

The Superfund Process

The Life of a Site*		
Step		
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	2	Remedial Investigation/Risk Assessment Where is the contamination? What are the risks?
Develop the Solution	3	Feasibility Study How can we best clean it up?
	4	Proposed Plan/Public Comment What does the public think of EPA's proposed plan for cleanup?
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Done Confirm	8	Operations and Maintenance Is the cleanup doing what it should?
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*Simplified

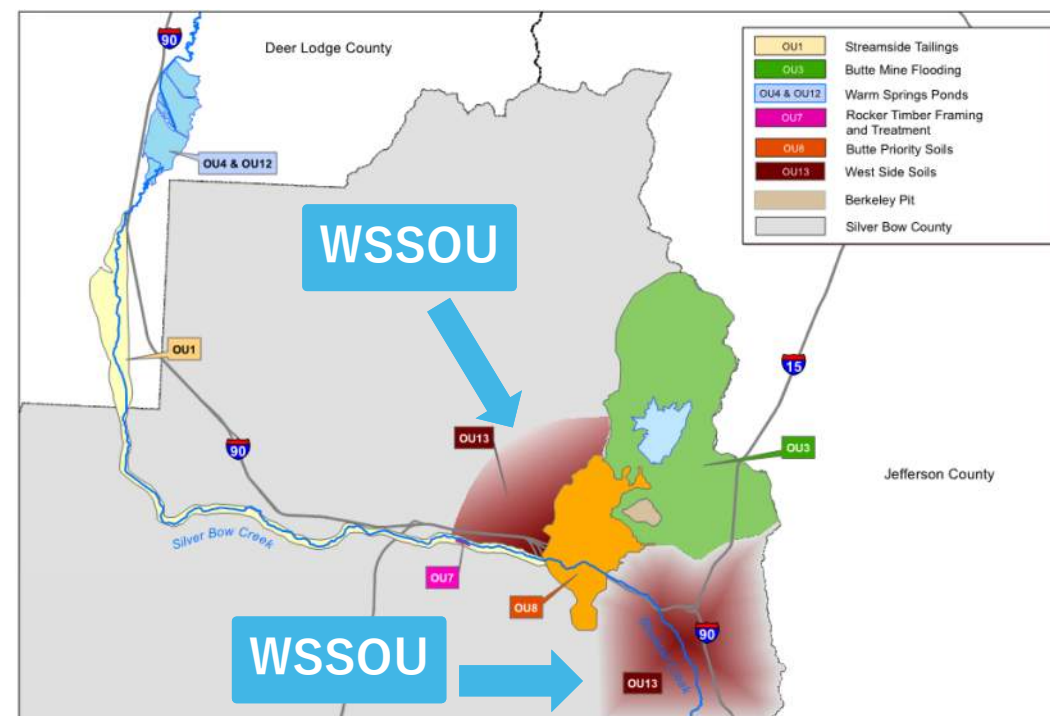
This open house covers

2 Remediation Investigation/Risk Assessment



We are now doing: 3 Feasibility Study

WSSOU = West Side Soils Operable Unit



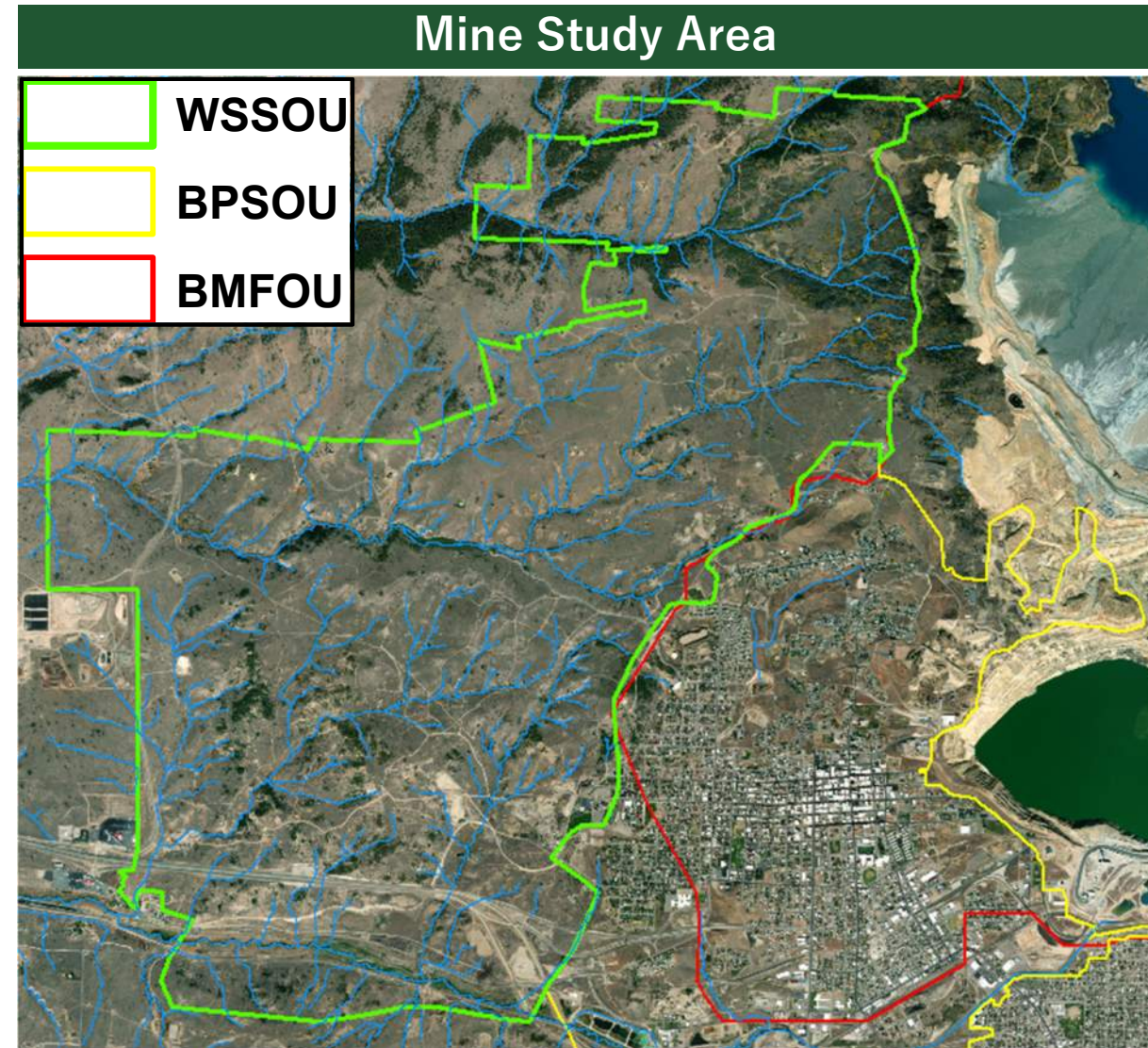
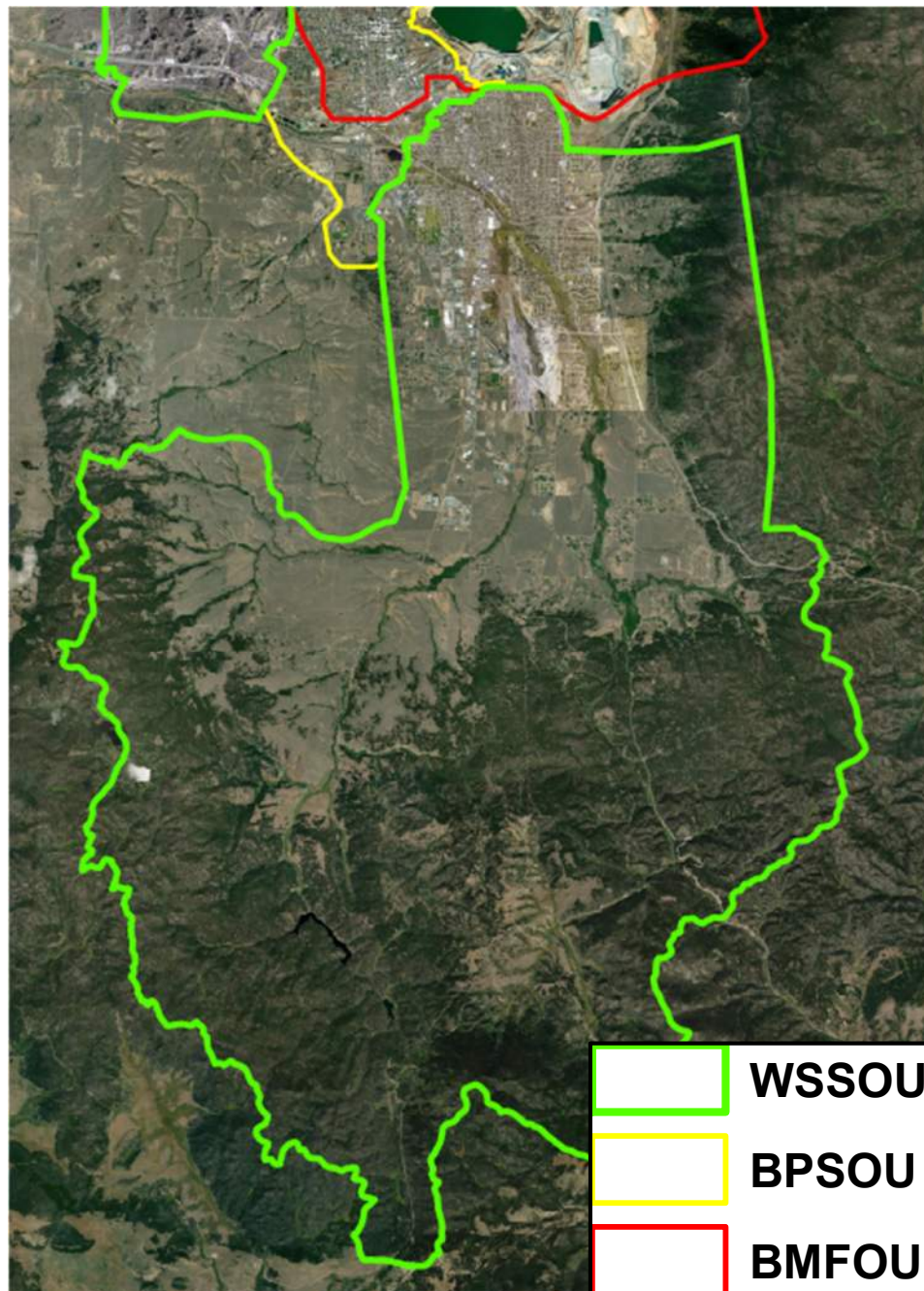
