

NATIONAL WETLANDS INVENTORY  
NOTES TO USERS FOR  
COLVILLE RIVER DELTA MAPS

The map codes used on the Colville River Delta National Wetland Inventory maps are listed below. A general description and/or community type, including dominant vegetation, is provided for each code. Complete definitions of the water regime modifiers are provided in Appendix A. Water regimes are represented by a single letter code at the end of each label.

Marine System

The marine system is restricted to areas offshore of the bars, flats, and associated channels at the mouth of the delta.

- M1OWL        Subtidal, open water areas with direct exposure to the waves and ice of the Beaufort Sea. Salinity is higher than in adjacent estuarine habitats. The M1OWL type is a subset of Markon's water class.
- M2USN        Intertidal, regularly-flooded unvegetated flats with direct exposure to the waves and ice of the Beaufort Sea. The substrate is typically composed of gravel and sand sized particles. The M2USN type is a subset of Markon's type 16.

Estuarine System

The estuarine system is confined to the bays, channels, flats, and adjacent tidal wetlands at the mouth of the Colville River Delta. These areas have partly obstructed or sporadic access to the open ocean. The salinity is generally less than that found in the adjacent marine habitats. Estuarine habitats are considered low-energy since they are usually protected from the full force of wave action in the open ocean.

- E1OWL        Subtidal, low-energy brackish open water. Includes portions of Harrison Bay and the tidal channels of the mouth of the delta where ocean-derived salts exceed 0.5 ppt. Also includes tidal ponds on flats and in coastal marshes. The E1OWL type is a subset of Markon's water class.
- E2USN        Intertidal, regularly-flooded unvegetated mud and sand flats in low-energy, brackish water environments. The E2USN type is a subset of Markon's Type 16.
- E2USP        Intertidal, irregularly-flooded unvegetated mud and sand flats in low-energy, brackish water environments. The E2USP type is a subset of Markon's type 16.

- E2US/EM1P Intertidal, irregularly-flooded unvegetated flats mixed with estuarine marsh vegetation. The emergent vegetation occupies 30-50 percent of the substrate. Dominant vegetation in higher salinity areas includes Puccinellia phryganodes, Carex subspathacea, C. rariflora and C. ramenskii. Areas flooded less often and characterized by lower salinities are dominated by Stellaria humifusa, Cochlearia officinalis, Dupontia fisheri and Bryophytes. Other species include Alopecurus alpinus, Arctagrostis latifolia and Poa spp. Areas mapped as E2US/EM1P on the NWI maps generally correspond to Markon's type 8, although Markon's types 06 and 07 are included in some areas.
- E2EM1P Intertidal, irregularly-flooded brackish marshes occurring near the outer edge of the Colville River Delta. The areal cover of vegetation exceeds 70 percent of the mapped units. Dominant species include Puccinellia phryganodes, Carex subspathacea, Stellaria humifusa, and Cochlearia officinalis. Other species common in this wetland type are those listed for E2US/EM1P. The E2EM1P type generally corresponds to Markon's type 06 and 07.
- E2EM1/USP Intertidal, irregularly-flooded brackish marshes mixed with unvegetated mud and sand flats. The emergent marsh vegetation occupies 50-70 percent of the mapped units. Common species for this type are the same as those listed for E2US/EM1P. Wetlands classified by the NWI as E2EM1/USP generally correspond to Markon's type 8, although Markon's types 06 and 07 are included in some areas.
- E2EM1/OW Intertidal, irregularly-flooded brackish marsh mixed with small, permanent pools of brackish water. These areas are predominantly polygonal tundra that is occasionally inundated by brackish water during storms. Brackish conditions may also be the result of sea-spray. Since the polygon centers are usually closed basins, brackish water persists following tidal inundation. Water levels are maintained by precipitation during periods between tidal flooding. The vegetation on the polygon ridges includes grasses such as Dupontia fisheri, Alopecurus alpinus and Arctagrostis latifolia. Sedges include Carex ursina, C. subspathacea, C. rariflora, and C. ramenskii. Other species present include Cochlearia officinalis, Stellaria humifusa, and Salix ovalifolia. The E2EM1/OW wetland class generally corresponds to types 06P and 07P in Markon's classification system.

