

Wetlands classification schema for the Barrow Peninsula, northern Alaska.

Decision rules for the field-based classification of wetland classes mapped across the Barrow Peninsula are given below. This key has been designed as a practical tool that will be most accurate when used during peak growing season (mid July – mid August) and under field conditions associated with average summer rainfall/evaporation. Codes agree with the National Wetlands Classification scheme that is searchable through the US Fish and Wildlife Service website (<https://fwsmapservices.wim.usgs.gov/decoders/SWI.aspx>). Table 1-07 below details characteristics of each class and photographs below depict archetypes for each class.

- 1.a. If area is > 20% vegetated; then vegetated land cover [go to #2].
 - 2.a. If standing water present; then aquatic or seasonally flooded graminoid tundra [go to #3].
 - 3.a. If water cover is 100% and shin-deep or deeper; vascular plant vegetation dominated by graminoid species (> 20% live cover); bryophyte cover low (< 20%) [go to #4].
 - 4.a. If area located on margin of lake larger than 8ha in size [go to #5].
 - 5.a. If macrophyte vegetation dominated by *Arctophila fulva*, then Lacustrine littoral emergent permanently flooded *Arctophila* littoral lake shore (**L2EMH**).
 - 5.b. If macrophyte vegetation dominated by *Carex aquatilis*, then Lacustrine littoral unconsolidated bottom organic permanently flooded graminoid littoral lake shore (**L2UB4H**).
 - 4.b. Else, located in depression, pond, or lake less than 8ha in size; then *Palustrine emergent persistent semi-permanently flooded aquatic graminoid tundra* (**PEM1F**).
- 3.b. Else, water is less than 100% cover and/or ankle deep or less; vascular plant vegetation dominated by graminoid species (> 20% live cover); bryophyte cover high

- (> 50%); then *Palustrine emergent persistent seasonally flooded and/or saturated graminoid tundra* **(PEM1E)**.
- 2.b. Else, wet, moist or dry tundra [go to #6].
- 6.a. If evidence of water inundation, soils wet to moist and water accumulates around boot when standing still; vegetation dominated by graminoid species, live graminoid cover > 50 %; then wet or moist graminoid tundra [go to #7].
- 7.a. If soils wet – boot sinks and covers with water when standing still; vegetation dominated by graminoid species; then *Palustrine emergent persistent seasonally flooded and/or saturated wet graminoid tundra* **(PEM1C)**.
- 7.b. Else, soils moist – boot sinks slightly when standing still but boot does not cover with water; vegetation dominated by graminoid species, bryophyte cover generally > 50%; then *Palustrine emergent persistently saturated moist graminoid tundra* **(PEM1B)**.
- 6.b. Else, soils moist to dry; vascular plant vegetation dominated shrubs or forbs, live graminoid cover < 50%; then moist-dry or dry dwarf shrub – graminoid tundra [go to #8].
- 8.a. If soils moist-dry – boot may sink but does not shed water after standing still; graminoid cover typically > 30% live cover, lichen cover < 20%, bryophyte cover > 50%; then *Palustrine emergent persistent temporarily flooded dry-moist graminoid tundra* **(PEM1A)**.
- 8.b. Else, soils are dry; vascular vegetation dominated by shrubs and forbs, lichen cover > 20%, bryophyte cover < 50%; then dry dwarf shrub- graminoid tundra [go to #9].
- 9.a. If soils are dry; shrub cover < 50%; then *Palustrine emergent persistent saturated /Palustrine moss-lichen lichen saturated dry dwarf shrub graminoid tundra* **(PEM1B/ PML2B)**.
- 9.b. Else, soils are dry; shrub cover > 50%; then *Palustrine emergent persistent temporarily flooded/Palustrine scrub-shrub evergreen temporarily flooded Dry dwarf shrub tundra* **(PEM1A/PSS7A)**.
- 1.b. Else, non vegetated [go to #10].
- 10.a. If > 90% water and <20% vegetated [go to #11].
- 11.a. Area is marine or estuarine in nature where salinity is above 0.5ppt [go to #12].
- 12.a. Area is situated in the Chukchi or Beaufort Sea north of the Barrier Islands; then *Marine subtidal unconsolidated bottom subtidal benthic zone* **(M1UBL)**.
- 12.b. Area is situated within a drainage system adjacent to the Chukchi Sea (e.g. Walakpa Bay), or Elson lagoon and the rivers/creeks entering Elson Lagoon; then *Estuarine subtidal unconsolidated bottom subtidal lagoon, creek or delta* **(E1UBL)**.
- 11.b. Else, water bodies are aquatic systems in the form of a pond or lake [go to #13].
- 13.a. Water body is larger than 8ha in size; then *Lacustrine limnetic unconsolidated bottom permanently flooded lake* **(L1UBH)**.
- 13.b. Water body is less than 8ha in size; then *Palustrine unconsolidated bottom permanently flooded pond* **(PUBH)**.
- 10.b. Else area is associated with a marine or estuarine littoral zone, is ice/snow, or is human-made or heavily disturbed by humans [go to #14].
- 14.a. If area is a beach or associated with the literal zone [go to #15].