Silver Bow Creek/Butte Area Superfund Site Operable Units

U.S. Environmental Protection Agency (EPA) finished the remedial investigation and risk assessment for the West Side Soils Operable Unit of the Silver Bow Creek/Butte Area Superfund Site in 2024



WSSOU Study Areas

Blacktail Creek Study Area



Blacktail Creek Study Area

- Surface water and sediment evaluation
- South of BPSOU and BMFOU
- Blacktail and Basin Creek watersheds

Mine Study Area



Mine Study Area

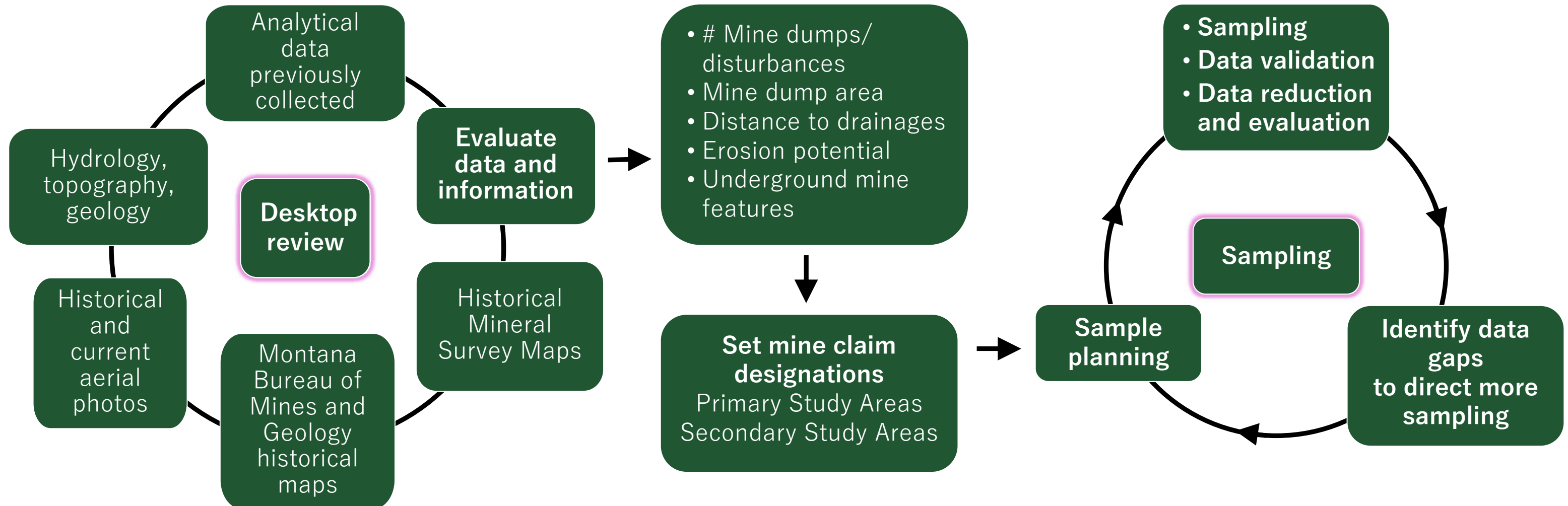
- West and North of Butte and Walkerville
- Mostly rangeland around historic mine claims
- Residential houses in the northern portion
- Large historical road network (now trails)
- Big Butte Open Space
- Montana Tech Mining Division (Orphan Boy Mine)
- World Museum of Mining (Orphan Girl Mine)
- Parts of BA&P Trail (old railroad)

