16350

Western North American Boreal Alpine Dwarf-shrubland

BpS Model/Description Version: Nov. 2024

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

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Vegetation Type

Shrubland

Map Zones

68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78

Geographic Range

This Biophysical Setting (BpS) is found in the alpine and subalpine areas of the boreal and sub-boreal regions of Alaska. To the southwest, the range includes the Ahklun Mtns. and the Aleutians and to the west it extends to the Nulato hills (Ecoregions 9 and 7, Nowacki et al. 2001).

Biophysical Site Description

This alpine and subalpine system occurs commonly on mountain sideslopes, low summits and ridges, windswept summits and ridges, and in alpine valleys, on sites throughout northern, western, and the boreal and boreal transition regions in Alaska. Sites in the boreal region are well-drained and mesic to somewhat dry. Sites that occur in the boreal transition regions are typically mesic and extend up to the alpine regions. Soils on alpine sites are thin, stony, and well-drained to excessively well-drained. Sites are generally exposed to the wind and do not accumulate much winter snow.

Vegetation Description

Within the boreal ecoregion, the dwarf shrub *Empetrum nigrum* both dominates and indicates the system (Boucher et al. 2016). Other dwarf-shrubs that may co-dominate in the core boreal region include *Vaccinium uliginosum, Vaccinium vitis-idaea, Ledum palustre* ssp*. decumbens, Loiseuria procumbens, Salix arctica, Cassiope tetragona, Dryas octopetala,* and *Arctostaphylos* spp. With increasing exposure to the desiccating effects of wind, the dwarf shrubs *Dryas integrifolia* and/or *Dryas octopetala* may become subdominant. With increasing maritime influence dwarf shrub codominance shifts to *Harrimanella stelleriana, Phyllodoce aleutica, Harrimanella stelleriana, Cassiope lycopodioides, Vaccinium caespitosum,* and *Luetkea pectinata*.

The herbaceous component is variable and provides little cover. Frequent herbaceous species include *Anthoxanthum monticola* ssp*. alpinum, Campanula lasiocarpa, Rhodiola integrifolia* ssp*. integrifolia, Arnica lessingii, Carex spectabilis, Cherleria* spp.*, Anemone narcissiflora, Trisetum spicatum, Festuca* *altaica*, and *Artemisia arctica*.

Mosses can include *Pleurozium schreberi*, *Polytrichum* spp., and *Racomitrium* spp. Lichen cover increases with exposure where common lichens include *Alectoria nigricans*, *Cetraria islandica*, *Cladina rangiferina, Cladina stellaris, Flavocetraria cucullata, Stereocaulon* spp., and *Thamnolia vermicularis.* *Cassiope* and *Harrimanella* tundra sites occur on terrain that is well-protected by snow in the winter, and often remains snow-covered until the middle of the growing season.

On alpine sites, canopy cover is sparse, generally less than 25%, due to extreme exposure. The shrub component is often mixed, with ericaceous shrubs, *Dryas*, and willows contributing to the layer. Exposed rock and lichens are abundant, and lichen cover is at least 25%. Fruticose lichens often co-dominate with the shrubs and can include *Flavocetraria nivalis*, *Asahinea chrysantha*, *Umbilicaria* spp., and *Masonhalea richardsonii*.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| CATE11 | *Cassiope tetragona* | White arctic mountain heather |
| EMNI | *Empetrum nigrum* | Black crowberry |
| VAUL | *Vaccinium uliginosum* | Bog blueberry |
| HAST3 | *Harrimanella stelleriana* | Alaska bellheather |
| ARCTO3 | *Arctostaphylos* | Manzanita |
| DRIN4 | *Dryas integrifolia* | Entireleaf mountain-avens |
| DROC | *Dryas octopetala* | Eightpetal mountain-avens |
| LEPAD | *Ledum palustre ssp. decumbens* | Marsh labrador tea |
| LOPR | *Loiseleuria procumbens* | Alpine azalea |

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

Disturbance Description

Alpine shrub systems likely represent a relatively stable topoedaphic climax, but little is known about their successional dynamics (Viereck et al. 1992). Vegetation in these areas is controlled by the alpine environment, wind desiccation, and short growing season.

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). It is possible that fires caused by lightning strikes could affect small patches of vegetation, but little is known about the frequency, severity or seasonality of fires in this BpS. Lightning strikes in subalpine forest could spread to adjacent alpine tundra communities (Innes 2013). Fire spread was likely limited due to the sparse cover of fine fuels and barren areas acting as fire breaks.

Recent soil surveys from the White Mountains near Fairbanks show fire related mosses (e.g. *Ceratodon*), grasses like *Poa*, and fireweed dominating post fire (personal communication Blaine Spellman).

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

Vegetation can be found in small or large patches. Fires are typically quite small, and their spread is inhibited by lack of fuel continuity.

Adjacency or Identification Concerns

Adjacent systems include Western North American Boreal Alpine Mesic Herbaceous Meadow, Alaska Sub-boreal and Maritime Alpine Mesic Herbaceous Meadow, or barren alpine classes (including talus or bedrock).

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 Western North American Boreal Alpine Dwarf-Shrub Summit (BpS 16310), Western North American Boreal Alpine Dryas Dwarf-Shrubland (BpS 16340), Western North American Boreal Alpine Ericaceous Dwarf-Shrubland (16350), Western North American Boreal Alpine Dwarf-Shrub-Lichen Shrubland (16360) into one system called Western North American Boreal Alpine Dwarf-shrubland. Kori Blankenship revised this description accordingly.

For LANDFIRE National this model was created by Kori Blankenship in consultation with Tina Boucher for the boreal region of AK and did not receive review for other parts of the state.

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 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| 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 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| RHCA5 | *Rhododendron camtschaticum* | Kamchatka rhododendron | Upper |
| EMNI | *Empetrum nigrum* | Black crowberry | Upper |
| VAUL | *Vaccinium uliginosum* | Bog blueberry | Upper |
| CALA7 | *Campanula lasiocarpa* | mountain harebell | Upper |

Description

Sparse, open, or closed dwarf shrubs dominate. Exposed rock and lichens can be abundant. *Phyllodoce aleutica, Harrimenilla stelleriana,* and *Luetkea pectinata* are potential indicators species in the ‘maritime boreal’ region.

This BpS is relatively stable over time. Continual wind disturbance maintains this BpS.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Early1: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** |
| Wind or Weather or Stress | Early1:ALL | Early1:ALL | 0.9999 | 1 | No | 0 |

References

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