



COLUMBIA RIVER BASIN
RESTORATION PROGRAM



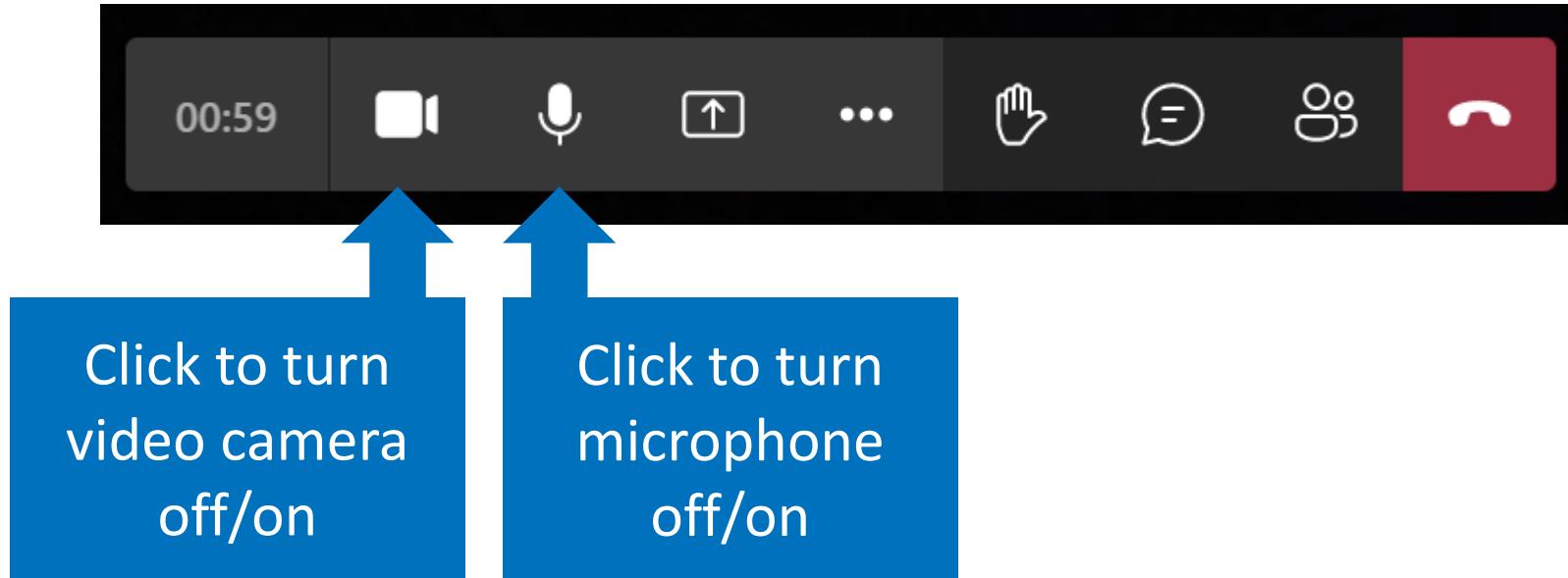
Columbia River Basin Restoration Program Toxics Monitoring Subgroup Meeting

JULY 11, 2023 | 12:30 – 2:00 PM PACIFIC



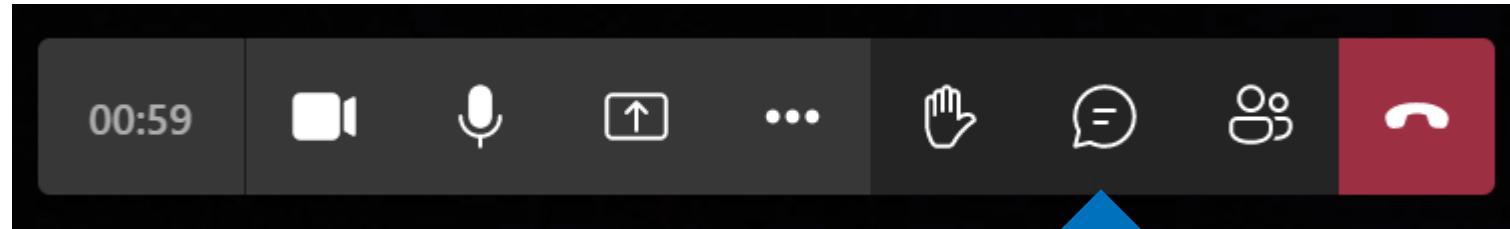
Image: Jim Choate

MS TEAMS TIPS



Please turn camera and mic off when not speaking.

INTRODUCTIONS



Click chat icon and
introduce yourself –
name and affiliation

AGENDA

12:30–12:35 PM

WELCOME & INTRODUCTIONS

12:35–12:45 PM

MONITORING MATRIX

- Review purpose, current content
- Discuss plans to provide access and update over time

12:45–1:00 PM

WINTER WORKSHOP PLANNING

- Get feedback on potential training, date, and location

1:00–2:00 PM

LIGHTNING TALKS

- 5 presentations, Q&A after each

TYPE QUESTIONS OR COMMENTS IN SLIDO



Join at [#TMS](https://www.slido.com)

COLUMBIA RIVER BASIN TOXICS MONITORING PROJECT TRACKING MATRIX

MONITORING MATRIX

Why do this?

- aid the broad understanding of work in the CRB – who's doing what, where, when, and how
- help facilitate coordination and collaboration
- identify information gaps
- facilitate use of comparable methods/approaches

THE MATRIX WILL INFORM OUR COLLABORATIVE TASKS

- Task 1.** Identify data gaps and areas of synergy for sampling and data management
- Task 2.** Develop recommendations for common collection and analytical methods to enable cross-project data comparisons
- Task 3.** Discuss and agree on screening values/thresholds for specific constituents to be monitored

MONITORING MATRIX CONTENT

Project Basics

- Title & Purpose
- Lead entity & contact info
- Geographic scope & mainstem or tributary
- Monitoring start/end dates
- Monitoring type

Parameters and Methods

- Parameters monitored (POP?)
- Sampling site #s & frequency
- Media
- QAPP
- Analytical method – CWA/other or novel?

Looking Forward

- Comparison thresholds?
- Primary source pathway?
- Mitigation solution proposed?

MATRIX SNAPSHOT

| Unique identifier | Project title | Project purpose | Lead entity | Entity conducting monitoring | Monitoring type | Geographic scope of monitoring | Mainstem Columbia River or tributary | Monitoring location description |
|-------------------|--|--|---|---|-----------------|--------------------------------|---|--|
| 44-02J20001 | Upper Columbia Basin Contaminant Status, Movement and Remedial Pilot Study | The primary goals of the study are to: 1) identify areas where contaminant concentrations are elevated or exceed water quality and sediment quality standards set by the Spokane Tribe and EPA, EPA Aquatic Water Quality Criteria (AWQC), 2) evaluate movement of contaminants transported through the river across media, 3) identify which contaminants are entering the food web via biofilm that are available to bioaccumulate up the food chain, and 4) test the feasibility of a sediment particle trap methodology that could be scaled up for large-scale restoration actions in the future. | Spokane Tribe of the Spokane Reservation | Spokane Tribe's Limnology Program, contractor | targeted | broad scale | mainstem and tributary (Columbia River and Spokane River) | upper Columbia River basin |
| 44-02J22301 | Eliminating Erosion of Legacy Mine Tailings from the Bodie Mine into Toroda Creek, Kettle Creek Watershed, WA | By halting the active erosion of Toroda Creek into the mine tailings along the proposed project reach, this project will eliminate pollution from added siltation as well as toxics including arsenic, cadmium, lead, mercury, selenium, copper, and zinc currently found in the tailings on the site. The project will not only improve water quality in Toroda Creek by reducing toxic sediment inputs to the stream, but it will also benefit the overall ecosystem health of the Kettle River watershed and the Columbia Basin. | Trout Unlimited | Trout Unlimited; Herrera Environmental Consultants, Inc. | targeted | localized | Columbia River tributary | Toroda Creek (NE WA) |
| 44-02J22501 | Upper Columbia River Toxics Monitoring; Caring for Shxʷntkʷitkʷ: Increase monitoring and access to data from monitoring in the UCR Basin with impact to human health and fish and wildlife | Undertake planning and piloting of an innovative environmental monitoring and risk communication program that centers the needs of Confederated Tribes of the Colville Reservation members while being expansive enough to have relevance for all local residents and users of the Upper Columbia River and Lake Rufus Woods. The ultimate goal is to reduce uncertainty around what activities and resources are safe for Confederated Tribes of the Colville Reservation members and other local residents to do and use, and to initiate a program that will track future trends in contaminant levels. | Confederated Tribes of the Colville Reservation | Confederated Tribes of the Colville Reservation | targeted | broad scale | Columbia River mainstem and tributary | Upper Columbia River, Lake Roosevelt, and Lake Rufus Woods |
| RB-01J72301 | Monitoring, Reduction, and Collection of Agricultural Pesticides in the Columbia River Basin | A pilot Pesticide Stewardship Partnership (PSP) project in the Yakima River watershed (YRW) and Palouse River watershed (PRW) that expands on preceding WSDA efforts. This project's three main components are 1) Conduct and expand surface water monitoring in key agricultural regions of Washington, 2) Create and conduct targeted outreach in the PRW and YRW, and 3) Waste pesticide collection in the PRW and YRW. | Washington State Department of Agriculture | Washington State Department of Agriculture Natural Resources Assessment Section and the Palouse Conservation District (PCD) | fixed-site | broad scale | Columbia River tributary | Palouse River watershed and Yakima River watershed |

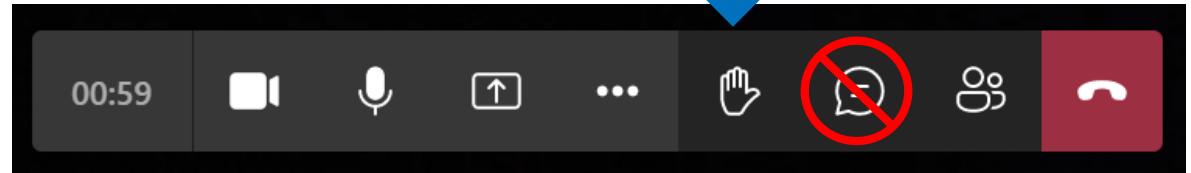
| Monitoring location county and state | Are locations of monitoring sites available now? | Number of sampling sites | Sampling frequency | Parameters monitored | Parameter type(s) | EPA Region 10 prioritization tiers for parameters monitored | Persistent organic pollutant | Media being sampled | Will chemical concentration data be compared to toxicity reference values? If yes, which reference values? | Primary source pathway being investigated | Potential mitigation solution |
|--|--|--------------------------|---|--|--|---|------------------------------|---|---|---|--|
| Ferry, Stevens, Lincoln, Grant - all in WA | No | 15-30 | 2 sampling events, spring & fall, 1 year | Target Analyte List (TAL) metals (Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Iron, Lead, Manganese, Mercury (Hg), Nickel, Selenium, Silver, Thallium, Vanadium and Zinc), methylmercury, polychlorinated biphenyls (PCBs) Aroclors, PCB congeners, cations (Calcium, Magnesium, Potassium, Sodium), anions, total organic carbon (TOC), dissolved organic carbon (DOC), and particle size. | metal, other inorganic, organic, other | tier 1, tier 2, tier 3 | mixed | surface water, bottom sediments, suspended sediments, and biofilm | Spokane Tribal Water Quality Standards, federal federal water quality standards, federal sediment guidelines | mining, industrial | no |
| Okanogan, WA | no | TBD | TBD | arsenic, cadmium, lead, mercury, selenium, copper, zinc | metal | tier 1, tier 2, tier 3 | no | sediment | NA | mining | removing tailings material from adjacent to the stream, stabilizing the streambank and restoring native riparian vegetation |
| Stevens, Ferry, Lincoln, Okanogan, Douglas - all in WA | no | TBD | 60-75 samples (20-25 per me | mercury, arsenic, copper, and lead; methylmercury (fish tissue only); PCBs (congener analysis); and DDT and its metabolites | metal, organic | tier 1, tier 2 | mixed | fish tissue composites, beach sediment composites, and surface water (dissolved and total analyses) | Final toxicity reference values have not yet been selected, but likely will include Tribal, state, and Federal standards, TSC benchmarks, EPA National Recommended Water Quality Criteria, Washington State water quality standards (WAC 173-201A: Water Quality Standards for Surface Waters of the State of Washington) | source pathways are not being investigated by this project, exposure pathways are | no |
| Whitman County WA, Yakima County WA, Benton County WA | yes | 5 | (PRW) about 66 water samples and 12 sediment samples over 2 years, (YRW) about 144 water samples over 2 years | Samples will be analyzed for more than 150 legacy and currently used pesticides, including toxics from all 3 tiers of the Columbia River Toxics Reduction Working Group list of priority pollutants. | organic | tier 1, tier 2, tier 3 | mixed | surface water, sediment | WAC 173-201A: Water Quality Standards for Surface Waters of the State of Washington) | agriculture | Targeted outreach in two watersheds will cover specific management practices growers in those regions can implement to reduce pesticide transport to surface water |

MONITORING MATRIX

- Who may contribute?
- How will it be updated in the future?
- How can you access it?

QUESTIONS?

Raise your hand in Teams to ask a question aloud



Type questions in **Slido Q&A** - go to slido.com, enter code **TMS**



WINTER WORKSHOP PLANNING



COLLABORATIVE TASKS

- Task 1.** Identify data gaps and areas of synergy for sampling and data management
- Task 2.** Develop recommendations for common collection and analytical methods to enable cross-project data comparisons
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WINTER WORKSHOP PLANNING

Pre-workshop tasks

- Understand priorities in order to identify gaps with respect to CRBRP needs
- Complete the matrix for grantees and others if willing

Workshop outcomes

- Identify data gaps with respect to CRBRP priorities
- Identify areas of synergy for sampling across projects
- Identify ways to connect mainstem monitoring and tributary monitoring projects
- Training if desired -- Topic TBD

WINTER WORKSHOP PLANNING

Workshop focus: identify data gaps and areas of synergy for sampling and data management

We want your input on

- **Logistics:** when/where/would you come in person?
- **Potential training.** Ideas from previous survey:
 - Developing Data Quality Objectives (DQOs)
 - Selecting analytical methods
 - Finding or creating SOPs for field sampling
 - Developing sampling plans
 - Finding a lab
 - Uploading data to WQX
 - Data analysis
- Any other input you want to share



Please fill in the survey

ⓘ Start presenting to display the poll results on this slide.

LIGHTNING TALKS

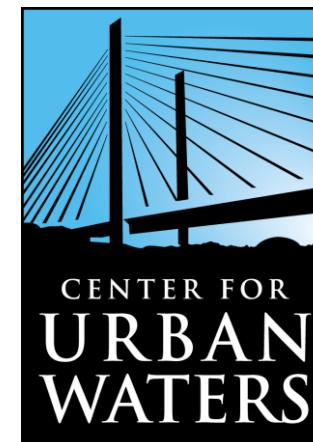


1. River TALC: Toxics Assessment of the Lower Columbia, Kelli Daffron (North Coast Watershed Association)
2. TLC: Tracking Toxics in the Lower Columbia (Phase I), Catherine Corbett (LCEP)
3. Lower Wenatchee River PCB Source Investigation, Abby Hendrickson (Chelan County)
4. Crayfish as indicators of 6PPD-quinone contamination, Mary Engels (University of Idaho)
5. Transboundary Impacts of Mining on US Waters, Travis Schmidt (US Geological Survey)

River TALC: Toxics Assessment of the Lower Columbia

Testing for Roadway Runoff Chemicals

North Coast Watershed Association
Kelli Daffron



Objectives

- Data gaps
 - First sampling for 6PPD-Q in our area
- Educational gaps
 - CCC, high schools, community
- Data Sharing
 - Oregon DEQ's Ambient Water Quality Monitoring System (AWQMS)
 - EPA's Water Quality Exchange (WQX)
 - Public and Partners



Targeted Chemicals in River TALC

| Vehicle-related chemicals | Pharmaceuticals and personal care products (PPCP) |
|--|--|
| (+)1,3-Diphenylguanidine | (+)Caffeine |
| (+)Hexa-(methoxymethyl)melamine | (+)Cetirizine |
| (+)N-cyclohexyl-1,3-Benzothiazole-2-amine (NCBA) | (+)Cotinine |
| 6PPD-quinone | (+)DEET |
| Benzothiazoles & Benzotriazole | (*)Diclofenac |
| (+)Benzotriazole | (*)Ibuprofen |
| (+)5-methyl-1-H-Benzotriazole | (+)Metformin |
| (+)2-amino-Benzothiazole | (*)Triclosan |
| (*)2-hydroxy-Benzothiazole | Industrial/Commercial chemicals |
| (+)2-(4-morpholinyl)Benzothiazole | (+)1,3-Dicyclohexylurea |
| Pesticides | (*)Bisphenol A |
| (+)Clothianidin | (*)Caprolactam |
| (+)Imidacloprid | (*)4-Nonylphenol |
| (+)Thiamethoxam | (*)4-tert-Octylphenol |
| (+)Fipronil | Substituted diphenylamine antioxidants & benzotriazole UV stabilizers (SDPA & BZT-UV) |
| (+)Carbendazim | (+)SDPA-diAMS |
| (+)Iprodione | (+)SDPA-C4C8 |
| (+)Pentachlorophenol | (+)SDPA-C8C8 |
| (+)Diazinon | (+)SDPA-C9C9 |
| (+)Diuron | (+)BTZ & UV-234 |
| (+)Mecoprop | (+)BTZ & UV-326 |
| (+)Prometon | |
| (+)4-Nitrophenol | |

6PPD-Quinone

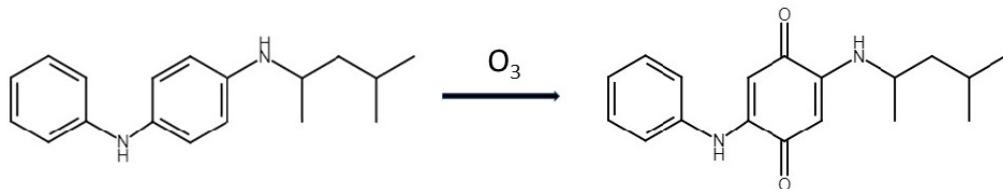
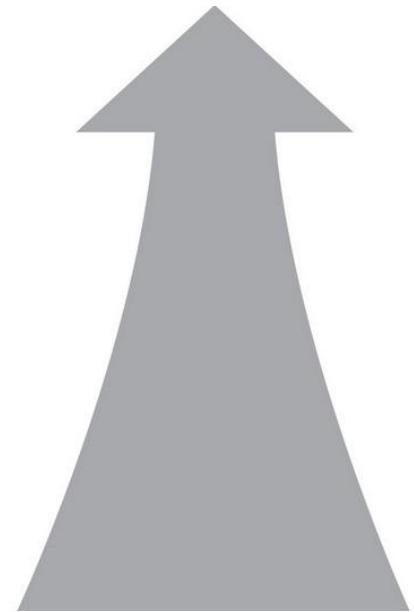


Figure 2: Reaction of 6PPD with ozone (O_3) to produce 6PPD-quinone.

