UPPER COLUMBIA RIVER UPLAND SOIL STUDY 2012-13

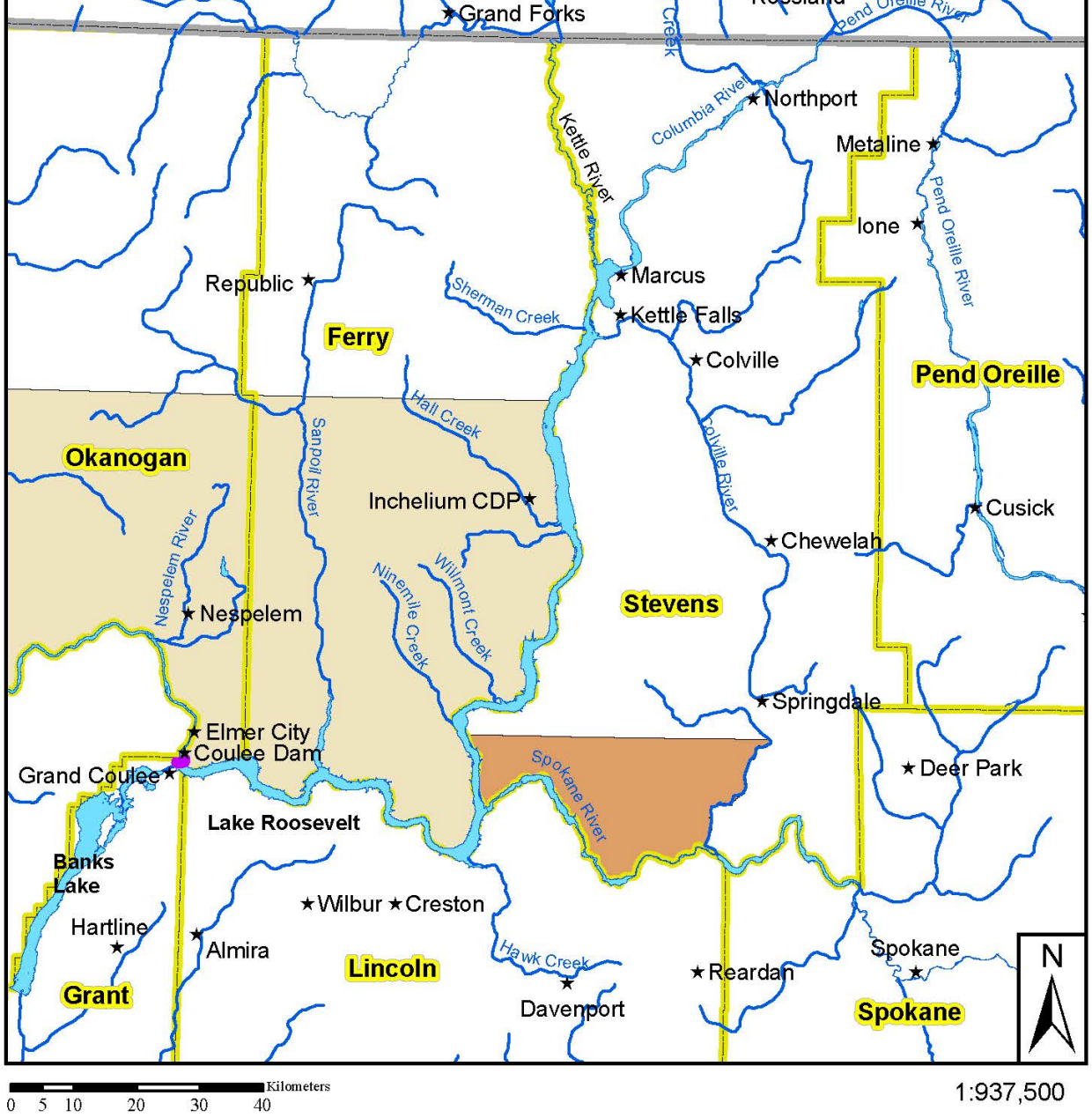
Northport Meeting

August 20, 2013

DEPARTMENT OF ECOLOGY
State of Washington

John Roland, P.G., LPHg
Upper Columbia River Coordinator

UPPER COLUMBIA RIVER SITE



What Triggered the State's Soil Study in 2012?

- Several Factors Involved

Upper Columbia Trustee Council and Natural Resource Damage Assessment (NRDA)

- A permanent Upper Columbia River/Lake Roosevelt Site Natural Resource Trustee Council was formed in May 2007

UCR Natural Resource Trustee Council members are:

- Confederated Tribes of the Colville Reservation
- Spokane Tribe of Indians
- United States Department of the Interior
- State of Washington (serving as Lead Administrative Trustee)

Natural Resource Trustee

- “A government that manages or controls natural resources on behalf of the public”
- Federal, state, or tribal entity

Natural Resources

The actual assessment is performed by the "Trustees"

- Examples of Trust Resources:
  - Migratory Birds
  - Anadromous fish
  - Endangered species
  - Marine mammals
  - Supporting ecosystems
  - Terrestrial and aquatic systems
  - Recreational Uses
  - Government owned minerals
  - Government managed lands
  - Tribal resources

What is the final objective of the Natural Resource Trustees?

Restoration of injured resources

Injury

A measurable adverse change in quality or viability as a result of exposure to a release of a hazardous substance or discharge of oil…

Natural Resource Damages

- If natural resource injuries are established and quantified, then restoration and compensation for losses can be claimed and recovered from the responsible parties.

- NRDA activities are independent of the USEPA effort

EPA Remediation vs. NRD Restoration

- Remedial Investigations
  - Evaluation of risks
  - Fate and extent
- Feasibility Studies
  - Clean-up alternatives
- Clean-up Plan

- Injury and pathway investigations (Natural Resource Damage Assessment)
- Restoration Planning
  - Quantify injury
  - Restoration alternatives
- Restoration Plan

Key UCR Trustee NRDA Steps thus Far

- Completed Preliminary Assessment Screen (PAS) – November 2009
- Issued Injury Assessment Plan – November 2012
  - Beginning the advancement of studies to assess injury to natural resources

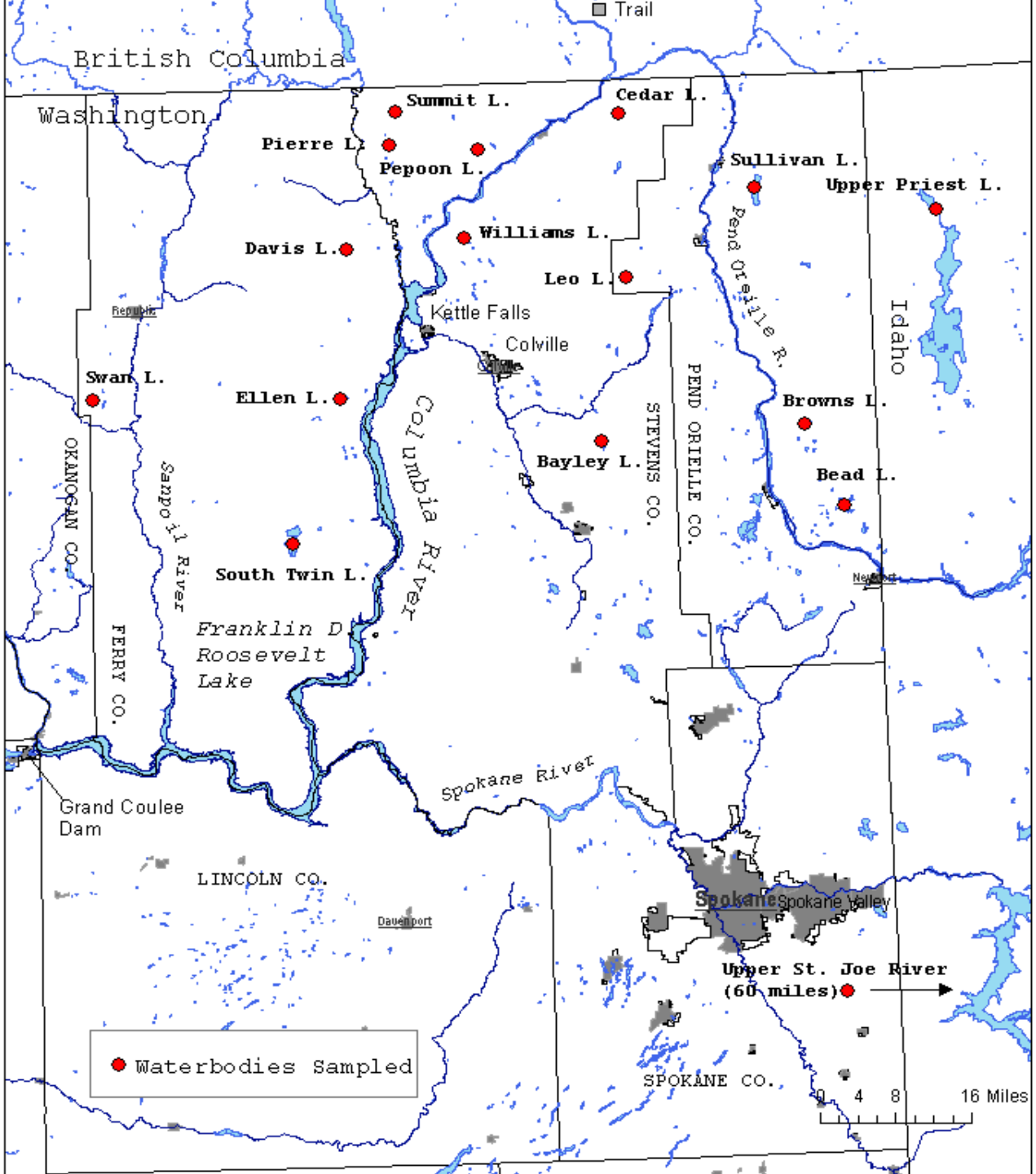
Why was this soil study needed and What was found….