WSSOU boundary not strictly defined (final boundary assigned with Record of Decision)

BPSOU: Butte Priority Soils Operable Unit
BMFOU: Butte Mine Flooding Operable Unit



The Remedial Investigation Process



Little Darling
Primary Study Area

Primary Study Areas

- Generally active mining took place within underground workings
- Mine dumps remain, largely unvegetated due to reduced pH and/or elevated metals

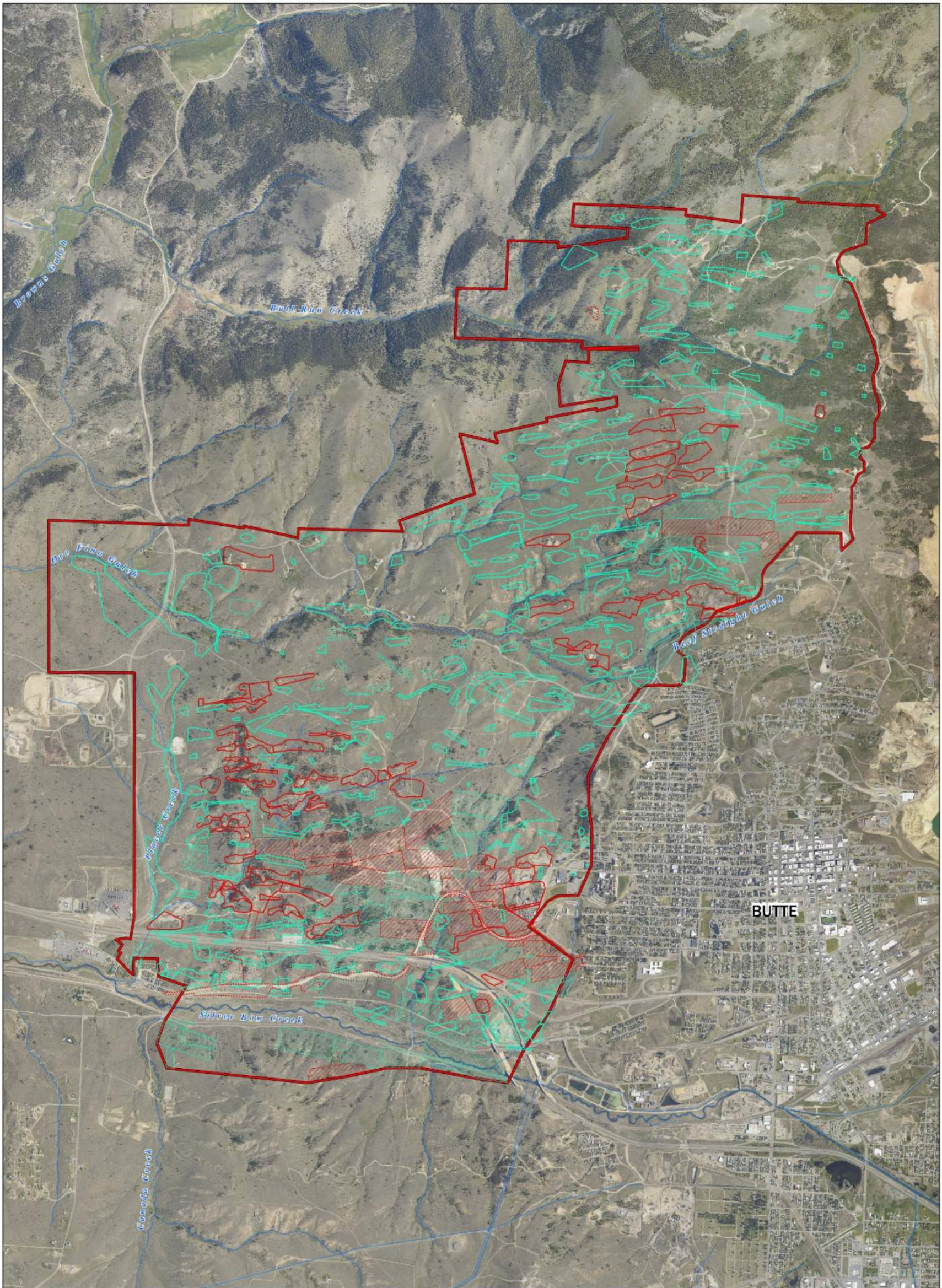


Bryan
Secondary Study Area

Secondary Study Areas

- Mine exploration areas, typically little or no mining took place
- Some small mine dumps or other mining related disturbances remain
- Many partly or completely vegetated

Primary and Secondary Study Areas



- WSSOU Mine Study Area
- Study Areas**
- Primary
- Secondary
- Non-Claim/Primary
- Non-Claim/Secondary
- AR Parcels Study Areas**
- Primary
- Secondary

Scale
1:15,000

*AR Parcels and study areas shown are per CERCLA-08-2019-004 Unilateral Administrative Order

0 0.5 Miles

Datum
NAD 83
Coordinate System
State Plane Montana FIPS 2500 (ft)

