JBER Signature Library

Charlie Weiss

April 9, 2023

1 CONTENTS

2 INTRODUCTION

This signature library is meant to assist the public and/or future data producers with understanding the relationship between on the ground wetland conditions and aerial imagery signatures on Joint Base Elmendorf Richardson. It is meant as a dynamic document; each item has a representative CIR and LiDAR signature, but may be missing a field photo due to lack of availability. Field photos and/or signatures may be updated from future field work.

3 PEM1

3.1 PEM1B – Seasonally Saturated

3.1.1 Description

This community is dominated by bluejoint grass (*Calamagrostis canadensis*). Hydrology was moist with organic soils, without standing water during the growing season. These generally occurred 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.

3.1.2 Common Species

Bluejoint grass

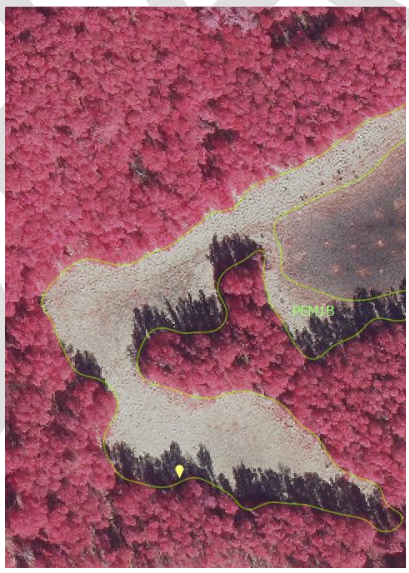
3.1.3 Signature

Description
PEM1B is tan in color with a smooth texture. Area is situated in a depression.

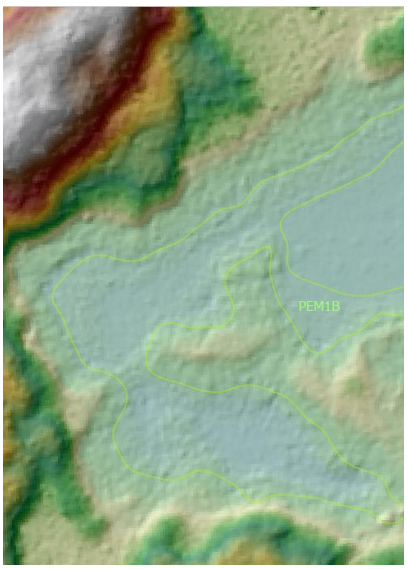
Coordinates
149.7918661°W 61.2760635°N

Field photo

2021 CIR



2021 LiDAR



3.2 PEM1C – SEASONALLY FLOODED

3.2.1 Description

PEM1C areas show signs of flooding in current imagery, but historical imagery showed varying flood state, revealing underlying vegetation. They were generally associated with small depressions along the edges of bluejoint grass fields.

3.2.2 Common Species

Bluejoint grass

3.2.3 Signature

Description

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

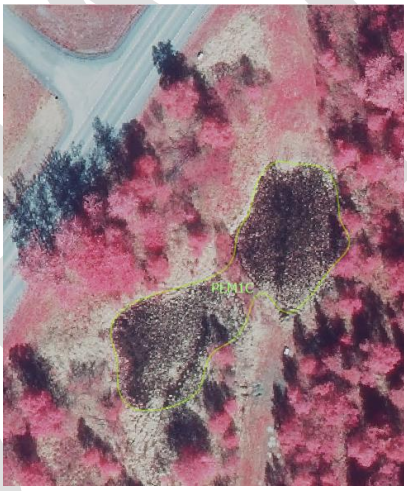
Coordinates

149.8300017°W 61.2783189°N

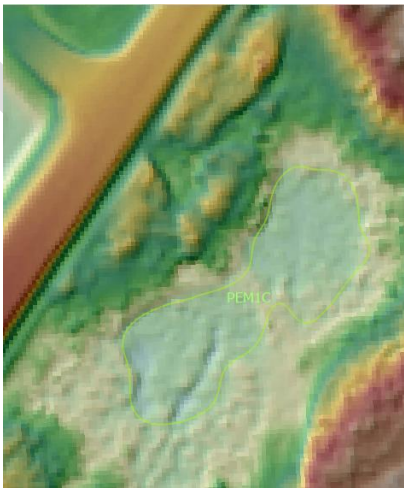
Field photo

FIELD PHOTO NOT AVAILABLE

2021 CIR



2021 LiDAR



3.3 PEM1D – CONTINUOUSLY SATURATED

3.3.1 Description

PEM1D communities comprised emergent vegetation with water trails, intense saturation, or small pockets of open water. Bluejoint grass fields were assigned PEM1D rather than PEM1B when there were isolated patches or trails of surface water visible in the imagery. Some areas in wetland complexes were assigned PEM1D if they had smoother (not scrubby) texture but fell short of appearing flooded. Shrubs are likely present in these areas, but are stunted and lower stature than the emergent plants.

3.3.2 Common Species

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

3.3.3 Signature

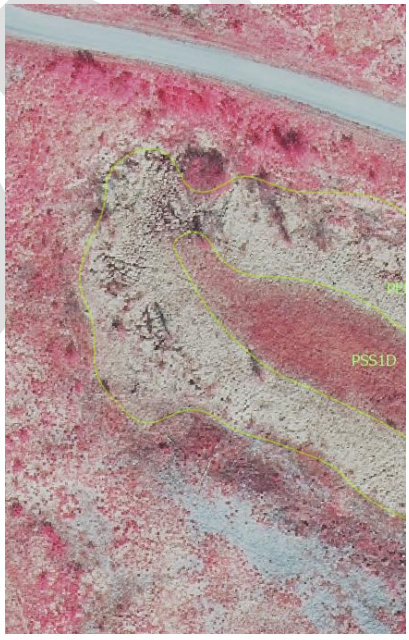
Example 1: Bluejoint Grass

Description
Tan color and smooth texture from bluejoint grass with dark patches of open water visible. Situated in a depression.

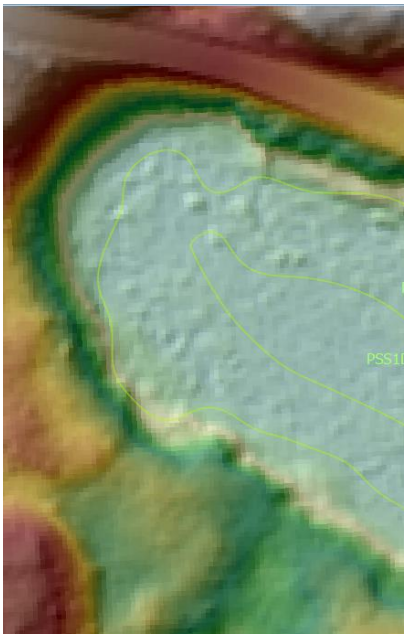
Coordinates
149.7973014°W 61.2748889°N
Field photo: 149.6263011°W 61.3608833°N

Field photo

2021 CIR



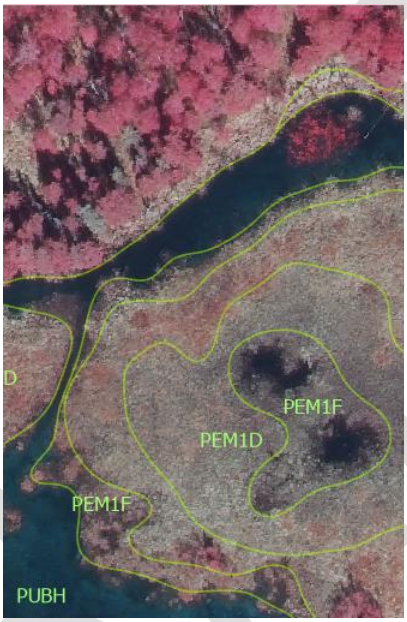
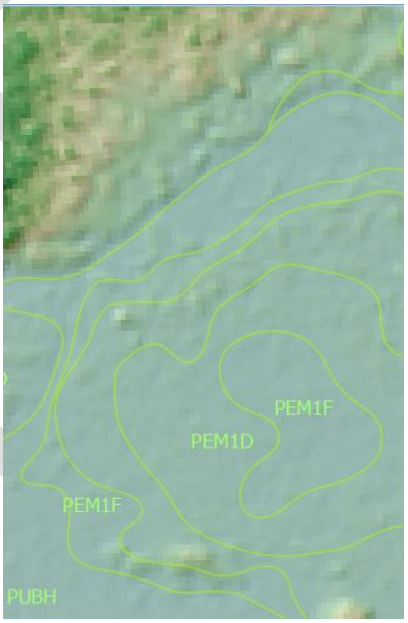
2021 LiDAR



Example 2: Wetland Complex

Description
Grey color and smooth texture from saturated emergent vegetation adjacent to more inundated area.

