

Integrating Mining Compliance Field Data to Streamline Reclamation:

GIS Data Structures & GPS Collection Methods



Jennifer Roskowski, Cindy Hamfler, Erin Jones, Tyler Cole

Bureau of Land Management, Fairbanks District Office,
1150 University Ave, Fairbanks, AK 99709

Mining Compliance Database

- ✘ System Overview
 - + Purpose & Goals
 - + History
 - + Components
 - + Process
- ✘ Field Applications - Examples
- ✘ Future possibilities & collaborations



PROJECT PURPOSE

- ✘ Data repository for spatial information
 - + Federal mine compliance program
 - + Consistency of data within and across field offices



PROJECT PURPOSE

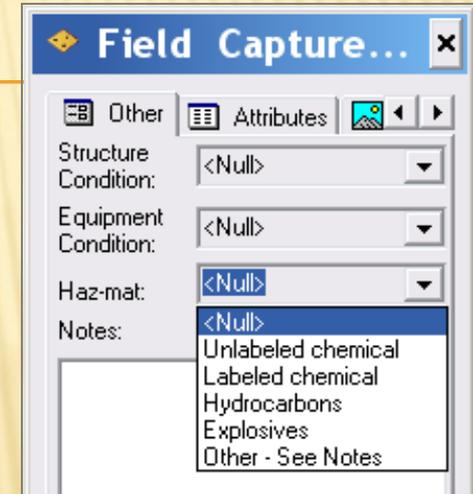
- ✘ View and manipulate large amounts of similar data types
- ✘ Management of mining activity & reclamation progress
 - + Locate specific pre-loaded features while in field
 - + Track changes year to year
 - + Spatially-based land management decisions



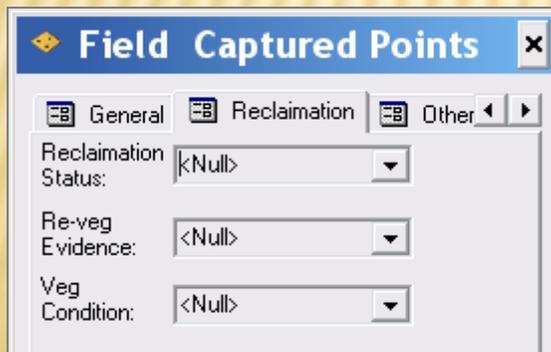
- ✘ BLM Alaska administers about 75 million acres

PROJECT PROCESS & RESULTS

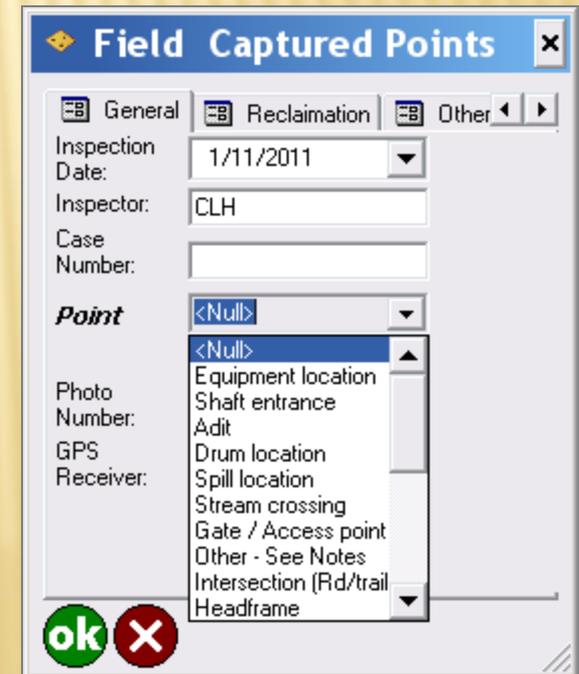
- ✘ Collaboration between mine inspectors and GIS specialists
 - + Inspectors identified needs & mapping priorities
 - + Technicians designed GIS apps to meet needs
- ✘ Created specialized database to collect and manage mine compliance field data
 - + Load features from other spatial databases
 - + Collect points, lines, polygons
 - ✘ Dropdown boxes with attributes



The 'Field Capture...' dialog box has a blue title bar with a diamond icon and a close button. It contains several tabs: 'Other' (selected), 'Attributes', and a map icon. Below the tabs are four dropdown menus: 'Structure Condition' (set to '<Null>'), 'Equipment Condition' (set to '<Null>'), 'Haz-mat' (set to '<Null>'), and 'Notes' (set to '<Null>'). The 'Notes' dropdown is open, showing a list of options: 'Unlabeled chemical', 'Labeled chemical', 'Hydrocarbons', 'Explosives', and 'Other - See Notes'.



The 'Field Captured Points' dialog box has a blue title bar with a diamond icon and a close button. It contains three tabs: 'General' (selected), 'Reclamation', and 'Other'. Below the tabs are three dropdown menus: 'Reclamation Status' (set to '<Null>'), 'Re-veg Evidence' (set to '<Null>'), and 'Veg Condition' (set to '<Null>').



The 'Field Captured Points' dialog box has a blue title bar with a diamond icon and a close button. It contains three tabs: 'General' (selected), 'Reclamation', and 'Other'. Below the tabs are several fields: 'Inspection Date' (set to '1/11/2011'), 'Inspector' (set to 'CLH'), 'Case Number' (empty), and 'Point' (set to '<Null>'). The 'Point' dropdown is open, showing a list of options: '<Null>', 'Equipment location', 'Shaft entrance', 'Adit', 'Drum location', 'Spill location', 'Stream crossing', 'Gate / Access point', 'Other - See Notes', 'Intersection (Rd/trail)', and 'Headframe'. At the bottom left, there are 'ok' and 'X' buttons.

SYSTEM COMPONENTS

- ✘ GPS units
 - + Trimble GeoXH & Juneau units
- ✘ Database
- ✘ GIS software
 - + ArcPad
 - + ArcGIS
- ✘ Training/Support