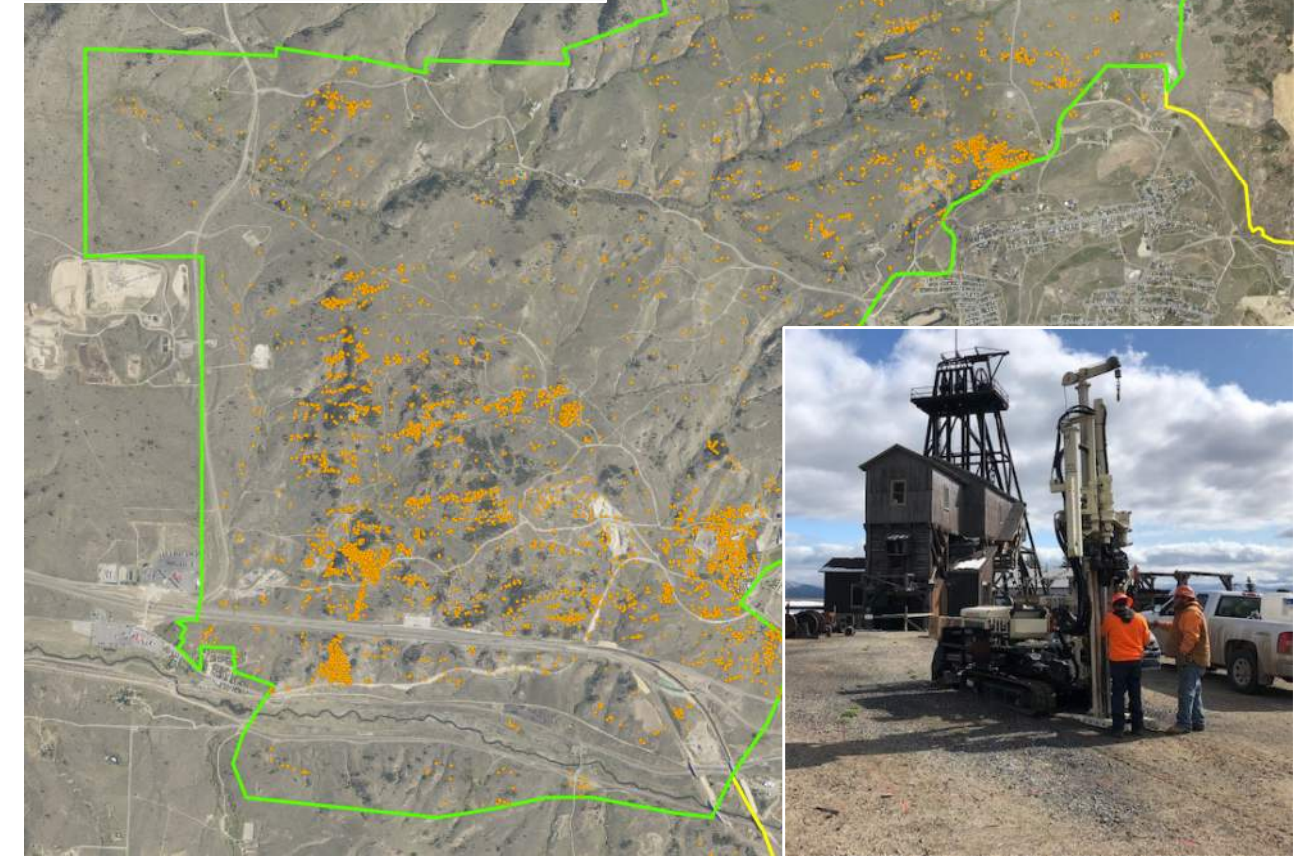
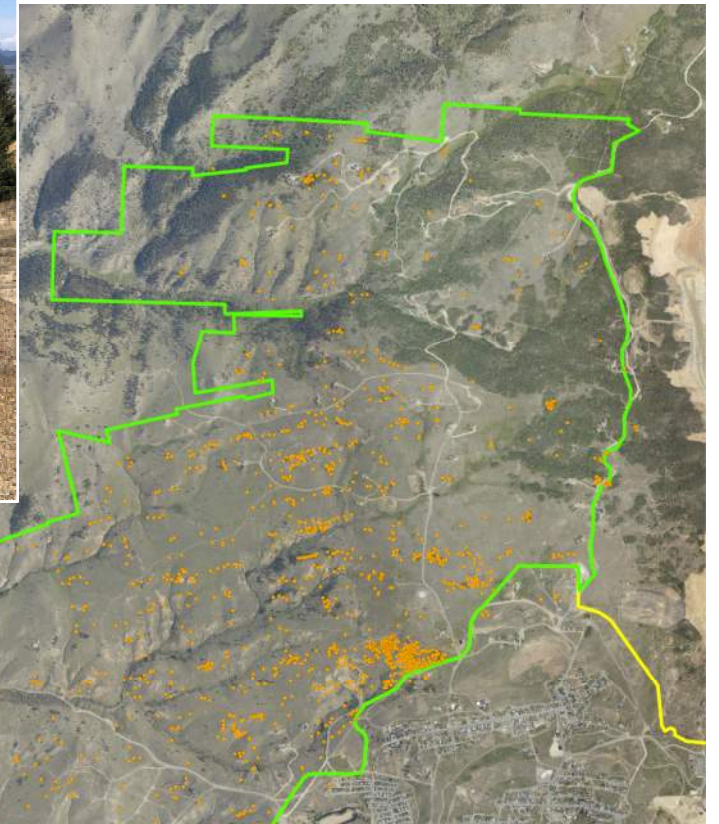
WSSOU Primary and Secondary Study Areas
Remedial Investigation
West Side Soils Operable Unit
Silver Bow Creek/Butte Area NPL Site



Soil and Mine Waste Sampling

2019-2020 Field Seasons

- Soil and subsoil sampling
 - >3,800 surface samples collected by EPA
 - >900 surface samples collected by Atlantic Richfield
 - >160 subsurface borings at 35 primary study areas
 - 99 primary study areas (larger)
 - 290 secondary study areas (smaller)
- Sampled undisturbed and native areas



