



# National Wetlands Inventory

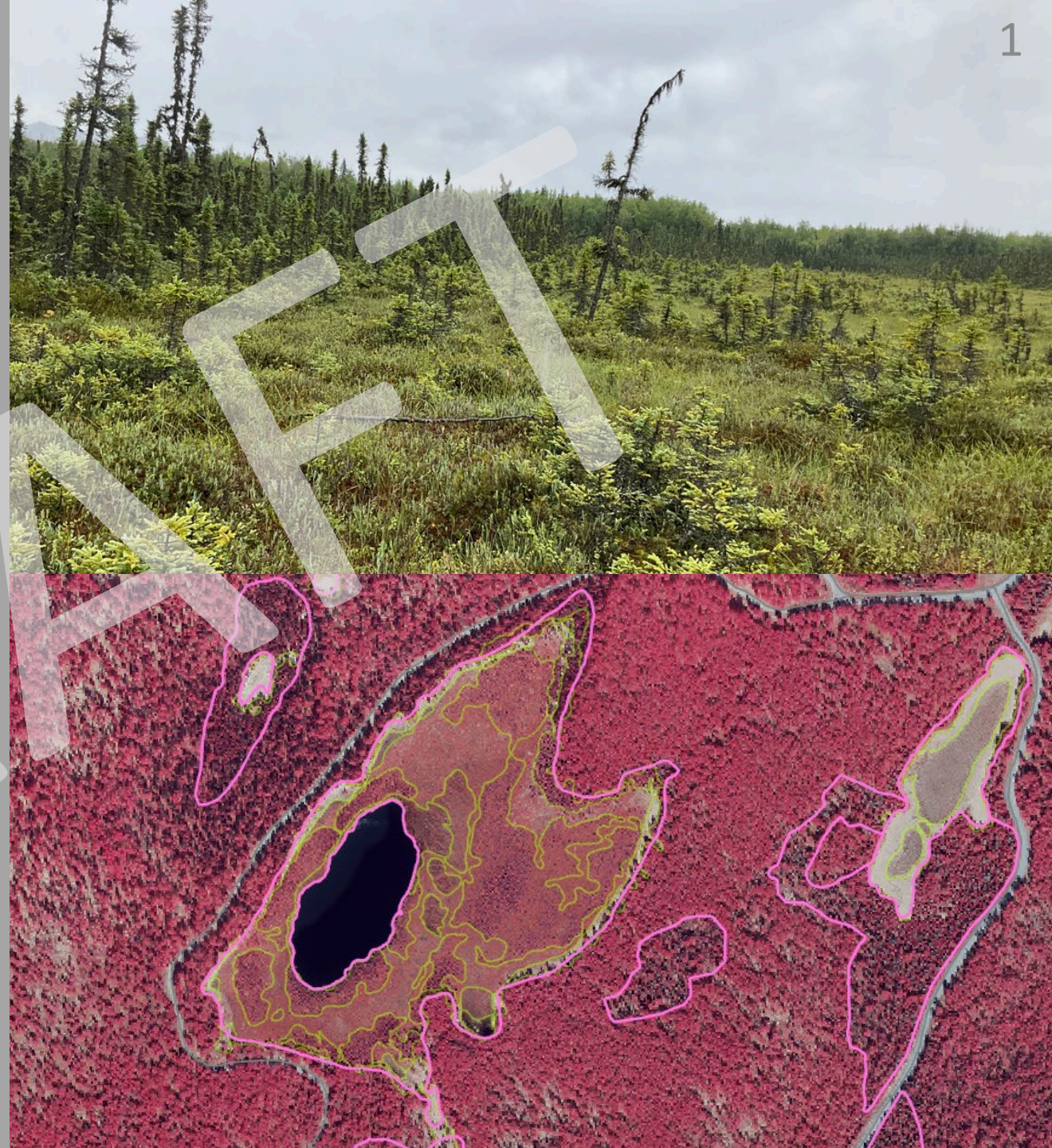
## JBER 2023

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Team:

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JBER: Cassandra Schoofs, Charlene Johnson





# Introduction

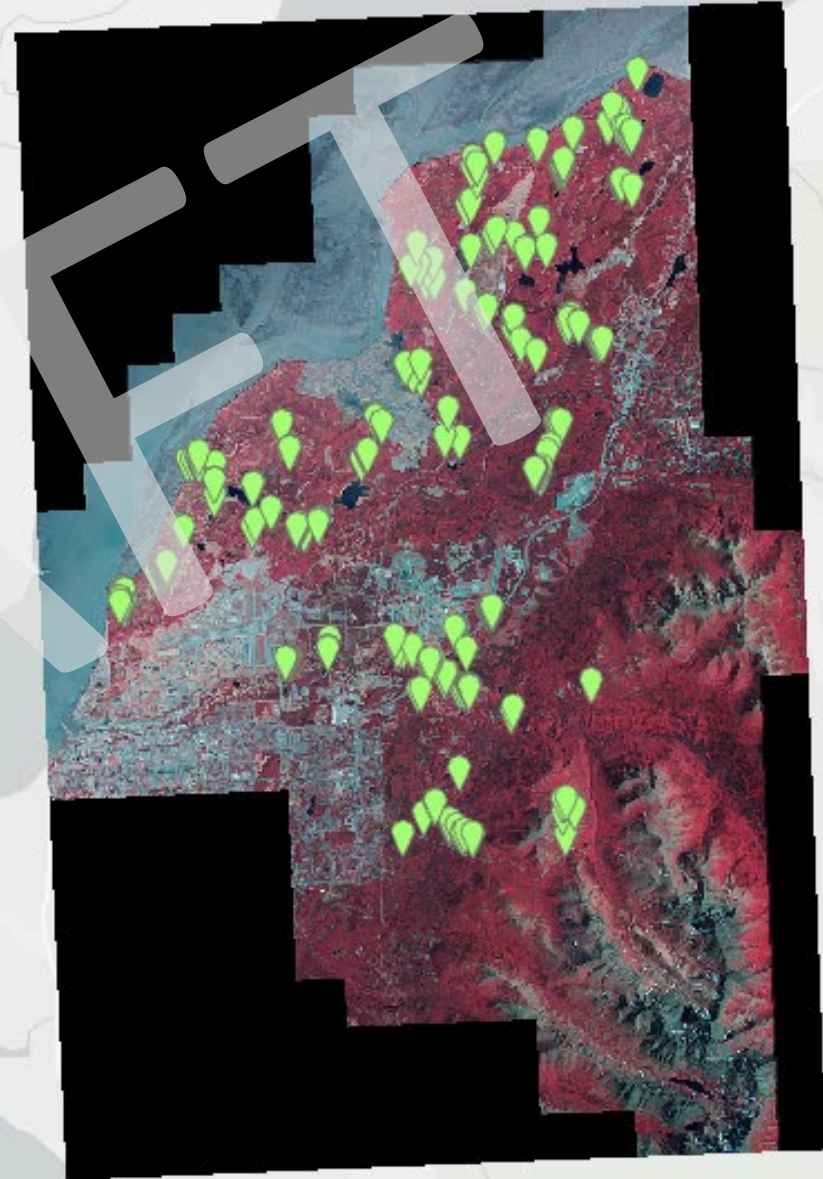
- Visited 78 field sites and took 383 data points in the cantonment area, most training areas, and alpine
  - Representative examples compiled into Signature Library
- Mapping done at a .25 acre TMU across JBER with various data references
- NWI and JBER wetland databases made consistent

# Today's topics

- Field work review
- Digitizing Process
- Results
- Signature library
- Specific cases
- Future Work

# Field Work Review

- We visited 78 field sites and took 383 data points in the cantonment area, most training areas, and alpine
- There were sometimes challenges in making a call for wetland or upland based on soils and hydrology
  - Glacial landscape
  - Weather conditions
  - Seasonal frost layer
- Some Alaskan wetlands are difficult to delineate
  - Some spruce forests and alpine areas
  - Timing can have big effects

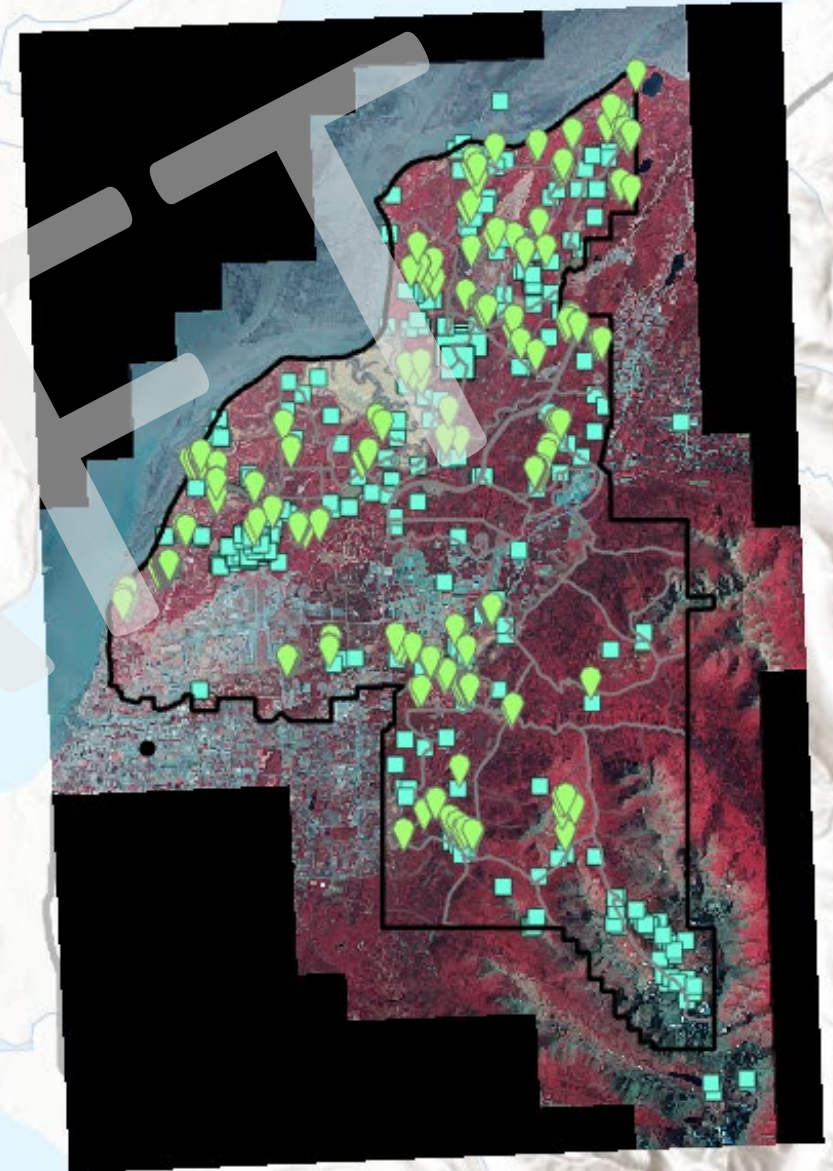


A topographic map showing a digitized area. The digitized area is outlined in black and filled with a green and brown color scheme, representing different terrain elevations. The rest of the map is in grayscale, showing contour lines and water bodies. A large, semi-transparent watermark 'DRAFT' is overlaid diagonally across the map. A white rectangular box is centered over the map, containing the text 'Digitizing Process'.

# Digitizing Process

# Data Used

- New field data collected in summer 2022
- 15 cm resolution multi-spectral imagery collected in 2021 and 2019
  - Imagery signatures vary between the years
- .15 m resolution LiDAR imagery collected in 2021
- Existing JBER Wetlands Inventory
- 448 field points collected with USACE methods spanning 1995-2019
- Legacy NWI data
- Google Earth Pro (All years, May 2021 especially)



Project Map Insert Analysis View Edit Imagery Share XTools Pro Appearance Data Data Command Search (Alt+Q) Charlotte (U.S. Fish & Wildlife Service)

Clipboard: Paste, Copy, Copy Path, Cut, Save, Discard

Manage Edits: AK\_wetlands\_Topo, Status, Error Inspector

Snapping: Snapping

Features: Create, Modify, Delete

Selection: Select, Clear

Tools: Move, Annotation, Edit Vertices, Reshape, Merge, Split

Corrections: Ground To Grid

Data Reviewer: Manage Quality

Digitizing: Generalize

Contents

Search

Drawing Order

- Project Boundary
- AK\_wet\_poly
- New NWI (5m\_smooth\_paek)
- CreateFishnet
- New Charlie Line Notes
- New Charlie Notes
- Data First 2 Weeks
- Training Areas
- Data Prior Field Data
- Data Clunie Creek
- Wetlands JBER
- Wetland\_A (JBER local)
- Wetlands NWI
- JBER\_Boundaries
- Other Depression Points
- JBER\_05sep2019\_wgs84\_utm6n\_7.5cm.sid
- Imagery 2021
- 5780026637448.tif
- Imagery Base 1950
- Imagery Anchorage 1939
- Imagery 2009
- LiDAR 2021
- HillShade2021
- World Terrain Base
- World Hillshade
- Standalone Tables



Create Features

Search

Create 7 ft circle completed

Templates Favorites

- CreateFishnet
  - CreateFishnet
- New Charlie Notes
  - 1/4 acre square

7 ft circle

Wetland\_A (JBER local) AK\_wet\_poly

Field: Add Calculate Selection: Select By Attributes Zoom To Switch Clear Delete Copy