- 15.a. If area is associated with a marine littoral zone [*go to #16*].
 - 16.a. If area is associated with a marine littoral zone and is regularly flooded; then *Marine intertidal unconsolidated shore regularly flooded beach (M2USN)*.
 - 16.b. If area is associated with a marine littoral zone and is irregularly flooded; then *Marine intertidal unconsolidated shore irregularly flooded beach (M2USP)*.
- 15.b. Else, area is associated with an estuarine littoral zone [*go to #17*].
 - 17.a. If area is associated with a estuarine littoral zone and is regularly flooded; then *Estuarine intertidal unconsolidated shore regularly flooded shoreline (E2USN)*.
 - 17.b. If area is associated with a estuarine littoral zone and is irregularly flooded; then *Estuarine intertidal unconsolidated shore irregularly flooded shoreline (E2USP)*.
- 14.b. Else, if cover is ice/snow/human-made or heavily disturbed; then *Urban/Road/Snow (Urban/Road/Snow)*.

National Wetland Inventory (NWI) class descriptions for the supervised classification of the Barrow Peninsula.

| WETLAND NAME/CODE | SYSTEM | SUBSYSTEM | CLASS | SUBCLASS | WATER REGIME | DESCRIPTION |
|--|--|---|--|----------|---|--|
| Unclassified | Unknown | Unknown | Unknown: includes areas with shadow on satellite imagery used for classification, trash, and/or other unidentifiable feature | Unknown | Unknown | Unclassified |
| Urban/Road/Snow | Unknown | Unknown | Unknown: Includes urban rooftops and objects, gravel roads, and snow banks | Unknown | Unknown | Urban/Road/Snow |
| Marine subtidal unconsolidated bottom subtidal (M1UBL) | Marine: open ocean and high energy coast lines with salinities exceeding 30 parts per thousand (ppt) and little or no dilution except outside the mouths of estuaries | Subtidal: continuously submerged substrate, (i.e. below extreme low water) | Unconsolidated bottom: includes all wetlands and deep water habitats with at least 25% cover of particles smaller than stones (less than 6-7 cm), and a vegetative cover less than 30% | | Regularly flooded: substrate is permanently flooded with tidal water | Open ocean, Beaufort Sea, Chukchi Sea |
| Marine intertidal unconsolidated shore regularly flooded (M2USN) | Marine: open ocean and high energy coast lines with salinities exceeding 30 parts per thousand (ppt) and little or no dilution except outside the mouths of estuaries | Intertidal: the area from extreme low water to extreme high water and associated splash zone | Unconsolidated shore: includes all wetland habitats having two characteristics: (1) unconsolidated substrates with less than 75 percent areal cover of stones, boulders or bedrock and; (2) less than 30 percent areal cover of vegetation. Landforms such as beaches, bars, and flats are included in the Unconsolidated Shore class | | Regularly Flooded: Tidal water alternately floods and exposes land surface at least once daily | Regularly flooded beach |
| Marine intertidal unconsolidated shore irregularly flooded (M2USP) | Marine: open ocean and high energy coast lines with salinities exceeding 30 parts per thousand (ppt) and little or no dilution except outside the mouths of estuaries | Intertidal: the area from extreme low water to extreme high water and associated splash zone | Unconsolidated shore: includes all wetland habitats having two characteristics: (1) unconsolidated substrates with less than 75 percent areal cover of stones, boulders or bedrock and; (2) less than 30 percent areal cover of vegetation. Landforms such as beaches, bars, and flats are included in the Unconsolidated Shore class | | Irregularly Flooded: Tidal water floods the land surface less often than daily | Irregularly flooded beach |
| Estuarine subtidal unconsolidated bottom subtidal (E1UBL) | Estuarine: deep water tidal habitats and adjacent tidal wetlands that are influenced by water runoff from and often semi-enclosed by land. Located along low-energy | Subtidal: continuously submerged substrate, (i.e. below extreme low water) | Unconsolidated bottom: includes all wetlands and deep water habitats with at least 25% cover of particles smaller than stones (less than 6-7 cm), and a vegetative cover less than 30% | | Subtidal: substrate is permanently flooded with tidal water | Deltas creek, lagoon |