Bluebird Mine dump sloping into Gimlet Gulch



Sampling material from mine dump for field paste pH analysis

Surface soil locations sampled

Background studies

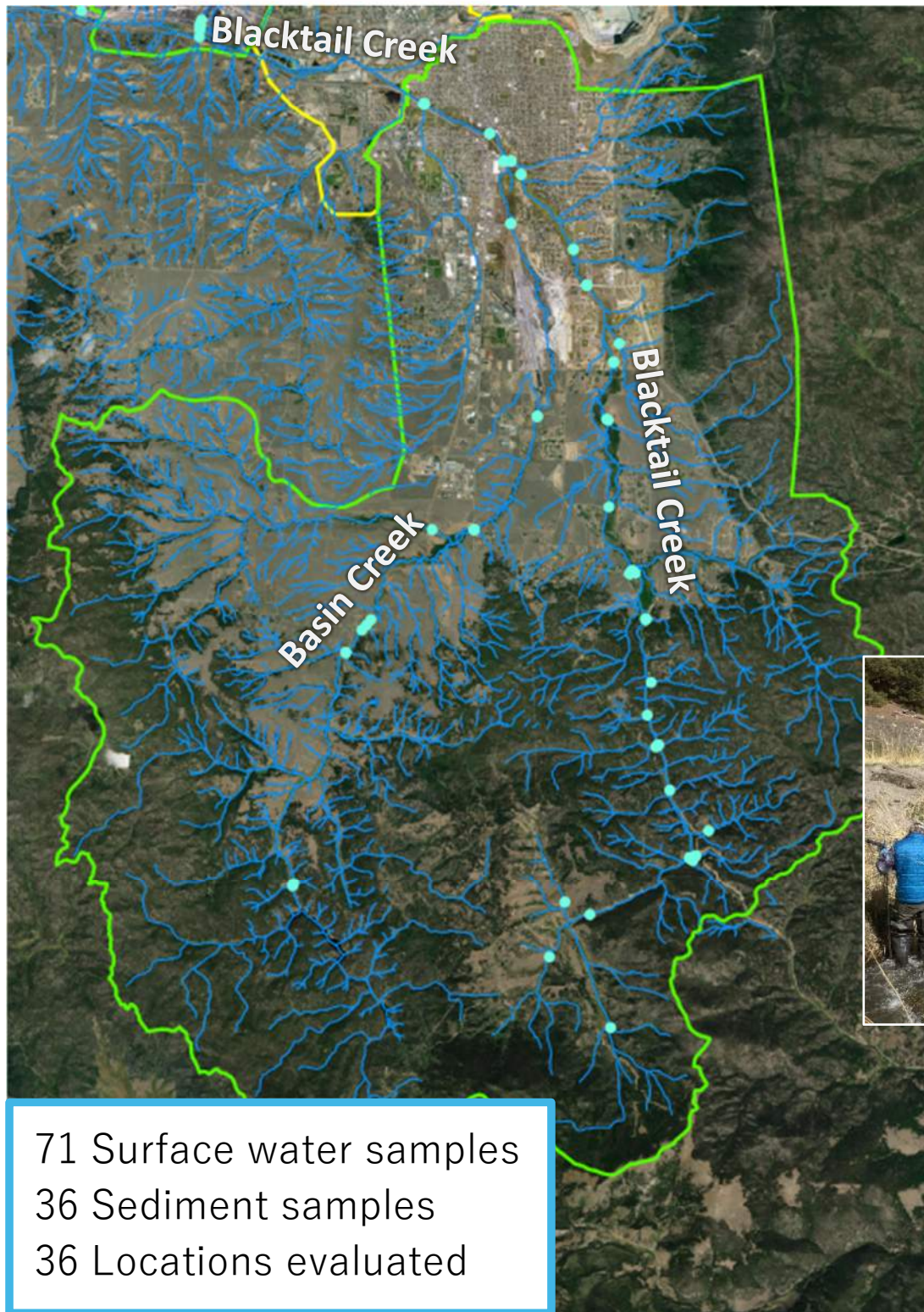
- Depth-interval sampling
- Rangeland sampling



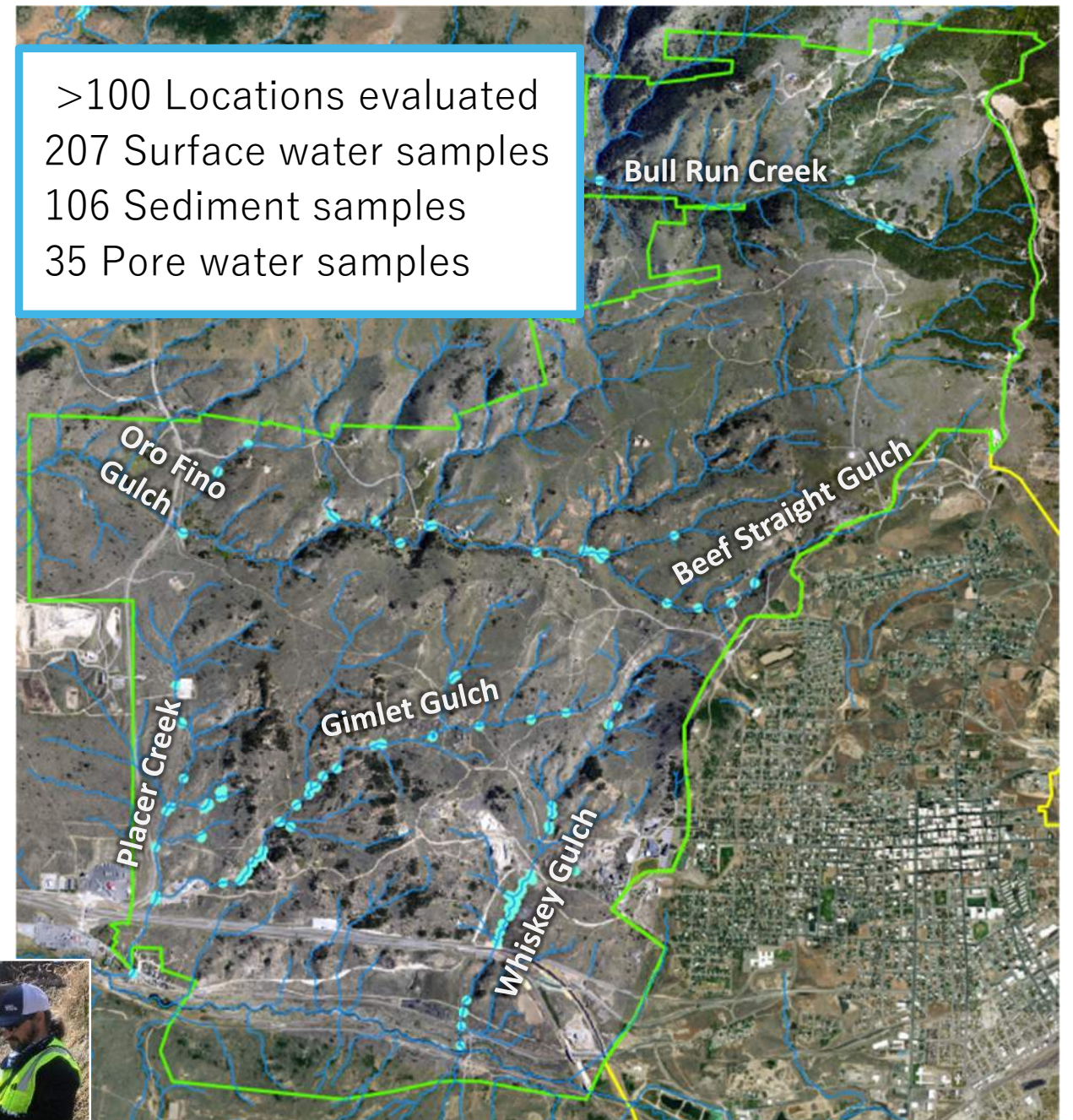
Surface and Pore Water, Sediment Sampling

