Appendix 4-PP

Fish and Fish Habitat Meeting - August 2021

NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

DFO – Fish and Fish Habitat Baseline

August 23, 2021

Agenda

1. Project Overview
2. Proposed Selenium Mitigation
3. Aquatic Study Area
4. Aquatic Valued Components
5. Fish and Fish Habitat Baseline Sampling
6. Population Study
7. Key Findings
8. Questions / Discussion

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Project Overview

- Proposed Open pit metallurgical coal mine located near Sparwood BC
  - Between Teck's Elkview and Line Creek Mines
- Up to 2.2 million tonnes clean coal per annum for 15 years
- Construction estimated at 1.5 years

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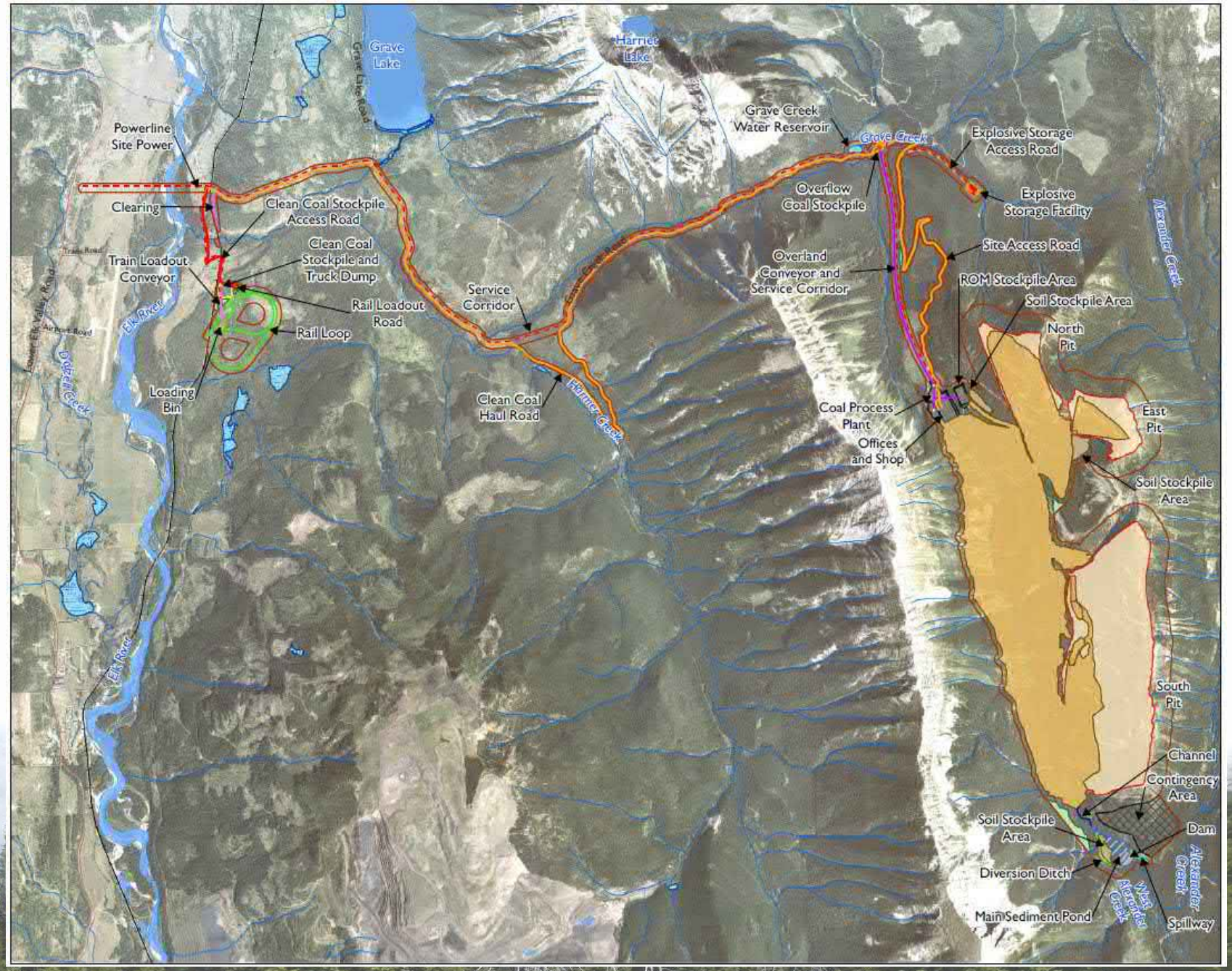


Regulatory Process: Overview

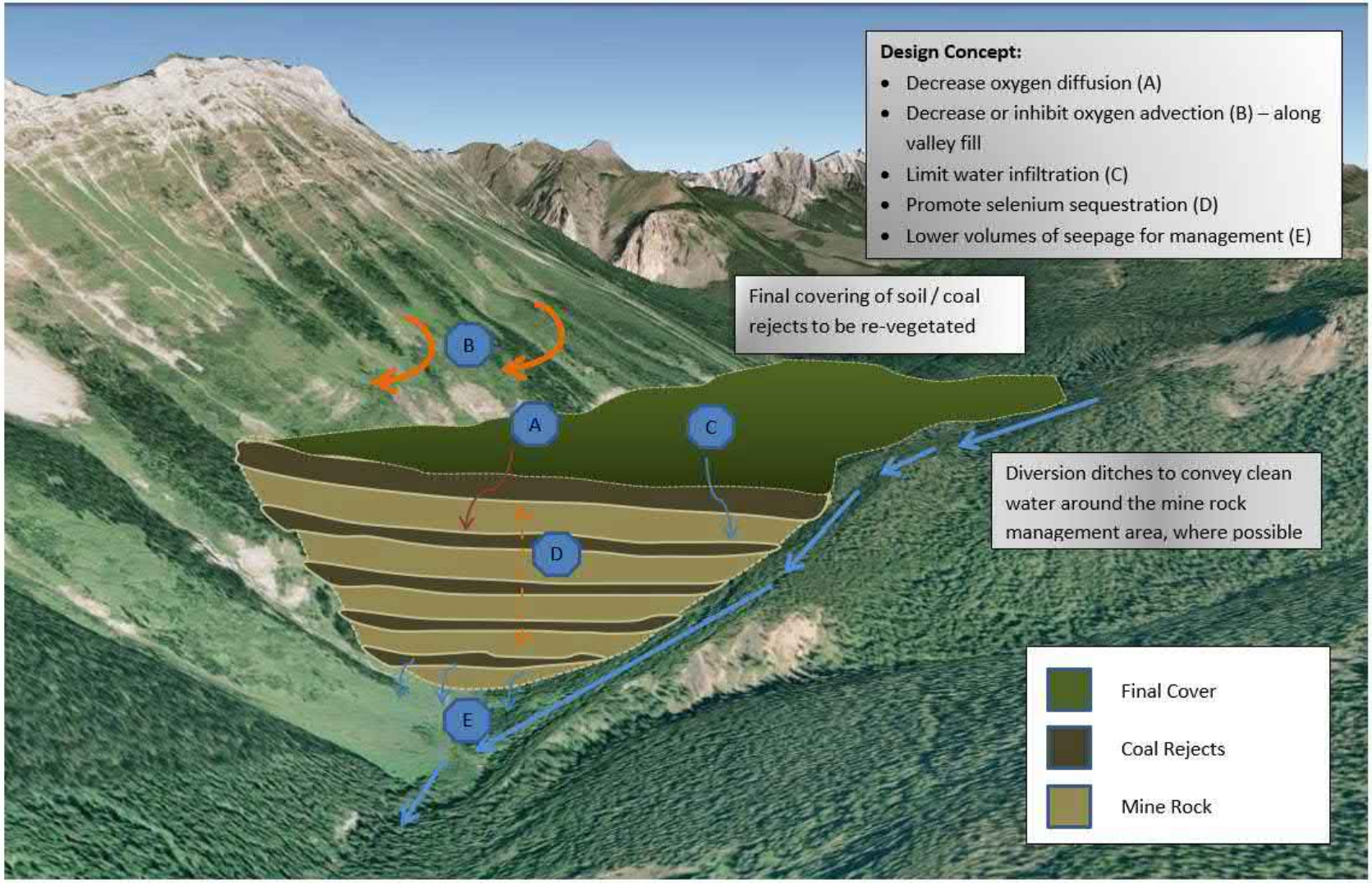
- Environmental Assessment under both federal (CEAA 2012) and BC (EAA 2002) legislation
- Currently in Pre-Application phase:
  - Project Description, October 2014
  - Federal EIS Guidelines, February 2015
  - BC Valued Components for Environmental Assessment, April 2016
  - BC Application Information Requirements, April 2018

