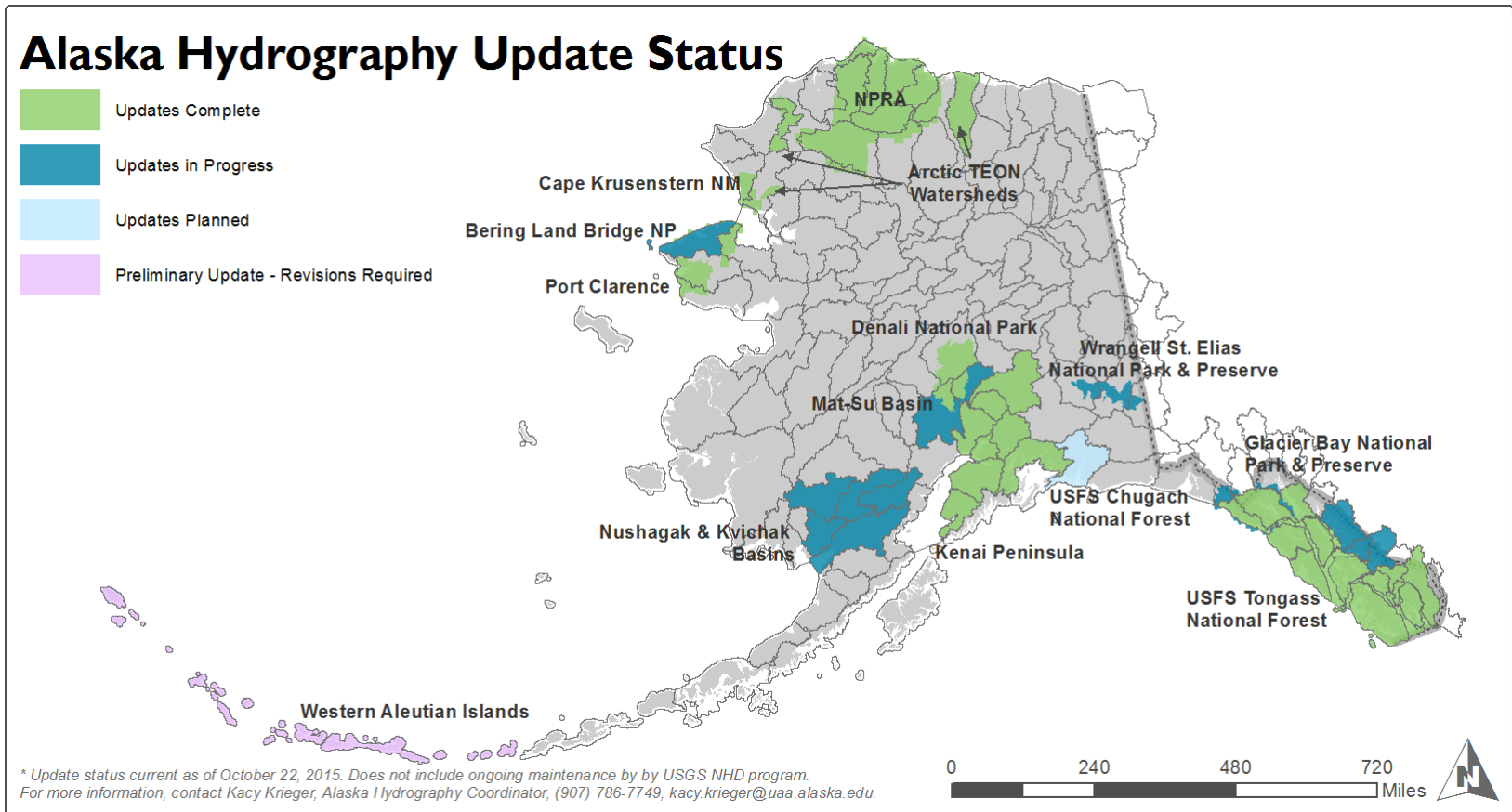


UPDATE:
**Systematic Validation of Modeled
Hydrography in the Mat-Su Basin
Using Field Reconnaissance and
Image Interpretation**

