

# Water-Quality Data Collection in the Transboundary Koocanusa Reservoir and Upper Kootenai River, Montana

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## **Special Thanks!**

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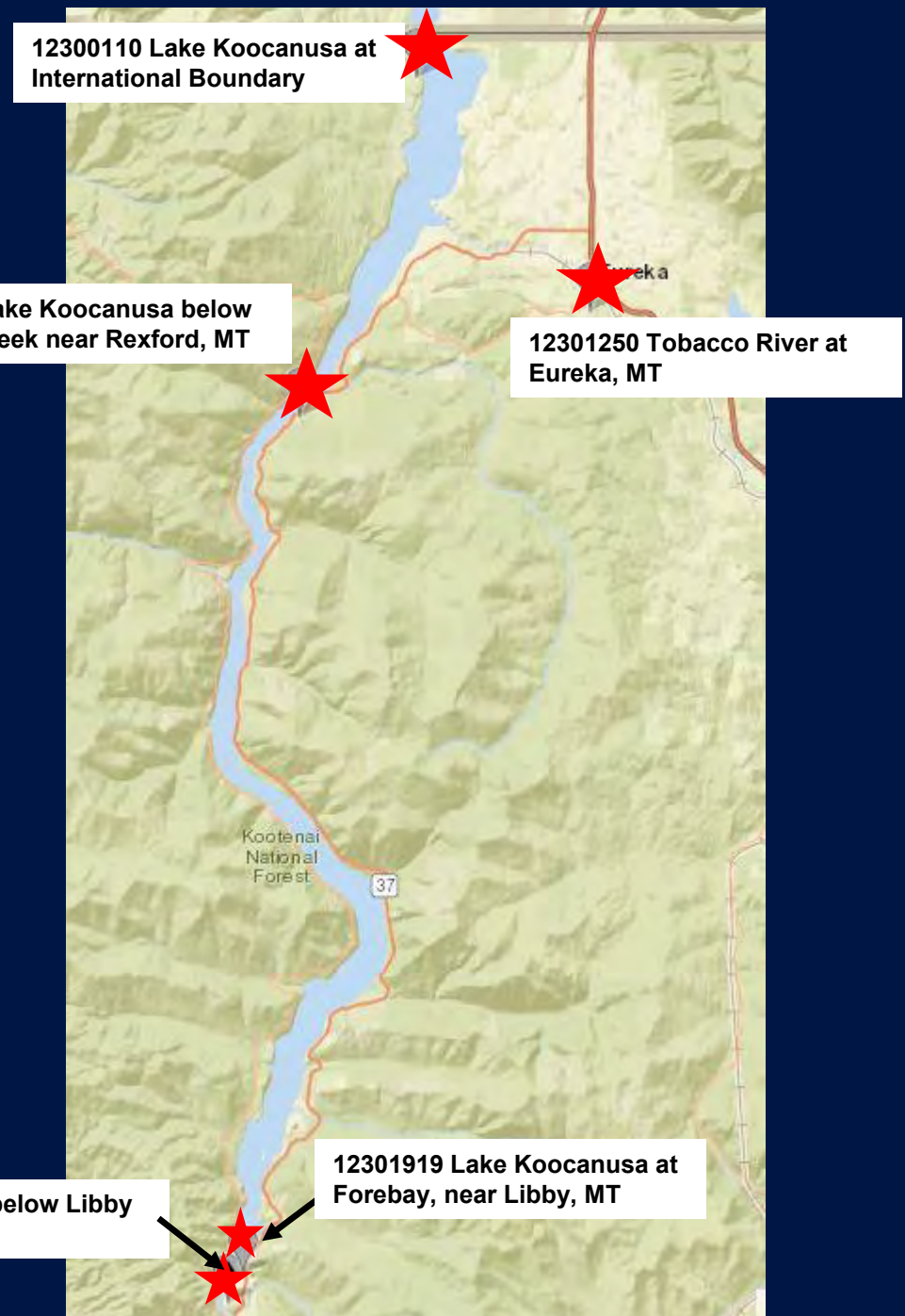
# Project Objectives

- Collect weekly composite water-quality samples from multiple depths using ServoSipper samplers at select locations.
- Collect continuous vertical profile water-quality data (2019 to 2022) to understand limnological processes contributing to variations in selenium concentrations at reservoir sites.
- Track water-quality trends over time and depth in reservoir and river.