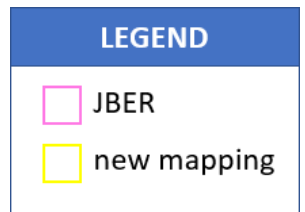
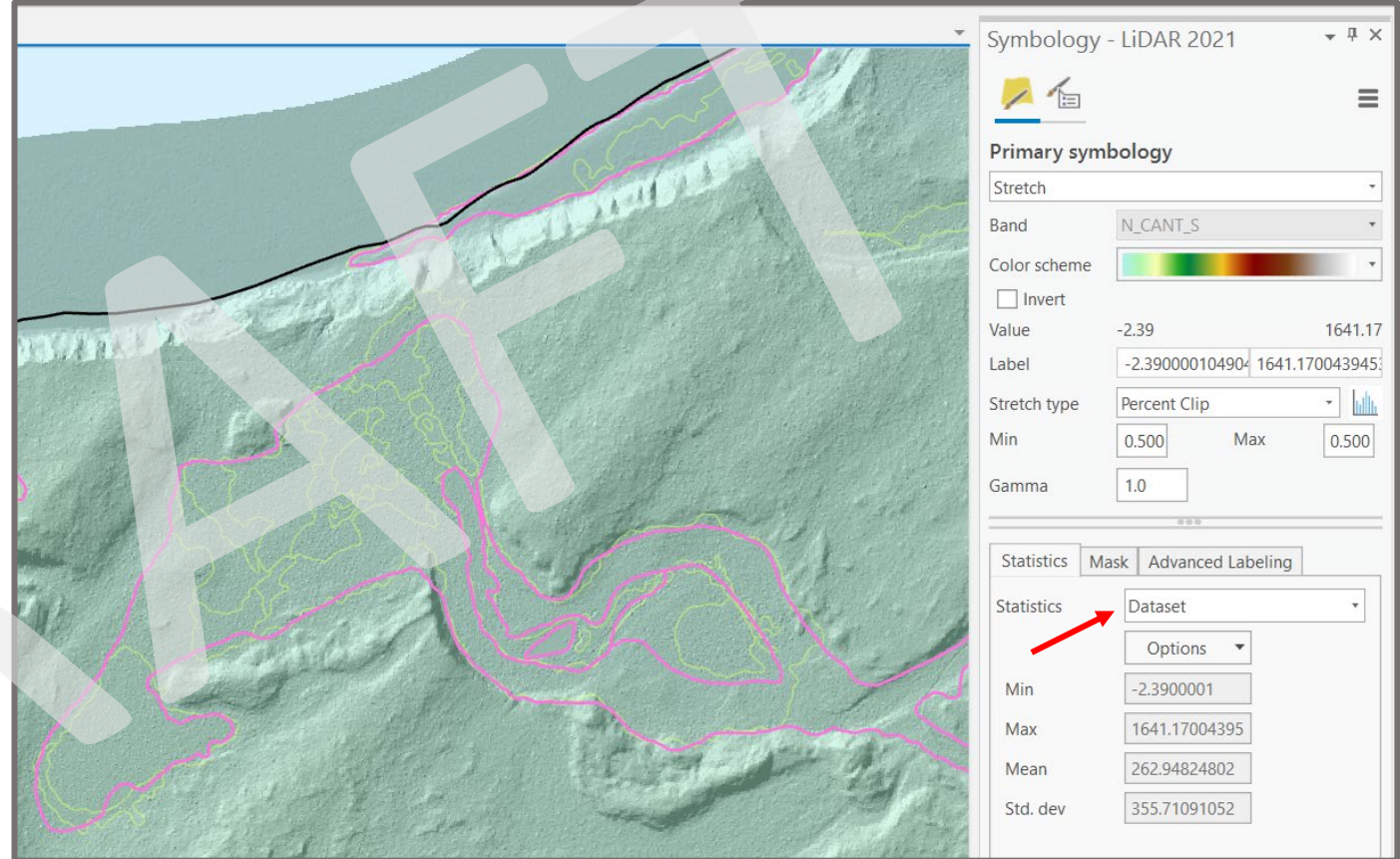
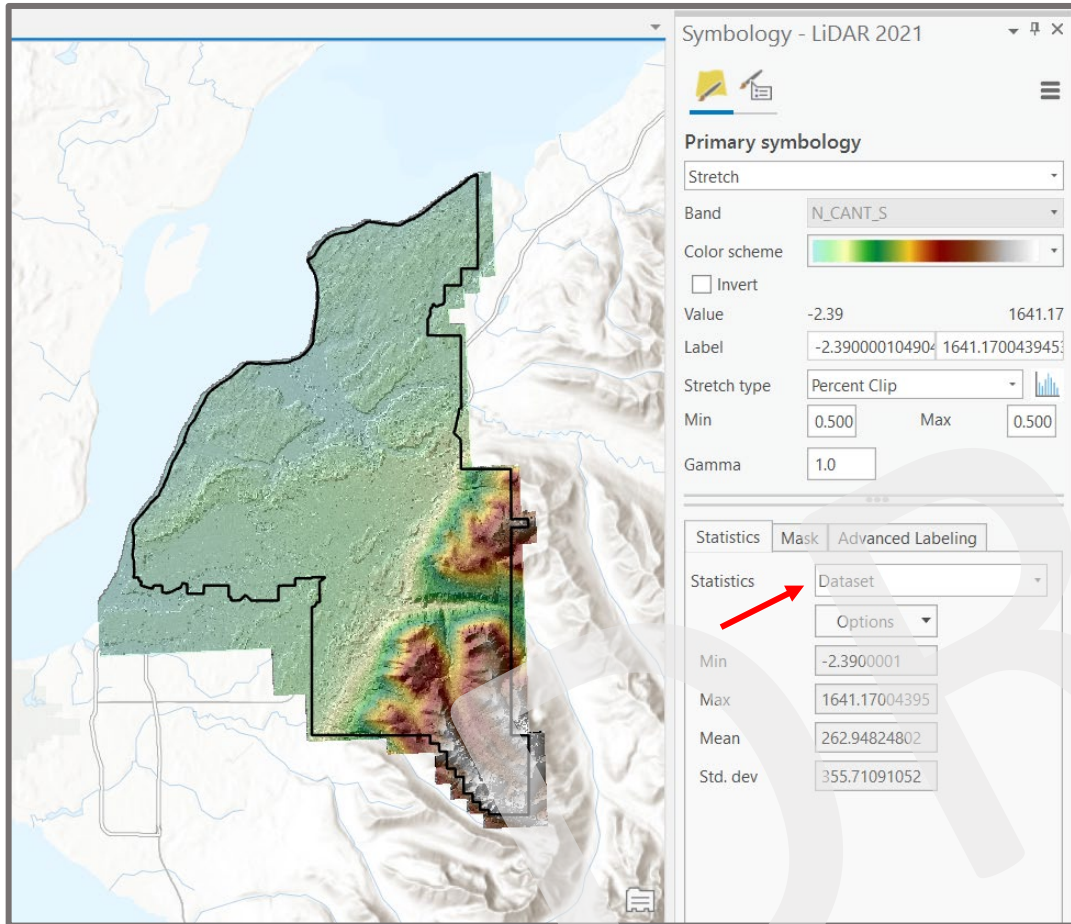
	OBJECTID *	SHAPE *	ATTRIBUTE	QAQC_CODE	WETLAND_TYPE	ACRES	GLOBALID *
1	708	Polygon	E2ABM	NNNNNN	Estuarine and Marine...	3.862535	{E81C0F60-CF2D-4CDE-8AAA-37943E56EE3A}
2	3964	Polygon	E2ABM	NNNNNN	Estuarine and Marine...	40.945027	{1128AC69-B336-42EE-BBA5-A476E1FAE67A}
3	3993	Polygon	E2ABM	NNNNNN	Estuarine and Marine...	4.110801	{CBA593CE-4DA6-44B4-B2AC-FC0A5252D87D}

0 of 3,413 selected Filters: 100%

charlie\_notes

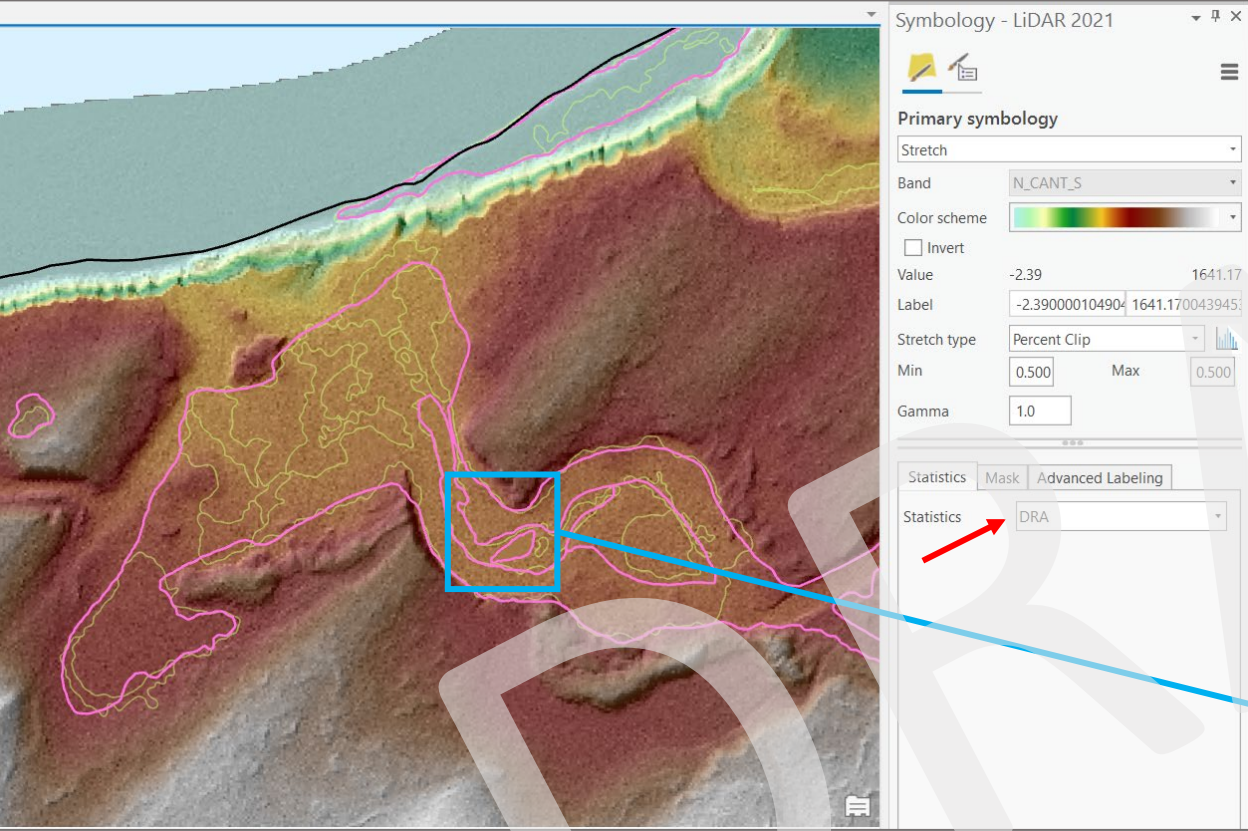
C. L. E. E. H. G. S. C. M. C.