### Riverine System

All river and stream channels upstream from the influence of ocean-derived salinity are included in the riverine system. Unvegetated (less than 30% vegetative cover) flats and bars contained within the outer banks of riverine channels are also part of the riverine system. Due to extremely limited tidal ranges at the mouth of the Colville River Delta, no attempt was made to identify and map freshwater tidal subsystems on the NWI maps.

- R2OWH Permanently-flooded open water channels of lower perennial rivers and streams. These channels are upstream from the influence of ocean-derived salinity. Brackish channels are mapped as E1OWL. All riverine channels on the Colville River Delta NWI maps are classified in the lower perennial subsystem. This category is a subset of Markon's water class.
- R2USD Seasonally-flooded river bars and flats (unconsolidated shore). These riverine features are usually flooded only during spring melt. The well drained substrate is exposed in June after flood waters recede. This category is a subset of Markon's type 16.
- R2USA Temporarily-flooded river bars and flats (unconsolidated shore). These areas are flooded for a shorter duration than the seasonally flooded bars and flats (R2USD). Sparse pioneer vegetation often becomes established on the more stable areas of the R2USA type. This category is a subset of Markon's type 16.
- R2US/OW This code is used to designate complexes of river bars and open water channels.

#### Lacustrine System

This system includes all freshwater lakes greater than 20 acres in size. Bodies of water less than 20 acres in size are included in the palustrine system.

- L10WH Permanently-flooded open water areas of lakes. As a mapping convention, most lacustrine open water areas are classified in the limnetic subsystem. This convention was used because the depth of many of the water bodies in the Colville River Delta exceeds 2 m (6.6 feet). This category is a subset of Markon's water class.
- L20WH Permanently-flooded, shallow open water areas of lakes. Littoral zones in some lakes were clearly visible on the aerial photography. These shallow areas are usually 1-3 feet in depth. This category is a subset of Markon's water class.
- L2USD Seasonally-flooded mud and sand flats occurring along lake shorelines. Water covers the substrate for approximately one month at the beginning of the growing season.
- L2USA Temporarily-flooded mud and sand flats occurring along lake shorelines. These areas are flooded for a shorter duration than the seasonally-flooded flats (L2USD). Surface water persists for approximately two-three weeks at the beginning of the growing season. Pioneer vegetation may become established in these areas.

L2EM2H Permanently-flooded grass marsh occurring in shallow zones of lacustrine basins. The non-persistent emergent vegetation consists primarily of Arctophila fulva. This species generally grows in water that is 20-100 cm deep. Other non-persistent species sometimes found with Arctophila include Hippuris vulgaris and Caltha palustris. The L2EM2H wetland type is a subset of Markon's type 02.

### Palustrine System

The palustrine system includes all wetlands on the Colville River delta dominated by shrubs, persistent emergents, moss, and lichens that are not influenced by ocean-derived salinity. Wetland types commonly referred to as moist tundra, wet tundra, tussock tundra, meadows, and marshes are grouped in the palustrine system. Lakes and ponds less than 20 acres in size are also part of the palustrine system.

POWH Permanently-flooded, small open water bodies (ponds). Some POWH wetlands have been left unlabeled on the NWI maps in order to reduce the complexity of the maps. This wetland type is a subset of Markon's water class.

PEM2H Permanently-flooded grass marsh occurring in shallow portions of pond basins. The non-persistent emergent vegetation consists primarily of Arctophila fulva. This species generally grows in water that is 20-100 cm deep. Other non-persistent species sometimes found with Arctophila include Hippuris vulgaris and Caltha palustris. This category is a subset of Markon's type 02.

PEM1H Permanently-flooded sedge marsh occurring in sites where shallow water persists throughout the ice-free season in all years. The PEM1H category appears infrequently on the Colville River Delta NWI maps. This type was mapped along the margins of lakes and ponds and in small basins. Carex aquatilis is the dominant species. PEM1H wetlands are a subset of Markon's type 01.