Image: (26)

- One of the most deadly chemicals in roadway runoff (23; 24).
- Has been linked to the observed sudden coho death in the Puget Sound area (24)
 - Potentially caused by malfunction of the blood brain barrier (26)

- Salmonid toxicity
 - Coho
 - Coastal cutthroat trout
 - Steelhead
 - Chinook
 - Sockeye
 - Chum
- Sublethal effects
 - Eye development
 - Slower/less vigorous
 - More research needed
- $LC_{50}=95$ ng/L (Center for Urban Waters)
 - Results vary 40-100 ng/L



Sampling . . . so far

- 10 sites, 8 roadways, 6 river systems
- 3 antecedent dry days
- 3mm of rain within an hour
- Mail iced samples to Tacoma overnight

- 3 sampling events: November, February, March
 - Highest numbers in November
- Working with Clatsop County to shift some sites (smaller tributaries)
- Working with CUW to hone sampling procedures (direct runoff and surface water?)



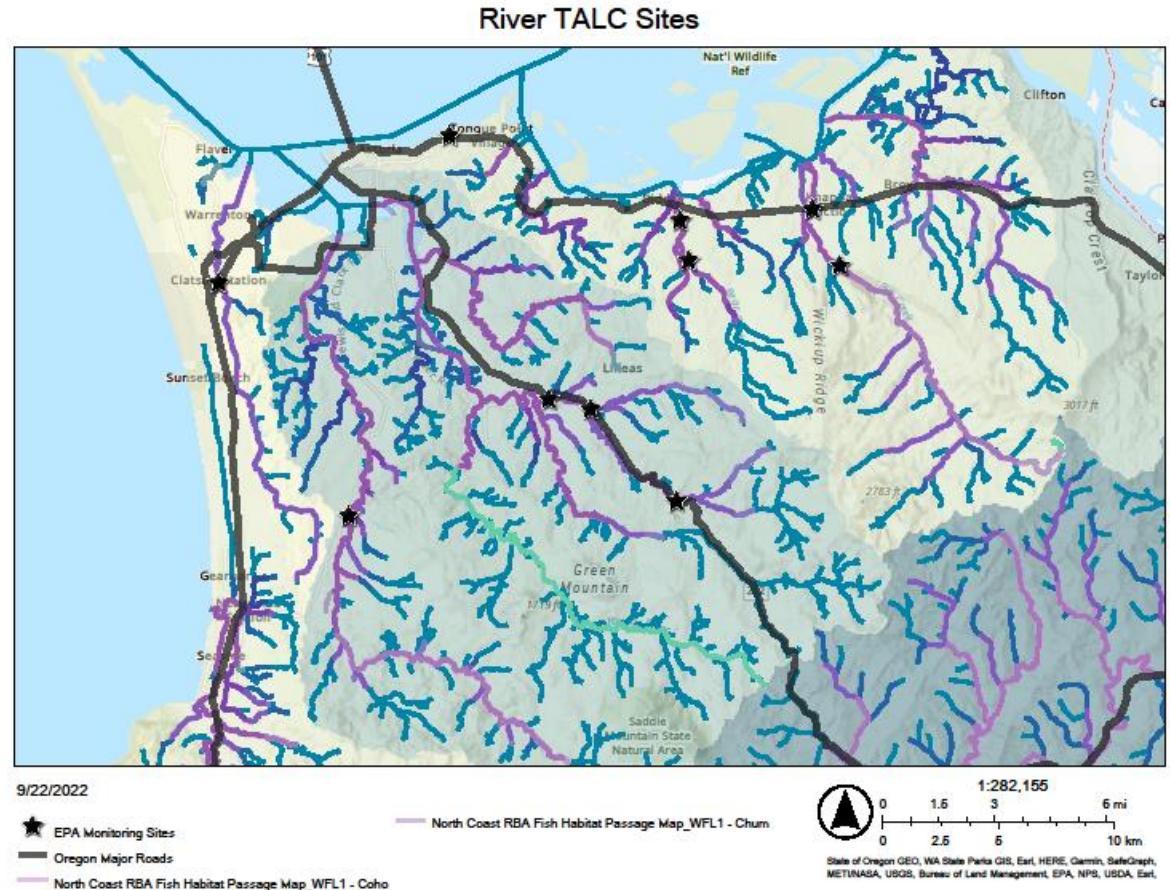
Outreach

- CCC guest lecture + field day with 2 introductory biology classes
 - Will repeat this fall
- 2 high school presentations
- 2 community presentations
 - Upcoming: Astoria Sunday Markets & KMUN Block Party
- Volunteers
 - CCC
 - Astoria High School
 - 21 hours combined thus far



Potential Mitigations

- Mapping areas where mitigation is needed
- Bioswales/vegetated strips
 - Similar performance to filtration systems—removal of 85% of suspended solids (29)
- Permeable pavement
- Infiltration trenches
- Tire manufacturing practices
 - 6ppd alternatives currently in R&D





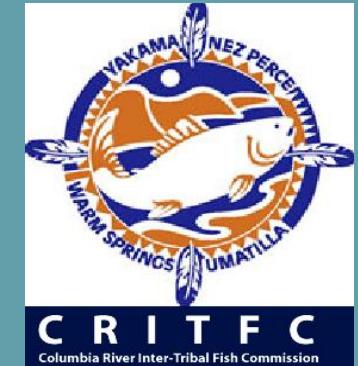
Lower Columbia
Estuary
Partnership



Tracking Toxics in the Lower Columbia River (TLC)

Catherine Corbett, Lower Columbia Estuary
Partnership

In Partnership with USGS (Jennifer Morace
and Sean Payne) and Columbia River Inter-
Tribal Fish Commission (CRITFC)





Overview

- **Background of Contaminant Monitoring in lower Columbia River**
- **Objectives and Design of TLC**
- **TLC Activities (with Status Update)**

Subset of Toxic Contaminant Monitoring in Lower Columbia River

1989 - 1996: Bi-State Program

1995: National Estuary Program (LCEP) Created – Long-Term Monitoring Strategy approved with CCMP in 1999

1996 - Current: Synaptic Sampling

- EPA EMAP, USGS BEST, Others

2004-2007: BPA funded Ecosystem Monitoring Program (EMP)

- Habitat Monitoring, Water Quality Monitoring, Salmonid Sampling, Toxics Contaminant Model Development

2007-2017: BPA funding shifted for Ecosystem Monitoring Program

- Habitat, fish, fish prey with NOAA providing inkind lab testing of fish tissue and prey for contaminants
- Stopped when Lyndal Johnson retired - no sustained contaminant testing since (argh!!!)

2008-2010: USGS Columbia River Contaminants and Habitat Characterization (ConHab) Study (10 sites sampled through EMP)

2008 -2010: USGS Columbia River Inputs Study (WWTP vs stormwater)

2010: LCEP compiled all toxic contaminant data (in electronic form) into geodatabase, compared “current” data to historic (pre-2000) and used results to update sampling design for contaminants

ConHab Foodweb Study

Passive samplers



- contaminant analyses
- estrogen screen

Sediments



- contaminant analyses
- sediment transport modeling

Invertebrates



- contaminant analyses
- community assessment

Largescale Suckers



- contaminant analyses (organs and whole bodies)
- biomarkers

Osprey



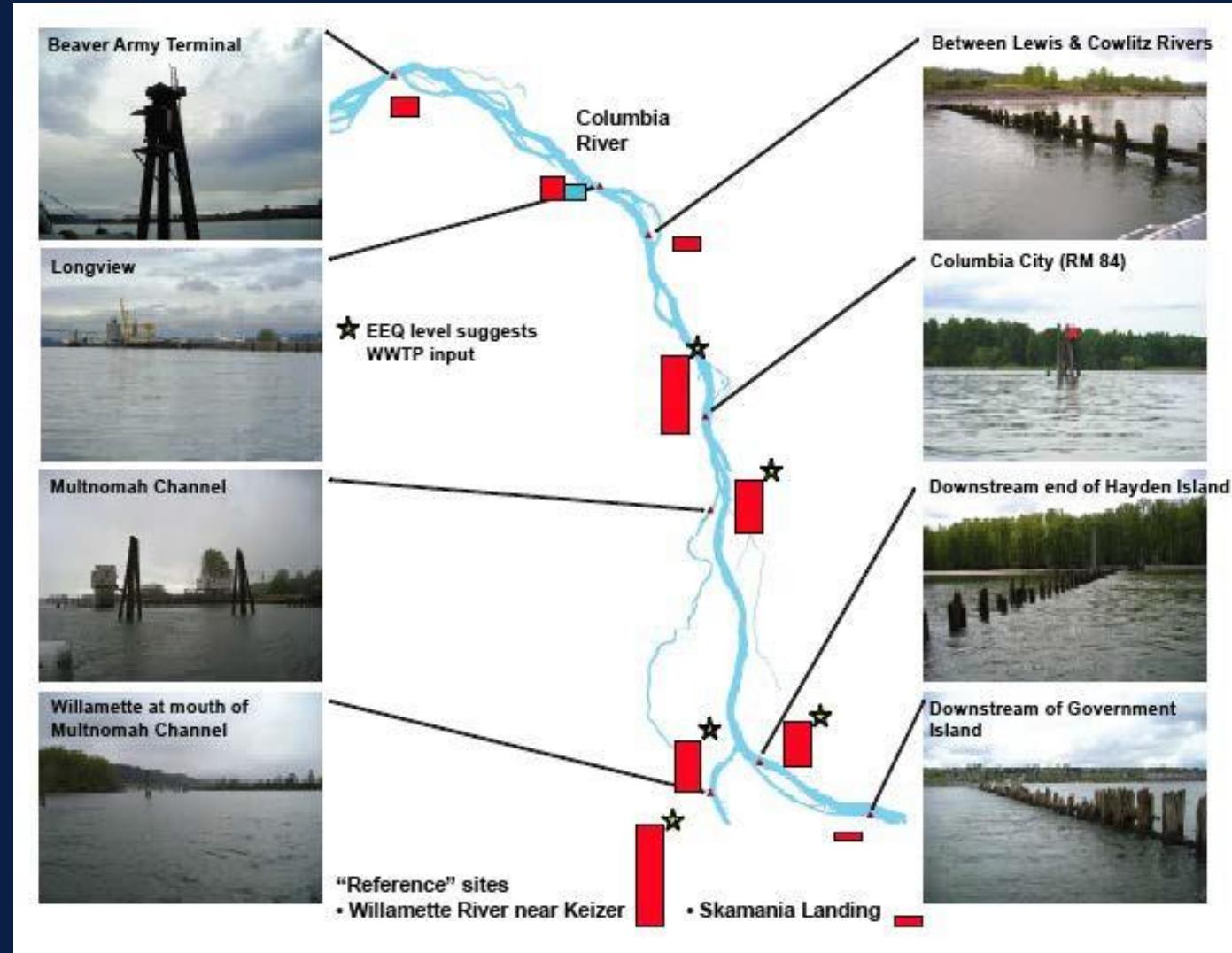
- contaminant analyses
- productivity assessment
- well bird blood analyses