# Current Water-Quality Sampling

- **Discrete water-quality sampling**
  - Lake Koocanusa at International Boundary
  - Lake Koocanusa below Pinkham Creek near Rexford, MT
  - Lake Koocanusa at Forebay, near Libby, MT
  - Tobacco River at Eureka, MT
  - Kootenai River below Libby Dam near Libby, MT
- **ServoSipper sampling**
  - Lake Koocanusa at International Boundary
  - Kootenai River below Libby Dam near Libby, MT





# Miscellaneous Water-Quality Sampling

- Discrete water-quality sampling
  - Lake Koocanusa at Tenmile Creek near Libby, MT
- ServoSipper sampling
  - Lake Koocanusa at Forebay, near, Libby, MT
- Continuous water-quality
  - YSI EXO2 deployed at 3 sites
- Synoptic sample
  - Conducted in Sept/Oct of 2020 at 6 locations
  - Discrete water-quality samples
  - Water-quality monitor profiles



Photo taken by C.B. Reese

# Lake Discrete Water-Quality Sampling

- Samples are collected using a Kemmerer sampler.
- Samples are collected as point samples at 3 different depths (3 meters below the surface, 3 meters from the bottom, and a depth determined by the change in specific conductance of the water column).

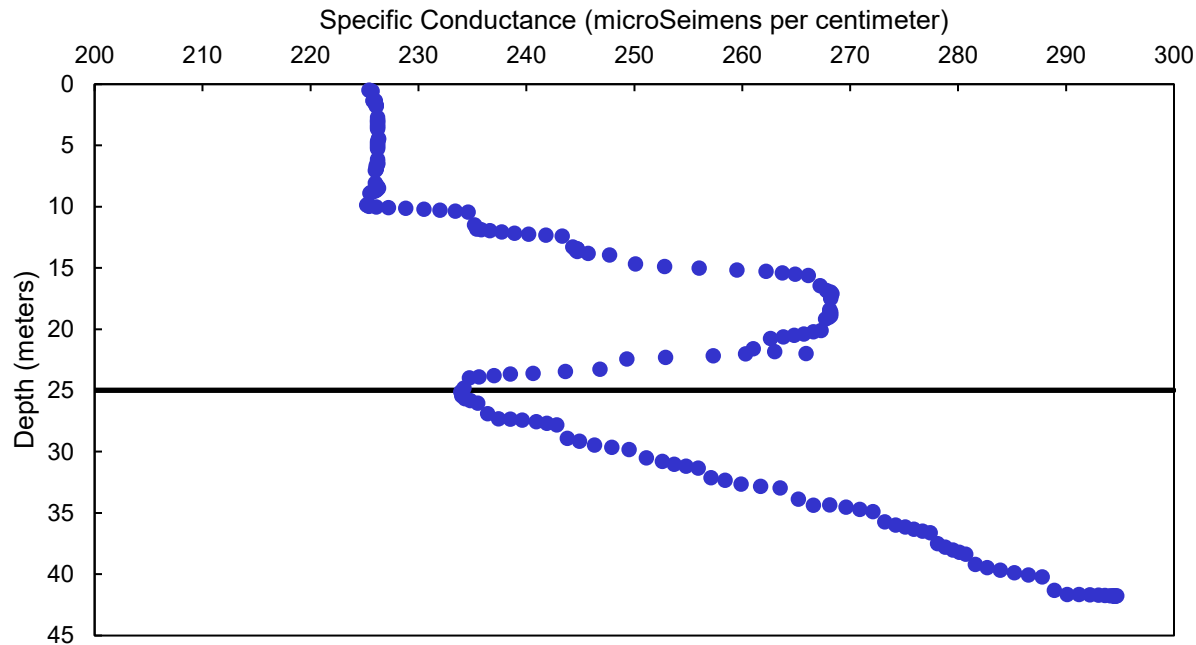


Photo taken by USGS Kocanusa Field Crew

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# River Discrete Water-Quality Sampling

- Samples are collected using various USGS samplers.
- Single vertical sample at Kootenai River monthly year-round.
- Equal width increment sample collected at Tobacco River monthly year-round.