Selenium Mitigation

- Layering Coal Process Rejects in the Mine Rock Piles
- Reduces Oxygen ingress into the pile
- Reduced oxygen environment reduce Nitrate and Selenium Levels
- Results in water quality equivalent to active water treatment
- Eliminates requirement tailings facility

Selenium Mitigation

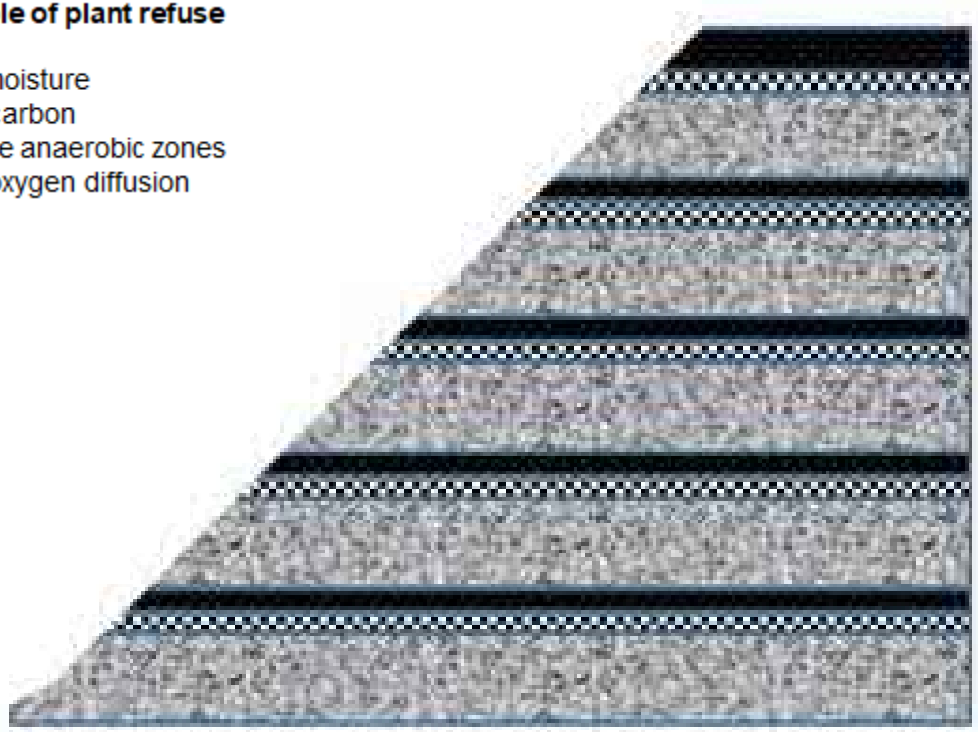
Waste Rock Management: Layered Approach



Selenium Mitigation

Expected role of plant refuse layers:

- Retain moisture
- Supply carbon
- Generate anaerobic zones
- Retard oxygen diffusion



Reductive Processes

Plant refuse Breaker Reject

Waste rock

Plant refuse Breaker reject

Waste rock

Plant refuse Breaker reject

Waste rock

Plant refuse Breaker reject

Waste rock

Plant refuse Breaker reject

Waste Rock

O_2 decreasing

When DO<0.5 mg/L:

$NO_3^- \rightarrow N_2$

$SeO_4^{2-} \rightarrow Se^0$

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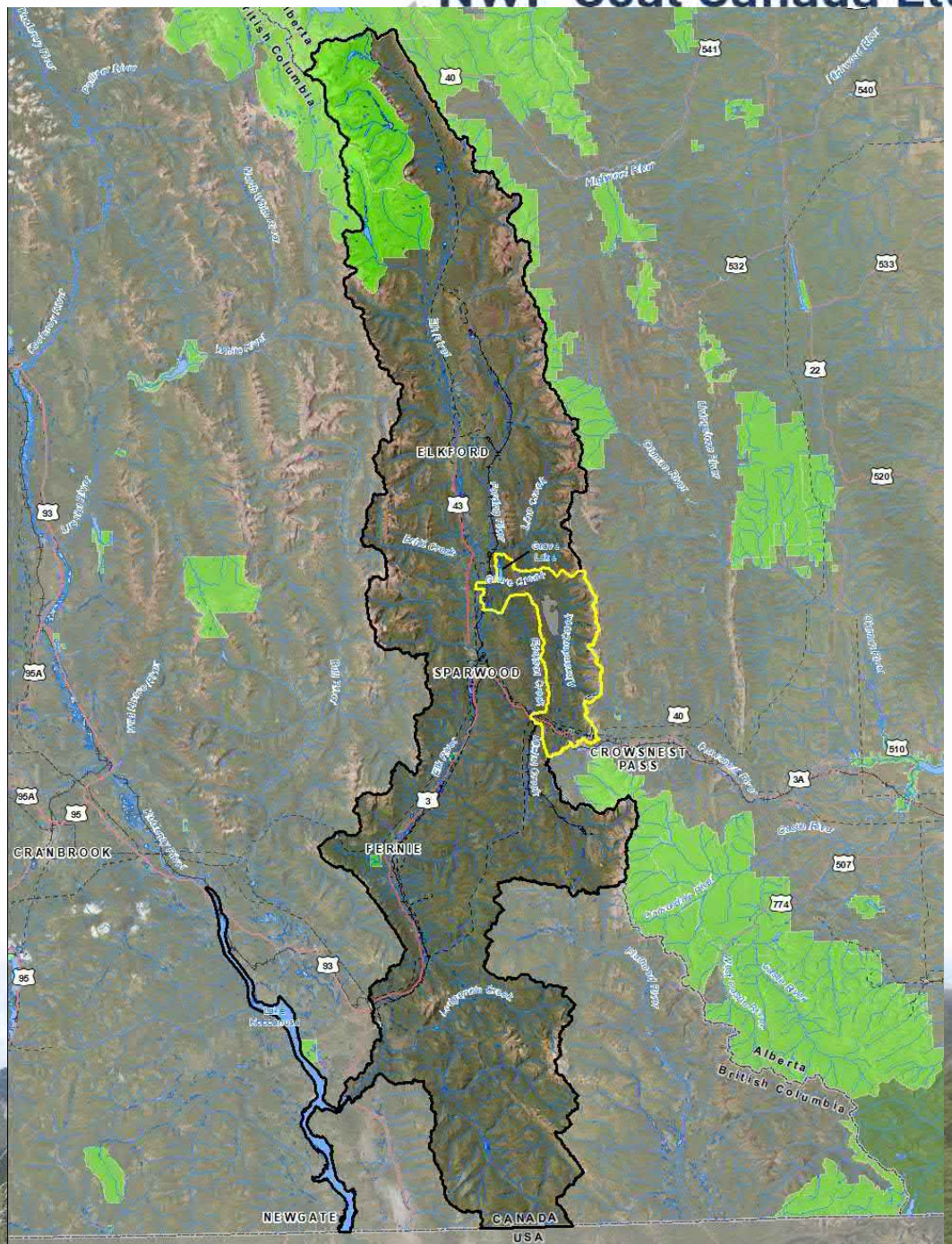
Aquatic Regional Study Area



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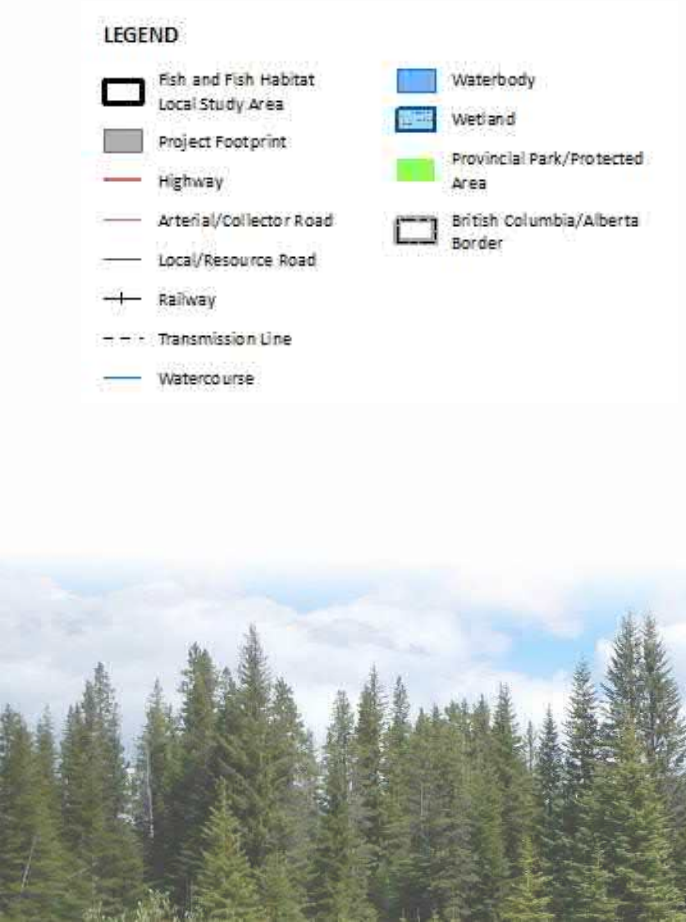
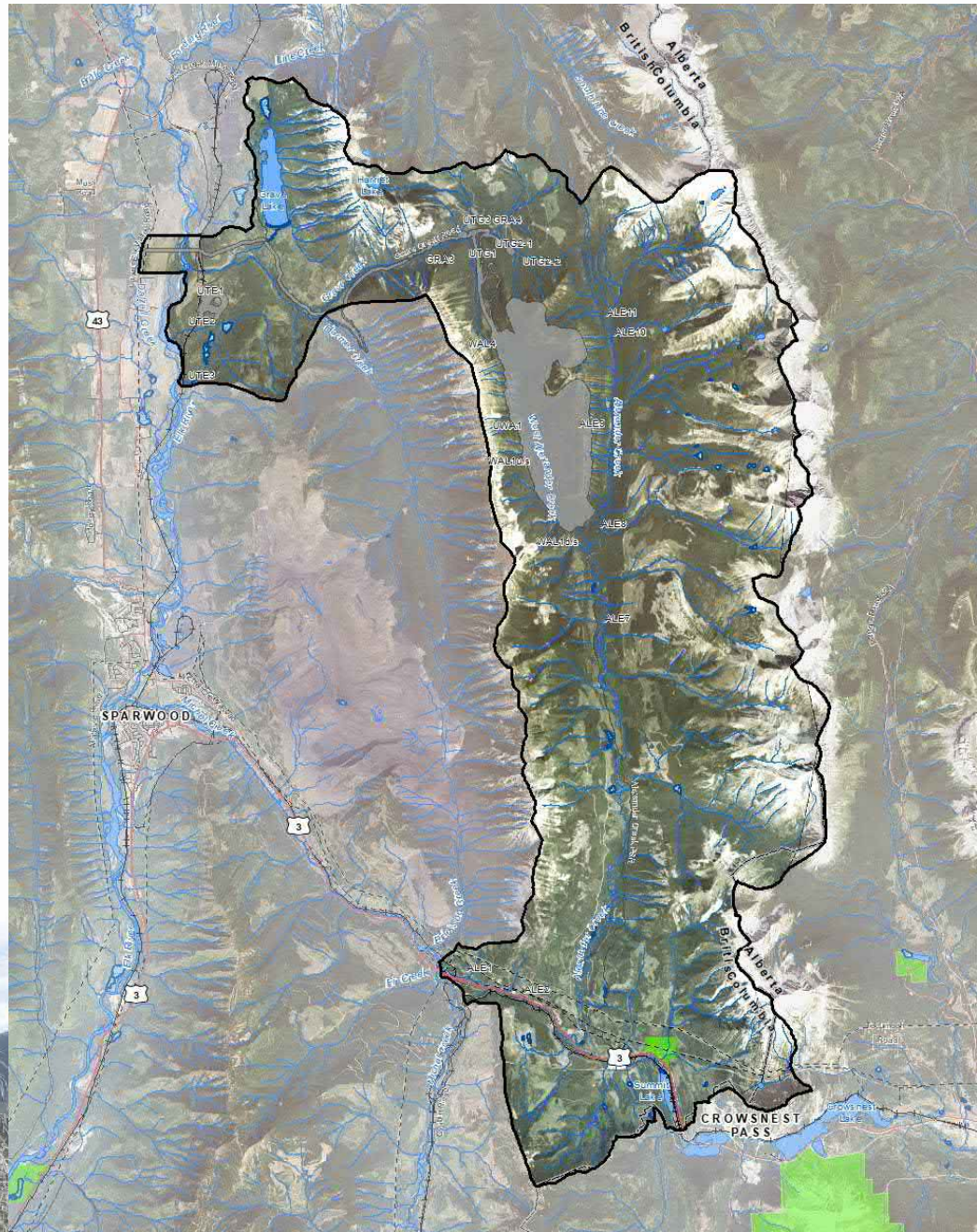
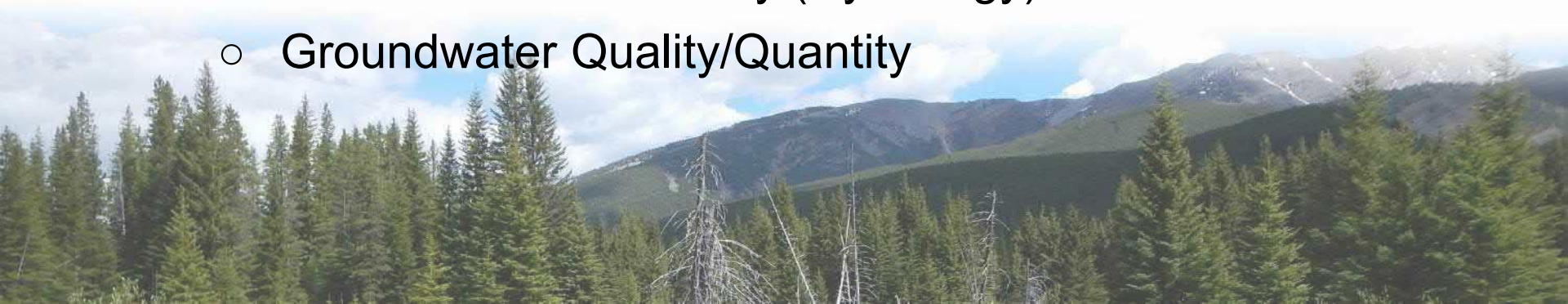
Aquatic Local Study Area