From Sept 2009 USGS, NOAA presentation to NPCC

ConHab Water Results

Estrogenicity,
PBDEs,
PCBs
present in CR

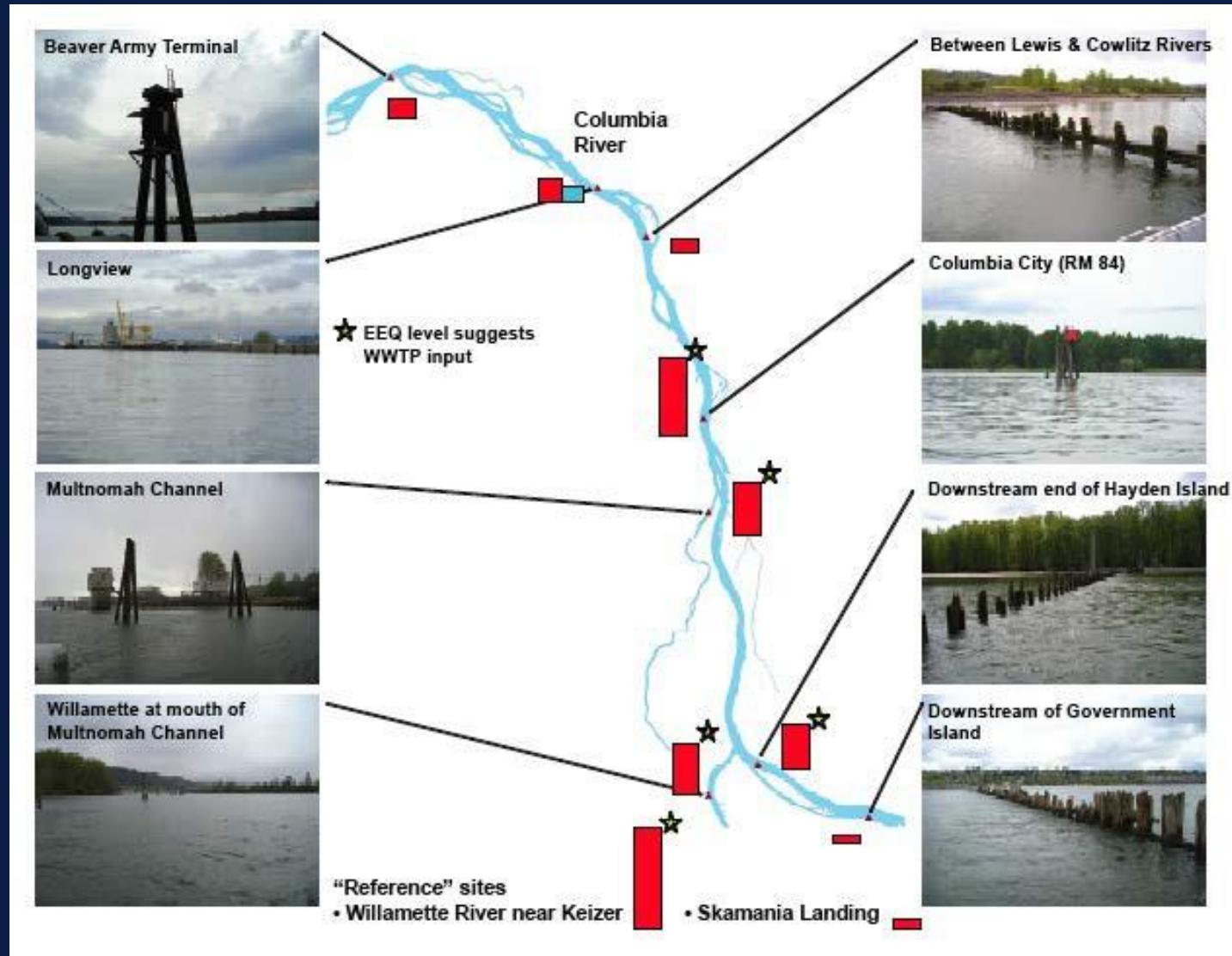
Higher near
urban areas



From Sept
2009 USGS,
NOAA
presentation
to NPCC

Influence of Urban Sources

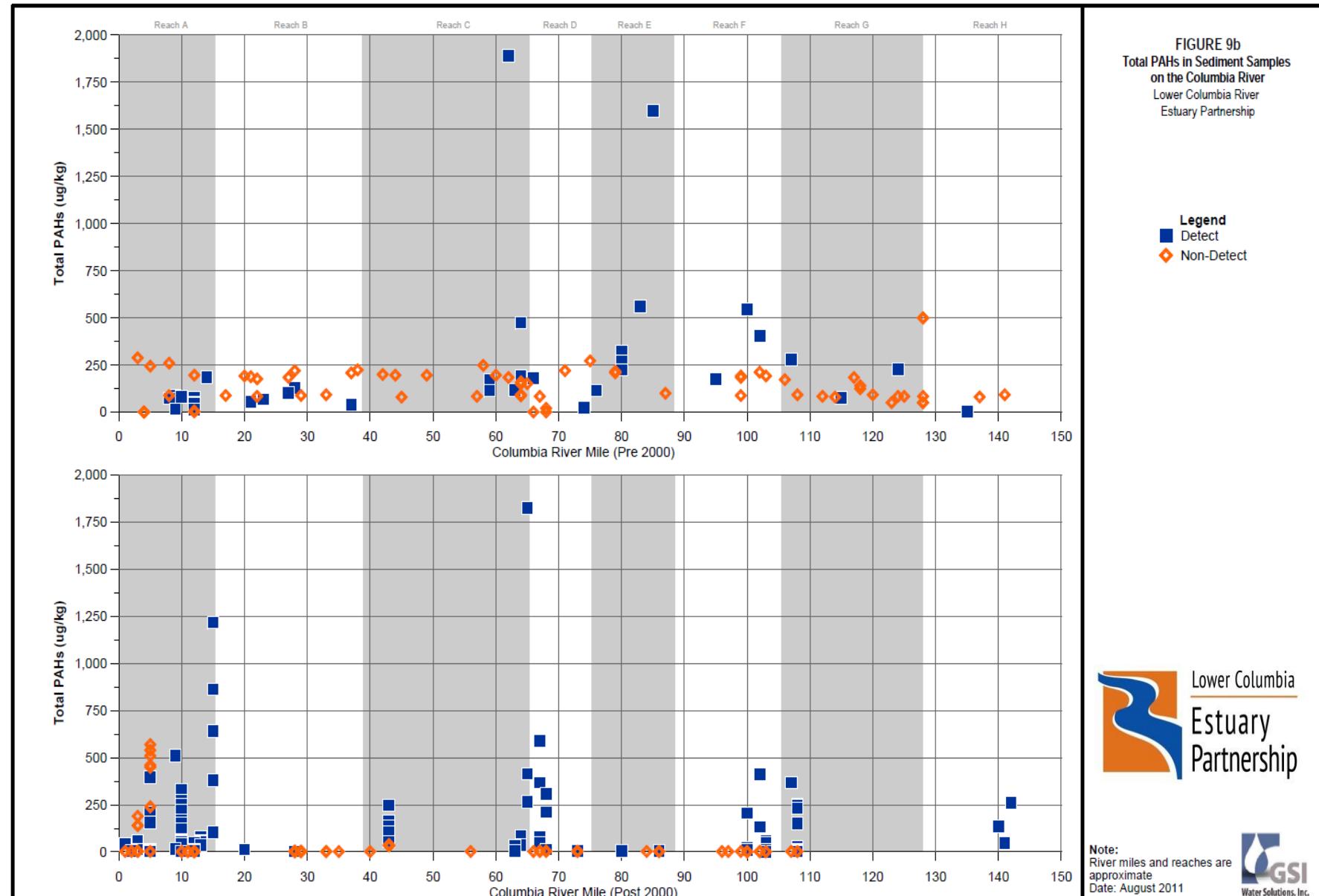
Urban signature
higher near
Columbia City,
Portland, Salem



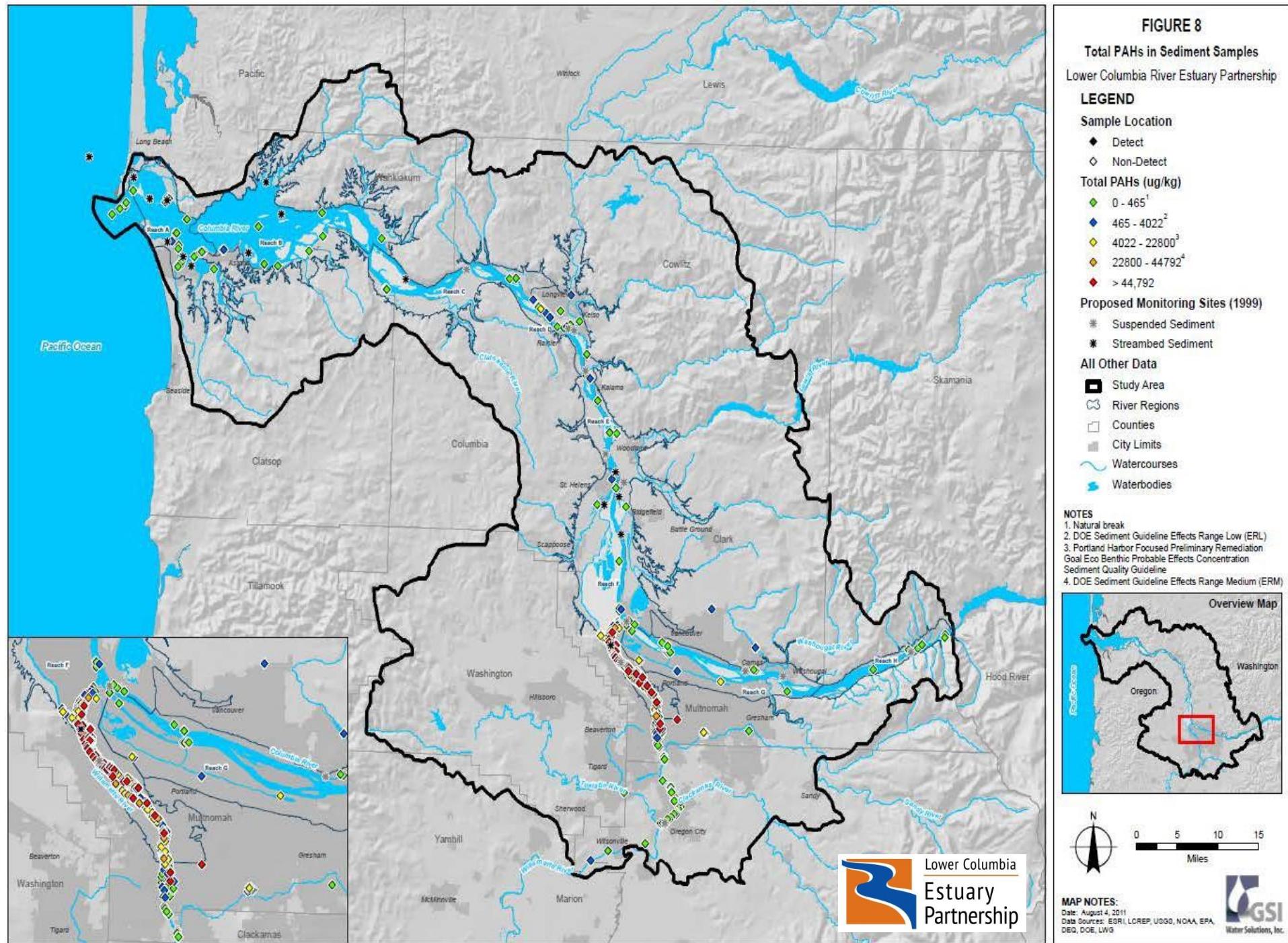
From Sept
2009 USGS,
NOAA
presentation
to NPCC

2010 Compilation of data in lower Columbia River

- Compiled by GSI Inc
- Geodatabase available on our website
- Identification of hot spots by “classes” of toxics
 - Metals
 - Legacy pesticides
 - Current use pesticides
 - Urban indicators
 - Others
- Working Group used results to update sampling plan for contaminants
 - WA Ecology
 - ODEQ
 - EPA
 - USGS
 - NOAA
 - USACE



2010 Compilation of Contaminant Data into Geodatabase



TLC Objectives and Design



- Kickstart a consistent long-term contaminants monitoring program in lower Columbia River by:
 - Providing up-to-date information on status of contaminants in the lower Columbia River
 - Allowing us to update the sampling design for contaminants based on current vs historic levels of contaminants
 - Current concentration levels
 - Ultimately lead to source tracking
 - Involving critical partners, i.e., states, tribes, municipalities, in these and future steps in hopes of ultimately leading to source reduction of contaminants

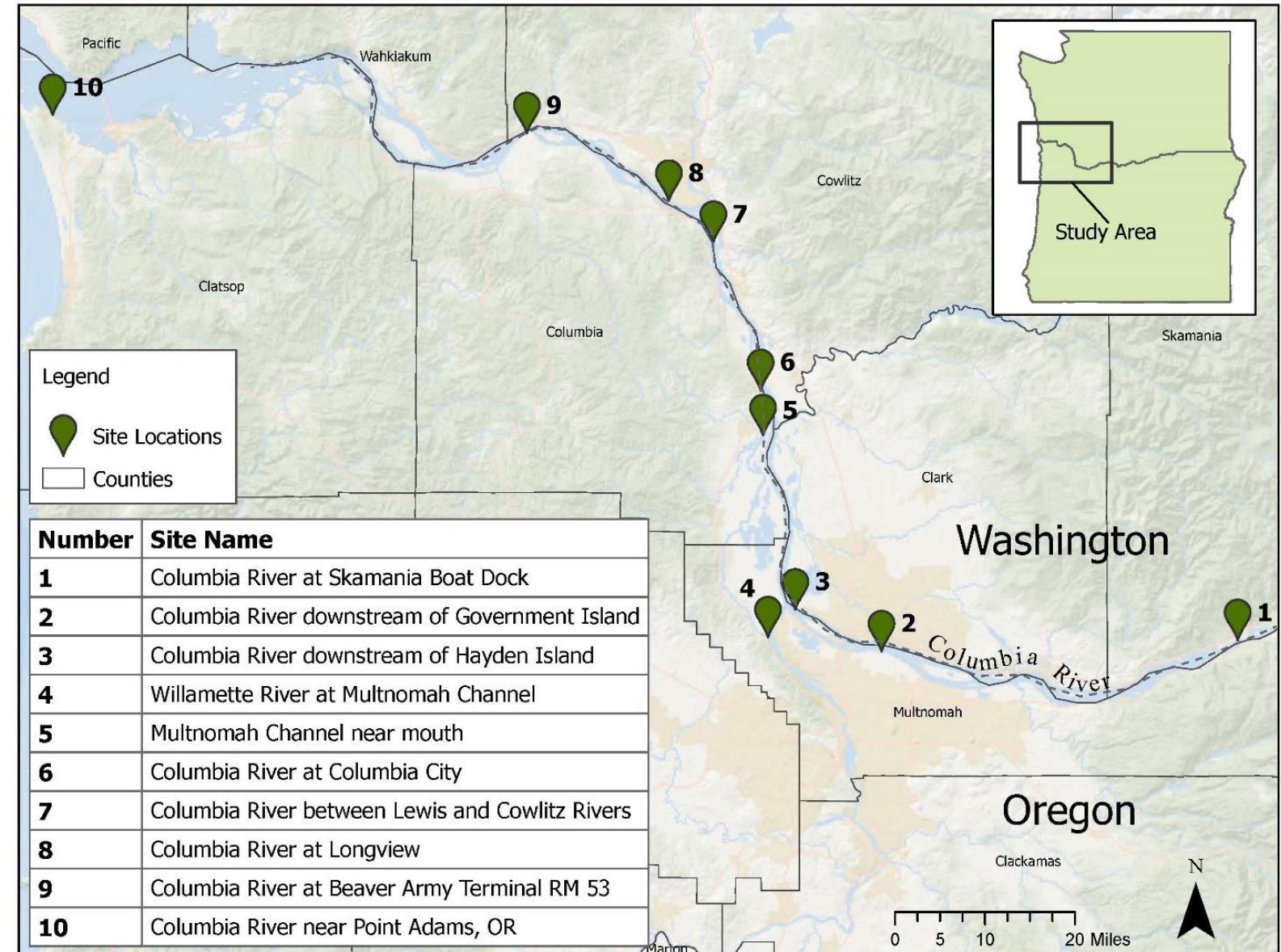
**10 Sampling Locations:
Repeat sites in EMP and
ConHab**

**3 Sampling Periods: Upriver
sources (Spring freshet)**

**Peak low and warm
summer water (August)**

**First flush of local runoff
(Oct/Nov)**

**Deploying SPMDs, POCIS
and SPATT**



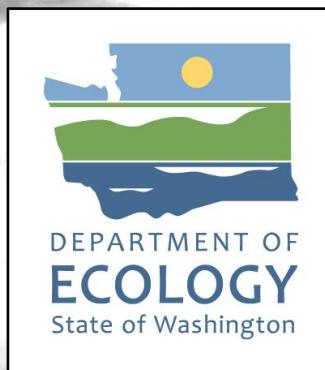
TLC Activities (with Status Update)

- ✓ **Activity 1. Sample Collection, Lab Analysis, and Reporting of Results for Toxic Contaminants (USGS with CRITFC): (STARTED)**
 - **SPMDs (semi-permeable membrane devices)** that concentrate hydrophobic contaminants, like DDTs, PCBs, and PBDEs. They are sometimes referred to as "virtual fish" because they can mimic the bioconcentration of organic contaminants in the fatty tissues of fish
 - **POCIS (polar organic chemical integrative sampler)** are deployed in the same canister as the SPMDs and concentrate hydrophilic compounds, like personal care products, many current use pesticides, and polyfluorinated "forever" chemicals (PFAS).
 - SPMDs and POCIS will be tested for PAHs, organochlorine compounds (DDTs), total PCBs, and halogenated flame retardants (PBDEs), per- and polyfluoroalkyl substances (PFAS), waste-indicator chemicals.
 - **Solid Phase Adsorption Toxin Tracking (SPATT)** to measure four cyanotoxins—anatoxins, cylindrospermopsins, microcystins, and saxitoxins.
- **Activities 2-3. Facilitate a Working Group focused on lower Columbia Toxics (LCEP with partners) and Disseminate Results: (STARTING FALL 2023)**
 - LCEP will establish and facilitate a Working Group to guide an update of LCEP's toxic contaminant monitoring program design
 - With the objective of establishing a long term monitoring program for the lower Columbia River that includes source tracking and contaminant reduction actions

Lower Wenatchee River PCB Source Investigation



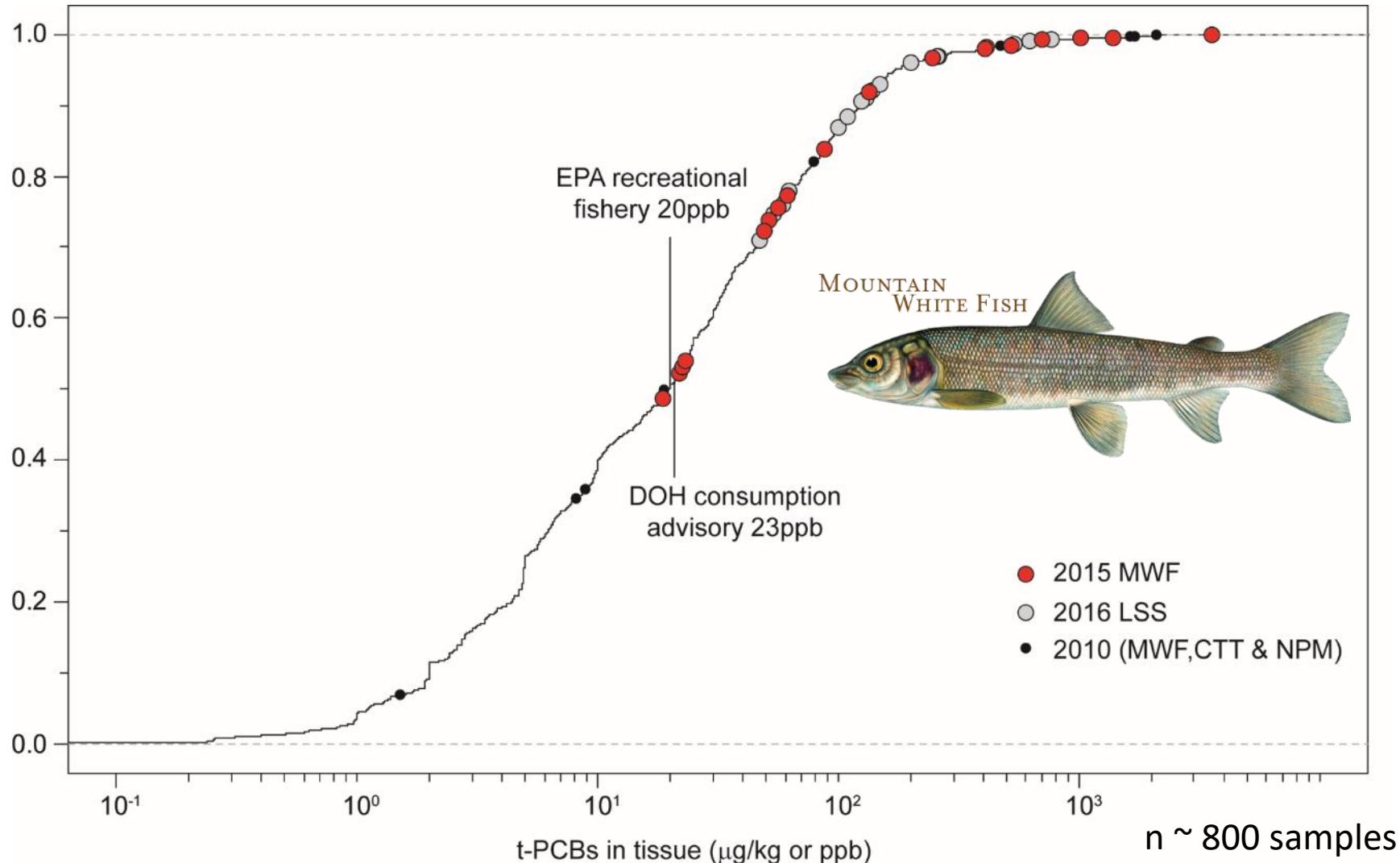
Abby Hendrickson, Mike Kaputa, Mary Jo Sanborn and Keeley Chiasson
Chelan County – Department of Natural Resources



