16850

North American Arctic Sparse Tundra

BpS Model/Description Version: Nov. 2024

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| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
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| None | None | None | None |

Vegetation Type

Shrubland

Map Zones

67, 68, 69, 70, 71, 72, 73, 76

Geographic Range

This Biophysical Setting (BpS) occurs throughout arctic Alaska, from the Bristol Bay lowlands in southwestern Alaska to the North Slope on the Arctic Ocean.

Biophysical Site Description

This is a common system on acidic (pH typically <6) or on non-acidic (pH typically >6) substrates in the hills and mountains of arctic Alaska. Sites on acidic substrates do not occur on flat thaw-lake plains, while non-acidic sites do not occur in the arctic lowlands. Common slope positions include valleys, sideslopes, and summits and ridges. The canopy is sparse due to extreme exposure, exposed bedrock, or unstable substrates. Sites are typically dry to mesic, and soils are typically thin, stony, and well-drained. Non-acidic sites are more common near floodplains, on carbonate substrates, and in loess deposition areas. Patch size is small to matrix-forming.

Vegetation Description

Total vascular plant cover is 10-25%, and lichen cover is <25%.

Common dwarf-shrub species on acidic sites include *Dryas octopetala, Empetrum nigrum, Vaccinium uliginosum, Dryas integrifolia, Loiseleuria procumbens,* and *Salix phlebophylla*.

Common dwarf-shrubs on non-acidic sites include *Dryas octopetala, Dryas integrifolia, Saxifraga oppositifolia, Rhododendron lapponicum, Salix arctica, Salix reticulata, Cassiope tetragona*, and *Arctostaphylos rubra*.

Herbaceous species on acidic sites may include *Antennaria alpina, Anthoxanthum monticola, Minuartia obtusiloba, Carex scirpoidea, Carex podocarpa, Carex microchaeta,* and *Festuca altaica*. Herbaceous species on non-acidic sites may include *Lupinus arcticus, Hedysarum boreale* ssp. *mackenziei* (= *Hedysarum mackenziei*), *Carex scirpoidea, Carex rupestris, Oxytropis nigrescens, Potentilla uniflora, Artemisia senjavinensis, Artemisia globularia, Artemisia furcata, Saxifraga oppositifolia*, and *Equisetum* spp.

Lichens on acidic sites include *Cladina* spp., *Sphaerophorus globosus, Nephroma arcticum, Flavocetraria* spp., and *Alectoria ochroleuca*. Lichens such as *Thamnolia* spp. and *Cetraria islandica* occur on non-acidic sites.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| DROC | *Dryas octopetala* | Eightpetal mountain-avens |
| EMNI | *Empetrum nigrum* | Black crowberry |
| VAUL | *Vaccinium uliginosum* | Bog blueberry |
| DRIN4 | *Dryas integrifolia* | Entireleaf mountain-avens |
| LOPR | *Loiseleuria procumbens* | Alpine azalea |
| SAPH | *Salix phlebophylla* | Skeletonleaf willow |
| ANAL4 | *Antennaria alpina* | Alpine pussytoes |
| HIAL3 | *Hierochloe alpina* | Alpine sweetgrass |

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

Disturbance Description

This BpS occupies sites characterized by high levels of disturbance such as frost heaving, solifluction, and wind. These continual disturbances combined with extremes site conditions (e.g. high elevation, very late melting snow beds, sometimes on bedrock substrate, shallow soils, scree slopes, and areas of active soil development) are the dominant factors shaping this BpS.

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

Patch size is small to matrix-forming.

Adjacency or Identification Concerns

This system is similar to the Alaska Arctic Acidic Dwarf-Shrub Lichen Tundra, but the vegetation cover is sparse. It is also similar to the Alaska Arctic Dwarf-Shrubland. For mapping, a bedrock geology map could be used to distinguish acidic and non-acidic tundra.

Issues or Problems

Native Uncharacteristic Conditions

Comments

In 2021 NatureServe merged Alaska Arctic Acidic Sparse Tundra (BpS 1685) and Alaska Arctic Non-Acidic Sparse Tundra (BpS 1686) into one Ecological System: North American Arctic Sparse Tundra. Pat Comer and Kori Blankenship merged the BpS descriptions to reflect the new Ecological System concept. Both BpS were represented by models with one seral state.

During LANDFIRE National Kori Blankenship and Keith Boggs drafted the description and model for BpS 1685 and 1686 based on 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

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| DROC | *Dryas octopetala* | Eightpetal mountain-avens | Upper |
| EMNI | *Empetrum nigrum* | Black crowberry | Upper |
| VAUL | *Vaccinium uliginosum* | Bog blueberry | Upper |
| DRIN4 | *Dryas integrifolia* | Entireleaf mountain-avens | Upper |

Description

This class represents the Arctic Sparse Tundra 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

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.