# Static LiDAR

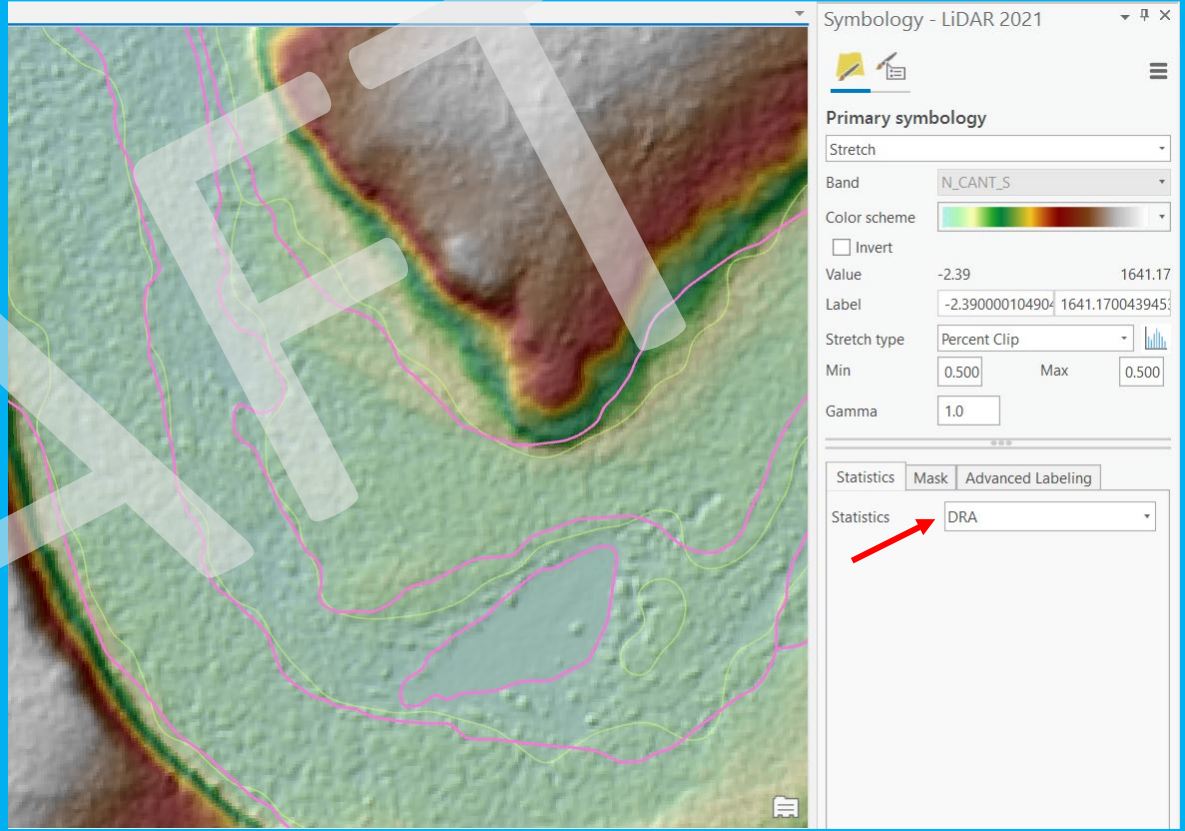




# Dynamic LiDAR



1:15,000




1:3,000

**LEGEND**

- JBER
- new mapping

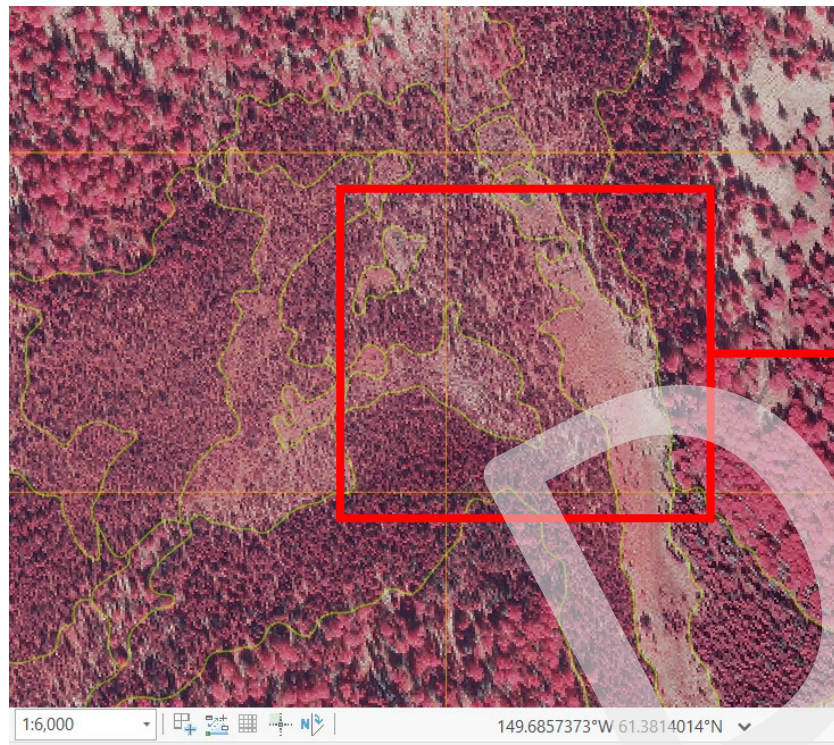


**LEGEND**

 new mapping

# Mapping to Scale

Use scale (1:6000)

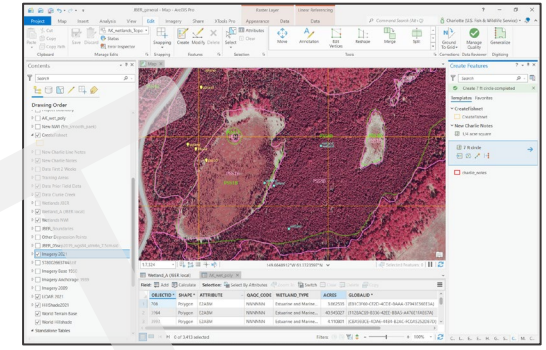
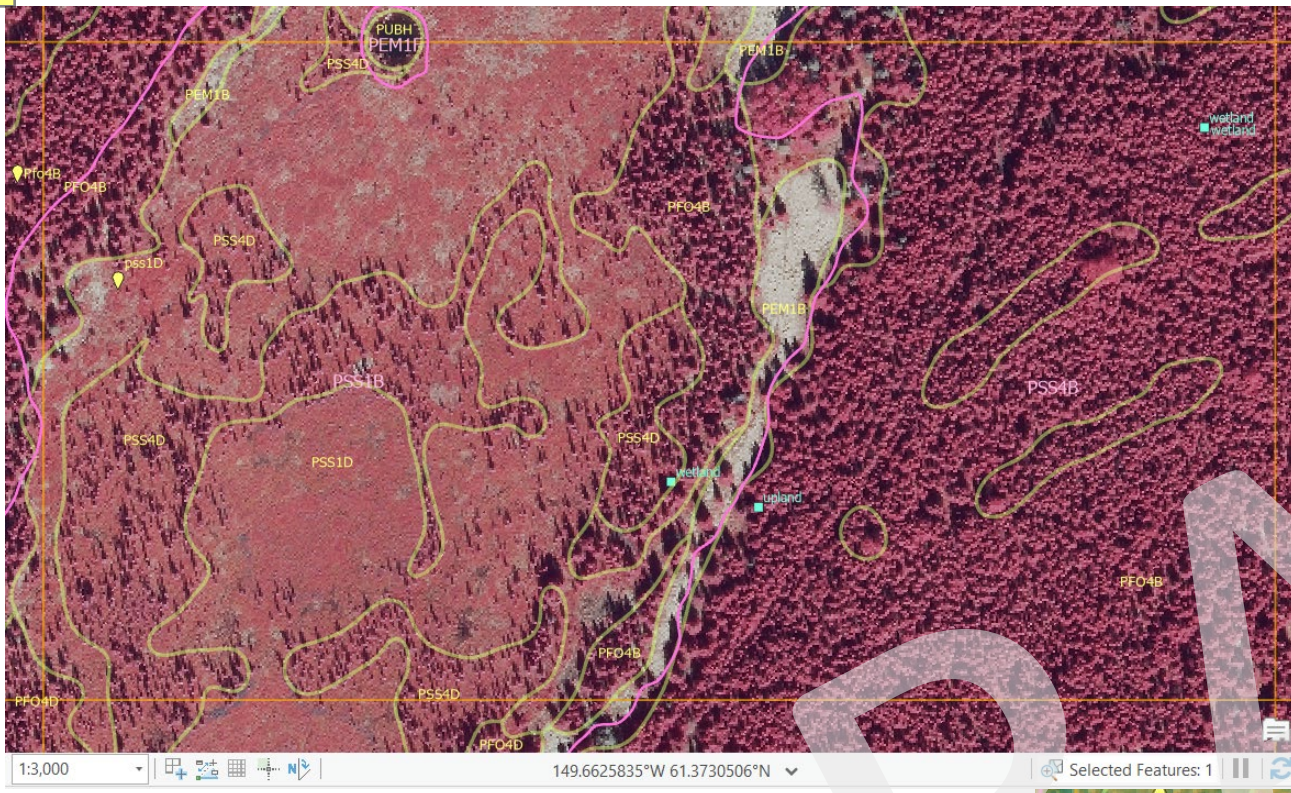


Digitizing scale (1:3000)

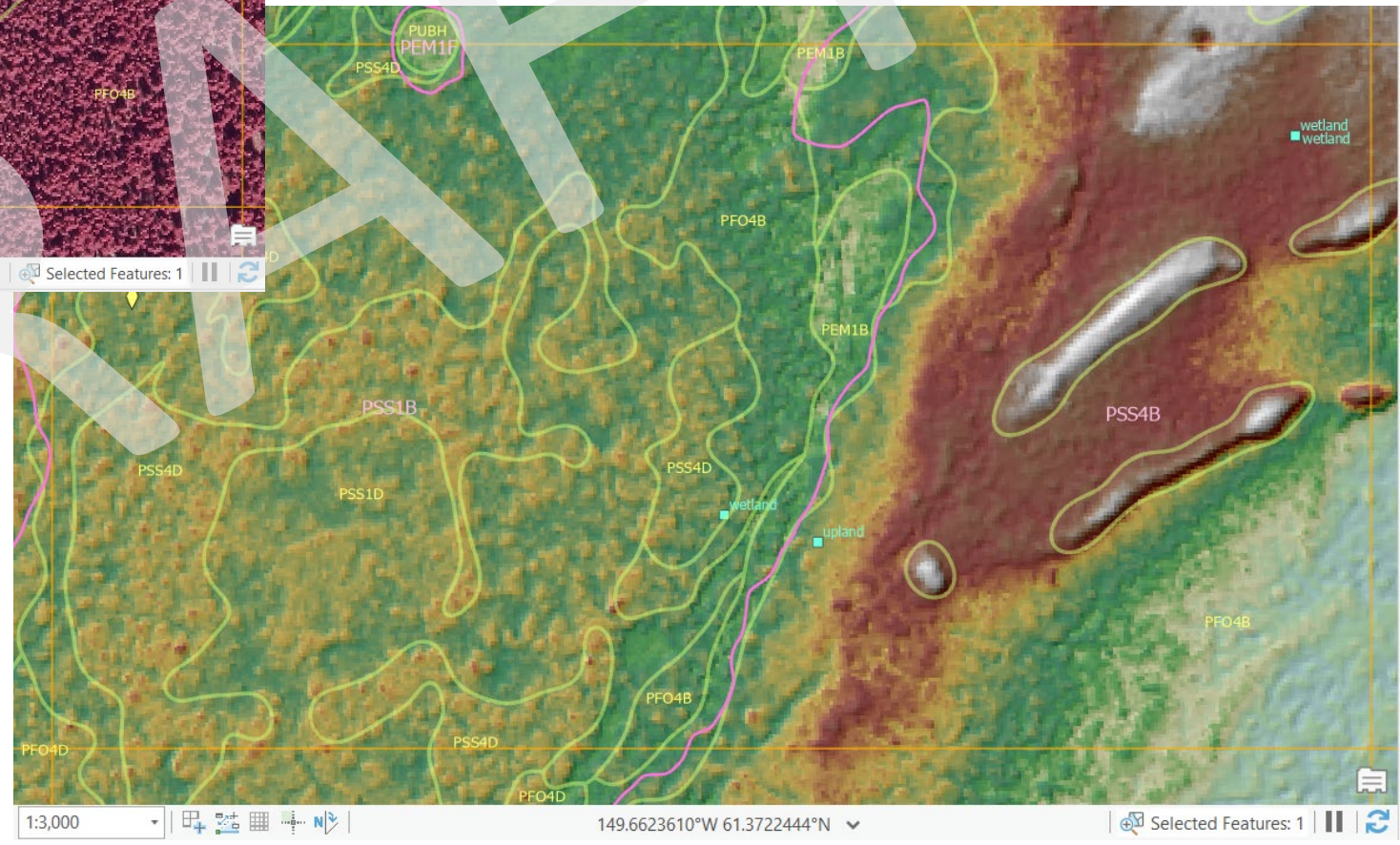


Too close (1:1000)





# Mapping with data



# Extrapolating from data

**Pop-up**

Data Points (1)  
<Null>

Data Points - <Null>

OBJECTID	55
NWI Code	upland
Dominant Vegetation	Cornus canadensis facu, not much sphagnum, low bush cranberry, black and white spruce mix (more black, but can't really distinguish well), hylacomium
Soil Characteristics	Bright, dry, cold
Hydrology Characteristics	Dry, don't see watermarks in depressions. Stopped

149.6629806°W 61.3728107°N

1 of 1

1

**Pop-up**

LiDAR 2021 (1)  
47.680000

LiDAR 2021 - 47.680000

Stretch.Pixel Value 47.680000

149.6629771°W 61.3728402°N

1 of 1

2

**Pop-up**

Data Points (1)  
0.049276

Data Points - 0.049276

OBJECTID	57
NWI Code	Pfo4B
Dominant Vegetation	Black spruce, some white spruce, Rhod groenlandicum, low bush cranberry, some fireweed, equisetum sylvaticum,
Soil Characteristics	Redox on top 7-8, hit cold
Hydrology Characteristics	<Null>
Additional	More sphagnum in