Background Characterization for Metals and Organic Compounds in Northeast Washington Lakes

Part 1: Bottom Sediments

DEPARTMENT OF ECOLOGY
State of Washington

September 2011
Publication No. 11-03-035


Trail
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Pierre L.
Pepoon L.
Sullivan L.
Upper Priest L.
Davis L.
Williams L.
Leo L.
Pend Oreille R.
Idaho
Republic
Kettle Falls
Colville
Swan L.
Ellen L.
Columbia River
STEVENS CO.
PEND ORIELLE CO.
Browns L.
Bayley L.
Bead L.
OKANOGAN CO.
Sanpoil River
South Twin L.
Franklin D. Roosevelt Lake
FERRY CO.
Spokane River
Grand Coulee Dam
LINCOLN CO.
Spokane
Spokane Valley
Davenport
Upper St. Joe River (60 miles)
Waterbodies Sampled
SPOKANE CO.
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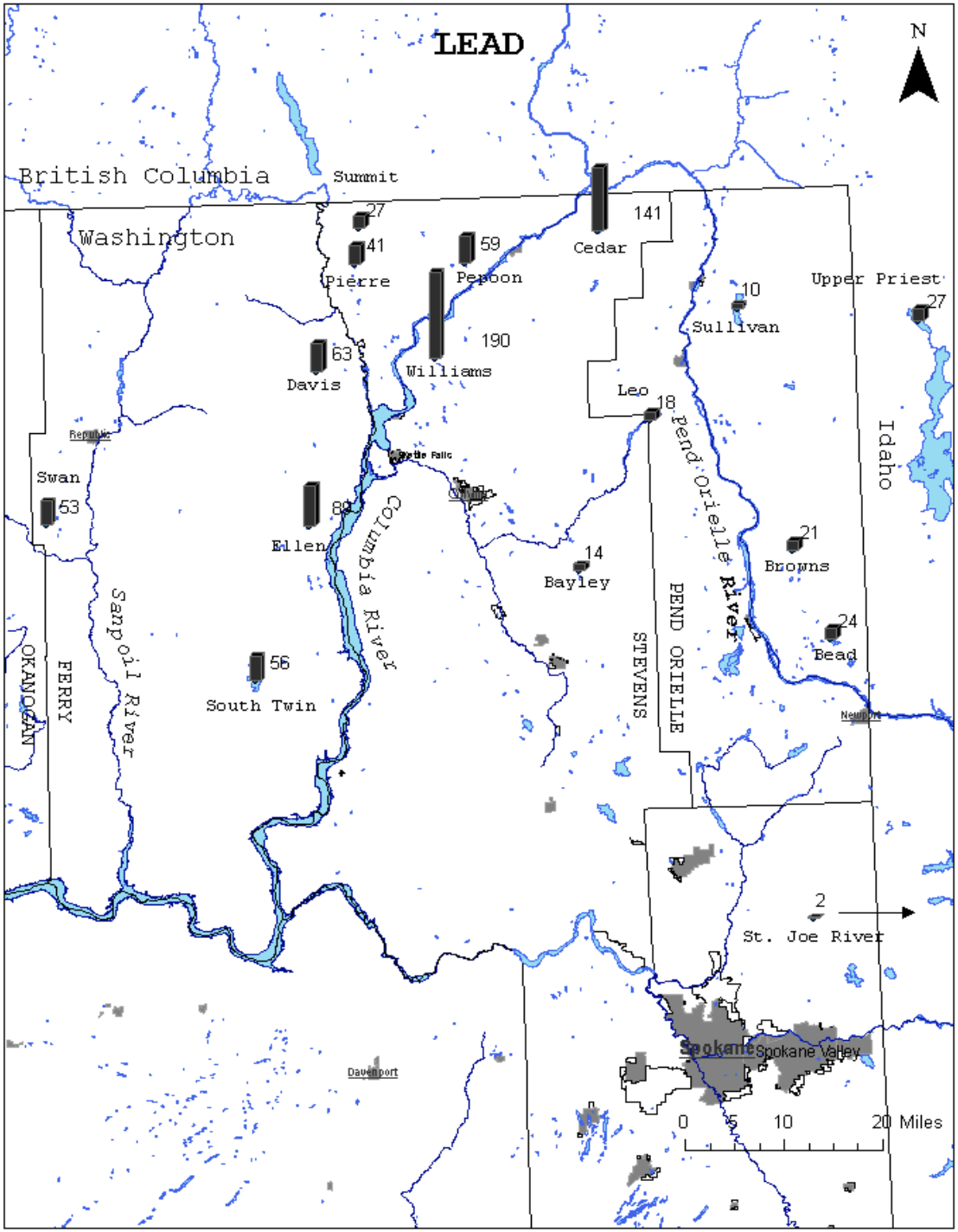
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Columbia River
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Bayley
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Browns
24
Bead
Newport
OKANOGAN
FERRY
Sanpoil River
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STEVENS
PEND ORIELLE
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St. Joe River
Spokane
Spokane Valley
Davenport
0
10
20 Miles

New Port of Entry

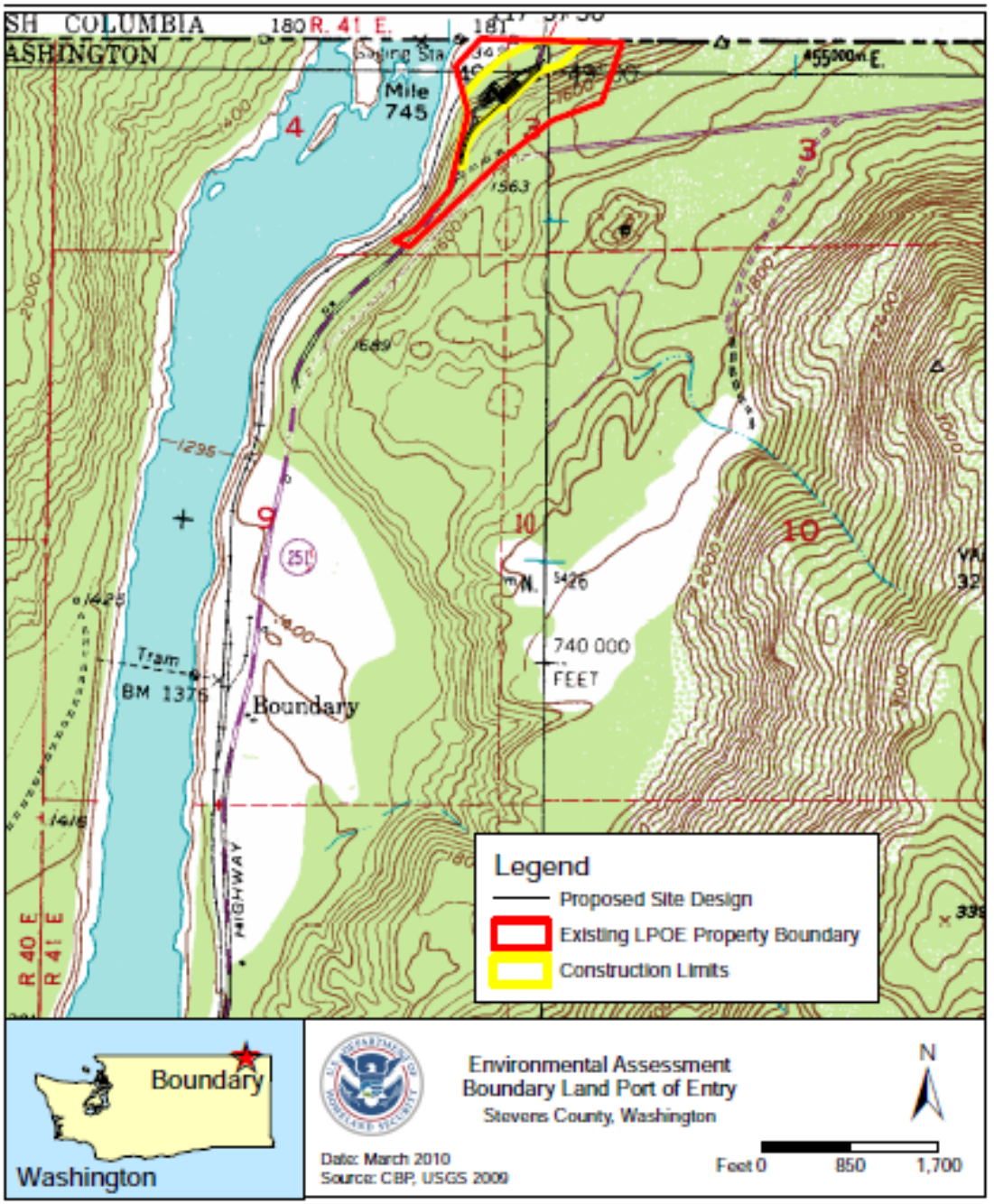


Figure 2-2. Approximate Location of Modernized Boundary Land Port of Entry - Northport, Washington (Topographic Map)

