Washington State Toxics Monitoring and Resident Fish Movement in the Columbia River

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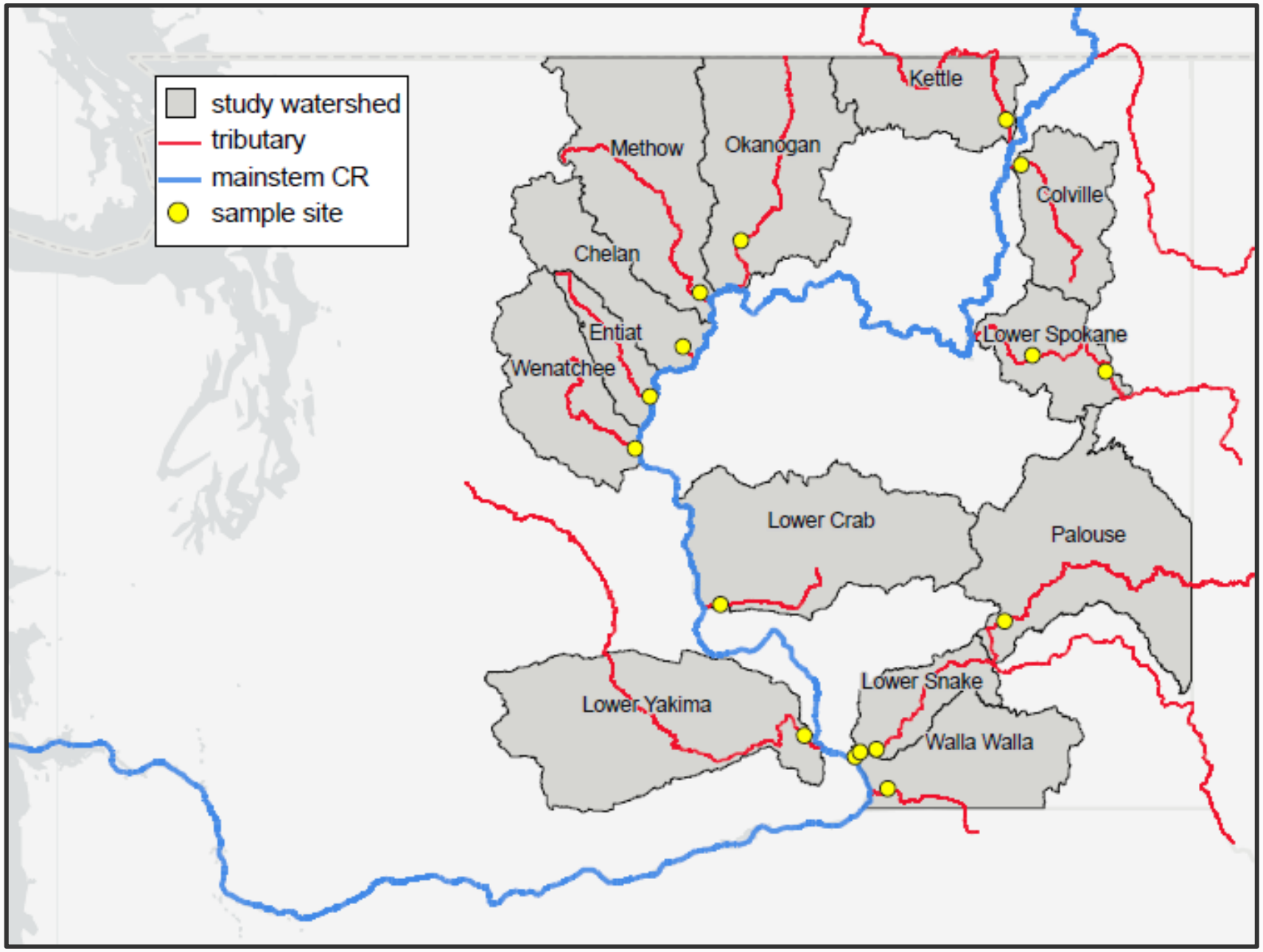
Goal 1

Sample and assess contaminant load and concentrations at a network of monitoring stations in major tributaries to the mainstem Columbia River