149.6625864°W 61.3727085°N

1 of 1

3

**Pop-up**

LiDAR 2021 (1)  
46.310001

LiDAR 2021 - 46.310001

Stretch.Pixel Value 46.310001

149.6625892°W 61.3727172°N

1 of 1

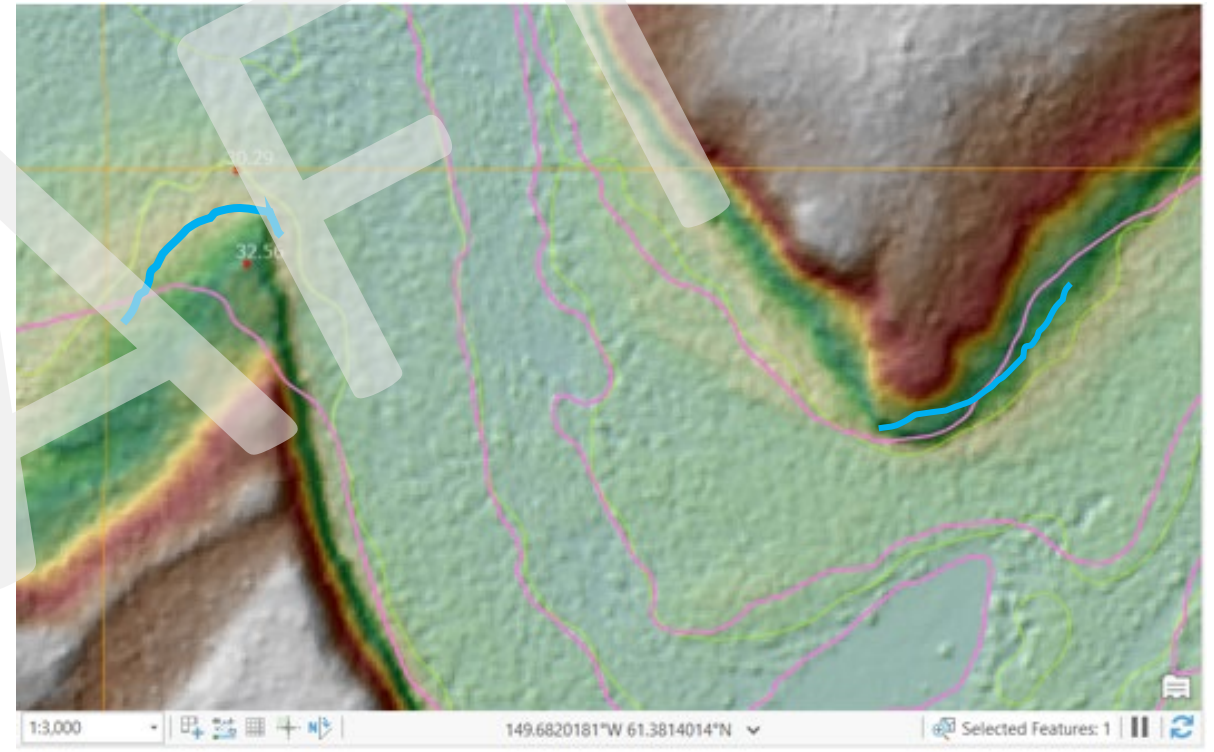
4



# CIR First, LiDAR for cleanup

**LEGEND**

- JBER
- new mapping



# Google Earth Reference



ArcGIS Pro interface showing a map of a wetland area. The map displays a red-toned satellite image with yellow outlines of wetland polygons. The 'Contents' panel on the left lists various layers, including 'AK\_wet\_poly' and 'Wetland\_A (JBER local)'. The 'Table of Contents' at the bottom shows a table with columns for OBJECTID, SHAPE, ATTRIBUTE, QAQC\_CODE, WETLAND\_TYPE, ACRES, and GLOBALID. The 'Locate' panel on the right is also visible.

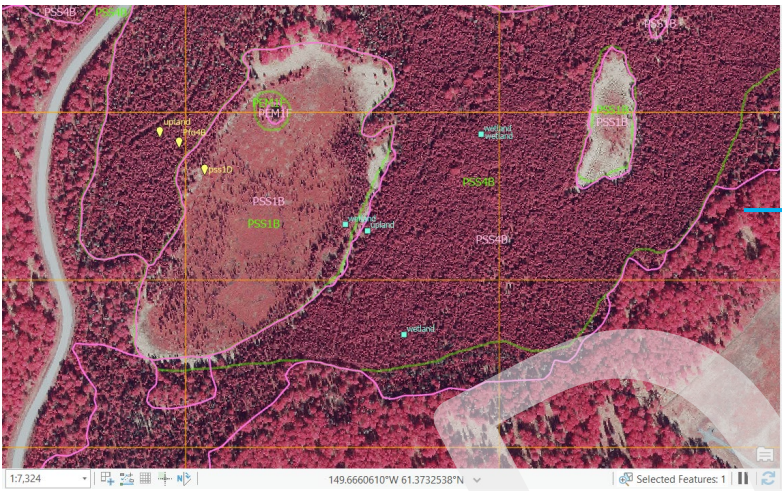
OBJECTID	SHAPE	ATTRIBUTE	QAQC_CODE	WETLAND_TYPE	ACRES	GLOBALID
1	708	Polygon	EZABM	NNNNNN	Estuarine and Marine...	3.862535 (E81C0F60-CF2D-4CDE-8AAA-37943E56EE3A)
2	3964	Polygon	EZABM	NNNNNN	Estuarine and Marine...	40.945027 (1128AC69-B336-42EE-BBA5-A476E1FAE67A)
3	3993	Polygon	EZABM	NNNNNN	Estuarine and Marine...	4.110801 (CBA593CE-4DA6-44B4-B2AC-FC0A5252D87E)

# Differences in CIR imagery



From left to right: PEM1B wetlands in 2021 imagery (149.8298369W 61.2827327N), 2019 imagery (149.5735241W 61.2741644N), and Google Earth May 2021 (149.5735241W 61.2741644N)

# Tracking work with a fishnet of polygons



JBER\_general - CreateFishnet - ArcGIS Pro

Project | Map | Insert | Analysis | View | Edit | Imagery | Share | XTools Pro | View | Appearance | Labeling | Data | Data

Class: Class 1 | Label Features In This Class:  | Field: note

Labeling: Font: Tahoma, Size: 10 pt, Style: Regular

Contents:

- NEW RIVERS
  - Project Boundary
  - AK\_wet\_poly
  - New NWI (5m\_smooth\_paek)
  - CreateFishnet
    - note
      - 1
      - 2
      - 3
      - <Null>
      - E
      - GE
      - L
      - QC1
      - QC2
      - QC3
      - QC4
      - QC5
      - RL
      - TBD
      - U
      - U1
      - U2
      - <all other values>
  - New Charlie Line Notes
  - Data First 2 Weeks
  - Training Areas
  - Data Prior Field Data
  - Data Clunie Creek
  - Wetlands JBER

Map View: 1:106,581 | 149.7445485°W 61.3848420°N | Selected Features: 0

Table View:

OBJECTID *	Shape *	Shape_Length	Shape_Area	note	cw_note
1	Polygon	2184.4208	270639.952	<Null>	<Null>
2	Polygon	2184.4206	270639.914	<Null>	<Null>
3	Polygon	2184.4206	270639.914	<Null>	<Null>
4	Polvnon	2184.4206	270639.914	<Null>	<Null>

Symbology - CreateFishnet

Primary symbology: Unique Values

Field 1: note

Color scheme: [Color selection]

Classes: Scales

Symbol	Value	Label
[Symbol]	1	1
[Symbol]	2	2
[Symbol]	3	3
[Symbol]	<Null>	<Null>
[Symbol]	E	E
[Symbol]	GE	GE
[Symbol]	L	L
[Symbol]	QC1	QC1
[Symbol]	QC2	QC2
[Symbol]	QC3	QC3
[Symbol]	QC4	QC4
[Symbol]	QC5	QC5
[Symbol]	oi	oi

Field: OBJECTID \* | Add | Calculate | Selection: Select By Attributes | Zoom To | Switch | Clear | Delete | Copy

0 of 5,127 selected | Filters: 100%



The screenshot displays the ArcGIS Pro interface for a project named 'JBER\_general - Map - ArcGIS Pro'. The main map area shows a satellite-style map with overlaid wetland data in various colors (red, yellow, green, blue). A large, semi-transparent watermark 'DRAFT' is centered over the map. A blue arrow points from the 'Polygon Errors' checkbox in the 'Drawing Order' panel to the map. Another blue arrow points from the 'QAQC\_CODE' column in the attribute table to the 'QAQC\_Tool\_Python.pyt' folder in the Catalog pane.

**Contents Panel (Left):**

- Map
  - World Terrain Reference
  - AK\_wetlands\_Topology
    - Dirty Areas
    - Point Errors
    - Line Errors
    - Polygon Errors
      - Exception
      - Error
  - JBER\_QC7\_STcoms
  - JBER\_QC6\_STcoms
  - JBER\_QC5\_STcoms
  - QC4\_coms\_ST
  - QC\_Delivery3
  - QC\_20221128
  - QC\_20221024
  - Data Points
  - Planned Field Sites
  - Data All data
  - New Rivers
  - Project Boundary
  - AK\_wet\_poly
  - New NWI (5m\_smooth\_paek)
  - CreateFishnet
  - New Charlie Line Notes
  - New Charlie Notes

**Table (Bottom):**

OBJECTID *	SHAPE *	ATTRIBUTE	QAQC_CODE	WETLAND_TYPE	ACRES	GLOBALID *
1	708	Polygon	E2ABM	NNNNNN	Estuarine and Marine...	3.862535 (E81C0F60-CF2D-4CDE-8A...
2	3964	Polygon	E2ABM	NNNNNN	Estuarine and Marine...	40.945027 (1128AC69-B336-42EE-BE...
3	3993	Polygon	E2ABM	NNNNNN	Estuarine and Marine...	4.110801 (CBA593CE-4DA6-44B4-B...

**Catalog Pane (Right):**

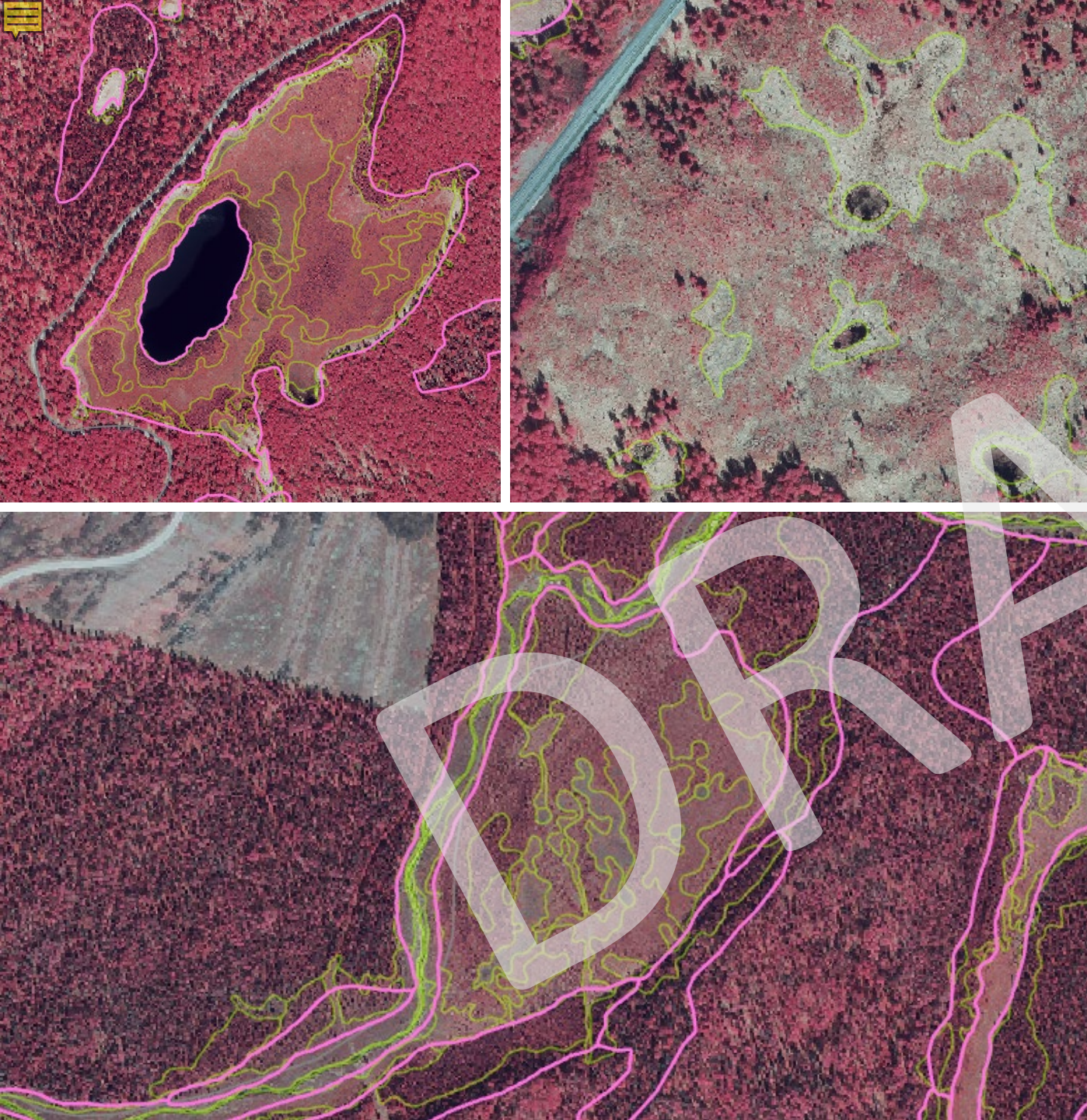
- Project Portal Favorites
  - Search Project
  - Maps
  - Toolboxes
    - JBER\_general.tbx
    - QAQC\_Tool\_Python.pyt
      - Combined Tools
        - Combined Riparian Tools
        - Combined Wetland and Riparian Tools
        - Combined Wetland Linear Tools
        - Combined Wetland Polygonal and Linear Tools
        - Combined Wetland Polygonal Tools
      - Individual Linear Tools
      - Individual Polygonal Tools
        - Adjacent Wetlands - Polygonal
        - Incorrect Wetlands Codes - Polygonal
        - Lake and Pond Size - Polygonal
        - Overlapping Wetlands - Polygonal
        - QAQC Code Reset - Polygonal
        - QAQC Summary - Polygonal
        - Sliver Uplands - Polygonal
        - Sliver Wetlands - Polygonal
        - Wetland Type Calculation - Polygonal
      - Individual Riparian Tools
  - Databases
  - Layouts
  - Styles
  - Folders
  - Locators