Samples collected in **2019**: Spring, Fall | **2020**: Spring | **2021**: Spring

Blacktail Creek Study Area



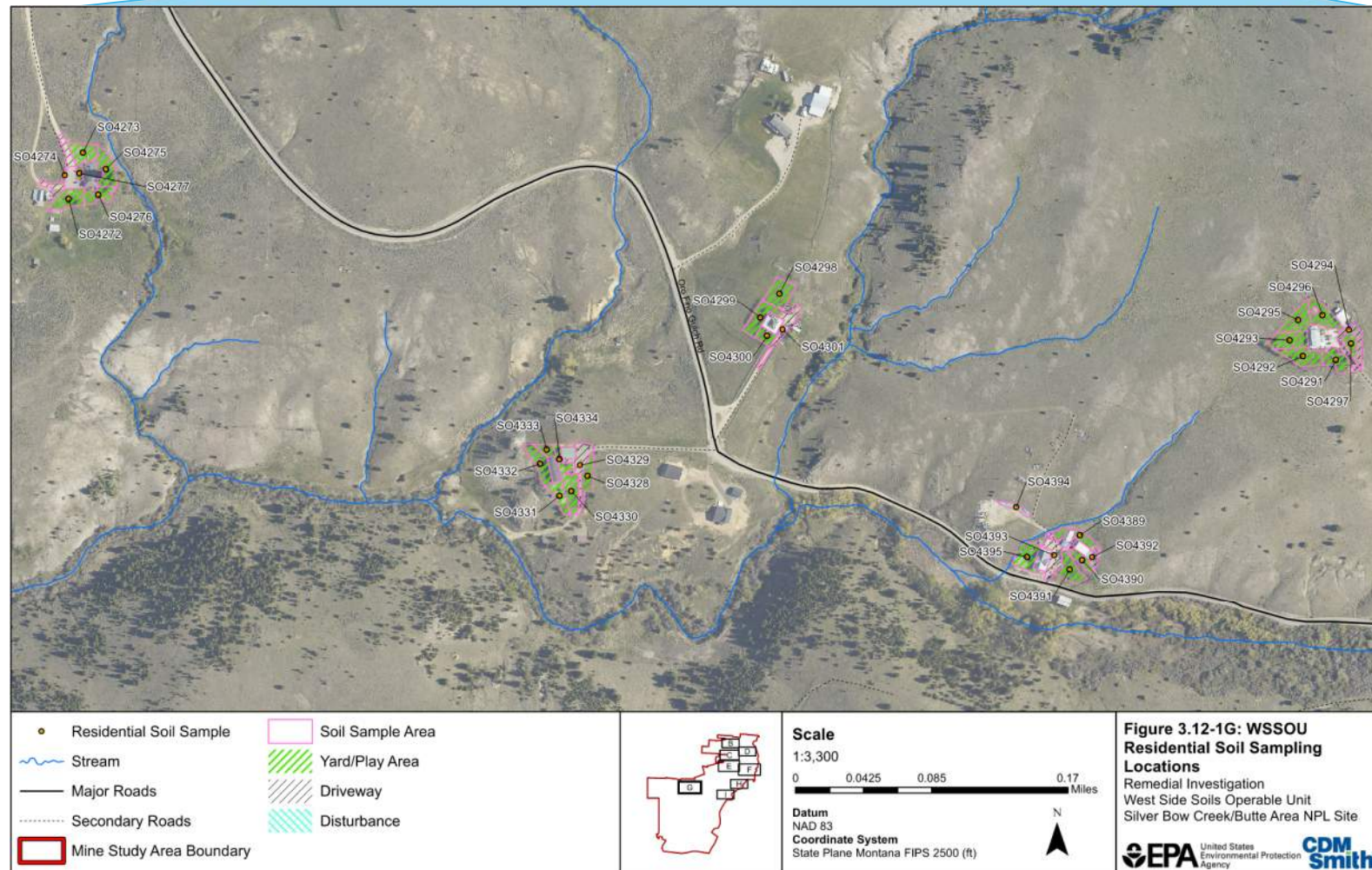
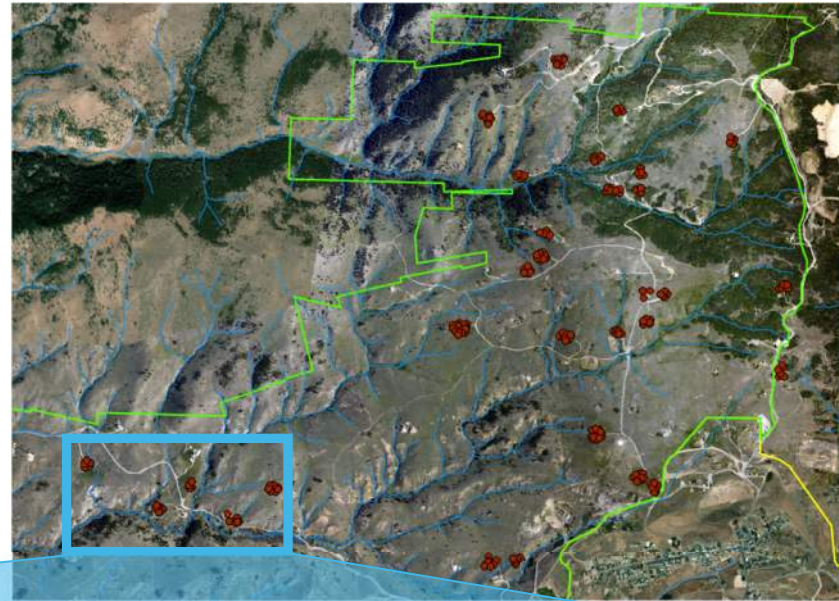
Mine Study Area: 5 Drainages



Residential Soil and Groundwater Sampling

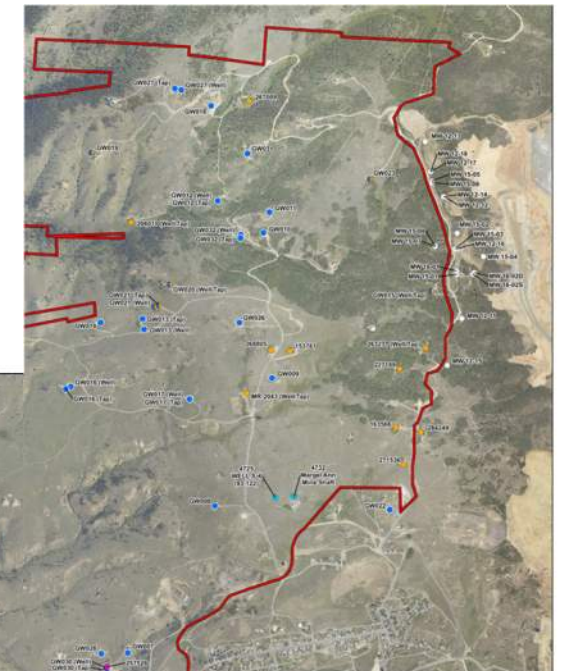
Residential Yards

- 30 yards sampled in 2022
- Samples collected <125 feet from house
- Yards, driveways, and bare/disturbed areas sampled
- Triple depth sampling
- 53 properties identified in WSSOU mine study area – access requested