Light Green: < 150
Light Yellow: 150 – 249
Yellow: 250 – 349
Pink: 350 – 999
Red: 1000 – 1500
Brownish: >1500

Trail BC Ecol. Risk Assessment

Modeled LEAD in Soil Soil Map (ppm)

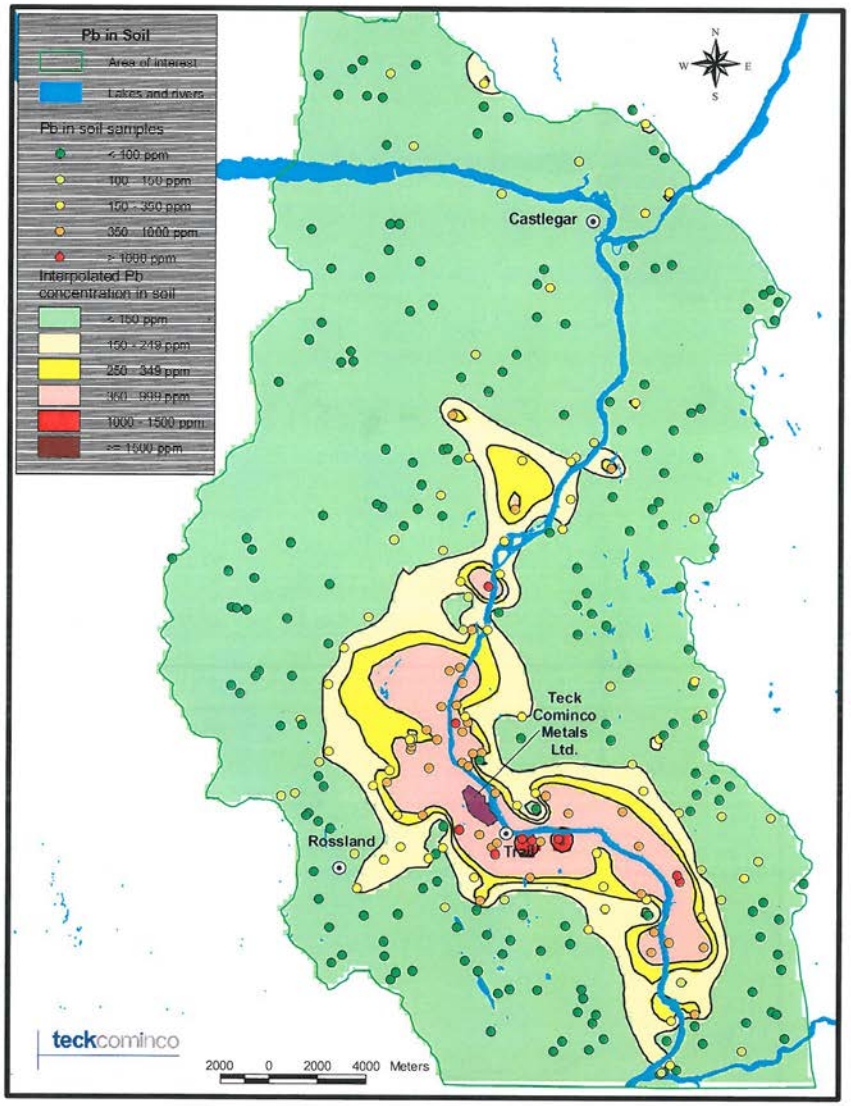


Figure B2.7. Interpolated and measured lead concentrations in soil in the Teck Cominco Ecological Risk Assessment area of interest.

Light Green: < 15
Yellow: 15 – 20
Pink: 20 - 24
Red: 25 – 49
Brownish: =>50

Trail BC Ecological Risk Assessment Modeled ARSENIC in Soil Map (ppm)

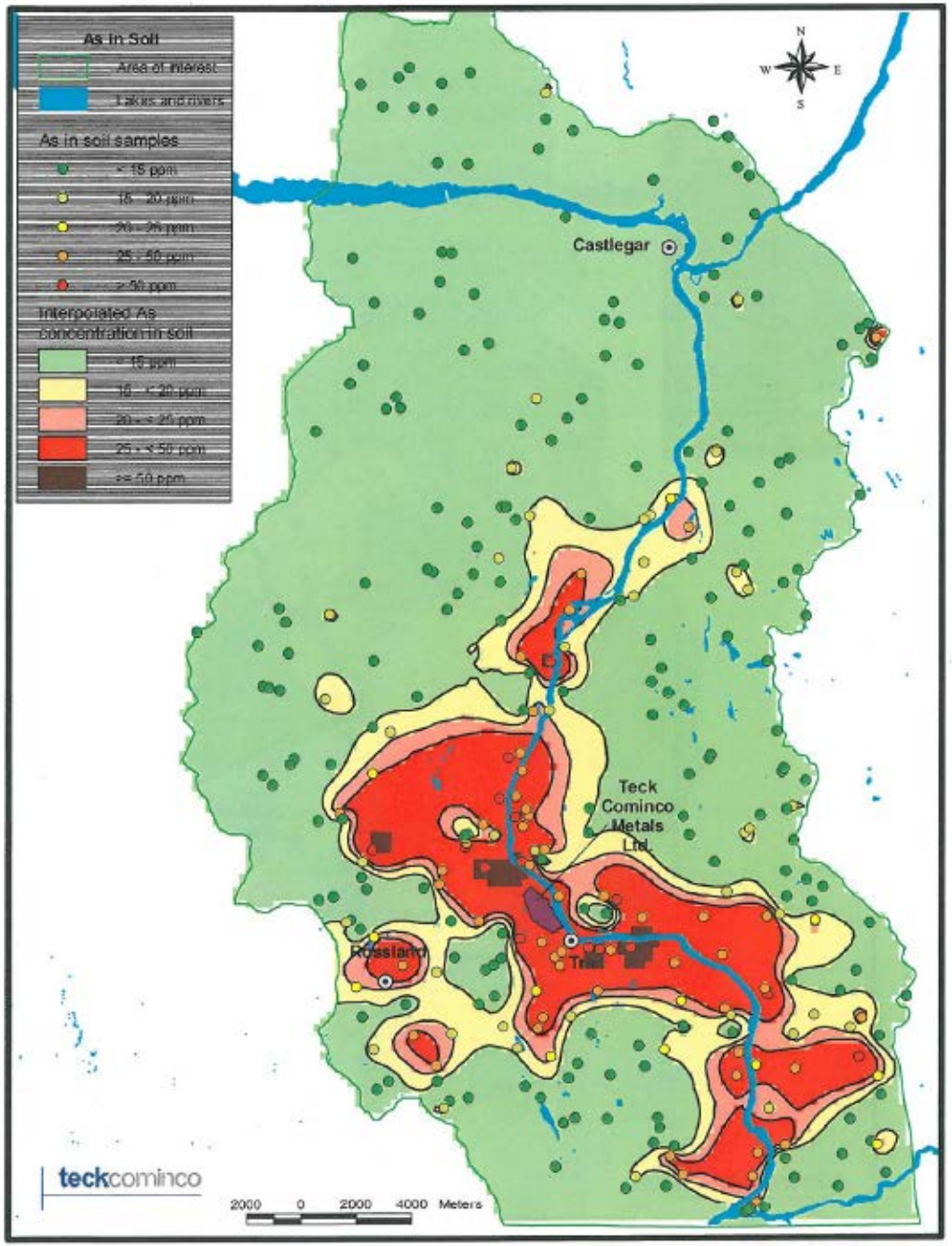
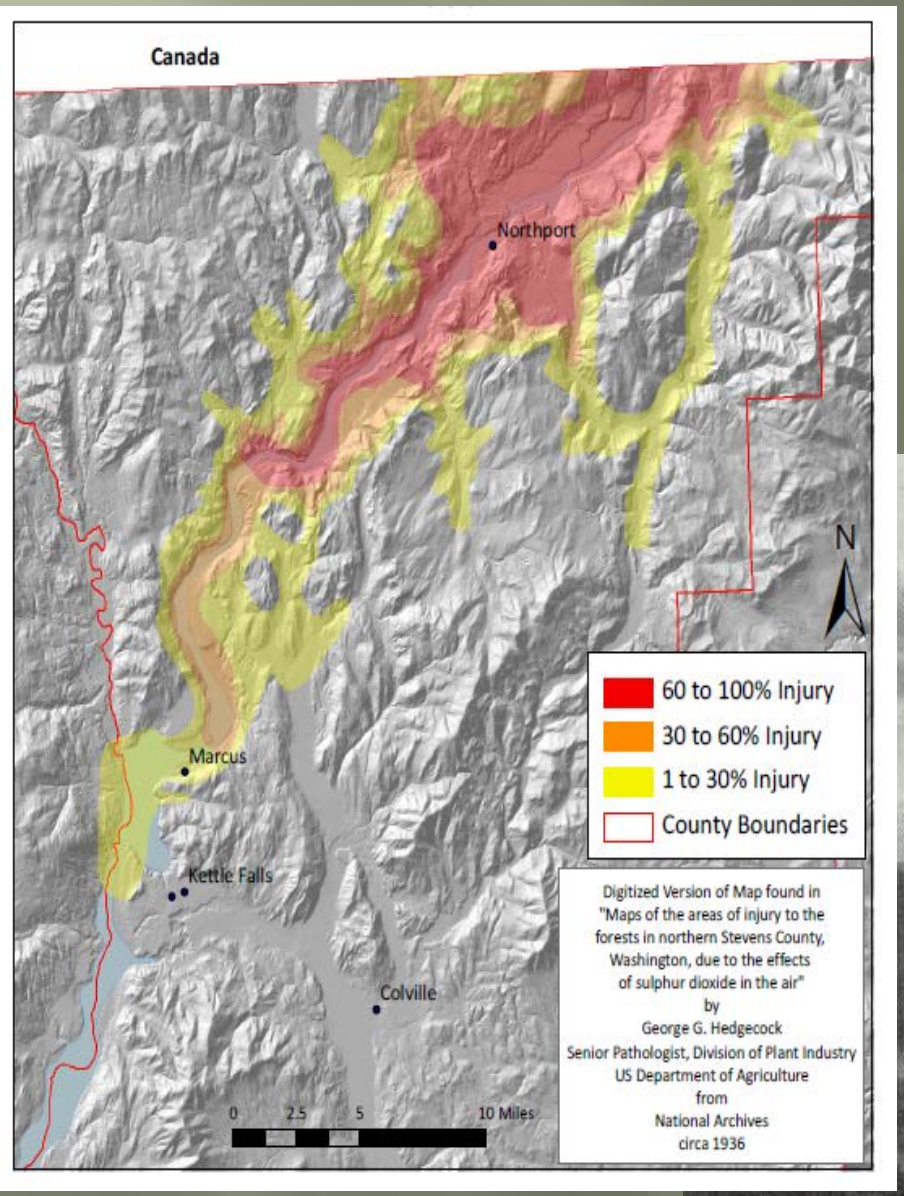


