16101

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

BpS Model/Description Version: Nov. 2024

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| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
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Vegetation Type

Shrubland

Map Zones

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

Model Splits or Lumps

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

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 16101 should apply in level 2 ecoregions (Nowaki et al. 2001): Intermontane Boreal, Aleutian Meadows, Arctic Tundra, Bering Taiga, Bering Tundra.

Geographic Range

This system is found in the boreal region from low elevations to the subalpine zone.

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 side slopes. 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, S. glauca,* 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*, *Hierochloe alpina, Calamagrostis canadensis* and *Chamerion angustifolium*. 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

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 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 fire return. Fire return intervals are long, likely greater than 100 yrs. Trees may also invade these shrublands but over long time frames (NatureServe 2008).

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 201 | 100 |  |  |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) |  |  |  |  |
| All Fires | 201 | 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 - 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 the 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 input from the experts who attended the LANDFIRE Fairbanks (Nov. 07) modeling meeting and refined by Jennifer Allen. This model did not receive review specifically for z76 during LANDFIRE National.

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 2 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 |
| CACA4 | *Calamagrostis canadensis* | Bluejoint | Upper |
| CHAN9 | *Chamerion angustifolium* | Fireweed | Upper |

Description

After fire, herbaceous species such as *Festuca altaica* and *Hierochloe alpina* may dominate, especially at higher altitudes. *Calamagrostis canadensis* and *Chamerion angustifolium* are common. Low shrubs can resprout following fire, quickly regaining dominance of a site. This class may persist for more than 5yrs if fire severity is high enough to remove the organic layer.

*Maximum Tree Size Class*  
None

Class B 98 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, Vaccinium uliginosum, Ledum decumbens, Salix pulchra, S. barclayi, S. glauca,* 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. Some sites may include very low cover of trees, especially black spruce.

*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 | 0.005 | 200 | Yes | 0 |
| Replacement Fire | Late1:ALL | Early1:ALL | 0.005 | 200 | Yes | 0 |

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