Photo taken by M.A. Schaar



Photo taken by M.A. Schaar

# Sample Analytes

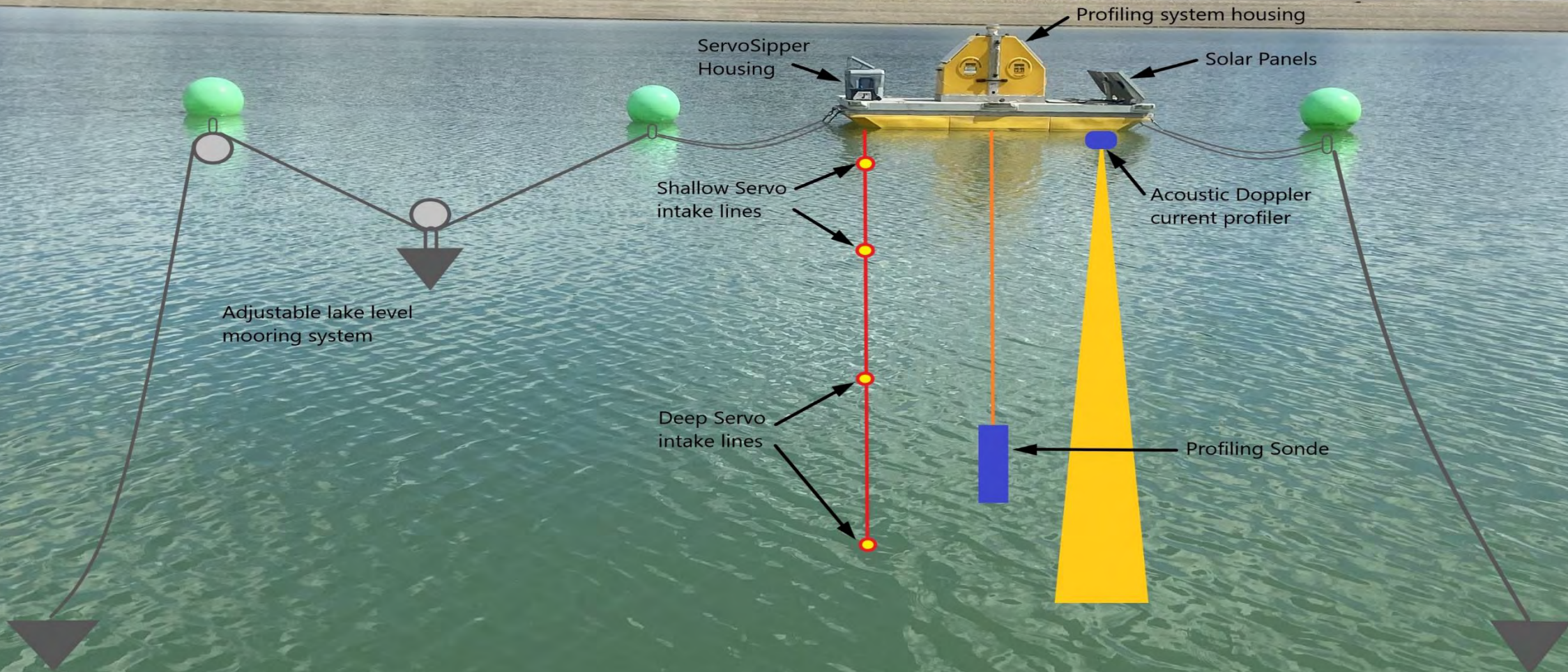
- Nutrients
- Sulfate
- Chlorophyll and Pheophytin
- Selenium (dissolved and total)
- Alkalinity
- Dissolved organic carbon
- Trace Metals



Photo taken by USGS Koochanusa Field Crew



# Lake Sampling Platform





# ServoSipper Samplers

- 8-port valve, 8 samples per module
- Current sampling protocol:
  - 7 daily subsamples composited into weekly sample.
  - Samples vials are pre-acidified with nitric acid
  - Collecting dissolved and total selenium samples.
  - Weekly composited samples capture daily changes.