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| | coastlines with variable salinity | | | | |
| Estuarine intertidal unconsolidated shore regularly flooded (E2USN) | Estuarine: deep water tidal habitats and adjacent tidal wetlands that are influenced by water runoff from and often semi-enclosed by land. Located along low-energy coastlines with variable salinity | Intertidal: the area from extreme low water to extreme high water and associated splash zone | Unconsolidated shore: includes all wetland habitats having two characteristics: (1) unconsolidated substrates with less than 75 percent areal cover of stones, boulders or bedrock and; (2) less than 30 percent areal cover of vegetation. Landforms such as beaches, bars, and flats are included in the Unconsolidated Shore class | Regularly flooded: substrate is permanently flooded with tidal water | Estuarine regularly flooded shoreline |
| Estuarine intertidal unconsolidated shore irregularly flooded (E2USP) | Estuarine: deepwater tidal habitats and adjacent tidal wetlands that are influenced by water runoff from and often semi-enclosed by land. Located along low-energy coastlines with variable salinity | Intertidal: the area from extreme low water to extreme high water and associated splash zone | Unconsolidated shore: includes all wetland habitats having two characteristics: (1) unconsolidated substrates with less than 75 percent areal cover of stones, boulders or bedrock and; (2) less than 30 percent areal cover of vegetation. Landforms such as beaches, bars, and flats are included in the Unconsolidated Shore class | Irregularly Flooded: Tidal water floods the land surface less often than daily | Estuarine irregularly flooded shoreline |
| Palustrine unconsolidated bottom permanently flooded (PUBH) | Palustrine: non-tidal wetlands dominated by trees, shrubs, emergents, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean derived salts is below 0.5 ppt. May also exhibit: 1. are less than 8 hectares (20 acres); 2. do not have an active wave-formed or bedrock shoreline feature; 3. has at low water a depth less than 2 meters (6.6 feet) in the deepest part of the basin; 4. have a salinity due to ocean-derived salts of less than 0.5 ppt | | Unconsolidated bottom: includes all wetlands and deep water habitats with at least 25% cover of particles smaller than stones (less than 6-7 cm), and a vegetative cover less than 30% | Permanently Flooded: Water covers the land surface throughout the year in all years | Pond |
| Palustrine emergent persistent semi-permanently flooded (PEMIF) | Palustrine: non-tidal wetlands dominated by trees, shrubs, emergents, mosses or lichens, and all such wetlands that | | Emergent: contains erect, rooted, herbaceous hydrophytes, excluding mosses and lichens; vegetation is present for most of the growing season in most years; | Persistent: dominated by species that normally remain standing at least until the beginning of | Semi-permanently Flooded: surface water persists throughout the growing season in most years. |
| | | | | | Aquatic graminoid tundra |