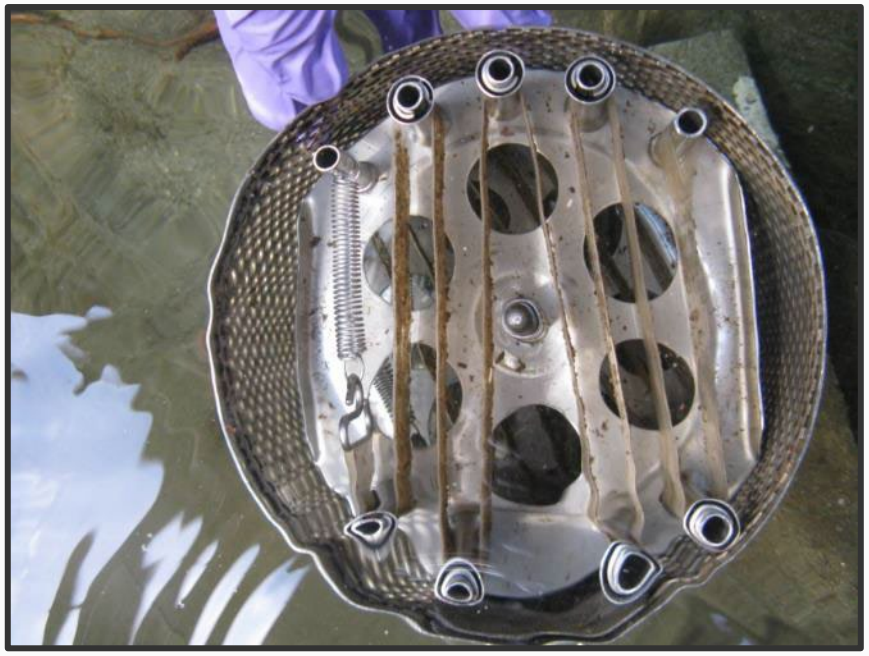
- Major Tributary monitoring stations in the mid and upper-Columbia
- Synoptic survey of inputs (concentrations and loads) to the mainstem at high and low flow – fixed stations with flow gages
- PCBs, PDBEs and chlorinated pesticides (e.g. DDx)
- Establish bioconcentration factors at the lower trophic levels

Sites

- One location per tributary, except Spokane and Snake.
- 2 - 4 sampling events depending on media
- **Passive** – Low Density Polyethylene (water and sediment) and biofilm
- **Active** –large volume samples (200L; particulate and dissolved phase)



Passive Sampling

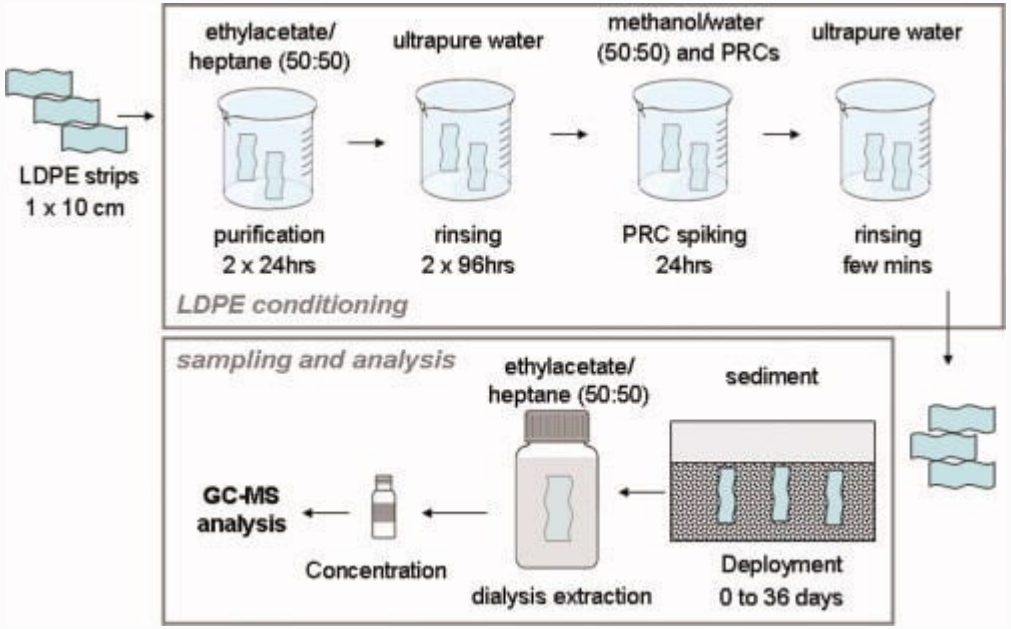


- Semi-permeable membrane devices (SPMDs)
- Calculated 30-day average water concentration

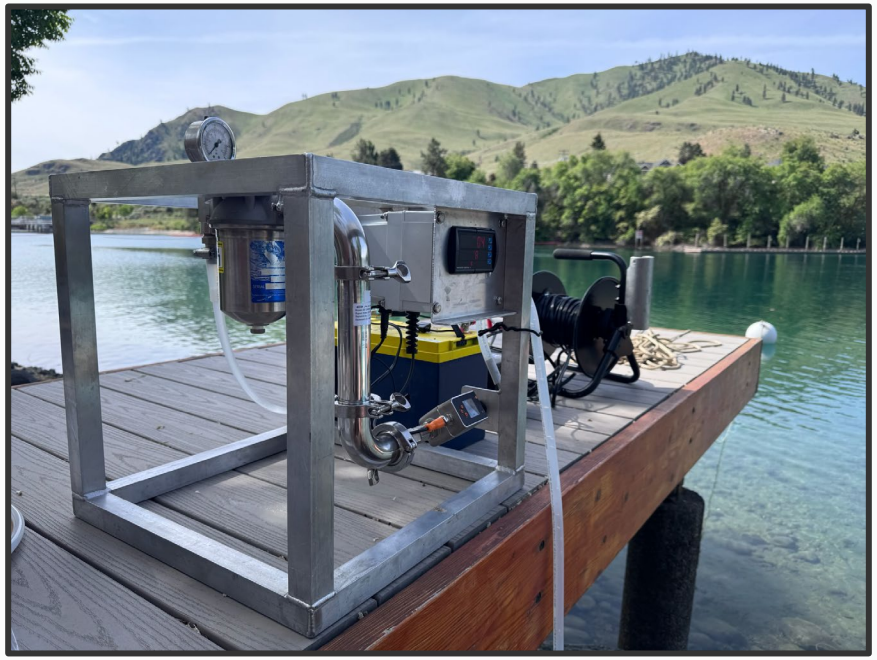
- Biofilm (periphyton, microbial growth and detrital organics)
- Natural passive sampler; base of the river food web