Coordinates
149.7248568°W 61.2918668°N

Field photo	2021 CIR	2021 LiDAR
FIELD PHOTO NOT AVAILABLE		

3.4 PEM1F – Semi-permanently Flooded

3.4.1 Description

PEM1F areas had obvious surface water or complete saturation. They were often found near permanently flooded or saturated areas, generally in the middle of wetland complexes. Bare ground (muddy) areas may exist if water is not present. Stunted shrubs are often present in low amounts.

3.4.2 Common Species

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

3.4.3 Signature

Description

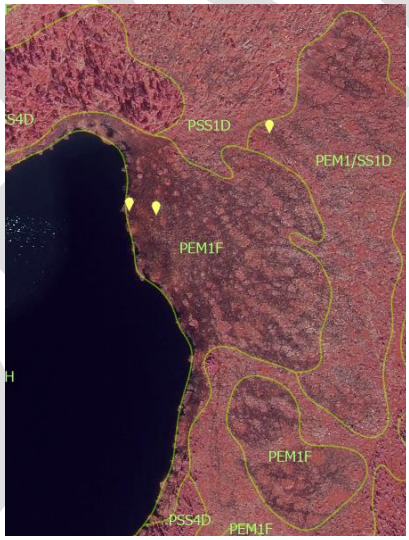
Dark area with smooth texture and pink mottles, adjacent to various other wetland types/textures. PEM1F occurs in patches with lowest elevation.

Coordinates

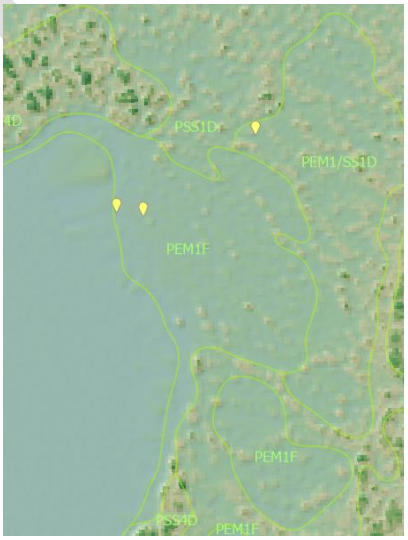
149.6144798°W 61.3750751°N

Field photo

2021 CIR



2021 LiDAR



4 PSS1

4.1 PSS1A – Temporarily Flooded

4.1.1 Description

PSS1A is assigned to areas adjacent to rivers with sparse scrubby vegetation. These are often a mix of pioneering upland species and wetland species. LIDAR data show historic channels and lower elevation overall compared to adjacent upland areas. Some PSS1A areas have water flowing through in smaller channels.

4.1.2 Common Species

Willows (*Salix spp.*), broad-leaf fireweed (*Chamaenerion latifolium*)

4.1.3 Signature

Description

Area is pale pink and rough textured with some larger pink shrubs scattered throughout. LiDAR shows smooth feature overall with historic (and/or current) smaller watercourse cutting through. Area is adjacent to river and R3USC area.

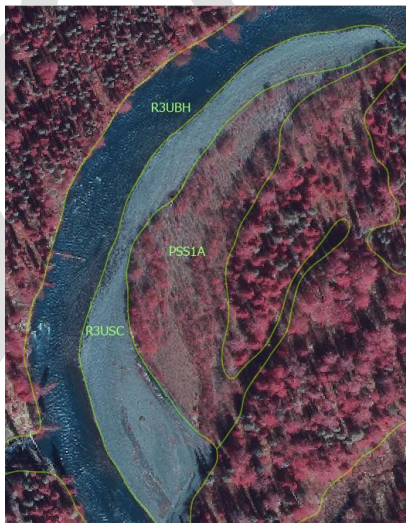
Coordinates

149.6395909°W 61.3142476°N

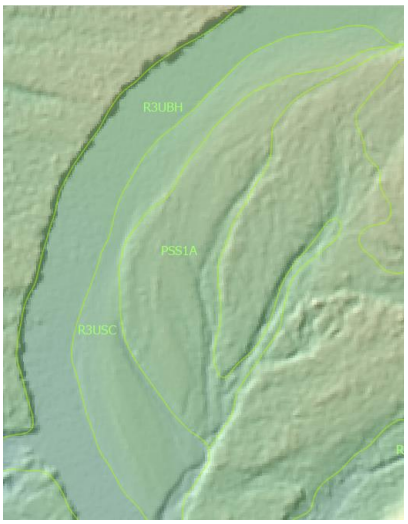
Field photo

FIELD PHOTO NOT AVAILABLE

2021 CIR



2021 LiDAR



4.2 PSS1B – SEASONALLY SATURATED

4.2.1 Description

PSS1B is assigned to areas that are scrubby and often border uplands. The decision to include these areas in the NWI is informed by prior mapping, elevation data, and association with other wetlands. PSS1B signatures may be confused on JBER with moose-browsed scrubby areas or areas previously cleared for training or development.

4.2.2 Common Species

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

4.2.3 Signature

Description

Area is rough textured from scrubby vegetation and light pink and tan in color. PSS1B area is slightly elevated in the middle of a depression which contains other wetlands.

Coordinates

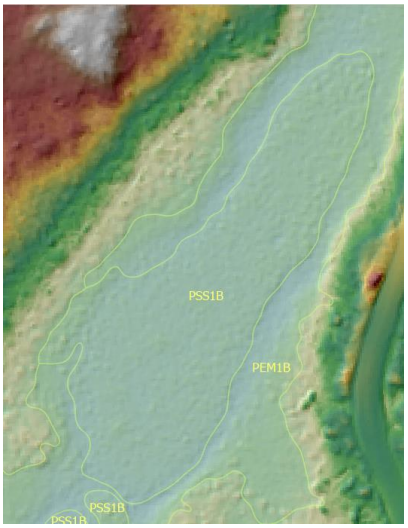
149.6016671°W 61.3758199°N

Field photo: 149.6750813°W 61.2452704°N

Field photo

2021 CIR

2021 LiDAR



4.3 PSS1D – CONTINUOUSLY SATURATED

4.3.1 Description

PSS1D is assigned to areas with wetland shrubs and obvious saturation or pockets of standing water. They are often associated with larger wetland complexes which contain multiple wetland types, particularly bogs and fens.

4.3.2 Common Species

Labrador tea, sweet gale, leatherleaf, bog-rosemary (*Andromeda polifolia*), dwarf birch

4.3.3 Signature

Description

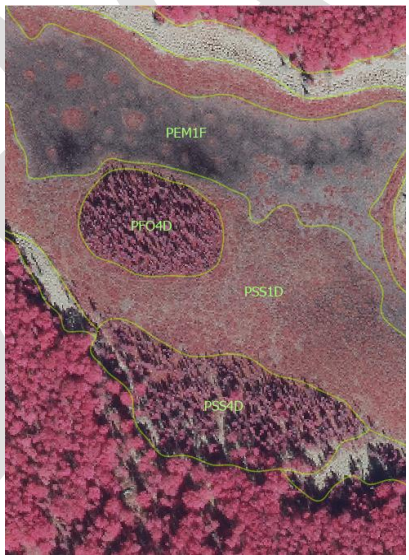
PSS1D area is lighter magenta than nearby forested areas, speckled with tan patches of emergent vegetation and dark patches of surface water. Texture is rough overall from scrubby vegetation. LiDAR shows PSS1D area is at the lowest part of the depression with the PEM1F area, which is smoother from more standing water.

