

11570

North Pacific Swamp Systems

BpS Model/Description Version: Aug. 2020

Modelers		Reviewers	
John Foster	jfoster@tnc.org	Jan Henderson	jahenderson@fs.fed.us
Kori Blankenship	kblankenship@tnc.org	Robin Leshner	rlesher@fs.fed.us
None	None	None	None

Vegetation Type

Woody Wetland

Map Zones

1, 2

Geographic Range

This type occurs in western Washington to southwestern Oregon, up to the Cascades crest.

Biophysical Site Description

These wooded swamps are mostly small-patch size and occur sporadically in glacial depressions; in river valleys; around the edges of lakes, ponds, and marshes; or on slopes with seeps that form sub-irrigated soils and where water tables fluctuate seasonally (mostly seasonally flooded regime). The type includes flat to gently sloping lowlands up to 457m (1,500ft) elevation, but also occur up to near the lower limits of continuous forest (below the subalpine parkland). It can occur on steeper slopes where soils are shallow over unfractured bedrock. This system is indicative of poorly drained, mucky areas and stagnant water. Soils can be woody peat, muck, or mineral. Deciduous broadleaf tall shrublands are located in depressions or around lakes or ponds.

Vegetation Description

These swamps are dominated by conifer forests and/or deciduous shrubs. Characteristic species are a mix of species that may include *Alnus incana* ssp. *tenuifolia* (= *Alnus tenuifolia*), *Alnus viridis* ssp. *crispa* (= *Alnus crispa*), *Alnus rubra*, *Alnus viridis* ssp. *sinuata* (= *Alnus sinuata*), *Thuja plicata*, *Betula papyrifera*, *Chamaecyparis nootkatensis*, *Cornus sericea*, *Fraxinus latifolia*, *Malus fusca*, *Salix* spp., *Spiraea douglasii*, *Picea sitchensis*, *Pinus contorta*, *Tsuga heterophylla*, and *Crataegus douglasii*. The overstory is often <50% cover, but the shrub understory can have high cover.

The hardwood/conifer swamps are dominated by species (*Tsuga heterophylla*, *Picea sitchensis*, *Thuja plicata*, *Chamaecyparis nootkatensis*, *Pinus contorta* var. *contorta*, *Alnus rubra*, *Fraxinus latifolia*) capable of growing on saturated or seasonally flooded soils. Overstory is often <50% cover, but shrub understory can have high cover. The southern end of the range of this type (e.g., the Willamette Valley) tends to have more hardwood-dominated stands (especially *Fraxinus latifolia*) and very little in the way of conifer-dominated stands. Shrub swamps include various species of *Salix*, *Spiraea douglasii*, *Crataegus*, *Malus fusca*, *Cornus sericea*, *Ribes bracteosum*, and *Oplopanax horridum*.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
SALIX	<i>Salix</i>	Willow
COSE16	<i>Cornus sericea</i>	Redosier dogwood
FRLA	<i>Fraxinus latifolia</i>	Oregon ash
THPL	<i>Thuja plicata</i>	Western red-cedar
TSHE	<i>Tsuga heterophylla</i>	Western hemlock

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

Disturbance Description

This type is primarily impacted by the hydrologic regime and usually behaves as a fire break to fire coming from the nearby uplands. There are frequent (5- to 10-yr) minor floods that maintain these communities. However, more severe flooding events can restructure the system along corridors. Windthrow, beaver activity, and clearing by Native Americans also occurred in this type.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement				
Moderate (Mixed)				
Low (Surface)				
All Fires				

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

Woody swamps are usually small-patch size, but vary in size depending on the former size of the remnant lake, existing size of the remaining lake (if any), and the size of the streams and rivers that feed the current swamp.

Adjacency or Identification Concerns

Caused by avalanches and major changes in hydrology. System is regenerated continuously with wet-tolerant species and it changes due to water changes (nutrients, level).

Although the typical landscape context for the type is extensive upland forests, for the *Fraxinus latifolia* stands, landscapes were very often formerly dominated by prairies and now by agriculture. Many conifer-dominated stands have been converted to dominance by *Alnus rubra* due to timber harvest. Shrub swamps are usually not intermixed with the forested swamps and tend to be more wet. Deciduous and conifer-forested swamps are often intermixed and more similar to each other in hydrology, and, therefore, are combined here in this system.

Shrub swamps may occur in mosaics with marshes or forested swamps, being, on average, more wet than forested swamps and drier than marshes. However, they may frequently dominate entire wetland systems. Shrub swamps are usually not intermixed with the forested swamps and tend to be more wet. Deciduous and conifer-forested swamps are often intermixed and more similar to each other in hydrology, and therefore are combined into North Pacific Hardwood-Conifer Swamp (CES204.090).

Issues or Problems

Foster and Buford built this model with some input from Jimmy Kagan, Robin Lesher, and Jan Henderson. The assumption was that most of the area of this biophysical setting (BpS) was shrub swamp historically (three quarters of the BpS), represented by Class B. These shrubs recover more speedily post-disturbance than forested sites. Alternate succession was used in Class A to represent the spatial distinction rather than to represent a process or transition. The successional dynamics of this system are not necessarily linear. The three classes described by this model can exist on the landscape without transitioning from one to another.