# Results



# Value added



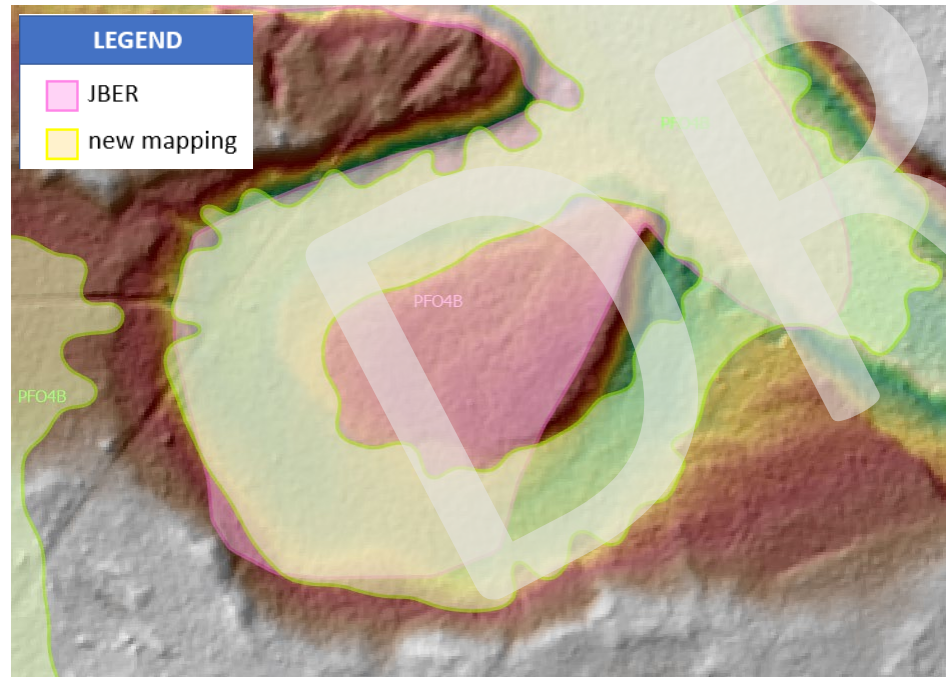
Wetlands Layer	Number of Wetlands	Acreage
JBER	1147	7420.85
Previous NWI	1046	7375.23
Updated NWI	3413	7177.51

- Added complexity to wetland complexes
- Captured some wetlands at .25 TMU that were not captured in prior mapping
- Lower acreage overall

# Removing PFO4B

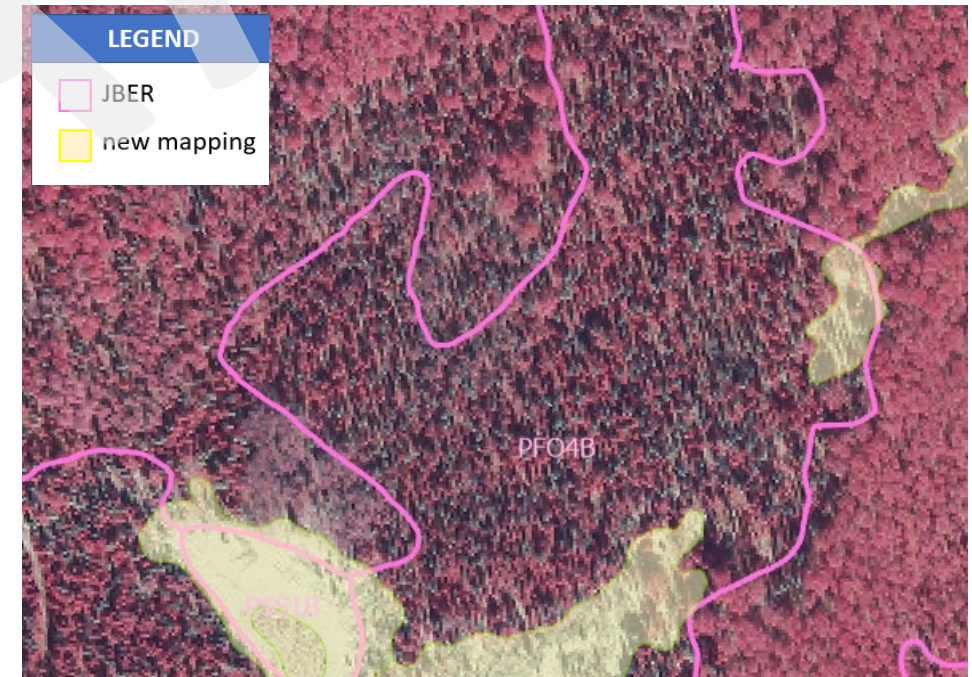
Wetlands Layer	PFO4B Acreage
JBER	1738.12
Previous NWI	1352.72
Updated NWI	1132.11

Inaccurate with elevation



Coordinates: 149.5903068W 61.3937222N

Dead white spruce signature



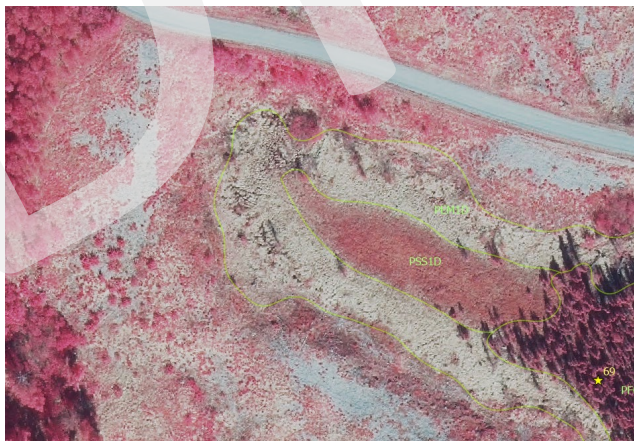
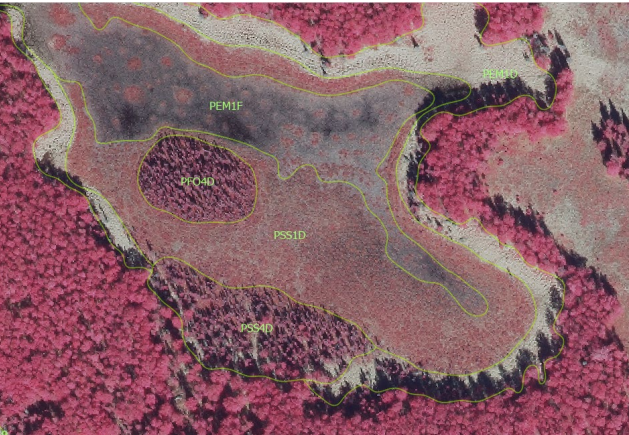
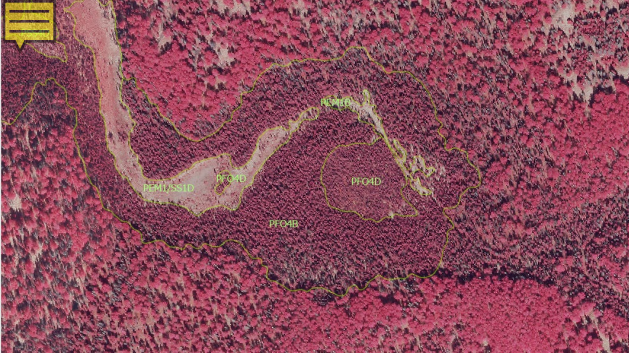
Coordinates: 149.7019037W 61.3473587N



# Signature Library Examples

PEM1F

PUBH



# 10 Most Common Codes

By occurrence:

1. PEM1D (422)
2. PFO4B (384)
3. PSS1D (372)
4. PEM1B (360)
5. PSS4D (292)
6. PEM1F (284)
7. PFO4D (182)
8. PUBH (114)
9. PSS1B (110)
10. PEM1C (98)

By acreage:

1. E2EM1N (1178)
2. PFO4B (1132)
3. PSS1D (628)
4. E2USN (486)
5. PSS4D (479)
6. PEM1D (313)
7. PFO4D (293)
8. L1UBH (248)
9. E2USM (217)
10. PEM1B (213)

# PEM1D

422 occurrences  
313.04 acres

23

## Signature #1: Bluejoint grass

### Description

- Emergent vegetation
- Water trails, intense saturation, or small pockets of open water.

### Common Species

Bluejoint grass (*Calamagrostis canadensis*), marsh five finger (*Comarum palustre*)

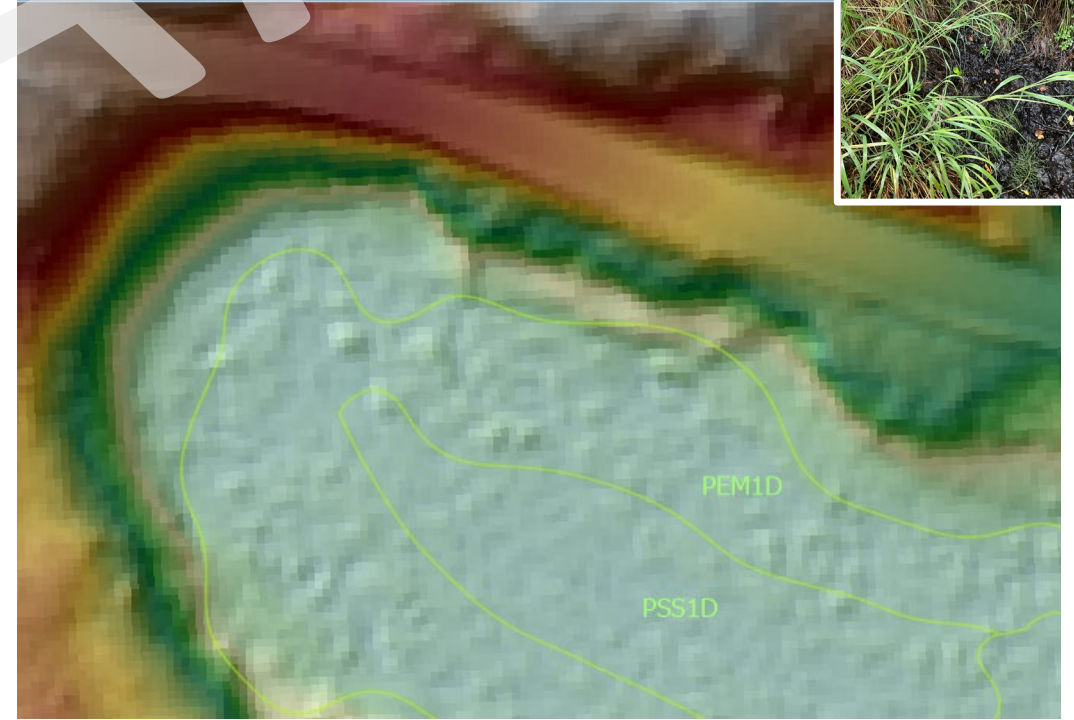
### Signature

- Tan color with dark patches
- Smooth texture

### Coordinates

149.7973014°W 61.2748889°N

Field photo: 149.6263011°W 61.3608833°N



# PEM1D

422 occurrences  
313.04 acres

## Signature #2: Wetland Complexes

### Description

- Areas in wetland complexes with smoother (not scrubby) texture that fell short of appearing flooded
- Shrubs likely present, but stunted and lower stature than emergent plants