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| | occur in tidal areas where salinity due to ocean derived salts is below 0.5 ppt. May also exhibit: 1. are less than 8 hectares (20 acres); 2. do not have an active wave-formed or bedrock shoreline feature; 3. has at low water a depth less than 2 meters (6.6 feet) in the deepest part of the basin; 4. have a salinity due to ocean-derived salts of less than 0.5 ppt | usually dominated by perennial plants | the next growing season | When surface water is absent, the water table is usually at or very near the land's surface. | |
| Palustrine emergent persistent seasonally flooded (PEM1E) | Palustrine: non-tidal wetlands dominated by trees, shrubs, emergents, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean derived salts is below 0.5 ppt. May also exhibit: 1. are less than 8 hectares (20 acres); 2. do not have an active wave-formed or bedrock shoreline feature; 3. has at low water a depth less than 2 meters (6.6 feet) in the deepest part of the basin; 4. have a salinity due to ocean-derived salts of less than 0.5 ppt | Emergent: contains erect, rooted, herbaceous hydrophytes, excluding mosses and lichens; vegetation is present for most of the growing season in most years; usually dominated by perennial plants | Persistent: dominated by species that normally remain standing at least until the beginning of the next growing season | Seasonally flooded/saturated: surface water is present for extended periods especially early in the growing season and when surface water is absent, substrate remains saturated near the surface for much of the growing season | Seasonally flooded graminoid tundra |
| Palustrine emergent persistent seasonally flooded and/or saturated (PEM1C) | Palustrine: non-tidal wetlands dominated by trees, shrubs, emergents, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean derived salts is below 0.5 ppt. May also exhibit: 1. are less than 8 hectares (20 acres); 2. do not have an active wave-formed or bedrock shoreline | Emergent: contains erect, rooted, herbaceous hydrophytes, excluding mosses and lichens; vegetation is present for most of the growing season in most years; usually dominated by perennial plants | Persistent: dominated by species that normally remain standing at least until the beginning of the next growing season | Seasonally Flooded: surface water is present for extended periods especially early in the growing season, but is absent by the end of the growing season in most years. The water table after flooding ceases is variable, extending from saturated to the surface to a water table well | Wet graminoid tundra |

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| | feature; 3. has at low water a depth less than 2 meters (6.6 feet) in the deepest part of the basin; 4. have a salinity due to ocean-derived salts of less than 0.5 ppt | | | below the ground surface | |
| Palustrine emergent persistently saturated (PEM1B) | Palustrine: non-tidal wetlands dominated by trees, shrubs, emergents, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean derived salts is below 0.5 ppt. May also exhibit: 1. are less than 8 hectares (20 acres); 2. do not have an active wave-formed or bedrock shoreline feature; 3. has at low water a depth less than 2 meters (6.6 feet) in the deepest part of the basin; 4. have a salinity due to ocean-derived salts of less than 0.5 ppt | Emergent: contains erect, rooted, herbaceous hydrophytes, excluding mosses and lichens; vegetation is present for most of the growing season in most years; usually dominated by perennial plants | Persistent: dominated by species that normally remain standing at least until the beginning of the next growing season | Saturated: the substrate is saturated to surface for extended periods during the growing season, but surface water is seldom present | Moist graminoid tundra |
| Palustrine emergent persistent temporarily flooded (PEM1A) | Palustrine: non-tidal wetlands dominated by trees, shrubs, emergents, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean derived salts is below 0.5 ppt. May also exhibit: 1. are less than 8 hectares (20 acres); 2. do not have an active wave-formed or bedrock shoreline feature; 3. has at low water a depth less than 2 meters (6.6 feet) in the deepest part of the basin; 4. have a salinity due to ocean-derived salts of less than 0.5 ppt | Emergent: contains erect, rooted, herbaceous hydrophytes, excluding mosses and lichens; vegetation is present for most of the growing season in most years; usually dominated by perennial plants | Persistent: dominated by species that normally remain standing at least until the beginning of the next growing season | Temporarily Flooded: surface water is present for brief periods during growing season, but the water table usually lies well below the soil surface for most of the growing season. Plants that grow both in uplands and wetlands may be characteristic of this water regime | Dry-moist graminoid tundra |