Coordinates

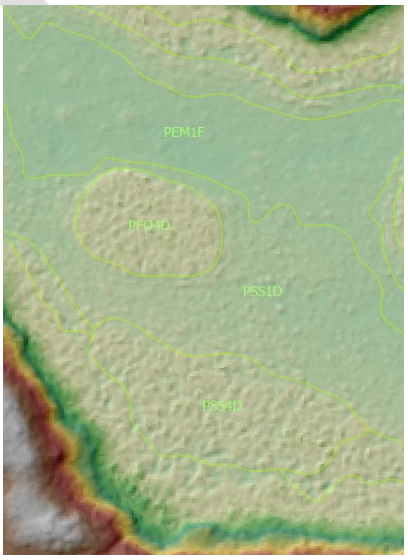
149.7689739°W 61.2745514°N

Field photo

2021 CIR



2021 LiDAR



5 PSS4

5.1 PSS4D – CONTINUOUSLY SATURATED

5.1.1 Description

PSS4D is assigned to inundated areas that cause black spruce (*Picea mariana*) to grow short and stunted. Complete saturation and/or standing water is common along with sphagnum mats and organic soils. Often occur in bog/fen wetland complexes alongside PSS1D areas, and as transition zones to PFO4 areas. Both PSS1D and PSS4D areas have deciduous wetland shrubs, but PSS4D is differentiated by high presence of black spruce.

5.1.2 Common Species

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

5.1.3 Signature

Description

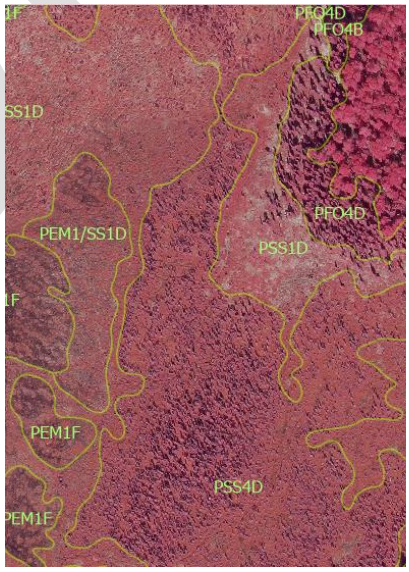
PSS4D area in image is very rough textured with dark magenta “triangles” (black spruce) above comparatively smoother lighter-colored understory (deciduous shrubs and emergent vegetation). The PSS4D expanse is bordered by PSS1D with PEM1F and PFO4D nearby, characteristic of wetland complexes. LiDAR shows PSS4D is mildly elevated compared to adjacent wetlands with microtopography. Overall area is in a large depression. Field photo shows gradient of black spruce from shrub to tree.

Coordinates

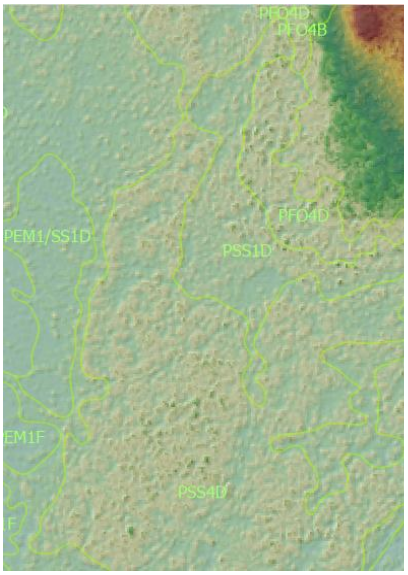
149.6125148°W 61.3745309°N

Field photo

2021 CIR



2021 LiDAR



6 PFO1

6.1 PFO1A – Temporarily Flooded

6.1.1 Description

PFO1A is assigned to areas with deciduous trees adjacent to rivers or estuaries. The areas are distinguished from upland forests by LIDAR data which show lower elevation and historic watercourses which could allow for inundation in the flood season. Close inspection of imagery may show inundation, though it is often obscured by forest cover.

6.1.2 Common Species

Alaska paper birch and felt-leaf willow (*Salix alaxensis*)

6.1.3 Signature

Description

PFO1A area is bright but comparatively dark magenta with "cloudy" texture from deciduous forest cover. It is adjacent to R3UBH river, which allows for flooding when the river's water level is higher. PFO1A boundary follows edge of historic watercourse.

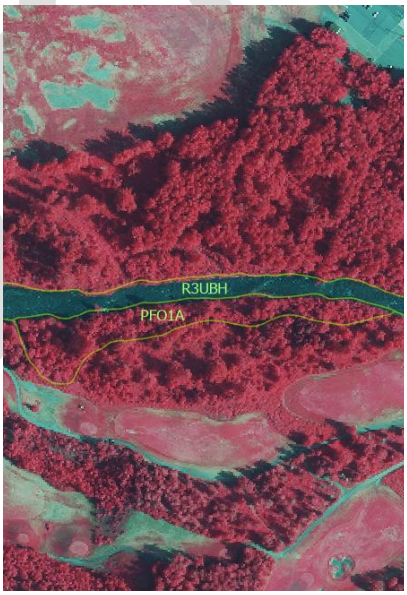
Coordinates

149.6717213°W 61.2299103°N

Field photo

FIELD PHOTO NOT AVAILABLE

2021 CIR



2021 LiDAR

6.2 PFO1B – SEASONALLY SATURATED

6.2.1 Description

PFO1B is assigned to areas forested near 30-50% cover with deciduous trees which lack the upland scrub signature in the understory, but do not necessarily show standing water. They are generally adjacent to more obvious wetlands but may be included as standalone areas if previously mapped. Birch trees (*Betula spp.*) are assumed to have morphological adaptations in these areas.

6.2.2 Common Species

Birch trees, bluejoint grass, alder (*Alnus spp.*)

6.2.3 Signature

Description

PFO1B has magenta “clouds” (deciduous trees) separated by semi-rough patches of smooth grey-tan (understory). PFO1B is adjacent to heavily saturated area and excludes elevated patch to its north. LIDAR data show PFO1B is semi-smooth with small bumps.

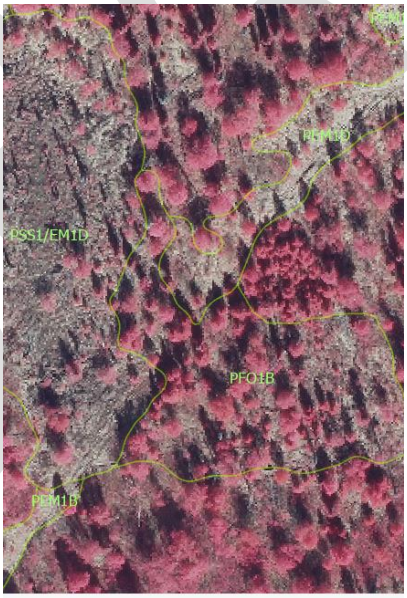
Coordinates

149.8664481°W 61.2533792°N

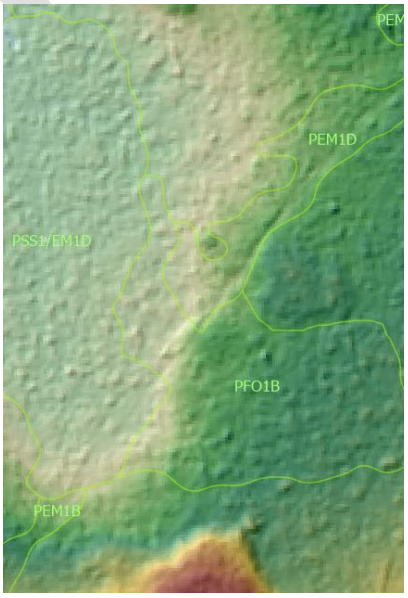
Field photo

FIELD PHOTO NOT AVAILABLE

2021 CIR



2021 LiDAR



6.3 PFO1C – SEASONALLY FLOODED

6.3.1 Description

Similar to PFO1A, PFO1C is assigned to areas with deciduous trees adjacent to rivers or estuaries. The areas are distinguished from upland forests by LIDAR data which show lower elevation and more watercourses which allow for inundation in the flood season. Close inspection of imagery may show current inundation, though it is often obscured by forest cover.