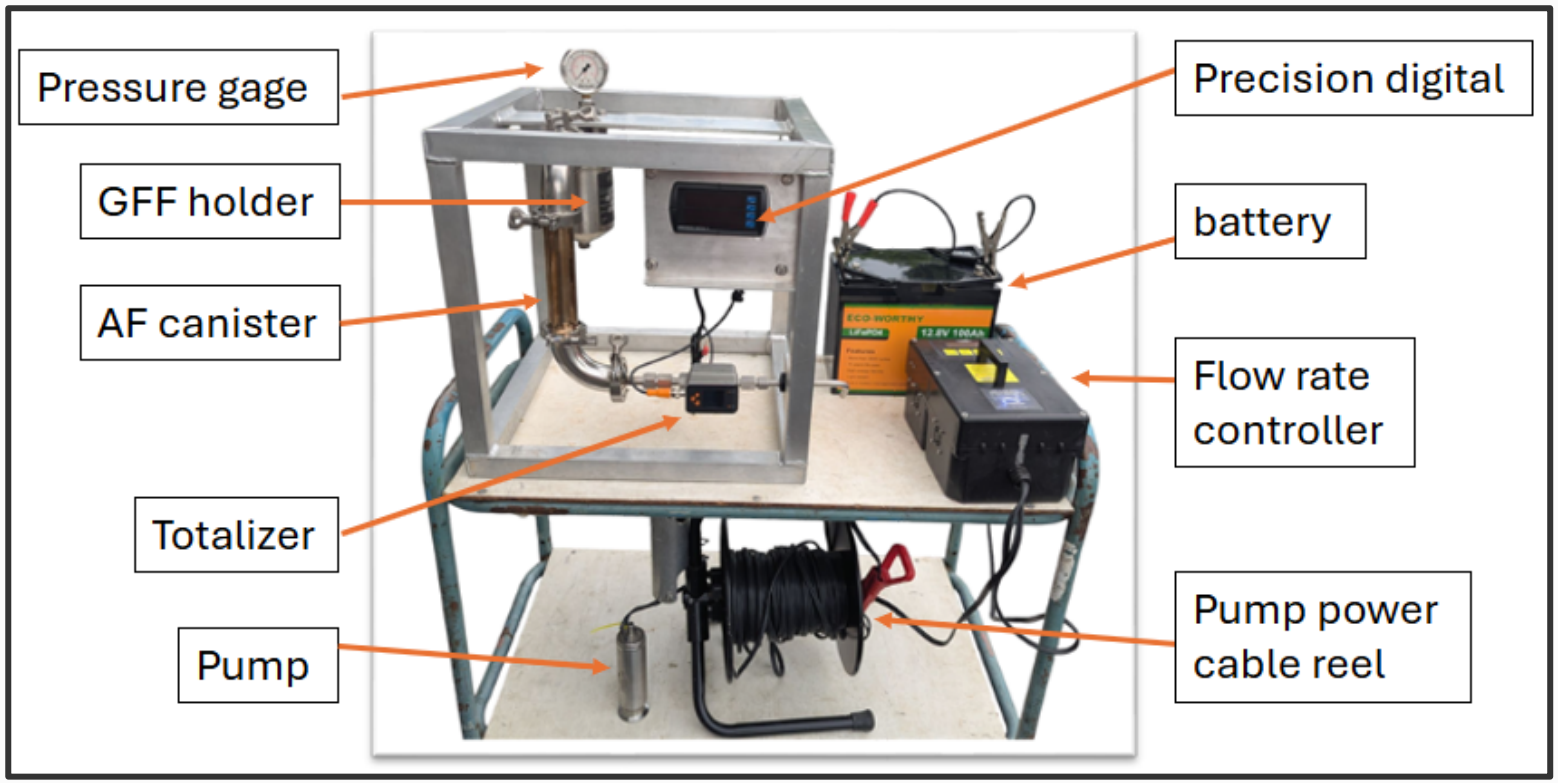
Sediment Sampling

- Upper ~2-3cm composited from 3 independant grab samples
- Water-sediment interface intact
- Split for bulk chemistry and porewater chemistry (ex situ LDPE strips).