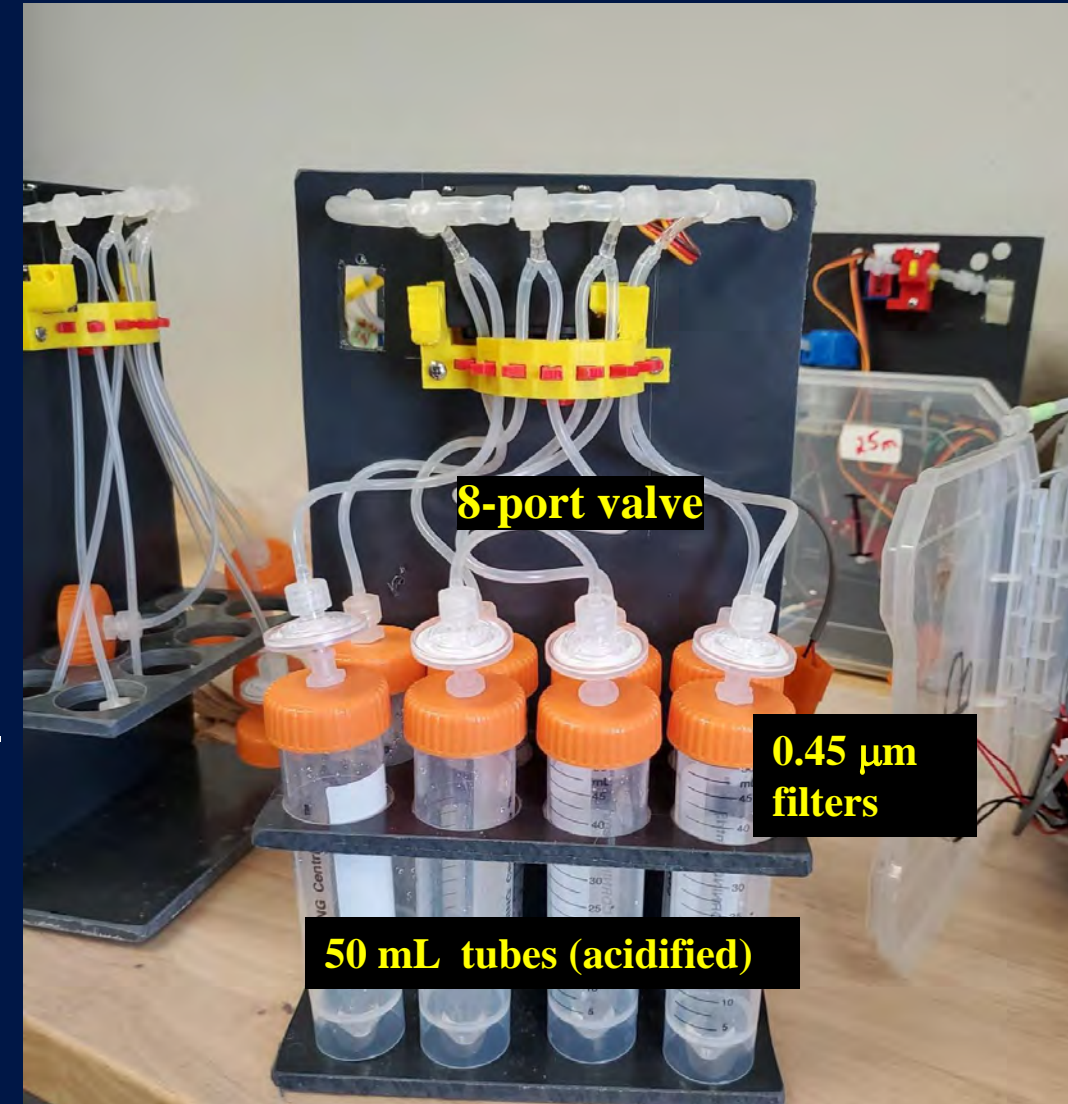


Photo taken by C.B. Reese

# ServoSipper Sampler Deployment at River Site

- Weekly composited samples
- 5 years of samples
- Samples year-round
- Sampler on constant power and in a controlled environment
- Sample water is lifted 30 feet to gage house
- Outside intake uses heat tape in the winter