WORKFLOW

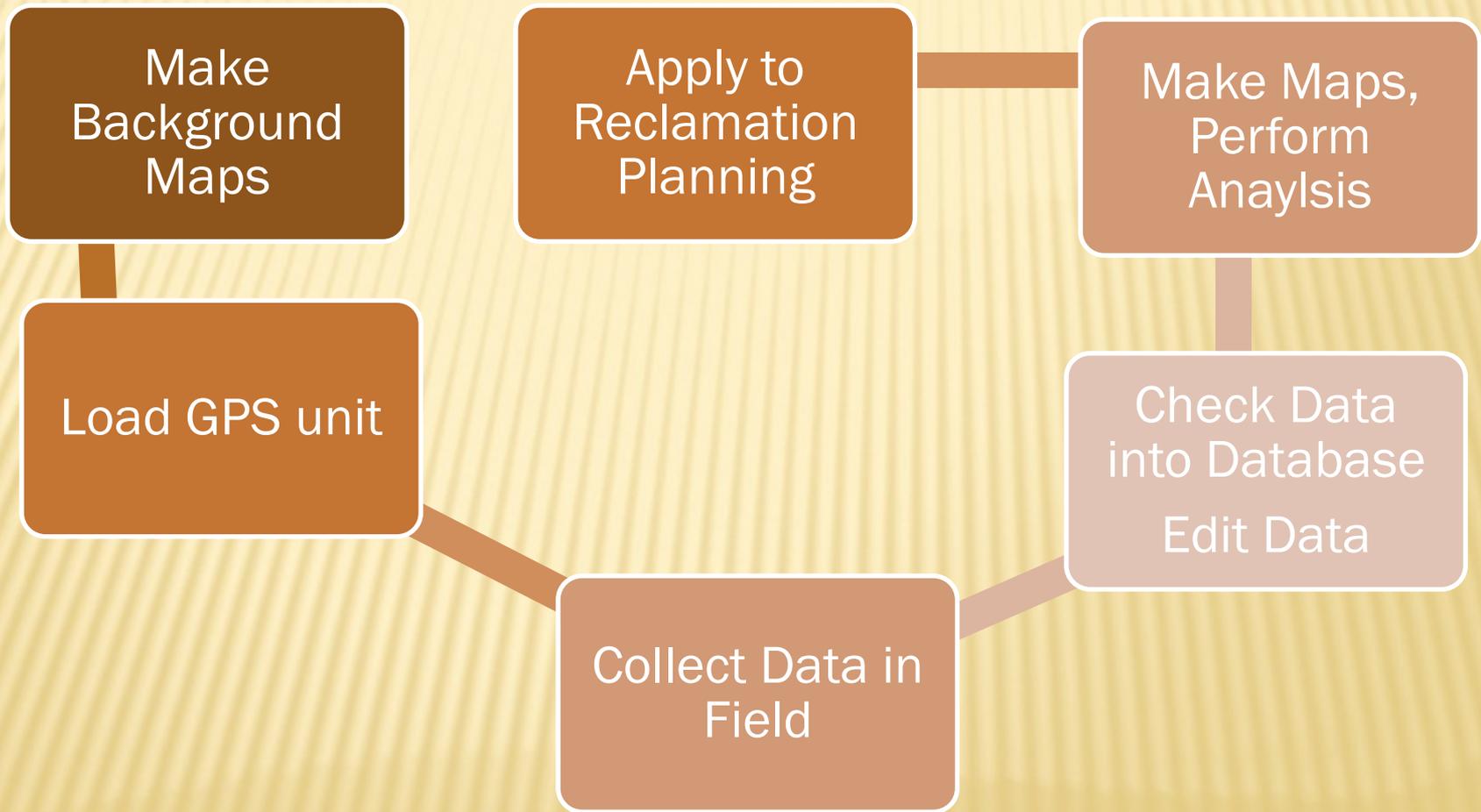


Table of Contents

Layers Legend Snapping

Title	Filename
<input type="checkbox"/> GPS Tracklog	
<input type="checkbox"/> Map Grid	
<input checked="" type="checkbox"/> field_lines	<input checked="" type="checkbox"/> MiningCompliance_g...
<input checked="" type="checkbox"/> Streets and Highw...	<input checked="" type="checkbox"/> BackgroundLayers.a...
<input checked="" type="checkbox"/> field_polygons	<input checked="" type="checkbox"/> MiningCompliance_g...
<input checked="" type="checkbox"/> Federal Mining Clai...	<input checked="" type="checkbox"/> BackgroundLayers.a...
<input checked="" type="checkbox"/> field_points	<input checked="" type="checkbox"/> MiningCompliance_g...
<input checked="" type="checkbox"/> ComplianceForm	<input type="checkbox"/> MiningCompliance_g...
<input checked="" type="checkbox"/> Mileposts	<input checked="" type="checkbox"/> BackgroundLayers.a...
<input checked="" type="checkbox"/> Generalized Land ...	<input checked="" type="checkbox"/> BackgroundLayers.a...

Alaska_Albers_test



Fall_Creek

MILEPOST 62
MILEPOST 61
MILEPOST 59
MILEPOST 58
MILEPOST 57
MILEPOST 56
MILEPOST 55
MILEPOST 54

Capture point feature using GPS

BACKGROUND MAPS

Inspector	Line Description	Notes	Rd_Condition	Road_Surface	Road	Route_track	Surface Condition
COLE	Trail	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
COLE	Road	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
COLE	Primitive Road	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
JAR	Trail	<Null>	Good	Improved Natural	6	<Null>	<Null>
JAR	Road	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
JAR	Road	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
JAR	Trail	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
JAR	Road	chapman access. foxtail grass, pineapple weed, plantain, wormwood, carrot-like plant	Good	Gravel	15	Single Track	Dry Ground, Drains well
JAR	Trail		Good	Natural	8	Double Track	Dry Ground, Drains well
JAR	Trail	needs water bars	Fair	Natural	8	Double Track	Wet, Drains Poor or Standing Water
JAR	Trail	6 to 15ft wide	Poor	Natural	15	Double Track	Marsh or Wet Spongy Ground
JAR	Trail	almost good condition , little rutted. needs water bars	Fair	Natural	6	Double Track	Dry Ground, Drains well
JAR	Trail	8-12ft, trail elevation . needs water control ditching. muck	Poor	Natural	12	Braided Track	Marsh or Wet Spongy Ground
JAR	Trail	multi braiding started. needs water bars. some muck	Fair	Natural	8	Braided Track	Rutted or Gullied
JAR	Trail	trail reroute	Poor	Natural	18	Braided Track	Marsh or Wet Spongy Ground
JAR	Trail		Good	Natural	8	Double Track	Dry Ground, Drains well
JAR	Trail	multi braiding . reroute needed. trail construction required . multiple tracks . ditching and water control needed	Poor	Natural	50	Braided Track	Marsh or Wet Spongy Ground
JAR	Trail	needs water bars	Fair	Natural	8	Double Track	Dry Ground, Drains well
JAR	Trail	user preferred route. part of multi trail ,braided section	Fair	Natural	6	Double Track	Dry Ground, Drains well
JAR	Trail	part of braided section	Poor	Natural	10	Double Track	Wet, Drains Poor or Standing Water
JAR	Trail	rutted . part of multi braided section . muck.	Poor	Natural	8	Double Track	Wet, Drains Poor or Standing Water
JAR	Trail	standing water . part of multi braided section	Poor	Natural	5	Double Track	Rutted or Gullied
JAR	Trail	part of multi braided section . winter only. standing water .	Poor	Natural	15	Double Track	Marsh or Wet Spongy Ground
JAR	Trail		Good	Natural	8	Double Track	Dry Ground, Drains well
JAR	Trail	multi braided .	Poor	Natural	100	Braided Track	Marsh or Wet Spongy Ground
JAR	Trail	needs water bars	Good	Natural	8	Double Track	Dry Ground, Drains well
JAR	Trail	multi braided section . wet and marshy	Poor	Natural	15	Braided Track	Rutted or Gullied
JAR	Trail	do not use	Poor	Natural	<Null>	<Null>	<Null>
JAR	Trail	preferred route. needs drainage improvement	Fair	Natural	8	Double Track	Wet, Drains Poor or Standing Water
JAR	Track	part of multi braided section . connects main rt to winter trail ?	Fair	Natural	8	Double Track	Dry Ground, Drains well
JAR	Trail	part of multi braided section	Poor	Natural	8	Double Track	Wet, Drains Poor or Standing Water
JAR	Trail	part of multi braided section	Poor	Natural	8	Double Track	Marsh or Wet Spongy Ground
JAR	Trail	parallel tracks . winter overland trail. headcutting occurring . flowing water -gullied	Poor	Natural	8	Braided Track	Marsh or Wet Spongy Ground
JAR	Trail	creek crossing. bench cut to creek needs to be smoothed out. gullied there.	Good	Natural	8	Double Track	Dry Ground, Drains well
JAR	Track	Tom's access road: leads to Fairbanks Gold Mining claim post	<Null>	<Null>	<Null>	<Null>	<Null>
JAR	Trail	old trail \ claim line	<Null>	<Null>	<Null>	<Null>	<Null>
JAR	Trail	Trail bearing 020 that cut across the Old Trail, connects to Claimant's Road	<Null>	<Null>	<Null>	<Null>	<Null>
JAR	Track	track to claim post	<Null>	<Null>	<Null>	<Null>	<Null>
JAR	Road	Elliott Highway to Alyeska gate	<Null>	<Null>	<Null>	<Null>	<Null>
JAR	Road	Alyeska Gate to parking Tom's parking area	<Null>	<Null>	<Null>	<Null>	<Null>
JAR	Road	Parking area to section line: start of State Mining Claim	<Null>	<Null>	<Null>	<Null>	<Null>
JAR	Road	From Section line (claim boundary) to equipment area	<Null>	<Null>	<Null>	<Null>	<Null>
JAR	Trail	access to fgmi claim block	Fair	Improved Natural	8	Double Track	<Null>
JAR	Trail	apoka st off steese. 8-12ft wide. various condition	<Null>	<Null>	<Null>	<Null>	<Null>
JAR	Trail		<Null>	<Null>	<Null>	<Null>	<Null>
JAR	Trail	ononnnn pedro dome rd	<Null>	<Null>	<Null>	<Null>	<Null>
JAR	Trail	end at reclaimed placer operation w stream bypass	<Null>	<Null>	<Null>	<Null>	<Null>
JAR	Road	access to livengood operations	<Null>	<Null>	<Null>	<Null>	<Null>
JAR	Trail	<Null>	Good	Improved Natural	6	Double Track	<Null>
JAR	Road		Fair	Natural	6	Double Track	Dry Ground, Drains well
JAR	Road		Fair	Natural	6	Double Track	Dry Ground, Drains well
JAR	Trail	road partial gps of longer rd.	Fair	Natural	6	Double Track	<Null>
JAR	Trail	access rd to stuff that appears to be off of claim. can walk it to claim post and on to claim	Fair	Natural	8	Double Track	<Null>
JAR	Trail	old rd goes uphill from foremans cabin. some grassy reveg but looks passable. didnt follow rd to top	Fair	Natural	10	Double Track	Dry Ground, Drains well
JARAR	Road	access to fgmi claim block	<Null>	<Null>	<Null>	<Null>	<Null>
JARR	Trail	disturbance piles along rd total width abt 50ft	Fair	Gravel	12	Single Track	Rutted or Gullied
YU	Other - See Notes	Airstrip	<Null>	<Null>	<Null>	<Null>	<Null>