6.3.2 Common Species

Birch trees and willows

6.3.3 Signature

Description

PFO1C area is bright but comparatively dark magenta with "cloudy" texture from deciduous forest cover. It is adjacent to R3UBH river, which allows for flooding when the river's water level is higher. Area is lower elevation overall compared to PFO4B areas, and slightly higher than adjacent river.

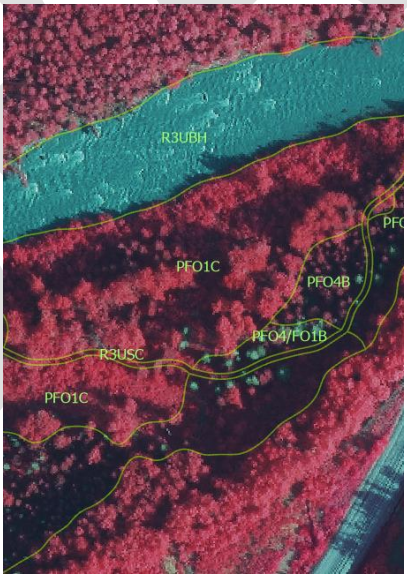
Coordinates

149.6216452°W 61.3174183°N

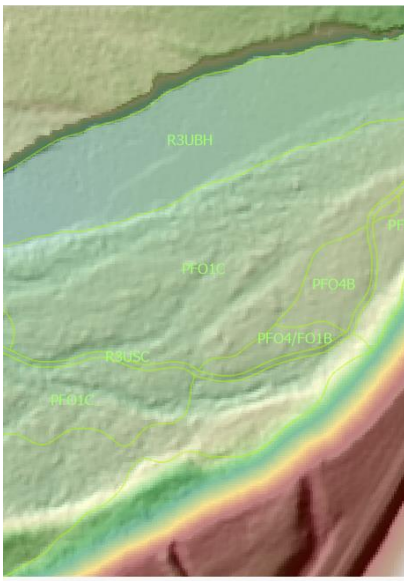
Field photo

FIELD PHOTO NOT AVAILABLE

2021 CIR



2021 LiDAR



6.4 PFO1D – CONTINUOUSLY SATURATED

6.4.1 Description

PFO1D is assigned to areas with greater than 30% cover forested with deciduous trees which show pockets of standing water. The understory is generally emergent vegetation, particularly bluejoint grass. They are typically adjacent to more obvious wetlands with heavy inundation that continues into the deciduous forest. Birch trees are assumed to have morphological adaptations.

6.4.2 Common Species

Birch trees, bluejoint grass

6.4.3 Signature

Description

Imagery shows PFO1D area with sparse magenta “clouds” (deciduous trees) and tan understory with dark patches and trails of standing water which continue from adjacent wetlands. LIDAR shows elevation is fairly equal with adjacent wetlands, and area is bumpy.

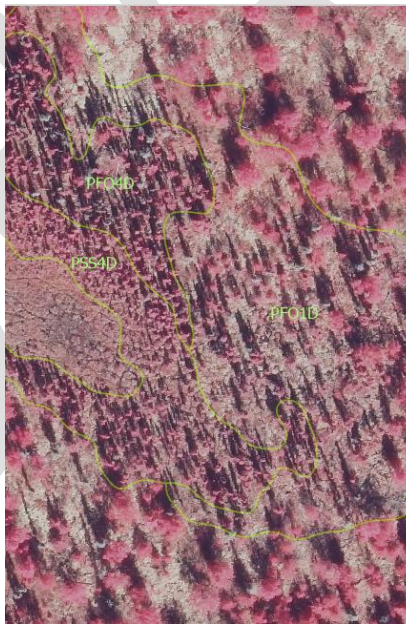
Coordinates

149.8118747°W 61.3100252°N

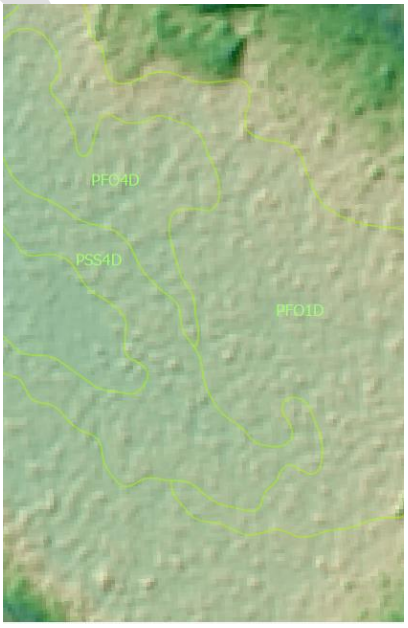
Field photo

FIELD PHOTO NOT AVAILABLE

2021 CIR



2021 LiDAR



7 PFO4

7.1 PFO4A – Temporarily Flooded

7.1.1 Description

PFO4A is assigned to forested areas adjacent to rivers or estuaries, but with spruce (may include white spruce). The areas are distinguished from upland forests by LIDAR data which show lower elevation and historic watercourses which could allow for inundation in the flood season. Close inspection of imagery may show current inundation, though it is often obscured by forest cover.

7.1.2 Common Species

Spruce trees (*Picea spp.*)

7.1.3 Signature

Description

Imagery shows dense magenta circles with triangular shadows (spruce). It borders an estuary with an elevation that may allow flooding in tidal highs.

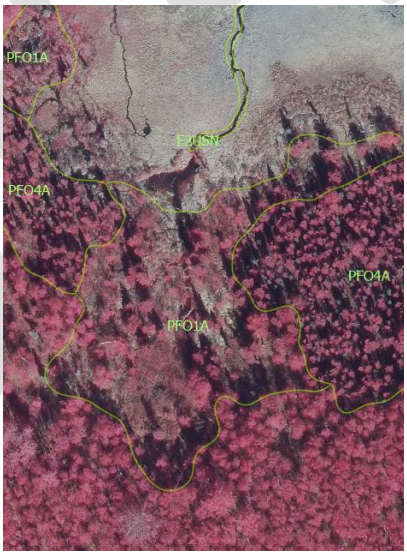
Coordinates

149.7100133°W 61.2964996°N

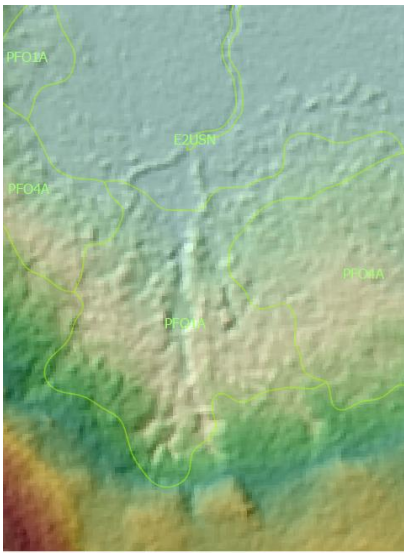
Field photo

FIELD PHOTO NOT AVAILABLE

2021 CIR



2021 LiDAR



7.2 PFO4B

7.2.1 Description

PFO4B is assigned to areas densely forested with live spruce (white spruce is more susceptible to death by spruce beetle). They often border PFO4D as an outer edge to a wetland complex, but also occur in large, isolated swaths. They should not be mapped over hills. Elevation clues and prior mapping inform whether to map spruce forests as wetlands.

7.2.2 Common Species

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

7.2.3 Signature

Description

PFO4B area is large swatch bordering PFO4D and PEM1B. Spruce trees are densely packed circles of dark magenta and appear larger than the spruce trees in the PFO4D area. The understory is not visible between the trees. PFO4B is slightly higher than PFO4D and situated on a slight incline, but does not extend to steeper slopes and higher elevation.