### Common Species

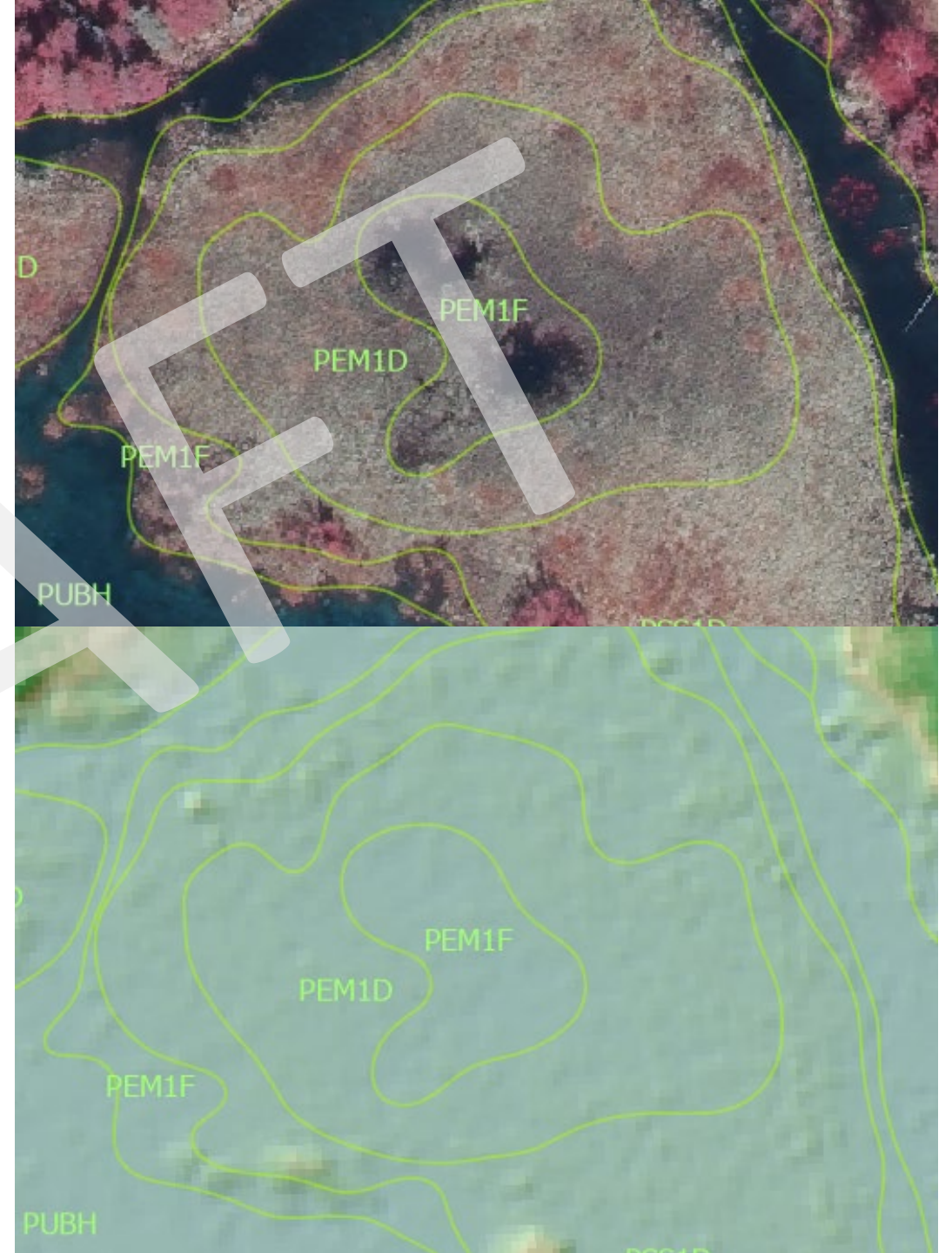
Bluejoint grass, marsh five finger, sedges (*Carex spp.*), sphagnum moss (*Sphagnum spp.*), *Equisetum spp.*, birch shrubs or saplings (*Betula spp.*), blueberry shrubs (*Vaccinium spp.*)

### Signature

- Grey color
- smooth texture

### Coordinates

149.7248568°W 61.2918668°N





# PFO4B

384 occurrences  
1132.11 acres

## Description

- Densely forested with live spruce
- Often border PFO4D as an outer edge to a wetland complex, but also occur in large, isolated swaths.

## Common Species

Black spruce (*Picea mariana*), white spruce (*Picea glauca*), bunchberry (*Cornus spp.*), sedges, currant/gooseberry (*Ribes spp.*), *Equisetum spp.*

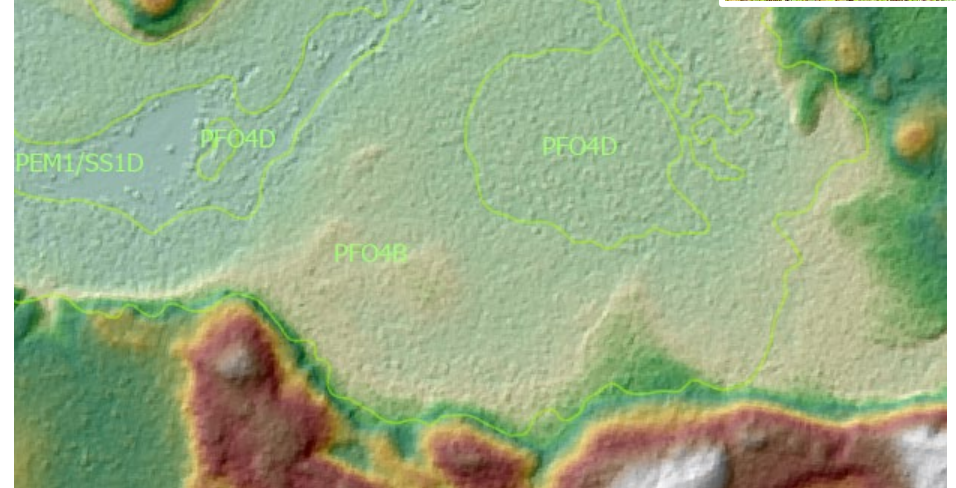
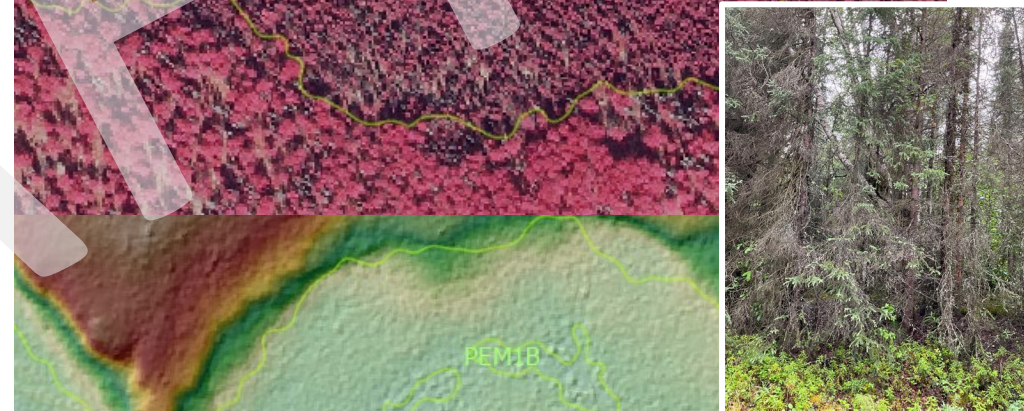
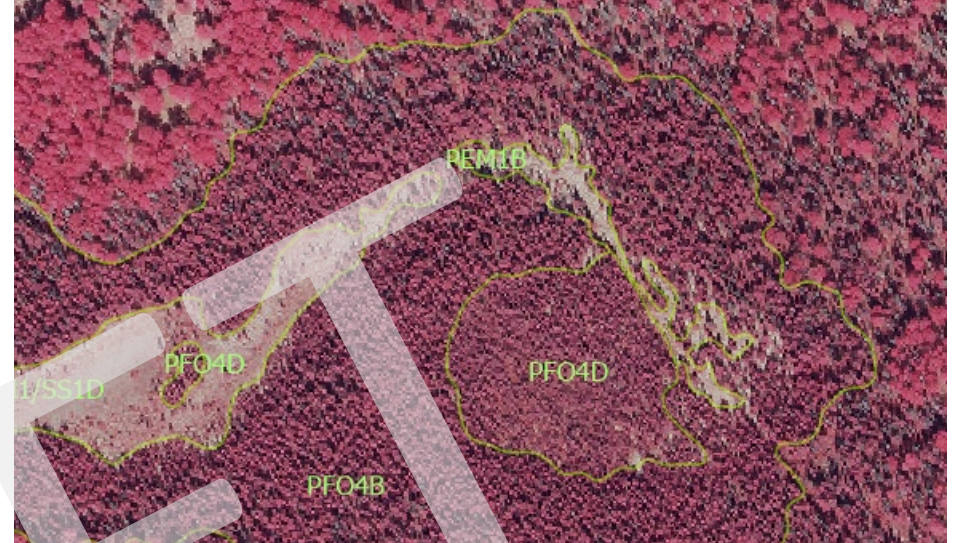
## Signature

- Spruce trees are densely packed circles of dark magenta and appear larger than the spruce trees in the PFO4D area
- Understory not visible between the trees
- PFO4B is slightly higher than PFO4D

## Coordinates

149.6751829°W 61.3795051°N

Field Photo: 149.6121026°W 61.3771587°N



# PSS1D

372 occurrences  
627.67 acres

## Description

- Areas with wetland shrubs and obvious saturation or pockets of standing water
- Often associated with larger wetland complexes which contain multiple wetland types, particularly bogs and fens.

## Common Species

Labrador tea (*Rhododendron spp.*), sweet gale (*Myrica gale*), leatherleaf (*Chamaedaphne calyculata*), bog-rosemary (*Andromeda polifolia*), dwarf birch (*Betula nana*)

## Signature

- Lighter speckled with tan and dark patches
- Texture rough overall
- Lowest part of the depression with the PEM1F area

## Coordinates

149.7689739°W 61.2745514°N





# PEM1B

360 occurrences  
213.45 acres

## Description

- Dominated by bluejoint grass
- Hydrology moist with organic soils, without standing water during the growing season
- Generally along edges of wetland complexes as transition zones to upland areas, in isolated areas in depressions or on mild slopes, or as connective areas between other wetland types

## Common Species

Bluejoint grass

## Signature

- Tan in color and smooth texture
- Area is situated in a depression.

## Coordinates

149.7918661°W 61.2760635°N



# PSS4D

292 occurrences  
478.78 acres

28

## Description

- Inundated areas that cause black spruce to grow short and stunted
- Complete saturation and/or standing water common along with sphagnum mats and organic soils
- Often occur in bog/fen wetland complexes

## Common Species

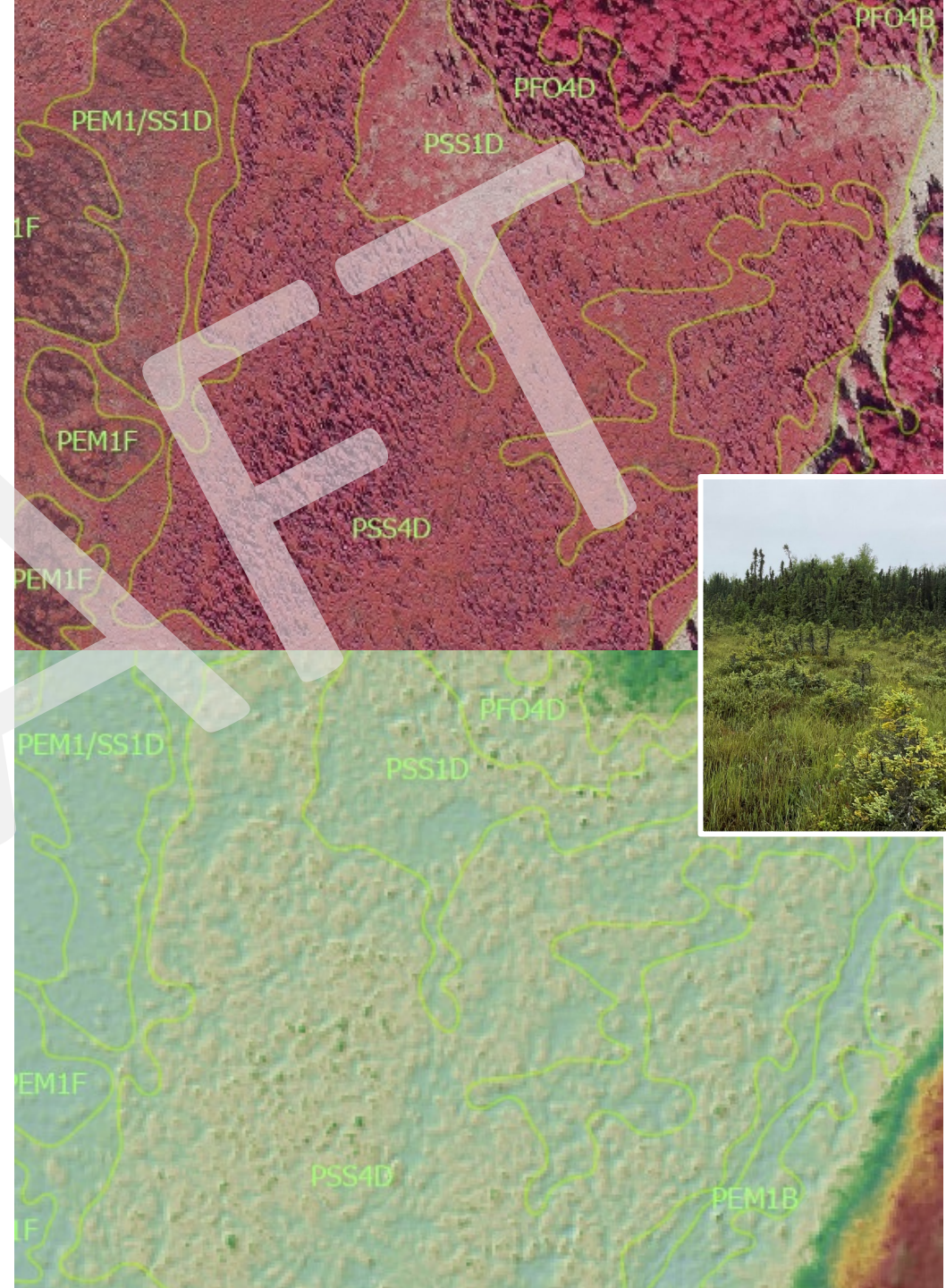
Black spruce, sedges, dwarf birch, labrador tea, sweet gale

## Signature

- Very rough textured with dark magenta “triangles” above smoother lighter-colored understory
- Mildly elevated compared to adjacent wetlands with microtopography
- Overall area is in a large depression

## Coordinates

149.6125148°W 61.3745309°N



# PEM1F

284 occurrences  
173.26 acres

## Description

- Obvious surface water or complete saturation
- Often found near permanently flooded or saturated areas, generally in the middle of wetland complexes

