

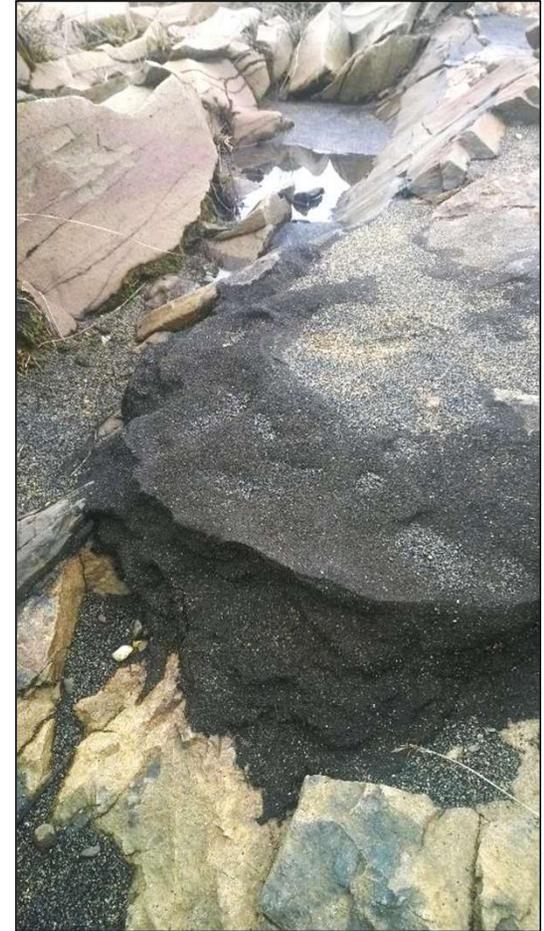
# **STRESSES AND SUCCESSES: A Difficult Responsibility for Tribes Restoring Contaminated Lands and Waters**

