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North Pacific Hypermaritime Sitka Spruce Forest

BpS Model/Description Version: Aug. 2020

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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	<i>Picea sitchensis</i>	Sitka spruce
TSHE	<i>Tsuga heterophylla</i>	Western hemlock
PSEUD7	<i>Pseudotsuga</i>	Douglas-fir
ALRU2	<i>Alnus rubra</i>	Red alder
RUSP	<i>Rubus spectabilis</i>	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	<i>Picea sitchensis</i>	Sitka spruce	Upper
TSHE	<i>Tsuga heterophylla</i>	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
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
ALRU2	<i>Alnus rubra</i>	Red alder	Upper
RUSP	<i>Rubus spectabilis</i>	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
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
TSHE	<i>Tsuga heterophylla</i>	Western hemlock	Upper
PISI	<i>Picea sitchensis</i>	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
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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
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Optional Disturbances

Optional 1: Fine-Scale Wind/Weather/Stress

References

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