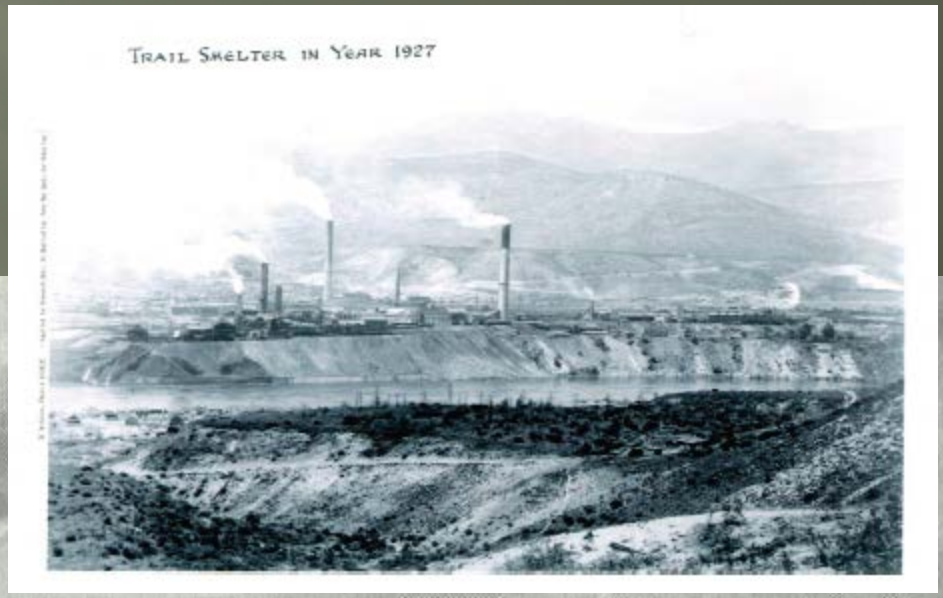
Figure B2.2. Interpolated and measured arsenic concentrations in soil in the Teck Cominco Ecological Risk Assessment area of interest.

Trail Discharge - Emissions

- Downwind air pollution in the first part of the last century resulted in the famous formation of the International Joint Commission and arbitration settlements in 1931 and later to compensate primarilyWashington timber losses.

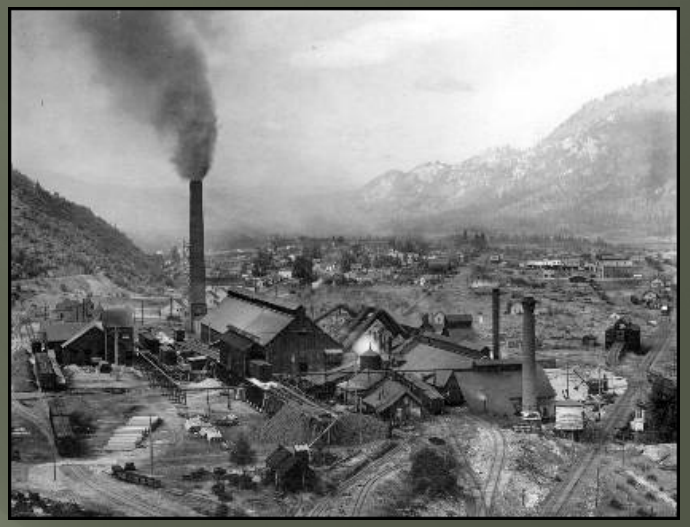
Trail





Oxide of Sulfur [Sulfur dioxide (SO2)] was the primary cause for the historical acute vegetation impacts. Metals were not evaluated.

Le Roi/Northport Smelter



Department of Ecology Upland Soil Sampling Study

Report Date: May 2013

Upper Columbia River
Upland Soil Sampling Study
Stevens County, Washington

Prepared for
Washington State
Department of Ecology

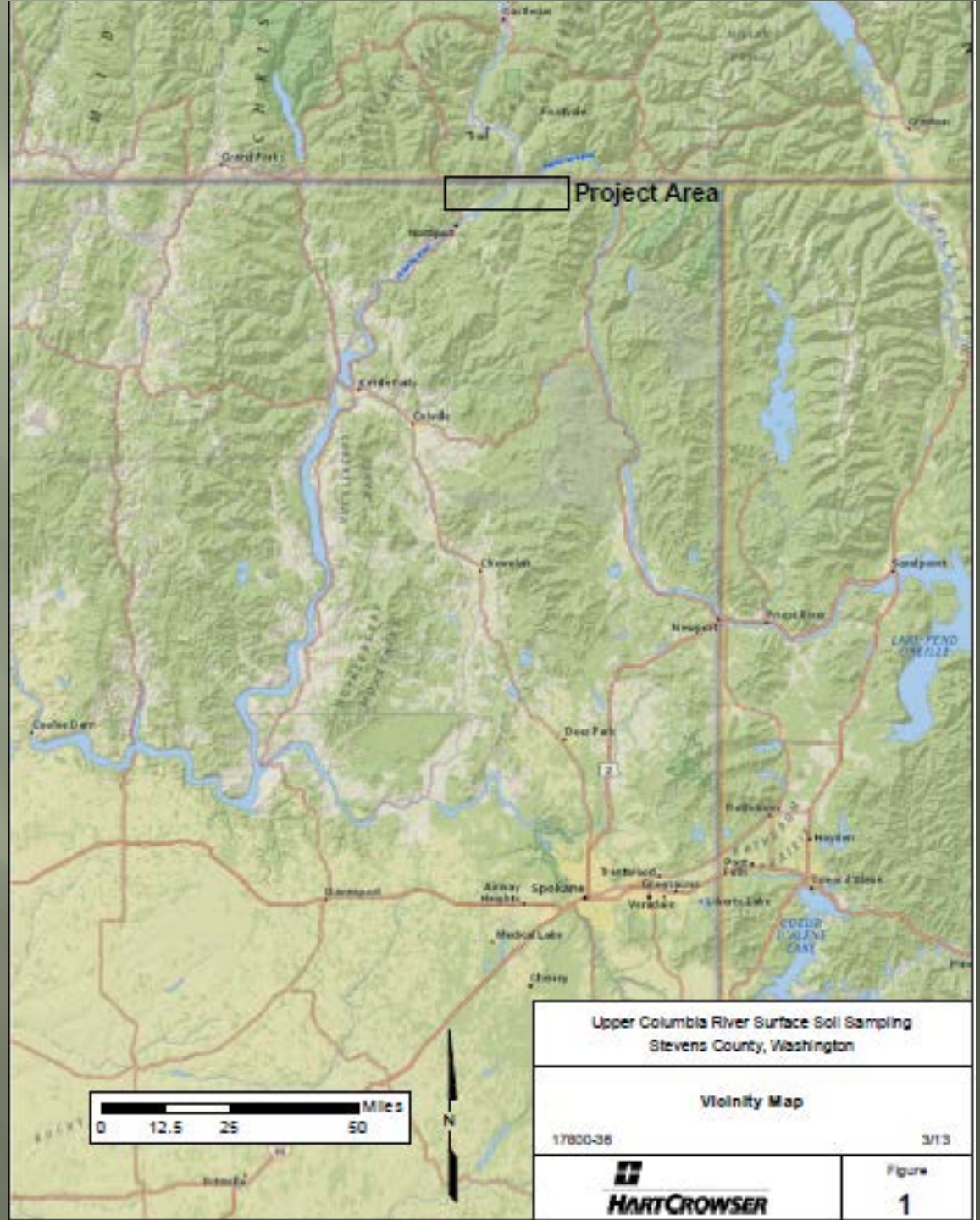
May 6, 2013
17800-36

HARTCROWSER

The soil report provides an initial assessment of surface and shallow subsurface soil conditions in a part of the upper Columbia River valley closest to the United States/Canada border.