William Hobbs
Washington State Department of Ecology

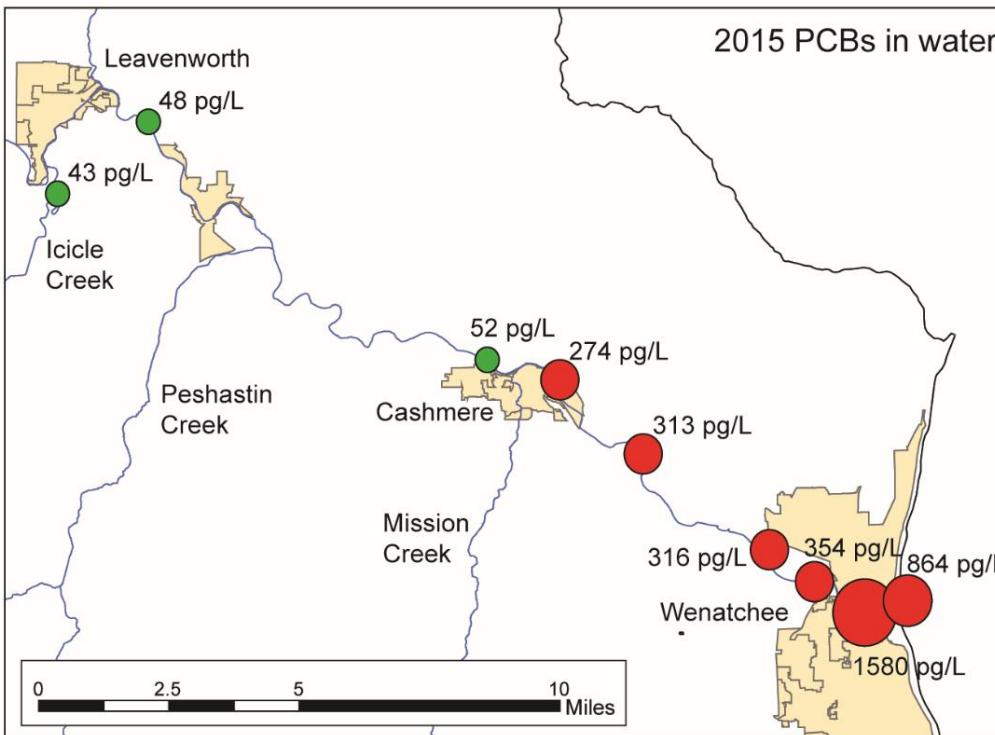
Problem:

- Mountain whitefish (*Prosopium williamsoni*) from the Wenatchee River have some of the highest PCB concentrations in Washington State
- Reaches of the Wenatchee River are listed as impaired under the U.S. EPA 303(d) list for PCBs.

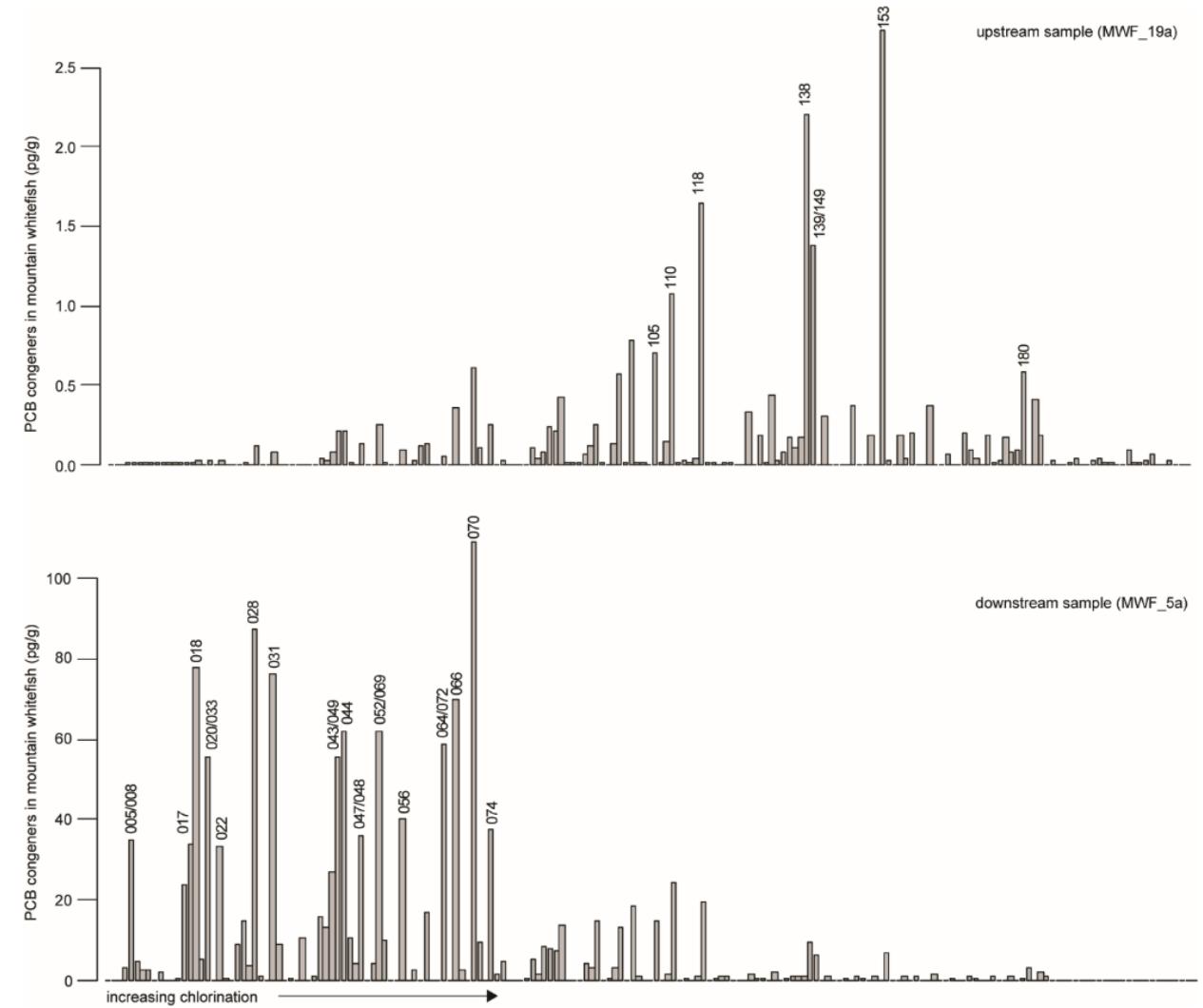


PCB Source Areas

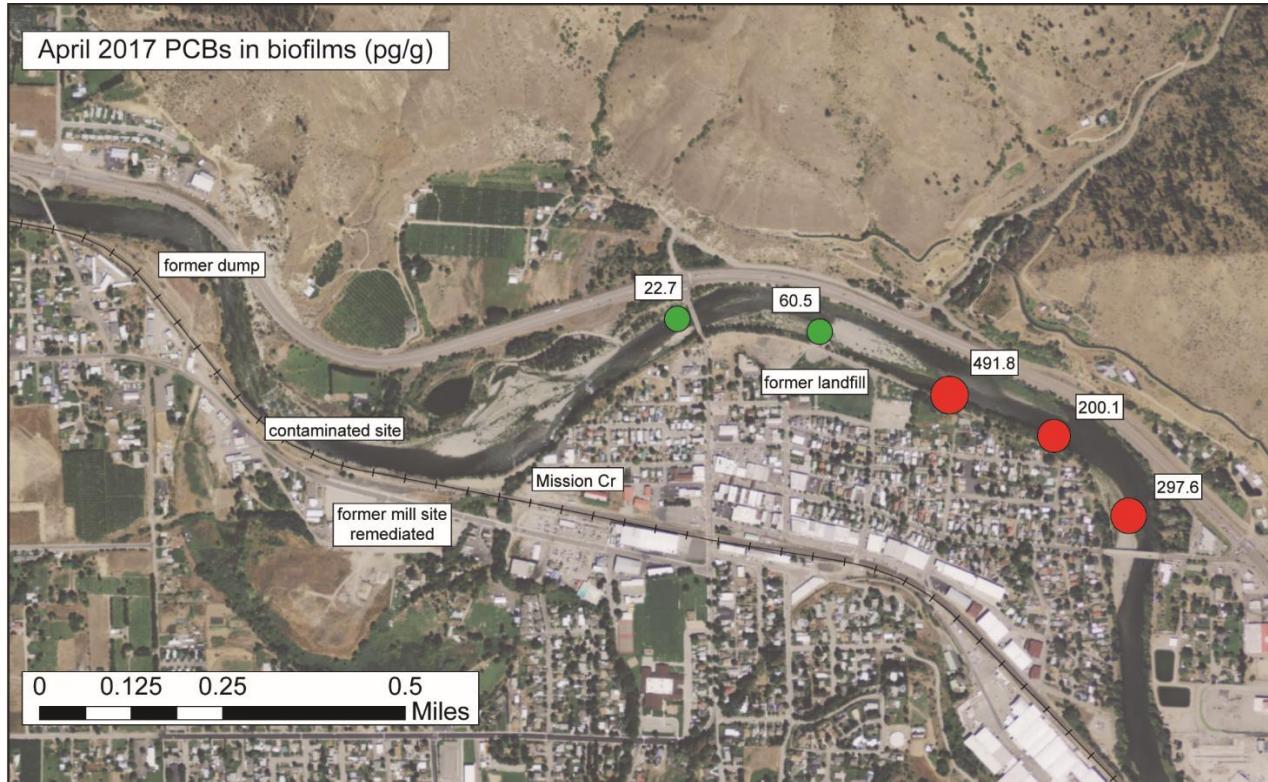
1. Source near Cashmere
2. Source near confluence with the Columbia



PCB fingerprint for the source areas

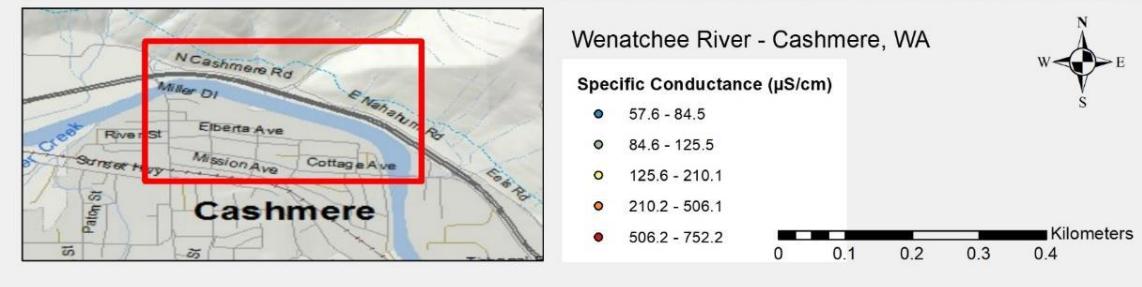


Cashmere PCB Source



Evidence of strong groundwater inputs through former landfill

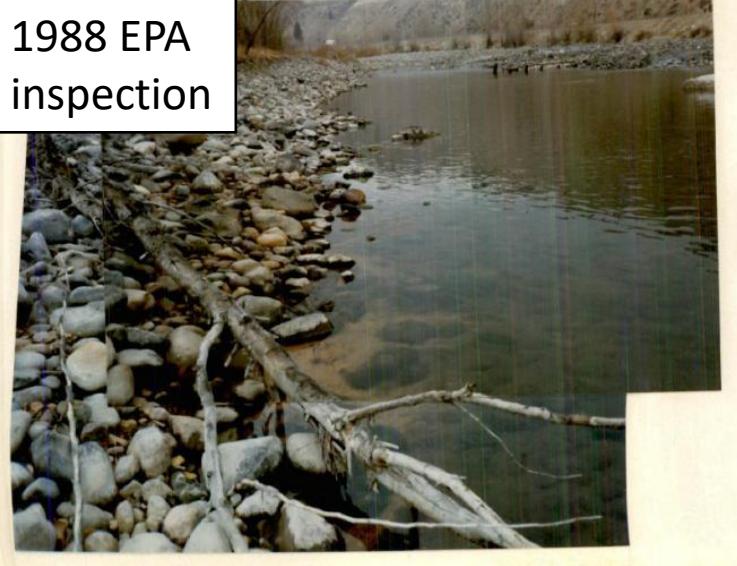
High PCB concentrations downstream of former landfill



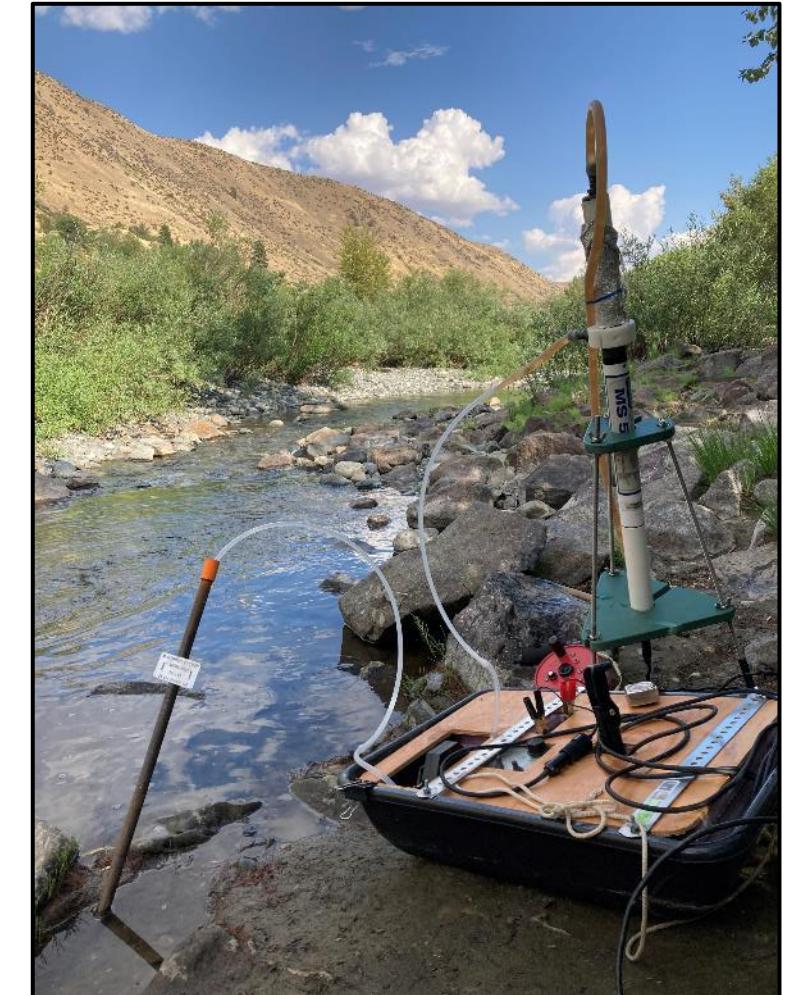
Summary – Ongoing Cashmere Source Identification

- Strong groundwater influence (gaining location) adjacent to the current park.
- Some evidence of possible leachate or high sulfur inputs
- Summer of 2022 instream piezometers installed to sample groundwater inputs
- 2 existing monitoring wells from the landfill closure
- One upgradient background well