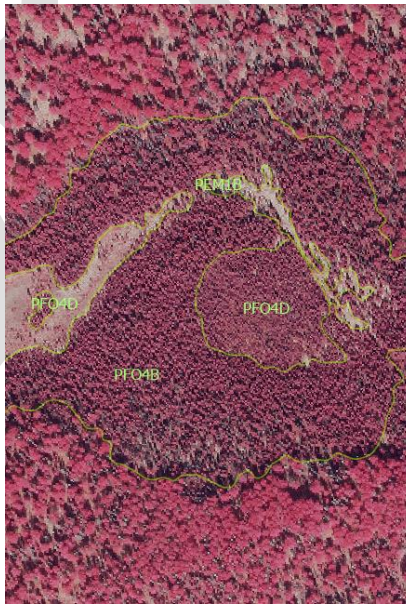
Coordinates

149.6751829°W 61.3795051°N

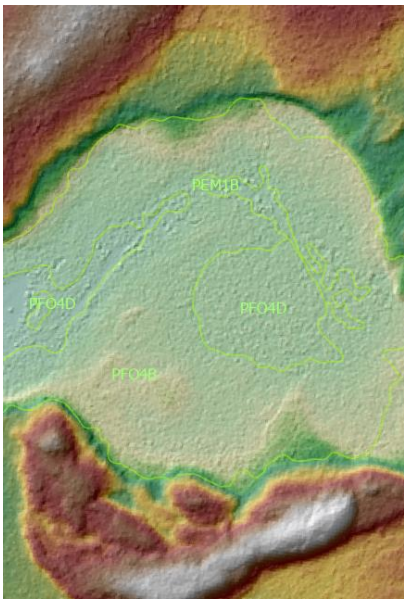
Field photo: 149.6121026°W 61.3771587°N

Field photo

2021 CIR



2021 LiDAR



7.3 PFO4D

7.3.1 Description

PFO4D is assigned to black spruce forests with thinner and shorter trees, suggesting growth limits from wetter hydrology. They occur in smaller swaths than PFO4B, generally bordering wetland complexes at low elevation. In the field, sphagnum moss grows in the valleys of microtopography, soils are organic, and there is no white spruce.

7.3.2 Common Species

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

7.3.3 Signature

Description

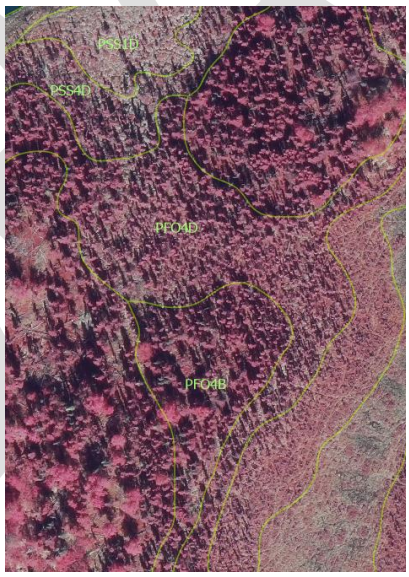
Imagery shows smaller black spruce trees (smaller circles and more twig-like, speckled appearance) with light magenta understory similar to PSS1D signature. PFO4D connects other wetland types with "D" water regime at the same low elevation. Trees appear taller than those in PSS4D signature.

Coordinates

149.8169190°W 61.2823616°N

Field photo

2021 CIR



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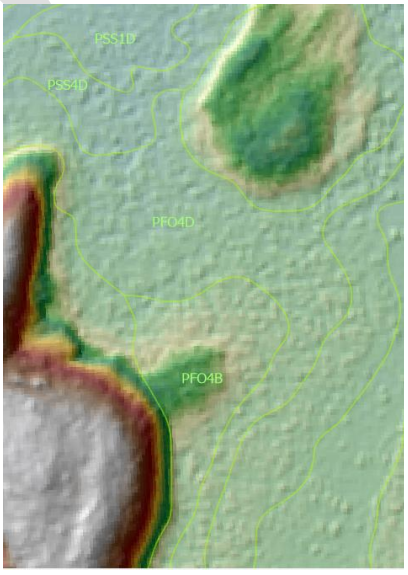


8 PUB

8.1 PUBF – Semi-permanently Flooded

8.1.1 Description

PUBF is assigned to areas of standing water with minimal extent that fluctuates throughout the seasons (visible in Google Earth), but may fluctuate over years. They are flooded often enough that vegetation is not present They may be standalone or part of wetland complexes, frequently bordered by PEM1F.

8.1.2 Common Species

Predominately unvegetated, but sporadic obligate species may be present

8.1.3 Signature

Description

Imagery shows a dark pocket of standing water with a few small pink mottles of vegetation. LiDAR confirms smooth depression where water collects.

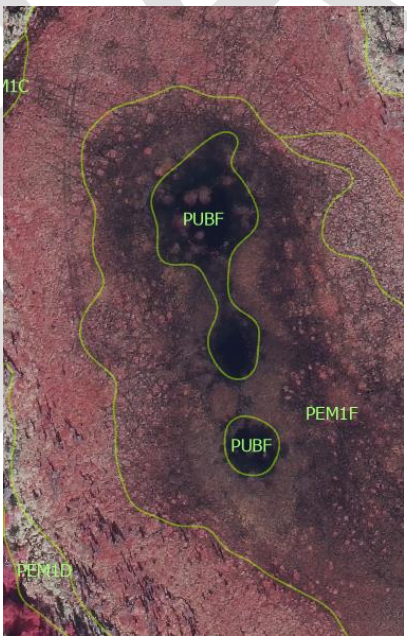
Coordinates

149.6378004°W 61.3256578°N

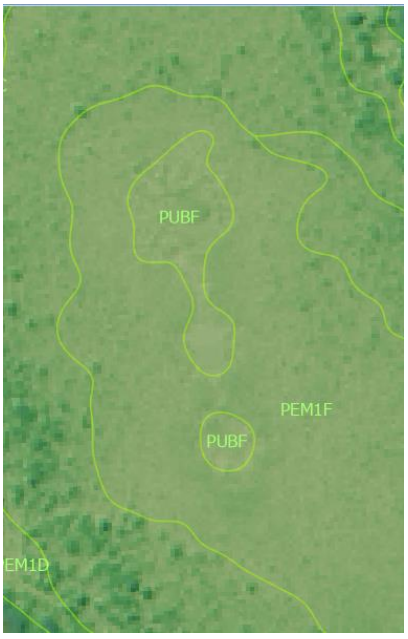
Field photo

FIELD PHOTO NOT AVAILABLE

2021 CIR



2021 LiDAR



8.2 PUBH – Permanently Flooded

8.2.1 Description

PUBH is assigned to non-vegetated wetlands smaller than 20 acres; these are generally referred to as ponds. They 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.

8.2.2 Common Species

Predominately unvegetated, but sporadic obligate species may be present.

8.2.3 Signature

Description

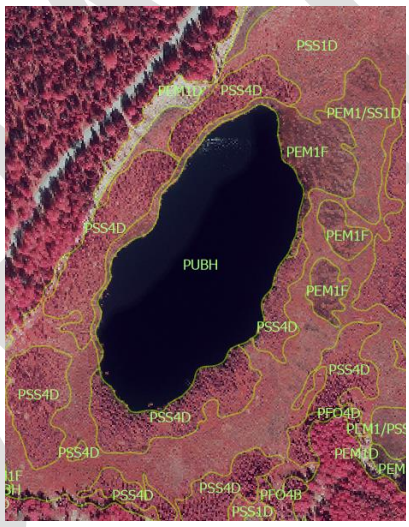
PUBH area is a large dark oval area. Imagery matches the smooth, lowest elevation area in LiDAR.