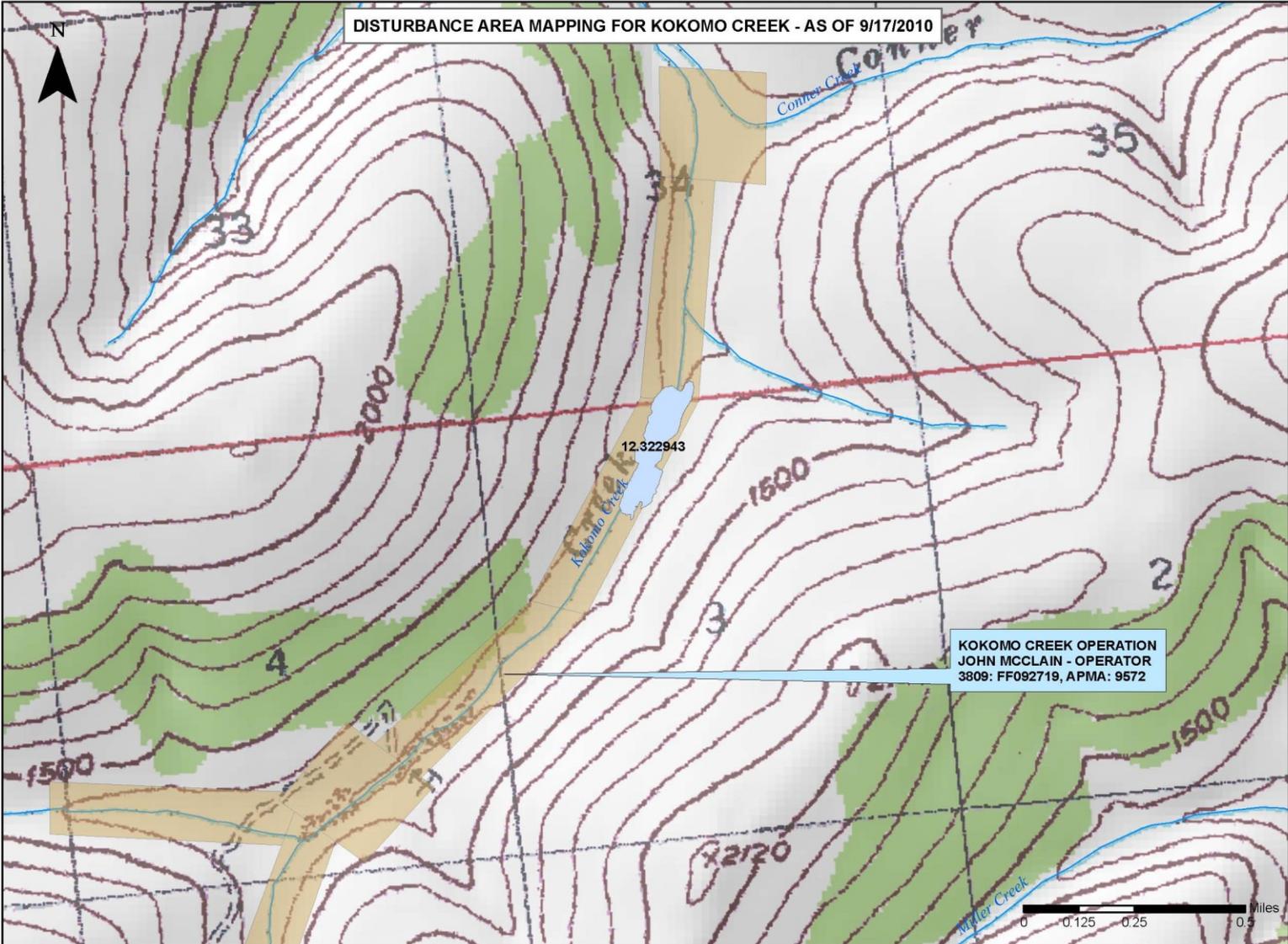
ATTRIBUTES

- ✘ Disturbance areas, routine monitoring
- ✘ Access
- ✘ Inventories
 - + HAZMAT
 - + AML
- ✘ Reclamation Projects
 - + Coordination with other agencies
 - + Trail restoration