1988 EPA inspection



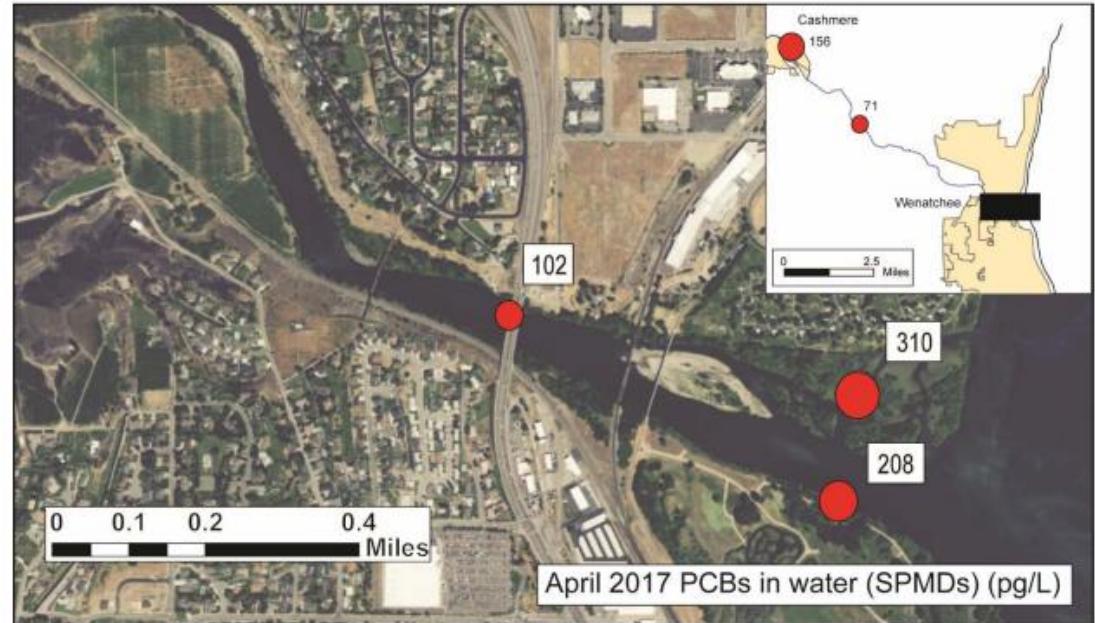
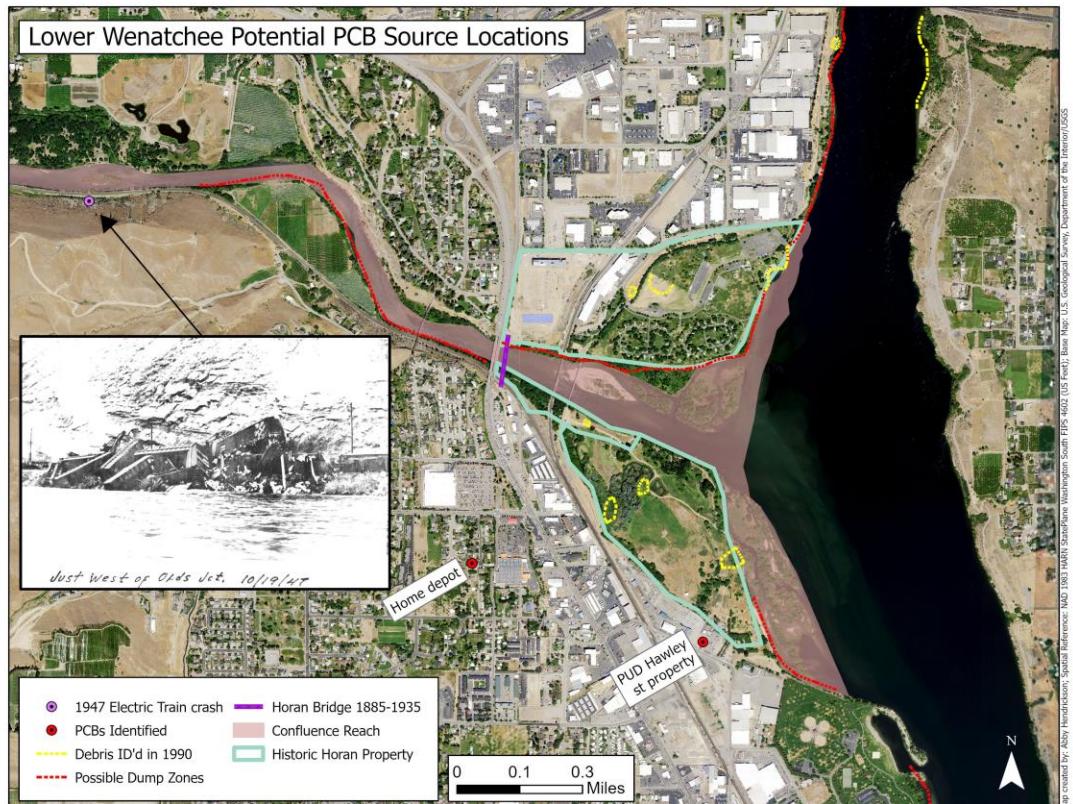
Dec 2020



Confluence PCB Source Identification

- Higher concentrations of PCBs in water near Columbia R
- Biota of the confluence area contaminated with PCBs

Project Goal: Determine if sediments in the confluence area are high in PCBs and acting as a source?



Possible PCB contamination sources @ Confluence:

1. Use of PCB's in pesticides from Horan Family Homestead
2. Train wreck 1.8RM up from confluence (1947),
3. Confirmed contaminated sites within .5-4.5mi
4. Dumping zones (evidence of debris found)

Summary – Confluence PCB Source

- Chelan County – Ecology partnership
- Received EPA funding for sediment survey in 2023/24
- QAPP approved; Historic study complete
- Synoptic sediment survey August 2023; analysis by USEPA Method 1668c
- No invertebrates available – sediment passive samplers (polyethylene) used to infer ‘bioavailable’ PCBs



Sediment from Horan Natural Area,
collected 6/15/2023





I
University
of Idaho



Connecting Rivers and Communities

Grant number: 02J19601

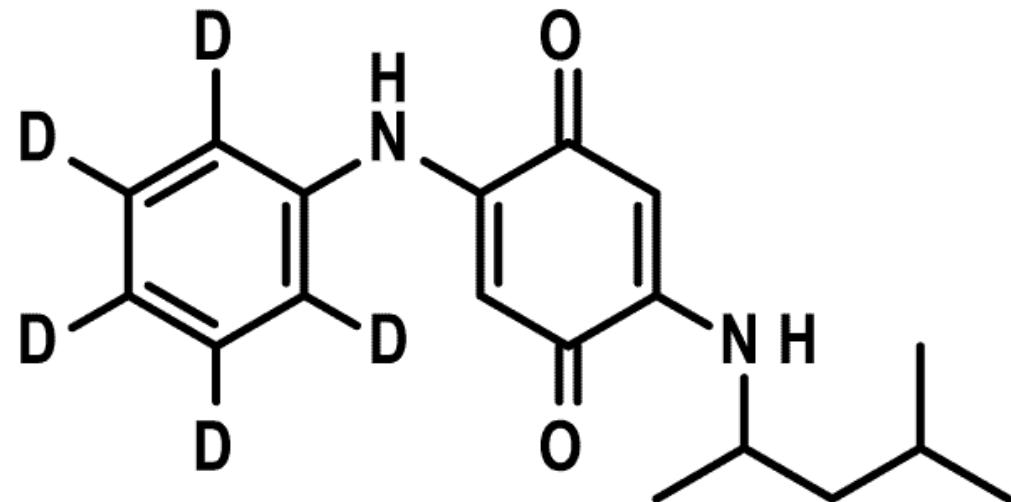


CRAYFISH AS INDICATORS OF 6PPD-QUINONE

MARY ENGELS, PI

PROJECT CONTACT: ENGELS@UIDAHO.EDU

6PPD-quinone



- Recently discovered (Tian et al. 2021)
- Degradation product of 6PPD, a commercial antioxidant
- Main source is from tire wear particulates in urban stormwater
- Toxic to Coho salmon and other aquatic organisms
- Thought to bioaccumulate
- **Distribution is unknown**

THE PROBLEM



<https://tenor.com/view/washington-state-north-cascades-river-nature-majestic-gif-11111063>



<https://giphy.com/gifs/columbia-o0vKra8rn7hVm>

THE SOLUTION?

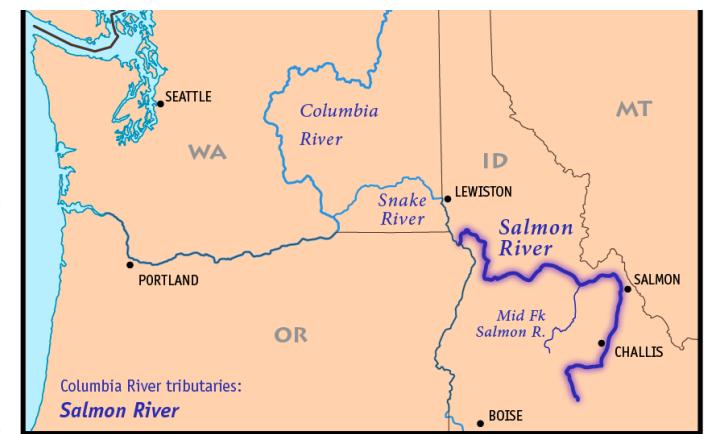
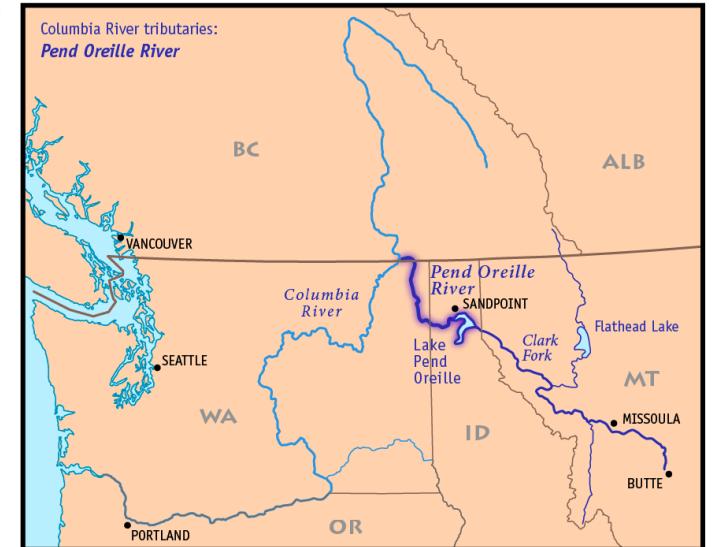
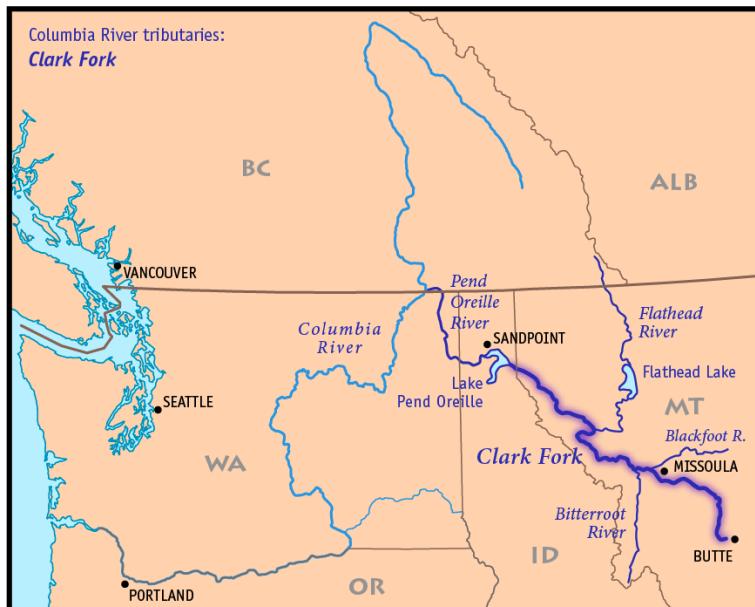


- Reflect local site conditions
- React quickly to environmental change
- Occupy multiple trophic levels
- Interact extensively with sediments
- Widely distributed in the CRB (both native and invasive species).

Project Goals

- To demonstrate the applicability of native and non-native crayfish as monitoring organisms for 6PPD-q contamination across a variety of environmental conditions.
- To promote citizen engagement and knowledge of aquatic contamination by tire wear particulates and 6PPD-q.

Focus Watersheds in the CRB



Project Objectives and Actions by

Phase

Phase 1:
Field Sampling

Phase 1:
Laboratory Analysis

Phase 2:
Field Sampling

Phase 2:
Laboratory Analysis

Phase 3:

Citizen Science Monitoring and Outreach Education

I **Phase 1:** Assess the accumulation of 6PPD-q in crayfish tissues under different exposure regimes in project year 1.

- Ecotox laboratory exposure study with two crayfish species (native Signal and invasive Rusty).

I **Phase 2:** Assess the presence of 6PPD-q and TWP in water, sediment, and crayfish and fish tissues in the middle and upper CRB in project years 1 and 2.