PEM1F Semipermanently-flooded sedge marsh occurring in low tundra areas, such as drained lake basins and pond and lake shorelines. Standing water is present throughout the ice-free season in most years. In dry years, sediments may become exposed by August. Carex aquatilis is the dominant species in areas mapped as PEM1F. This type is a subset of Markon's type 01.

PEM1E Seasonally-flooded sedge meadow occurring in low centered polygons, in large depressions such as old river channels and old oxbow lakes, and in drained lake basins. Seasonally-flooded polygonal tundra is only mapped as PEM1E if the shrub dominated polygonal ridges cover less than 30 percent of the mapped units.

There is shallow standing water in PEM1E wetlands in early summer, but the water is seldom present late in the growing season. Eriophorum angustifolium, E. russeolum, and Carex aquatilis are the dominant species. Other species present include Eriophorum scheuchzeri, Pedicularis sudetica and Salix spp. The PEM1E wetland type is a subset of Markon's type 01.

- PEM1B Saturated sedge meadow occurring primarily in drier portions of old drained lake basins. Standing water is seldom present, but the soil remains saturated throughout the growing season. This classification was also used for moist tundra areas dominated by graminoid tussocks. Areas of moist tundra mapped as PEM1B have a shrub cover that is less than 30 percent. If the areal coverage of shrub species exceeds 30 percent, the PEM1/SS1B classification was usually applied. Eriophorum vaginatum is the dominant species in the sedge tussock areas. Dominant species in the PEM1B portions of old drained lake basins include Carex bigelowii, C. rariflora, Eriophorum angustifolium and E. Scheuchzeri. The PEM1B type occurs very infrequently on the Colville River Delta. This wetland type generally corresponds to Markon's type 17.
- PEM1/2H Permanently-flooded sedge-grass marsh occurring in shallow portions of pond or lake basins. This wetland type is characterized by a mix of persistent and non-persistent emergent vegetation. Carex aquatilis is the dominant persistent species, and Arctophila fulva is the dominant non-persistent species. This wetland type is equivalent to Markon's type 02.
- PEM1/OWH Areas of low-centered polygons with permanent standing water occurring in the polygonal basins. The moist polygon ridges are dominated by emergent species including Dryas integrifolia, Pedicularis spp. Petasites frigidus, Saxifraga hirculus, Eriophorum angustifolium, and Carex spp. Low shrubs are also found on the polygon ridges. Shrub species include Salix reticulata, S. arctica, and S. rotundifolia. Some of the deeper polygonal basins remain as unvegetated open water throughout the growing season. Shallower basins are vegetated with those emergent species described for PEM1F and PEM1H wetlands. PEM1/OWH areas were generally mapped as type 03P by Markon.
- PEM1/USA Temporarily-flooded areas on river floodplains and in recently drained lake basins consisting of a mix of emergent vegetation and unconsolidated shore (bars or flats). Plant species include Carex spp., Dupontia fisheri, Deschampsia caespitosa, and Epilobium latifolium. The emergent vegetation covers 50 - 70 percent of the mapped units. This wetland type corresponds to Markon's types 05 and 15.

