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## North Pacific Avalanche Chute Shrubland

BpS Model/Description Version: Aug. 2020

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### Vegetation Type

Shrubland

### Map Zone

1

### Geographic Range

This tall shrubland system occurs throughout mountainous regions of the Pacific Northwest.

### Biophysical Site Description

This system occurs on steep sideslopes of hills or mountains on glacial till/colluvium. These habitats range from very xeric talus slopes of montane elevations to mesic habitats of avalanche chutes and points of heavy snow accumulation.

### Vegetation Description

Stands are dominated by *Alnus viridis* ssp. *sinuata* (= *Alnus sinuata*), *Acer circinatum* (west of the cascade crest), *Salix* ssp., and *Rubus spectabilis* with various herbs and ferns.

Xeric talus supports *Holodiscus discolor*, *Symphoricarpos mollis*, *Corylus cornuta* var. *californica*, and *Festuca occidentalis*. *Acer circinatum* communities are known from the montane *Tsuga heterophylla* zone and continue well into the *Abies amabilis* zone and intergrade with the wetter *Alnus viridis* ssp. *sinuata* communities that occur where there is heavy snowpack accumulation.

Typically, smaller-statured shrubs and mesic forbs dominate at the higher portions of the chute, while taller shrubs and trees are more common in the lower portions. Understory herb composition can change significantly from chute to chute.

### BpS Dominant and Indicator Species

| Symbol | Scientific Name                          | Common Name |
|--------|------------------------------------------|-------------|
| ALVIS  | <i>Alnus viridis</i> ssp. <i>sinuata</i> | Sitka alder |
| SALIX  | <i>Salix</i>                             | Willow      |

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

### Disturbance Description

The main feature of these shrublands is that they occur on steep slopes. The disturbance can be moving snow (avalanches) or rocks from exposed and eroding soil. Avalanche chutes can be quite long, extending from the subalpine into the montane and foothill toeslopes. Fire is minimal and is expressed only around the edges of this type as fires are introduced from neighboring

## Fire Frequency

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.

Typically narrow, linear patches within coniferous forest vegetation matrix. Fires do not carry well in this vegetation type.

These communities occur in forested zones at mid- to upper elevations in the ABAM and TSME vegetation zones. Also, the dynamics here are similar to the montane shrub type, except the repeated avalanches prevent conversion to trees.

Individually, avalanche chutes and talus slopes would be separate one-box models; however, they have been combined in the current model. Both types occur on steep terrain, and both are rather stable in vegetation structure. Avalanche chutes are mesic but kept in shrubs due to the frequent scouring of snow. Talus slopes that support vegetation have a significant amount of ash between the stones and may be free of disturbances, but the limited soil prevents tree establishment. Any changes in area of the S-classes represented would be due to climate changes (precipitation, snow depth) or added ash from a volcanic eruption.

This model was reviewed by Kathleen Roche during the 2016 BpS Review.

### ***Succession Classes***

[illegible]

|       |         |   |   |   |   |   |   |   |   |   |   |
|-------|---------|---|---|---|---|---|---|---|---|---|---|
| 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     | B | B | B | B | B | B | B | B | B | B |
| Tree  | 5-10    | B | B | B | B | B | B | B | B | B | B |
| Tree  | 10-25   | B | B | B | B | B | B | B | B | B | B |
| Tree  | 25-50   | B | B | B | B | B | B | B | B | B | B |
| Tree  | >50     | B | B | B | B | B | B | B | B | B | B |

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

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### Class A      97      Early Development 1 - All Structures

#### *Indicator Species*

| Symbol | Scientific Name                          | Common Name | Canopy Position |
|--------|------------------------------------------|-------------|-----------------|
| ALVIS  | <i>Alnus viridis</i> ssp. <i>sinuata</i> | Sitka alder | Upper           |
| ACCI   | <i>Acer circinatum</i>                   | Vine maple  | None            |

#### *Description*

This structure class represents avalanche chutes or talus slopes that are rather stable in the path of frequent snow avalanches or rock (respectively). Forbs, shrubs, and deciduous trees resprout immediately following disturbance and maintain for extended periods. Scattered, severely damaged conifers may be present. Dominant lifeform may be herbaceous at any cover level. Although upper-layer species are tree lifeform, they may appear as shrubs in remotely sensed imagery due to their dwarfed nature.

#### *Maximum Tree Size Class*

None

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### Class B      3      Mid Development 1 - All Structures

#### *Indicator Species*

| Symbol | Scientific Name                          | Common Name   | Canopy Position |
|--------|------------------------------------------|---------------|-----------------|
| ALVIS  | <i>Alnus viridis</i> ssp. <i>sinuata</i> | Sitka alder   | Upper           |
| ACCI   | <i>Acer circinatum</i>                   | Vine maple    | Upper           |
| ABLA   | <i>Abies lasiocarpa</i>                  | Subalpine fir | Upper           |
| CHNO   | <i>Chamaecyparis nootkatensis</i>        | Alaska cedar  | Upper           |

#### *Description*

Mid-height shrubs and trees growing at the edges or the bottom of the chutes. This class may persist for long periods of time.

#### Maximum Tree Size Class

None

### **Model Parameters**

#### **Deterministic Transitions**

| From Class | Begins at (yr) | Succeeds to | After (years) |
|------------|----------------|-------------|---------------|
| Early1:ALL | 0              | Early1:ALL  | 999           |
| Mid1:ALL   | 1              | Early1:ALL  | 501           |

#### **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 |
|------------------------|-----------------------|---------------------|-------------------------|-----------------------|-----------------------------------------------------|------------------------------|
| Alternative Succession | Early1:ALL            | Mid1:ALL            | 0.0001                  | 10000                 | Yes                                                 | 0                            |
| Replacement Fire       | Early1:ALL            | Early1:ALL          | 0.001                   | 1000                  | Yes                                                 | 0                            |
| Optional 2             | Early1:ALL            | Early1:ALL          | 0.002                   | 500                   | Yes                                                 | 0                            |
| Optional 1             | Early1:ALL            | Early1:ALL          | 0.5                     | 2                     | No                                                  | 0                            |
| Replacement Fire       | Mid1:ALL              | Early1:ALL          | 0.001                   | 1000                  | Yes                                                 | 0                            |
| Optional 1             | Mid1:ALL              | Mid1:ALL            | 0.5                     | 2                     | No                                                  | 0                            |

#### **Optional Disturbances**

Optional 1: Avalanches (large, infrequent)

Optional 2: Rock slide

### **References**

Butler, D.R. and C. F. Sawyer. 2008. Dendrogeomorphology and high-magnitude snow avalanches: a review and case stud. Nat. Hazards Earth Syst. Sci., 8, 303–309, 2008 [www.nat-hazards-earth-syst-sci.net/8/303/2008/](http://www.nat-hazards-earth-syst-sci.net/8/303/2008/)

Kovalchik, B.L. and R.R. Clausnitzer. 2004. Classification and management of aquatic, riparian, and wetland sites on the national forests of eastern Washington: series description. Gen. Tech. Rep. PNW-GTR-593. Portland, OR: USDA Forest Service, Pacific Northwest Research Station. 354 pp.

NatureServe. 2007. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA. Data current as of 10 February 2007.