16091

Alaska Sub-boreal Mesic Subalpine Alder Shrubland -- Avalanche Slopes

Model Date: 04/15/08 Report Date: 9/11/15

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

Reviewer: Robin Innes

Vegetation Type

Upland Shrubland

Map Zones

70, 71, 72, 73, 74, 75, 76

Model Splits or Lumps

This BpS is split from Alaska Sub-boreal Mesic Subalpine Alder Shrubland (1609) to represent the dynamics of avalanche slopes.

Geographic Range

This system is found on steep mountain slopes in the Sub-boreal region and less frequently in the boreal region of AK.

Biophysical Site Description

Avalanche slopes occur where mountain slopes are steep enough to produce frequent snow slides preventing forest development. Upper avalanche slopes typically have a slope angle of at least 70% but the lower slopes and run-out zones may be much less steep. Soils are shallow and stony, underlain by colluvium, glacial till, and residuum (NatureServe 2008).

Vegetation Description

The dominant shrub species is typically Alnus viridis ssp. sinuata; but other shrubs including Sambucus racemosa, Salix spp. and Spirea stevenii may be common (NatureServe 2008). Herbaceous patches are often dominated by Calamagrostis canadensis and Chamerion angustifolium; other common herbs include Athyrium filix-femina, Dryopteris expansa and Veratrum viride (Viereck et al. 1992). Tree seedlings and saplings may be common on some slopes but do not emerge as an overstory due to frequent snow avalanches (NatureServe 2008).

BpS Dominant and Indicator Species

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

Disturbance Description

Avalanche slopes can extend from the alpine into the montane and lower toe slopes; this model, however, applies only to avalanche slopes occurring below treeline. Snow avalanche is the dominant disturbance, but rocks, soil, and debris can also be transported in the slide. This system represents a topoedaphic climax (Viereck et al. 1992). Alnus viridis ssp. sinuata has a growth form that tolerates avalanche disturbance and can maintain dominance on the site (NatureServe 2008). Frequent snow slides prevent tree seedlings and saplings from reaching the upper canopy (NatureServe 2008).

Fire is minimal and is expressed only around the edges of this type as fires are introduced from neighboring types. Avalanche slopes may act as a firebreak except during severe weather (Innes 2015). Sitka alder is generally top-killed by fire but can resprout from the root crown and seeds can germinate in soil exposed by fire (Uchytil 1989).

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Min FI** | **Max FI** | **Percent of All Fires** |
| Replacement | 909 |  |  | 85 |
| Moderate (Mixed) | 5000 |  |  | 15 |
| Low (Surface) |  |  |  |  |
| **All Fires** | **769** |  |  | **100** |

Scale Description

Small to large patch

Non-Fire Disturbances

Other 1: Avalanche

Adjacency or Identification Concerns

This system is similar in species composition to Alaska Sub-Boreal Mesic Subalpine Alder Shrubland, but it occurs below the subalpine zone and tree growth is limited by avalanche frequency rather than elevation as in the subalpine system (NatureServe 2008). Adjacent forest systems may include Alaska Sub-boreal Mountain Hemlock-White Spruce Forest, Alaska Sub-boreal Mountain Hemlock Forest or Alaska Sub-boreal White Spruce-Hardwood Forest.

Though avalanche slopes can occur from alpine to lower slopes, this model excludes the avalanche slopes above treeline—these would be included in other systems according to vegetation type: Alaska Sub-Boreal Mesic Subalpine Alder Shrubland, Western North American Boreal Alpine Dwarf-Shrubland, Alaska Sub-boreal and Maritime Alpine Mesic Herbaceous Meadow, etc.

Issues or Problems

No information is available on the FRI for this type. The FRI was estimated to be the same as the Alaska Sub-Boreal Mesic Subalpine Alder Shrubland BpS.

Native Uncharacteristic Conditions

Comments

In 2021 Kori Blankenship eliminated the use of mixed fire in the state-and-transition simulation model fire because Sitka alder, the dominant species, is top killed by fire (Uchytil 1989). Blankenship increased the frequency of replacement fire to maintain the overall All Fire MFRI.

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#LimitationsOfInformation) (Innes 2015). 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.

During LANDIFRE National this model did not receive review specifically for z76. This model was developed by Kori Blankenship using the class age ranges from the Persistent Shrub North PNVG model (Murphy and Witten 2006) and a similar FRI to the Alaska Sub-Boreal Mesic Subalpine Alder Shrubland BpS.

**Model Parameters**

*Using Track Changes in Word you may suggest changes to any of the parameters indicated in the following tables. If you wish to see how those changes impact model results, go to the “Simulation Model Review Instructions” section on* <http://www.landfirereview.org/models.html>*. If you do not wish to edit and run the actual model, the TNC LANDFIRE will do so and if requested provide the reviewer with the results.*

**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** |
| Optional1 | Early1:ALL | Early1:ALL | 0.2500 | 4 | No | 0 |
| ReplacementFire | Early1:ALL | Early1:ALL | 0.0013 | 769 | No | 0 |
| Optional1 | Late1:ALL | Early1:ALL | 0.2500 | 4 | Yes | 0 |
| ReplacementFire | Late1:ALL | Early1:ALL | 0.0013 | 769 | Yes | 0 |

Succession Classes

Class A 68 Early Development 1 - All Structures

Structural Information

Tree Size Class: Seedling/Sapling <5"

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

Forbs, shrubs, and deciduous trees resprout immediately following disturbance, but herbaceous vegetation dominates in early succession. Herbaceous patches are often dominated by Calamagrostis canadensis and Chamerion angustifolium; other common herbs include Athyrium filix-femina, Dryopteris expansa, and Veratrum viride (Viereck et al. 1992).

Class B 32 Late Development 1 - All Structures

Structural Information

Tree Size Class: Pole 5–9" (swd)/5–11" (hwd)

Indicator Species

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

Description

Shrubs can become established at the edges or the bottom of the chutes. The dominant shrub species is typically Alnus viridis ssp. sinuata; but other shrubs including Sambucus racemosa, Salix spp., and Spiraea stevenii may be common. Tree seedlings and saplings may be common on some slopes but typically do not emerge as an overstory due to frequent snow avalanche. On sites where avalanche activity is less frequent trees can occasionally emerge temporarily in the overstory.

References

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].

Murphy, K.A. and E. Witten. 2006. Persistent Shrub North. In Fire Regime Condition Class (FRCC) Interagency Guidebook Reference Conditions. Available at www.frcc.gov.

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

Uchytil, Ronald J. 1989. Alnus viridis subsp. sinuata. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station,

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Viereck et al. 1992. The Alaska vegetation classification. Pacific Northwest Research Station, USDA Forest Service, Portland, OR. Gen. Tech. Rep. PNW-GTR286. 278 p.