Active Sampling





large volume samples (~200L)

- particulate phase (>1 µm) on GFFs
- colloidal/dissolved phase on PUF media

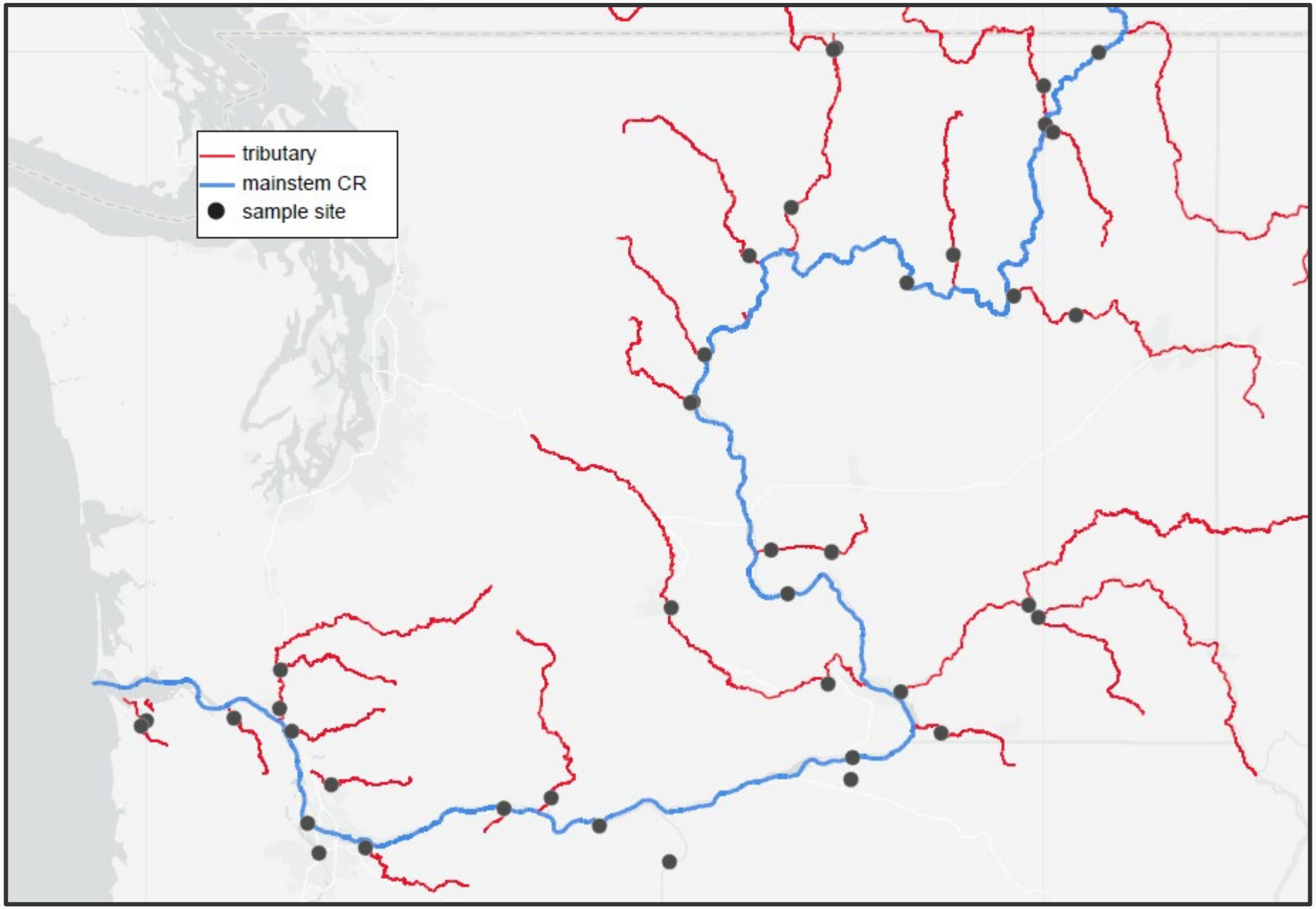
Goal 2

Establish and evaluate a baseline dataset for resident fish otolith microchemistry and fish life history

- Collaboration with WDFW, Otolith and Aging Labs
- Establish the movement and provenance of resident fish tissues used in contaminant monitoring.
- Grab samples at ambient WQ stations to establish a geochemical baseline for otolith microchemistry.
- Use Ecology's Freshwater Fish Contaminant Monitoring Program collections (2024-2027) in the Mainstem Columbia R. to describe the geographic provenance of fish tissues used in toxics monitoring.
- PCBs, PDBEs, chlorinated pesticides (e.g. DDx), Hg and PFAS.
- Pilot study in the Wenatchee Basin with archived fish otoliths

Sites

- Water: 41 sites sampled quarterly for 2 years.
- Triplicate samples for Al, As, B, Ba, Ca, Cu, Fe, K, Li, Mg, Mn, Na, Pb, Rb, Sr, U, V, Zn and Sr isotopes.



