11740

North Pacific Dry-Mesic Silver Fir-Western Hemlock-Douglas-Fir Forest

BpS Model/Description Version: Aug. 2020

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

Reviewer: Miles Hemstrom, Pat Hochhalter, Jane Kertis, Amy Nathanson

Vegetation Type

Forest and Woodland

Map Zones

1, 7

Geographic Range

The Pacific Silver fir type occurs on the western slopes of the Cascades from British Columbia south to the Rogue and Umpqua River divide in the Southern Cascades. It can occur east of the Cascades crest south of Mount Hood. This low-elevation type (with a mixed-severity regime) is also found throughout the Ross Lake Drainage and on the eastern slopes of the North Cascades.

Biophysical Site Description

The Pacific Silver fir forests described in this type occur at lower elevations within the Pacific Silver fir zone (450-800m in the north, 1,600-1,800m in the south). Pacific silver fir grows on soils developed from nearly every type of parent material found in the Northwest. Growth rates for Pacific silver fir are greatest at low elevations on fine-textured residual soils from sedimentary and basaltic rocks.

Vegetation Description

Pacific Silver fir is the dominant and climax tree species in the mature canopy, which it shares with a wide variety of conifers depending upon locale. Douglas-fir and western hemlock are co-dominant throughout the range. Subalpine fir, grand fir, white pine, and Engelmann spruce are common around Mount Adams and in parts of Oregon. Noble fir is commonly associated with the type from Mount Rainier and south, and Lodgepole pine is common in the North Cascades. The understory is predominantly composed of a lush to moderate layer (depending upon the amount of moisture) of heath shrubs, forbs, ferns, and mosses.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| ABAM | *Abies amabilis* | Pacific silver fir |
| TSHE | *Tsuga heterophylla* | Western hemlock |
| PSME | *Pseudotsuga menziesii* | Douglas-fir |
| ABPR | *Abies procera* | Noble fir |

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

Disturbance Description

Pacific Silver fir forests in this type are characterized by infrequent mixed-severity fire regimes occurring at >100yrs. These fires produced variably sized patches throughout the landscape. Landscapes were reset at intervals >200yrs through stand-replacing events. Avalanches and wind events are also common disturbances in this type.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 330 | 48 | 100 | 800 |
| Moderate (Mixed) | 305 | 52 | 100 | 400 |
| Low (Surface) |  |  |  |  |
| All Fires | 158 | 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

Mixed-severity fire events occur on the scale of 1,000s of acres and are usually stand-replacing. Infrequent avalanches and wind disturbances also occur in this type, but these disturbances more frequently occur at scales of 10s-100s of acres.

Adjacency or Identification Concerns

The Pacific Silver fir type occurs above the Western hemlock forests. This low-elevation type is replaced by moister and cooler plant associations (Silver fir -- Mountain hemlock) at higher elevations. This BpS is distinguished from the high-elevation Pacific Silver fir type (BpS 10420) by elevation breaks: the low-elevation type occurs below 800m in the north and 1,800m in the south.

Issues or Problems

Although windthrow and avalanches are known disturbances in this type, the nature of these disturbances is based upon opinion only and should be checked for validity. These disturbances were not modeled explicitly.

In 2016, reviewers expressed concern that the late seral closed class might be underrepresented as compared to North Pacific Maritime Mesic-Wet Douglas-Fir-Western Hemlock (10390) and North Pacific Maritime Dry-Mesic Douglas-Fir-Western Hemlock (10370). Reviewers were unsure if this was “real” or if there might be a problem with the model.

Native Uncharacteristic Conditions

Comments

Miles Hemstrom, Pat Hochhalter, Jane Kertis, and Amy Nathanson reviewed this model during the 2016 review period and adjusted the s-class mapping rules.

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 | A | C | C | C | C | C | B | B | B | B |
| Tree | 25-50 | A | D | D | D | D | D | E | E | E | E |
| Tree | >50 | A | D | D | D | D | D | E | 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 12 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PSME | Pseudotsuga menziesii | Douglas-fir | Upper |
| ABPR | Abies procera | Noble fir | Upper |
| PIMO3 | Pinus monticola | Western white pine | Upper |
| ABAM | Abies amabilis | Pacific silver fir | Mid-Upper |

Description

The early seral stand consists of low heath shrubs, seedlings, and saplings. Sometimes, competition can keep the trees at no greater than 2in DBH. Silver fir is seral; however, Douglas-fir, western white pine, and noble fir may also be seral, and where they occur, they grow more quickly than silver fir. This stage can last for decades.

*Maximum Tree Size Class*  
Sapling >4.5ft; <5" DBH

Class B 21 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ABAM | Abies amabilis | Pacific silver fir | Upper |
| PSME | Pseudotsuga menziesii | Douglas-fir | Upper |
| PIMO3 | Pinus monticola | Western white pine | Upper |
| ABPR | Abies procera | Noble fir | Upper |

Description

Canopy closure occurs in the middle-aged stand. The early seral species continue to dominate the stand, and the midstory fills in with increasingly larger amounts of Pacific silver fir and a variety of more shade-tolerant conifers (Engelmann spruce, western hemlock, western red cedar).

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

Class C 3 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PSME | Pseudotsuga menziesii | Douglas-fir | Upper |
| PIMO3 | Pinus monticola | Western white pine | Upper |
| ABAM | Abies amabilis | Pacific silver fir | Upper |
| PICO | Pinus contorta | Lodgepole pine | Upper |

Description

Openings in the canopy are created by mixed-severity fire. Fire-resistant Douglas-fir and western white pine remain. Lodgepole pine (where it occurs) and Pacific silver fir regenerate in the openings as the stand fills back in.

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

Class D 8 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PSME | Pseudotsuga menziesii | Douglas-fir | Upper |
| ABAM | Abies amabilis | Pacific silver fir | Upper |
| TSHE | Tsuga heterophylla | Western hemlock | Upper |

Description

Douglas-fir is resistant to mixed-severity fire events. The overstory trees average 45in DBH. Pacific silver fir and western hemlock regenerate in the understory.

*Maximum Tree Size Class*  
Very Large >33" DBH

Class E 56 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ABAM | Abies amabilis | Pacific silver fir | Upper |
| PSME | Pseudotsuga menziesii | Douglas-fir | Upper |
| TSHE | Tsuga heterophylla | Western hemlock | Upper |

Description

Pacific silver fir is dominant in the late seral stand. The trees average 45in DBH and range from 20-150in DBH. Douglas-fir and western hemlock are co-dominant. Insect/disease occur in these old stands.

*Maximum Tree Size Class*  
Very Large >33" DBH

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:CLS | 39 |
| Mid1:OPN | 40 | Late1:CLS | 119 |
| Mid1:CLS | 40 | Late1:CLS | 119 |
| Late1:OPN | 120 | Late1:CLS | 169 |
| Late1:CLS | 120 | 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 | 0.003 | 333 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.002 | 500 | No | 0 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.003 | 333 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.002 | 500 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:CLS | 0.002 | 500 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.003 | 333 | Yes | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.002 | 500 | No | 0 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.003 | 333 | Yes | 0 |
| Insects or Disease | Late1:CLS | Late1:OPN | 0.001 | 1000 | Yes | 0 |
| Insects or Disease | Late1:CLS | Early1:ALL | 0.001 | 1000 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.002 | 500 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:CLS | 0.002 | 500 | No | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.003 | 333 | Yes | 0 |

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