Aquatic Valued Components

- Receptor Valued Components
  - Fish and Fish Habitat
    - Westslope Cutthroat Trout (WCT), Bull Trout (BT), Kokanee, Burbot, Longnose Sucker, Mountain Whitefish, benthic invertebrates
  - Aquatic Health
    - Benthic invertebrates, fish tissues, sediment
- Intermediate Valued Components
  - Surface Water Quality
  - Surface Water Quantity (Hydrology)
  - Groundwater Quality/Quantity



Fish and Fish Habitat Baseline Sampling

Survey Type	Dates	Survey Details
Fish inventory sampling	July 2014 Aug 2017 Aug 2019	• Determined upstream limit of fish distribution • Electrofishing and minnow traps • Habitat data collected
Fish community sampling	Aug/Sept 2017 Sept 2019 (Lower Alexander)	• Assessed fish density within fish-bearing sections • Collected habitat type: length, gradient, water depth, cover type, off-channel habitat, and barriers
Fish spawning surveys	July 2014 June 2017 Oct 2014/2017 Sept 2019 July 2021	• Assessed spawning activity and spawning habitat • Described redds, spawning fish, and spawning habitat (cover, proximity to holding water, adequate flows, suitable gravel size)
Overwintering surveys	March 2014	• Assessed suitable overwintering habitat potential • Collected water temperature, dissolved oxygen, water depth, ice cover, and flow rates
Level 1 Fish and Fish Habitat Procedures (FHAP)	Aug – Sept 2014 Oct 2017	• Described habitat quality within fish bearing reaches and delineated stream reaches into channel units, assessed quantity of functional large woody debris, riparian vegetation type and stage, and disturbance indicators • Collected calcite data as part of pebble counts completed during FHAP surveys. Data used to generate a calcite index for each reach.

Fish and Fish Habitat Baseline Sampling

Survey Type	Dates	Survey Details
Aquatic health (fish tissues, benthics, sediments)	July – Aug 2017	◦ Determined baseline contaminant levels for the Aquatic Health discipline ◦ Captured 8 fish per reach by electrofishing and collected 4 mm muscle plugs using a biopsy punch
	Oct 2014, 2017, and 2019	◦ 25 benthic community samples at 9, 10, and 2 sites (2014, 2017, and 2019 respectively) at riffle/glide habitats ◦ Periphyton not a VC but sampled to better understand baseline conditions
Fish migration assessment (Grave Creek)	Aug 2018 – June 2019	◦ Assessed fish habitat changes that may result from reductions in the quantity of stream flow from the proposed point of diversion on Grave Creek, downstream to the confluence with Harmer Creek ◦ Assessment of riffle passage
Lentic ecosystem surveys	September 2019	◦ Surveyed 6 wetlands for fish absence/presence using electrofishing and minnow traps, general observations (substrate, depth, length/width, side channels, inflow/outflow channels), and *in-situ* water quality

Population Study 2020-2021

Survey Type	Dates	Survey Details
Population Study	August 2020 – July 2021	• Population assessment within Alexander and West Alexander Creeks • Assess/confirm fish movement and life history activity within the LSA – overwintering and rearing behavior • Assess/confirm spawning activity

