10360

North Pacific Hypermaritime Sitka Spruce Forest

BpS Model/Description Version: Aug. 2020

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

Forest and Woodland

Map Zones

1, 2

Geographic Range

This biophysical setting (BpS) occurs on the outer fringe of coast throughout Oregon and Washington. There are small amounts of this type in northern California and rather more of it north into British Columbia.

Biophysical Site Description

This type occurs in the coastal fog belt, including up river valleys. The BpS extends farther inland toward the northern part of its distribution. The climate of this BpS is characterized by 200-300cm of annual precipitation, frequent summer fog, and mild temperatures year-round.

Vegetation Description

Mature and old forests are characterized by Sitka spruce, western hemlock, and less often other conifers. In southern Oregon, Port Orford cedar is a common associate. Red alder often dominates disturbed sites. Mature and old forests can attain levels of volume and biomass rivaled by few other forests in the world. Lodgepole pine occurs due to adjacency to dunes or the ocean.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PISI | *Picea sitchensis* | Sitka spruce |
| TSHE | *Tsuga heterophylla* | Western hemlock |
| PSEUD7 | *Pseudotsuga* | Douglas-fir |
| ALRU2 | *Alnus rubra* | Red alder |
| RUSP | *Rubus spectabilis* | Salmonberry |

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

Disturbance Description

Fire is usually stand-replacing, with a fire return interval of 300-1,000yrs or longer. Wildfire occurs infrequently in this type.

In most of the type, windthrow is a more significant catastrophic disturbance than wildfire. Windthrow “rotation” is estimated to be between 100yrs and 200yrs, (but can be up to 1,000yrs due to patchiness). The effects of windthrow are strongly correlated with topography and adjacent land use (e.g., clearcuts).

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 680 | 100 | 300 | 2000 |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) |  |  |  |  |
| All Fires | 680 | 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

When fires occur, they often spread from other types and cover large areas (up to hundreds of thousands of acres). Windthrow events can be small (tens of acres) to very large (up to 1,000,000ac or more). Within large events, the degree of wind damage is quite variable.

Adjacency or Identification Concerns

Boundary with wet Douglas-fir-western hemlock type is sometimes indistinct.

Issues or Problems

This BpS in map zone (MZ) 2 differs from MZ01 by having more fire, and less variability of wind effects.

Native Uncharacteristic Conditions

Comments

MZs 1 and 2 were combined during 2015 BpS Review.

On first draft of model, modelers weren’t sure how to capture probability of alternative successional pathway from Class A-C (dense alder stands). For a first try, they guessed at the fractional probability of the pathway (25%) and apportioned that over the duration of Class A. This resulted in less than 1% in Class C on average over the entire simulation. In 2018 Kori Blankenship changed the probability for this transition to .005, the minimum frequency needed to average 1% in Class C over time.

We assumed that catastrophic wildfire probability was the same for all classes. We assumed that all classes other than Class A can be converted to Class A through catastrophic windthrow. We assumed that non-catastrophic windthrow converts Class E to Class D. Large-scale wind events were modeled with wind/weather/stress; fine-scale wind events were modeled with Option 1.

Miles Hemstrom suggested that there was too much mid seral due to too frequent windthrow replacement. Jane Kertis and John Foster modified the model to the current values, which reduced Classes A, B, and D, and increased Class E to the currently stated amounts.

This model was adapted from the Rapid Assessment (RA) model R#SSHE, and the VDDT model is reflected here as is. One reviewer of the RA model commented that a landscape of this type may not climax and then vary around those proportions, but rather the proportions would fluctuate quite a bit due to the sporadic wind disturbances, which lessen with distance from the coast.

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 mix | C mix | C mix | C mix | C mix | C mix | C mix | C mix | C mix | C mix |
| Tree | 10-25 | B con | B con | B con | B con | B con | B con | B con | B con | B con | B con |
| Tree | 10-25 | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf |
| Tree | 25-50 | D | D | D | D | D | D | E | E | E | E |
| Tree | >50 | D | 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 6 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| RUSP | Rubus spectabilis | Salmonberry | Lower |
| SARA2 | Sambucus racemosa | Red elderberry | Lower |
| PISI | Picea sitchensis | Sitka spruce | Upper |
| ALRU2 | Alnus rubra | Red alder | Upper |

Description

Dense shrub layer dominated by salmonberry, elderberry, huckleberry, and salal. Regeneration of red alder or conifers may be present. Shrubs are the dominant lifeform (although early regenerating trees form the upper canopy). Shrub height ranges from 0.5m-4m and canopy cover of shrubs ranges from 0-90%.

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

Class B 9 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PISI | Picea sitchensis | Sitka spruce | Upper |
| TSHE | Tsuga heterophylla | Western hemlock | Upper |

Description

Dense stands of Sitka spruce and/or western hemlock dominate this class. Stem densities can be very high; tree diameters can be up to 20in.

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

Class C 1 Mid Development 2 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ALRU2 | Alnus rubra | Red alder | Upper |
| RUSP | Rubus spectabilis | Salmonberry | Lower |

Description

Dense stands of red alder dominate this class. Shrub understories, especially salmonberry, are common. Regeneration of Sitka spruce and western hemlock is occurring in the understory.

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

Class D 11 Mid Development 2 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| TSHE | Tsuga heterophylla | Western hemlock | Upper |
| PISI | Picea sitchensis | Sitka spruce | Upper |

Description

The stand is mature and open. Most stems in the class are western hemlock, because partial wind disturbance commonly removes most of the largest Sitka spruce.

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

Class E 73 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PISI | Picea sitchensis | Sitka spruce | Upper |
| TSHE | Tsuga heterophylla | Western hemlock | Upper |

Description

Large individuals of Sitka spruce and western hemlock dominate this class (diameter, >20in). Douglas-fir and western red-cedar are occasionally present.

*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 | 20 |
| Mid1:CLS | 21 | Late1:CLS | 59 |
| Mid2:CLS | 21 | Mid2:OPN | 59 |
| Mid2:OPN | 60 | Late1:CLS | 89 |
| Late1:CLS | 60 | 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 | 0.0015 | 667 | Yes | 0 |
| Alternative Succession | Early1:ALL | Mid2:CLS | 0.005 | 200 | Yes | 0 |
| Wind or Weather or Stress | Mid1:CLS | Mid1:CLS | 0.0015 | 667 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.0015 | 667 | Yes | 0 |
| Wind or Weather or Stress | Mid2:OPN | Early1:ALL | 0.0015 | 667 | Yes | 0 |
| Replacement Fire | Mid2:OPN | Early1:ALL | 0.0015 | 667 | Yes | 0 |
| Optional 1 | Mid2:OPN | Mid2:OPN | 0.005 | 200 | No | 0 |
| Wind or Weather or Stress | Mid2:CLS | Early1:ALL | 0.0015 | 667 | Yes | 0 |
| Replacement Fire | Mid2:CLS | Early1:ALL | 0.0015 | 667 | Yes | 0 |
| Wind or Weather or Stress | Late1:CLS | Early1:ALL | 0.0015 | 667 | Yes | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.0015 | 667 | Yes | 0 |
| Wind or Weather or Stress | Late1:CLS | Mid2:OPN | 0.005 | 200 | Yes | 0 |

Optional Disturbances

Optional 1: Fine-Scale Wind/Weather/Stress

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