The study area covered a limited portion of the area where vegetation damage and impairment was documented in the 1920s and 1930s.

Oxide of Sulfur [Sulfur dioxide (SO2)] was the primary cause for the historical vegetation impacts. Metals were not evaluated previously.

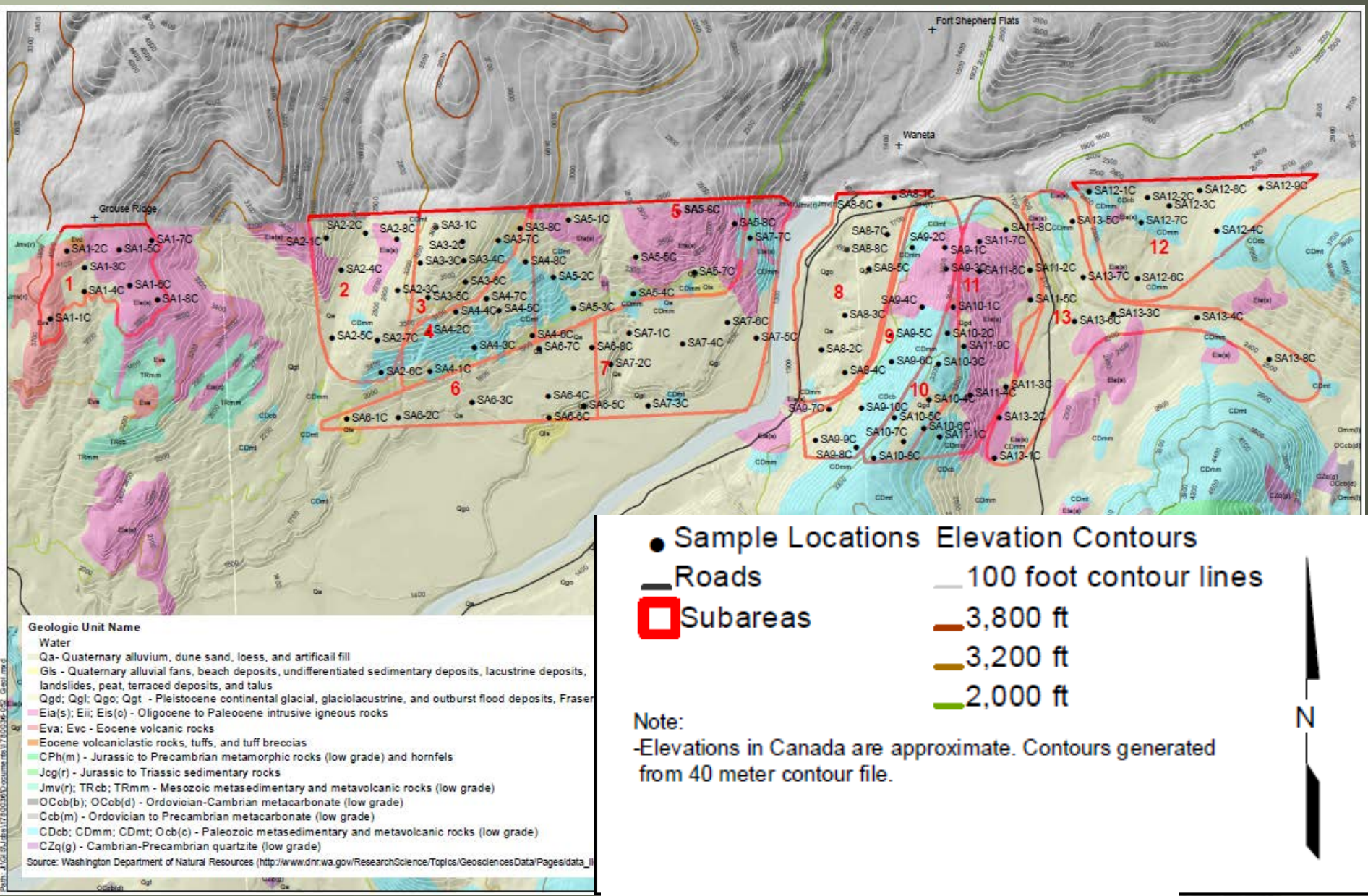

Project Area
Miles
0
12.5
25
50
N
Upper Columbia River Surface Soil Sampling
Stevens County, Washington
Vicinity Map
17800-36
3/13
HARTCROWSER
Figure
1

The two primary objectives of this study were to:

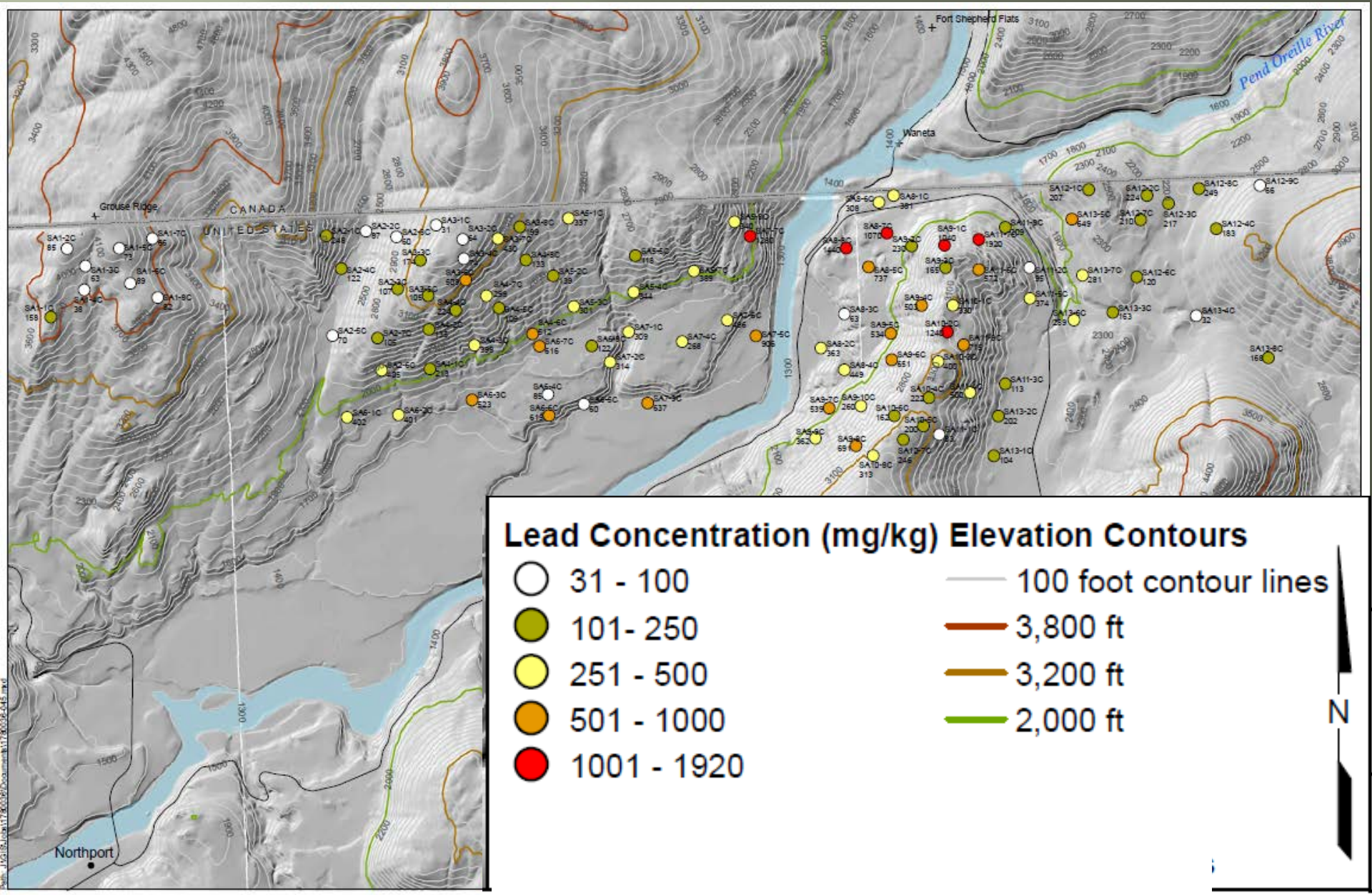
- Collect representative surface and shallow subsurface soil samples and analyze for smelter-related heavy metals and other selected soil parameters.

- Evaluate for potential spatial patterns and statistical variability of smelter-related metals concentrations in study area soils.

