

# Lake Koocanusa:

## Site-Specific Selenium Criteria Update

Water Pollution Control Advisory Council Meeting  
July 10, 2020

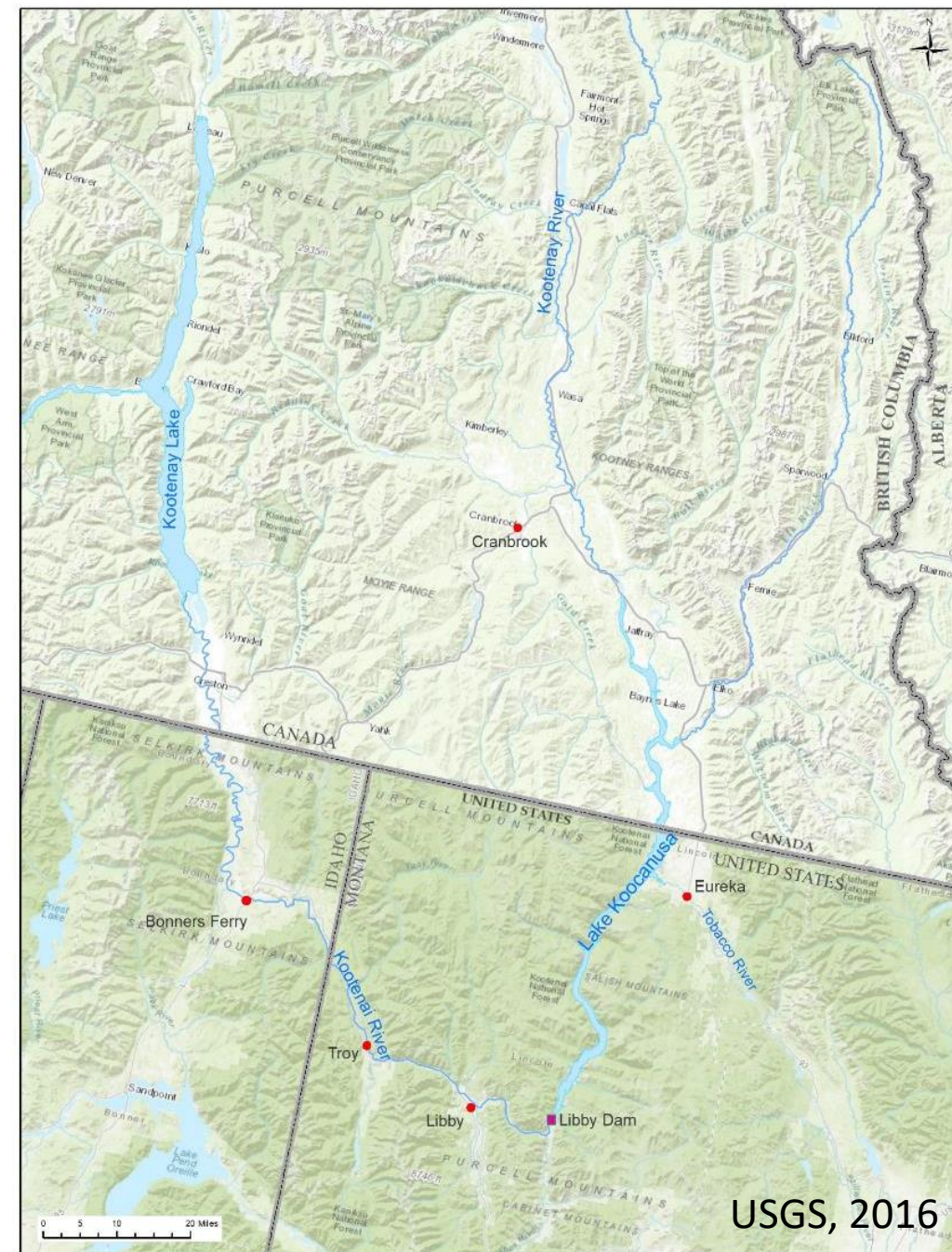
**Lauren Sullivan & Myla Kelly**  
**Water Quality Standards & Modeling**  
**Montana Department of Environmental Quality**

# Kootenai/Kootenay River

- Originates in SE British Columbia (B.C.)
- Flows south into Montana, west into Idaho, and then north back into B.C.