WCT Pit and Radio tagging 2020

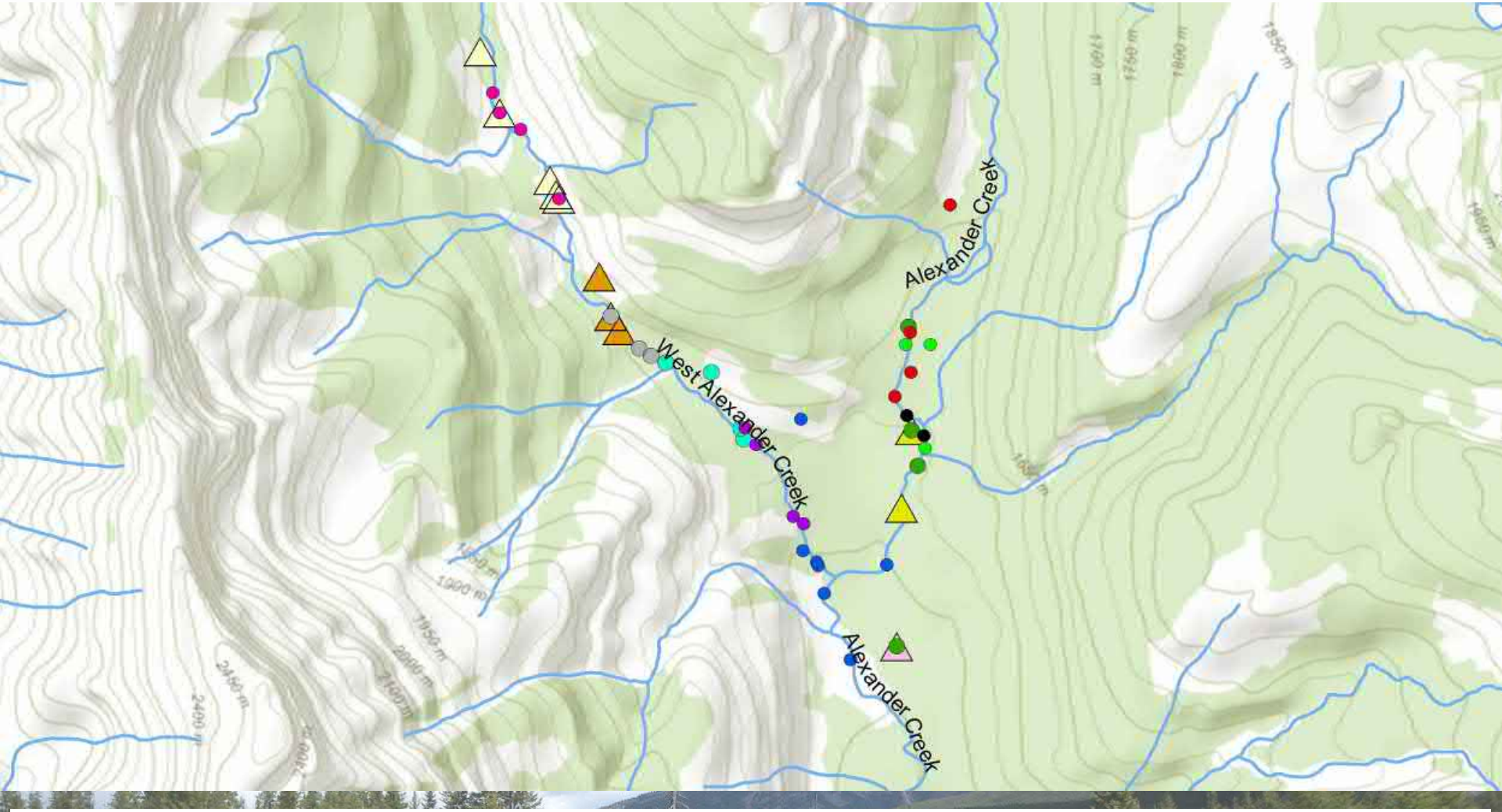
Population Study 2020-2021

- Objective: Improve our understanding of the fish (WCT) movement and habitat usage in the Alexander Creek watershed.
- Aug – Oct 2020: Fish tagged with a combination of radio and floy tags. Snorkel survey for adult abundance and rearing usage.
- December 2020 to March 2021: 26 of the 30 tagged WCT were detected during the winter period.
- May - June 2021: Telemetry tracking during spawning period, supplemented with ground-based spawning survey of Alexander and West Alexander Creeks.

Population Study 2020-2021

- Rearing (summer)
  - W. Alexander Creek fish → W. Alexander
  - Mainstem fish → concentrated in lower Alexander Creek (Reaches 1-6)
- Overwintering
  - W. Alexander Creek fish → W. Alexander
  - Mainstem fish → downstream migration to lower Alexander and Elk River
- Spawning
  - W. Alexander Creek fish → W. Alexander. Redds confirmed
  - Mainstem fish → Elk River, Michel Creek, lower Alexander
- Results suggest WCT exist as two subpopulations:
  - Resident population of W. Alexander
  - Fluvial population extending up to Alexander Reach 6
- Results interpreted with only one year of telemetry data, corroborated by related studies and WCT ecology.

Population Study 2020-2021



Different symbols represent different individual fish.
Each symbol of the same shape and color represents the location a fish occurred between August 2020 – March 2021.
6 Fish tagged in West Alexander were found to stay within West Alexander never moving into Alexander Creek downstream.

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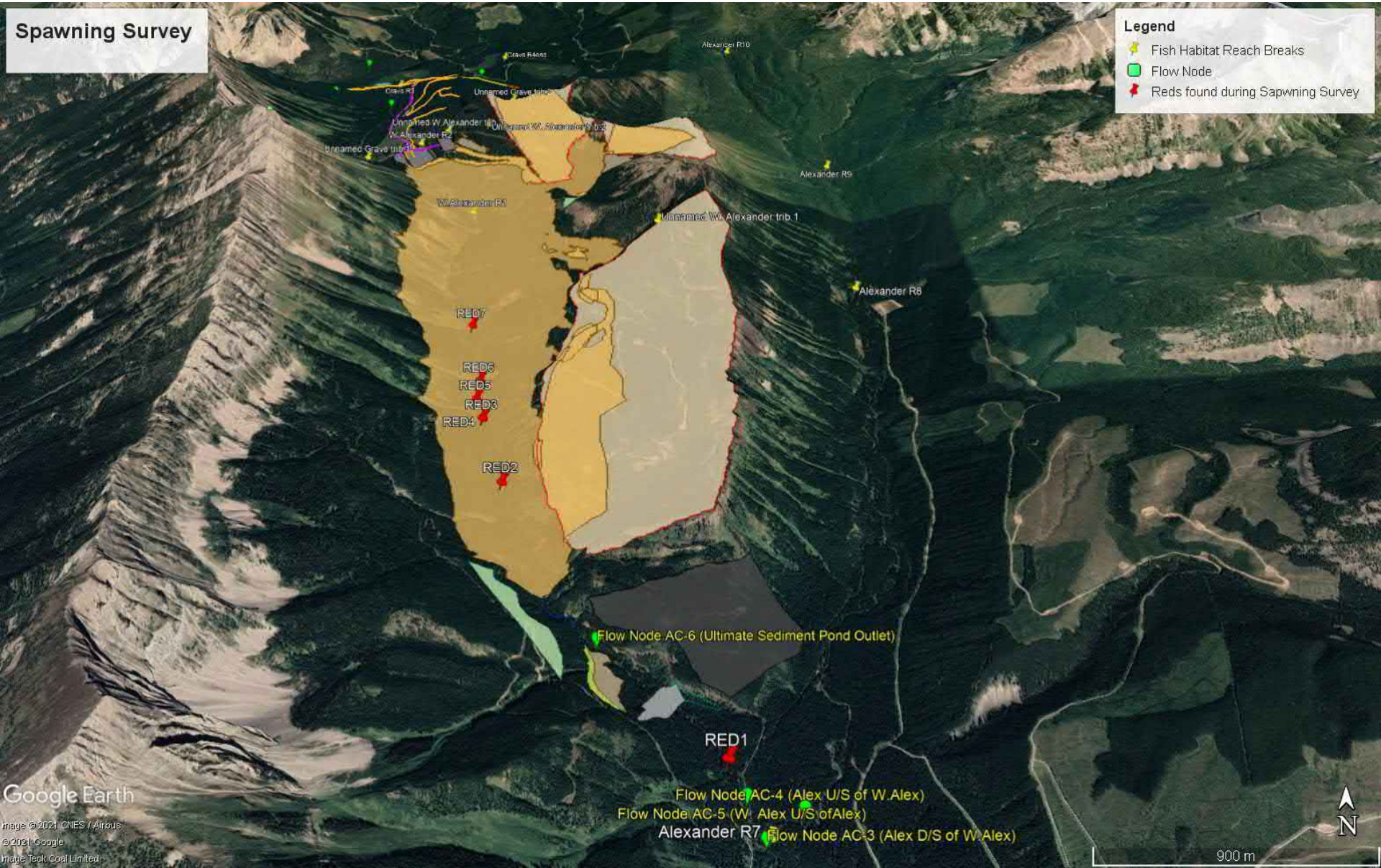
Population Study 2020-2021