---

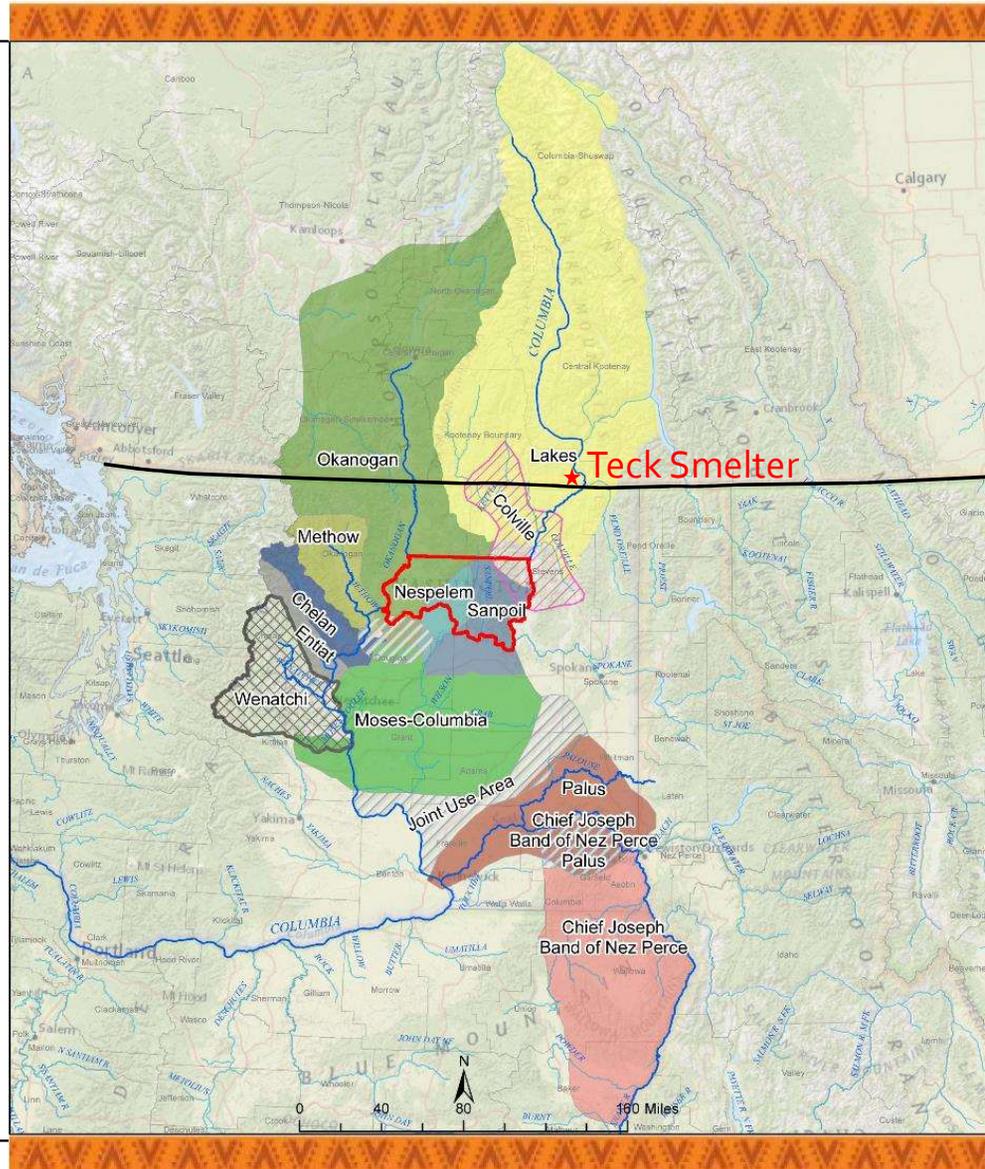
November 6, 2019







# Context



# Columbia River Importance



Photo credit: Tribal Tribune



# The Smelter



Photo credit: The Globe and Mail



# Smelter Discharges



# Smokestack Impact Expands



# Emissions Inventory

The mass of lead, zinc, cadmium, arsenic, and mercury discharged by Teck as slag, liquid effluent, and air emissions from 1923 to 2005 (in tons):

	<b>SLAG</b>	<b>LIQUID</b>	<b>AIR</b>	<b>TOTAL</b>
<b>ZINC</b> tons	500,279	166,025	38,465	704,769
<b>LEAD</b> tons	22,008	22,163	22,688	66,859
<b>ARSENIC</b> tons	2,851	361	1,225	4,437
<b>CADMIUM</b> tons	182	2,402	1,103	3,687
<b>MERCURY</b> tons	n/a	198	97	295

**These are “minimum” discharges and do not include spills, storm water, contaminated groundwater, or contributions from burning coal.**

## Goals

- Investigation
- Cleanup
- Restoration



Sturgeon embryo covered in slag

## Strategies

Engaging the federal government

Taking independent action

Maintaining a focus on the end goal of restoring Tribal members' relationship to the River



# Engaging the Federal Government

Goals of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA or Superfund):

- Protect human health and the environment by cleaning up polluted sites;
- Make responsible parties pay for cleanup work;
- Involve communities in the Superfund process;
- Return Superfund sites to productive use.



# Engaging the Federal Government

Typical CERCLA steps:

- Preliminary Assessment/Site Investigation (PA/SI)
- National Priorities Listing (NPL)
- Remedial Investigation/Feasibility Study (RI/FS)
- Record of Decision (ROD)
- Remedial Design/Remedial Action (RD/RA)
- Construction Completion
- NPL Deletion
- Reuse/Redevelopment



# Engaging the Federal Government



# Engaging the Federal Government

Preliminary Assessment/Site Investigation (PA/SI)

**SKIPPED**

National Priorities Listing (NPL)

**STILL HERE**

Remedial Investigation/Feasibility Study (RI/FS)

**???**

Record of Decision (ROD)