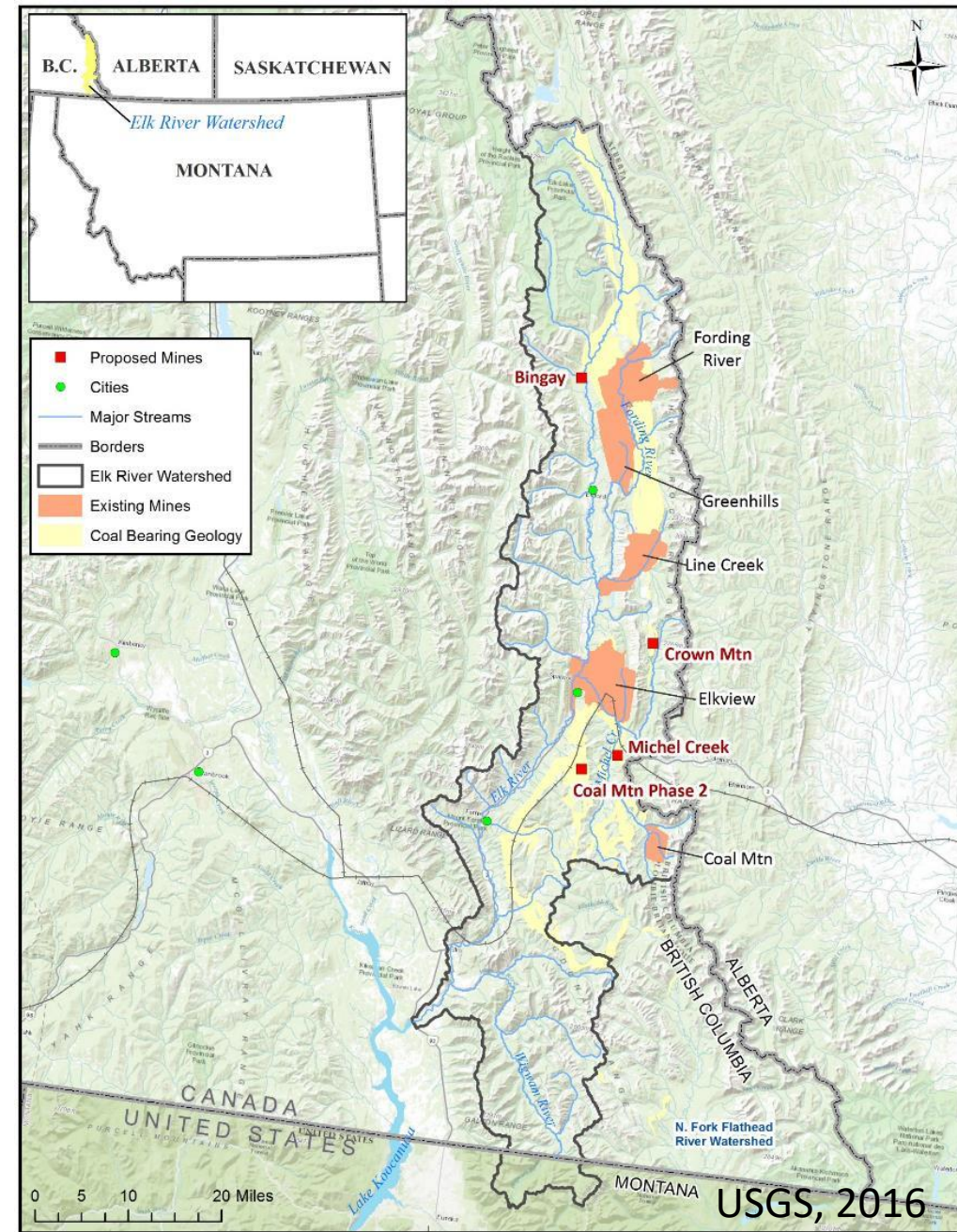
# Lake Koocanusa

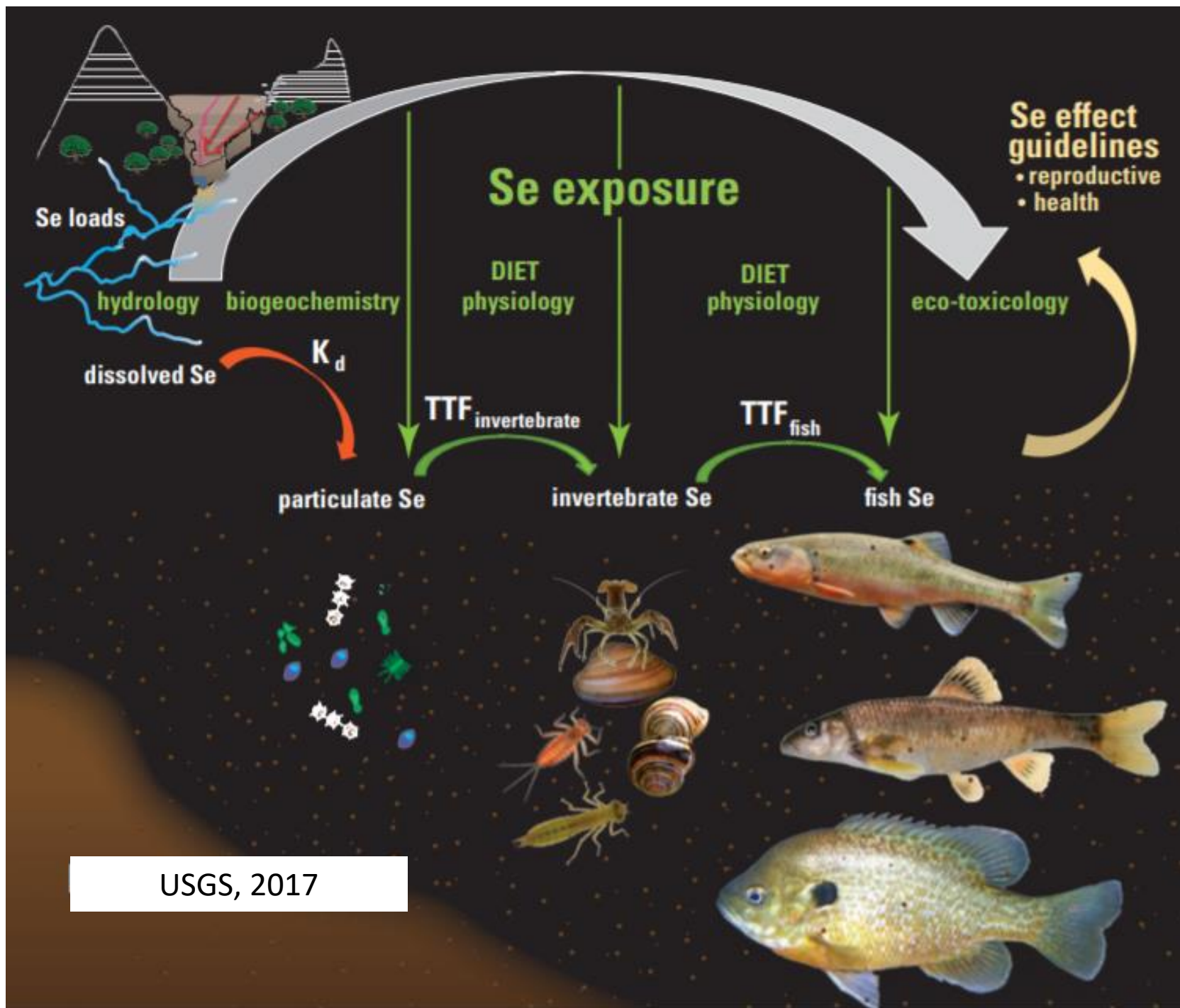
- Reservoir created by Libby Dam
- Located in Montana and B.C.