Westslope Cutthroat Trout

- Species listed as Schedule 1 – Special Concern under *SARA*
- Provincially Blue-listed in BC
- Important recreational, commercial, and/or Indigenous values
- Largest range within LSA

Westslope Cutthroat Trout (fork length of 146 mm) from Alexander Creek Reach 9

- The only fish species found in the upper reaches of the Grave Creek watershed and tributaries

Survey Dates	Survey Details	Results

2014, 2017, 2019 and 2020-2021	• Spring spawning surveys
	• Fish inventory sampling
	• Fish community sampling
	• Population study
		• Ubiquitous in LSA
		• WCT was only species found in upper Grave Creek at time of surveys; assumed isolated population
		• Suitable spawning habitat:
		  • Alexander Creek Reaches 1, 2, 7-9
		  • West Alexander Creek Reach 1 & 2
		  • Grave Creek Reaches 3-4
		  • Unnamed Tributaries of Grave Creek 1 & 2
		• Population study suggests resident population in West Alexander
		• Suitable overwintering habitat:
		  • Alexander Creek Reach 7
		  • West Alexander Reach 1 & 2
		• Highest WCT densities at Grave Creek

Bull Trout

- Listed as Special Concern by COSEWIC (Not at Risk – *SARA* Schedule 1)
- Provincially Blue-listed
- Important recreational, commercial, and/or Indigenous values
- Primarily in the Michel Creek and Elk River mainstem, but also have moderate juvenile distribution in Alexander Creek

Juvenile Bull Trout salvaged from Alexander Creek Reach 8 and West Alexander Creek Reach 1, respectively

Survey Dates	Survey Details	Results
2014, 2017, and 2019	• Fall spawning • Fish inventory sampling • Fish community sampling	• BT captured/observed in Alexander Creek Reaches 7-9 • BT spawning suspected to occur in Alexander Creek (presence of potential redds and BT)

Kokanee & Burbot

- Kokanee:
  - Provincially Yellow-listed
  - Important for fishing and consumption
  - Grave Lake population stocked
  - Key representative planktivore species - important to assess impacts to aquatic resources
- Burbot:
  - Lower Kootenay population is provincially Red-listed
  - Important recreational, commercial, and/or Indigenous values
  - Found within the RSA

Photo: Wetland at West Alexander Creek Reach 4, not suitable fish habitat due to steep slope gradient and frequent dewatering

Survey Dates	Survey Details	Results
2014, 2017, and 2019	Fish inventory and community sampling	Kokanee and burbot not detected in the LSA during baseline surveys

Longnose S`ucker

- Provincially Yellow-listed
- Important recreational, commercial, and/or Indigenous values
- Primarily in lentic/wetland habitats and in lower gradient reaches of the Elk River watershed
- Useful wildlife prey species

Photo: Cascade habitat at Alexander Creek Reach 7. Longnose Sucker not detected within this reach.

Survey Dates	Survey Details	Results
2014, 2017, and 2019	Fish inventory and community sampling	• No detection in LSA during baseline surveys • Previously documented in nearby wetlands

Mountain Whitefish

- Provincially Yellow-listed
- Important recreational, commercial, and/or Indigenous values
- Primarily mainstream species, not frequently observed in reaches lower than 4th order
- Known spawning in mainstream Michel Creek and Elk and Fording Rivers

Photo: Immature Mountain Whitefish sampled at Alexander Creek Reach 1

Survey Dates	Survey Details	Results
2014, 2017, and 2019	Fish inventory and community sampling	• Species only recorded to occur in lower Alexander Creek near Michel Creek confluence (Reach 1 & 2)