Native Uncharacteristic Conditions

Comments

Map zones 1 and 2 were combined during 2015 BpS Review. In the model, the wind/weather/stress transition was used to represent some type of stand-restructuring disturbance (flooding and windthrow being the most likely causes).

For mapping, split classes based on evergreen versus deciduous. Then, if deciduous and taller than 5m, then it is Class B. If it is evergreen and taller than 10m, then it is Class C. Everything else is 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	B brdlf	B brdlf	B brdlf	B brdlf	B brdlf	B brdlf	B brdlf	B brdlf	B brdlf	B brdlf
Tree	5-10	B mix	B mix	B mix	B mix	B mix	B mix	B mix	B mix	B mix	B mix
Tree	5-10	A con	A con	A con	A con	A con	A con	A con	A con	A con	A con
Tree	10-25	B brdlf	B brdlf	B brdlf	B brdlf	B brdlf	B brdlf	B brdlf	B brdlf	B brdlf	B brdlf
Tree	10-25	C con	C con	C con	C con	C con	C con	C con	C con	C con	C con
Tree	10-25	B mix	B mix	B mix	B mix	B mix	B mix	B mix	B mix	B mix	B mix
Tree	25-50	C	C	C	C	C	C	C	C	C	C
Tree	>50	C	C	C	C	C	C	C	C	C	C

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
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
SALIX	Salix	Willow	Upper
ALNUS	Alnus	Alder	Upper

Description

Cover is still developing, with most vegetation in early stages. In forested swamps, this stage succeeds to Class C when the trees are firmly established above shrub vegetation. In shrub swamps, the shrubs become firmly established within 5-15yrs. (Alternate succession is used twice: once to Class B and once to Class C.)

These early seral patches are shorter than 3m for the shrub swamps; however, for the conifer-deciduous swamps, their height can reach 15-20m before the conifers begin to show dominance over the deciduous trees.

Maximum Tree Size Class

Sapling >4.5ft; <5" DBH

Class B	69	Late Development 1 - Closed
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
ALNUS	Alnus	Alder	Upper
SALIX	Salix	Willow	Upper
FRLA	Fraxinus latifolia	Oregon ash	Upper

Description

Shrubs are firmly established and stands are dominated mostly by deciduous trees. If conifers are present, they are in the mix but not significantly distinct from the matrix of deciduous species. Other sub-types may be dominated by conifers, but shorter in stature than Class C. In Washington state, red alder is found in this class on the west side and *Alder* spp. is seen on the east side of the Cascades. Ash may be found in large patches, especially in southwest Washington and through the Willamette Valley of Oregon. In swamps, Oregon ash and alder reach a height of 60ft. Disturbances include edge effects, individual tree blowdown, and hydrologic fluctuations.

In swamps, FRLA and *Alnus* reach a height of 60ft. Disturbances include edge effect, individual blowdown, and hydrologic disturbances.

Maximum Tree Size Class

Medium 9-21" DBH

Class C**19****Late Development 2 - Open**Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
THPL	<i>Thuja plicata</i>	Western red-cedar	Upper
PICO	<i>Pinus contorta</i>	Lodgepole pine	Upper
TSHE	<i>Tsuga heterophylla</i>	Western hemlock	Upper
PISI	<i>Picea sitchensis</i>	Sitka spruce	Upper

Description

Conifer are prominent in some patches of this BpS. These species do not necessarily occur together, so the canopy position is usually "upper." PICO are in the short end of this height range, if that. Species may include PICO, THPL, and PISI, and TSME in high elevations. Conifer swamps likely have deciduous species underneath, including *Spirea* and sedges. Other species may include *Ledum*, *Kalmia*, *Vaccinium* in bogs (acidic, stagnant), and cryptogams. In upland flats, these conifer areas occur in small patches. Disturbances include edge effect, individual tree blowdown, and hydrologic fluctuations.

Overstory of conifers can be 20-60% closure, but the understory could be up to 100% closure of shrubs. Evergreen trees <10m tall are included in this class.

Maximum Tree Size Class

None

Model Parameters**Deterministic Transitions**

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	0	Late2:OPN	40
Late1:CLS	6	Late1:CLS	999
Late2:OPN	41	Late2:OPN	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
Alternative Succession	Early1:ALL	Late2:OPN	0.005	200	Yes	0
Alternative Succession	Early1:ALL	Late1:CLS	0.045	22	Yes	0
Wind or Weather or Stress	Late1:CLS	Early1:ALL	0.008	125	Yes	0

Wind or Weather or Stress	Late2:OPN	Early1:ALL	0.008	125	Yes	0
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References

Franklin, J.F. and C.T. Dyrness. 1988. Natural Vegetation of Oregon and Washington. Oregon State University Press. 452 pp.

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