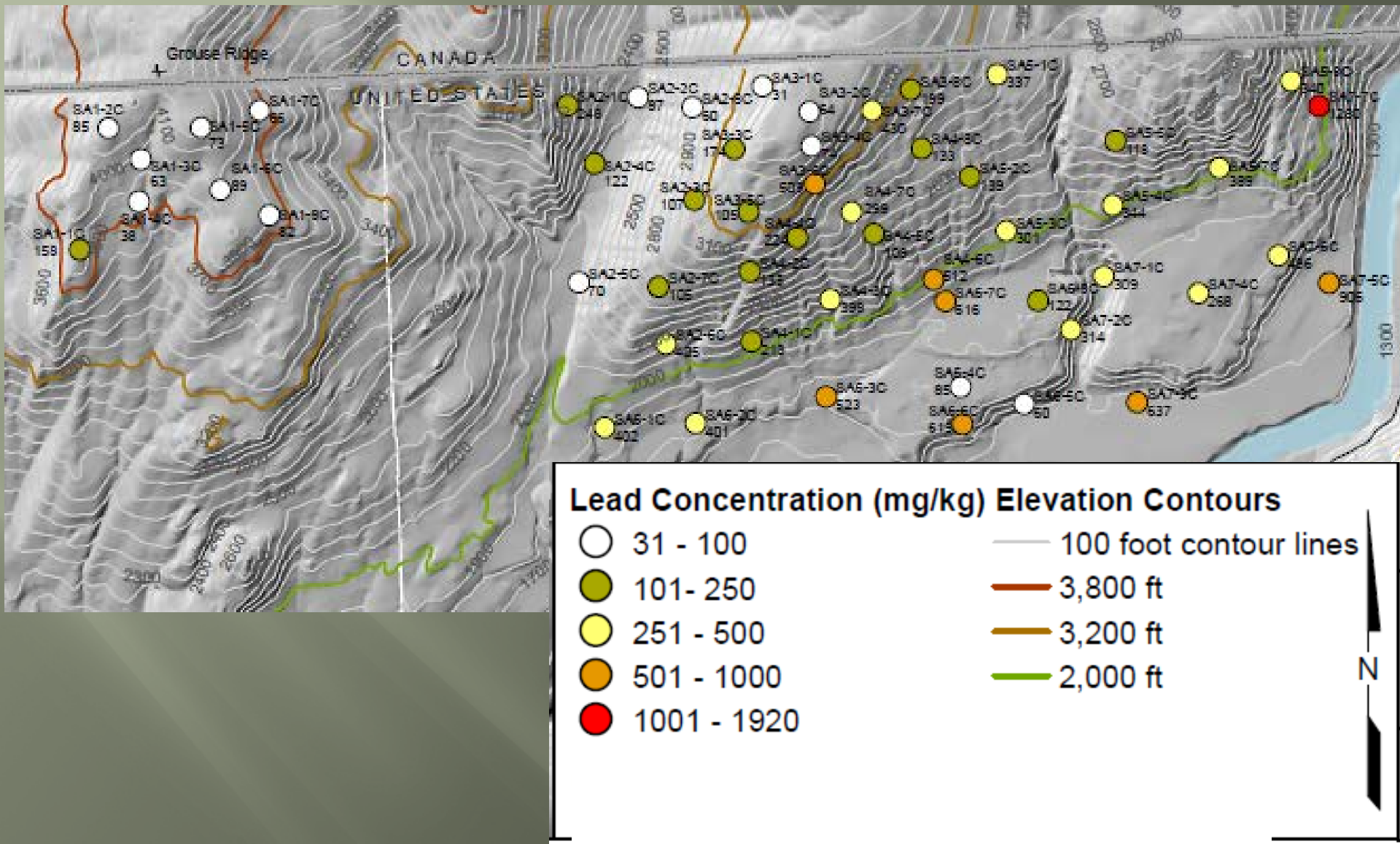
Sample Locations and Subareas, showing underlying geology