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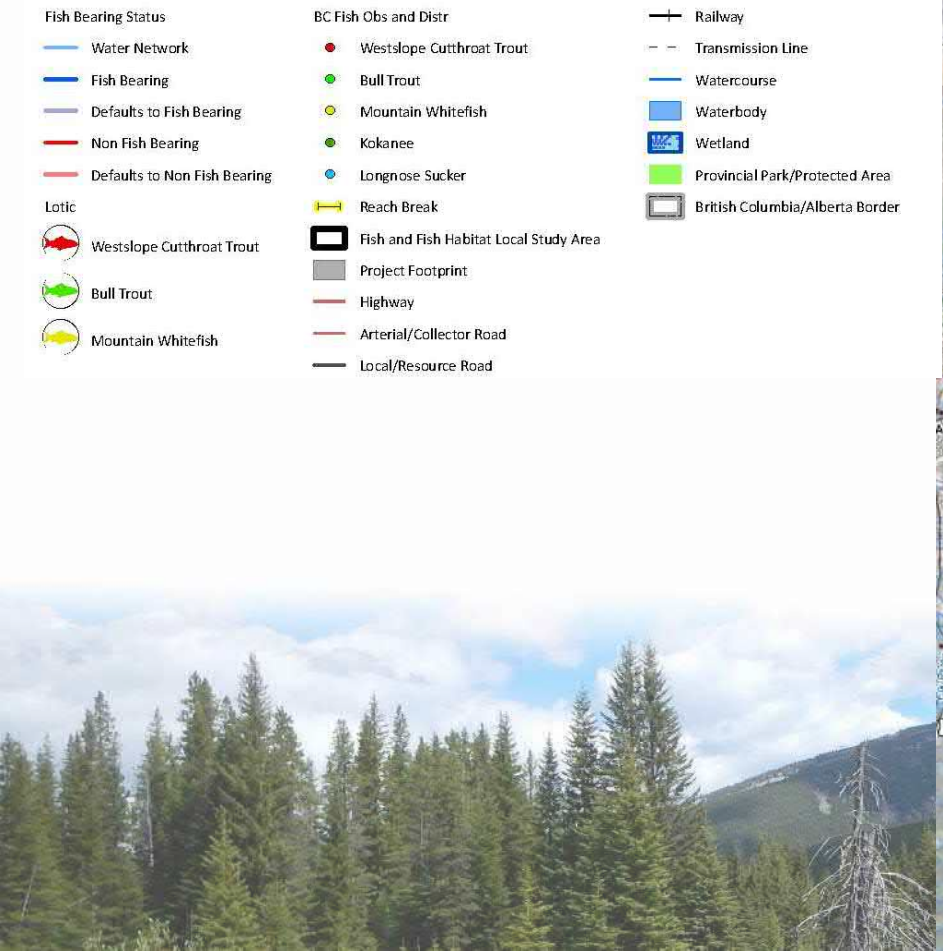
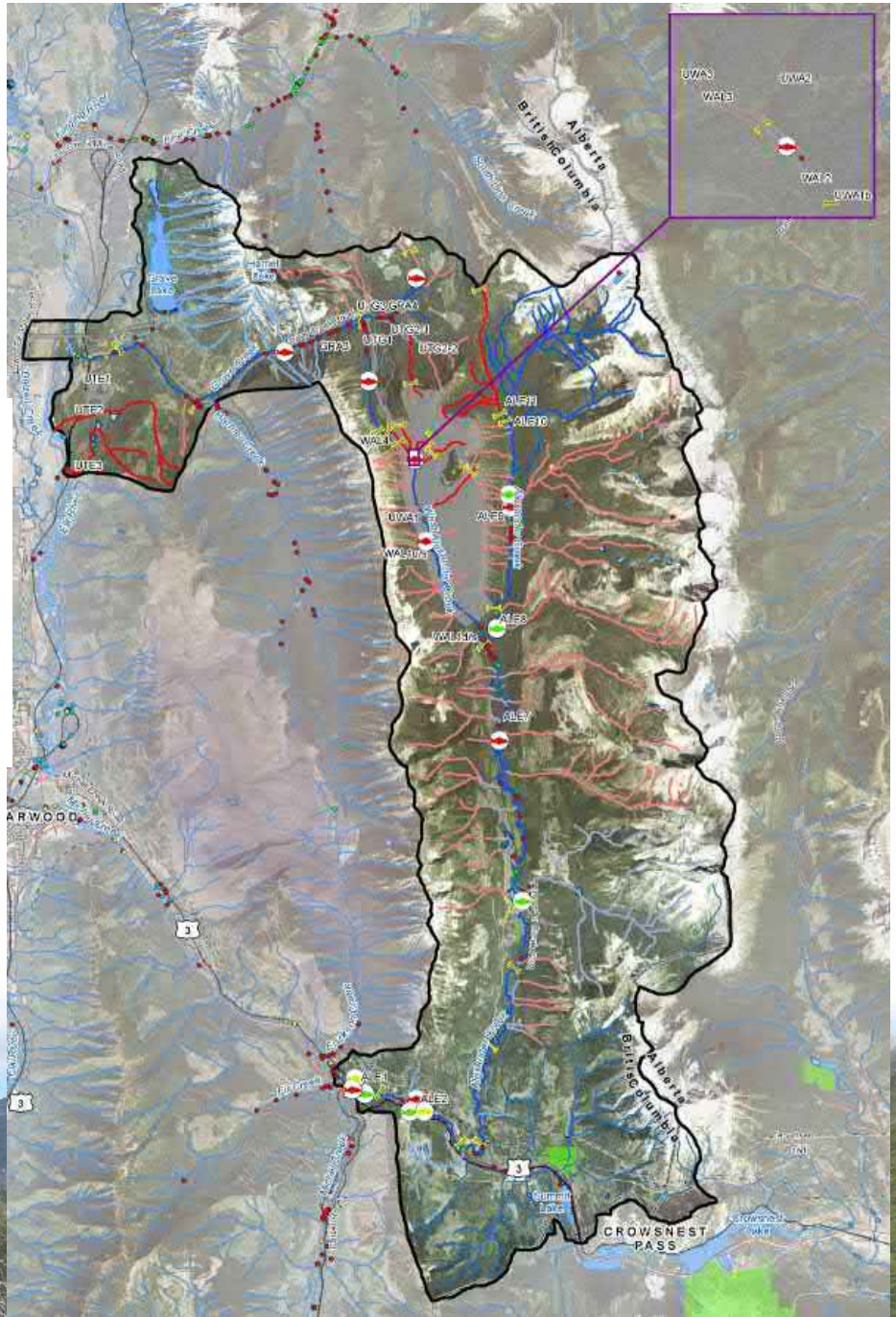
Fish Distribution in the LSA





Fish and Fish Habitat Summary

- Fish-bearing watercourses:
  - Alexander Creek
  - West Alexander Creek
  - Grave Creek
  - Unnamed Tributaries of Grave Creek #1 and #2
- Low fish densities in the LSA
- Westslope Cutthroat Trout most abundant species
  - Found in Alexander, West Alexander, and Grave Creeks
  - Bull Trout, Mountain Whitefish and Eastern Brook Trout also detected in Alexander Creek

Fish and Fish Habitat Summary

Varied habitat quality present in Alexander and West Alexander Creeks:

- Highly suitable fish habitat present in lower reaches
- Good overwintering potential in Alexander Creek (Reach 7) due to warm water temperatures and suitable pools
- Moderately good overwintering habitat in West Alexander, overwintering use confirmed with population study
- Bull Trout Spawning occurring in Alexander Creek
- West Alexander Creek likely provides habitat to a resident population of WCT – habitat use includes rearing, overwintering and spawning

Key Findings:

- Two Species of Special Concern – WCT and BT
- Isolated, genetically pure WCT population in Grave Creek; life stages distributed throughout
- West Alexander Creek provides habitat to resident WCT population - Spawning , Rearing and Overwintering life history use confirmed
- Expanded understanding of BT distribution
- West Alexander Creek suspected as high use WCT spawning habitat in LSA
- Alexander Creek Reaches 5-7 documented BT spawning
- Overwintering in Alexander Creek Reach 7
- Overall densities follow typical elevational pattern

Questions and Discussion

Appendix

- Additional information that NWP does not plan to present available for review or support for responding to questions about site infrastructure

