**16880**

North American Arctic Dryas Tundra

BpS Model/Description Version: Nov. 2024

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| --- | --- | --- | --- |
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Vegetation Type

Shrubland

Map Zones

67, 68, 69, 70, 71, 72, 73, 74, 76

Geographic Range

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

Biophysical Site Description

The arctic *Dryas* tundra system commonly occurs on exposed, circumneutral, rocky substrates in the hills and mountains of arctic Alaska. Sites are commonly found on mountain slopes, hillslopes, sideslopes, summits, ridges, pingos, and stabilized dunes, throughout the arctic, and are uncommon to rare on late-lying snow beds and flat thaw-lake plains. Non-acidic sites are more common on carbonate substrates loess deposition areas associated with large floodplains, dunes, and bluffs, and may be found as small patches on river bluffs on the Arctic Coastal Plain, but otherwise does not occur in the arctic lowlands. Acidic sites do not occur in the arctic lowlands. Patch size is small to matrix-forming. Permafrost is present. Sites are typically dry to mesic, and soils are thin, stony, and well-drained to mesic, but may be saturated below 15 cm.

Vegetation Description

Sites may be dominated by *Dryas integrifolia* or *D. octopetala* (*D. octopetala* is now considered restricted to Greenland; *Dryas alaksensis* and *Dryas anjanensis* are more current nomenclature for *Dryas* species that are present in Alaska, but they are not listed in the USDA Plants Database) or co-dominated by a combination of the two species. *Dryas integrifolia* is more common on exposed microtopographic highs on the Arctic Coastal Plain whereas *D. octopetala* is more common on summits, shoulders, and ridges in the mountains and hills. This system is co-dominated by sedges and dwarf-shrubs. *Dryas* spp. cover is >10%, and total dwarf-shrub cover ranges from <25% to >25% depending on the pH and moisture of the substrate.

The plant community typically includes *Cassiopie tetragona, Arctous alpina, Salix reticulata*, and/or *Salix phlebophyla* (Viereck et al. 1992, Alaska Center for Conservation Science unpublished field data). Herbaceous cover is generally low, and composition is variable. Frequent graminoids are *Anthoxanthum monticola* ssp*. alpinum, Trisetum spicatum, Carex microchaeta,* and *Carex scirpoidea*. Forbs such as *Polygonum viviparum*, *Minuartia macrocarpa*, *M. obtusiloba, Anemone* spp., and *Saxifraga* *nelsoniana* may occur. Mosses such as *Polytrichum* spp., *Racomitrium lanuginosum,* and lichens such as *Thamnolia vermicularis, Stereocaulon* spp*., Bryocaulon divergens, Alectoria ochroleuca, A. nigraicans, Cetraria islandica,* and *Flavocetraria cucullate*.

Accessory species characteristic of acidic substrates: *Empetrum nigrum* (although not present in the high arctic)*, Vaccinium vitis-idaea,* and *Vaccinium uliginosum.*

Accessory species characteristic of calcareous substrates: *Rhododendron lapponicum*, *Saxifraga oppositifolia, Potentilla uniflora, Hedysarum boreale* ssp*. mackenziei* (= *Hedysarum mackenziei*), *Oxytropis nigrescens*, and *Tortula ruralis*.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| DROC | *Dryas octopetala* | Eightpetal mountain-avens |
| DRIN4 | *Dryas integrifolia* | Entireleaf mountain-avens |
| VAUL | *Vaccinium uliginosum* | Bog blueberry |
| LOPR | *Loiseleuria procumbens* | Alpine azalea |
| SARE2 | *Salix reticulata* | netleaf willow |
| SAPH | *Salix phlebophylla* | Skeletonleaf willow |
| ANMOA3 | *Anthoxanthum monticola ssp. alpinum* | Alpine sweetgrass |
| POVI3 | *Polygonum viviparum* | Alpine bistort |

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

Disturbance Description

Successional relationships are unclear. Cryoturbation is the primary disturbance affecting this BpS. Compared to dwarf shrub lichen tundra and tussock tundra, *Dryas* tundra is slow growing and unlikely to sustain fire due to low fuel load.

In 2013 an extensive search was done by Fire Effects Information System staff to locate information for a synthesis on fire regimes of Alaskan tundra communities (Innes 2013). Little information was available on *Dryas* communities. For Alaskan tundra ecosystems during the late Holocene mean fire return intervals from 142 to 5000 years were reported (Innes 2013). Fire frequency varies by region with tundra communities on the Seward Peninsula and in the Noatak River, Watershed burning more frequently than other regions (Innes 2013). Shrubs are typically top killed by fire but regrow quickly (Innes 2013). Sedge-dryas dominated sites would likely burn with the adjacent tussock tundra, but the wetter sedge-willow dominated sites likely would not carry fire (personal communication Arctic modeling meeting April 2008).

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

Patches are small to large and may be matrix-forming.

Adjacency or Identification Concerns

This BpS may occur adjacent to tussock tundra.

Issues or Problems

Native Uncharacteristic Conditions

Comments

10/2021 This description was updated by NatureServe staff and Kori Blankenship based on the updated Ecological Systems classification for Alaska. Edits focused on adjusting the Geographic Range, Biophysical Site Descriptions, and Vegetation Description sections.

In 2021 NatureServe merged Alaska Arctic Acidic Dryas Dwarf-Shrubland (BpS 1688), Alaska Arctic Mesic Sedge-Dryas Tundra (BpS 1684), and Alaska Arctic Non-Acidic Dryas Dwarf-Shrubland (BpS 1689) into a single Ecological System called North American Arctic Dryas Tundra. Kori Blankenship merged the old BpS descriptions to create a description for this system.

For LANDFIRE National BpS 1684, 1688, and 1689 were created by Kori Blankenship and Keith Boggs based on the draft Arctic Ecological Systems description (Boggs et al. 2008) and reviewed by Janet Jorgenson.

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 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Shrub | >3.0 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 0-5 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 5-10 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 10-25 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 25-50 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | >50 | UN | UN | 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 |
| DRIN4 | *Dryas integrifolia* | Entireleaf mountain-avens | Upper |
| SAPH | *Salix phlebophylla* | Skeletonleaf willow | Upper |
| ANMOA3 | *Anthoxanthum monticola* ssp*. alpinum* | Alpine sweetgrass | Upper |
| POVI3 | *Polygonum viviparum* | Alpine bistort | Upper |

Description

This class represents the North American Arctic Dryas Tundrasystem. Refer to the vegetation description for common species.

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.

Hall, Dorothy K.; Brown, Jerry; Johnson, Larry. 1978. The 1977 tundra fire in the Kokolik River area of Alaska. Arctic. 31(1): 54-58.

Innes, Robin J. 2013. Fire regimes of Alaskan tundra communities. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us

/database/feis/fire\_regimes/AK\_tundra/all.html [2016, June 28].

Johnson, L.; Viereck, L. 1983. Recovery and active layer changes following a tundra fire in northwestern Alaska. In: Permafrost: Fourth international conference, Proceedings; Fairbanks, AK. Washington DC: National Academy Press: 543-547.

Jorgenson, M. T., J. E. Roth, M. Emers, W. Davis, S.F., Schlentner and M.J. Macander. 2004. Landcover Mapping for Bering Land Bridge National Preserve and Cape Krusenstern National Monument, Northwestern Alaska. Final report for National Park Service. ABR, Inc. Fairbanks, AK. 129 p.

Viereck et al. 1992. The Alaska vegetation classification. Pacific Northwest Research Station, USDA Forest Service, Portland, OR. Gen. Tech. Rep. PNW-GTR286. 278 p.