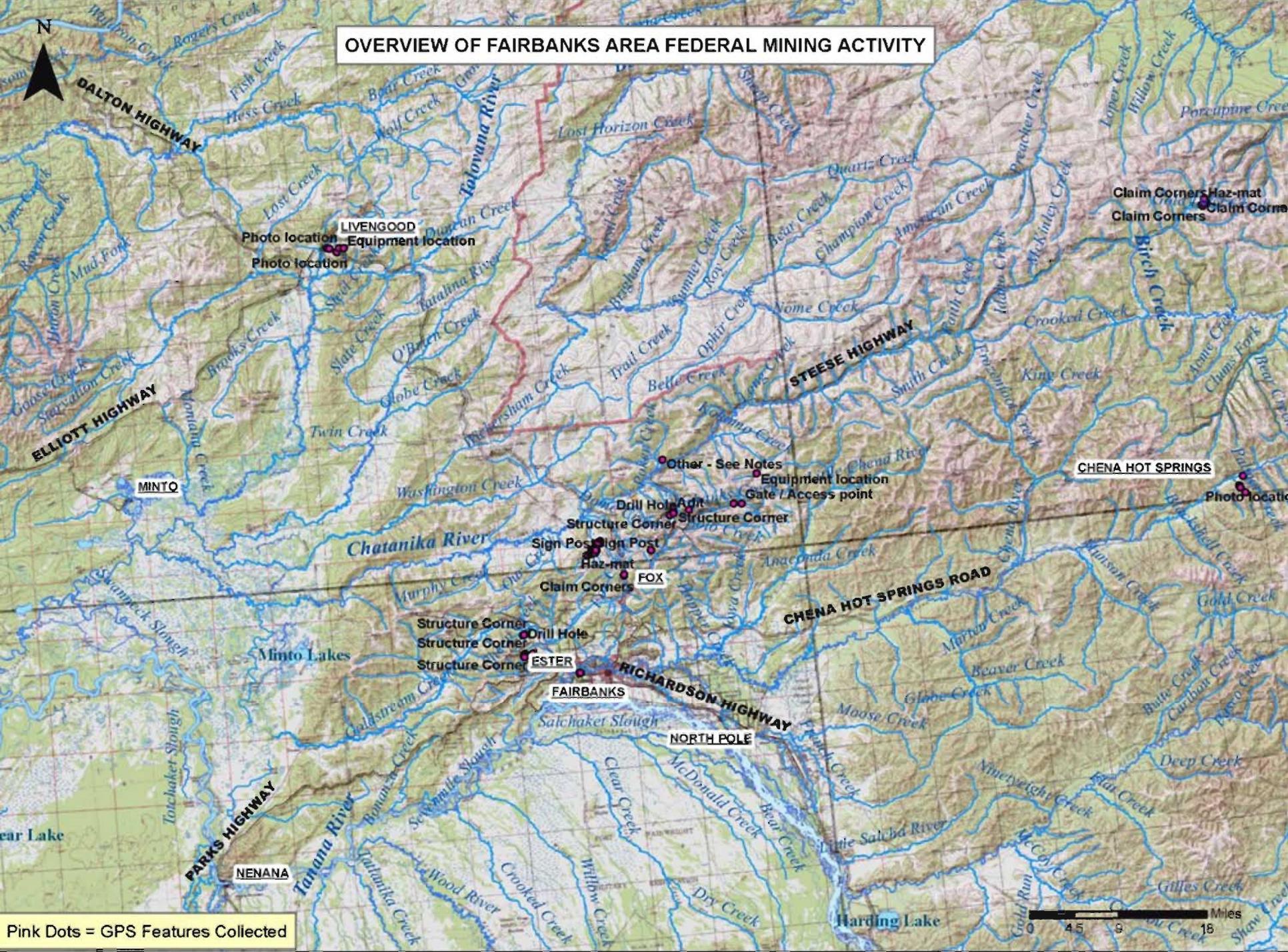


FIELD APPLICATIONS

DISTURBANCE AREA MAPS



OVERVIEW OF FAIRBANKS AREA FEDERAL MINING ACTIVITY



Pink Dots = GPS Features Collected

0 4.5 9 15 Miles

INVENTORY – AML & HAZMAT



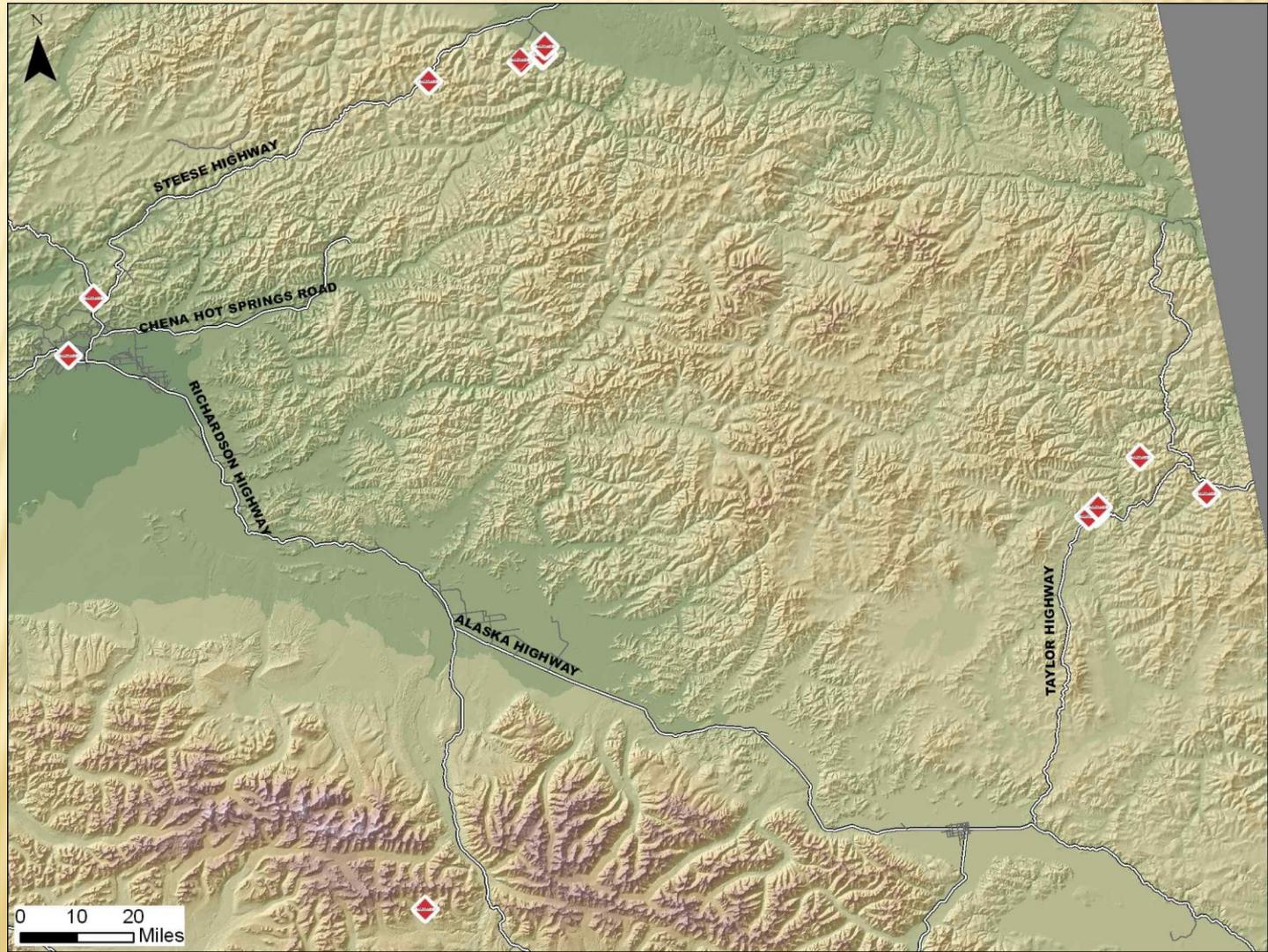
INVENTORY – AML & HAZMAT

- ✘ Regional assessment of HAZMAT storage sites & remediation areas
- ✘ Academically-funded AML project (Michigan Tech):
 - + 1- Document sites
 - + 2- Propose clean-up and/or preservation plan