Coordinates

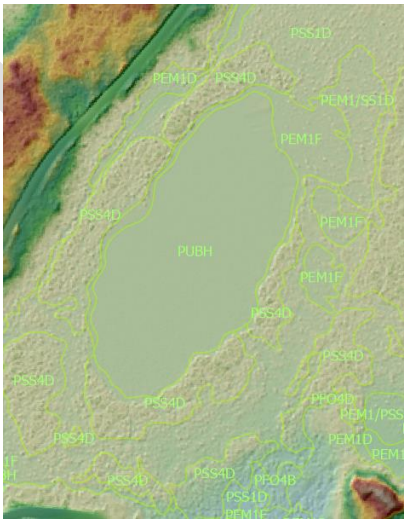
149.6159323°W 61.3742543°N

Field photo

2021 CIR



2021 LiDAR



9 PUS

9.1 PUSC – Seasonally Flooded

9.1.1 Description

Within JBER, PUSC is assigned to areas of standing water with minimal extent that fluctuates throughout the seasons (visible in Google Earth) but may fluctuate over years. They occur in non-vegetated areas, typically altered by human disturbance (such as a pond in a graveled area).

9.1.2 Common Species

Non-vegetated

9.1.3 Signature

Description

PUSC area is lighter teal than PUBH areas, surround by light blue material with evidence of human disturbance (striations from vehicles). PUSC wetland is located in minor depression.

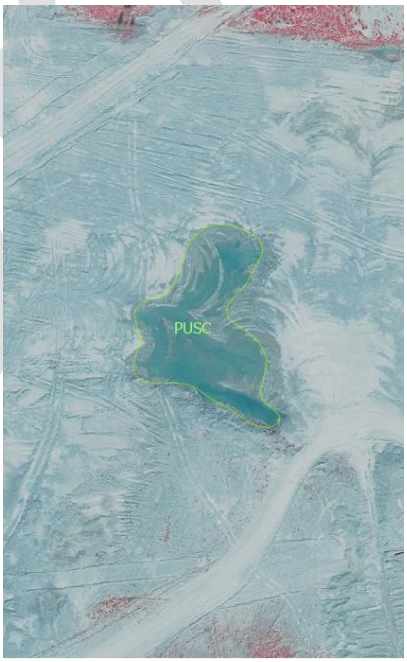
Coordinates

149.7925064°W 61.2703397°N

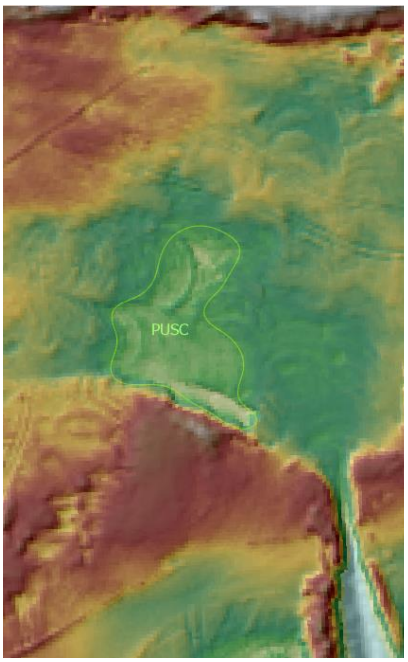
Field photo

FIELD PHOTO NOT AVAILABLE

2021 CIR



2021 LiDAR



10 R

10.1 R3UBH – Upper Perennial, Unconsolidated Bottom, Permanently Flooded

10.1.1 Description

High velocity river systems greater than 8 feet wide. Substrate is a mix of fine and coarse materials.

10.1.2 Common Species

Not vegetated.

10.1.3 Signature

Description

R3UBH area is a long stretch of dark blue. Imagery matches the smooth, lowest elevation area in LiDAR.

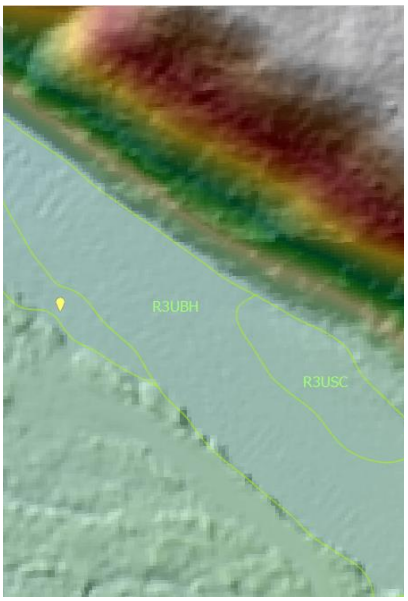
Coordinates

149.6796590°W 61.3074325°N

Field photo

2021 CIR

2021 LiDAR



10.2 R3USC – Upper Perennial, Unconsolidated Shore, Seasonally Flooded

10.2.1 Description

The gravel or sandbar areas of high velocity river systems greater than 8 feet wide. Substrate is a mix of fine and coarse materials.

10.2.2 Common Species

Not vegetated

10.2.3 Signature

Description

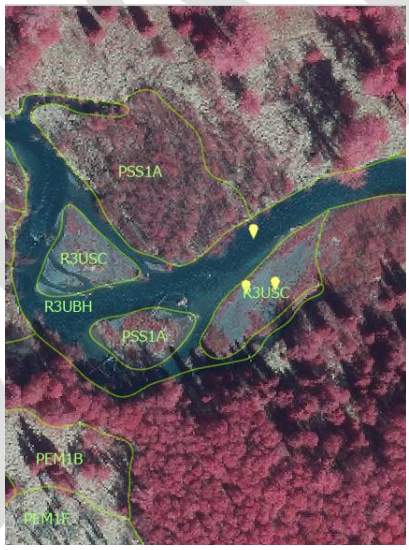
R3USC areas are pale grey and smooth (perhaps with some pink shrubs). They occur within or alongside the river and are mildly elevated above it.

Coordinates

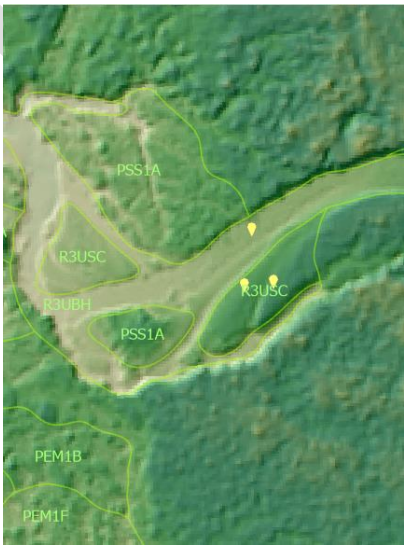
149.7758002°W 61.2370368°N

Field photo

2021 CIR



2021 LiDAR



11 E2

11.1 E2ABM – Aquatic Bed, Irregularly Exposed

11.1.1 Description
Saltwater tidal systems that remain flooded most years.

11.1.2 Common Species
The team was unable to access the estuarine zone but it is expected these areas are dominated by brown algae (*Fucus spp*.), red algae (*Halosaccion spp*.) or seagrasses (*Zostera spp*.)

11.1.3 Signature

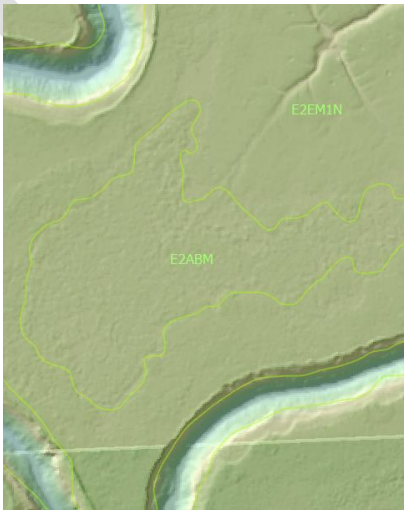
Description
E2ABM area is overall dark in color, mottled with navy, purple and bright teal. The texture is rough.

Coordinates
149.7174203°W 61.3085621°N

Field photo
FIELD PHOTO NOT AVAILABLE

2021 CIR

2021 LiDAR



11.2 E2EM1N – Emergent (Persistent), Regularly Flooded

11.2.1 Description

Saltwater tidal systems that are flooded regularly by rising tides. These are generally referred to as salt marshes.

11.2.2 Common Species

Though not verified in the field, expected vegetation includes salt grass (*Puccinellia spp*.), *Salicornia spp*., milkwort (*Glaux spp*.), Lyngbye's sedge (*Carex lyngbyei*), seaside arrowgrass (*Triglochin maritimum*) in lower areas, and silverweed cinquefoil (*Argentina egedii*) and sand ryegrass (*Leymus arenarius*) at higher less flooded areas.