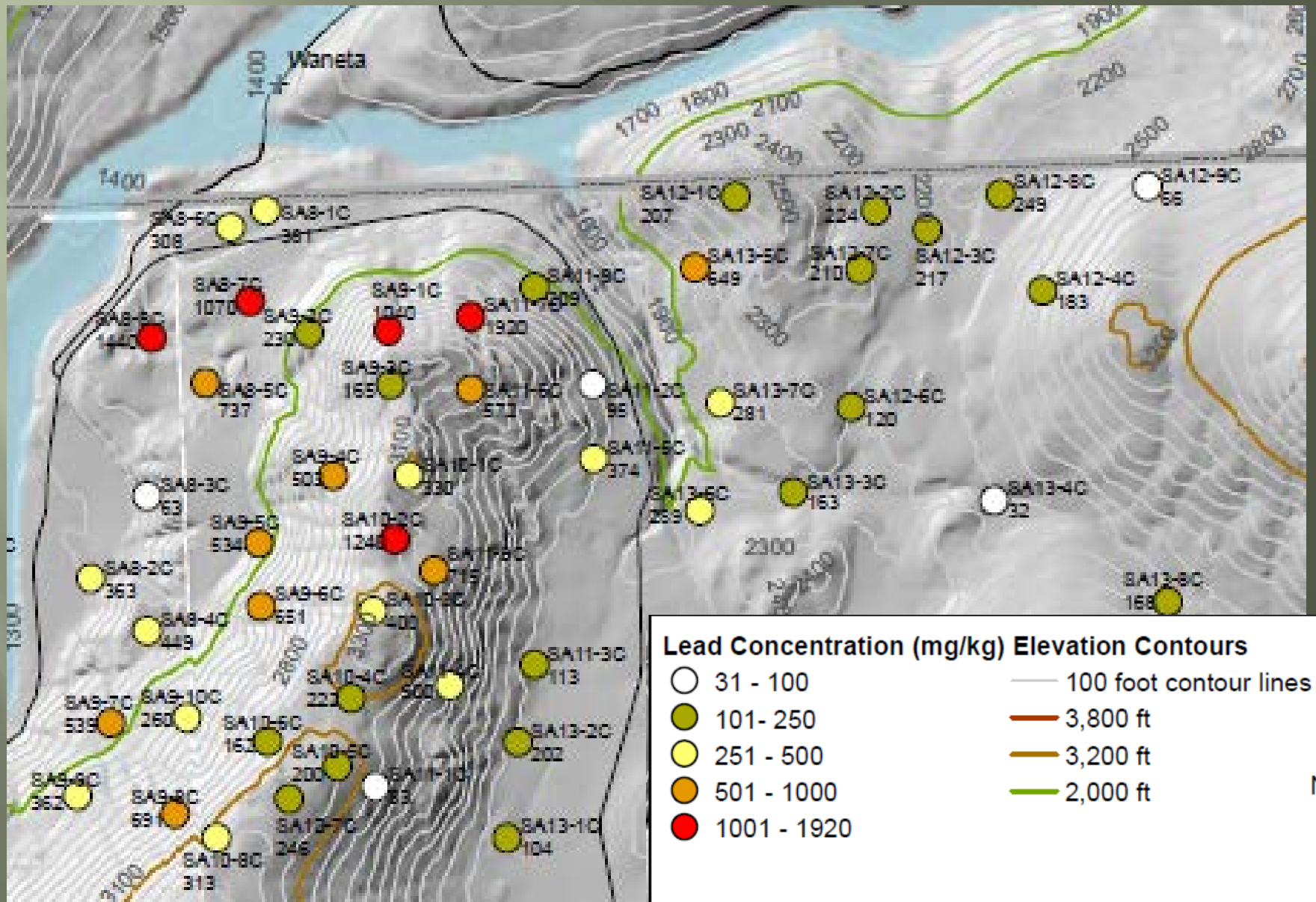
Surface Soil Lead Concentrations



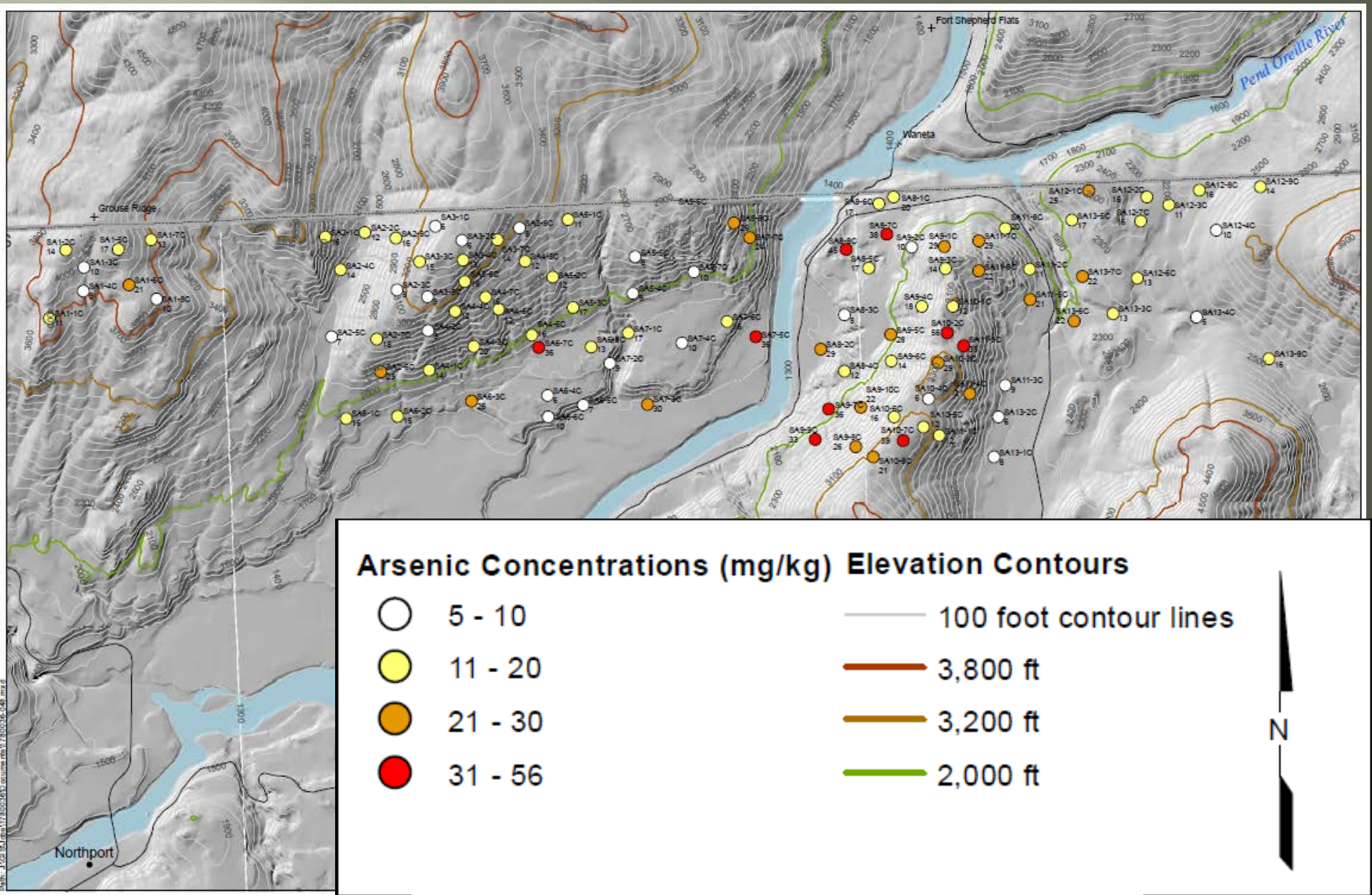
Surface Soil Lead Concentrations – west of River



Surface Soil Lead Concentrations – east of River



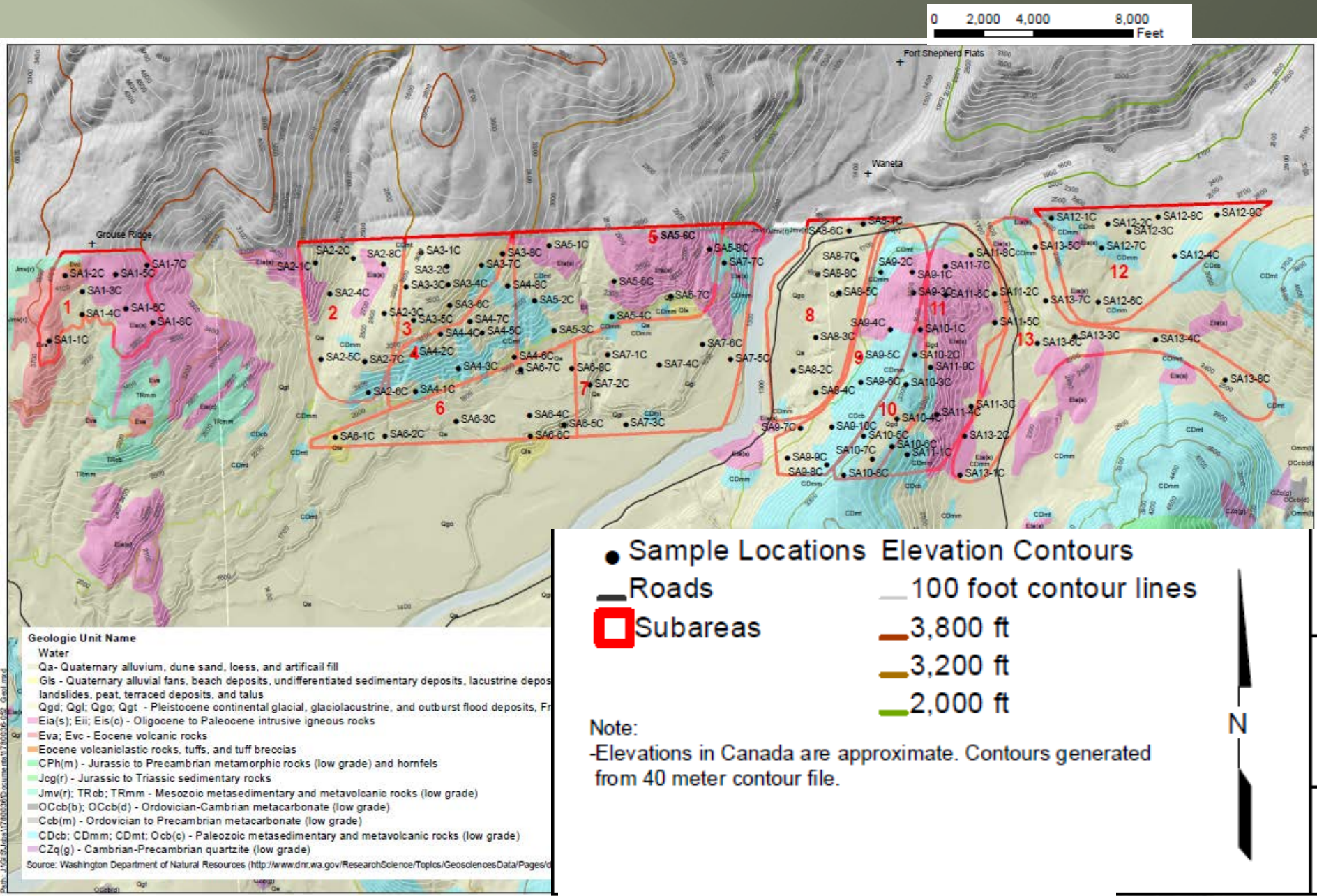
Surface Soil Arsenic Concentrations



Surface Subarea Soil Concentration Ranges and Variability (ppm)

Metal	Sampled Range	Subarea Mean Ranges	Subarea Median Ranges	Standard Deviation Ranges	Coefficient of Variation Ranges
Arsenic	**5 to 56**	**12 to 24**	**11 to 26**	**3.4 to 15.8**	**0.239 to 0.644**
Cadmium	0.6 to 37.3	1.68 to 13.1	1.6 to 10.5	0.748 to 11.2	0.34 to 0.909
Lead	**31 to 1,920**	**78 to 611**	**73 to 503**	**34.2 to 552**	**0.308 to 1.02**
Mercury	0.04 to 0.527	0.0453 to 0.147	0.036 to 0.115	0.0102 to 0.142	0.203 to 0.964
Zinc	70 to 1,330	152 to 549	147 to 490	31.2 to 376	0.205 to 0.741

Sample Locations and Subareas,



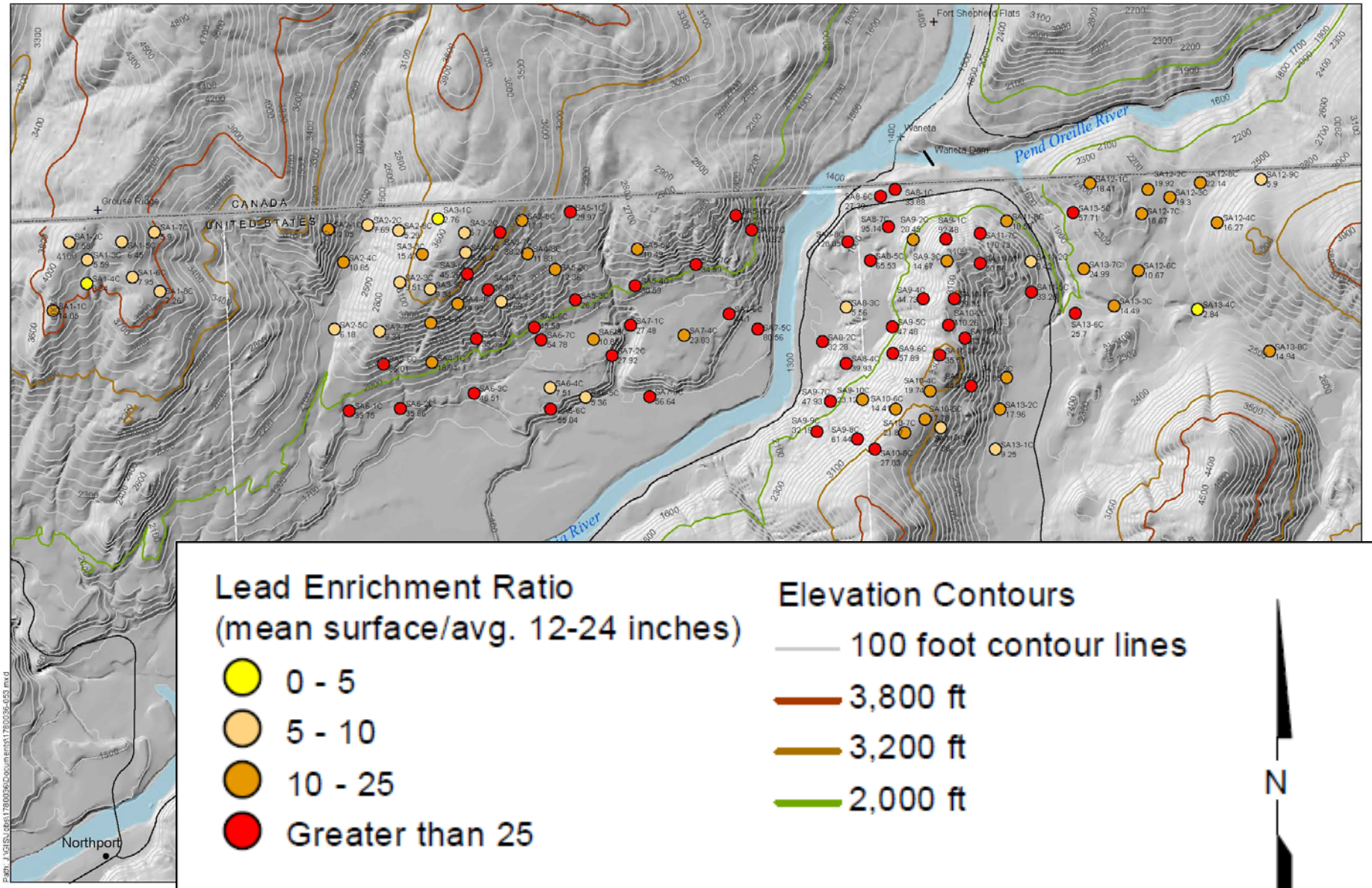
Subsurface (12 to 24-inch) Soil Profile Concentration Ranges and Variability