**ServoSipper access at river site below Libby Dam**

Photo taken by C.B. Reese

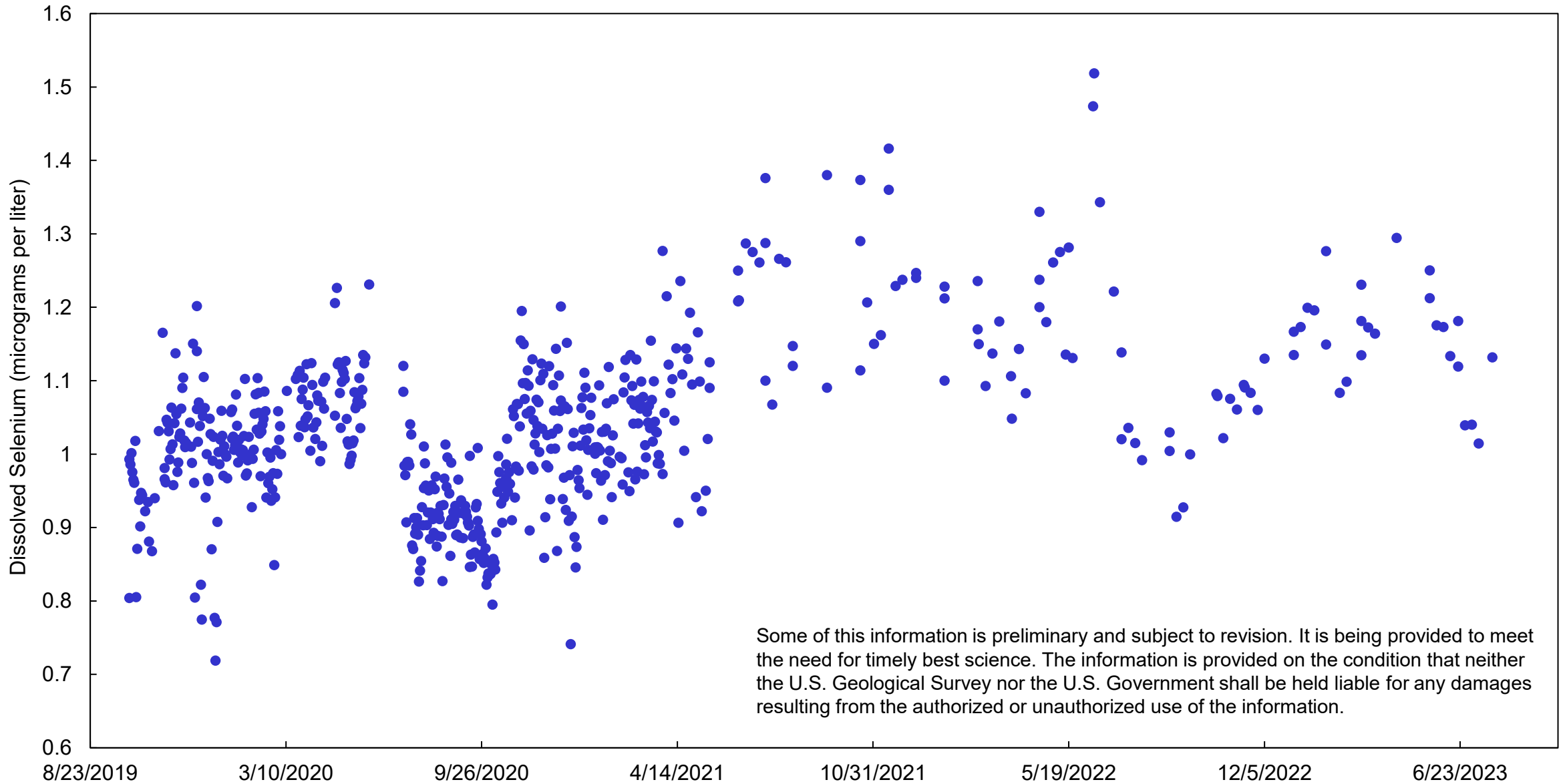


**Gage house located at river site below Libby Dam**

Photo taken by C.B. Reese

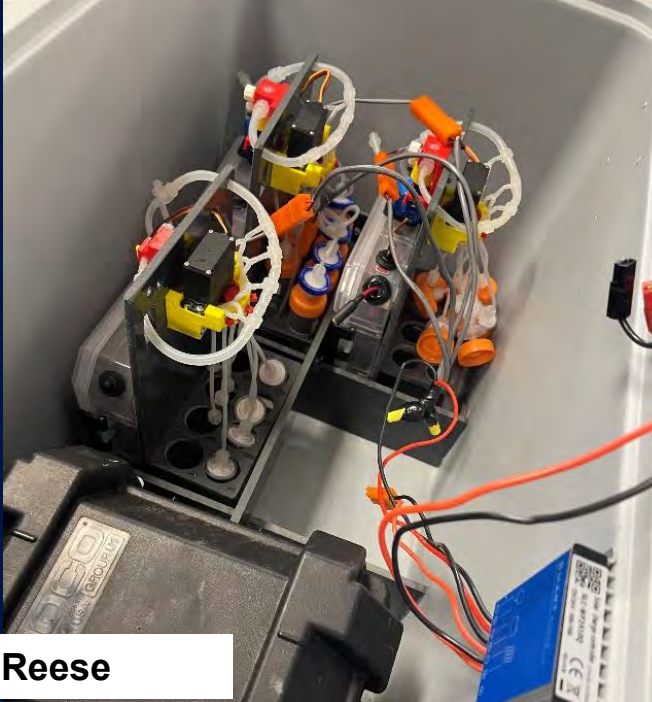


# Dissolved Selenium Concentrations at Kootenai River Below Libby Dam near, Libby Montana (2019-2023)

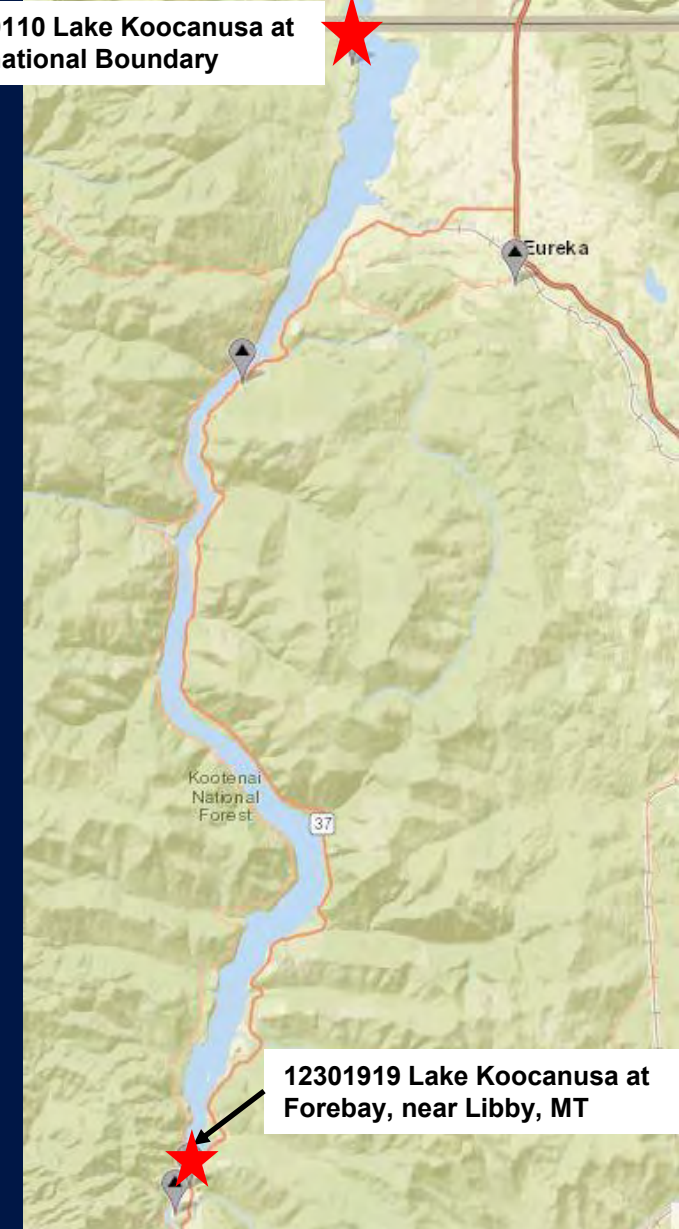


# ServoSipper Sampler Deployment at Lake Sites

- **International Boundary**
