16390

North American Arctic Mesic-Wet Low Willow Shrubland

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 |

Reviewer: Robin Innes

Vegetation Type

Shrubland

Map Zones

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

Geographic Range

This Biophysical Setting (BpS) occurs throughout arctic AK, from the Bristol Bay lowlands in southwestern AK to the North Slope on the Arctic Ocean. If mapped in the Boreal region it would generally be found in the alpine zone. In MZ76 this type is found in Nowacki ecoregions 8, 9 and 10.

Biophysical Site Description

The low-tall willow system is widespread and common on mesic to wet mountain and hill slopes, flats, and adjacent to streams throughout arctic AK (Boggs et al. 2008). Soils are mesic to wet, including wet sites with subsurface water flow, water tracks, adjacent to narrow constrained streams, and on snow accumulation areas with late snowmelt (Boggs et al. 2008).

Vegetation Description

Total low- and tall-shrub (>0.2m tall) cover is >25% and dominated by willows (Boggs et al. 2008). *Salix alaxensis, Salix pulchra* and *Salix glauca* are the dominant species. *Alnus viridis* ssp*. crispa, Betula nana, Vaccinium uliginosum,* and *Ledum palustre* ssp*. decumbens* may codominate. Dwarf-shrubs such as *Empetrum nigrum* and *Vaccinium vitis-idaea* may be common under the low-shrub layer. Herbaceous species are sparse but sedges (*Carex aquatilis* and *Eriophorum angustifolium*) are sometimes common on wet sites. Feathermosses (*Hylocomium splendens* and *Pleurozium schreberi*) and lichens may be common.

*Salix* spp. are the primary indicators for this type. The other species listed in the Dominant Species field overlap with other BpS.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| SAAL | *Salix alaxensis* | Feltleaf willow |
| SAPU15 | *Salix pulchra* | Tealeaf willow |
| SAGL | *Salix glauca* | Grayleaf willow |
| ALVIC | *Alnus viridis ssp. crispa* | Mountain alder |
| BENA | *Betula nana* | Dwarf birch |
| VAUL | *Vaccinium uliginosum* | Bog blueberry |
| LEPAD | *Ledum palustre ssp. decumbens* | Marsh labrador tea |
| EMNI | *Empetrum nigrum* | Black crowberry |

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

Disturbance Description

This system seems to be relatively stable over time (personal communication experts’ workshop April 2008). Viereck et al. (1992) and others note that the successional status of Closed Tall Willow Shrub (II.B.1.a) on sheltered upland slopes are unclear and that these stands may persist over long time periods. The expert review indicated that this system is not controlled by avalanche activity, although avalanches may occur (personal communication experts’ workshop April 2008). Insects and diseases also affect willows.

Shrub stringers that occur next to small streams or water tracks appear to be stable. Seasonal overbank flooding may occur, but generally it does not result in shifting channels or gravel bar formation. Subsurface flow may be common, and the soils are often stony.

The fire-return interval is likely long and primary fire spread likely comes in from adjacent vegetation. The willow canopy shades the understory vegetation, possibly making the fine fuel layer moist and less able to carry fire.

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 alder and willow shrublands (Innes 2015). At that time, the scientific literature about fire regimes in Alaskan alder and willow shrublands was scarce. Descriptions of fire ignition, season, pattern, and size specific to alder and willow shrublands were not found in the literature. Alder and willow communities can act as firebreaks but are also known to burn during extreme fire weather (Innes 2015). Alders and willows are generally top-killed by fire but may resprout following fire (Viereck and Schandelmeier 1980). *Salix glauca*, in particular, is known to sprout aggressively after fire (Uchytil 1992).

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 large and often linear along small streams.

Adjacency or Identification Concerns

This system does not include floodplain, which can be distinguished using a floodplain mask, or tussock-dominated (>35% tussocks) sites (Boggs et al. 2008). This type is common from high elevation to the flatlands and will therefore occur adjacent to many of the other Arctic BpS.

Issues or Problems

Little information exists on fire history in Alaskan alder and willow shrublands (Innes 2015).

Native Uncharacteristic Conditions

For information on contemporary changes in this BpS see Innes 2015.

Comments

During LANDFIRE National this system was created for the AK Arctic region and did not receive review for other regions in the state. 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

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| SAAL | *Salix alaxensis* | Feltleaf willow | Upper |
| SAPU15 | *Salix pulchra* | Tealeaf willow | Upper |
| SAGL | *Salix glauca* | Grayleaf willow | Upper |
| ALVIC | *Alnus viridis* ssp*. crispa* | Mountain alder | Upper |

Description

This class represents the Arctic Mesic-Wet Willow Shrubland. See Vegetation Description for more information on species composition.

*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 Alaska Arctic Region.

Innes, Robin J. 2015. Fire regimes of Alaskan alder and willow shrublands. 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\_alder\_shrub/all.html [ 2016, August 3].

Uchytil, Ronald J. 1992. Salix glauca. In: Fire Effects Information System, [Online].

U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station,

Fire Sciences Laboratory (Producer). Available: https://www.fs.fed.us/database/feis/plants/tree/salgla/all.html [2021, May 24].

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

Viereck, Leslie A.; Schandelmeier, Linda A. 1980. Effects of fire in Alaska and adjacent Canada: a literature review. BLM-Alaska Tech. Rep. 6, BLM/AK/TR-80/06. Anchorage, AK: U.S. Department of the Interior, Bureau of Land Management, Alaska State Office. 124 p