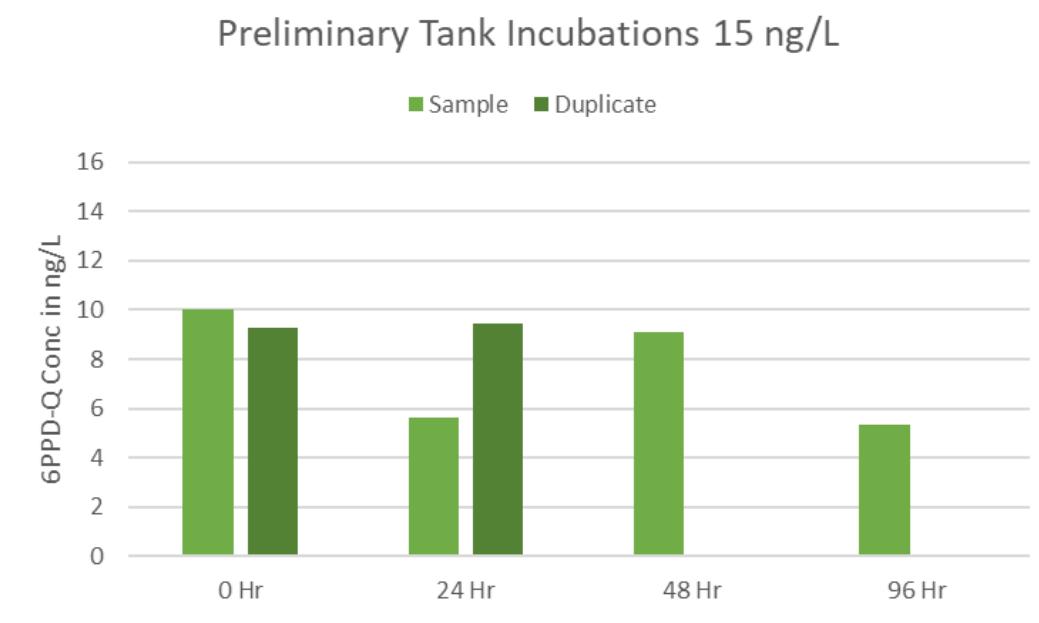
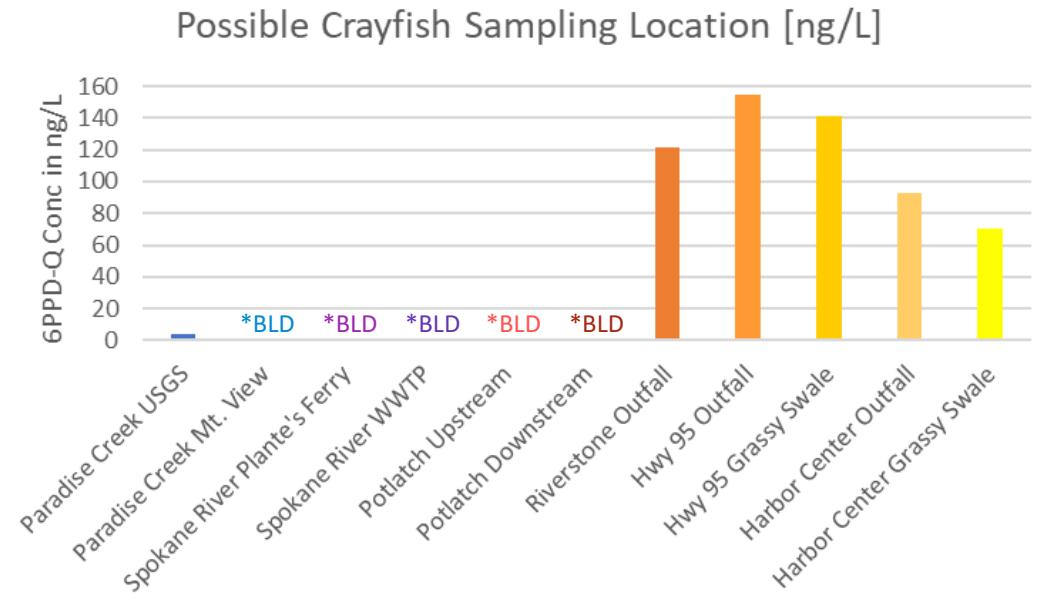
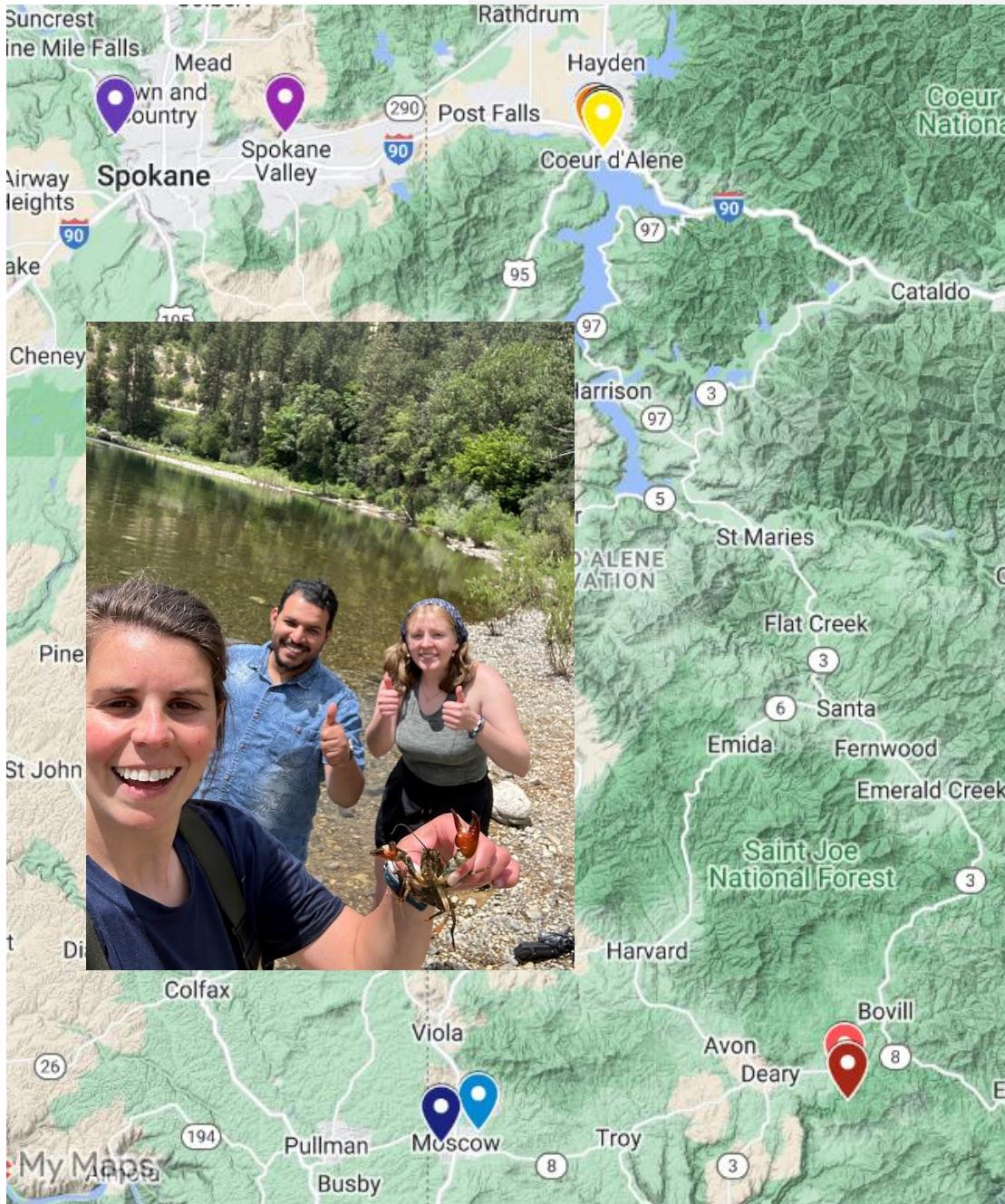
- a field sampling, collection, and monitoring campaign at 40 sites across the upper CRB

I **Phase 3:** Enhance public awareness of 6PPD-q and TWP as aquatic pollutants in the CRB through the project period.

- a public awareness campaign tied to citizen science collection of crayfish, student outreach, and a public facing website.

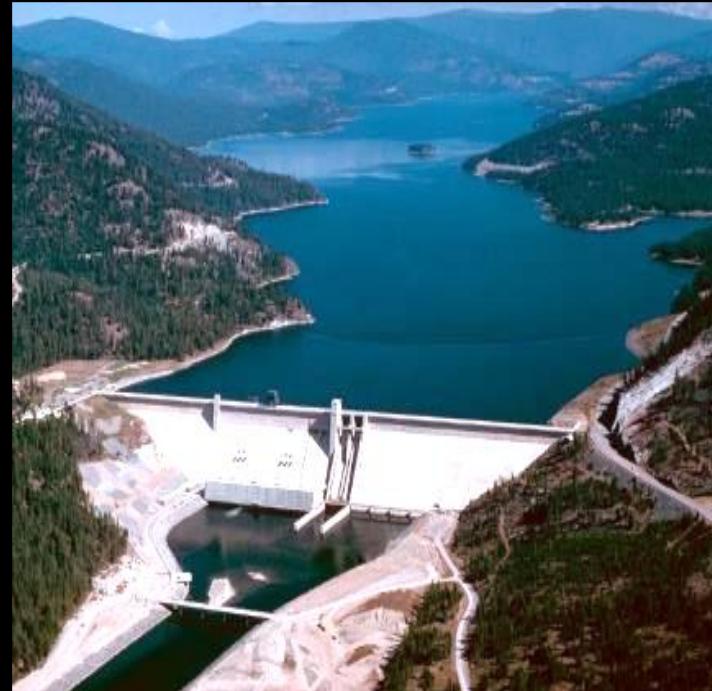
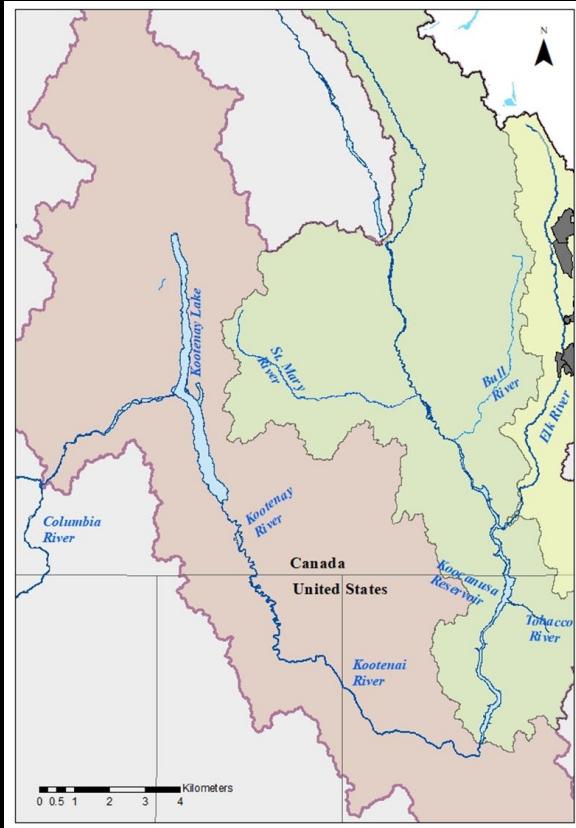


Preliminary Data – As of yesterday!



*BLD:
Below Limit
of Detection

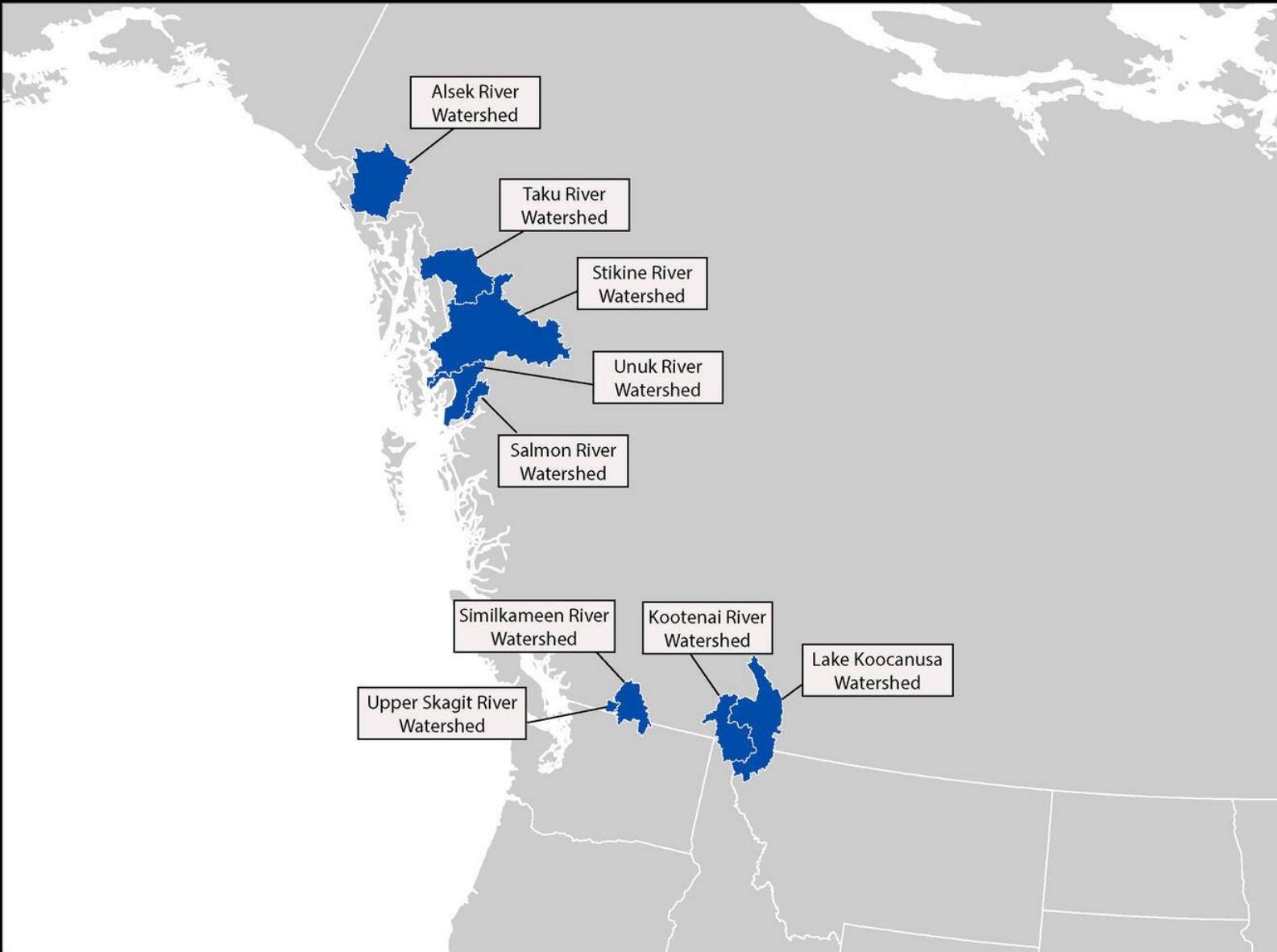
Selenium trends in the Columbia River Basin



Travis Schmidt, Meryl Storb, Ashley Bussell,
Madison Foster

Columbia River Basin Restoration Program Toxics Monitoring Subgroup Meeting
July 11th, 2023.

USGS Transboundary Water Quality Project



USGS Transboundary Water Quality Project



Meryl Storb



Ashely Bussell



Madison Foster

Wyoming-Montana Water Science Center

USGS Transboundary Water Quality Project



Lauran Zinsser, Chris Mebane, Erin Murray
Idaho Water Science Center

USGS Transboundary Water Quality Project



Patrick Moran & Robert Black
Washington Water Science Center

Elk Valley Coal Mines

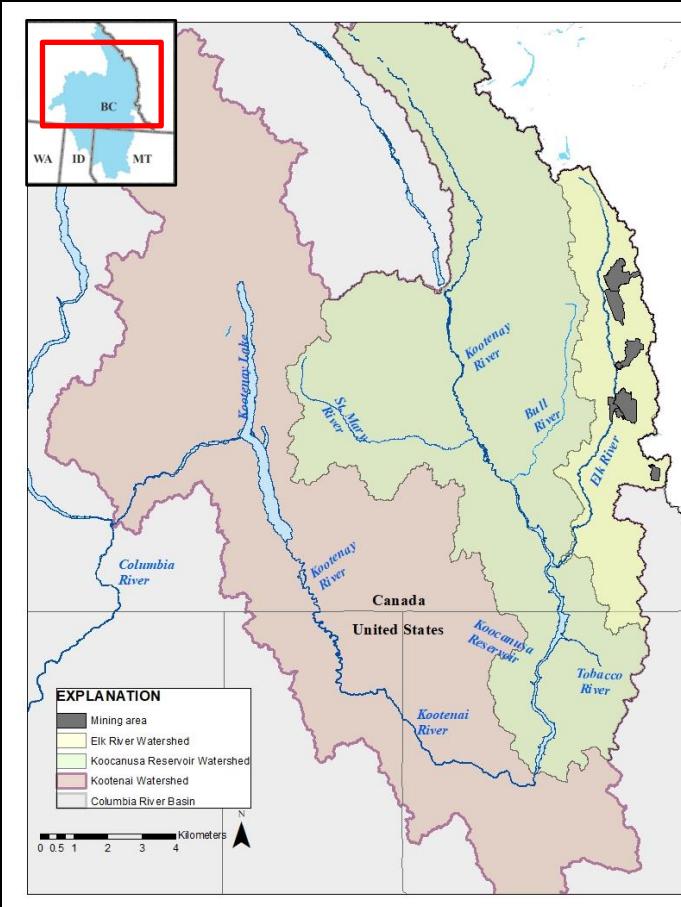


Photo Reference : [Elkview \(teck.com\)](http://Elkview (teck.com))

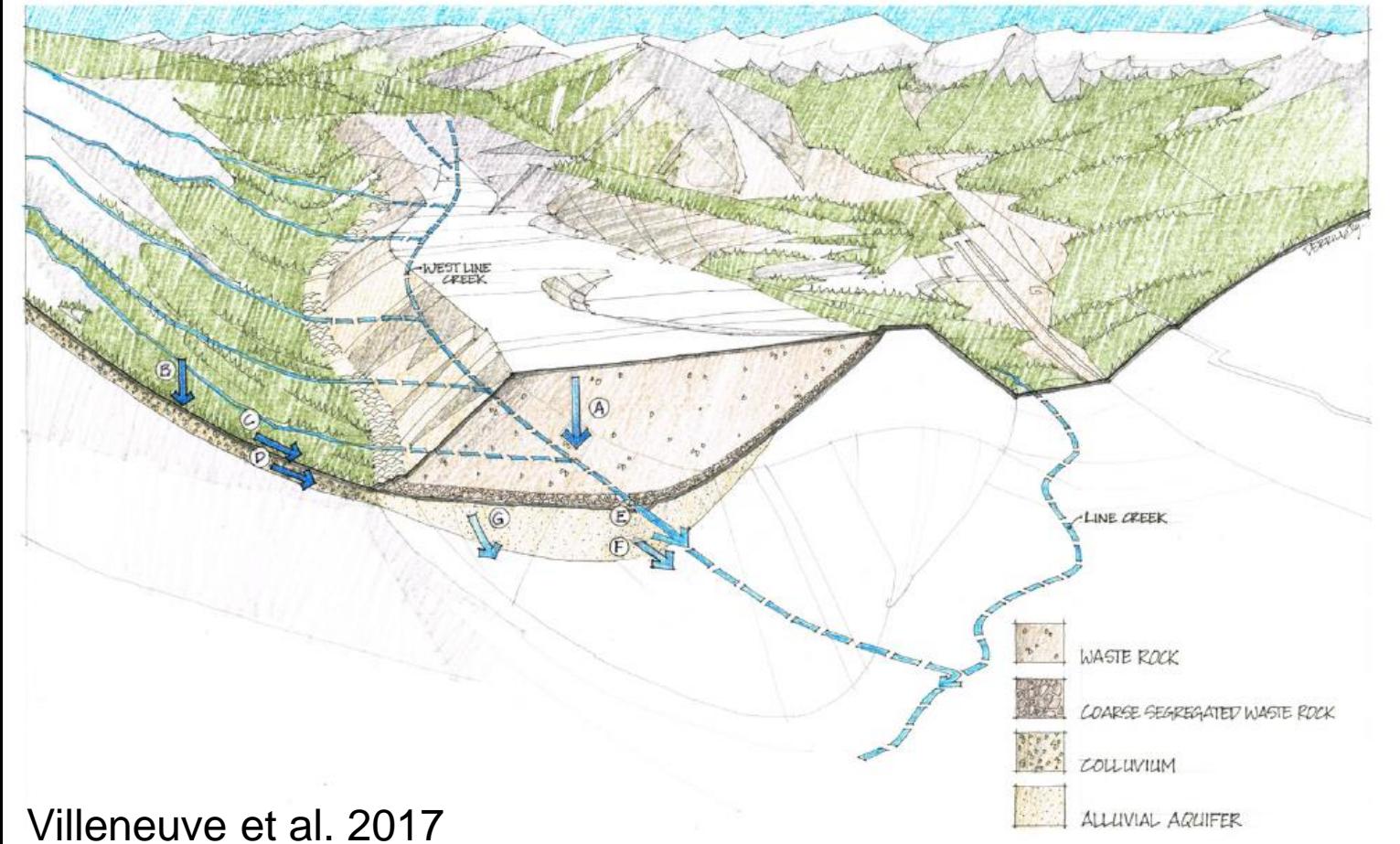


“This information is preliminary and subject to revision”