2015 Mat-Su Salmon Symposium
November 18, 2015
Palmer, AK

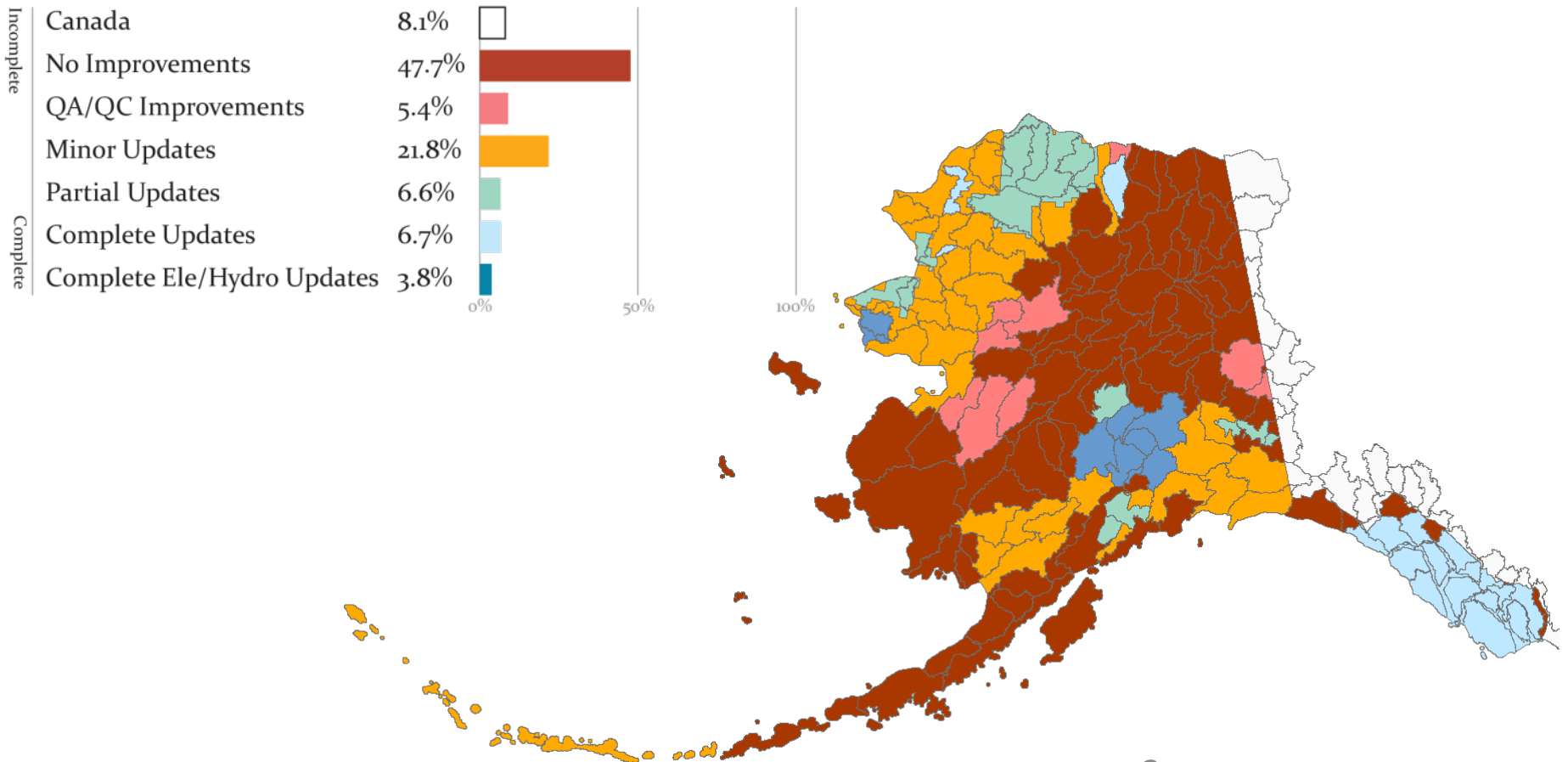
NHD Project Status

complete • ongoing • planned



NHD Update Status

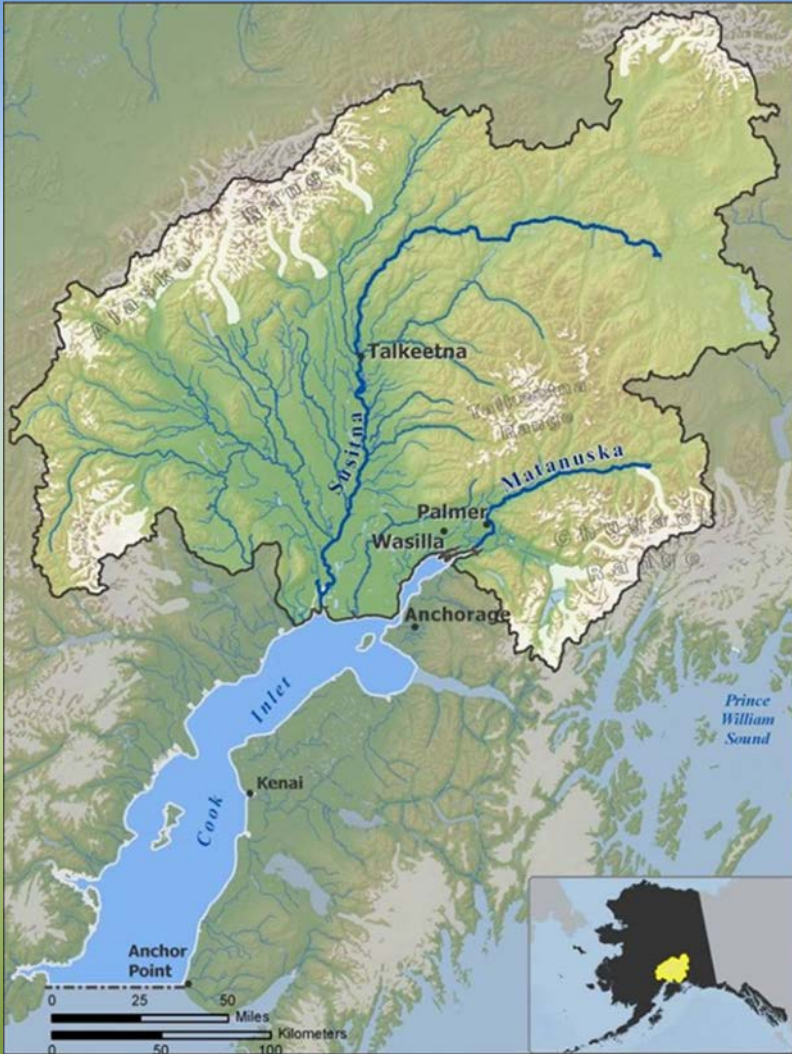
goal of full statewide hydro update



Alaska NHD Quality Status

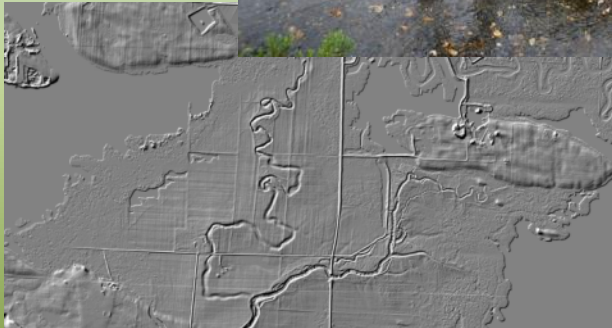
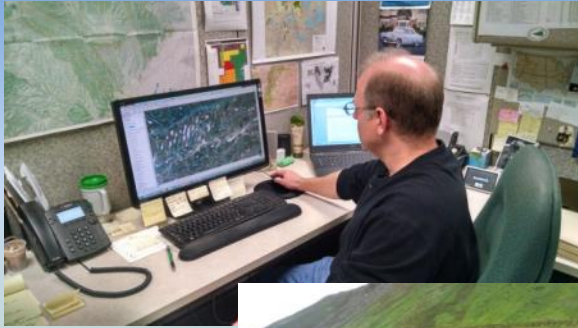
Category		Data Status
Incomplete	Canada	No updates to Canadian hydrography
	No Improvements	NHD is in the original 1:63,360 (or pre-AK Hydro) state. Contains numerous errors.
	QA/QC Improvements	Initial updates addressing network issues. Data should pass NHD QA checks.
Complete	Minor Updates	Initial updates addressing geometry updates. Data should pass NHD QA checks.
	Partial Updates	More extensive updates to geometries. Updates to 1D or 2D features, may or may not be densified. Data should pass NHD QA checks.
	Complete Updates	Complete updates to 1D and 2D features, data is densified, complete attributes. Data must pass all NHD QA checks.
	Complete Ele/Hydro Updates	Complete updates to 1D and 2D features, data is densified, complete attributes. Data is integrated/derived from elevation data. Data must pass all NHD QA checks.

Mat-Su Introduction



- Availability of high resolution elevation and imagery data has made a basin-wide hydrography update possible
- Mat-Su LiDAR, SDMI SPOT and IfSAR, Gracz and NWI wetlands, modeled flow lines, 2D breaklines
- AK Hydro and NHD data standards, stewardship initiatives, tools and techniques