11.2.3 Signature

Description

E2EM1N area is lightly colored with a blue grey tone in lower areas and a beige, sandy tone in lower areas. Texture is smooth with some speckles (minor depressions).

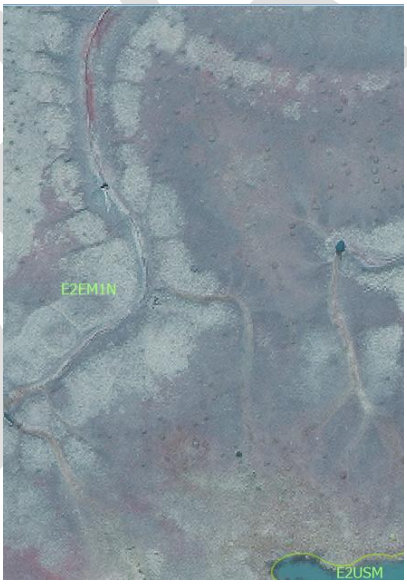
Coordinates

149.7250301°W 61.3138294°N

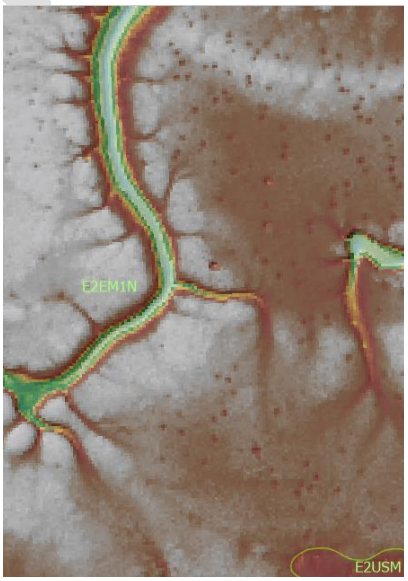
Field photo

FIELD PHOTO NOT AVAILABLE

2021 CIR



2021 LiDAR



11.3 E2EM1P – Emergent (Persistent), Irregularly Flooded

11.3.1 Description

The team was unable to visit this area. E2EM1P are higher elevation areas still within the general estuarine zone. These areas likely are influenced by saltwater enough to fall into the estuarine category but likely have a higher presence of salt intolerant species.

11.3.2 Common Species

Species could include Lyngbye's sedge, seaside arrowgrass, silverweed cinquefoil and sand ryegrass

11.3.3 Signature

Description

E2EM1P area is large and multicolored with orange, beige, teal, and dark grey. Area is smooth overall, with some "fine sandpaper" texture from small plants.

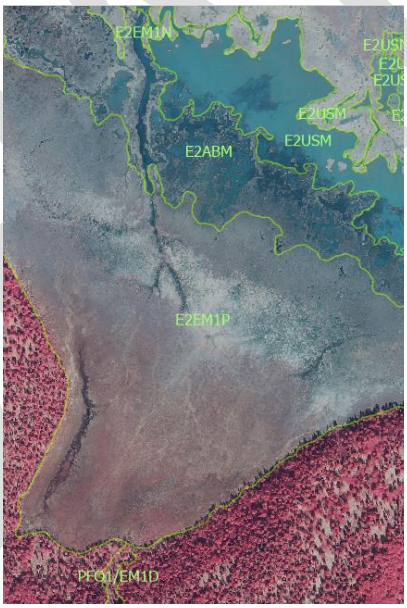
Coordinates

149.7377073°W 61.3127317°N

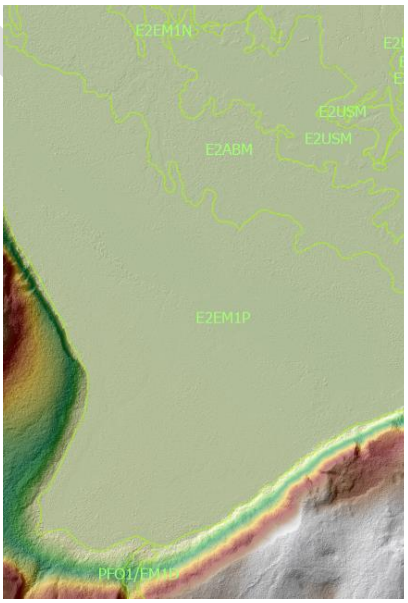
Field photo

FIELD PHOTO NOT AVAILABLE

2021 CIR



2021 LiDAR



11.4 E2USM – Unconsolidated Shore, Irregularly Exposed

11.4.1 Description

The team was unable to visit this area. E2USM areas are brackish small ponds pooled among E2EM1N (salt marsh) areas.

11.4.2 Common Species

Unvegetated, though may have aquatic beds not visible on the imagery

11.4.3 Signature

Description

E2USM areas are bright teal water pooled in depressions in the greater estuarine area.

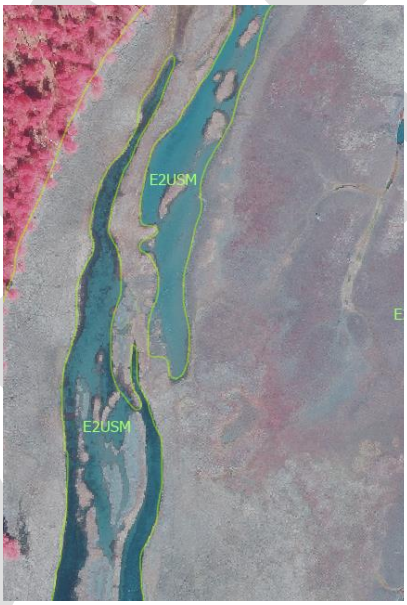
Coordinates

149.7642523°W 61.3244296°N

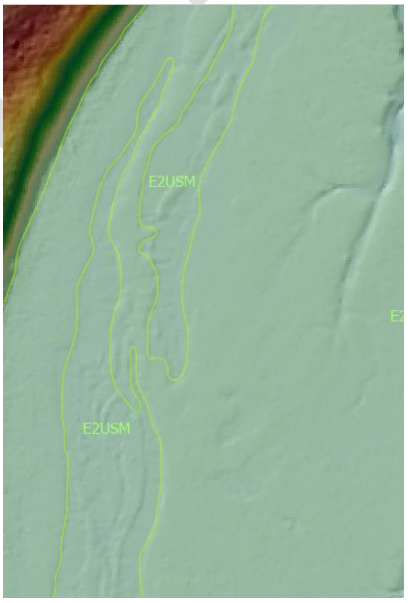
Field photo

FIELD PHOTO NOT AVAILABLE

2021 CIR



2021 LiDAR



11.5 E2USN – Unconsolidated Shore, Regularly Flooded

11.5.1 Description

The team was unable to visit this area. E2USN areas are brackish ponds interspersed with mud, unlike E2USM which are consistently inundated.

11.5.2 Common Species

Unvegetated

11.5.3 Signature

Description

E2USN areas are bright teal (water) with mottles of beige (exposed mud). Located in shallow depressions containing some deeper pockets.

Coordinates

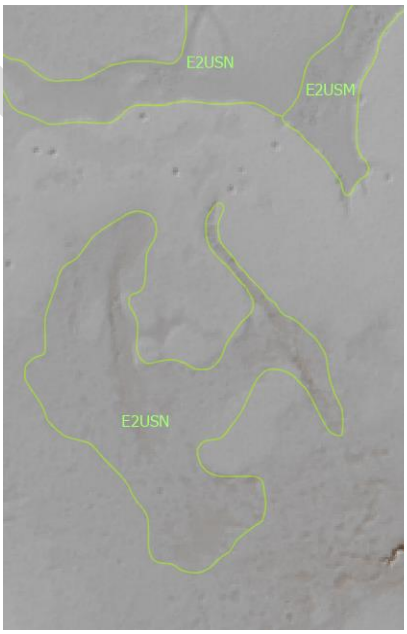
149.7524438°W 61.3197247°N

Field photo

FIELD PHOTO NOT AVAILABLE

2021 CIR

2021 LiDAR



12 PAB

12.1 H – Permanently Flooded

12.1.1 Description

PABH is assigned to permanently flooded vegetated wetlands smaller than 20 acres; ponds with aquatic vegetation.