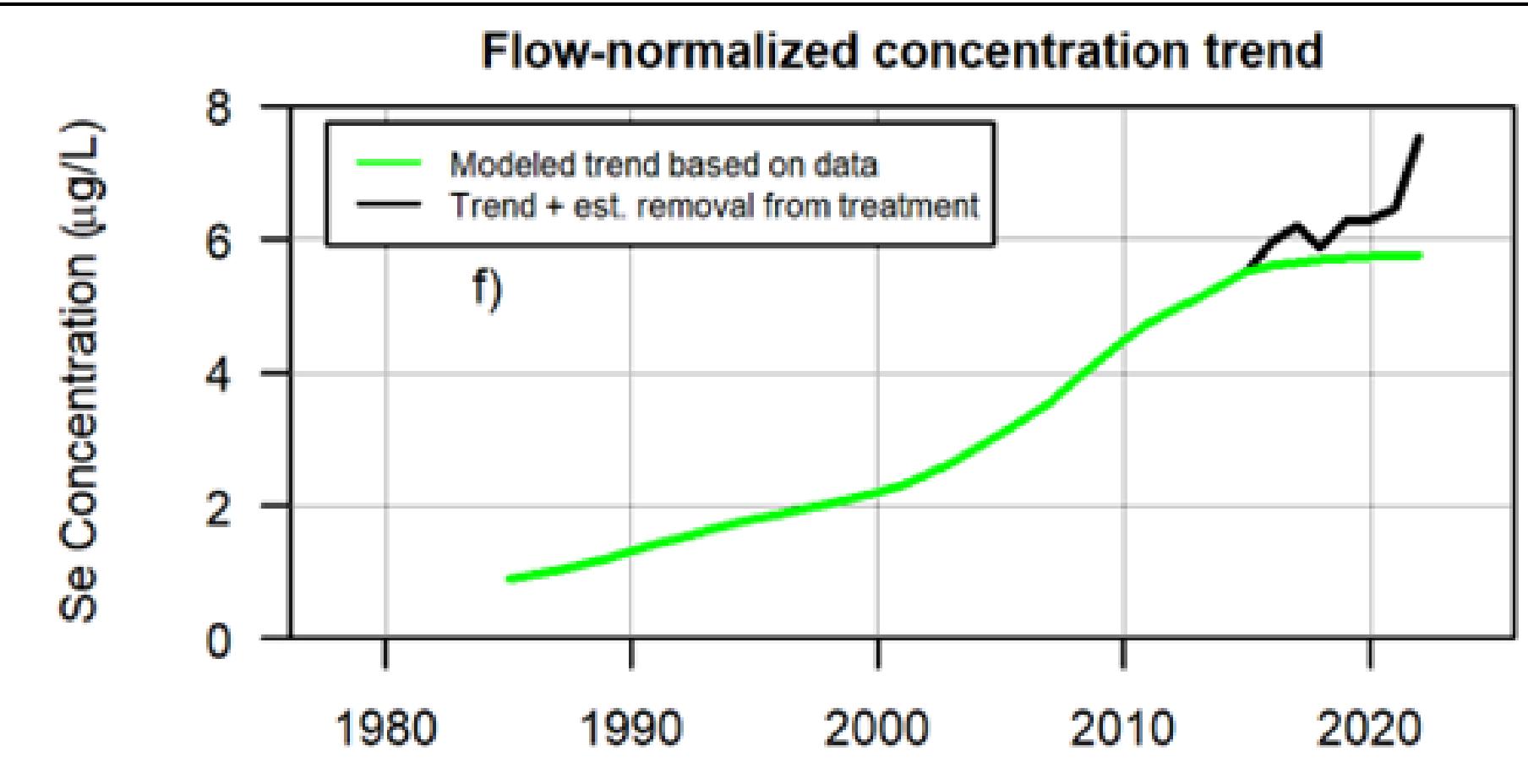
Elk Valley Coal Mines



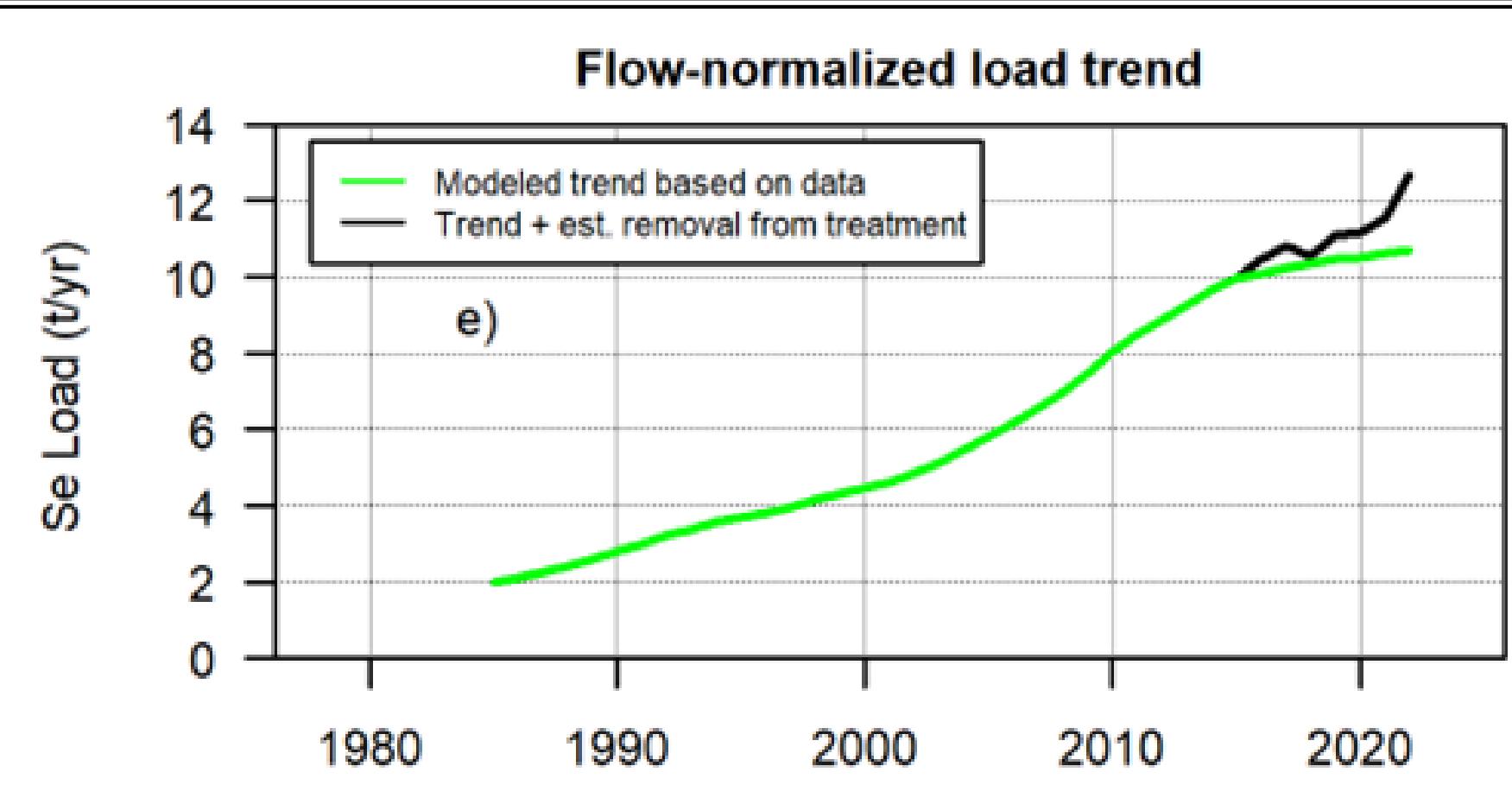
Elk Valley Coal Mines



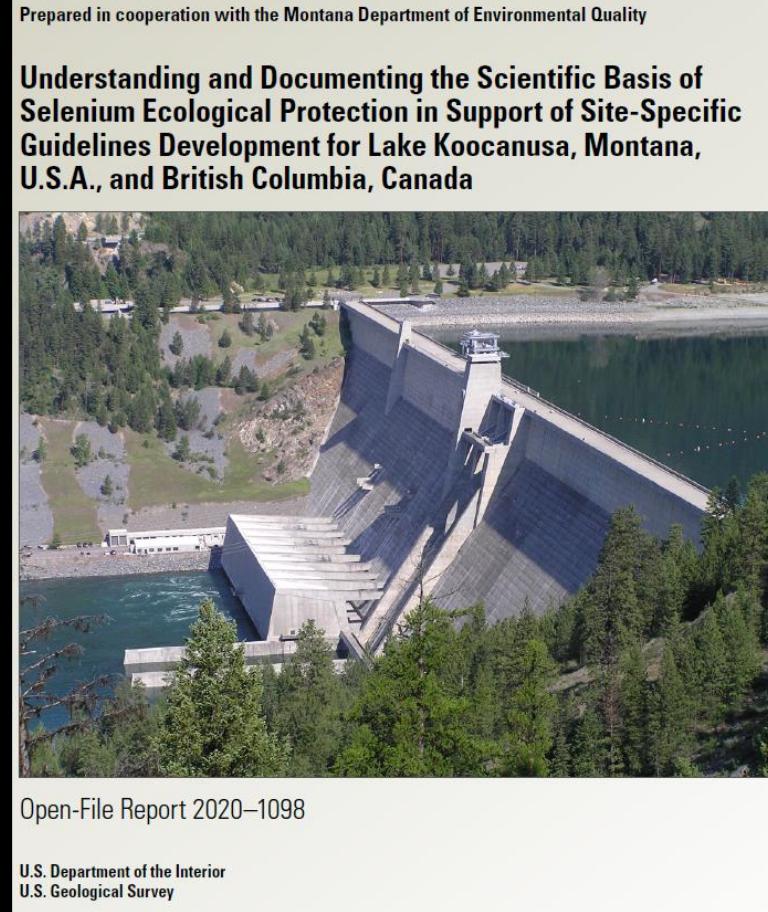
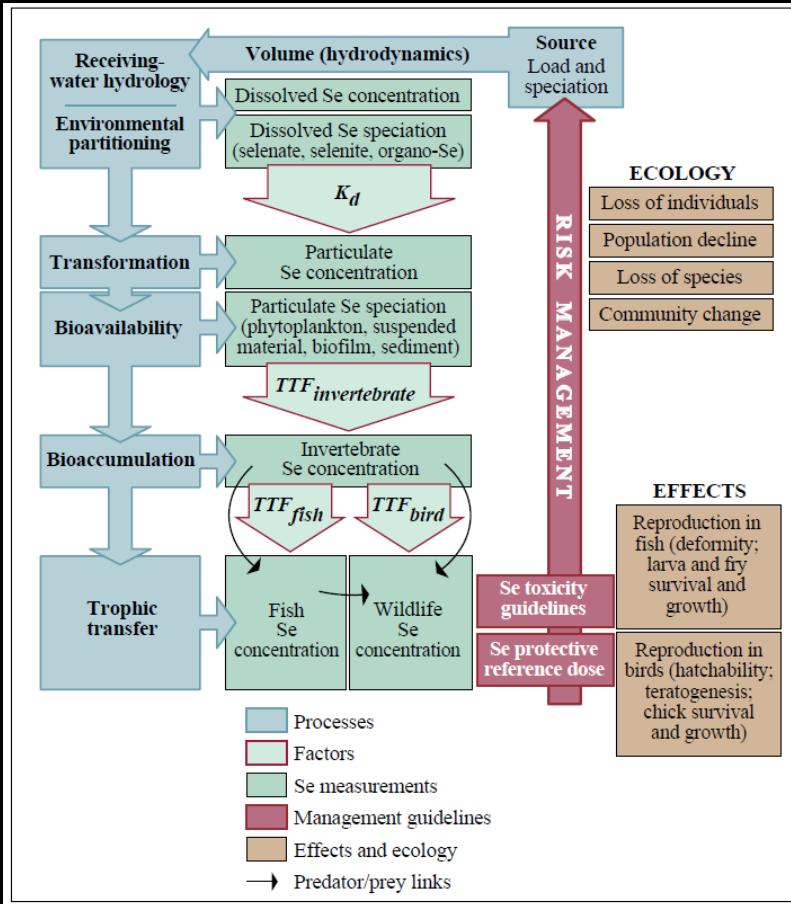
Elk River at HWY 93 (near mouth in Canada)



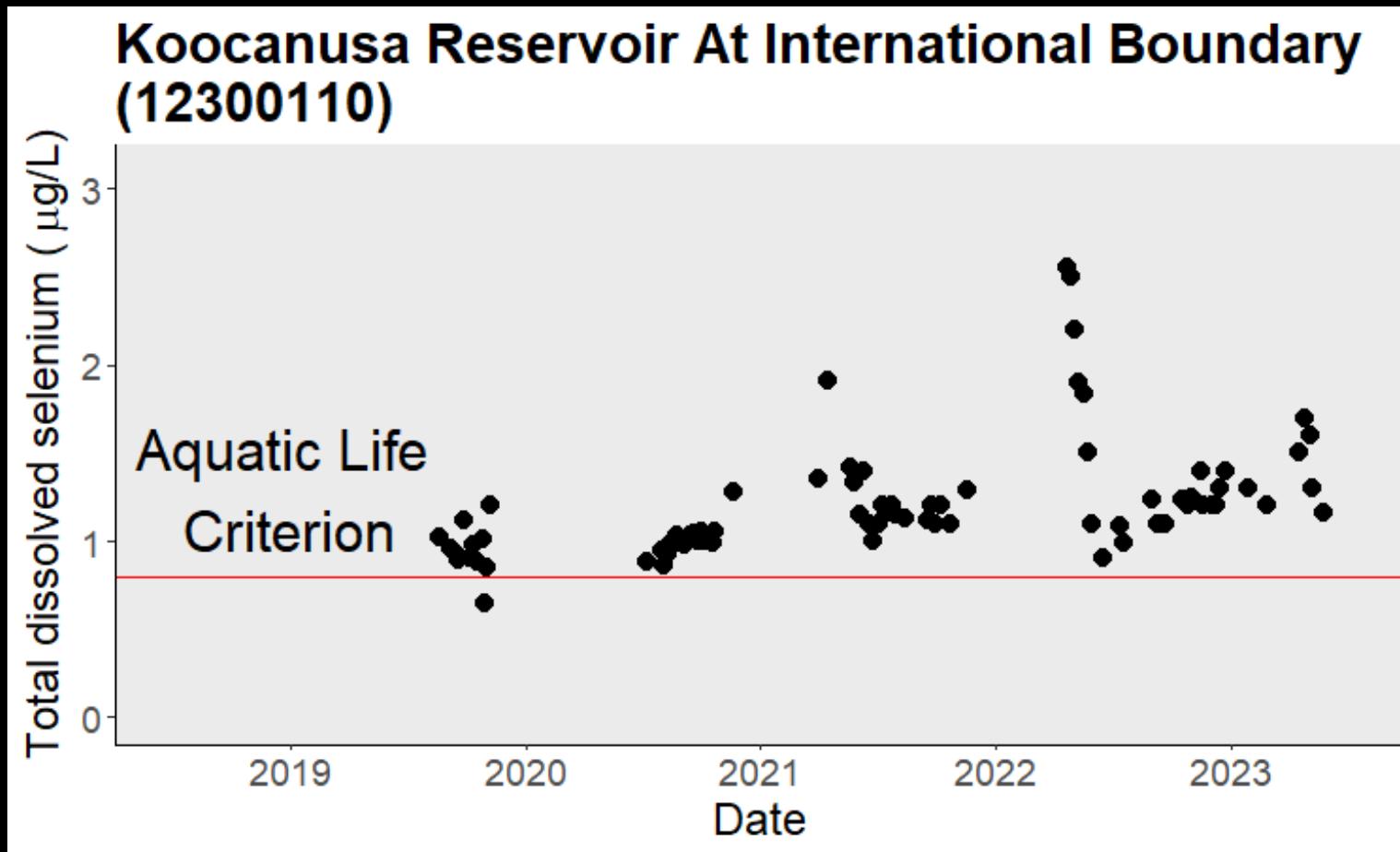
Elk River at HWY 93 (near mouth in Canada)