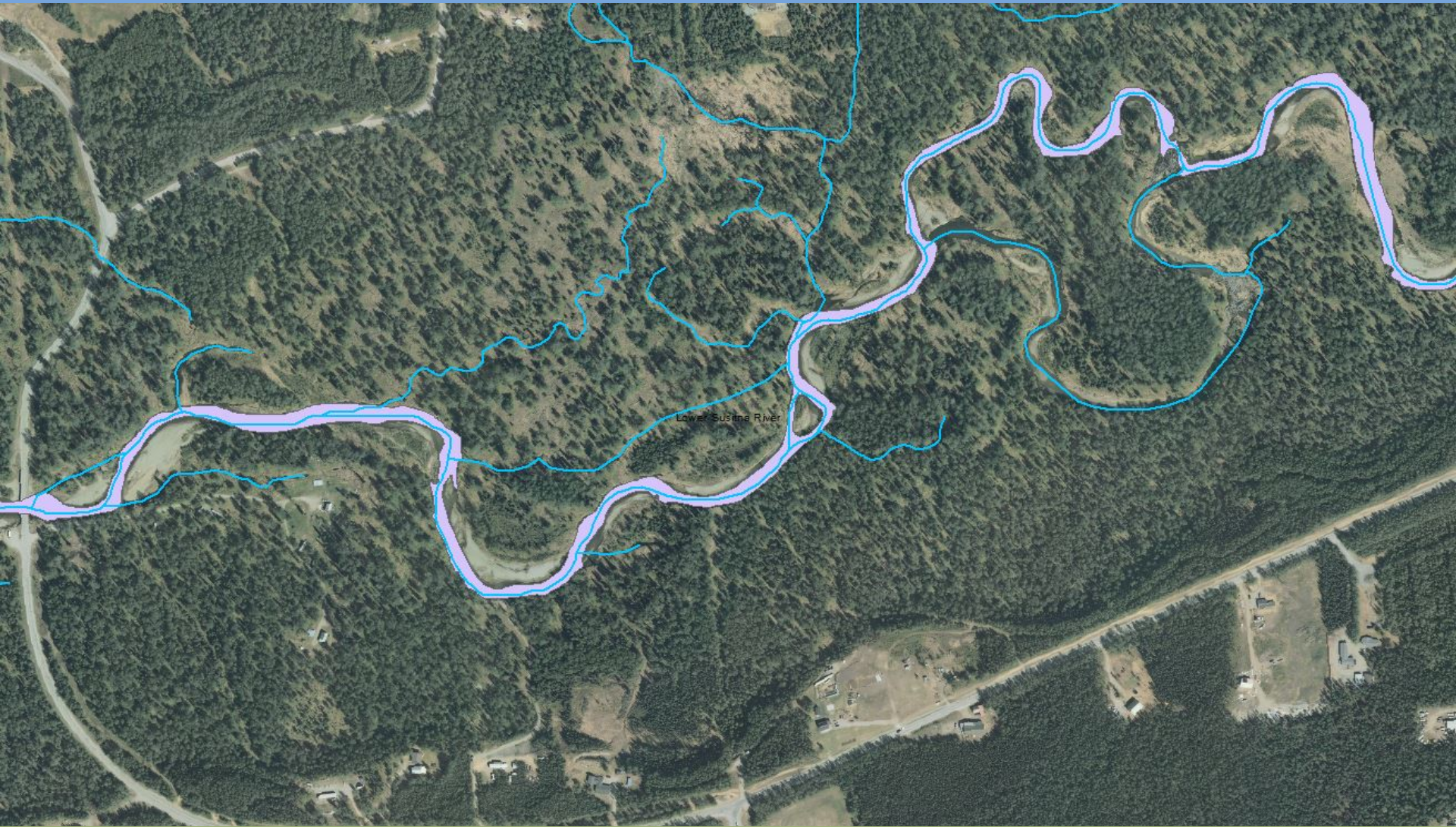
Mat-Su Introduction



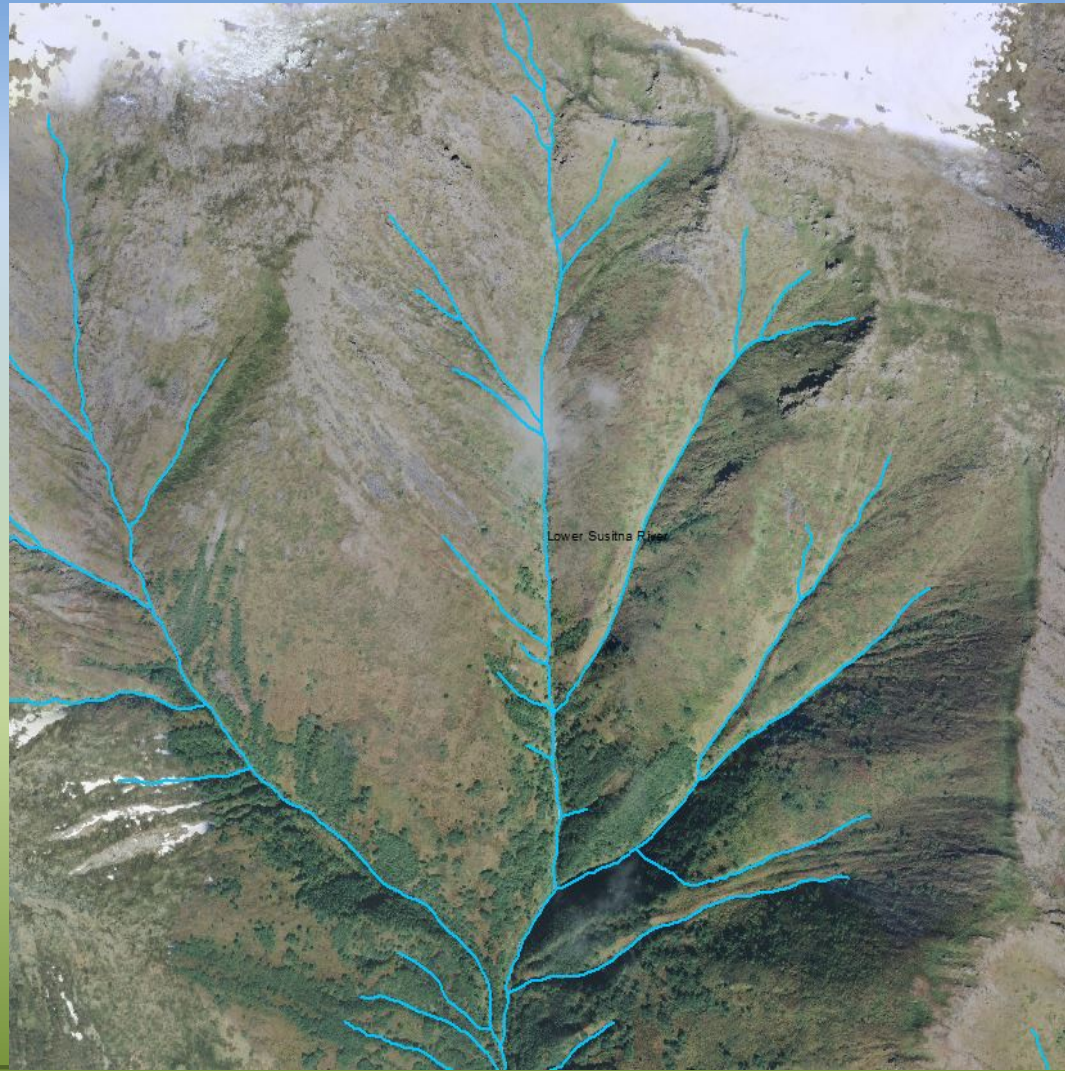
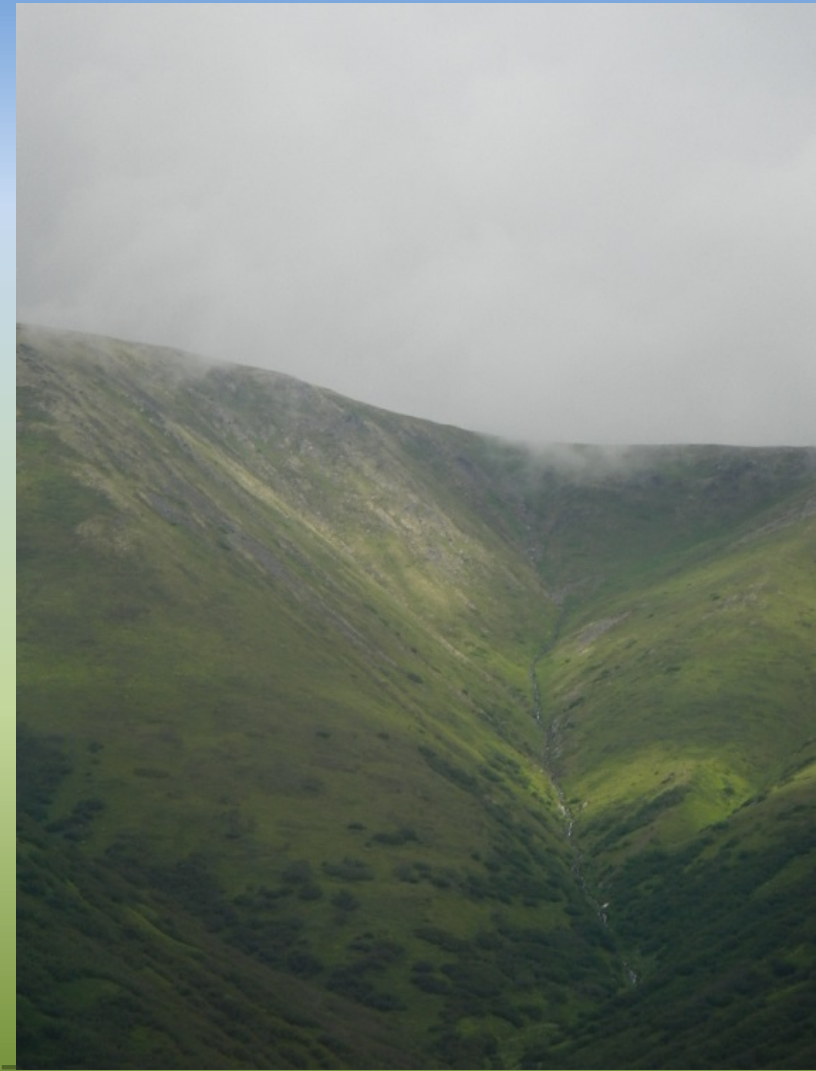
Hydrography Validation

- Independent photogrammetric review of modeled streams
- Incorporate reconnaissance level fieldwork to verify ground conditions
- Utilize collateral spatial databases to verify stream location and flow paths
- Once validated stream network will be conflated to the USGS NHD from AK Hydro

Level of Detail



Field Reconnaissance



Workflow Process

1. Development of DEMs

- LiDAR vs. IfSAR coverage
- Conditioning (digital dams, urban areas)
- Barriers (topographic, man-made)

2. Generation of synthetic hydrography

- Accumulation or initiation points
- Flow direction discussions
- Periodicity (slope/accumulation/elevation)

3. Field Observations

- Initiation points
- Vegetation lines
- Culverts and other barriers

Workflow Process

4. Data Validation
 - Topology review
 - Downstream directionality
 - Configuration relative to imagery
 - Decision support using collateral data
 - Classification applied
5. Capture Missing 1D and 2D Features
 - Interpretation and collateral (e.g. ORI)
 - 2 acre MMU for 2D
6. Load Into AK Hydro Network Data Model
 - Validation tools
7. Transfer to AK Data Steward for Conflate

Challenges

1. Densification

- Hydrology much more dense than PI
- Validation important for other uses
- Generalization and smoothing

2. Incorporation of Wetlands

- Critical as stream IP and inline storage
- Complete surface hydrology picture
- Extensive and relatively flat... flow?

3. Derived Hydrology in Flat Areas

- Importance of collateral data
- Fieldwork and image interpretation

Challenges

4. Flow Direction

- Must be checked carefully
- Especially when using concatenated DEM

5. Missing Features

- Clear 1D streams in flat areas
- 2D features below MMU or beneath canopy

6. Handling Disconnected Streams

- Importance of collateral data
- Fieldwork and image interpretation

7. Features Crossing Watershed Boundaries

- WBD update required

Challenges

8. Accuracy of Collateral Data

- Validate collateral as well as primary

9. Data Cleanup - Noise

- Generation of additional features in flat areas
- Centerlines and artificial paths
- Hydro masks