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| Palustrine emergent persistent saturated /Palustrine moss-lichen lichen saturated (PEM1B/PML2B) | Palustrine: non-tidal wetlands dominated by trees, shrubs, emergents, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean derived salts is below 0.5 ppt. May also exhibit: 1. are less than 8 hectares (20 acres); 2. do not have an active wave-formed or bedrock shoreline feature; 3. has at low water a depth less than 2 meters (6.6 feet) in the deepest part of the basin; 4. have a salinity due to ocean-derived salts of less than 0.5 ppt | | Emergent: contains erect, rooted, herbaceous hydrophytes, excluding mosses and lichens; vegetation is present for most of the growing season in most years; usually dominated by perennial plants Moss-lichen: areas where mosses or lichens cover substrates other than rock. This class is found in the northern regions of the conterminous U.S. and Alaska | Persistent: dominated by species that normally remain standing at least until the beginning of the next growing season Lichen: northern subclass; reindeer moss forms the most important community | Saturated: the substrate is saturated to surface for extended periods during the growing season, but surface water is seldom present | Dry-moist dwarf shrub graminoid tundra |
| Palustrine emergent persistent temporarily flooded/Palustrine scrub-shrub evergreen temporarily flooded (PEM1A/PSS7A) | Palustrine: non-tidal wetlands dominated by trees, shrubs, emergents, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean derived salts is below 0.5 ppt. May also exhibit: 1. are less than 8 hectares (20 acres); 2. do not have an active wave-formed or bedrock shoreline feature; 3. has at low water a depth less than 2 meters (6.6 feet) in the deepest part of the basin; 4. have a salinity due to ocean-derived salts of less than 0.5 ppt | | Emergent: contains erect, rooted, herbaceous hydrophytes, excluding mosses and lichens; vegetation is present for most of the growing season in most years; usually dominated by perennial plants Scrub-shrub: areas dominated by woody vegetation less than 6 m (20 feet) tall. The species include true shrubs, young trees (saplings), and trees or shrubs that are small or stunted because of environmental conditions | Persistent: dominated by species that normally remain standing at least until the beginning of the next growing season Evergreen: evergreen trees or shrubs represent more than 50% of the areal coverage of trees and shrubs. The canopy is never without foliage; however, individual trees or shrubs may shed their leaves | Temporarily Flooded: surface water is present for brief periods during growing season, but the water table usually lies well below the soil surface for most of the growing season. Plants that grow both in uplands and wetlands may be characteristic of this water regime | Dry dwarf shrub graminoid tundra |
| Lacustrine limnetic unconsolidated bottom permanently flooded (LIUBH) | Lacustrine: wetlands and deepwater habitats with all of the following characteristics: 1. situated in a topographic depression or a dammed river channel; 2. | Limnetic: extends outward from Littoral boundary and includes all deep-water habitats within the Lacustrine System | Unconsolidated bottom: includes all wetlands and deepwater habitats with at least 25% cover of particles smaller than stones (less than 6-7 cm), and a vegetative cover less than 30% | | Permanently Flooded: water covers the land surface throughout the year in all years | Lake |