Groundwater

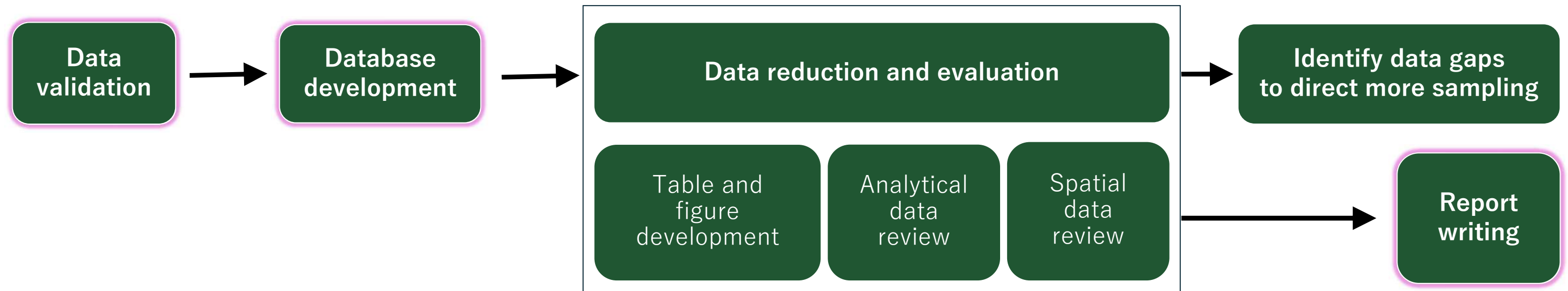
- Mine Study Area Groundwater Wells
- Residential Wells – sample by EPA, Montana Resources, and Montana Bureau of Mines and Geology
- Monitoring Wells – sampled by Montana Resources
- BMFOU Monitoring Network



BMFOU: Butte Mine Flooding Operable Unit



Data Evaluation/Assessment



Nature and Extent of Contamination Process

1. Evaluate and determine background
2. Develop screening criteria
 - a. Criteria based on risk thresholds
 - b. Criteria based on concentration magnitude
 - c. Criteria based on background
3. Compare contaminants of concern results to screening criteria
4. Spatial data review
5. Develop correlations and media result comparisons

Nature of Contamination

Primary and secondary sources
Geochemistry and geology/minerology relationships
Anthropogenic vs. Natural background conditions

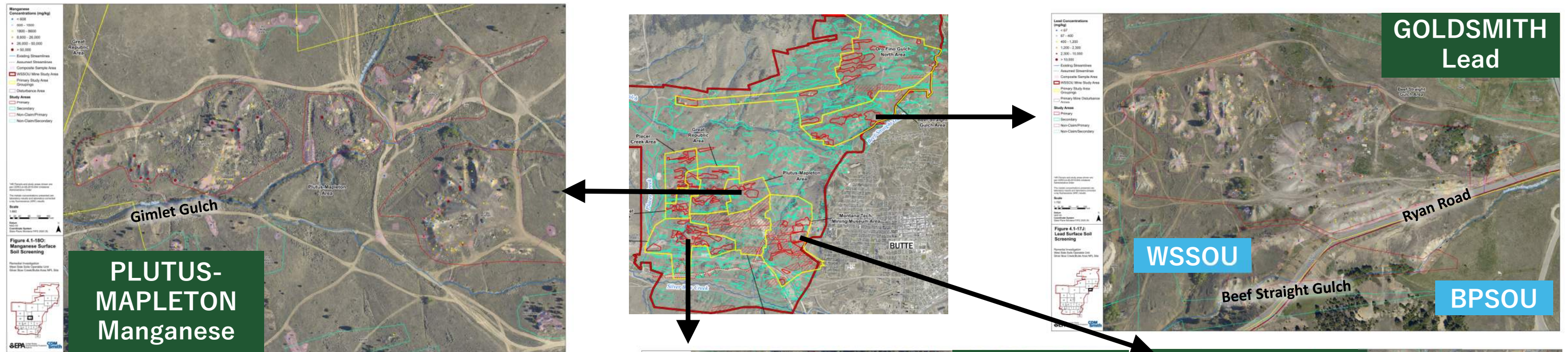
Extent of Contamination

Concentration magnitude
Spatial extent and volume

Fate and Transport of Contaminants

Develop conceptual site model (CSM)
Contaminant sources and release mechanisms
Potential routes of migration
Contaminant fate and persistence