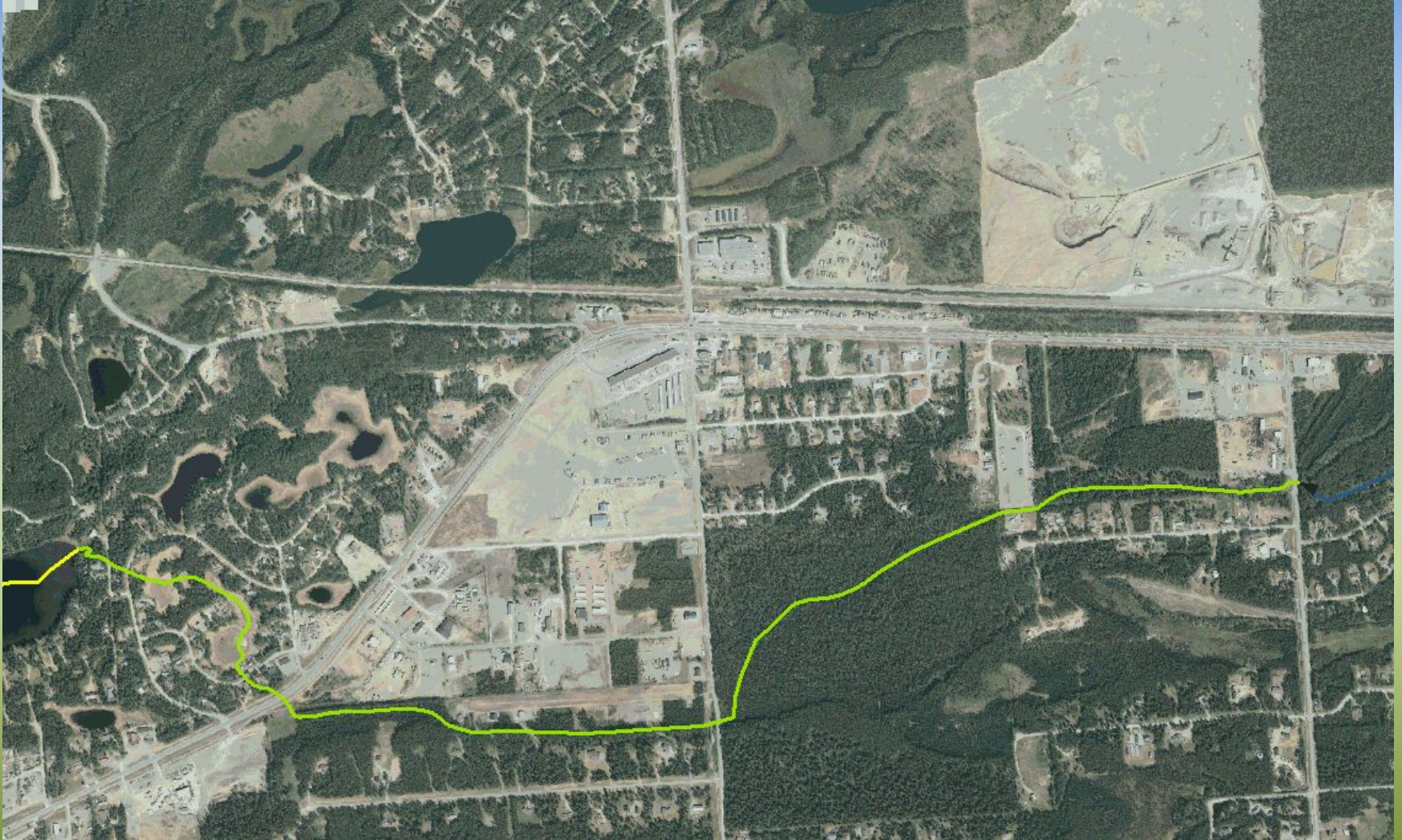
10. Stream Classification

- Image evidence – water, vegetation, slope
- Fieldwork validation
- Broad assumptions

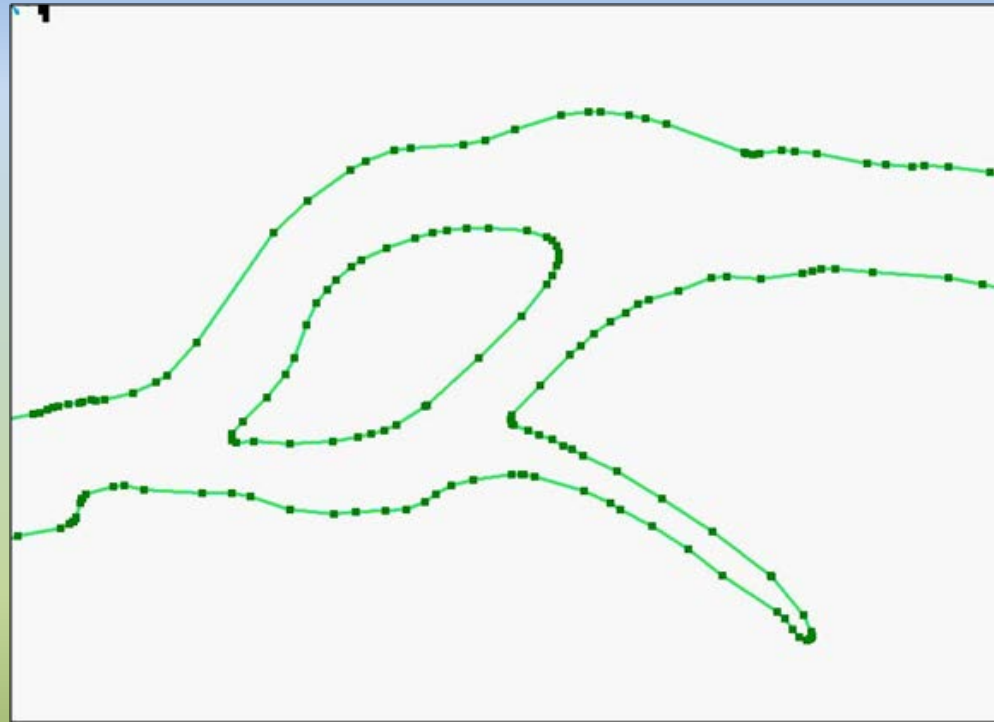
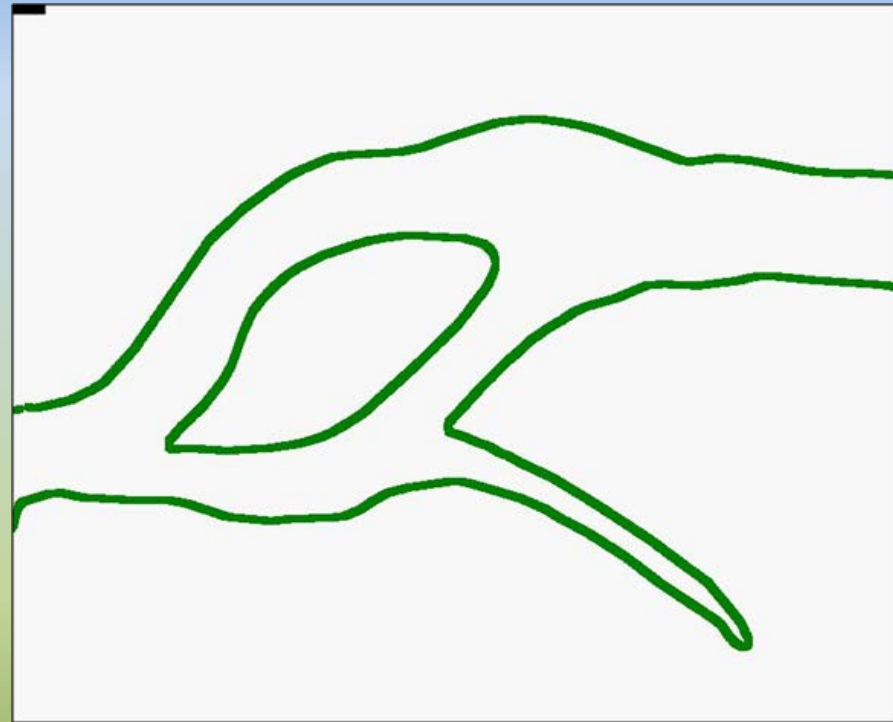
Densification