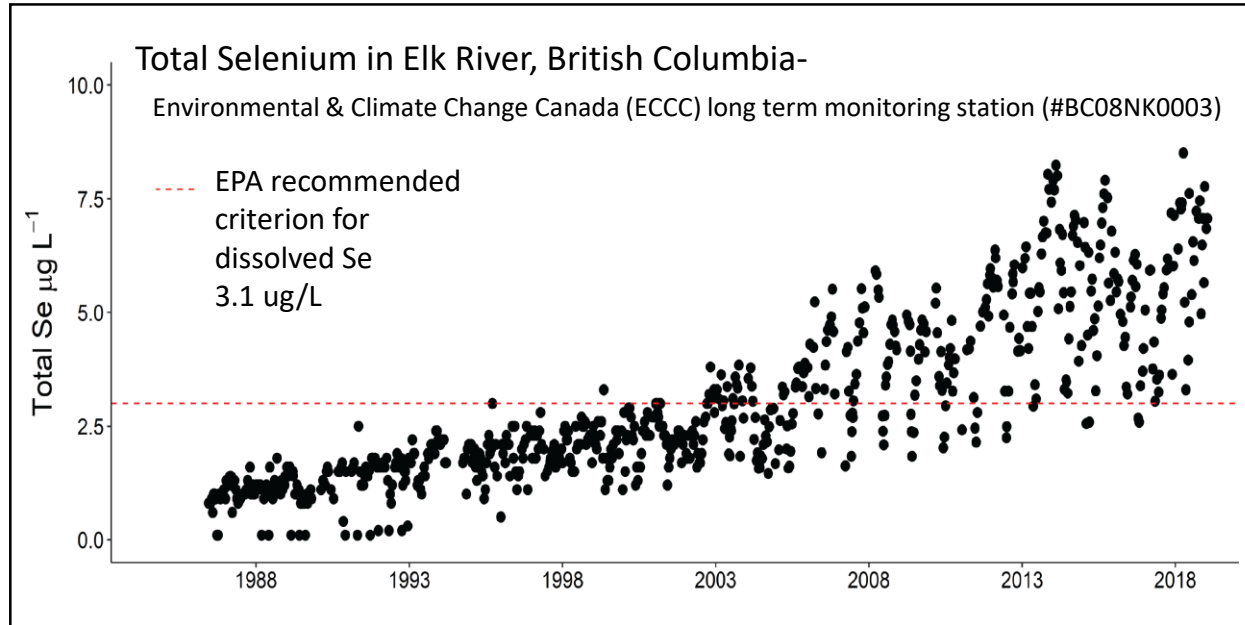
# Water Quality Concerns

- Increasing concentrations of selenium (Se), nitrate, sulfate, and cadmium in Elk River, Canada originating from mine spoils
- Se fish tissue concentrations (egg/ovary and muscle tissue)
- Currently 4 mines in operation and 4 new mines in the environmental assessment (EA) process

