17020

North American Arctic Dwarf-shrub-Wet Sedge-Sphagnum Peatland

BpS Model/Description Version: Nov. 2024

|  |  |  |  |
| --- | --- | --- | --- |
| **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 |

Vegetation Type

Woody Wetland

Map Zones

67, 68, 69, 70, 72, 73, 76

Geographic Range

This Biophysical Setting (BpS) is found in arctic AK primarily on the Yukon-Kuskokwim Delta and the Kotzebue Sound lowlands ecoregions (Nowacki et al. 2001).

Biophysical Site Description

This BpS is common in wet depressions, old lake basins, flat permafrost plateaus, and raised bogs (Boggs et al. 2008). Soils are poorly drained and acidic, typically with a well-developed peat layer (Boggs et al. 2008). Permafrost may be present.

Vegetation Description

Dwarf- and low-shrub cover is >25%, *Sphagnum* spp. cover is >25% (usually continuous), herbaceous species (primarily sedges) cover is >25%, and lichen cover is <25%. The dominant sedges are *Eriophorum* spp. and *Carex utriculata*. The dominant dwarf-shrubs are *Betula nana*, *Ledum palustre* ssp*. decumbens,* and *Comarum palustre (= Potentilla palustris)*. Other species include *Empetrum nigrum, Chamaedaphne calyculata, Vaccinium uliginosum, Salix pulchra, Spiraea stevenii (= Spiraea beauverdiana), Vaccinium vitis-idaea, Arctostaphylos* spp., *Equisetum fluviatile,* *Carex aquatilis*, *Carex macrochaeta,* and *Sphagnum* spp.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| ERIOP | *Eriophorum spp.* | Cottongrass |
| CAUT | *Carex utriculata* | Northwest territory sedge |
| BENA | *Betula nana* | Dwarf birch |
| COPA28 | *Comarum palustre* | Purple marshlocks |
| EQFL | *Equisetum fluviatile* | Water horsetail |
| SPHAG2 | *Sphagnum spp.* | Sphagnum |
| LEPAD | *Ledum palustre ssp. decumbens* | Marsh labrador tea |
| EMNI | *Empetrum nigrum* | Black crowberry |
| CHCA2 | *Chamaedaphne calyculata* | Leatherleaf |
| VAUL | *Vaccinium uliginosum* | Bog blueberry |

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

Disturbance Description

This is an early- or mid- seral stage in the thaw pond cycle. It starts with the collapse of a permafrost plateau resulting in a wet depression often with open water. This is colonized by marsh species or Sphagnum species or a combination of both. Sedges eventually invade, and the wet sedge-Sphagnum system develops. If organic matter buildup or permafrost uplift the surface, then this system may be seral to the dwarf-shrub-Sphagnum system. This system, in turn, may be seral to the permafrost plateau-dwarf-shrub-lichen system. The seral sequence may not be unidirectional, and the timeframe is unclear, possibly taking hundreds of years. The successional processes of this system are likely too slow (i.e., on the scale of 1000s of years) to be captured using the LANDFIRE methodology (personal communication Arctic modeling meeting April 2008).

In 2015, an extensive search was done by FEIS staff to locate information for a synthesis on fire regimes of Alaskan wet and mesic herbaceous systems (Innes 2015). According to the review, the importance of fire will vary depending on the type of peatland and the amount of soil drainage. Peatlands with a low or seasonally low water table are the most likely to burn, but there is little published research on fire frequency in herbaceous peatlands in AK (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 to large patch

Adjacency or Identification Concerns

Issues or Problems

Native Uncharacteristic Conditions

Innes 2015 provides information about climate change and Alaskan wet and mesic herbaceous communities.

Comments

In 2021 NatureServe merged Alaska Arctic Wet Sedge-Sphagnum Peatland (BpS 1702) and Alaska Arctic Dwarf-Shrub-Sphagnum Peatland (BpS 1703) into one Ecological System: North American Arctic Dwarf-shrub-Wet Sedge-Sphagnum Peatland. Both models were created by Kori Blankenship and Keith Boggs, reviewed by Janet Jorgenson, and had models with one seral state defined. Kori Blankenship and Pat Comer merged the BpS model and description.

During 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 (Boggs et al. 2008).

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 | A | A | A | A | A | A | A | A |
| Shrub | 0.5-1.0 | A | A | A | A | A | A | A | A | A | A |
| Shrub | 1.0-3.0 | A | A | A | A | A | A | A | A | A | A |
| Shrub | >3.0 | A | A | A | A | A | A | A | A | A | A |
| 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

Upper Layer Lifeform: Herb and shrubs

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ERIOP | *Eriophorum* spp. | Cottongrass | Upper |
| SPHAG2 | *Sphagnum* spp. | Sphagnum | Upper |
| BENA | *Betula nana* | Dwarf birch | Upper |
| LEPAD | *Ledum palustre* ssp*. decumbens* | Marsh labrador tea | Upper |

Description

Herbs or dwarf shrubs dominate.

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

Boggs et al. 2008. International Ecological Classification Standard: Terrestrial Ecological Classifications. Draft Ecological Systems Description for the Alaska Arctic Region.

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].

Nowacki, G., P. Spencer, M. Fleming, T. Brock and T. Jorgenson. 2001. Unified ecoregions of Alaska. U.S. Department of the Interior, U.S. Geological Survey. Open file-report 02-297. 2 page map.