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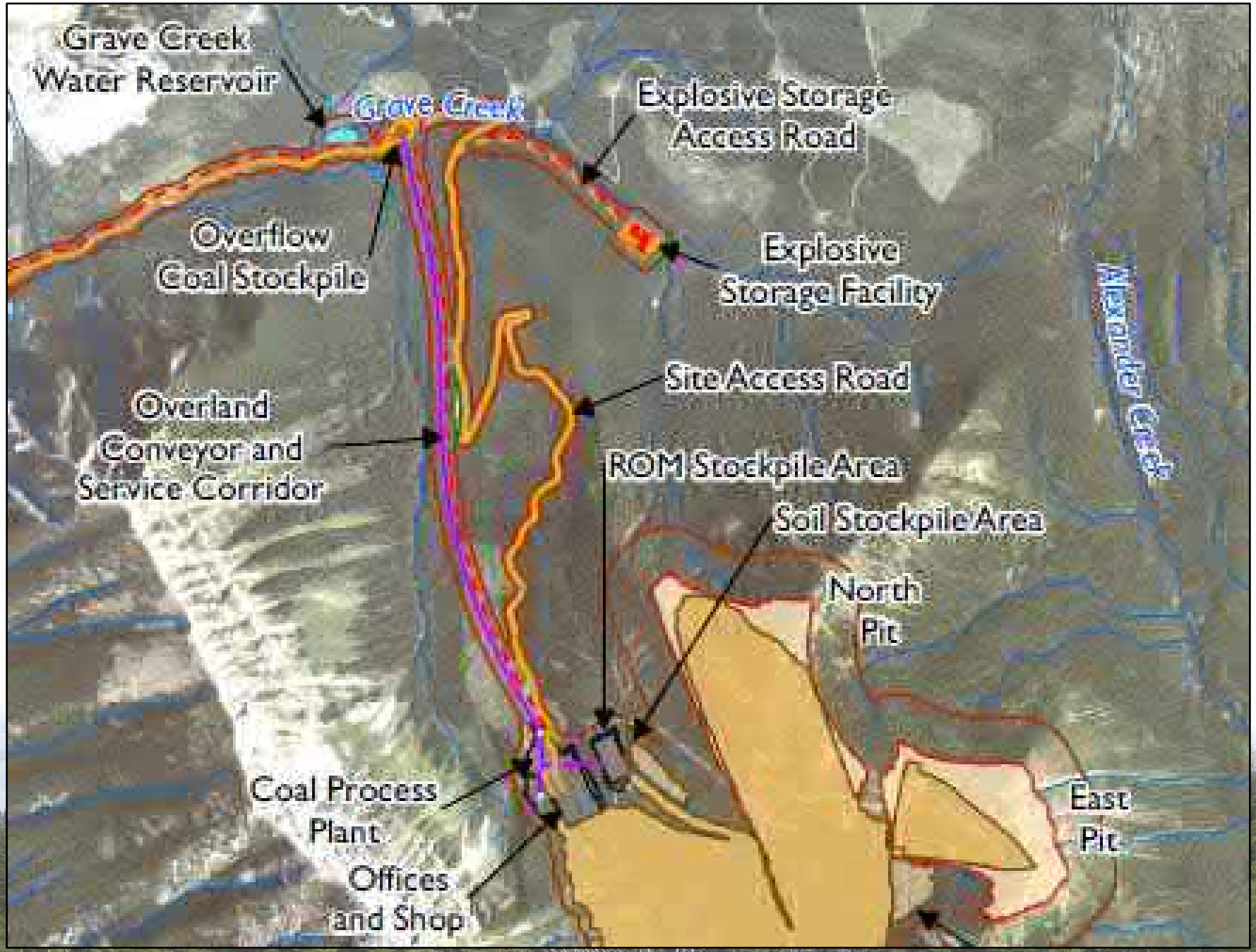

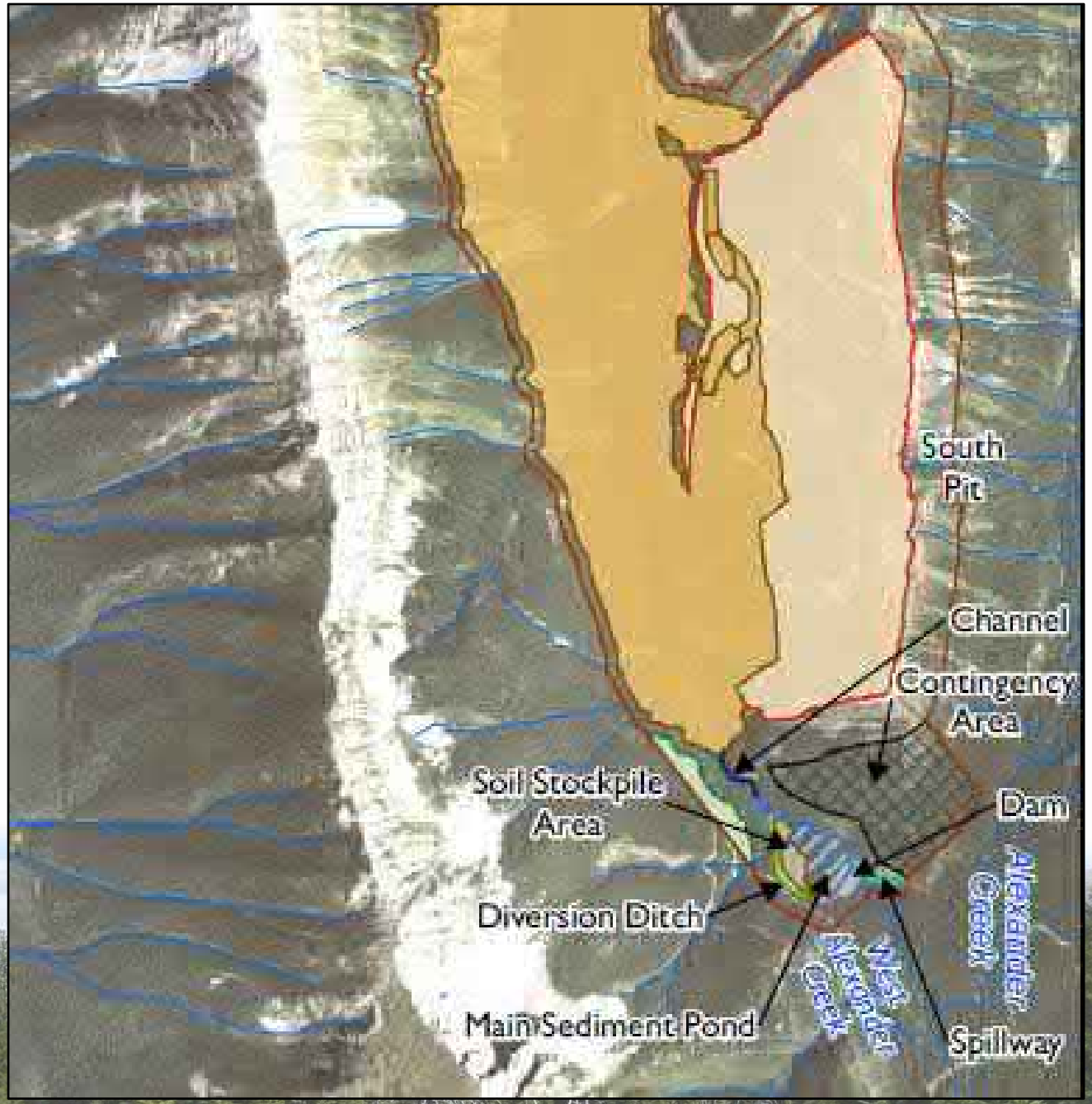
South Pit
Channel
Contingency Area
Soil Stockpile Area
Dam
Diversion Ditch
Alexander Creek
West Alexander Creek
Main Sediment Pond
Spillway