16102

Western North American Boreal Mesic Scrub Birch-Willow Shrubland - Boreal Transition

BpS Model/Description Version: Nov. 2024

|  |  |  |  |
| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
| Kori Blankenship | kblankenship@tnc.org | None | None |
| Tina Boucher | antvb@uaa.alaska.edu | None | None |
| None | None | None | None |

Reviewer: Robin Innes

Vegetation Type

Shrubland

Map Zones

73, 74, 75, 76, 77

Model Splits or Lumps

This Biophysical Setting (BpS) is split into multiple models:

Western North American Boreal Mesic Scrub Birch-Willow Shrubland was split into Boreal and Sub-boreal variants for BpS modeling so that a longer fire return interval could be applied to the Sub-boreal variant. For mapping BpS 16102 should apply in level 2 ecoregions (Nowaki et al. 2001): Alaska Range Transition, Pacific Mountains Transition, Coast Mountains Transition, Coastal Rainforests.

Geographic Range

This system is found in the Sub-boreal region from low elevations to the subalpine zone. This system is more common in the northern portion of the Sub-boreal region (e.g., northern Cook Inlet). The tall shrub system dominated by *Alnus viridis* spp*. Sinuata* replaces this BpS in the southern portion of the region.

Biophysical Site Description

This system occurs on well-drained sites often in the subalpine. It is found on mesic sites on mid to upper slopes, above tree line, and on terraces and sideslopes. Soils are mineral with a well-decomposed organic layer of 5-30 cm thick (Viereck et al. 1992; NatureServe 2008).

Vegetation Description

*Betula nana* usually dominates the shrub layer, but *Vaccinium uliginosum, Ledum decumbens* (*Ledum palustre* L. ssp. *Decumbens*), *Salix pulchra, S. barclayi,* or other *Salix* spp. may also be common or occasionally dominant (Viereck 1979; Viereck et al. 1992; NatureServe 2008). Dwarf shrubs such as *Empetrum nigrum* and *Vaccinium vitis-idaea* may be common under the low shrub layer. Herbaceous species are sparse but may include *Festuca altaica* and *Hierochloe* *alpina*. Feathermoss (*Hylocomium splendens* and *Pleurozium schreberi*) and lichens are common, but peat-forming mosses and sedges are not common (Viereck et al. 1992; NatureServe 2008).

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| BENA | *Betula nana* | Dwarf birch |
| VAUL | *Vaccinium uliginosum* | Bog blueberry |
| LEPAD | *Ledum palustre ssp. decumbens* | Marsh labrador tea |
| SAPU15 | *Salix pulchra* | Tealeaf willow |
| SABA3 | *Salix barclayi* | Barclay's willow |
| EMNIN | *Empetrum nigrum ssp. nigrum* | Black crowberry |
| VAVI | *Vaccinium vitis-idaea* | Lingonberry |
| HYSP70 | *Hylocomium splendens* | Splendid feather moss |

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

Disturbance Description

The following information was taken from the draft Boreal Ecological Systems description (NatureServe 2008):

This system represents a topoedaphic climax in some areas, in other cases it may be seral to shrub-tussock over long time periods (Viereck et al. 1992).

There is little information available about the fire history of shrub communities in AK. Birch and ericaceous shrub tundra tends to produce more severe burns than sedge-shrub tussock tundra (Racine 1979). After fire, shrubs resprout readily from underground propagules if they have not been burned, and a shrub community re-establishes on the site within five years. After severe fires that remove the organic layer and burn the propagules, herbaceous species that establish by seed may dominate the site for more than five years. Burned-over spruce woodlands near treeline may be converted to low shrub after fire (Pegau 1972) and may slowly regenerate a spruce overstory. The fire return interval (FRI) is longer in the Sub-boreal region than in boreal AK. Adjacent vegetation influences the fire frequency. If the adjacent vegetation is flammable, then the low shrub type will have a more frequent FRI. FRIs are long, likely greater than 100 yrs. Trees may also invade these shrublands but over long timeframes.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 301 | 100 |  |  |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) |  |  |  |  |
| All Fires | 301 | 100 |  |  |

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

Large patch

Adjacency or Identification Concerns

At treeline, this system occurs above the Western North American Boreal Treeline White Spruce Woodland - Alaska Sub-boreal (NatureServe 2008)

Sites dominated by non-riparian or non-wetland *Salix* spp. are included in this type (NatureServe 2008). Low shrub types on peat deposits are included in the wetland types (NatureServe 2008).

Issues or Problems

The probability for fire in the state-and-transition model is a best guess, not based on literature.