  - 5 years of samples (2019-present)
  - 50 – 130-foot deployment depths
  - Samples taken at 4 depths: 3 meters, 10 meters, 25 meters, and 35 meters
- **Lake Kootenai at Forebay**
  - 1 year of samples (2021)
  - 300-foot deployment depth
  - Samples taken at 2-3 depths



12300110 Lake Kootenai at International Boundary



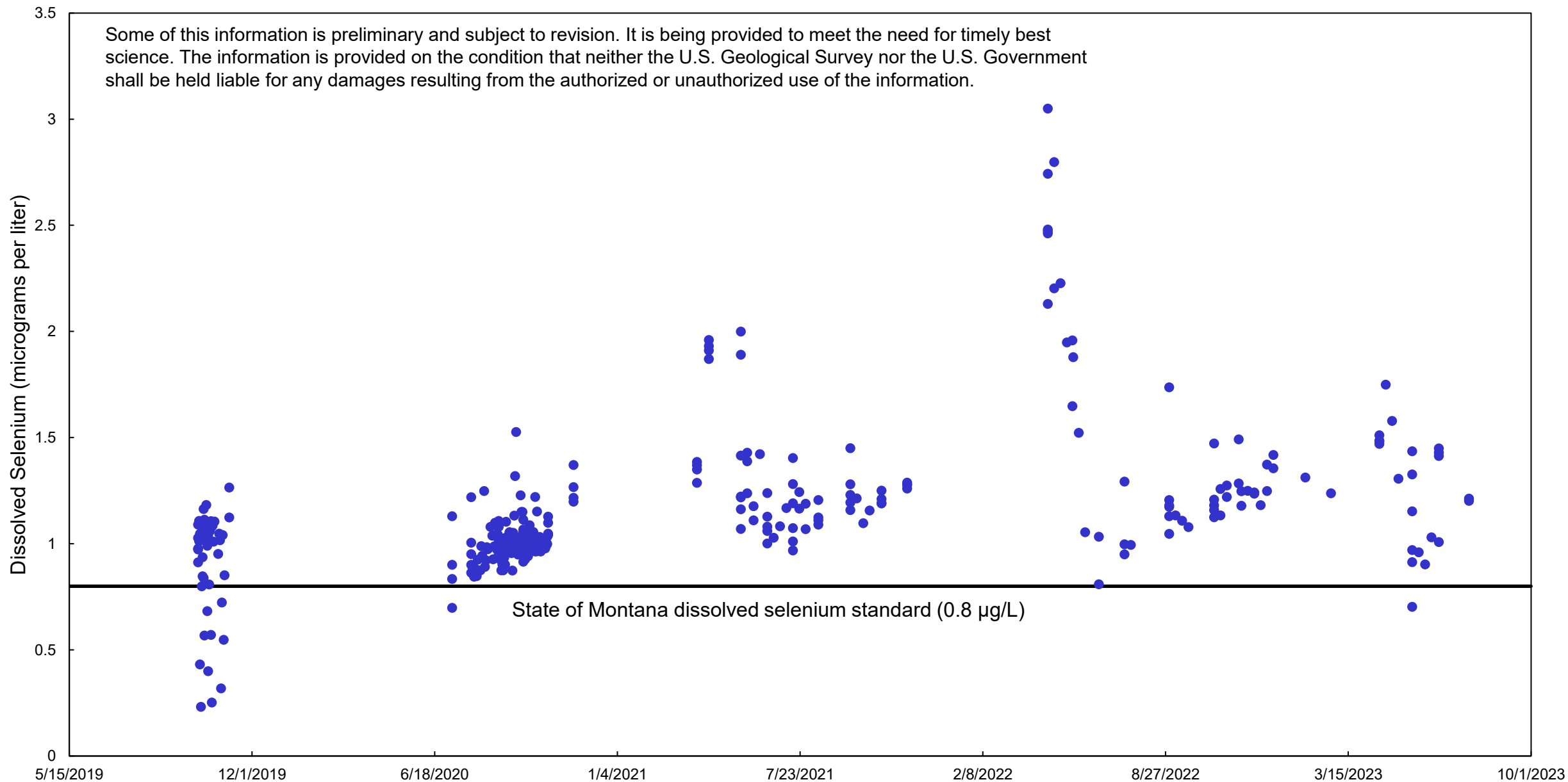
12301919 Lake Kootenai at Forebay, near Libby, MT



