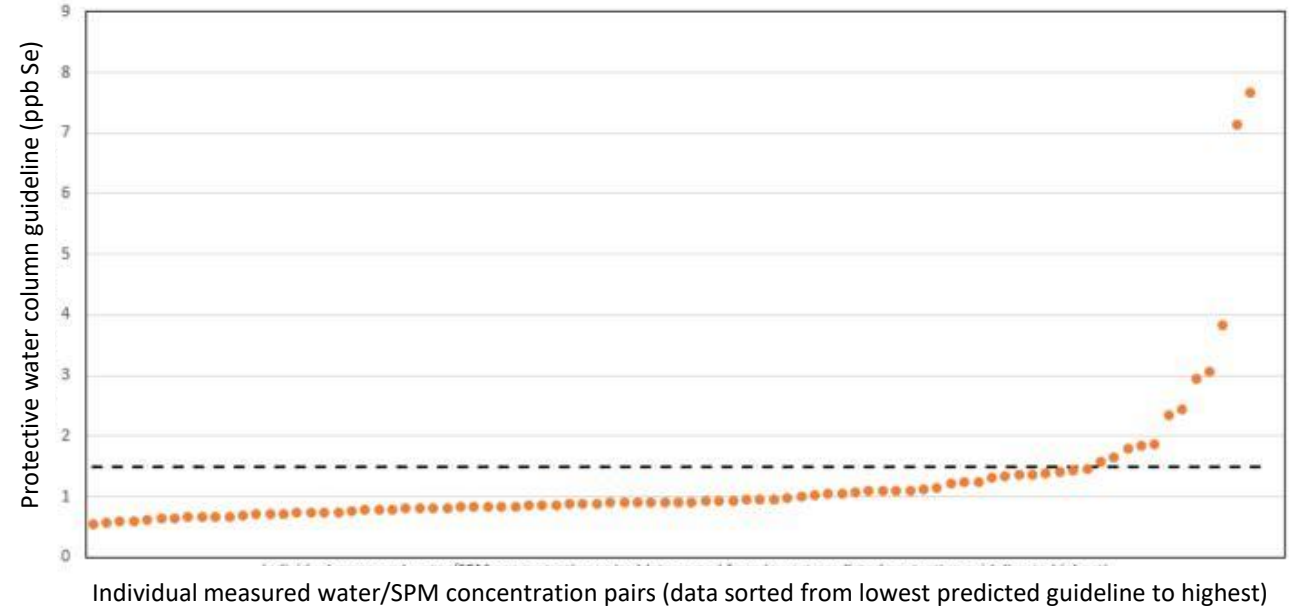
# Comments on 0.8 µg/L vs. 1.5 µg/L

## National criteria

- 1.5 may be under/over protective for some sites across the US
- Site-specific criteria may be necessary

## Model results

- Results from DEQ selected scenario:
  - 85% of results  $\leq 1.5$  µg/L



Through this modeling effort it was the objective to consider ecologically significant species and the long-term protection for fish in all parts of the reservoir including those with the most sensitive food webs

- 1.5 µg/L does not meet the protection goals
- 0.8 µg/L meets these objectives and protects the beneficial use

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# Summary of proposed changes

- Minimum number of samples
- Clarification on hierarchy of samples

NEW RULE I SELENIUM STANDARDS FOR LAKE KOOCANUSA AND THE KOOTENAI RIVER (1) through (5) remain as proposed.

(6) Fish tissue standards will be instantaneous measurements not to be exceeded. Fish tissue sample results shall be reported as a single value representing an average of individual fish samples or a composite sample, each option requiring a minimum number of five individuals from the same species. Fish tissue standards are applicable to tissues of fish in Lake Kooconusa from the US-Canada international boundary to the Libby Dam and in the mainstem Kootenai River from the outflow below the Libby Dam to the Montana-Idaho border. Egg/ovary tissue standards supersede any muscle or whole-body standards, as well as the water column standards in (7), when fish egg/ovary samples are available and when the aquatic ecosystem is in steady state. When fish egg/ovary samples are unavailable, and the aquatic ecosystem is in steady state, fish muscle or whole-body standards supersede the water column standards in (7).

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