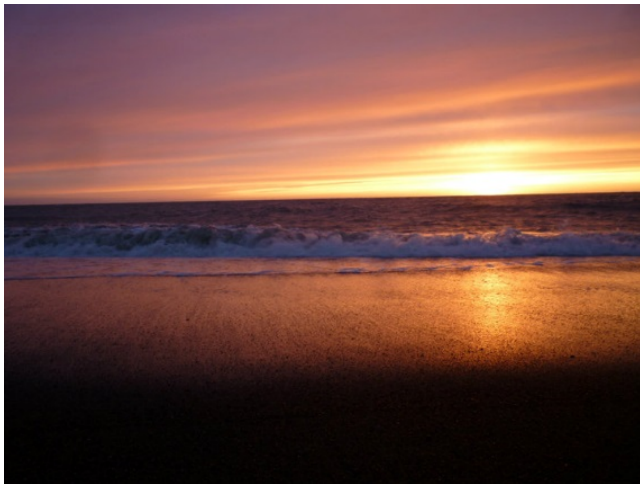
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| | lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30% areal coverage; 3. total area exceeds 8 hectares (20 acres) | | | | | |
| Lacustrine littoral emergent permanently flooded (L2EMH) | Lacustrine: wetlands and deep water habitats with all of the following characteristics: 1. situated in a topographic depression or a dammed river channel; 2. lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30% areal coverage; 3. total area exceeds 8 hectares (20 acres) | Littoral: All wetland habitats in the Lacustrine System. Extends from shoreward boundary to 2 meters (6.6 feet) below annual low water or to the maximum extent of non-persistent emergents, if these grow at depths greater than 2 meters | Emergent: contains erect, rooted, herbaceous hydrophytes, excluding mosses and lichens; vegetation is present for most of the growing season in most years; usually dominated by perennial plants | Permanently Flooded: Water covers the land surface throughout the year in all years | <i>Arctophila littoral</i> lake shore | |
| Lacustrine littoral unconsolidated bottom organic permanently flooded (L2UB4H) | Lacustrine: wetlands and deepwater habitats with all of the following characteristics: 1. situated in a topographic depression or a dammed river channel; 2. lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30% areal coverage; 3. total area exceeds 8 hectares (20 acres) | Littoral: All wetland habitats in the Lacustrine System. Extends from shoreward boundary to 2 meters (6.6 feet) below annual low water or to the maximum extent of nonpersistent emergents, if these grow at depths greater than 2 meters | Unconsolidated bottom: includes all wetlands and deepwater habitats with at least 25% cover of particles smaller than stones (less than 6-7 cm), and a vegetative cover less than 30% | Organic: unconsolidated material smaller than stones is predominantly organic soils of formerly vegetated wetlands | Permanently Flooded: Water covers the land surface throughout the year in all years | Graminoid littoral lake shore |

Photographs of wetland and mapped land cover classes in the Barrow area.

Urban/Road/Snow



Marine subtidal unconsolidated bottom subtidal benthic zone (**M1UBL**)



Marine intertidal unconsolidated shore regularly flooded beach (**M2USN**)



Marine intertidal unconsolidated shore irregularly flooded beach (**M2USP**)



Estuarine subtidal unconsolidated bottom subtidal lagoon, creek or delta (**E1UBL**)



Estuarine intertidal unconsolidated shore regularly flooded shoreline (**E2USN**)



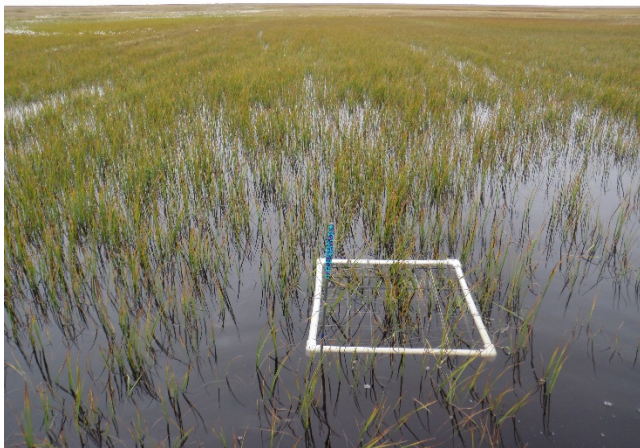
Estuarine intertidal unconsolidated shore irregularly flooded shoreline (**E2USP**)



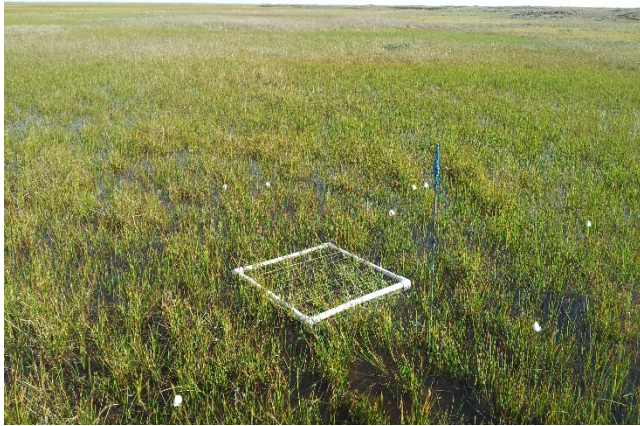
Palustrine unconsolidated bottom permanently flooded pond (**PUBH**)



Palustrine emergent persistent semi-permanently flooded aquatic graminoid tundra (**PEM1F**)