- PEM1/USD Seasonally-flooded, well drained areas on river floodplains and in recently drained lake basins consisting of a mix of emergent vegetation and unconsolidated shore (bars or flats). The soil in these wetland areas does not remain saturated following periods of flooding. The dominant emergent species are similar to those listed for the PEM1/USA wetland type. This wetland type corresponds to Markon's types 05 and 15.
- PEM1/USE Seasonally-flooded, saturated areas primarily in recently drained lake basins. These wetlands consist of a mix of emergent vegetation and unconsolidated shore (flats). The soil remains saturated following periods of flooding. The dominant emergent species are similar to those listed for the PEM1/USA wetland type. This wetland type generally corresponds to Markon's types 05 and 15.
- PEM1/SS1A Temporarily-flooded areas on river floodplains consisting of a mix of herbaceous emergent vegetation and broad-leaved deciduous shrubs. Emergent species occupy 50 - 70 percent of the mapped units, and include Arctogrostis latifolia, Carex spp., Juncus sp., Equisetum spp., and Epilobium latifolium. The most commonly found shrub species include Salix glauca, S. lanata, and S. alaxensis. This wetland type is a subset of Markon's type 10.
- PEM1/SS1B Saturated graminoid-dwarf shrub tundra. Although the soil remains saturated in these areas throughout the growing season, standing water is seldom present. This wetland type includes sedge tussock tundra areas where the dwarf shrub component has an areal coverage of 30 - 50 percent. Herbaceous species commonly found in this type include Eriophorum vaginatum, Carex aquatilis, C. Bigelowii, C. rariflora, Pedicularis spp., Arctogrostis latifolia, Petasites frigidus, Saxifraga hirculus, and Papaver lapponicum. The shrub component consists primarily of willow species including Salix lanata, S. reticulata, S. rotundifolia and S. glauca. Areas mapped as PEM1/SS1B on the National Wetland Inventory maps most frequently correspond to types 03 and 17 on the Markon map series.
- PEM1/SS1E Seasonally-flooded, saturated polygonal tundra areas consisting of a mix of herbaceous emergent and dwarf shrub vegetation. The polygon basins contain standing water for approximately half of the growing season. The basins are vegetated with emergent species including Eriophorum angustifolium, E. russeolum, and Carex aquatilis. The drier polygon ridges are dominated by dwarf shrub species including Salix lanata, S. reticulata, S. rotundifolia, and S. arctica. Emergent species on the polygon ridges include Dryas integrifolia, Pedicularis spp., Petasites frigidus, Eriophorum spp., and Carex spp. The PEM1/SS1E code was also used to designate non-polygonal tundra areas consisting of a mosaic of seasonally flooded sedge meadow (PEM1E) and saturated graminoid-dwarf shrub tundra (PEM1/SS1B). PEM1/SS1E areas were generally mapped as types 03P and 04P on Markon's maps.

- PEM1/SS1F Polygonal tundra areas consisting of semipermanently-flooded basins and saturated polygon ridges. Carex aquatilis is the dominant species in the polygon basins. The drier ridges support a mix of dwarf shrubs and herbaceous emergents. The dominant species on the elevated ridges are the same as those species described for PEM1/SS1E wetlands. PEM1/SS1F areas were generally mapped as types O3P and O4P on Markon's maps.
- PSS1A Temporarily flooded deciduous shrub areas on river floodplains. This wetland type often occurs on river bars that have become stable enough to support persistent woody vegetation. Salix sp. is the dominant vegetation and include S. glauca, S. lanata and S. alaxensis. Other species present may include Arctogrostis Tatifolia, Carex spp., Juncus sp., Equisetum spp., and Dryas sp. These herbaceous species cover less than 30 percent of the mapped units. This wetland is a subset of Markon's type 10.
- PSS1B Saturated dwarf shrub tundra. This wetland type is uncommon on the Colville River Delta. Salix sp., is the dominant vegetation and includes S. ovalifolia, S. arctica and S. lanata. Herbaceous emergent vegetation covers less than 30 percent of the areas mapped as PSS1B.
- PSS1D Seasonally-flooded deciduous shrubs occurring on well drained shores and bars of active river channels. Salix alaxensis and S. glauca are the most common species. Herbaceous emergent vegetation covers less than 30 percent of the areas. The dominant emergent species are the same as those listed for the PSS1A wetland type. This wetland category is a subset of Markon's type 10.
- PSS1/USA Temporarily-flooded areas on active river floodplains consisting of a mix of deciduous shrubs and unvegetated substrate. The shrub areas are dominated by willow and cover between 50 - 70 percent of the mapped units. Salix alaxensis and S. glauca are the most common shrub species. This wetland type is a subset of Markon's type 10.
- PSS1/USD Seasonally-flooded areas on active river floodplains consisting of a mix of deciduous shrubs and unvegetated substrate. The shrub areas cover between 50 - 70 percent of the mapped units and are dominated by Salix alaxensis and S. glauca. This wetland type is a subset of Markon's type 10.
- PSS1/EM1A Temporarily-flooded areas on river floodplains consistency of a mix of broad-leaved deciduous shrubs and emergent vegetation. Shrub species occupy 50 - 70 percent of the areas. The shrub and emergent species are the same as those listed for the PEM1/SS1A wetland type. This wetland category is a subset of Markon's type 10.