## Examples

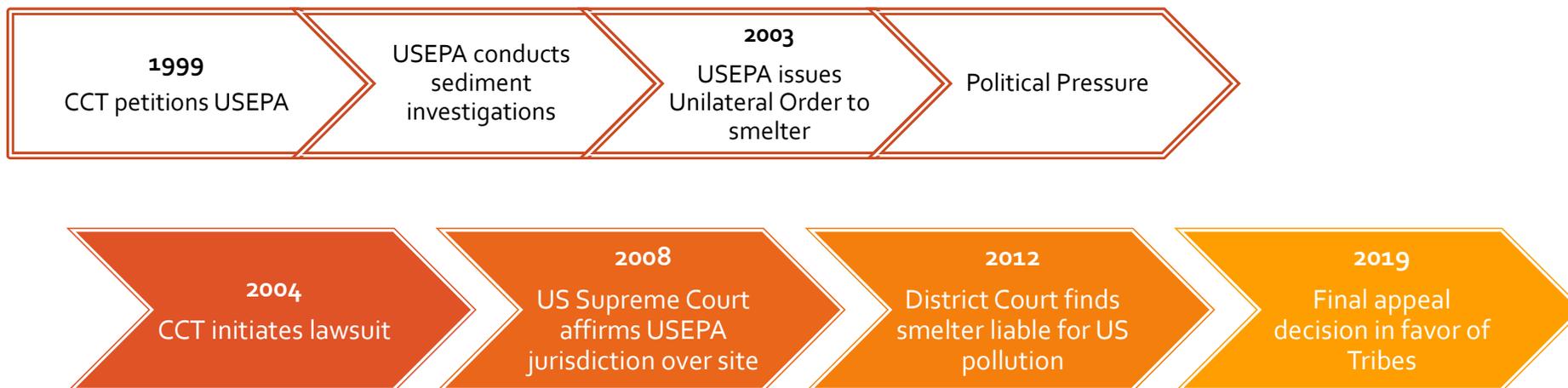
*RI/FS Work Plan* – 2 years

*BERA Work Plan* – 3 years

*Sediment Sampling*  
(from initial plan to data report) – 7 years



# Taking Independent Action



# The Stresses: Common to Many Sites

The different sides involved in the site have vastly differing priorities.

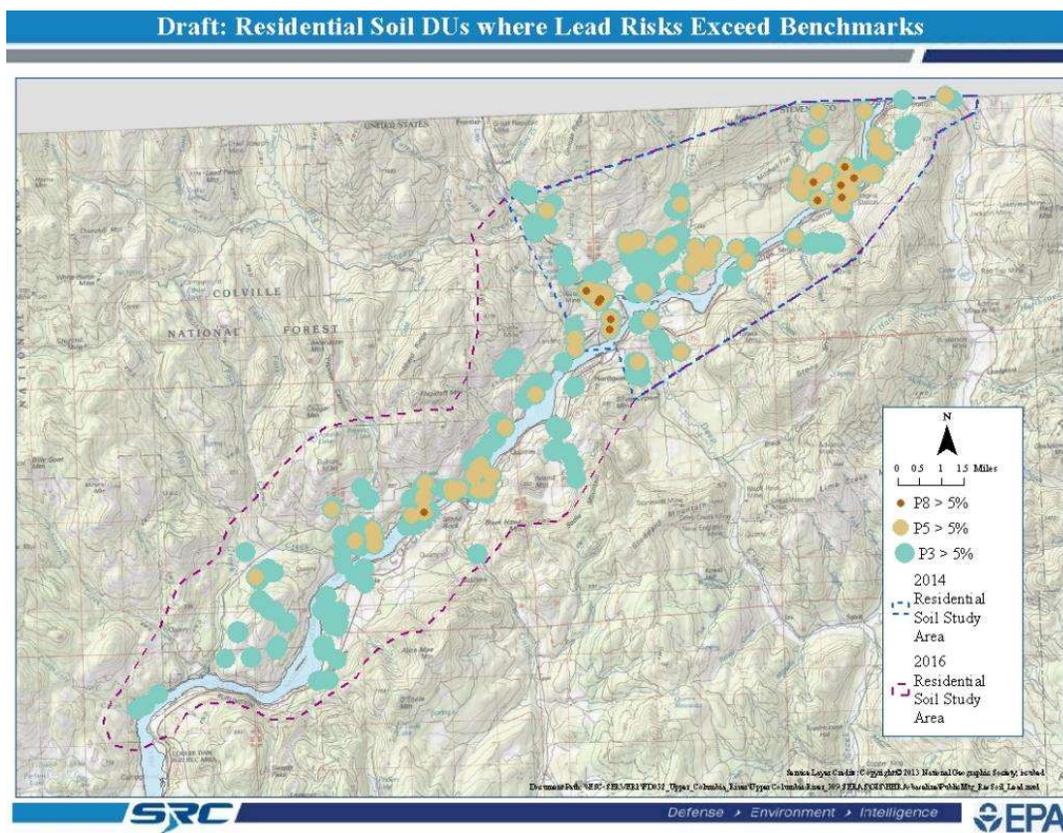
The lack of consensus leads to uncertainty, with no clear plan to manage it .