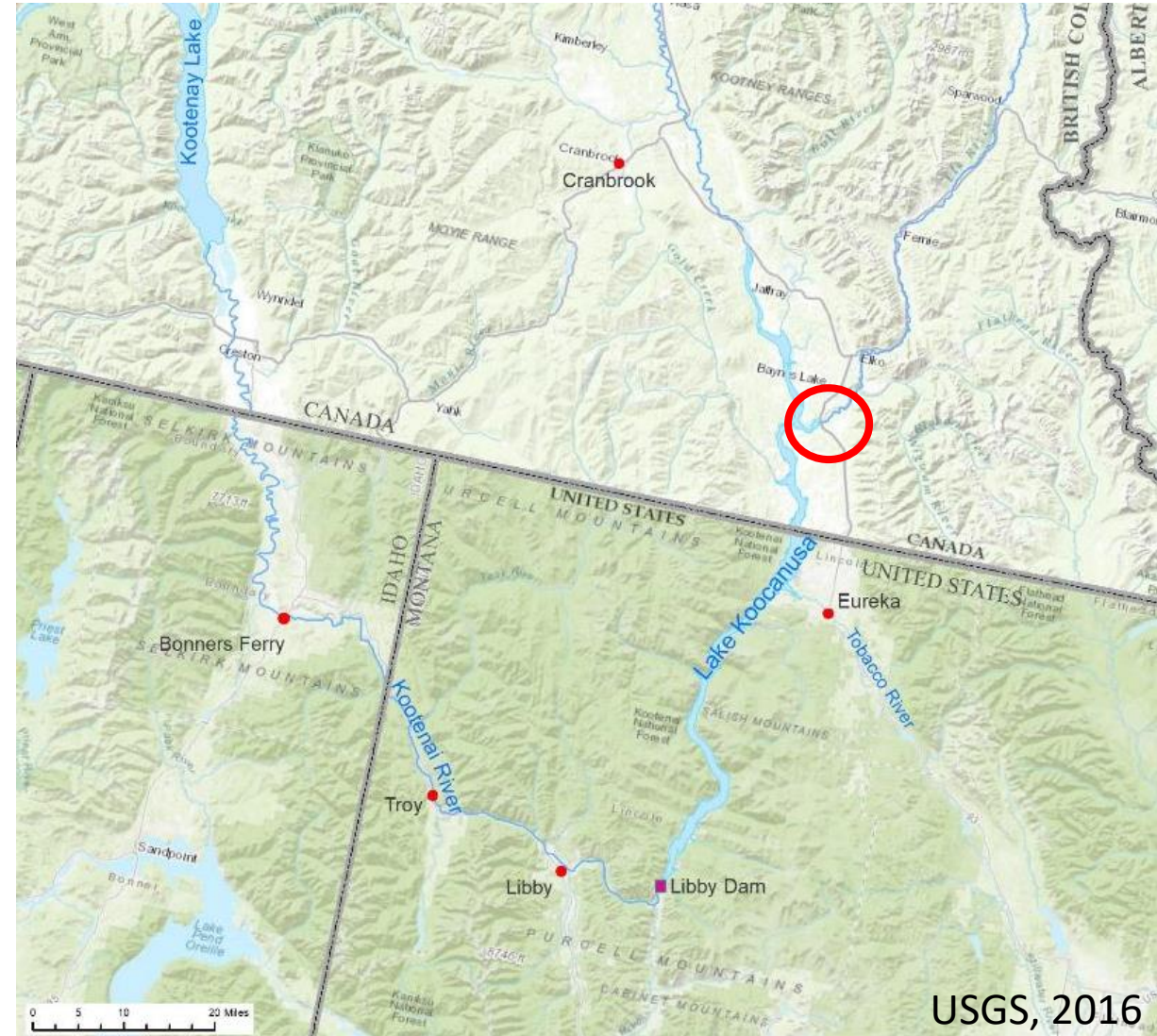




# Increasing selenium over time found in Elk River, Canada



- 95% of the selenium entering the lake is from the Elk River
- Elk River provides ~26% of the water to the Lake



