16090

Alaska Sub-boreal Mesic Subalpine Alder Shrubland

BpS Model/Description Version: Nov. 2024

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

Reviewer: Phillip Barber, Robin Innes

Vegetation Type

Shrubland

Map Zones

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

Geographic Range

This Biophysical Setting (BpS) is widespread on upper mountain slopes from mid-elevation to above treeline throughout the boreal transition region, and less frequently in the boreal region of AK (Viereck 1979). A riparian shrub variant of this system is found throughout the boreal and sub-boreal regions of AK in subalpine through alpine valleys.

Biophysical Site Description

This BpS is widespread on upper mountain slopes above treeline throughout south-central and southwestern AK (Viereck 1979), on well-drained mesic sites in the subalpine zone, and in constrained riparian corridors on slopes in the alpine and subalpine. Seasonal overbank flooding may occur in the riparian areas, but generally it does not result in shifting channels or gravel bar formation. Soils are shallow, stony, and well-drained, underlain by colluvium, glacial till, and residuum.

Vegetation Description

This system often appears as a band of alder above treeline and below the alpine systems. *Alnus viridis* ssp*. sinuata* is the dominant shrub species, but other shrubs including *Salix* spp. (sometimes the dominant shrub), *Sambucus racemosa* and *Spiraea stevenii* may be common. Herbaceous patches often occur within the shrub zone and may be dominated by *Calamagrostis canadensis* and *Chamerion* *angustifolium*; other common herbs include *Athyrium filix-femina, Dryopteris expansa, Veratrum viride, Valeriana sitchensis, Lupinus nootkatensis* and *Sanguisorba canadensis* (Viereck et al. 1992). In boreal Alaska, low-shrub tundra is more common in the gaps between alder patches.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| ALVIS | *Alnus viridis ssp. sinuata* | Sitka alder |
| SALIX | *Salix spp.* | Willow |
| SARA2 | *Sambucus racemosa* | Red elderberry |
| SPST3 | *Spiraea stevenii* | Beauverd spirea |
| CACA4 | *Calamagrostis canadensis* | Bluejoint |
| CHAN9 | *Chamerion angustifolium* | Fireweed |
| ATFI | *Athyrium filix-femina* | Common ladyfern |
| DREX2 | *Dryopteris expansa* | Spreading woodfern |

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

Disturbance Description

This BpS represents a topoedaphic climax (Viereck et al. 1992). It occurs above treeline and is not controlled by avalanche activity, although avalanches may occur.

There is little published information about the fire regimes of this BpS (Innes 2015). Attendees of the LANDFIRE National Modeling Meeting (2007, Anchorage) speculated that the fire return interval was likely long, possibly 500-1,000 years. Alders and willows are generally top-killed by fire, but will root sprout following fire (Viereck and Schandelmeier 1980). Early season fire prior to green-up would be more likely to carry than late season fire.

Alder is affected by insects and diseases. Flooding and herbivory may be important disturbances, especially for the Alpine Riparian system. It is believed that shrubs would resprout immediately following flooding and herbivory disturbances.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 620 | 100 |  |  |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) |  |  |  |  |
| All Fires | 620 | 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

Small to large patch

Adjacency or Identification Concerns

This system is similar in species composition to Alaska Sub-boreal Mesic Subalpine Alder Shrubland - Avalanche Slopes, but it occurs in the subalpine zone and tree growth is limited by elevation, not avalanche frequency. Pacific Maritime Tall Shrubland occupies a similar landscape position along the Gulf Coast of AK, but this system may be dominated by *Rubus spectabilis*, which does not occur in boreal regions. In the boreal transition region, the alder zone is intermixed with mesic herbaceous meadows (*Calamagrosits canadensis* and *Chamerion angustifolium*).

This system includes riparian shrub types in the alpine and subalpine zones.

Issues or Problems

In 2015 an extensive search was done by Fire Effects Information System staff to locate information for a synthesis on [Fire regimes of Alaskan alder and willow shrublands](https://www.fs.fed.us/database/feis/fire_regimes/AK_alder_shrub/all.html#78) (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. In the absence of data on the fire frequency for this BpS, the mean fire return interval (MFRI) was estimated to be slightly lower than that in the FRCC Guidebook Persistent Shrub North model.

Native Uncharacteristic Conditions

This system may have been expanding further into the alpine in recent decades.

Comments

11/2024: K. Blankenship changed the model to ensure at least 1% in class A. This changed the all FRI from 833 years to 625 years.

4/2022: A 2022 reviewer noted that: NRCS has proposed unique ecosites for the alder/willow, alder/spirea, and alder/elderberry communities. The alder/spirea and alder/willow are noted in Southwestern and Western Alaska. The alder/elderberry community is predominantly on Kodiak and the Alaska Peninsula. All three communities develop on similar soils and undergo similar disturbance, so it makes sense to group them together at the larger BpS scale.

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.

For LANDFIRE National this model was based on the FRCC Guidebook PNVG model for Persistent Shrub North (Murphy and Witten 2006). The MFRI was increased based on input from the experts who attended the LANDFIRE Anchorage (Dec. 07) modeling meeting. Tina Boucher reviewed an initial draft of this model and recommended eliminating mixed fire and decreasing the MFRI for Replacement Fire slightly so that the AllFire MFRI is slightly lower than that for Persistent Shrub North (these suggestions are reflected in the current draft of the model).

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** |
| CACA4 | *Calamagrostis canadensis* | Bluejoint | Upper |
| CHAN9 | *Chamerion angustifolium* | Fireweed | Upper |
| ATFI | *Athyrium filix-femina* | Common ladyfern | Upper |
| DREX2 | *Dryopteris expansa* | Spreading woodfern | Upper |

Description

Grasses, sedges and/or forbs dominate the site. Shrubs sprout from rootstock. Herbaceous patches often occur within the shrub zone and may be dominated by *Calamagrostis canadensis* and *Chamerion angustifolium*. Other common herbs include *Athyrium filix-femina, Dryopteris expansa, Veratrum viride, Valeriana sitchensis, Lupinus nootkatensis*, and *Sanguisorba canadensis* (Viereck et al. 1992).

*Maximum Tree Size Class*  
None

Class B 99 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ALVIS | *Alnus viridis* ssp*. sinuata* | Sitka alder | Upper |
| SALIX | *Salix* spp. | Willow | Upper |
| SARA2 | *Sambucus racemosa* | Red elderberry | Upper |
| SPST3 | *Spiraea stevenii* | Beauverd spirea | Upper |

Description

Shrubs overtop herbaceous layer and become dominant. A low shrub and/or herbaceous layer usually persists. Shrub cover is 25-75%. *Alnus viridis* ssp*. sinuata* is the dominant shrub species, but other shrubs including *Salix* spp. (sometimes the dominant shrub), *Sambucus racemosa* and *Spiraea stevenii* may be common.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:CLS | 4 |
| Mid1:CLS | 5 | Mid1:CLS | 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 | 0.0011 | 909 | Yes | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.0016 | 625 | Yes | 0 |

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