## Common Species

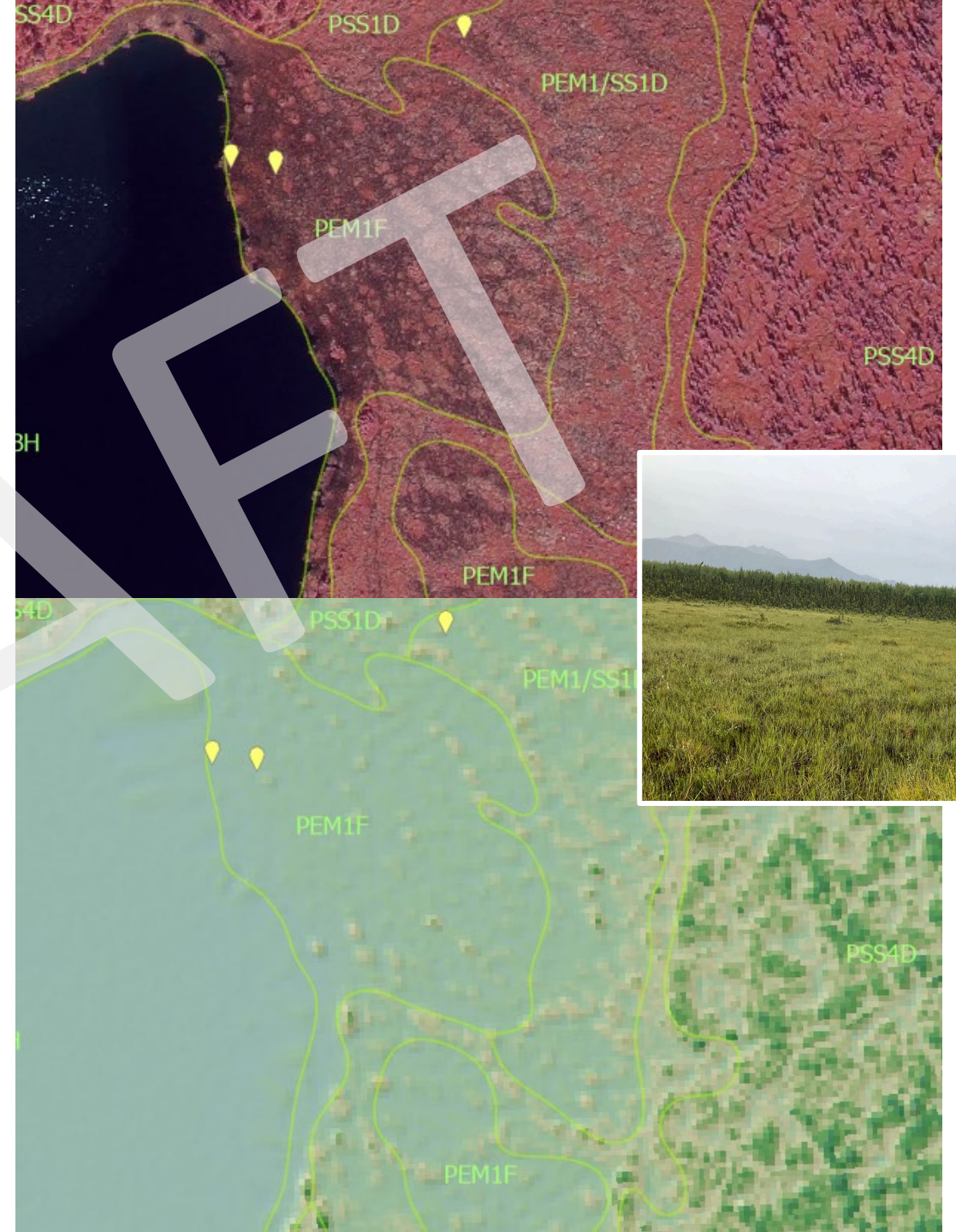
Cotton-grass (*Eriophorum spp.*), sedges, marsh five finger, sphagnum moss, buck-bean (*Menyanthes trifoliata*), sweet gale, leatherleaf

## Signature

- Dark area with smooth texture and pink mottles, adjacent to various other wetland types/textures
- Occurs in patches with lowest elevation.

## Coordinates

149.6144798°W 61.3750751°N



# PFO4D

182 occurrences  
293.13 acres

## Description

- Black spruce forests with thinner and shorter trees, suggesting growth limits from wetter hydrology
- Occur in smaller swaths than PFO4B, generally bordering wetland complexes at low elevation
- Sphagnum moss grows in the valleys of microtopography, soils are organic, and there is little white spruce

## Common Species

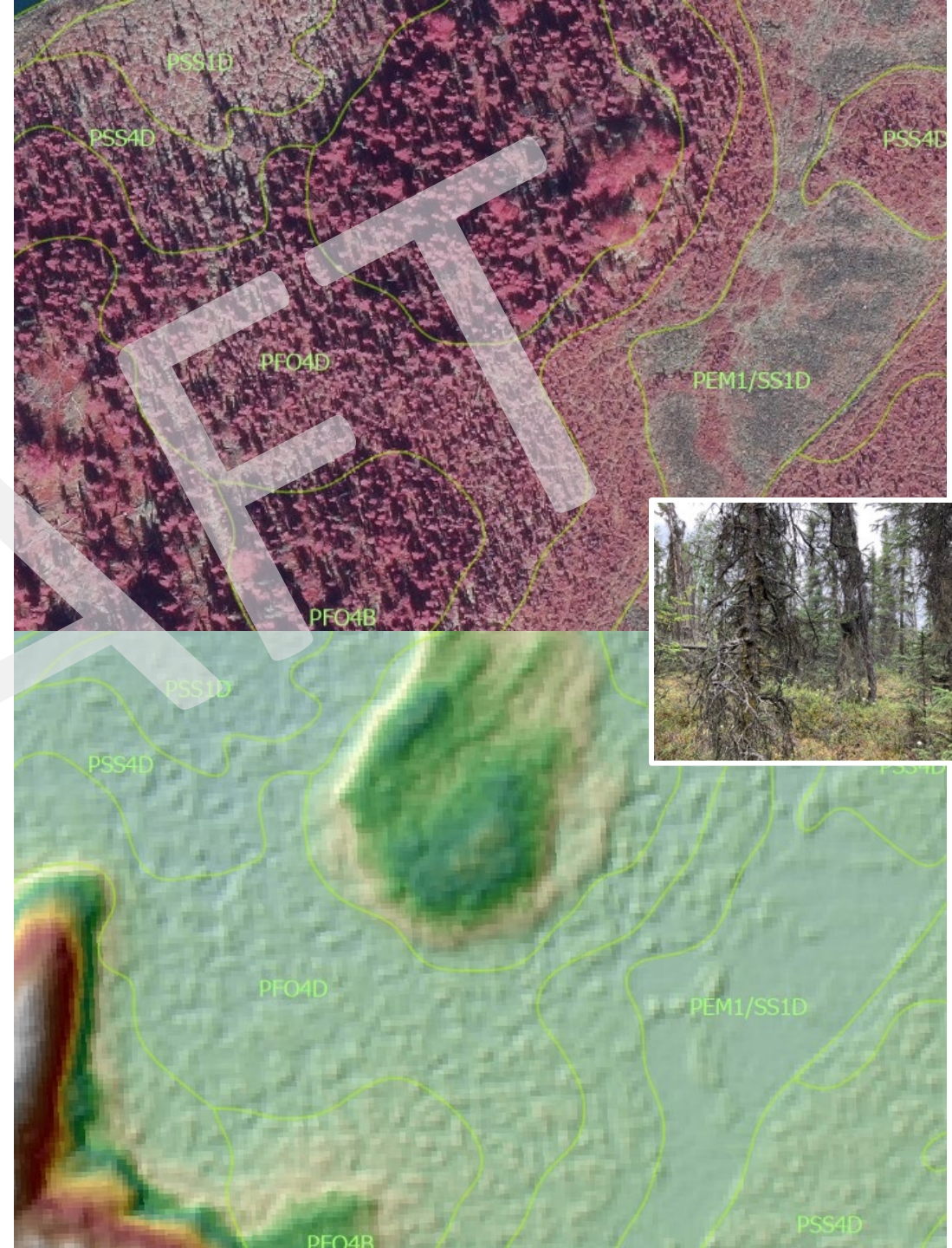
Black spruce, Labrador tea, bunchberry, sedges, currant/gooseberry, *Equisetum spp.*

## Signature

- Smaller black spruce trees with light magenta understory similar to PSS1D signature
- PFO4D connects other wetland types with “D” water regime
- Trees appear taller than those in PSS4D signature.

## Coordinates

149.8169190°W 61.2823616°N



# PUBH

114 occurrences  
162.88 acres

## Description

- Non-vegetated wetlands smaller than 20 acres (ponds)
- May have small pockets of vegetation or aquatic beds that are either not visible in the imagery or do not reach 30% cover across the mapping unit

## Common Species

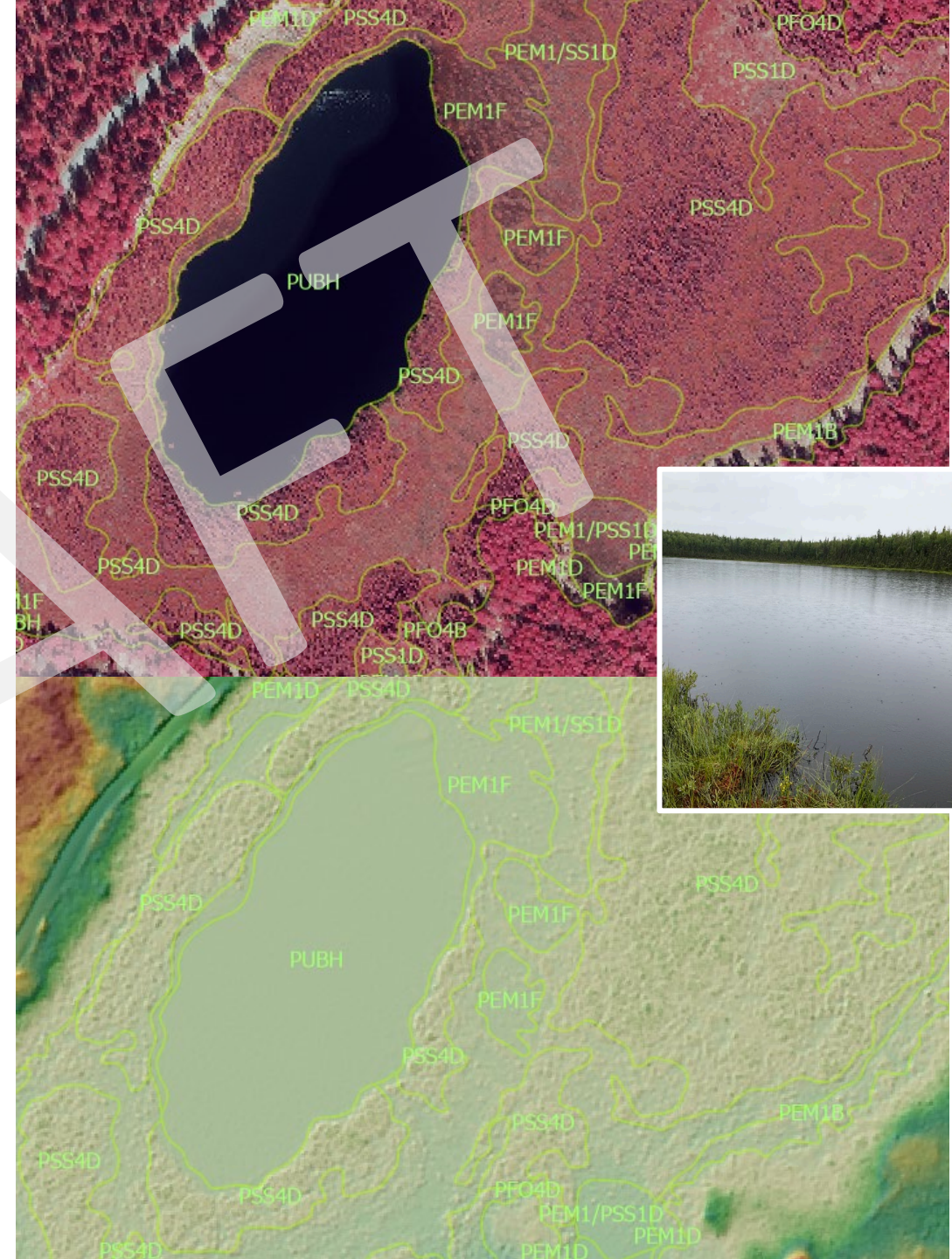
Predominately unvegetated, but sporadic obligate species may be present.