Editing and Smoothing



Editing and Smoothing



Incorporating Wetlands



GeoSpatial Services

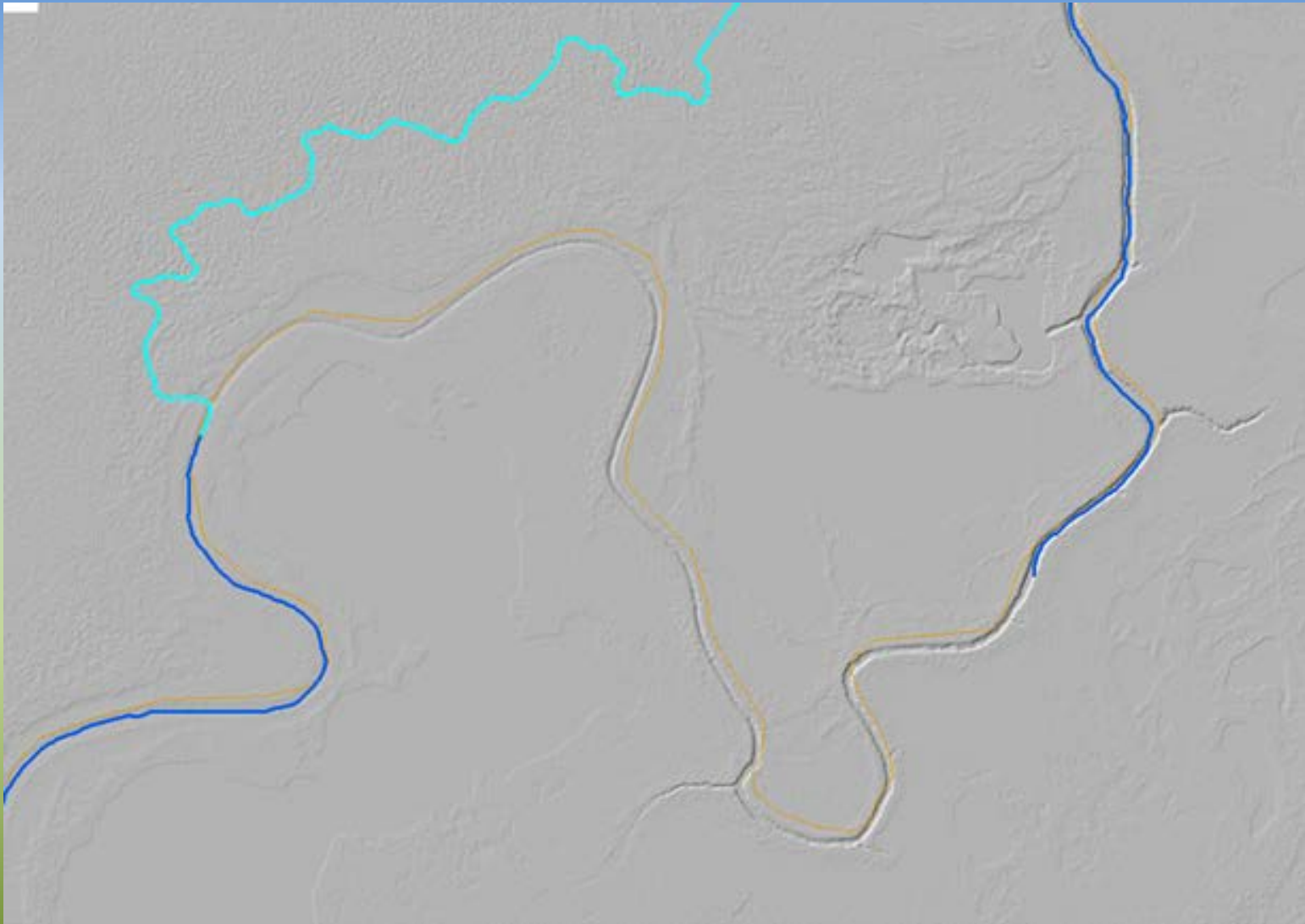


Wetland Connections

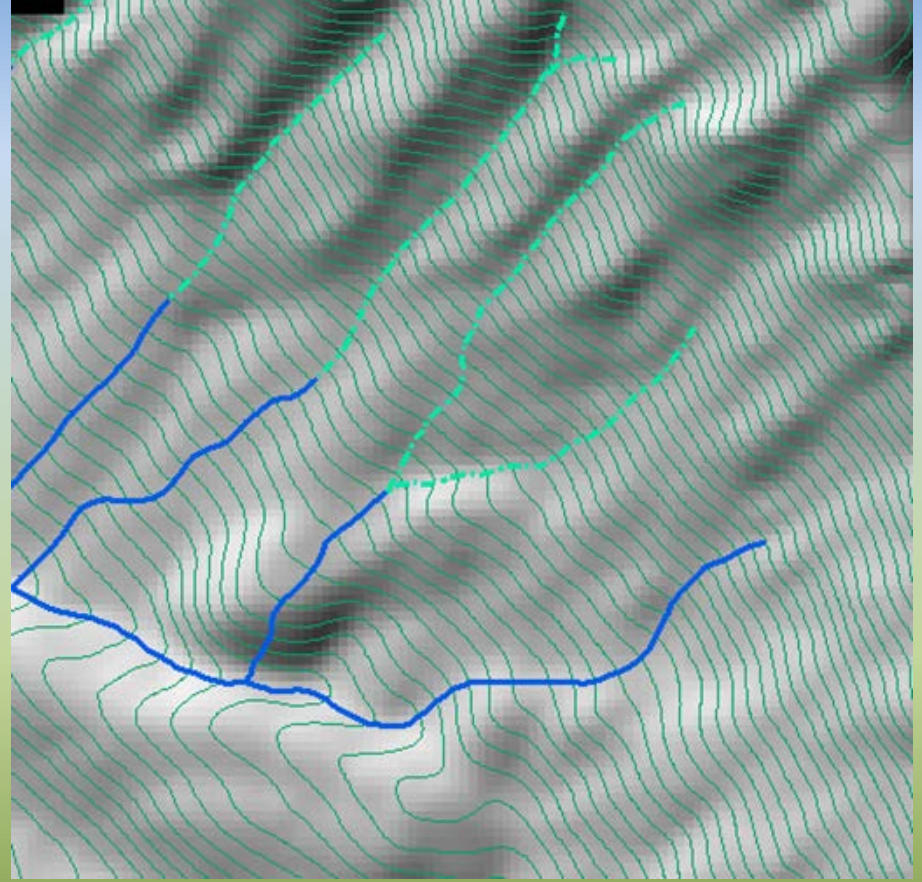
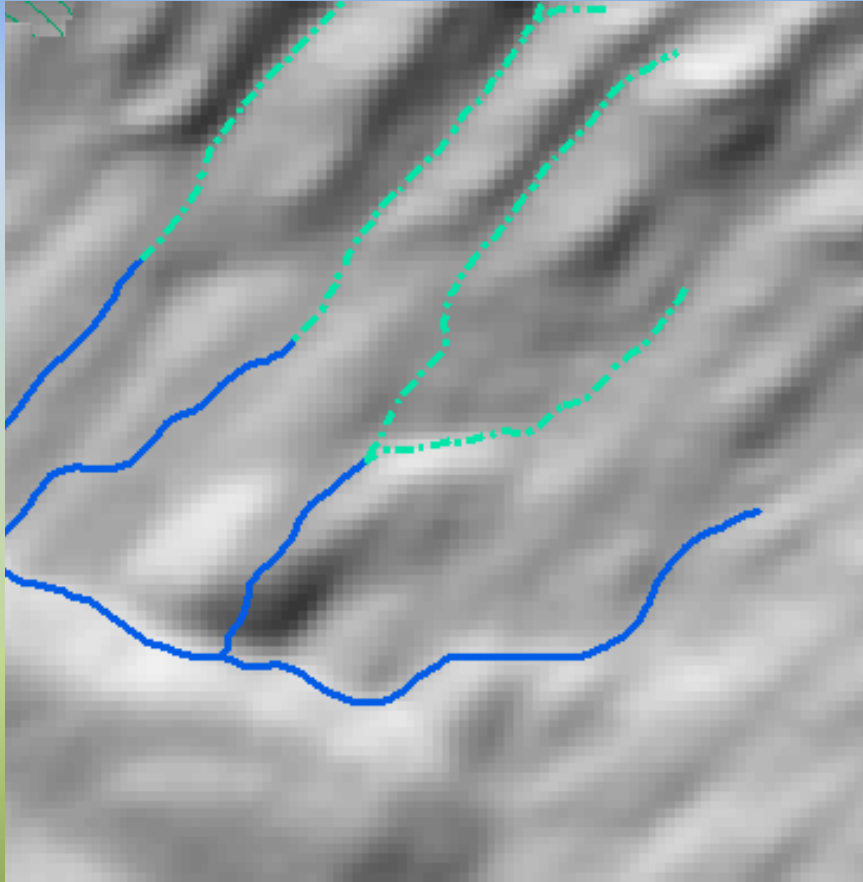
Incorporating Wetlands



