10411

North Pacific Mountain Hemlock Forest-Wet

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
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Vegetation Type

Forest and Woodland

Map Zones

1, 7

Model Splits or Lumps

This biophysical setting (BpS) is split into multiple models: wet and dry. Washington has two types of mountain hemlock. This model represents the wet variant. For the dry variant, use the model for 10412.

Geographic Range

This type occupies some of the highest elevation forested zones in the Northern Cascades and Olympic mountains. This type is rare farther south. It occurs in the Gifford Pinchot National Forest sporadically, and possibly in northern Oregon.

Biophysical Site Description

The lower elevation limit of the type ranges from about 3,000ft in the Olympics, 3,500ft in the Cascades, and 3,000ft on the east side of the Cascades. Sites are cold and characterized by deep (10-20ft) and persistent snowpack and short growing seasons.

Vegetation Description

The late-seral stands are co-dominated by mountain hemlock and silver fir, with occasional Alaskan yellow cedar. Common understory species include *Vaccinium alaskaense* (aka *V. ovalifolium*), *Menziesia ferruginea*, *Oplopanax horridum*, *Clintonia uniflora*, *Rubus pedatus*, and *Blechnum spicant*.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| TSME | *Tsuga mertensiana* | Mountain hemlock |
| ABAM | *Abies amabilis* | Pacific silver fir |
| CHNO | *Chamaecyparis nootkatensis* | Alaskan yellow cedar |
| VACCI | *Vaccinium* | Blueberry |

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

Disturbance Description

Most of the occurrence of fire in this type is single-tree lightning strikes, especially on ridgelines, so the frequency of fire tends to be low. Estimates of the return of fire are >1,000yrs. It’s hard to estimate fire return due to lack of evidence. Avalanches may be a more common disturbance than fire, and they tend to repeat at the same locations. Avalanches can be initiated after fire. Heart rot and butt rot occur, but not at a stand scale.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 10549 | 32 |  |  |
| Moderate (Mixed) | 5051 | 68 |  |  |
| Low (Surface) |  |  |  |  |
| All Fires | 3415 | 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

In areas of continuous forest, fire size can range from tens to hundreds of acres.

Adjacency or Identification Concerns

The type is above the mesic-wet Pacific silver fir type and below subalpine parkland.

Issues or Problems

There is little to no evidence of fire in this type, so estimations of fire return are difficult to gauge. The current cohort established under a different climate.

Native Uncharacteristic Conditions

Comments

Map zones 1 and 7 were combined during 2015 BpS Review.

In Classes B and E, AltSuccession is used to represent a portion of the landscape that remains in an open condition due to rock outcrops, marshy areas, etc.

During model review for LANDFIRE National, Foster ran a model with replacement mean fire return interval (MFRI) of 1,500yrs and mixed MFRI of 500yrs. The changes were to have only 75% of the landscape in Class E, 10% in Class D, and 5% in Class A.

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 | A | A | A | A | A | A | A | A | A | A |
| 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 | A | A | A | A | A | A | A | A | A | A |
| Tree | 5-10 | A | A | A | A | A | A | A | A | A | A |
| Tree | 10-25 | C | C | C | C | C | C | C | B | B | B |
| Tree | 25-50 | D | D | D | D | D | D | D | E | E | E |
| Tree | >50 | D | D | D | D | D | D | D | E | E | E |

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** |
| TSME | Tsuga mertensiana | Mountain hemlock | Upper |
| ABAM | Abies amabilis | Pacific silver fir | Upper |
| VACCI | Vaccinium | Blueberry | Low-Mid |

Description

The first few years following stand-replacing wildfire are characterized by bare ground, herbs, shrubs, and varying densities of tree seedlings (presumably dependent on seed sources). Dominant species include Pacific silver fir and mountain hemlock. The shrub layer is dominant. Shrub height ranges from 0.5-6ft and shrub canopy cover ranges from 0-90%.

*Maximum Tree Size Class*  
Pole 5-9" DBH

Class B 5 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| TSME | Tsuga mertensiana | Mountain hemlock | Upper |
| ABAM | Abies amabilis | Pacific silver fir | Upper |
| VACCI | Vaccinium | Blueberry | Low-Mid |
| MEFE | Menziesia ferruginea | Rusty menziesia | Low-Mid |

Description

This class represents rapid regeneration by Pacific silver fir and mountain hemlock at stand reinitiation. Typical understory species for the type are usually present.

*Maximum Tree Size Class*  
Medium 9-21" DBH

Class C 4 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| TSME | Tsuga mertensiana | Mountain hemlock | Upper |
| ABAM | Abies amabilis | Pacific silver fir | Upper |
| VACCI | Vaccinium | Blueberry | Low-Mid |

Description

This class represents mid-seral open stands that are predominantly comprised of mountain hemlock. This class can persist for decades.

*Maximum Tree Size Class*  
Medium 9-21" DBH

Class D 4 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| TSME | Tsuga mertensiana | Mountain hemlock | Upper |
| ABAM | Abies amabilis | Pacific silver fir | Upper |
| VACCI | Vaccinium | Blueberry | Upper |

Description

This class represents the late open stand.

*Maximum Tree Size Class*  
Large 21-33" DBH

Class E 86 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| TSME | Tsuga mertensiana | Mountain hemlock | Upper |
| ABAM | Abies amabilis | Pacific silver fir | Upper |
| CHNO | Chamaecyparis nootkatensis | Alaska cedar | Upper |
| VACCI | Vaccinium | Blueberry | Lower |

Description

This class represents late-successional stands with large individuals (>20in DBH) of mountain hemlock dominating the stand. Advanced regeneration of mountain hemlock and other shade-tolerant species.

*Maximum Tree Size Class*  
Large 21-33" DBH

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:CLS | 100 |
| Mid1:OPN | 100 | Late1:OPN | 250 |
| Mid1:CLS | 100 | Late1:CLS | 250 |
| Late1:OPN | 250 | Late1:OPN | 999 |
| Late1:CLS | 250 | Late1: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 | 0.0001 | 10000 | Yes | 0 |
| Alternative Succession | Mid1:OPN | Mid1:CLS | 1 | 1 | Yes | 50 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.0001 | 10000 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.0002 | 5000 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.0001 | 10000 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.0002 | 5000 | Yes | 0 |
| Alternative Succession | Mid1:CLS | Mid1:OPN | 0.005 | 200 | Yes | 0 |
| Alternative Succession | Mid1:CLS | Late1:CLS | 0.9 | 1 | Yes | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 1 | 1 | Yes | 50 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.0001 | 10000 | Yes | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.0002 | 5000 | No | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.0001 | 10000 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.0002 | 5000 | Yes | 0 |
| Alternative Succession | Late1:CLS | Late1:OPN | 0.03 | 33 | Yes | 0 |
| Alternative Succession | Late1:CLS | Mid1:OPN | 0.05 | 20 | Yes | 0 |

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