Metal	Range	Mean	Median	Standard Deviation	Coefficient of Variation
Arsenic	1 to 10	5	5	2.69	0.532
Cadmium	0.1 to 0.8	0.336	0.25	0.232	0.692
Lead	5 to 26	13	9	7.70	0.584
Mercury	0.007 to 0.058	0.0204	0.0145	0.0154	0.753
Zinc	24 to 166	65.8	57.5	39.0	0.593

Comparison of Soil Descriptive Statistical Values with Selected Eastern WA Soil Background Values (mg/Kg)

	Church, 2010	Ecology, 1994	Pooled subsurface 12-24 in depth	Range of Surface Soil median and 90th for Subareas
Arsenic - median (or geo. mean)	2	3	5	11 to 26
Lead - median (or geo. mean)	9	8	9	73 to 503

Lead Enrichment Ratios



TOXICS CLEANUP

Dirt Alert!
- Health Effects
- Healthy Actions
- Soil Sampling

Area Wide
- Tacoma Smelter Plume
- Everett Smelter
- Former Orchard Lands
  - School and park cleanups

Areawide Soil Contamination Project History

Area-wide soil contamination is low-to-moderate arsenic and lead soil contamination spread over a large area. The area could range from several hundred acres to many square miles. In Washington State, area-wide contamination comes from three main historical sources:

- Emissions from metal smelters in Everett and Tacoma.
- Use of arsenical pesticides, especially on orchards.
- Combustion of leaded gasoline.

History of the Area-Wide Soil Contamination Task Force

In the early 2000's, the State of Washington brought together a task force to develop a strategy for dealing with "area-wide" soil contamination. In 2003, the task force put out a report with their recommendations. Ideas included educating the public, protecting children, and cleaning up areas of highest contamination.

Ecology is using many of these ideas for the Tacoma Smelter Plume , the Everett Smelter , and at schools built on former orchard lands.

- Area-Wide Soil Contamination Task Force Final Report June 30, 2003
  - Appendices
- Area-wide Soil Contamination Strategy: Implementation of Task Force Recommendations October 1, 2003
- Update on the Task Force Recommendations - September 15, 2004

Area-Wide Soil Contamination Toolbox

This toolbox provides background on how Ecology is addressing area-wide arsenic and lead. The Area-Wide Soil Contamination Task Force helped to develop these maps and tools. **Please note that this is historical information and may not be up-to-date**.

- **Background information on area-wide soil contamination.**

- **Maps and other information describing the location and extent of area-wide soil contamination in Washington.**
  This information is organized according to the three main sources of area-wide soil contamination:
  - historical emissions from metal smelters located in Tacoma, Harbor Island, Everett, Northport, and Trail, BC;
  - historical use of lead arsenate pesticides on apple and pear trees; and
  - emissions from combustion of leaded gasoline

Do I live in an affected area?

Smelter air pollution and pesticides used on old orchards have polluted large areas of soil with arsenic and lead.

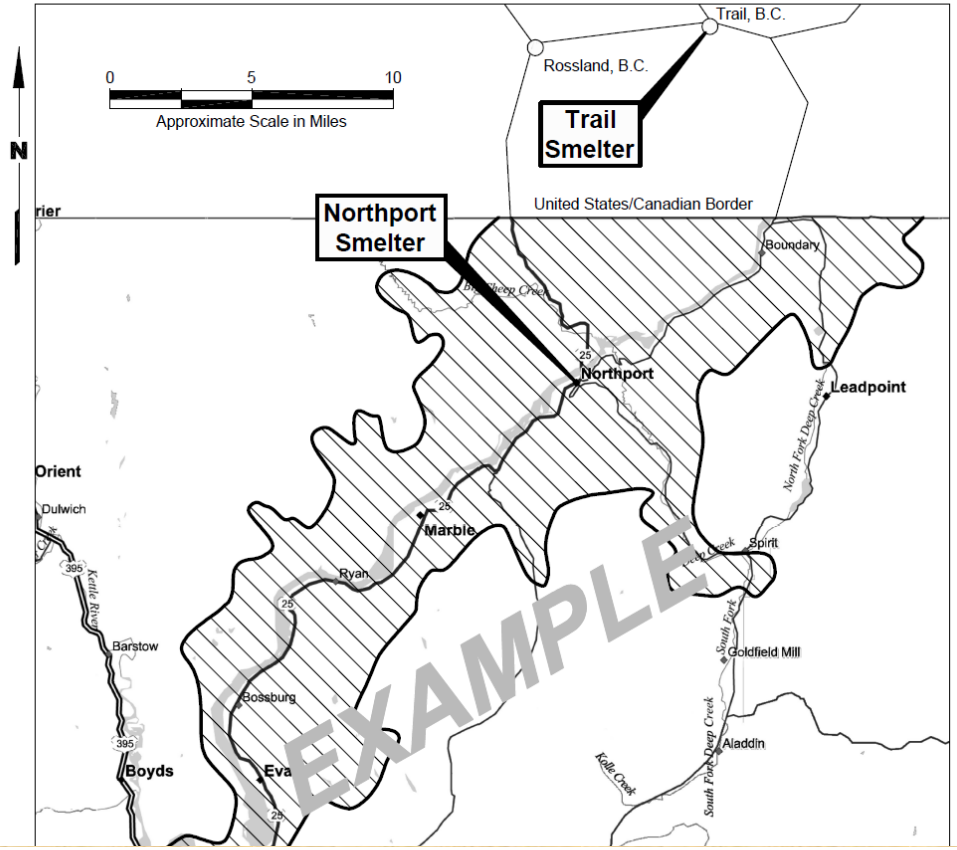
Large areas of Washington state have soil polluted with lead and arsenic from smelter air pollution and lead-arsenate orchard pesticides in use from the early- to mid-1900s. Counties that may have polluted soils are listed on this page. If you live in one of these counties, this guide is for you. Other historical sources of these pollutants include arsenic treated wood, lead paint, and air emissions from the combustion of leaded gasoline. You can request assistance from the Department of Ecology and your local health department or district in taking the soil safety actions described here.

Counties that may have polluted soil

- King
- Pierce
- Snohomish
- Kitsap
- Thurston
- Stevens
- Yakima
- Chelan & Douglas
- Spokane
- Okanogan

State Area-wide Contamination Information Online

Figure I-4: Estimate of Area Potentially Affected by Emissions from the Northport and Trail, BC Smelters (Based on Data Available as of January 2003)



The map of the area affected by smelter emissions was originally developed in 2003 for the report "Area-wide Soil Contamination Project, Task 3.4: Preliminary Estimates." They are based on information available at that time and are intended to provide a general indication of where elevated levels of arsenic and lead in soil may be present due to historical smelter emissions, so individuals and communities can assess whether to look into additional information on area-wide soil contamination.

The area potentially affected by smelter emissions is only shown for Washington State, not Canada.

The area potentially affected by smelter emissions is only shown for Washington State, not Canada.

Toxics Cleanup Program

Healthy Actions - Protect your family from soil contamination

Healthy Actions are simple things you and your family can do to decrease contact with dirt that may have arsenic, lead, or other harmful chemicals.

Wash hands well before eating and after working or playing in the dirt. Use plenty of soap and water.

Leave your shoes at the door or use a "wipe-off" map to reduce dirt and dust that gets into your home. Provide a shoe rack or area for shoes at your door.

Damp-dusting and vacuuming at least once a week decreases the amount of dust and dirt in your home. **Always** use a damp-mop or a damp-cloth when you dust.

Wash children's toys, bedding, and pacifiers frequently.

END