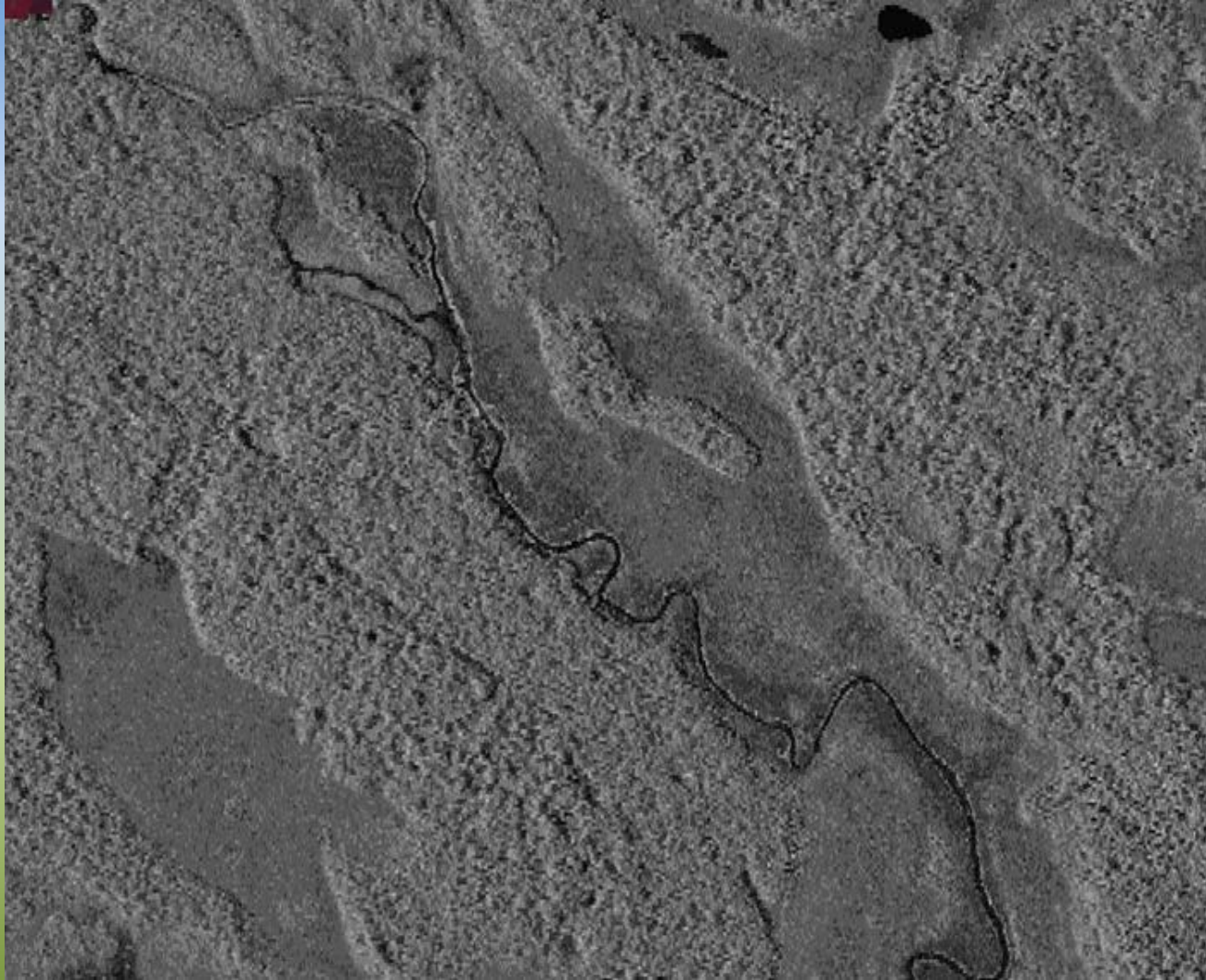
Working in Flat Areas



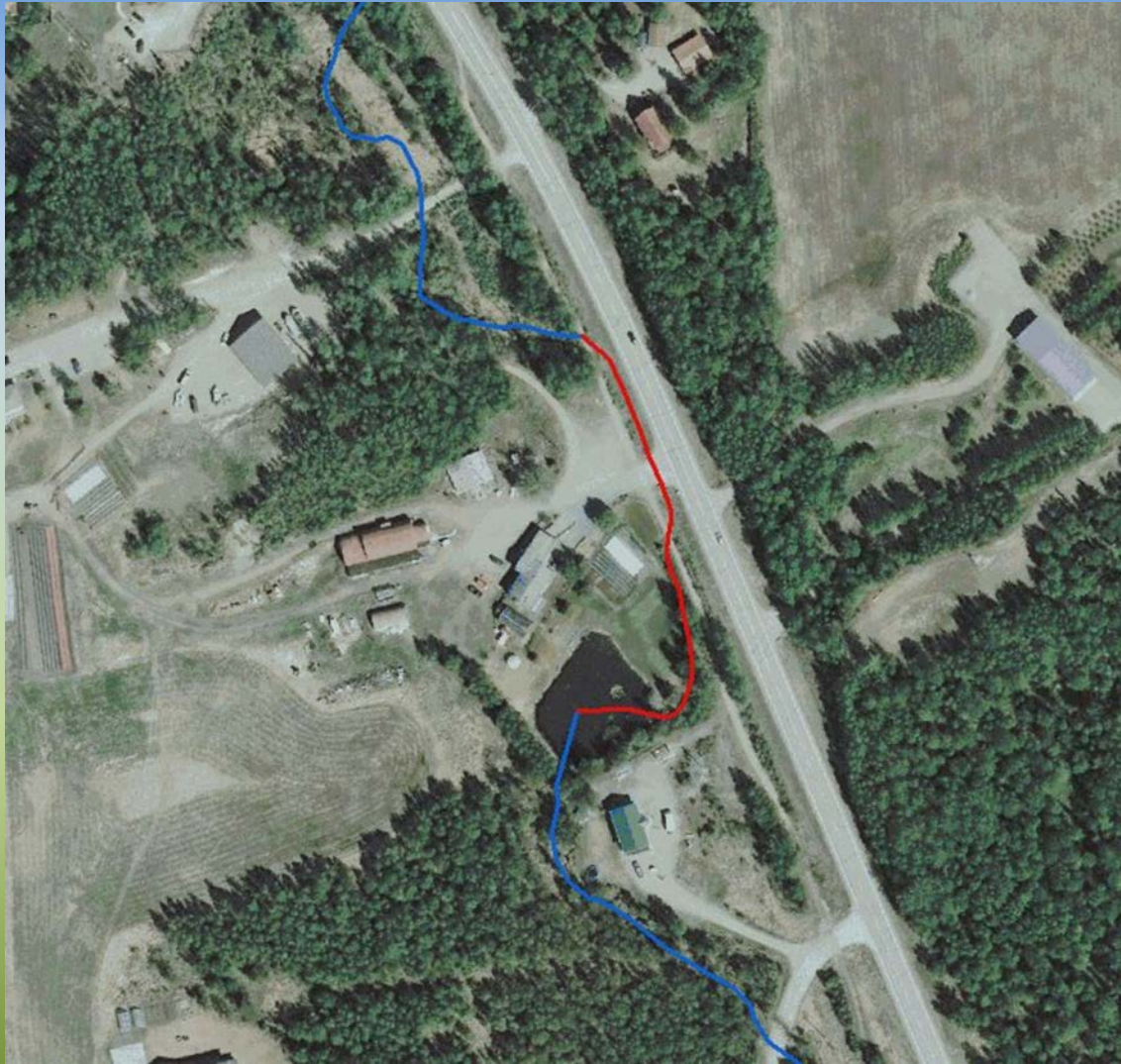
Correcting Flow Direction



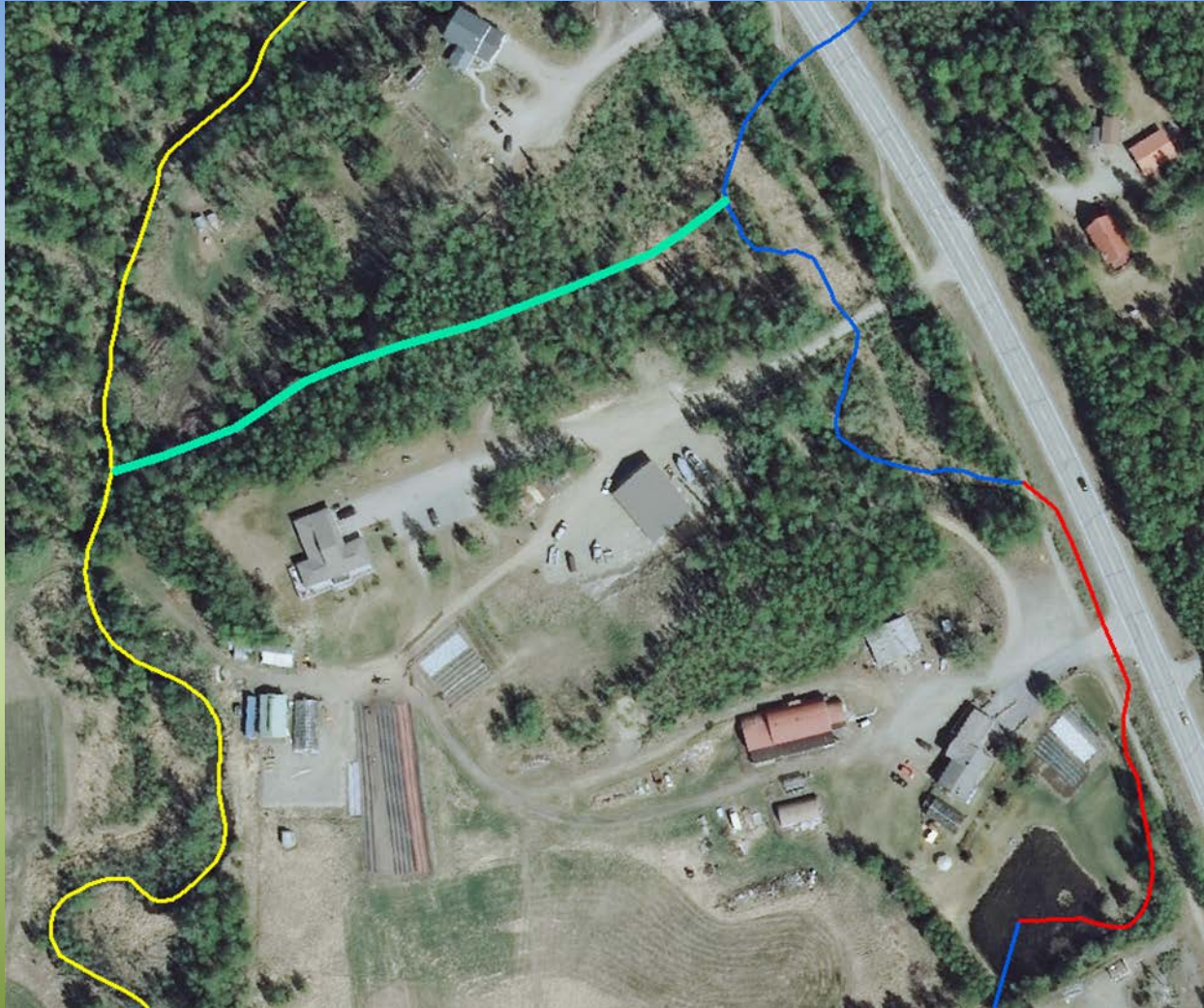
Missing Features



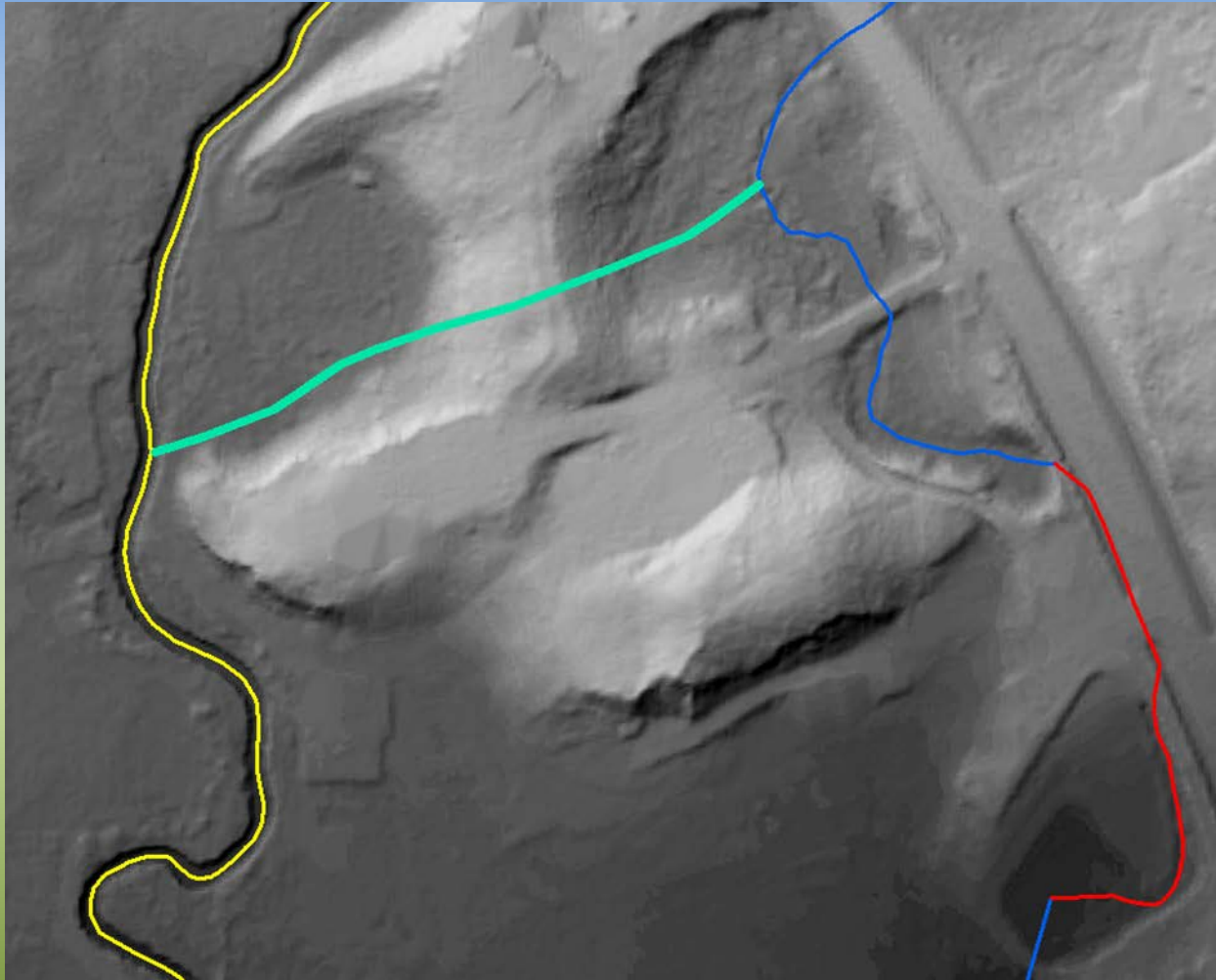
Disconnected Streams



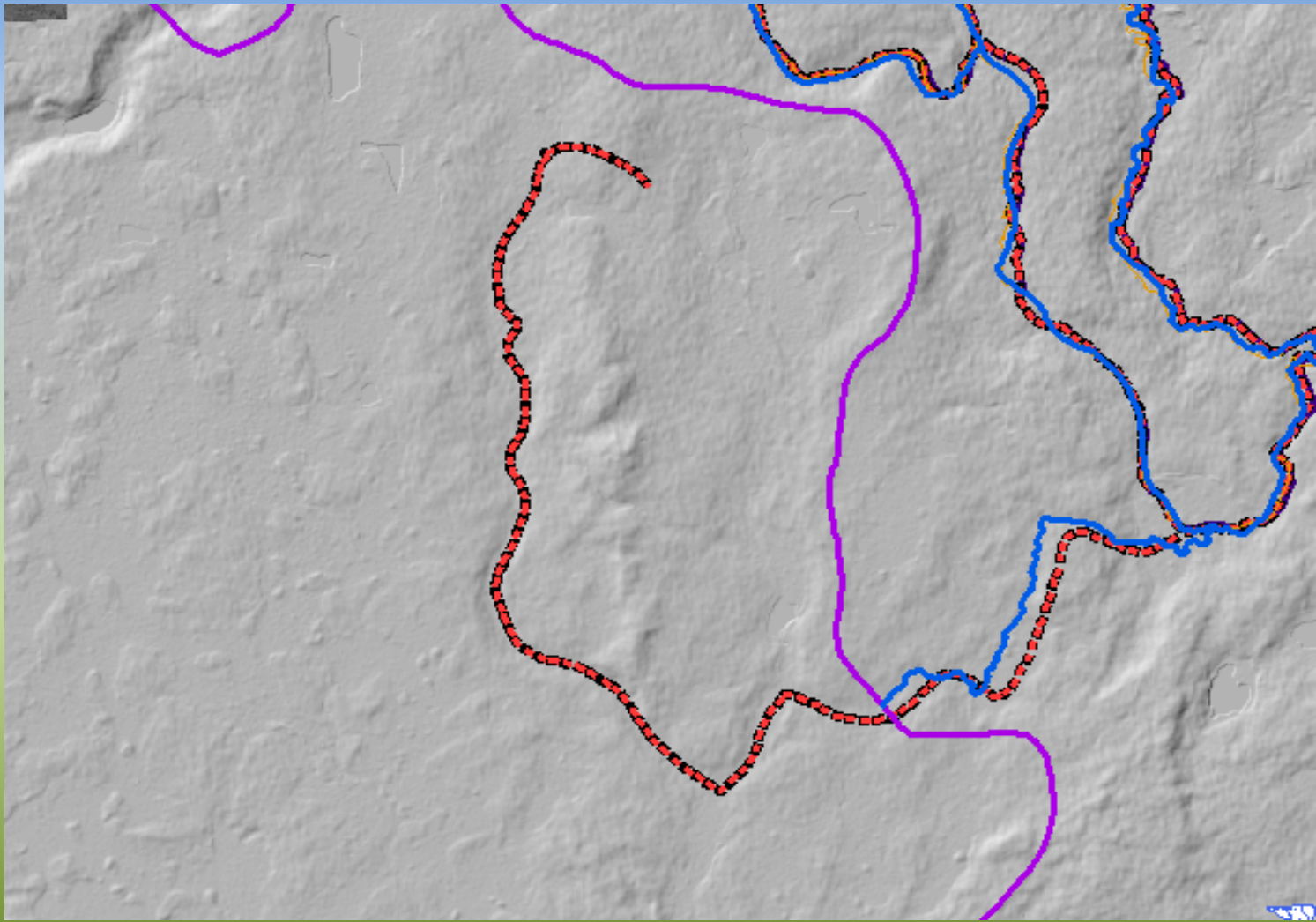
Disconnected Streams



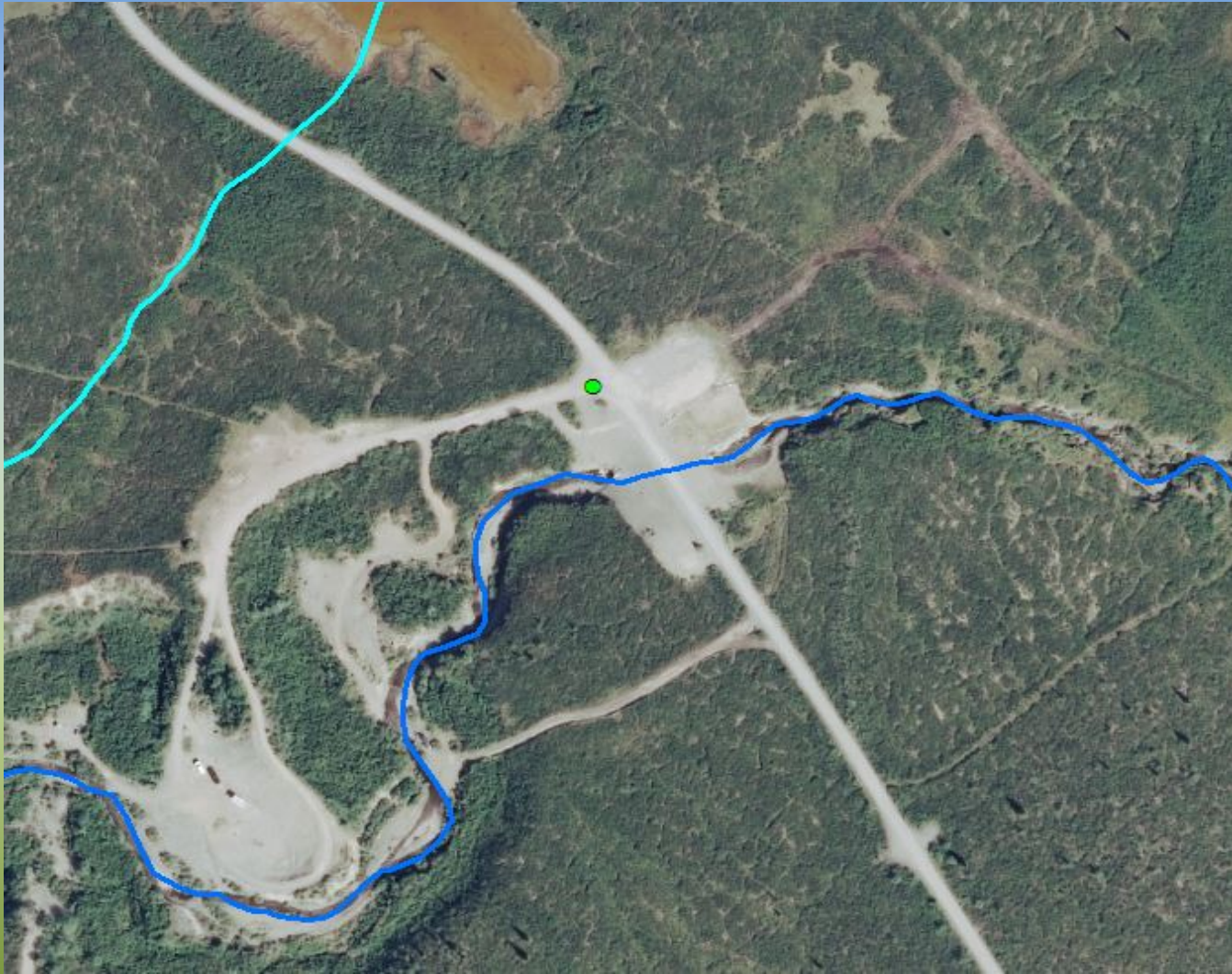
Disconnected Streams