## Signature

- PUBH area is a large dark oval area
- Imagery matches the smooth, lowest elevation area in LiDAR

## Coordinates

149.6159323°W 61.3742543°N





# PSS1B

110 occurrences  
193.68 acres

## Description

- Scrubby and often border uplands
- Inclusion informed by prior mapping, elevation data, and association with other wetlands

## Common Species

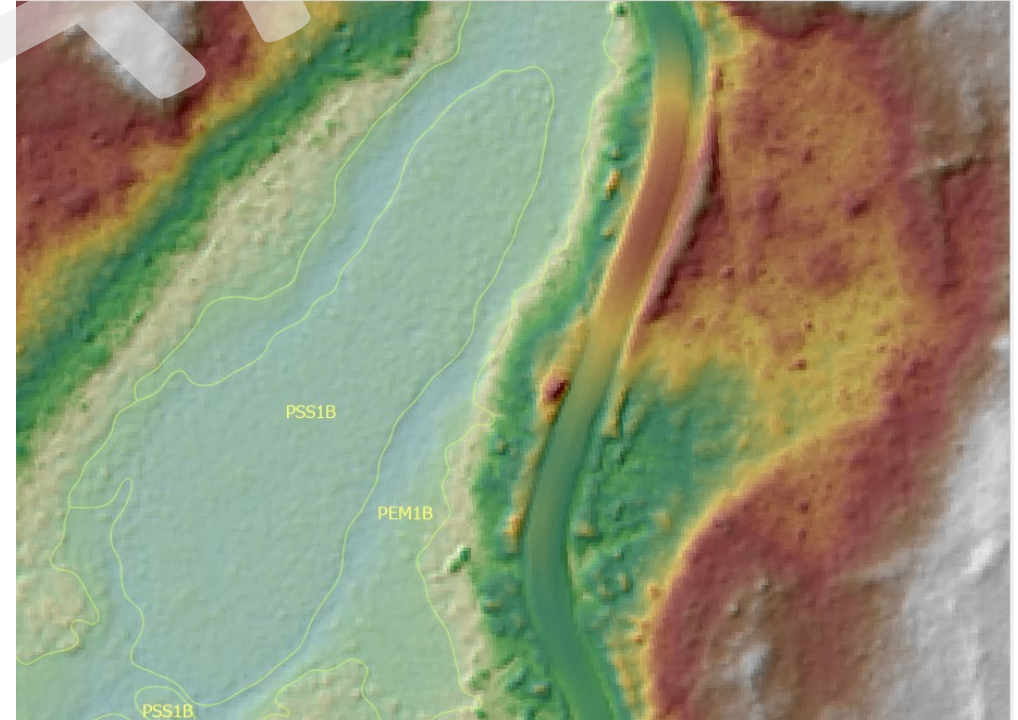
Dwarf birch, Alaska paper birch (*Betula neoalaskana*, stunted), Labrador tea, blueberry shrubs, sedges, bluejoint grass

## Signature

- Rough textured from scrubby vegetation
- light pink and tan in color
- Slightly elevated in the middle of a depression which contains other wetlands.

## Coordinates

149.6016671°W 61.3758199°N







# PEM1C

98 occurrences  
23.73 acres

## Description

- Show signs of flooding in current imagery, but historical imagery showed varying flood state, revealing underlying vegetation
- Generally associated with small depressions along the edges of bluejoint grass fields.

## Common Species

Bluejoint grass

## Signature

- Very dark smooth texture from standing water, with speckles of tan grass.

## Coordinates

149.8300017°W 61.2783189°N





# Specific Cases

# Copying in below TMU

Some areas were directly copied in because prior mapping was done below the TMU for this project

## LEGEND

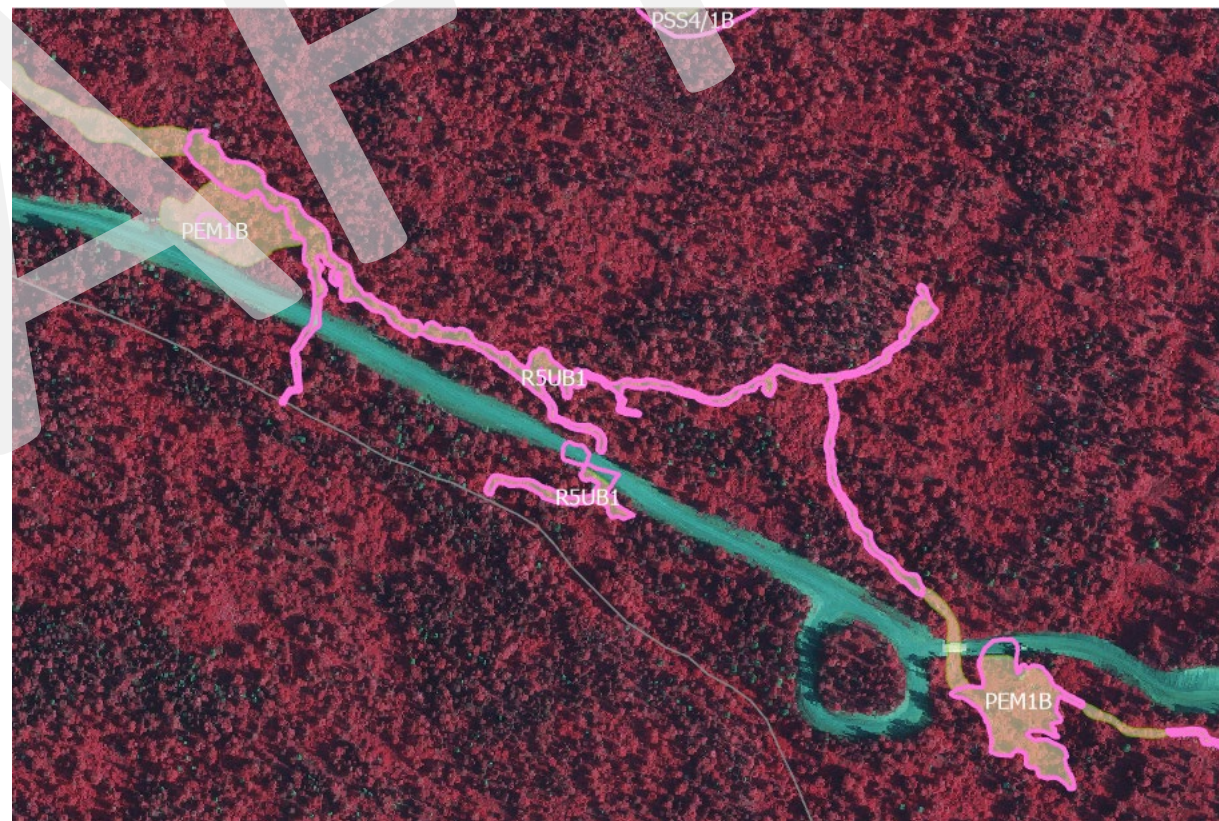
- JBER
- new mapping

Alpine wetlands



149.6314640°W 61.1666611°N

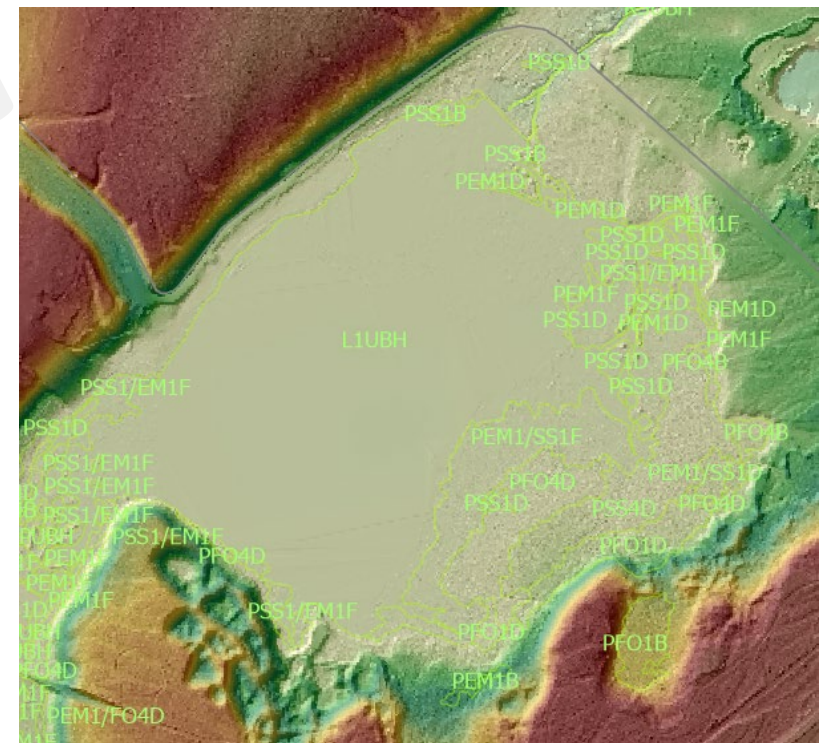
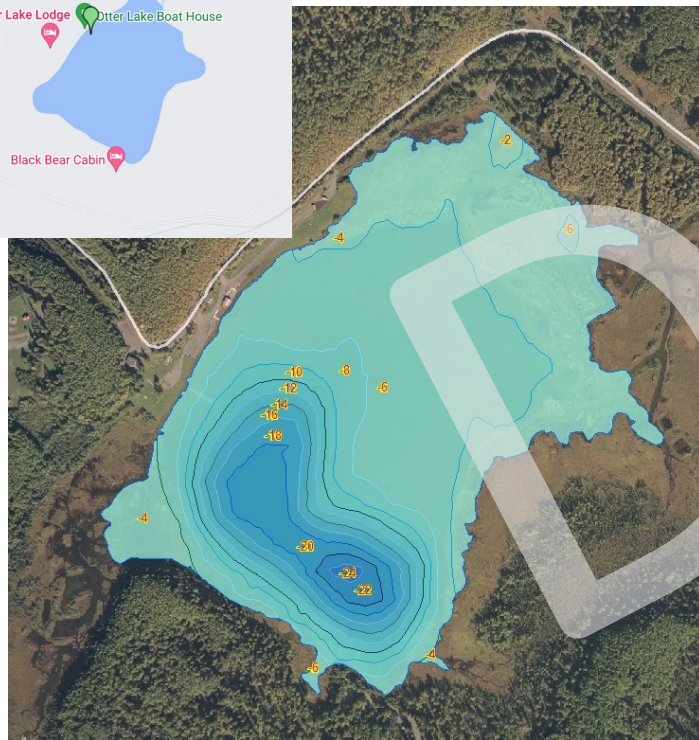
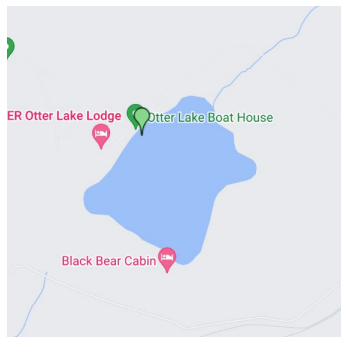
Prior JD



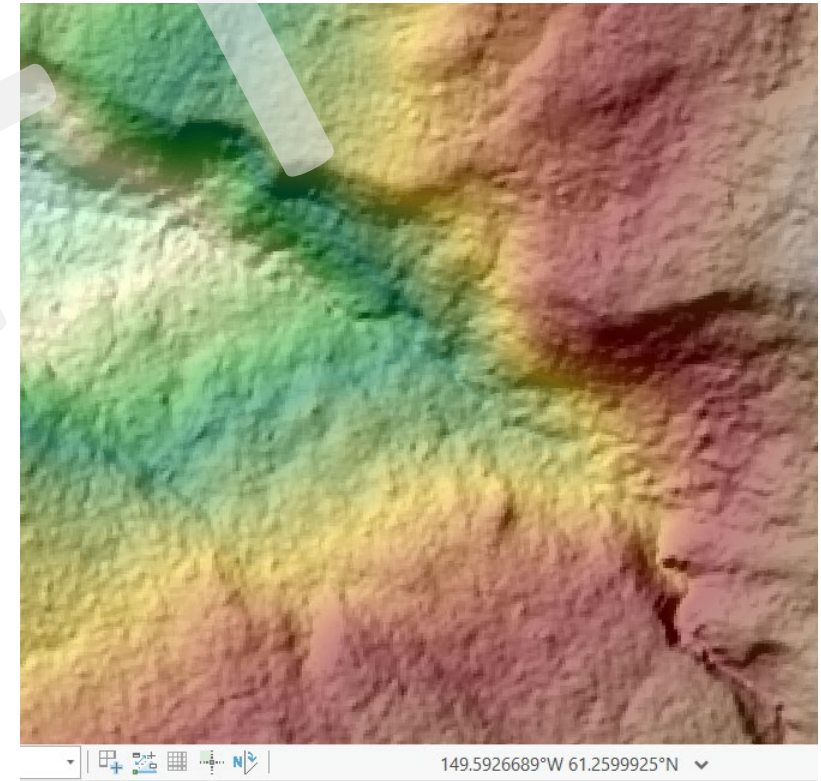
149.6750326°W 61.1904530°N

# Lacustrine Areas - Limnetic or Littoral?

Data from the Alaska Lake Database ([http://www.adfg.alaska.gov/SF\\_Lakes/](http://www.adfg.alaska.gov/SF_Lakes/)) informed whether lacustrine areas were above or below the 2.5 meter cutoff for limnetic (above) vs. littoral (below) classification.



# Wetlands not visible in imagery





# Future Work

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- Eagle River Flats
- Alpine
- Difficult PFO4B areas

This inventory defaulted to assigning areas that met certain photo interpretive characteristics as wetlands– it is likely on the ground determinations will find upland areas, especially in the B water regimes, or wetlands that were not captured



# Summary

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- Roughly 3400 wetland polygons, as opposed to ~1100
- Value added
  - Complexity
- Signature library
  - Full signature library available as appendix in final report
- Future work
  - Did not access Eagle River Flats
  - Difficult areas remain
  - Likely upland areas within inventory



Let us discuss!

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