Soil and Mine Waste Extent of Contamination



Soil and Mine Waste Extent

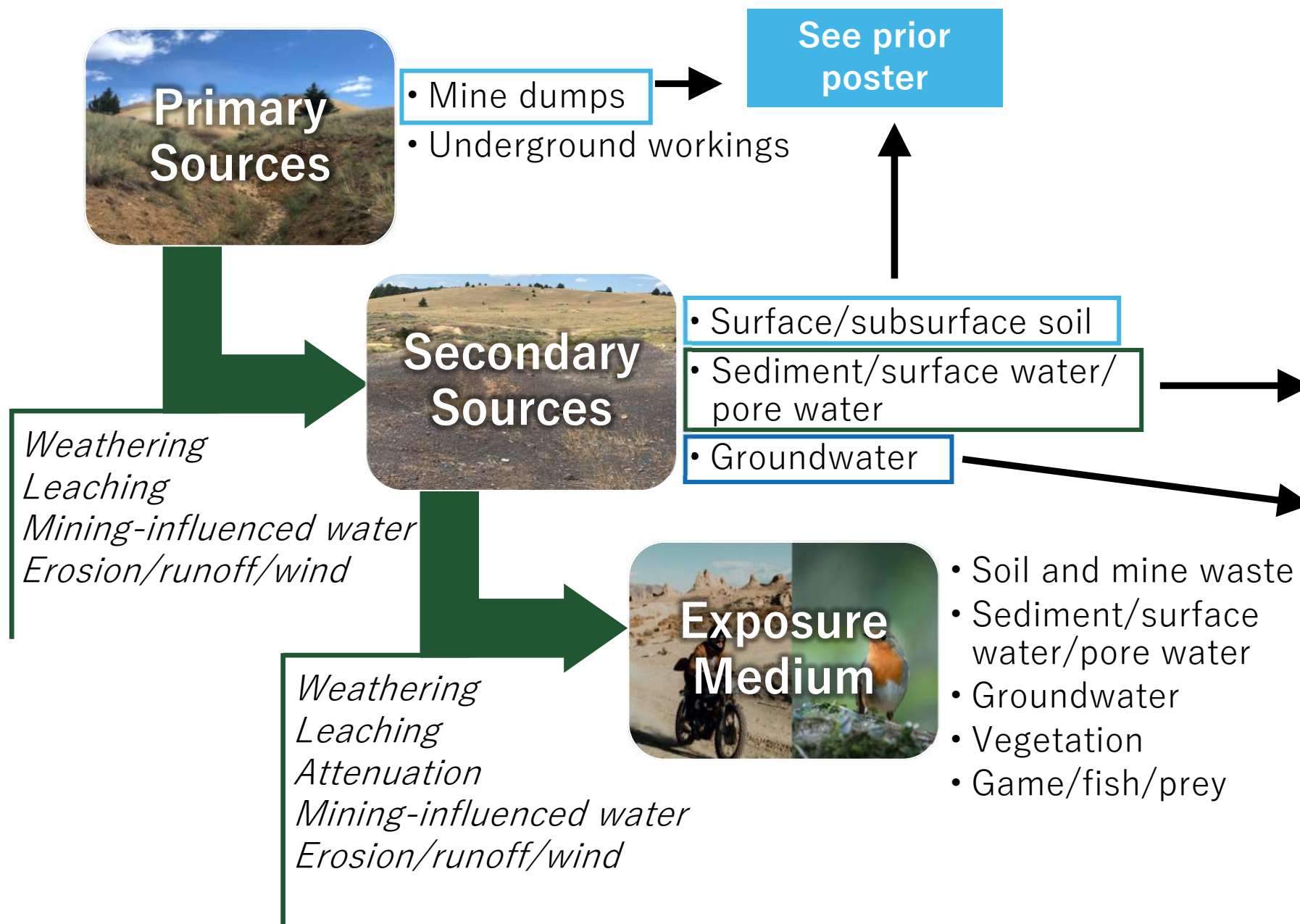
- Total disturbance ~ 250 acres and > 1 million cubic yards
- Direct erosion to drainages at 59 primary mines
- **Arsenic, lead, and/or manganese**
 - > non-residential criteria:
 - 84 primary study areas
 - 64 of 290 secondary study areas sampled
- **Cadmium, copper, and/or zinc**
 - > ecological criteria:
 - Copper primarily at Orphan Girl mine and BA&P Trail
 - Zinc collocated sitewide with lead and manganese
- Elevated **mercury** associated with mineral processing at Bluebird Mill and Mapleton

Background Results

- Slightly elevated metals in surface soils throughout WSSOU from smelter deposition
- Elevated metals in surface soils are widespread in naturally mineralized outcrops



Other Media Extent of Contamination



Surface Water, Pore Water, Sediment

- **Copper, lead, iron, manganese, zinc** > surface water aquatic criteria
- Locally elevated metals downstream of primary study areas and groundwater discharge
- Greatest impacts to Gimlet Gulch, Whiskey Gulch, Placer Creek, and Beef Straight Gulch
- Elevated **copper, arsenic, iron** in Blacktail Creek from upstream background and municipal stormwater

Groundwater

Elevated metals in residential wells:

Groundwater Exceeding Human Health Standards				
	Well Exceedance	Wells Sampled	Tap Exceedance	Taps Sampled
Arsenic	20	41	3	14
Manganese*	10		2	
Nitrate+Nitrite	4	35	0	9
Uranium	5		1	

*Manganese compared to DEQ health-based guidance value
Elevated metals in groundwater discharges to Whiskey Gulch and Gimlet Gulch surface water

Weathering: when the weather affects the physical or chemical properties of media

Leaching: the release of metals from rock to water

Acid generation: acid generating minerals mix with oxygen and water, and catalyzed by microorganisms, creating more acidic soil and water

Background Results

- Surface water and sediment: Background based on headwater reference locations
- Highly variable background groundwater for mineralized and non-mineralized areas



Mine Study Area Risk Assessment

Human Health



Soils and Mine Waste

- Potential for unacceptable risks for residents, recreators, and workers from **arsenic, lead, manganese, and mercury**



Groundwater

- Potential for unacceptable risks for residents if untreated groundwater is used as drinking water from **arsenic and uranium**
- Metals may be naturally elevated in groundwater within the area



Surface Water, Sediment, Biota

- **No unacceptable risks** expected from exposure to metals in streams or from consumption of fish and game animals

Ecological



Wildlife

- Birds and mammals that ingest **soil, mine waste, and sediment** or consume contaminated dietary items have the potential for unacceptable risks from several metals (mainly **lead, arsenic, and mercury**)
- Drinking stream surface water is not of potential concern



Terrestrial Plants and Soil Invertebrates

- **Several metals and low pH** in the mine waste piles may adversely impact plants and invertebrates
- Impacts likely limited to locations **near visible mine waste piles**



Aquatic Life

- Several metals (mainly **copper, manganese, and zinc**) in site creeks could be adversely impacting fish, aquatic invertebrates, and plants
- **Whiskey Gulch and Gimlet Gulch** have higher concentrations compared to other streams

Blacktail Creek Analysis

Data Sources

- Atlantic Richfield
- Butte Silver Bow County
- EPA
- Montana Department of Environmental Quality
- Montana Natural Resource Damage Program
- United States Geological Survey

Media Evaluated

- Surface water
- Stormwater
- Sediment
- Pore water

EPA conducted extra analysis of a specific section of Blacktail Creek, from Father Sheehan Park to Lexington Ave, in response to a stakeholder request.

Results

- Most background sources are naturally occurring
- Elevated copper found across watershed, including headwaters of Blacktail Creek
- Elevated metals concentrations observed during runoff (stormwater) events
- Data gap identified for stormwater outputs to Blacktail Creek along Harrison Avenue and Interstate 90/15



Additional stormwater sampling conducted this summer (2024) to address stormwater data gap
Results currently pending



Blacktail Creek Analysis
Sample Locations



Next Steps

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- Complete Feasibility Study (Step 3)
 - Develop cleanup alternatives
- Analyze impacts of lead policy change in conjunction with Butte Priority Soils Operable Unit
- Complete report on Blacktail Creek stormwater sampling
- Develop EPA's Proposed Plan