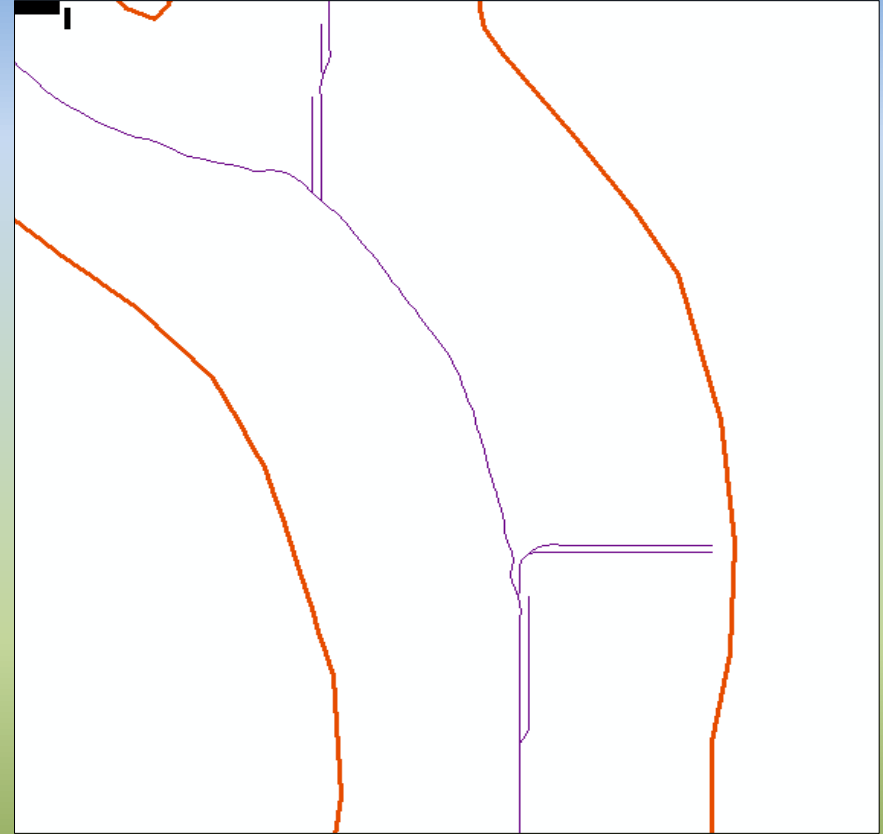
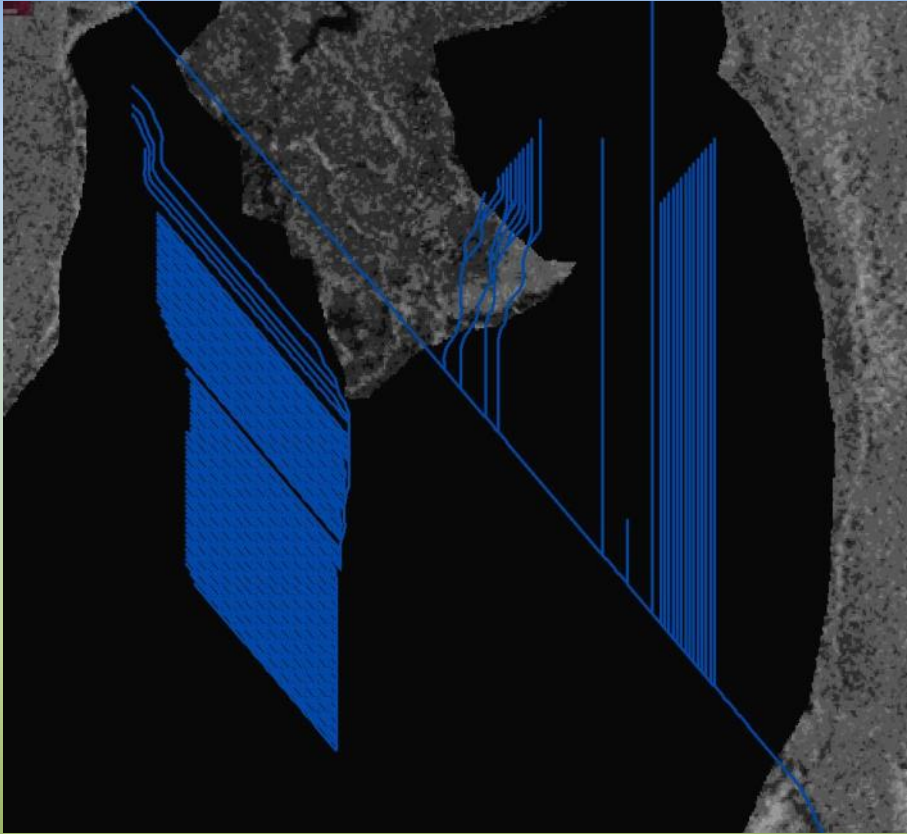
Watershed Boundary Updates



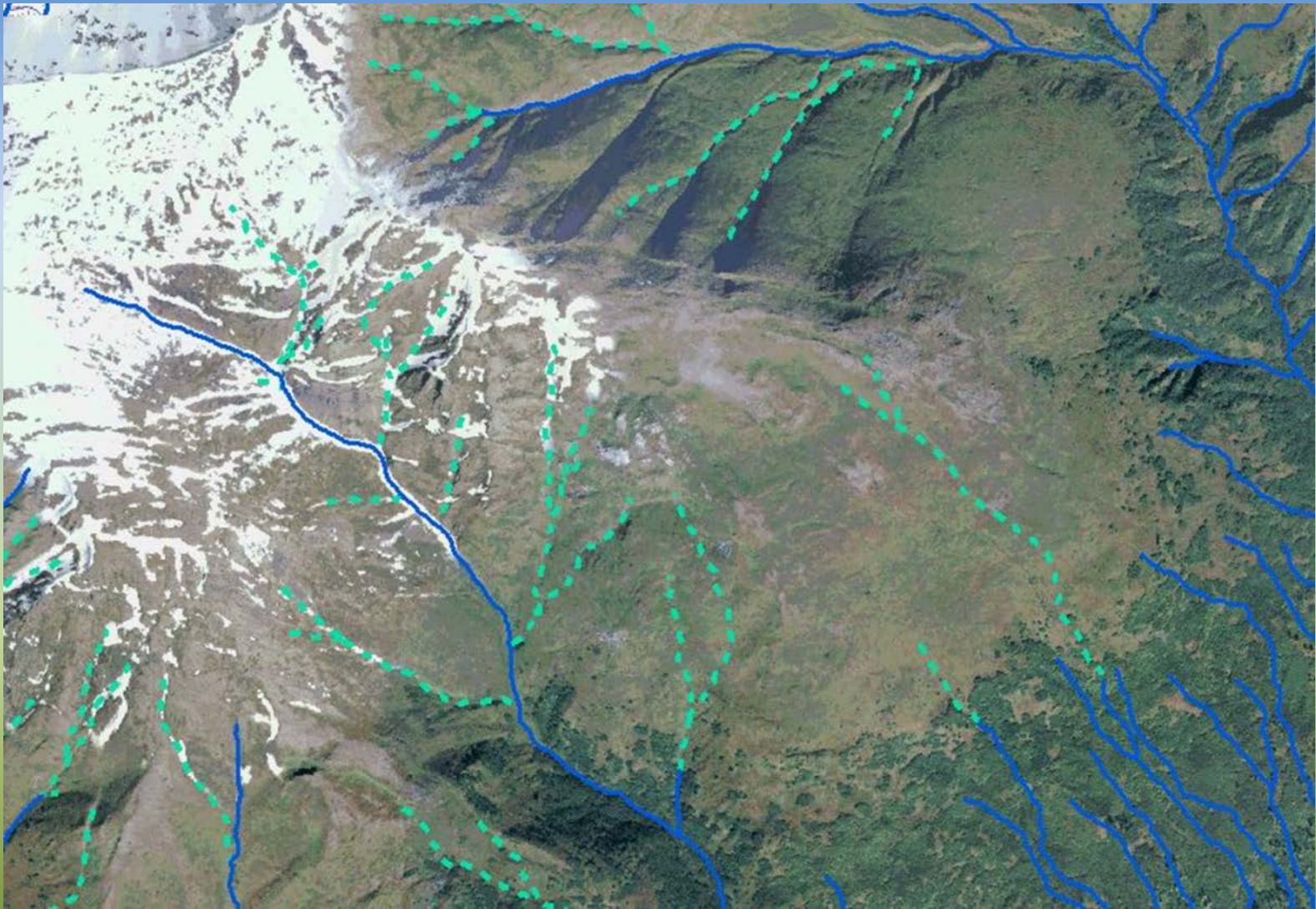
Accuracy of Collateral Data



Data Cleanup - Noise



Feature Classification



Conclusions



1. Viable and cost effective method for NHD update and densification
2. Dependent upon availability of high quality, spatially consistent imagery and digital elevation data
3. Fieldwork and collateral spatial datasets are essential for decision support and validation
4. Upfront effort on stream initiation point determination hydrologic conditioning of DEM pays dividends

Questions?

Andy Robertson
Associate Director
GeoSpatial Services
Saint Mary's University of Minnesota
aroberts@smumn.edu
507-457-8746