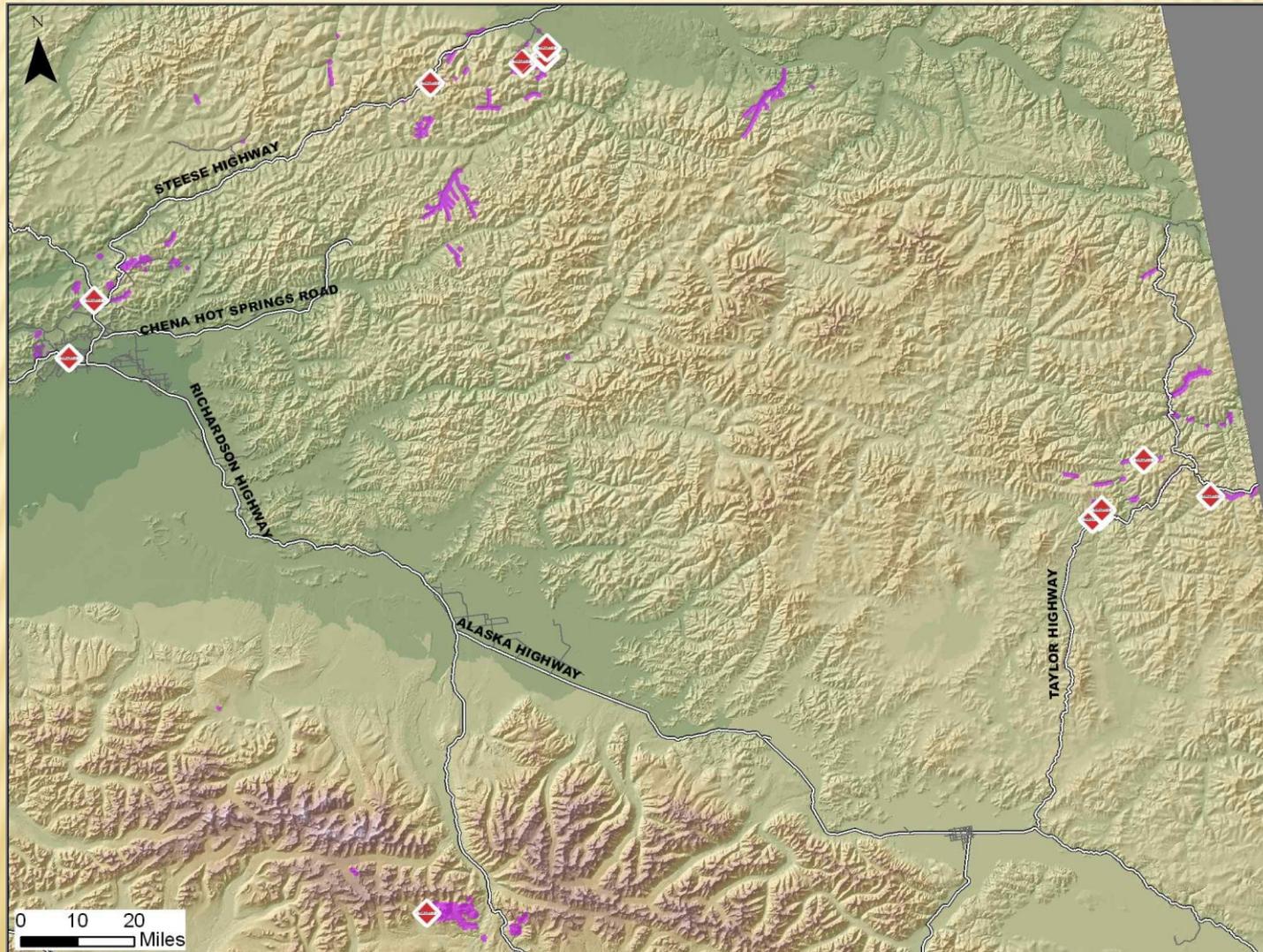


HAZMAT SITES: CYFO FAIRBANKS & EIFO

- ✘ Regional planning purposes
- ✘ 36 sites shown – occur in clusters



HAZMAT SITES – RELATION TO MINING CLAIMS