12.1.2 Common Species

Pondweed (*Potamogeton spp*.), common mare's-tail (*Hipparus vulgaris*), narrowleaf bur-reed (*Sparganium angustifolium*), water sedge (*Carex aquatilis*)

12.1.3 Signature

Description

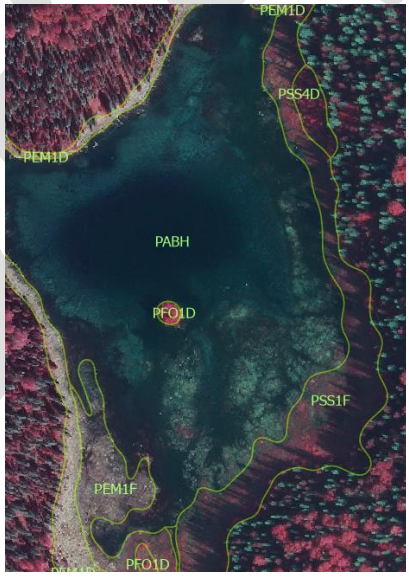
PABH area is dark overall with large (>30% cover) patches of light teal, mottled vegetation. Overall area is a depression with PABH at the lowest elevation.

Coordinates

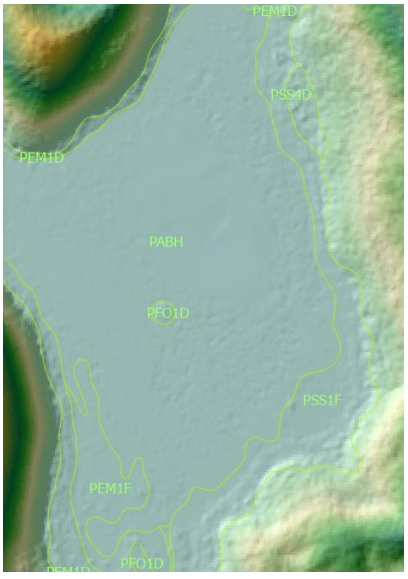
149.6703969°W 61.2936473°N
Field: 149.7498882°W 61.2398682°N

Field photo

2021 CIR



2021 LiDAR



13 L

13.1 L1UBH – Limnetic, Unconsolidated Bottom, Permanently Flooded

13.1.1 Description

L1UBH is assigned to deepwater habitats larger than 20 acres and deeper than 2.5 meters; these are generally referred to as lakes. The team referenced bathymetry data in the Alaska Lake Database (ALDAT) collected by the Alaska Department of Fish and Game (ADF&G, n.d.) to make rough distinguishments between limnetic and littoral habitats in the Lacustrine System.

13.1.2 Common Species

Predominately unvegetated, but sporadic obligate species may be present.

13.1.3 Signature

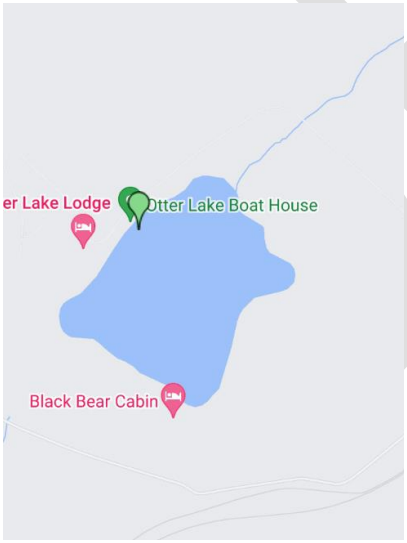
Description

ALDAT shows one datapoint measuring the maximum depth as 7.3 meters, which exceeds the 2.5-meter requirement. Imagery shows dark teal area with lighter teal edges that may be less than 2.5 meters, but are not separated due to lack of data. LiDAR does not show lake depth.

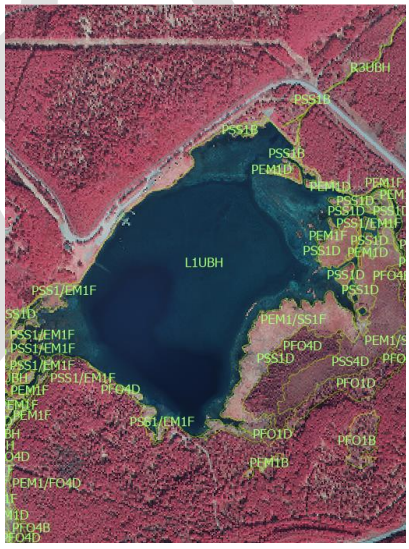
Coordinates

149.7359692°W 61.2896833°N

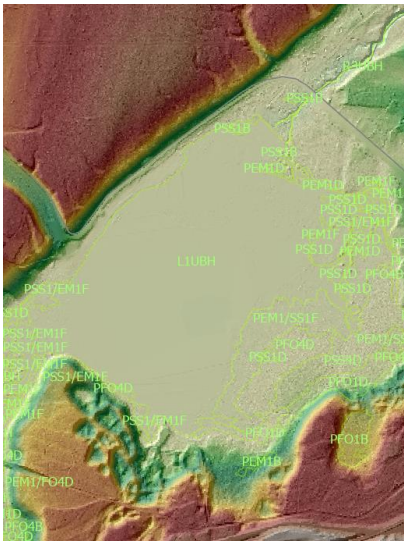
ALDAT



2021 CIR



2021 LiDAR



13.2 L2UBH – Littoral, Unconsolidated Bottom, Permanently Flooded

13.2.1 Description

L1UBH is assigned to wetland habitats in the Lacustrine System that are larger than 20 acres and less than 2.5 meters deep; these are generally referred to as shallow lakes. The team referenced bathymetry data in the Alaska Lake Database (ALDAT) collected by the Alaska Department of Fish and Game (ADF&G, n.d.) to make rough distinguishments between limnetic and littoral habitats in the Lacustrine System.

13.2.2 Common Species

Predominately unvegetated, but sporadic obligate species may be present.

13.2.3 Signature

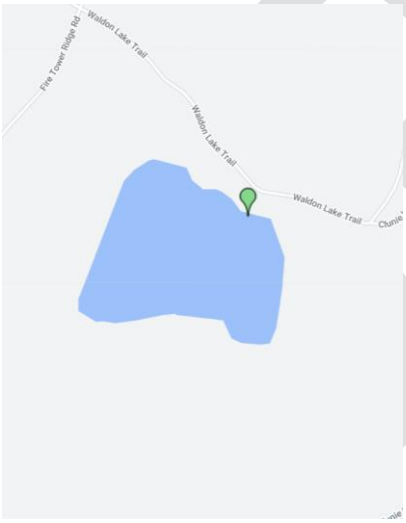
Description

ALDAT shows one datapoint measuring the maximum depth as 2.4 meters, which is below the 2.5-meter requirement. Imagery shows very dark teal, almost black area. LiDAR does not show lake depth.

Coordinates

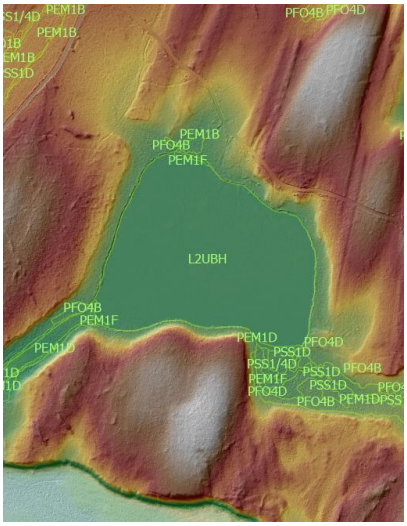
149.6341633°W 61.3501325°N

ALDAT



2021 CIR

2021 LiDAR



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Alaska Department of Fish and Game (ADF&G). (n.d.). Alaska Lake Database (LDAT). Retrieved February 10, 2023, from http://www.adfg.alaska.gov/SF_Lakes/