- PSS1/EM1B Saturated dwarf shrub-graminoid tundra. The dwarf shrub component has an areal coverage of 50 - 70 percent. The common species in this wetland type are the same as those described for PEM1/SS1B wetlands. Areas mapped as PSS1/EM1B most frequently correspond to types 03 and 17 on the Markon map series.
- PSS1/EM1D Seasonally-flooded, well drained areas on river floodplains consisting of a mix of broad-leaved deciduous shrubs and emergent vegetation. See description of PEM1/SS1A wetlands for a listing of common species in this wetland type. This wetland type is a subset of Markon's type 10.
- PSS1/EM1E Seasonally-flooded, saturated polygonal tundra areas consisting of a mix of dwarf shrubs and herbaceous emergent vegetation. The areas are characterized by wide, well developed polygon ridges and small, seasonally flooded basins. The shrub dominated ridges have a greater areal coverage than the emergent dominated basins. The most common species found in this wetland type are the same as those listed for PEM1/SS1E wetlands. PSS1/EM1E areas are generally mapped as types 03P and 04P on Markon's maps.
- PSS1/EM1F Polygonal tundra areas consisting of saturated polygon ridges and semipermanently flooded basins. The wide, well-developed ridges have a greater areal coverage than the small, semipermanently flooded basins. Carex aquatilis is the dominant species in the polygon basins. The shrub and emergent species on the drier ridges are the same as those described for the PEM1/SS1E wetland type. PSS1/EM1E areas are generally mapped as types 03P and 04P on Markon's maps.
- PUSD Seasonally-flooded small basins (less than 20 acres in size) that typically contain standing water only during the early part of the growing season. When surface water is absent, the exposed substrate usually remains unvegetated.
- PUS/EM1A This wetland code is the inverse of the PEM1/USA designation. The unconsolidated shore (bars or flats) component has a greater areal coverage than the herbaceous emergents. These wetlands are temporarily-flooded areas on river floodplains and in recently drained lake basins. Common plant species include Carex spp., Dupontia fisheri, Deschampsia caespitosa, and Epilobium latifolium. The PUS/EM1A wetland type corresponds to Markon's types 05 and 15.
- PUS/EM1D Seasonally-flooded, well drained areas on river floodplains and in recently drained lake basins consisting of a mix of unconsolidated shore (bars or flats) and emergent vegetation. Common plant species are the same as those listed for the PUS/EM1A wetland type. This type generally corresponds to Markon's types 05 and 15.

PUS/EMTE

Seasonally-flooded, saturated areas primarily in recently drained lake basins. These wetlands consist of a mix of unconsolidated shore (flats) and emergent vegetation. The substrate remains saturated following periods of flooding. The dominant species are similar to those listed for the PEM1/USA wetland type. This type generally corresponds to Markon's types 05 and 15.

## APPENDIX A

### Water Regime Modifiers

#### Tidal-Marine and Estuarine Systems

- (L) Subtidal - The substrate is permanently flooded with tidal water.
- (N) Regularly-Flooded - Tidal water alternately floods and exposes the land surface at least once daily.
- (P) Irregularly-Flooded - Tidal water floods the land surface less often than daily. The area must be flooded by tide at least once yearly as a result of extreme high spring tide.

#### Non-Tidal

- (A) Temporarily-Flooded - Surface water is present for brief periods during the growing season, but the water table usually lies well below soil surface. Plants that grow both in uplands and wetlands are characteristic of this water regime.
  - (B) Saturated - The substrate is saturated to the surface for extended periods during the growing season, but surface water is seldom present.
  - (D) Seasonally-Flooded, Well Drained - Surface water is present for extended periods during the growing season, but is absent by the end of the growing season in most years. When the surface water is absent, the water table drops well below the soil surface.
  - (E) Seasonally-Flooded, Saturated - Surface water is present for extended periods during the growing season, but is absent by the end of the growing season in most years. When the surface water is absent, the water table remains at the soil surface.
  - (F) Semipermanently-Flooded - Surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land's surface.
  - (H) Permanently-Flooded - Water covers land surface throughout the year in all years.
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