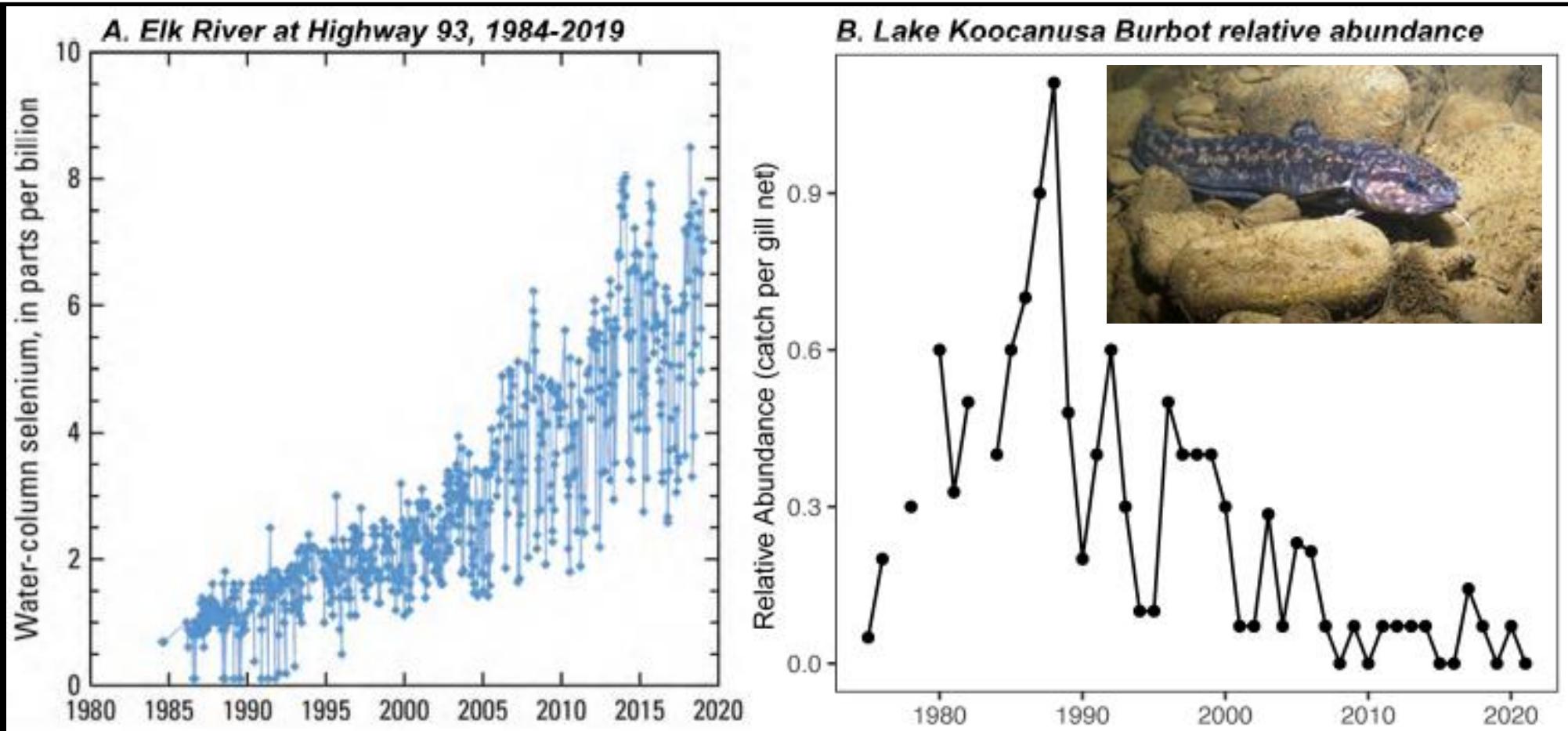
Problem: Transboundary water quality impacts to US waters



Problem: Transboundary water quality impacts to US waters



Problem: Transboundary water quality impacts to US waters

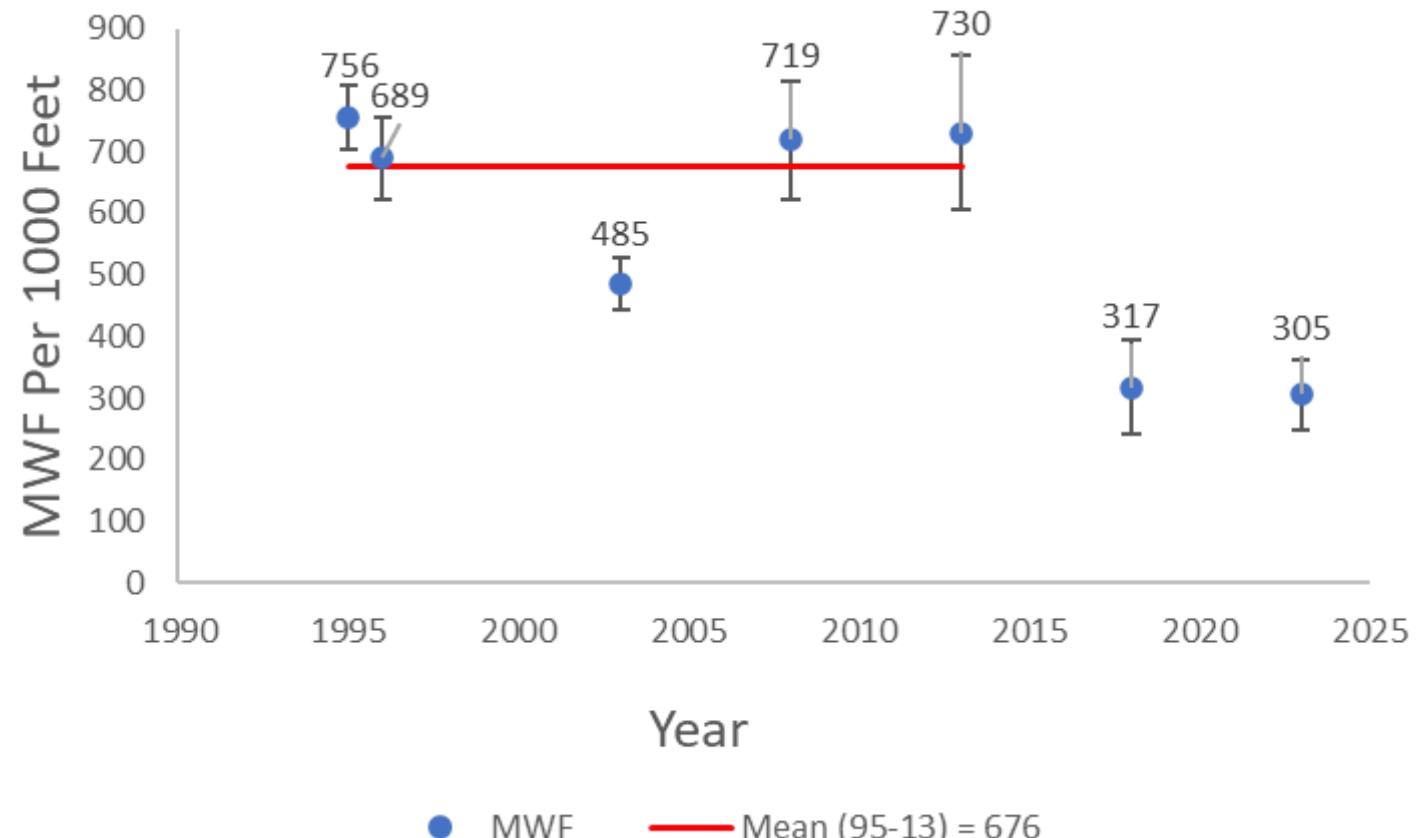
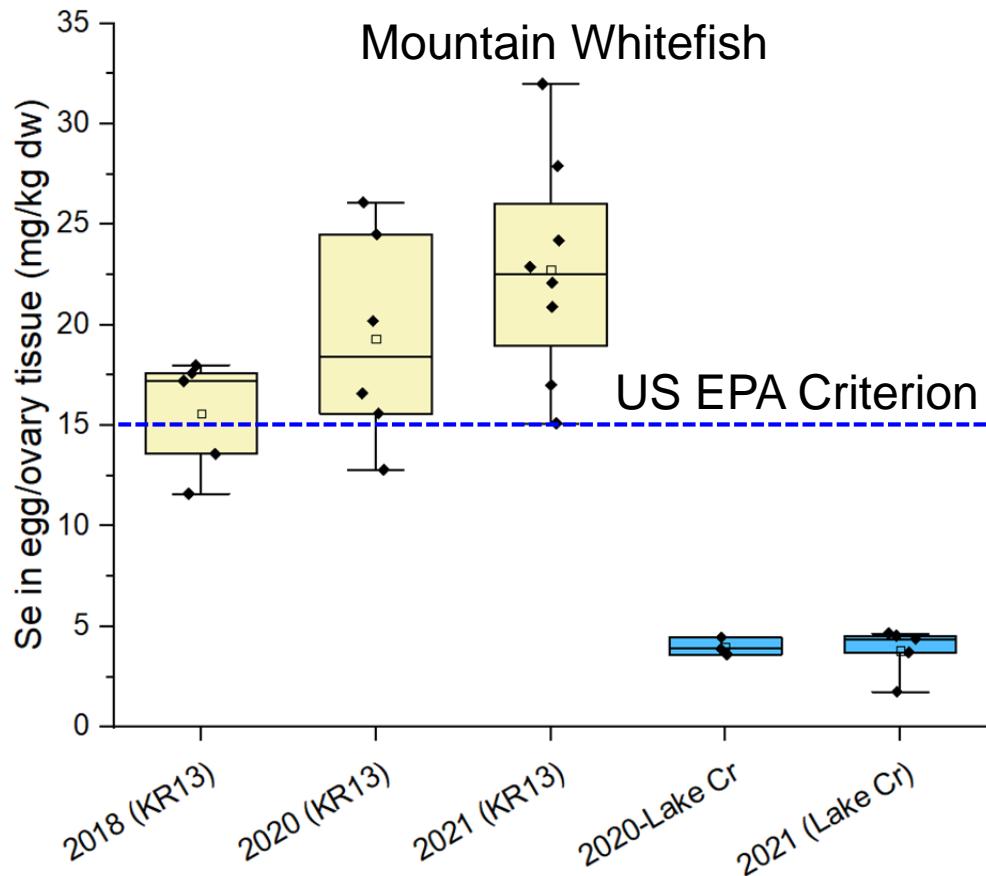


US EPA Columbia River Basin Restoration Project: Reconstructing 40 years of selenium exposure from fish otoliths: Archival tissue applications for contaminant biomonitoring in Lake Koocanusa. Jessica Brandt, UCONN Lead-PI

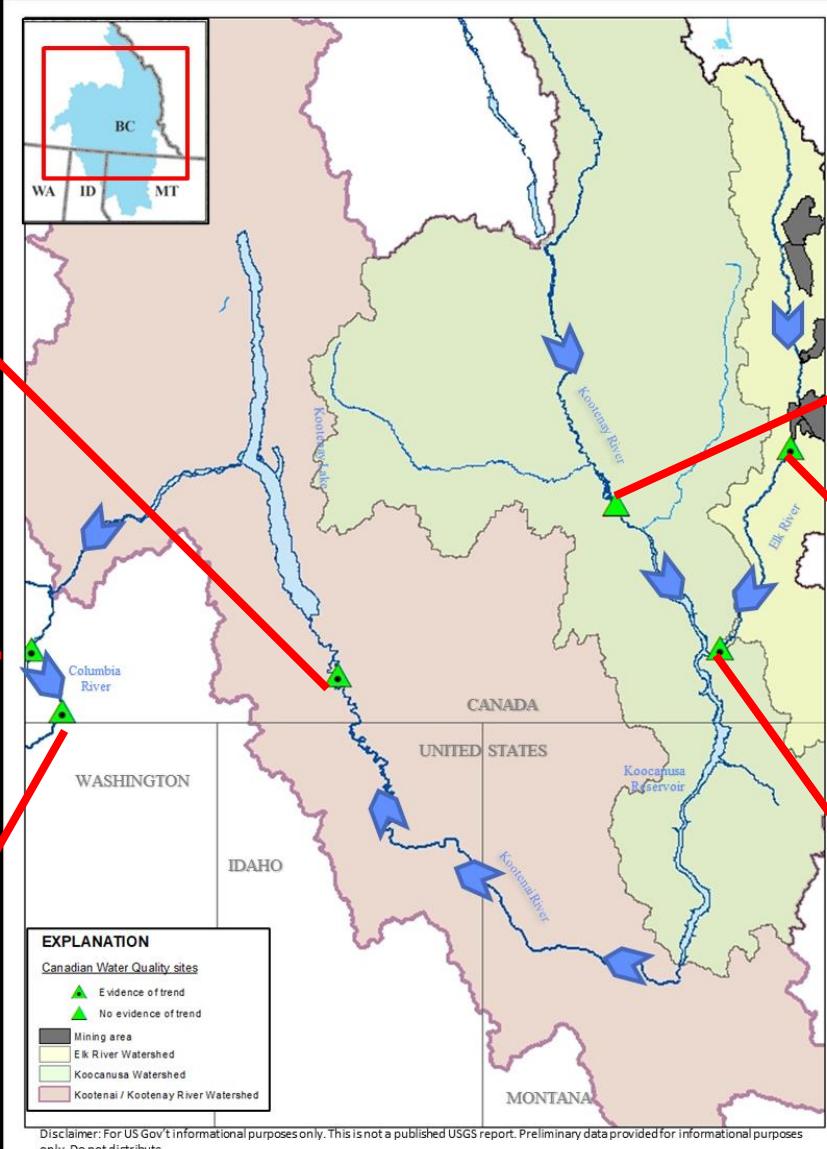
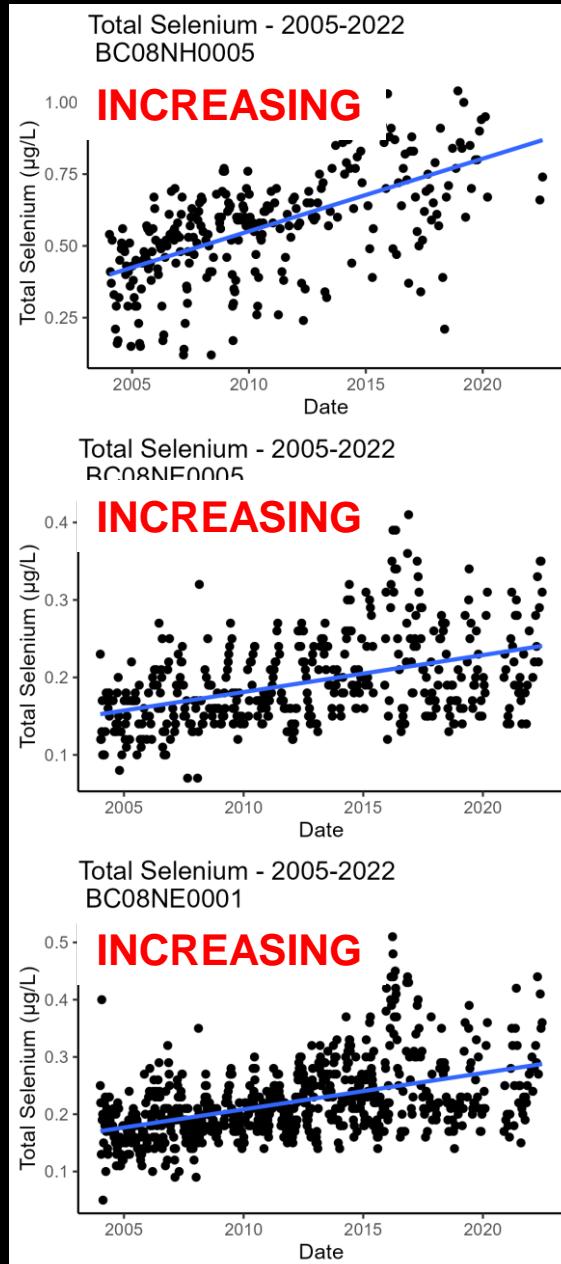
Problem: Transboundary water quality impacts to US waters



Problem: Transboundary water quality impacts to US waters



Transboundary impacts extend beyond Montana



"This information is preliminary and subject to revision". Data from BC ENV/ECCC.

Take homes

- The Elk River mines produce large loads of Selenium, Nitrate, and Sulfate
- Mining will continue and possibly expand into the foreseeable future
 - Treatment is not reversing trends
- US Aquatic Life Criterion for selenium are exceeded in MT & ID
 - Fisheries health is a concern from BC to ID
- Trends in selenium persist 400 river miles downstream of the mines
 - No historical data downstream of Columbia River at Waneta Eddy
- Is a monitoring network in Washington and/or Oregon needed?

THANKS FOR JOINING US!

Next CRBRP Toxics Monitoring Subgroup (TMS) Meeting
September 26, 10:30 – 12:00 Pacific

Questions? Want to join the TMS distribution list?
Email us at gs-crbtoxmon@usgs.gov