ServoSippers

Photos taken by C.B. Reese

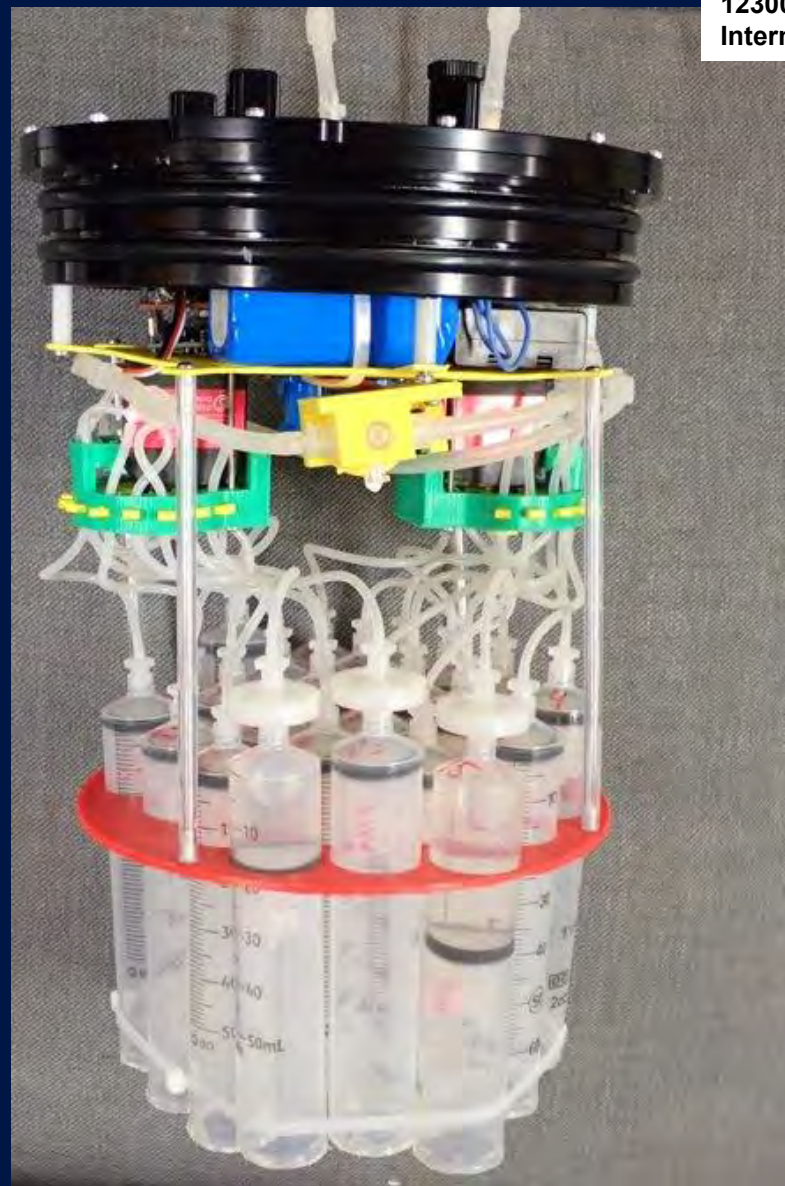
# Dissolved Selenium Concentrations at Lake Koocanusa at International Boundary (2019 – 2023)





# Submersible ServoSipper Samplers

- First deployment winter of 2022-2023
- Will be deployed again in November 2023
- Deployed over winter
  - November through April when platform was not deployed
- 6-month sampling capacity
- Weekly composite of daily subsamples
- Deployed at 3-meter and 10-meter depth