# Current criteria

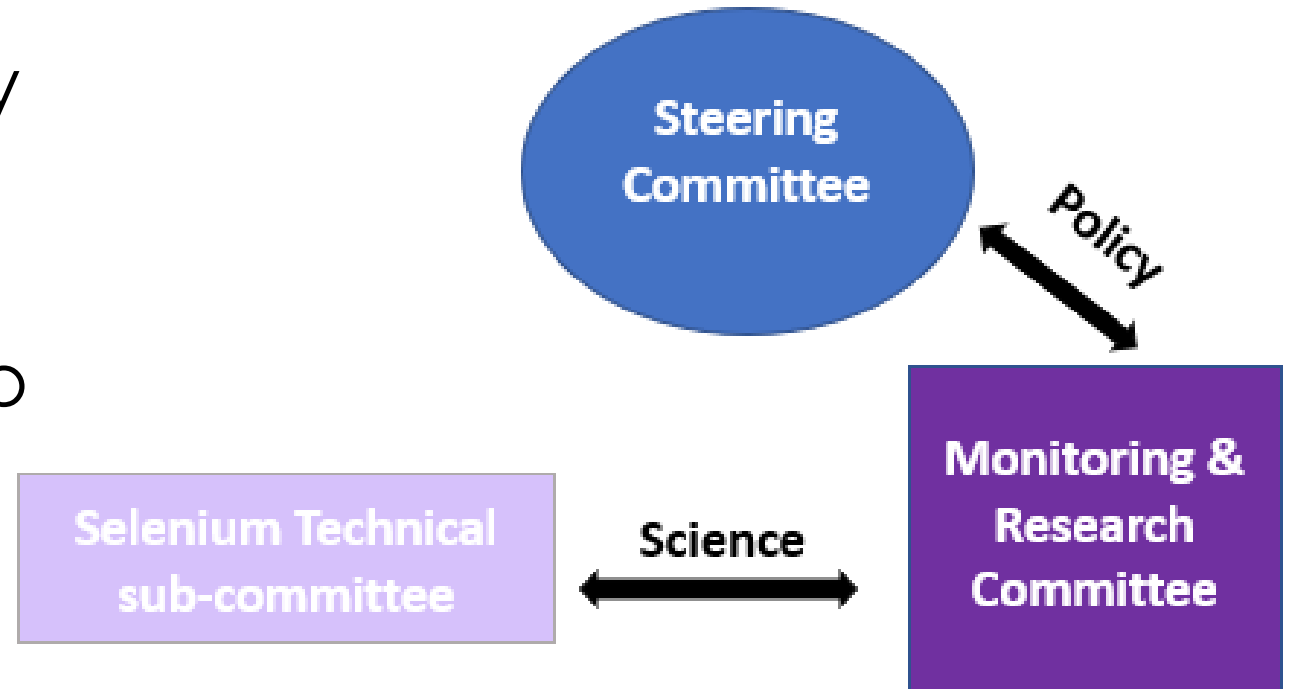
- B.C. – 2.0 ug/L
- Montana – 5.0 ug/L

## EPA 2016 recommended criteria:

Media Type	Fish Tissue <sup>1</sup>		Water Column <sup>4</sup>	
	Criterion Element	Egg/Ovary <sup>2</sup>	Fish Whole Body or Muscle <sup>3</sup>	Monthly Average Exposure
Magnitude	15.1 mg/kg dw	8.5 mg/kg dw whole body or 11.3 mg/kg dw muscle (skinless, boneless filet)	1.5 µg/L in lentic aquatic systems  3.1 µg/L in lotic aquatic systems	$WQC_{int} = \frac{WQC_{30-day} - C_{bkgrnd}(1 - f_{int})}{f_{int}}$
Duration	Instantaneous measurement <sup>6</sup>	Instantaneous measurement <sup>6</sup>	30 days	Number of days/month with an elevated concentration
Frequency	Not to be exceeded	Not to be exceeded	Not more than once in three years on average	Not more than once in three years on average

# Lake Koocanusa Working Group

- Formed in 2015 to address transboundary water quality issues
- Semi annual meetings
- Selenium was determined to be the first priority
- Formation of a Selenium Technical Subcommittee