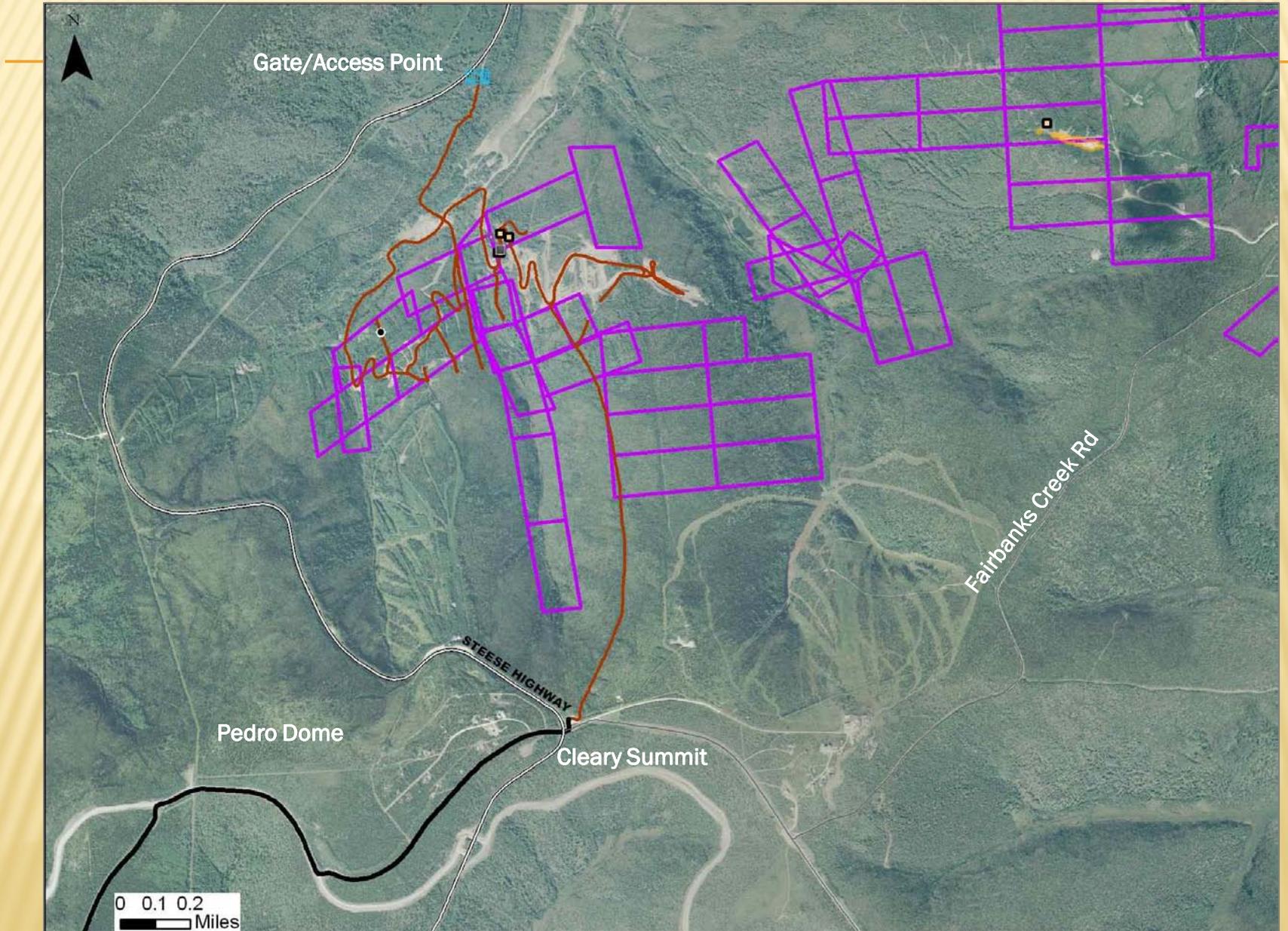


AML INVENTORY & COORDINATION WITH DNR

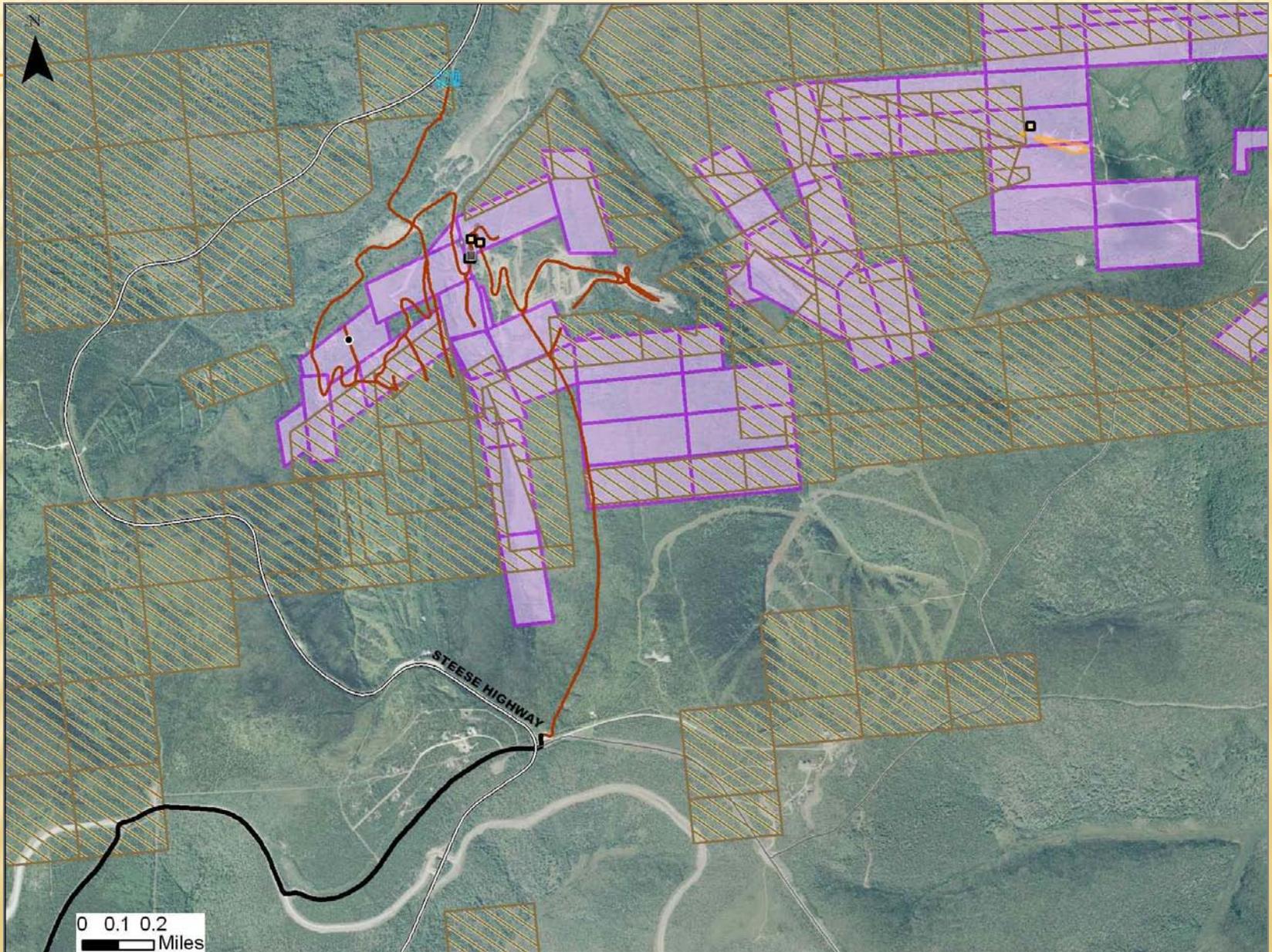
✘ Golden Summit Project



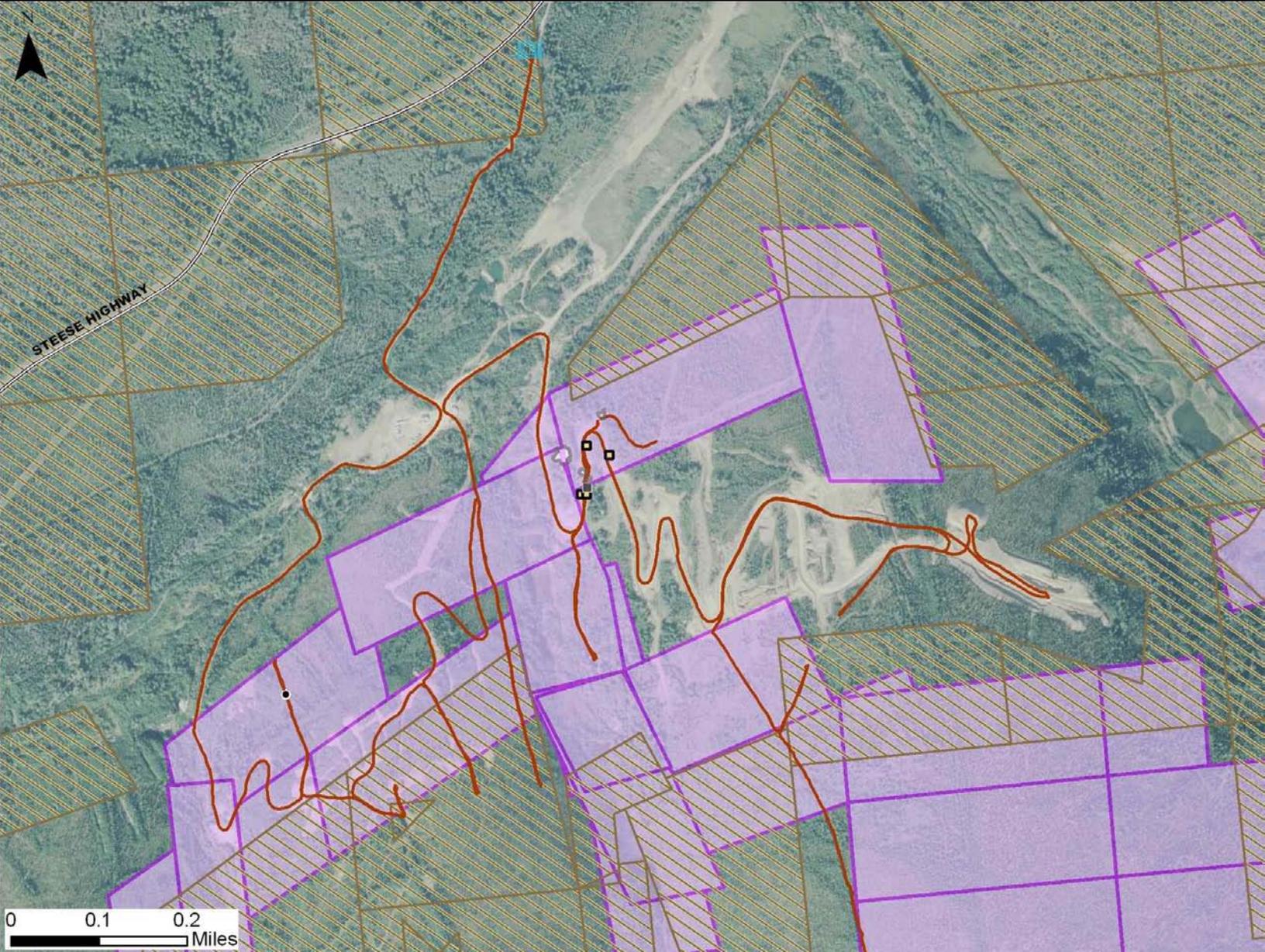
GOLDEN SUMMIT – DISTURBANCE & FED CLAIMS