Sites

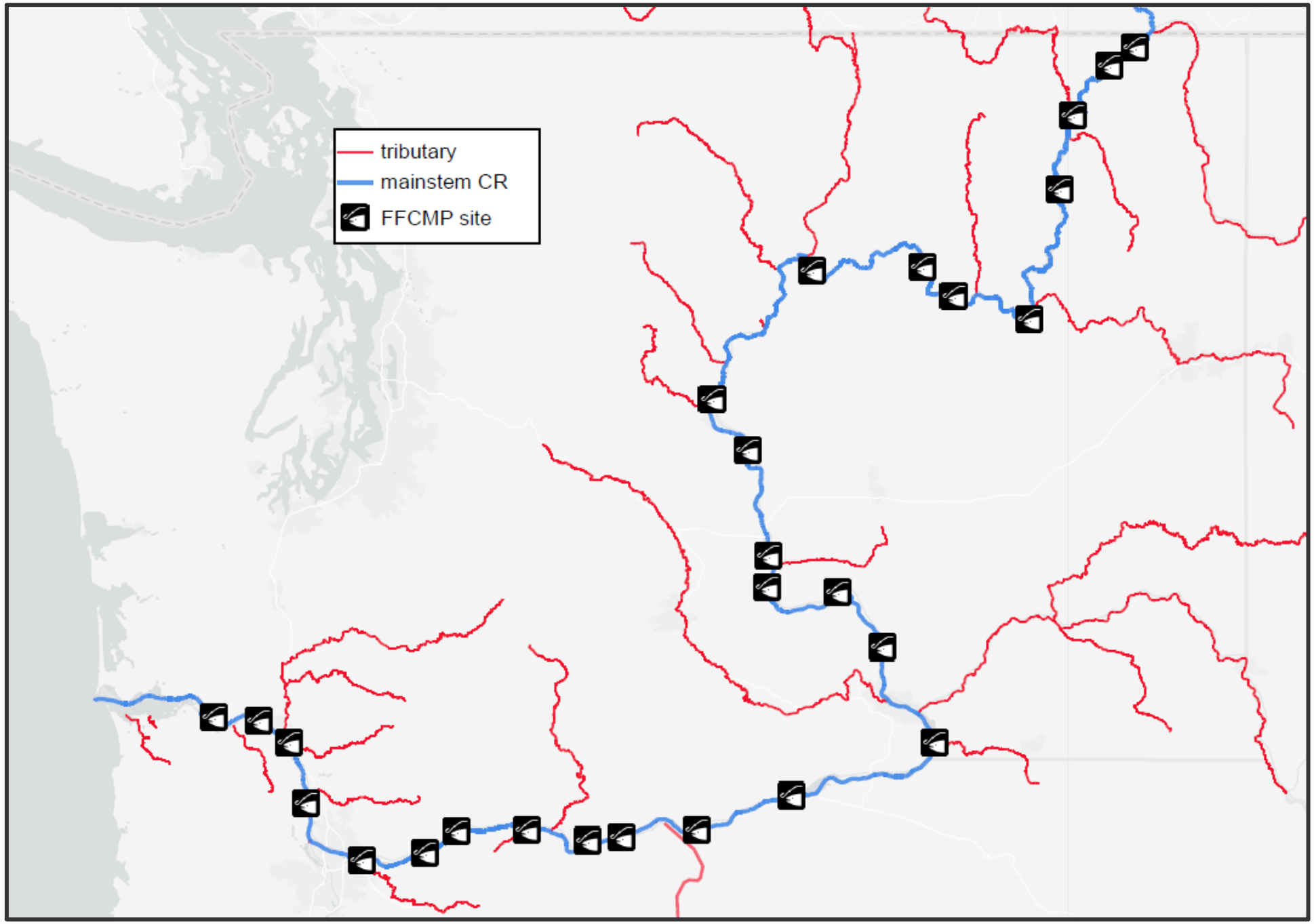
2024: Columbia R-1 (estuary to Bonneville Dam);

2025: Columbia R-2, lower (Bonneville Dam to McNary Dam)

2026: Columbia R-3, middle (McNary Dam to Priest Rapids Dam)