Palustrine emergent persistent seasonally flooded and/or saturated graminoid tundra (**PEM1E**)



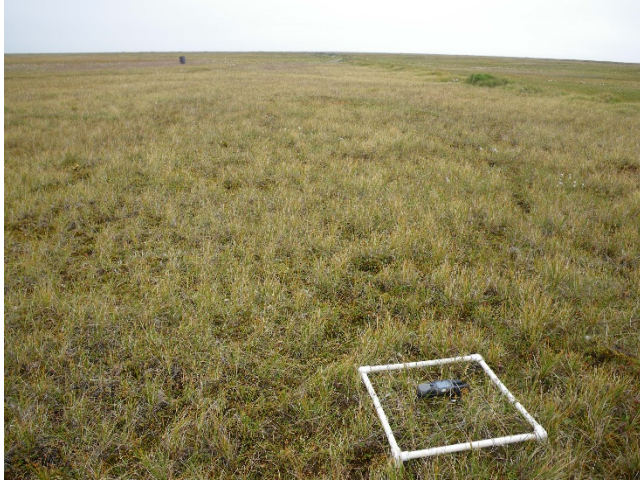
Palustrine emergent persistent seasonally flooded and/or saturated wet graminoid tundra (**PEM1C**)



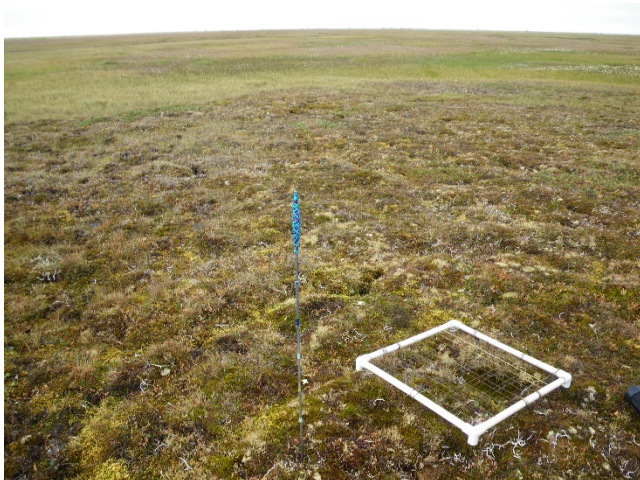
Palustrine emergent persistently saturated moist graminoid tundra (**PEM1B**)



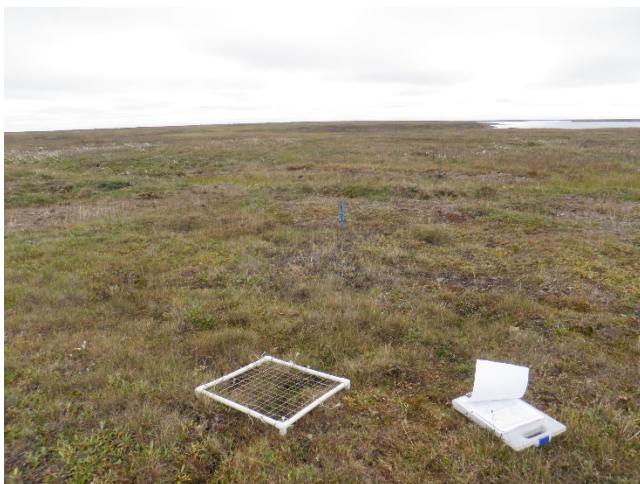
Palustrine emergent persistent temporarily flooded dry-moist graminoid tundra (**PEM1A**)



Palustrine emergent persistent saturated /Palustrine moss-lichen lichen saturated dry dwarf shrub graminoid tundra (**PEM1B/ PML2B**)



Palustrine emergent persistent temporarily flooded/Palustrine scrub-shrub evergreen temporarily flooded Dry dwarf shrub tundra (**PEM1A/PSS7A**)



Lacustrine limnetic unconsolidated bottom permanently flooded lake (L1UBH)



Lacustrine littoral emergent permanently flooded *Arctophila* littoral lake shore (L2EMH)



Lacustrine littoral unconsolidated bottom organic permanently flooded graminoid littoral lake shore (L2UB4H)