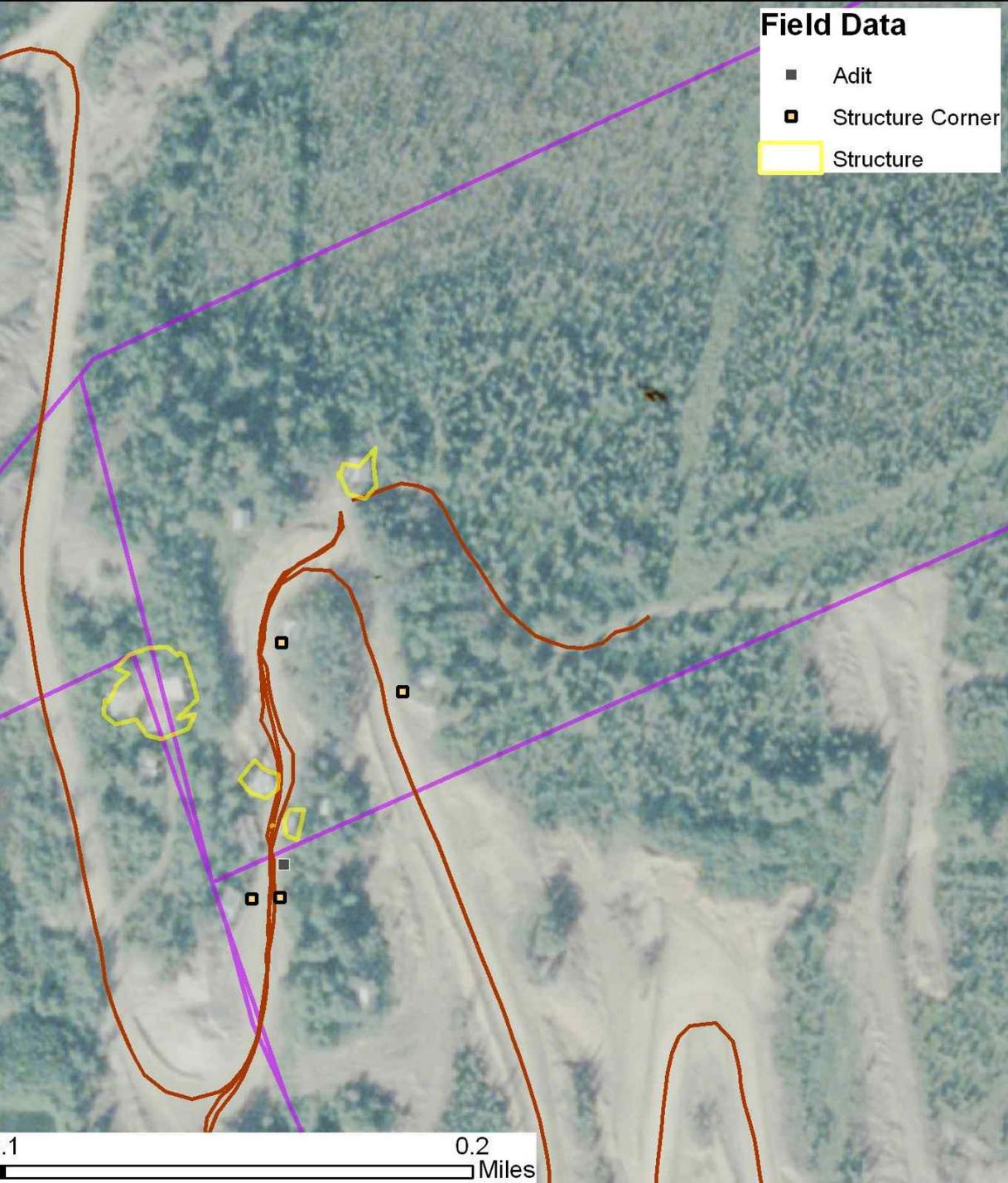


GOLDEN SUMMIT – DISTURBANCE & ALL CLAIMS



GOLDEN SUMMIT – CLOSE UP – LAND OVERVIEW





AML FEATURES – CLEARY HILL MINE



GOLD CREEK MINING ACCESS TRAIL

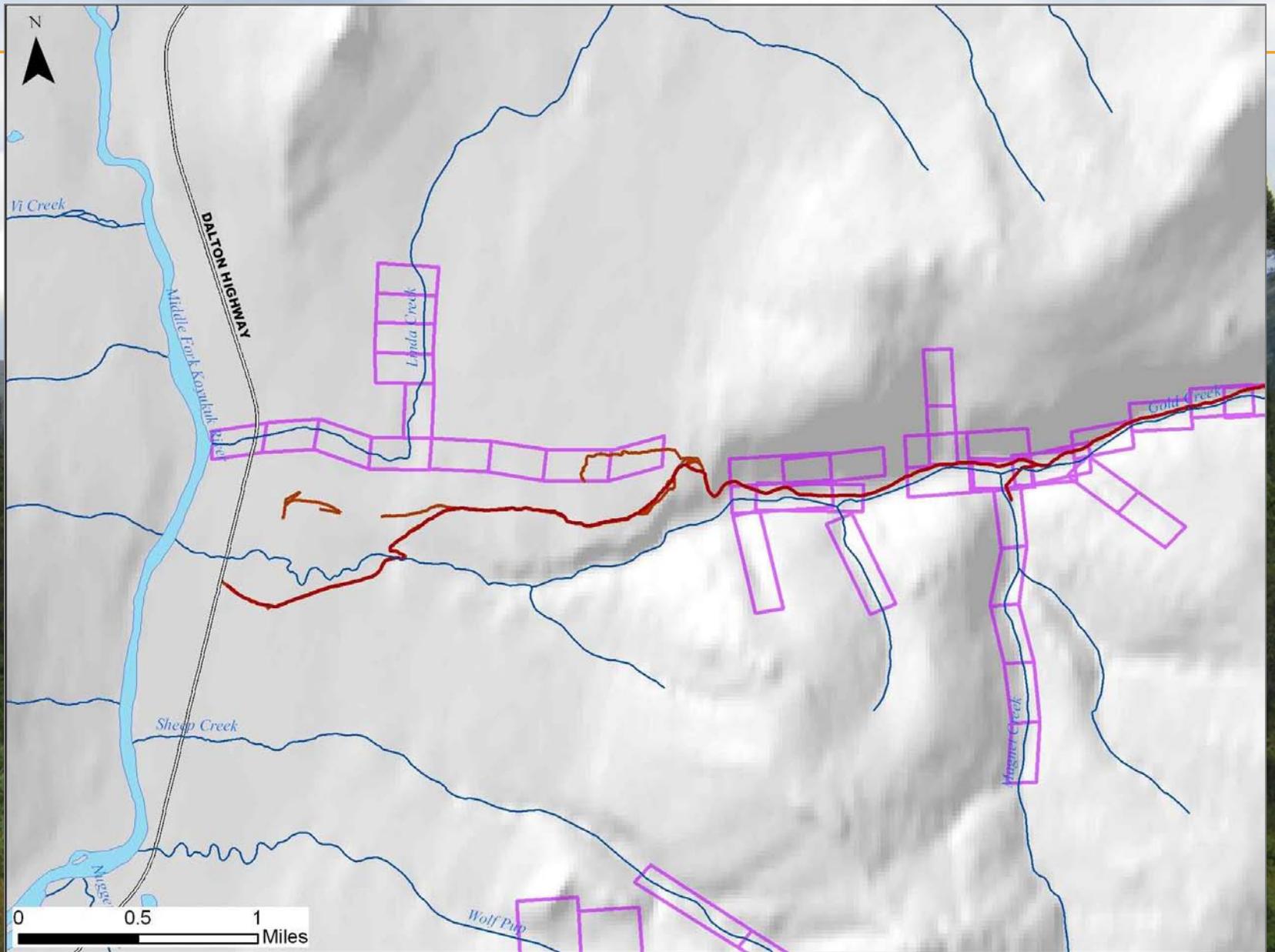
- ✘ Provides access to placer mining claims
- ✘ Shared use among several claimants
- ✘ Degradation due to overuse and soft ground
- ✘ Road not bonded due to legacy issue
 - + BLM facilitating repair & maintenance by operators

GOLD CREEK ACCESS

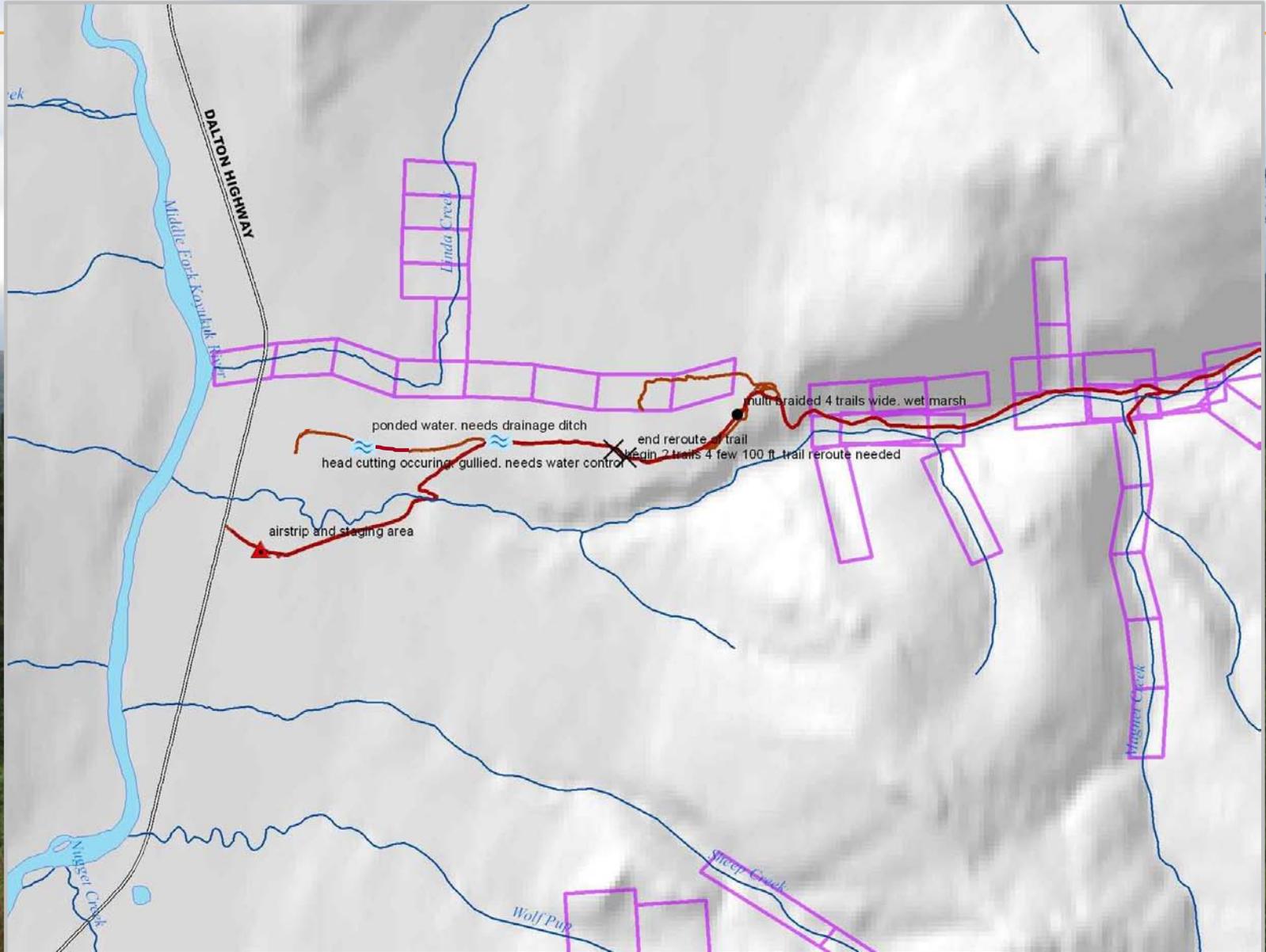
- ✘ Variety of trail conditions that change along trail
- ✘ Used database system to:
 - ✘ Map trail conditions
 - ✘ Locate areas requiring improvement