Native Uncharacteristic Conditions

Comments

More information on this type can be found in the Fire Effects Information System (FEIS) Synthesis: [Fire regimes of Alaskan alder and willow shrublands](http://www.fs.fed.us/database/feis/fire_regimes/AK_alder_shrub/all.html) (Innes 2015). In 2015 an extensive search was done by FEIS staff to locate information for a synthesis on fire regimes of Alaskan alder and willow shrublands. At that time, the scientific literature about fire regimes in Alaskan alder and willow shrublands was scarce. Anecdotal and qualitative descriptions are used in this synthesis to supplement the limited quantitative literature. Descriptions of fire ignition, season, pattern, and size specific to alder and willow shrublands were not found in the literature.

This model was based on the Western North American Boreal Mesic Scrub Birch-Willow Shrubland - Boreal model created by Jennifer Allen. Kori Blankenship and Tina Boucher increased the mean fire return interval (MFRI) for the Sub-boreal variant of the model and made minor edits to the description. This model was created for the AK sub-boreal region and did not receive review during LANDFIRE National 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 | B | B | B | B | B | B | B | B | B | B |
| Shrub | 0.5-1.0 | B | B | B | B | B | B | B | B | B | B |
| Shrub | 1.0-3.0 | B | B | B | B | B | B | B | B | B | B |
| Shrub | >3.0 | B | B | B | B | B | B | B | B | B | B |
| Tree | 0-5 | B | B | B | B | B | B | B | B | B | B |
| Tree | 5-10 | B | B | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 10-25 | B | B | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 25-50 | B | B | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | >50 | B | B | 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 1 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| FEAL | *Festuca altaica* | Altai fescue | Upper |
| HIAL3 | *Hierochloe alpina* | Alpine sweetgrass | Upper |

Description

After fire, herbaceous species such as *Festuca altaica* and *Hierochloe alpina* typically dominate. This class may persist for more than five years if fire severity is high enough to remove the organic layer.

*Maximum Tree Size Class*  
None

Class B 99 Late Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| BENA | *Betula nana* | Dwarf birch | Upper |
| VAUL | *Vaccinium uliginosum* | Bog blueberry | Upper |
| LEPAD | *Ledum palustre* ssp*. decumbens* | Marsh labrador tea | Upper |
| SALIX | *Salix* spp. | Willow | Upper |

Description

This class is dominated by shrubs, often *Betula nana. Betula glandulosa, Vaccinium uliginosum, Ledum decumbens, Salix pulchra, S. barclayi* or other *Salix* spp. may also be common (Viereck 1979; Viereck et al. 1992). Dwarf shrubs such as *Empetrum nigrum* and *Vaccinium vitis-idaea* may be common under the low shrub layer. Trees may invade the shrubland over long time frames.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Late1:ALL | 4 |
| Late1:ALL | 5 | Late1: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** |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.0033 | 303 | Yes | 0 |
| Replacement Fire | Late1:ALL | Early1:ALL | 0.0033 | 303 | Yes | 0 |

References

Hulten, E. 1966. Contributions to the knowledge of flora and vegetation of the southwestern Alaskan mainland. Sven. Bot. Tidskr. 60(1): 175-189.

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].

NatureServe. 2008. International Ecological Classification Standard: Terrestrial Ecological Classifications. Draft Ecological Systems Description for Alaska Boreal and Sub-boreal Regions.

Pegau, R.E. 1972. Caribou investigations-analysis of range. In: Pegau, R.E. and J.E. Hemming (ed.). Caribou report. Volume 12. Progress report. Federal Aid in Wildlife Restoration, Projects W-17-2 and W-17-3, Job 3.3R. Alaska Dept. of Fish and Game, Juneau, AK: 1-216.

Racine. 1979. Climate of the Chucki-Imuruk area. Pages 32-37 in H. R. Melchior, ed., Biological Survey of the Bering Land Bridge National Monument. Alaska Cooperative Park Studies Unit, University of Alaska Fairbanks, Fairbanks, AK.

Viereck, L.A. 1963. Sheep investigations: survey of range ecology. Project W-6-R-4, Work plan E. Job 2-A. Alaska Department of Fish and Game, Juneau, AK.

Viereck, L.A. 1979. Characteristics of treeline plant communities in Alaska. Holarctic Ecology. 2: 228-238.

Viereck, L.A., and Little, E.L. 1972. Alaska Trees and Shrubs. USDA Forest Service Ag. Handbook 410. University of Alaska Press, Fairbanks, Alaska. 265 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.