Decision making is not structured and is often not well documented.

A linear project management attitude prevents addressing obvious problems early.

# Maintaining Focus: Success Stories

# Problem: Soil Contamination (Lead)



# Standard Solution: Removal

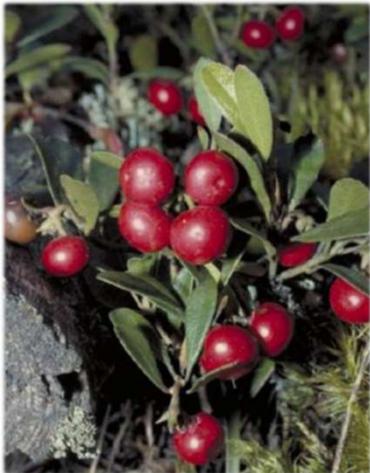


## Our Solution

A win-win cleanup alternative avoids destroying the landscape and costs less than removal.



# Soil Amendment Overview



Soil amendments will be applied to surface soil to cause a change in soil chemistry, with the objective to reduce human exposure to lead

A successful soil amendment will yield one or more of the following results:

- Reduction of soil lead bioavailability
- Increased vegetation growth, especially native plant species
- Improved soil quality

Field and laboratory work is funded by Teck American Incorporated CCT conducting vegetation monitoring on test plots for study

# Current Status

Phase II laboratory bench-scale testing began September 11, 2019

- Five individual amendments being tested
- Plus seven amendment combinations

Soluble phosphate



Biosolids



Wood ash



Biochar



Compost



# Current Status (continued)

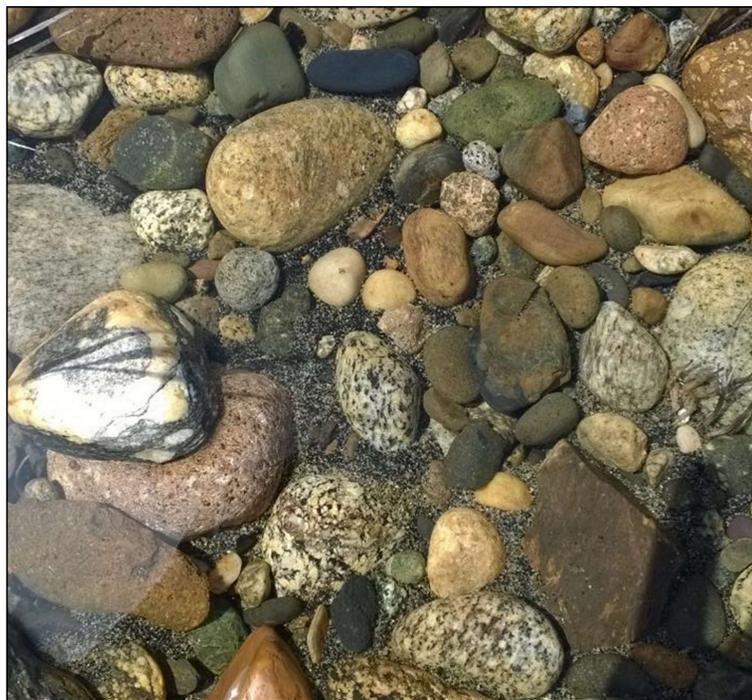
Soil amendments have been added to pots containing samples of soil from the site

The pots will be incubated for 6 months and tested for bioaccessible lead and soil conditions at four time points (baseline, 1 month, 4 months, and 6 months)