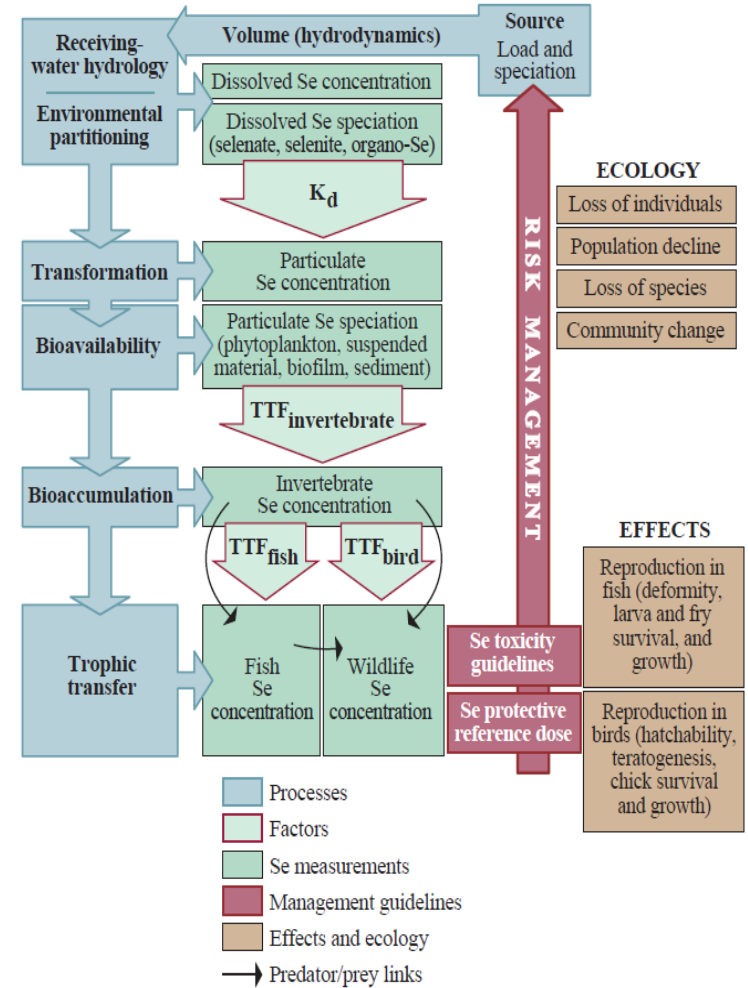
# Site-specific selenium criteria

A multi-year collaborative process



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

**Data collected by:**  
**MT FWP, USACE, USFWS,**  
**USGS, Teck, MT DEQ, BC ENV**



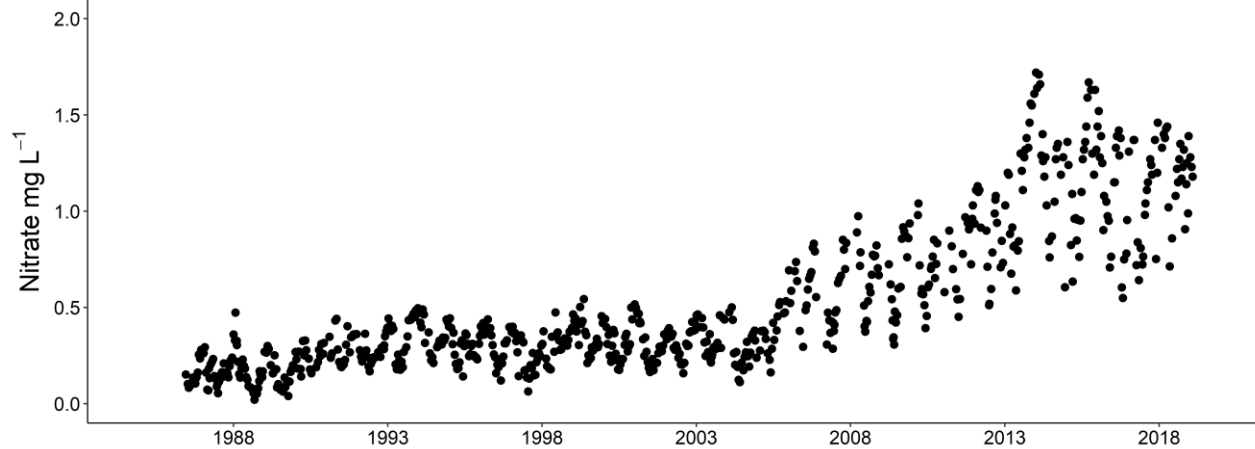
Presser and Luoma, 2010



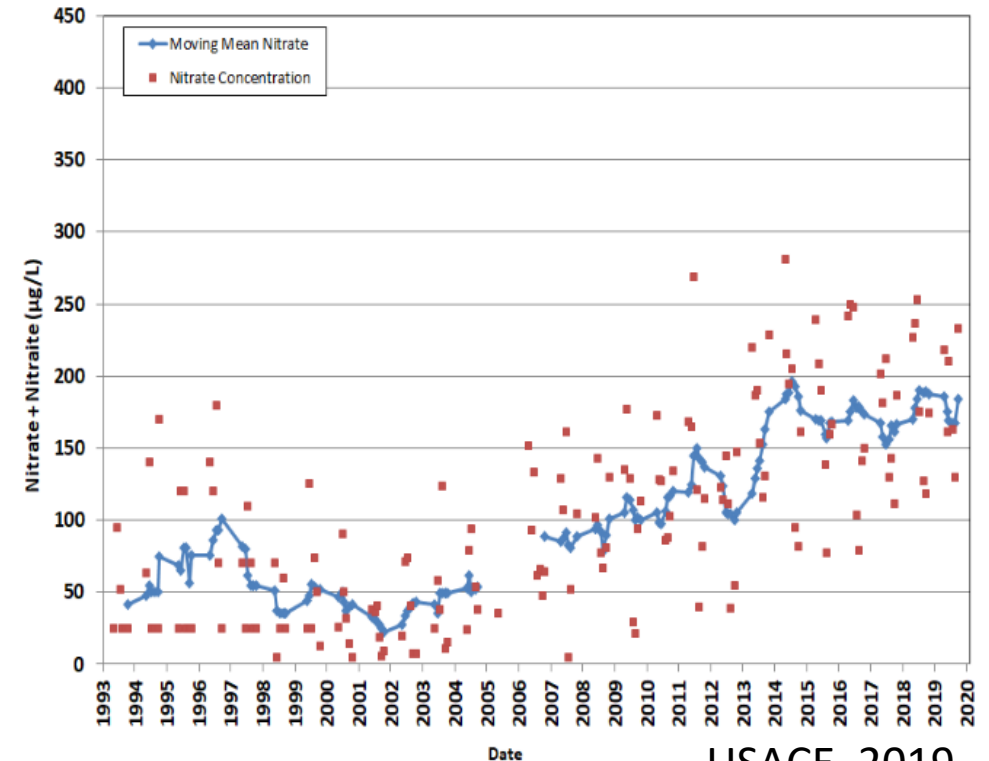
# Water quality trends for other contaminants of concern

- Nitrate – DEQ is concerned about nitrate concentrations
- Cadmium – mostly below detection limit
- Sulfate – very low levels detected

Elk River at Hwy 93 Crossing (near confluence with Kootenay River)  
Environment and Climate Change (ECCC) Long-term Monitoring Station  
Elk River: Nitrate