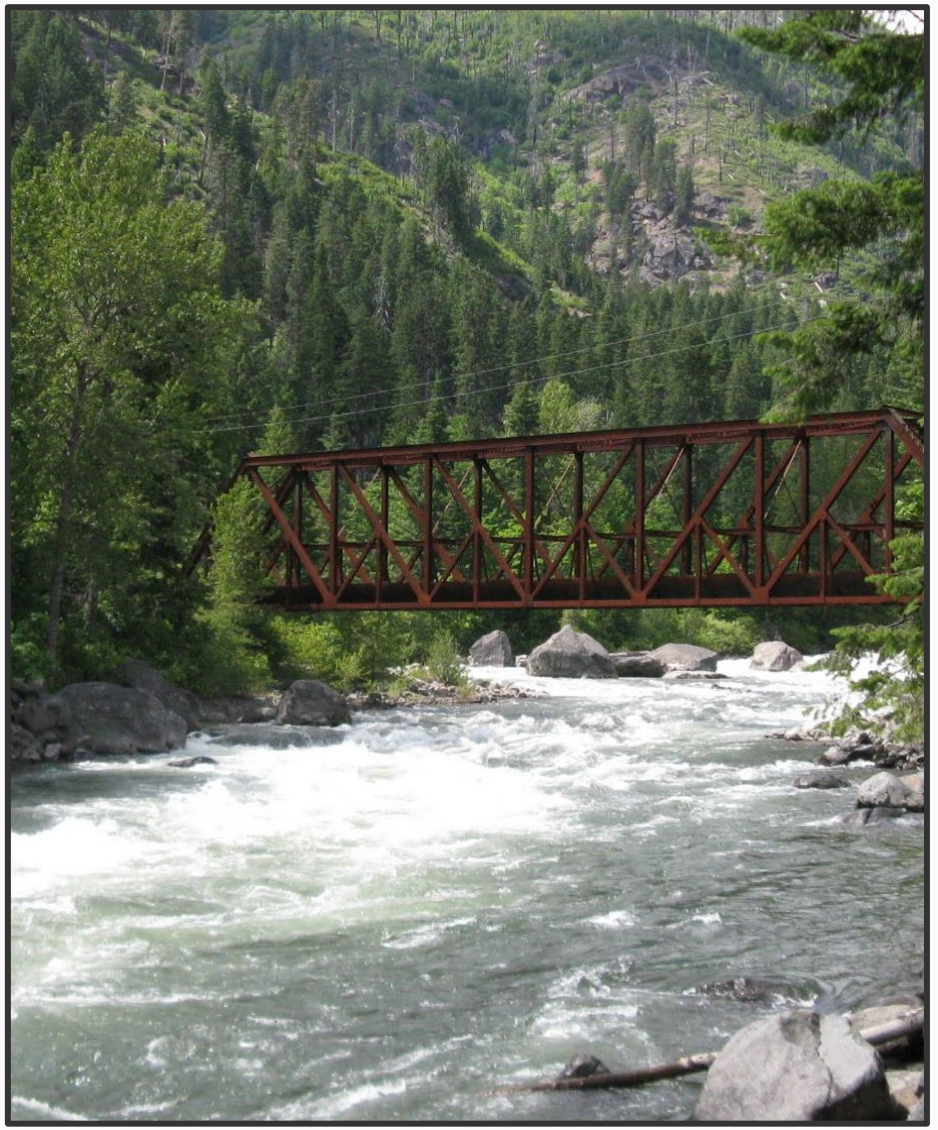
2027: Columbia R-4, middle (Priest Rapids Dam to Grand Coulee Dam)

2028: Columbia R-5, upper (Grand Coulee Dam to Northport)