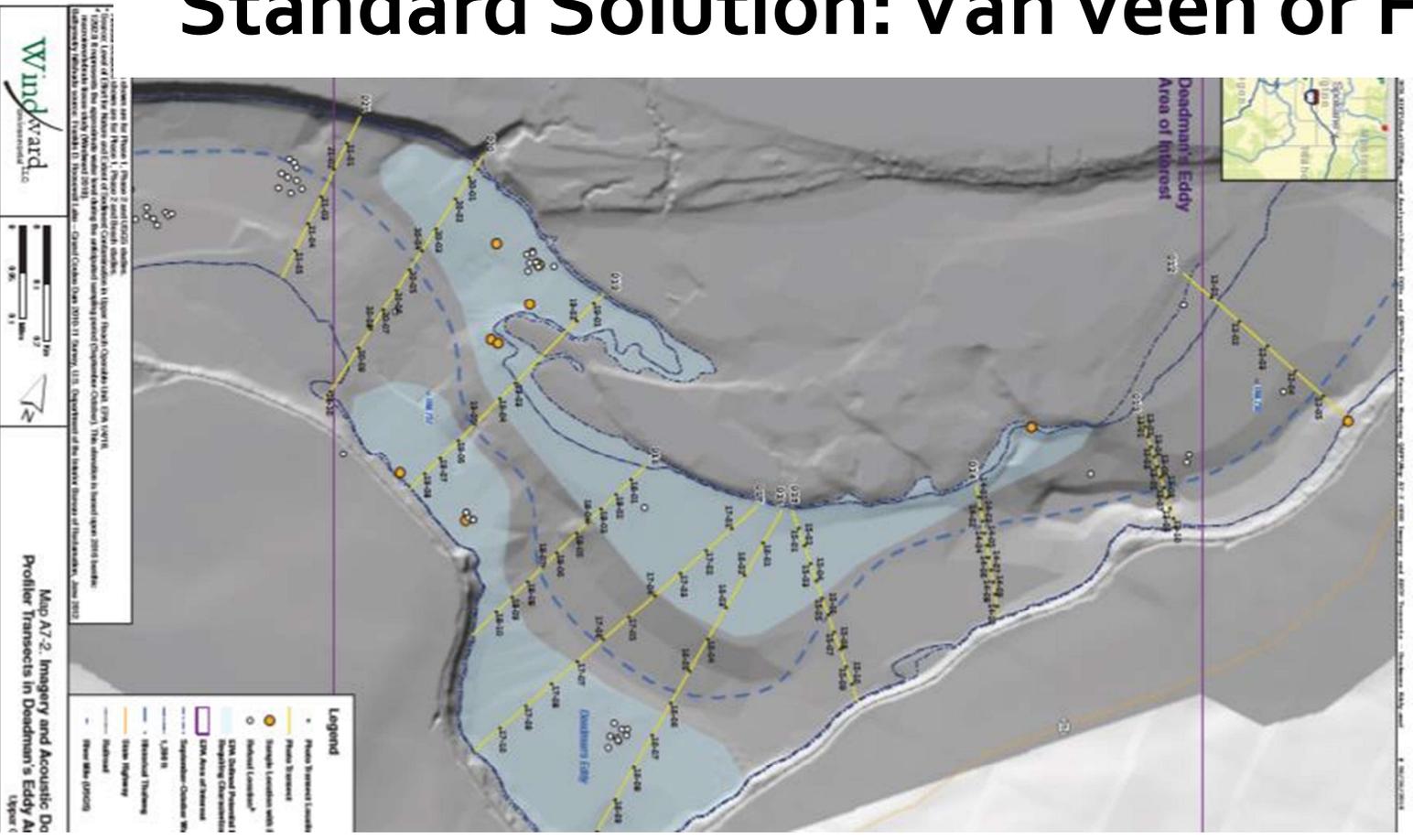
After the amendment selection is narrowed, there will be two years of field tests



# Problem: Sampling Stony Sediment



# Standard Solution: Van Veen or Hamon



## Our Solution

A new sampling technique lets us recover embedded slag and get better spatial coverage for sediment sampling in the river.



