16970

**North American Arctic Freshwater Marsh Model**

Date: 10/08/08

|  |  |  |  |
| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
| Kori Blankenship | kblankenship@tnc.org | Janet Jorgenson | Janet\_Jorgenson@fws.gov |
| Keith Boggs | Ankwb@uaa.alaska.edu | None | None |
| None | None | None | None |

Reviewer: Robin Innes

Vegetation Type

Herbaceous Wetlands

Map Zones

67, 68, 69, 70, 71, 72, 76

Model Splits or Lumps

North American Boreal and Arctic Freshwater Aquatic Bed (BpS 1627) is lumped with this Biophysical Setting (BpS).

Geographic Range

This BpS occurs throughout arctic AK, from the Bristol Bay lowlands in southwestern AK to the North Slope on the Arctic Ocean. It is especially common on the arctic coastal plain and Yukon River delta.

Biophysical Site Description

These freshwater marshes occur as small patches throughout arctic Alaska, typically on the margins of ponds, lakes, and beaded streams. They are semi-permanently flooded, but some have seasonal flooding, and the water depth typically exceeds 10 cm. It is also found on large to small floodplains where various wetlands form in oxbows, wet depressions, low-lying areas, and abandoned channels, including freshwater marshes. Adjacent deeper water supports aquatic beds. Soils are muck or mineral, and water is nutrient-rich. In floodplains, permafrost is absent.

**Vegetation Description**

This system has standing water with >10% cover of emergent herbaceous vegetation, primarily *Arctophila fulva*. Species diversity is low. It is often dominated by *Carex aquatilis* or *Eriophorum angustifolium*, but other emergent species may occur, including *Comarum palustre, Hippuris vulgaris, Carex triculate, Menyanthes trifoliata, Lysimachia thyrsiflora*, and *Equisetum fluviatile.* Adjacent aquatic beds would support submerged vegetation.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| ARFU2 | *Arctophila fulva* | Pendantgrass |
| CAAQ | *Carex aquatilis* | Water sedge |
| ERAN6 | *Eriophorum angustifolium* | Tall cottongrass |

Species names are from the NRCS PLANTS database. Check species codes at http://plants.usda.gov.

Disturbance Description

This system occurs within a variety of successional processes, including thaw lakes, ice-wedge polygons, and oriented lakes. Seral stages and the rate of succession are unclear. In floodplains, primary succession on the Yukon-Kuskokwim Delta may move rapidly from aquatic bed to marsh to wet sedge and, possibly, to wet low-tall shrub. An alternate wetland pathway is mesic sites supporting low or tall willows moving to wet low-tall shrub to wet sedge to tussocks, but this last stage is no longer part of floodplain dynamics. Primary succession on the Beaufort Coastal Plain progresses slowly from gravel bars to tall willow (possibly persisting for 300 years) or alder-willow, then to wet low willow (possibly persisting for 500 years). Paludification may lead to wet sedge (possibly persisting for 1000-2000 years), and permafrost formation may lead to tussock tundra, but this last stage is no longer part of the floodplain dynamics.

In 2015, an extensive literature search was done by Fire Effects Information System staff to locate information for a synthesis on fire regimes of Alaskan wet and mesic herbaceous systems (Innes 2015). At that time there was little published information on fire regimes of freshwater marshes in AK, but anecdotal information suggests that they can occasionally burn (Innes 2015).

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement |  |  |  |  |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) |  |  |  |  |
| All Fires |  |  |  |  |

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Percent of all fires is the percent of all fires modeled in that severity class. Minimum and Maximum FIs show the relative range of fire intervals as estimated by model contributors, if known.

Scale Description

Small patch.

Adjacency or Identification Concerns

Issues or Problems

Native Uncharacteristic Conditions

Comments

In 2021 NatureServe merged Alaska Arctic Pendantgrass Freshwater Marsh (BpS 1697) and Alaska Arctic Sedge Freshwater Marsh (BpS 1705) into one Ecological System: North American Arctic Freshwater Marsh. Both BpS were described and modeled by Keith Boggs and Kori Blankenship and reviewed by Janet Jorgenson. Both BpS were represented by models with one seral state and no transitions. Kori Blankenship worked with NatureServe staff to merge the BpS descriptions to reflect the new Ecological System concept.

For LANDFIRE National this model was created by Kori Blankenship and Keith Boggs based input from experts who attended the LANDFIRE Arctic Modeling Meeting (April 2008) and the draft Arctic Ecological Systems description.

Succession Classes

**Mapping Rules**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Upper Layer Lifeform** | **Height (m)** | **Canopy Cover (%)** | | | | | | | | | |
| **0-10** | **11-20** | **21-30** | **31-40** | **41 - 50** | **51-60** | **61-70** | **71-80** | **81-90** | **91-100** |
| Herb | 0-0.5 | A | A | A | A | A | A | A | A | A | A |
| Herb | 0.5-1.0 | A | A | A | A | A | A | A | A | A | A |
| Herb | >1.0 | A | A | A | A | A | A | A | A | A | A |
| Shrub | 0-0.5 | A | A | UN | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 0.5-1.0 | A | A | UN | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 1.0-3.0 | A | A | UN | UN | UN | UN | UN | UN | UN | UN |
| Shrub | >3.0 | A | A | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 0-5 | A | A | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 5-10 | A | A | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 10-25 | A | A | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 25-50 | A | A | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | >50 | A | A | UN | UN | UN | UN | UN | UN | UN | UN |

Succession class letters A-E are described in the Succession Class Description section. Some classes use a leafform distinction where a qualifier is added to the class letter: Brdl (broadleaf), Con (conifer), or Mix (mixed conifer and broadleaf). UN refers to uncharacteristic native or a combination of height and cover that would not be expected under the reference condition. NP refers to not possible or a combination of height and cover which is not physiologically possible for the species in the BpS.

**Description**

Class A 100 Mid Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ARFU2 | *Arctophila fulva* | Pendantgrass | Upper |

Description

Herbaceous vegetation dominates the marsh system.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Mid1:ALL | 0 | Mid1:ALL | 999 |

Probabilistic Transitions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Disturbance Type** | **Disturbance occurs In** | **Moves vegetation to** | **Disturbance Probability** | **Return Interval (yrs)** | **Reset Age to New Class Start Age After Disturbance?** | **Years Since Last Disturbance** |

References

Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, M. Russo, K. Schulz, K. Snow, J. Teague, and R. White. 2003-present. Ecological systems of the United States: A working classification of U.S. terrestrial systems. NatureServe, Arlington, VA.

Innes, Robin J. 2015. Fire regimes of Alaskan wet and mesic herbaceous systems. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Missoula Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/fire\_regimes/AK\_wet\_herbaceous/all.html [2016, August 2].

Viereck, L.A., C.T. Dyrness, A.R. Batten and K.J. Wenzlick. 1992. The Alaska vegetation classification. Pacific Northwest Research Station, USDA Forest Service, Portland, OR. Gen. Tech. Rep. PNW-GTR286. 278 p.