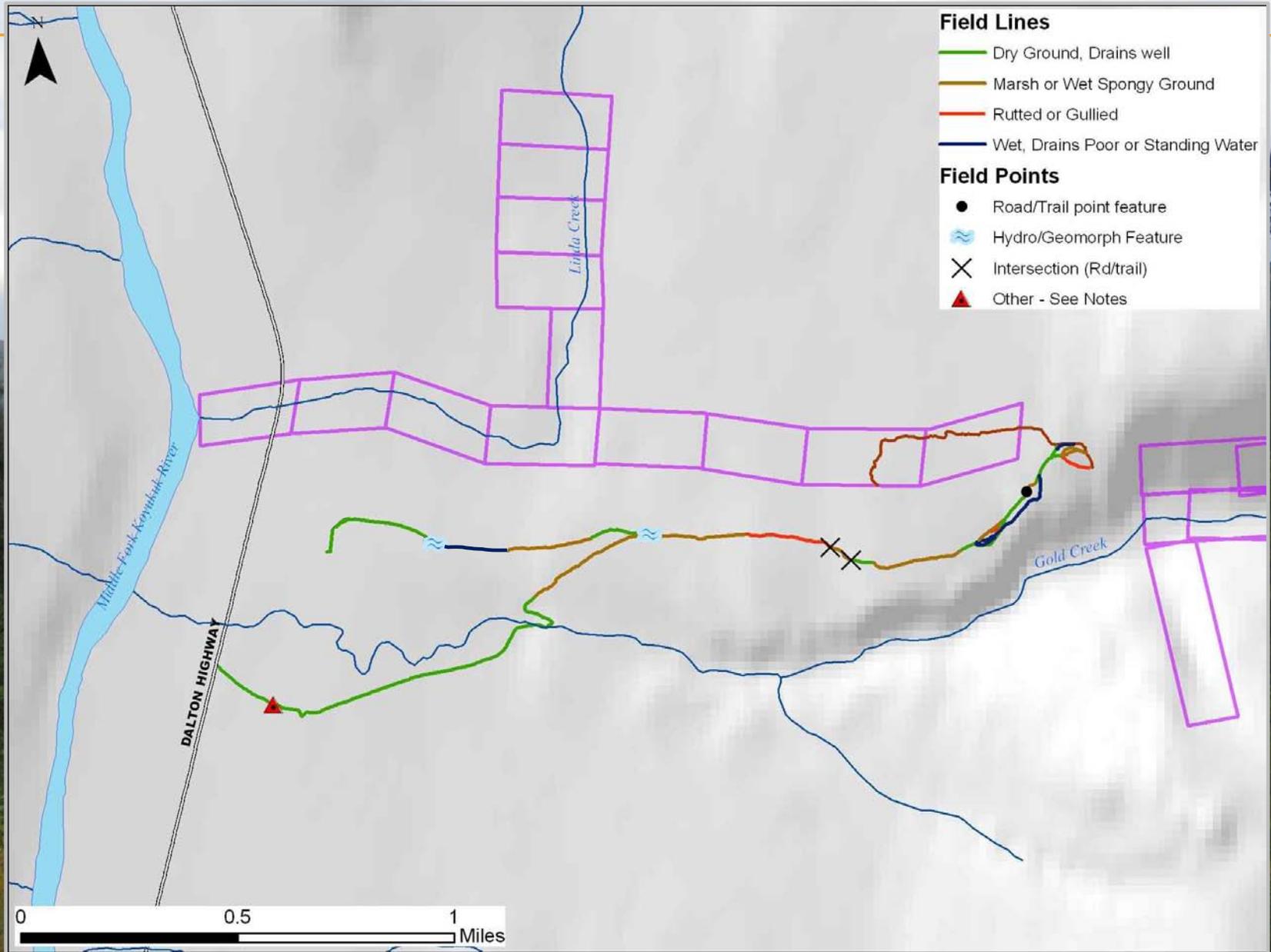
GOLD CREEK ACCESS MAPS



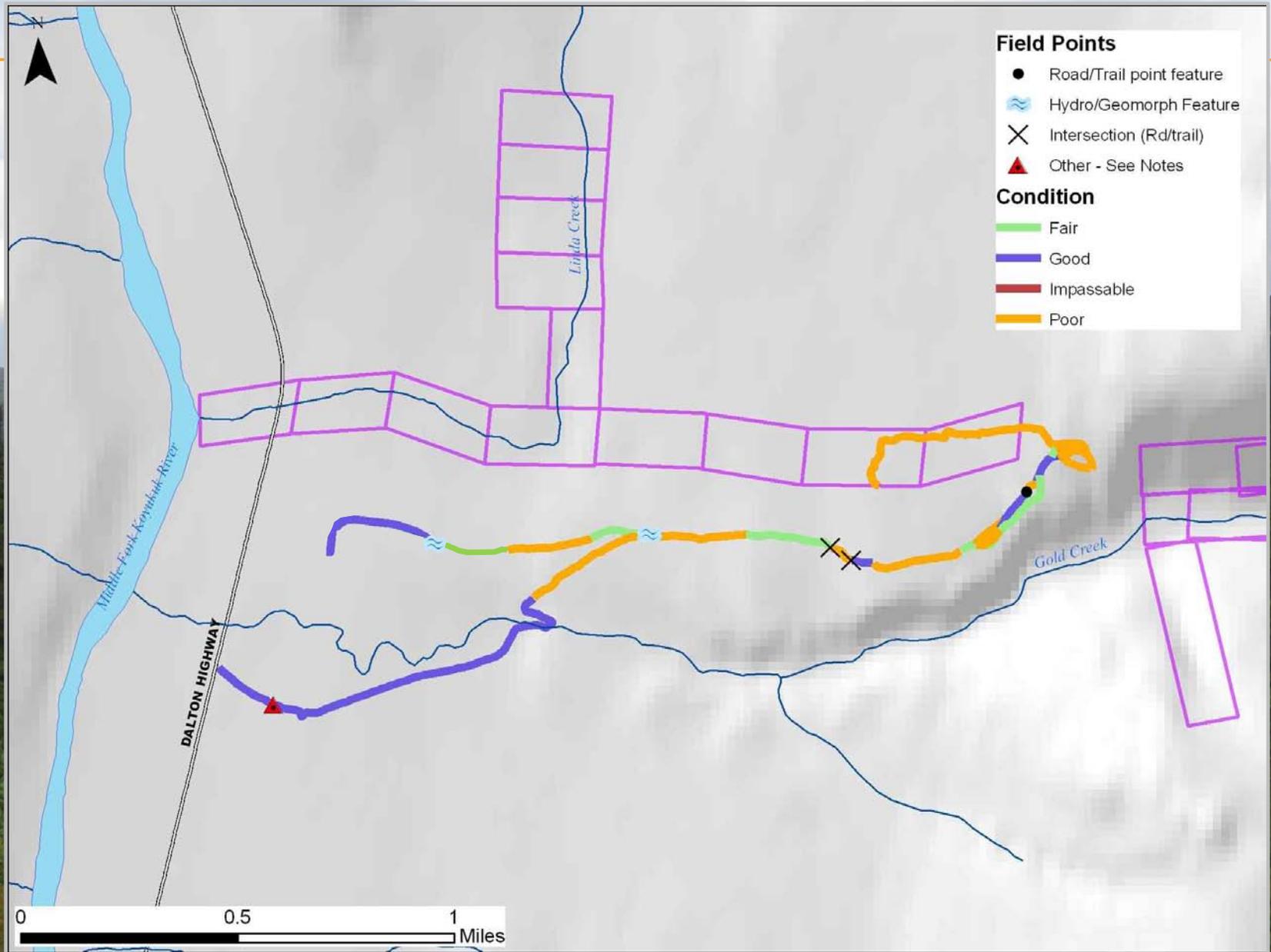
GOLD CREEK – FEATURE DETAILS



GOLD CREEK – TRAIL SURFACE



GOLD CREEK - TRAIL CONDITION



FUTURE APPLICATIONS

- ✘ Revise database categories & attributes
- ✘ Track changes from year to year
- ✘ Add in picture/document links
- ✘ Fillable PDF Inspection Form
- ✘ Collaboration with other agencies
 - + State DNR Mining