Photo credit: ERM

# Freeze Grab Overview



# Problem: No Colville Specific Data

Standard solution:  
national data

Our solution: Tribal  
survey

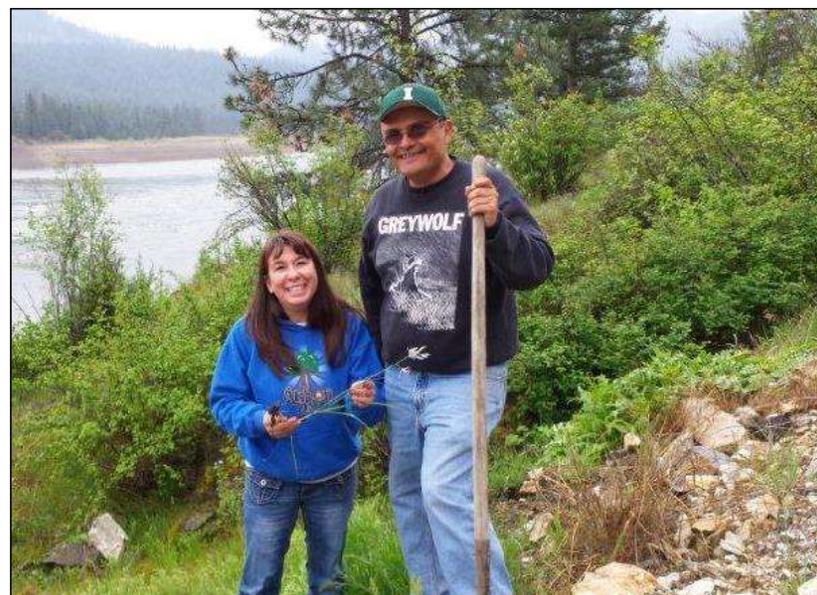


Photo credit: Patti Bailey

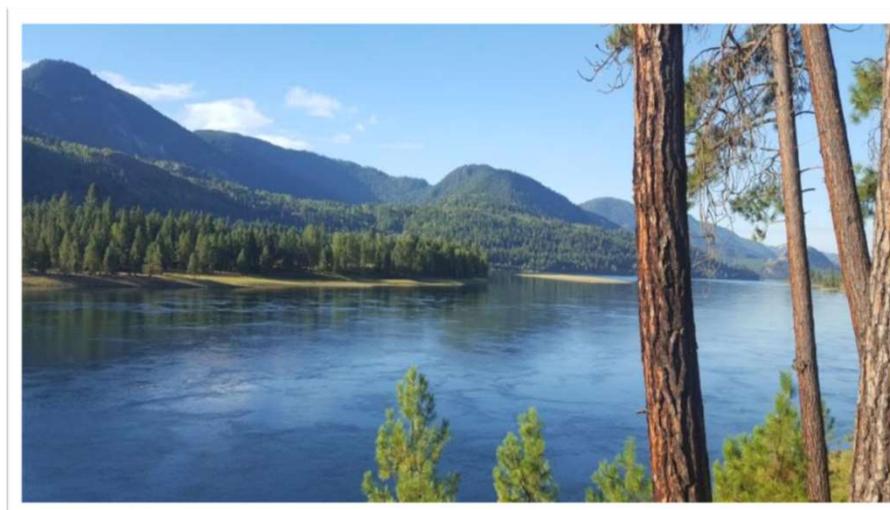


# Overview

Planned and implemented from 2009-2012, with advice from elders and resource experts.

Over a dozen Tribal members and descendants were trained and paid to interview community members up to 6 times with 3 different instruments involving maps and props like measuring cups.

Completed interview series with over 1,100 people – most detailed survey of its kind ever completed with a Tribe.



# Current Status

EPA is finishing the HHRA.

Able to more accurately say which food items and activities are of risk to Tribal members.

Important specific analysis: sweat lodge activities by the river are not a health risk.