Station LIBFB (Forebay) Epilimnion Moving Mean Nitrate + Nitrite  
1993-2019

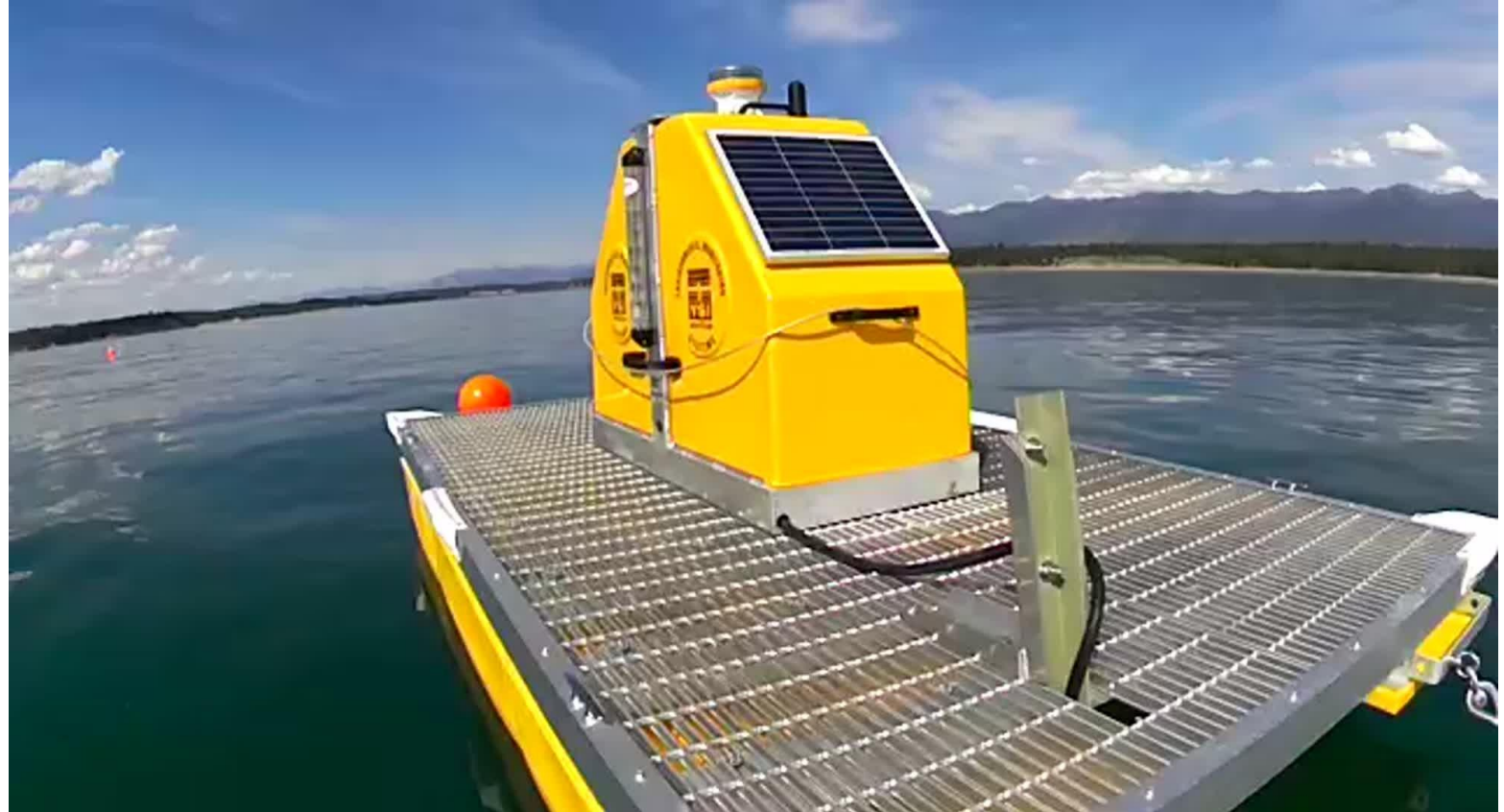


USACE, 2019

# On-going monitoring to support the protection of Lake Koocanusa

Establishment of  
Transboundary  
Monitoring Working  
Group

USGS and USACE on-  
going monitoring of Lake  
Koocanusa for the  
foreseeable future



USGS high frequency monitoring station at Boundary & Kootenai River

- Daily samples taken at 4 depths
- Hourly lake profiles at 0.5 m resolution
  - pH, Temp, dissolved oxygen, turbidity, chlorophyll a, dissolved organic matter

# Next steps

- Continued collaboration with B.C.
- USGS ScienceBase (report & data compilation) – August
- Tribal Consultation
- Lake Koocanusa Working Group meetings
- Stakeholder outreach & public meetings
- Rulemaking

Please contact DEQ with any questions or comments on the development of the selenium site-specific standard for Lake Koocanusa

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