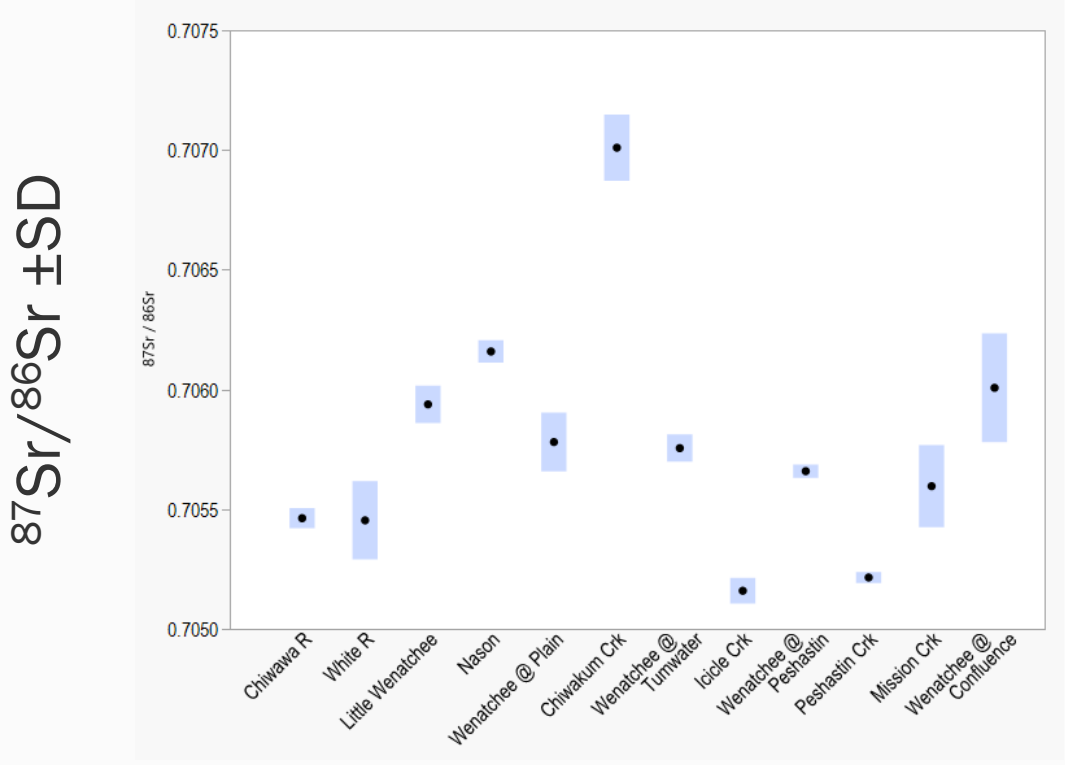
Pilot Study – Wenatchee River

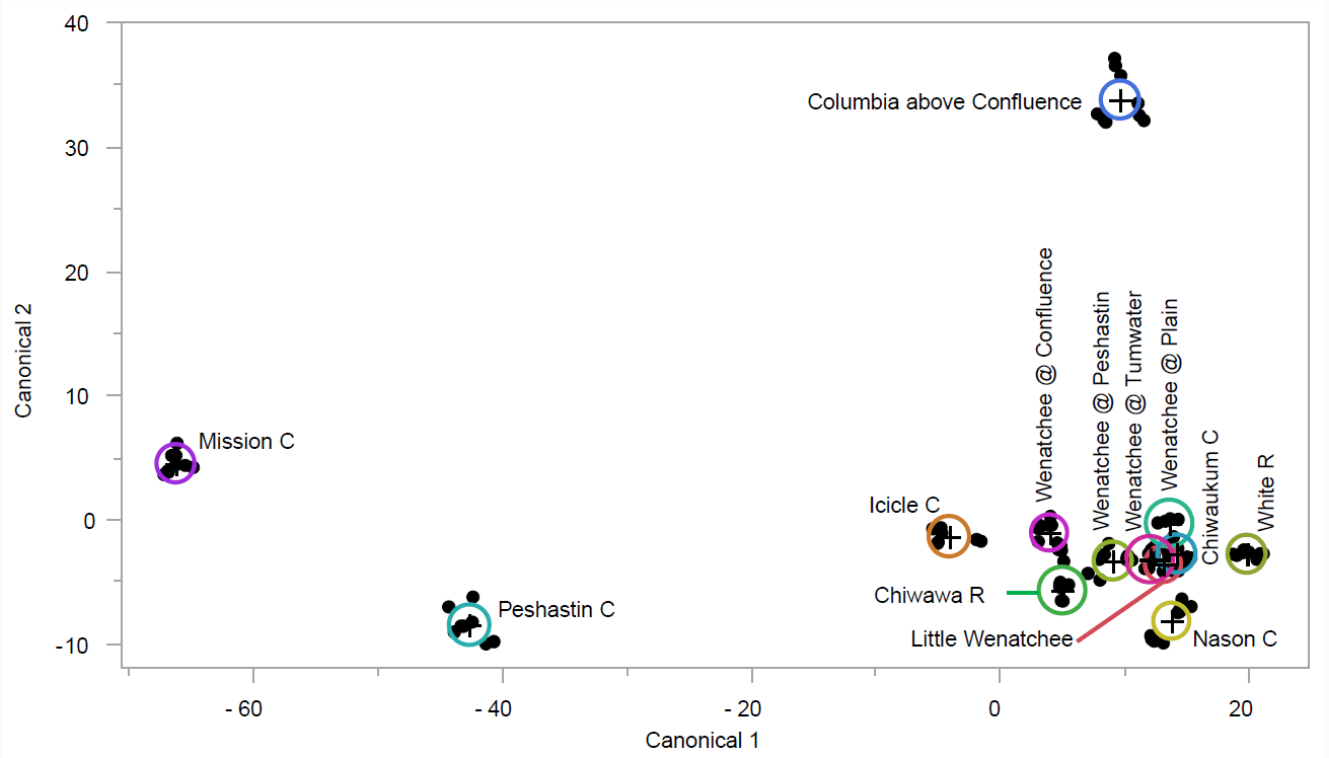
1. Are there clear differences in water chemistry at the HUC10 (tributary) watershed level?
2. Can we thin section resident fish otoliths and get useable microchemistry results?
   a) Mountain whitefish archived collections (2004, 2010 and 2015)