12300110 Lake Kooconusa at  
International Boundary

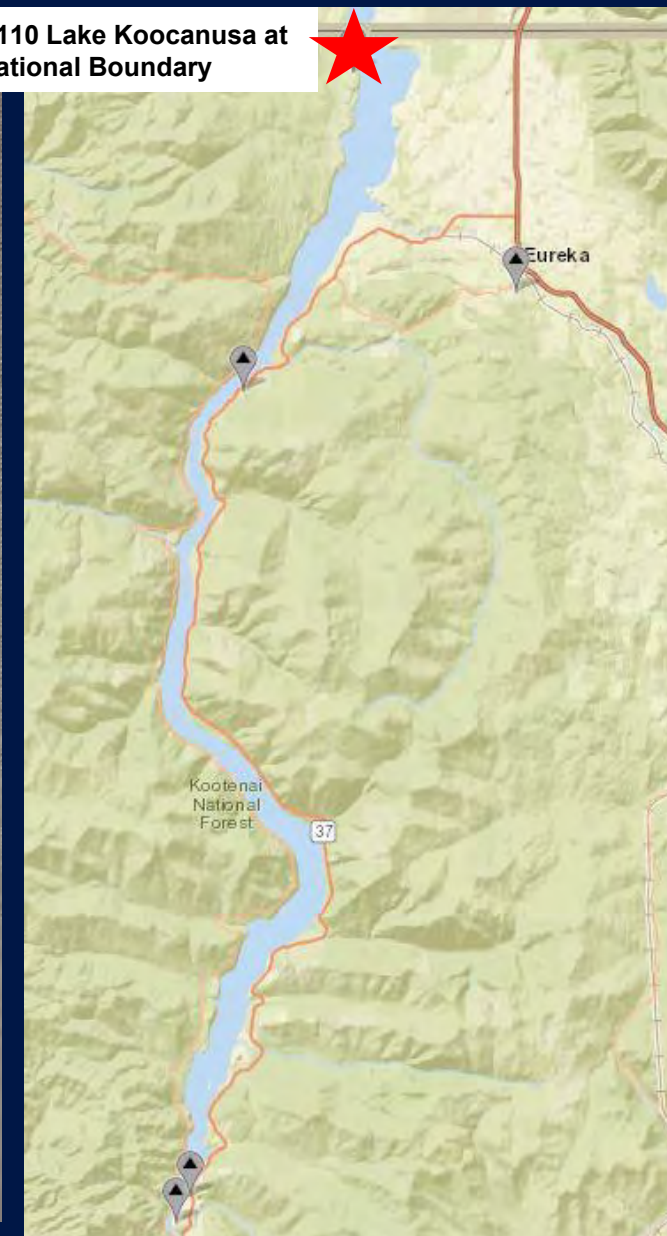
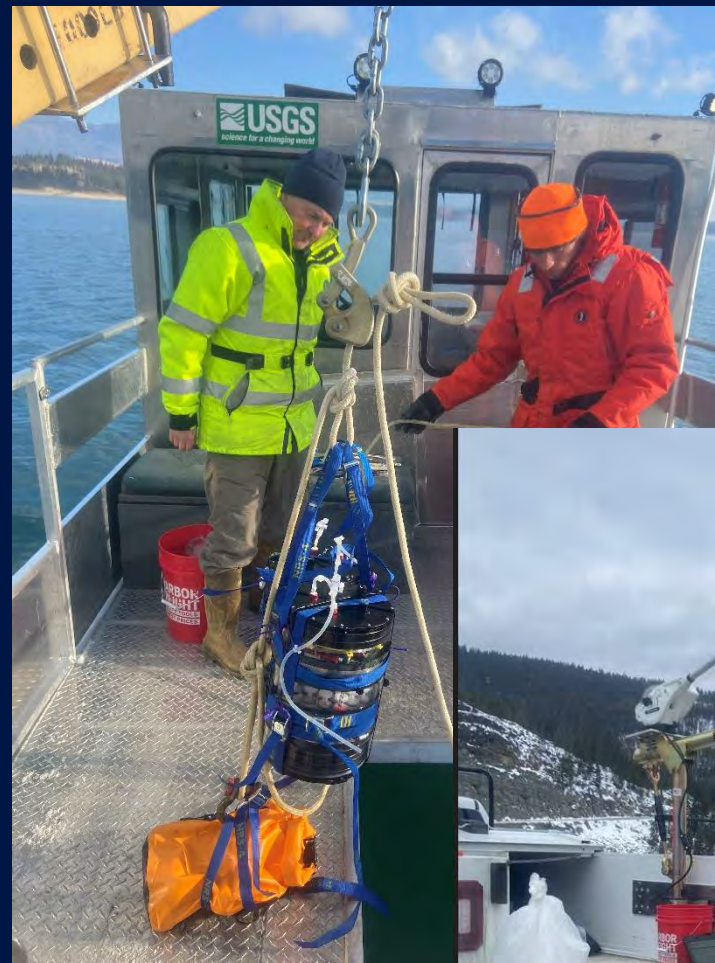


Photo taken by C.B. Reese



# Winter Sampling

- Samples were collected monthly at Lake Koocanusa below Pinkham Creek near Rexford, MT (~13 miles south) for comparison with submersible ServoSipper samplers deployed at the international boundary.
- Platform at Lake Koocanusa at International Boundary was removed due to ice cover.
- Monthly samples at Kootenai River below Libby Dam, near Libby, MT.



Photos taken  
by Koocanusa  
Field Team



Photo taken  
by J.P. O'Connell





# Questions?

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## ServoSipper Samplers

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