# Problem: Unknown Plant Metals

Standard solution:  
models or literature

Our solution: site-  
specific sampling

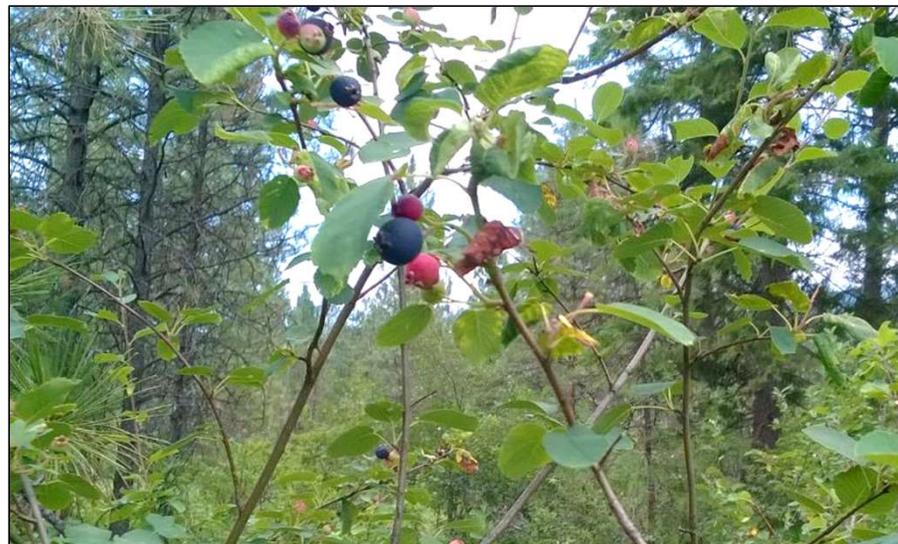


# Overview

Plant parts sampled across three seasons and a range of lead levels, with co-located soil samples

Food: Three roots, four berries, two nuts, three leafy plants, black tree lichen

Non-food: Willow and tule



# Current Status

The plant data are being used by EPA in the Human Health Risk Assessment to evaluate what potential actions should be taken to reduce risks to Tribal members and others in the area who consume local plants.



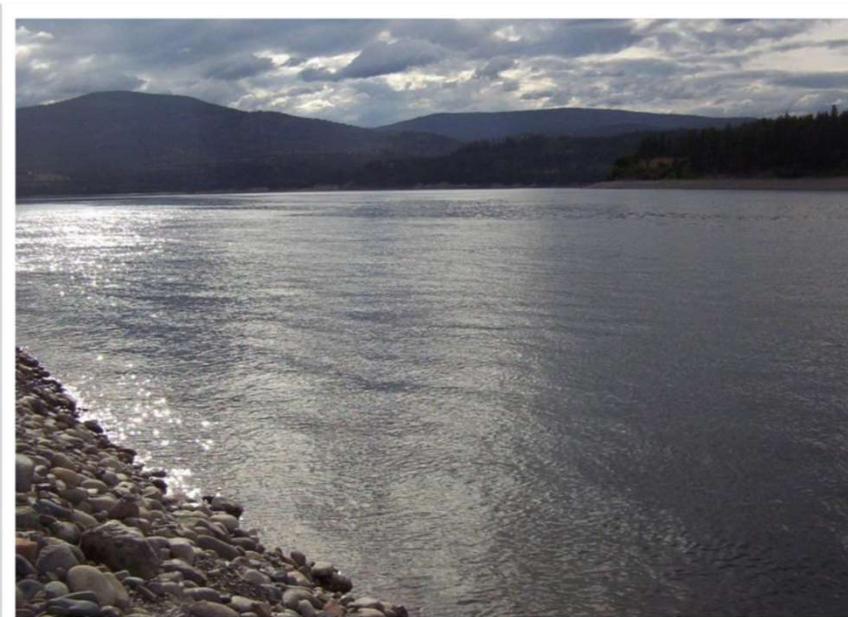
Photo credit: Hearts Gathered Immersion School



# Stress

According to the Tribal Survey, a significant percentage of people are avoiding using the River because of contamination, meaning that Colville members face obstacles towards:

- Fulfilling their traditional stewardship obligations toward the land, waters, plants, and animals
- Passing on practical, theoretical, philosophical, and linguistic knowledge of what it means to be a Tribal member



*"...without the River we wouldn't be here and without, us, I guess fighting for what we do have left, what does the River have, there's interconnectedness that people, I don't think people even remember anymore...I think it's all there, **but my responsibility to it I feel like is hard to do because of the pollution.** I mean we can't fish it, we can't really swim in it, I wouldn't swim in it too long or too often anymore."*

# Success

The Tribes' vision includes:

- **restoring** the ability of the people to understand, describe and appreciate the natural environment of the River using the Colville Salish language (n'səl'xcin);
- **revitalizing** traditional cultural practices associated with the natural environment of the River;
- **empowering** people to engage in positive, culturally appropriate, and sustainable stewardship of the natural environment of the River.



# Why Keep Fighting?



Photo credit: Spokesman-Review

# Questions?

## Whitney Fraser

Lodestone Environmental Consulting LLC

fraser@lodestonellc.com

www.lodestonellc.com

206-739-5993

Photo credit: Hearts Gathered Immersion School