Water Chemistry

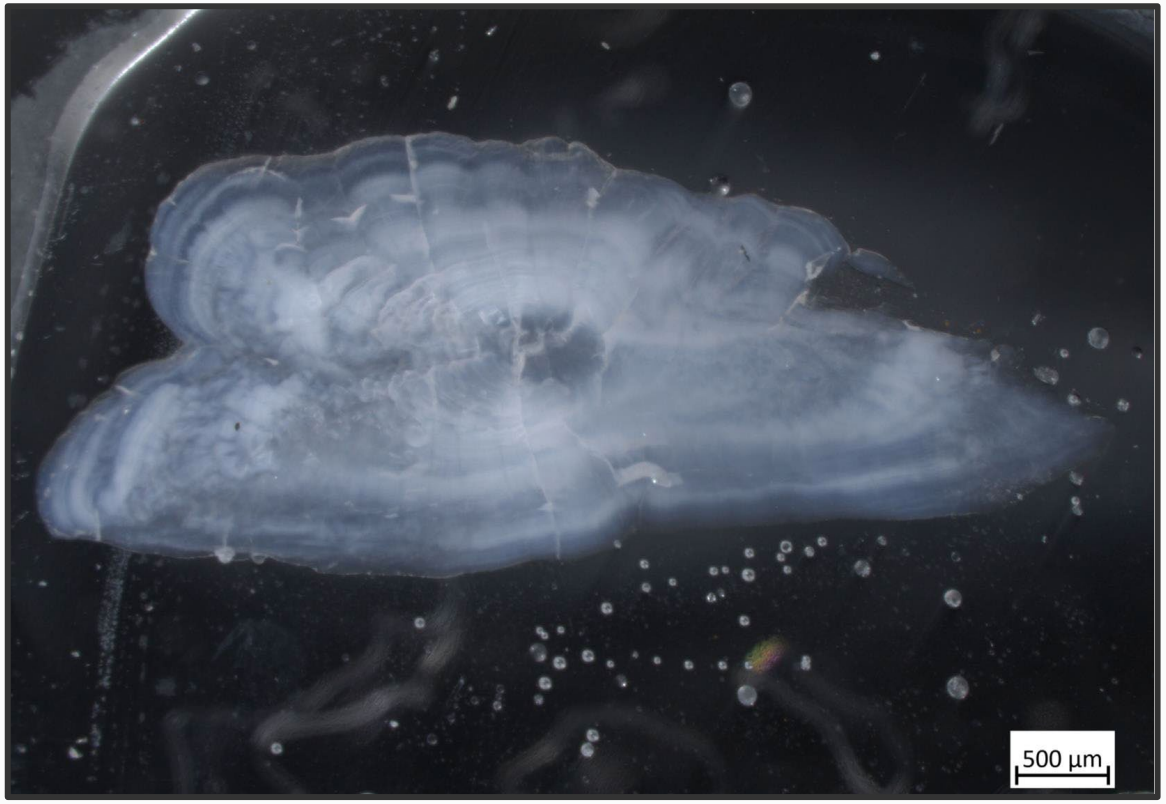
- Verified that samples need to be field filtered; concentrations increase if filtering is delayed.
- Seasonal differences in metals concentrations
  - Necessary to capture various hydrologic regimes
  - Samples will be collected over 2 years during high and low flow periods
- Significant spatial differences between mainstem Wenatchee, Columbia and several tributaries
  - Spatial differences should be resolvable over larger scales throughout CRB

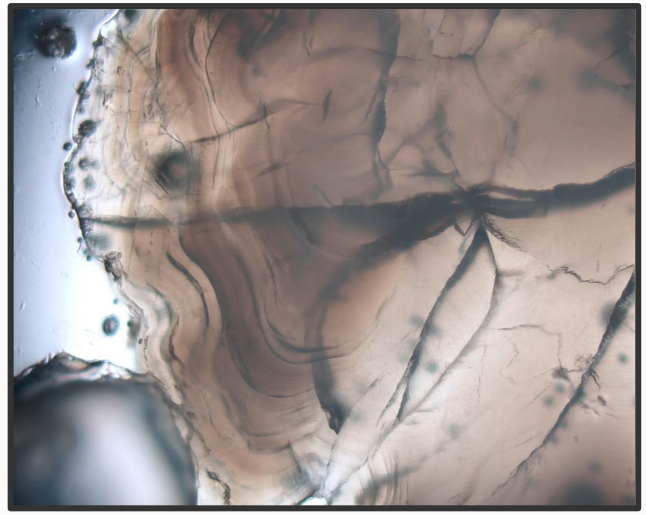




Otoliths

- Whitefish otoliths can be thin sectioned and provide adequate annuli for microchemistry
  - Analysis underway at OSU
- Will proceed with analyzing ~100 archived otoliths
- Large scale sucker otoliths (lower Columbia R) may present some complications due to size
  - Typically the operculum is used for ageing
- Bass and walleye otoliths (lower Columbia) are currently being processed





Future Work

- Use this toxics loading study as a prioritization tool
  - Focus on tributary watersheds with high loading of toxics to the mainstem CR for toxics reduction efforts
  - Guide Ecology-led source identification work
- Support the development of a mainstem monitoring program
- Continue to develop and apply tools for understanding resident fish movement

Thank you

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Project QAPP: Report 26-03-106

Google: “Ecology Hobbs Columbia”

Project Timeline

Project year	Federal fiscal period	Project planning and manufacturing of equipment	Final published QAPP	Sampling for Toxics	Sampling for metals / isotopes	Project data reduction	Project final report and data archiving
1	10/01/2024 - 03/31/2025						
1	04/01/2025 - 09/30/2025			Aug/Sept 2025			
2	10/01/2025 - 03/31/2026			May/June 2026			
2	04/01/2026 - 09/30/2026			Aug/Sept 2026			
3	10/01/2026 - 03/31/2027			May/June 2027	WY 2027		
3	04/01/2026 - 09/30/2027			Aug/Sept 2027	WY 2027		
4	10/01/2027 - 03/31/2028				WY 2028		
4	04/01/2028 - 09/30/2028				WY2028		
5	10/01/2028 - 03/31/2029						
5	04/01/2029 - 09/30/2029						