10600

East Cascades Oak-Ponderosa Pine Forest and Woodland

BpS Model/Description Version: Aug. 2020

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

Forest and Woodland

Map Zones

1, 2, 7

Geographic Range

These narrowly restricted woodlands occur at or near lower treeline in foothills of the east Cascades in Oregon and Washington within 65km of the Columbia River Gorge (Rocchio 2011). Disjunct occurrences are found further south in Klamath County, OR, and Siskiyou County, CA. They dominate areas between shrub-steppe and steppe communities at lower elevations and conifer-dominated woodlands or forest above.

Biophysical Site Description

Areas supporting Oregon White Oak are among the warmest and most arid sites supporting trees at the western edge of the Columbia Plateau. Most stands occur below 2,000ft in elevation but range between 1,700-3,000ft.

Sites supporting this type range from steep, lower slopes to more moderate slopes on dry benches. The more mesic sites are river and stream terraces where this deciduous tree and more mesic shrub species (common snowberry, rose, bittercherry, and California hazel) represent vegetation seral to ponderosa pine or Douglas-fir forest. Precipitation is generally ca.20in annually.

The substrates are usually very gravelly, stony, coarse loams derived from basalt colluvium in the uplands while alluvial material, including basalt, is the primary regolith along rivers and streams.

Vegetation Description

On both upland sites and on river and stream terraces, Oregon White Oak dominates the tree canopy layer. In late seral stands on the more mesic sites, conifers such as ponderosa pine and Douglas-fir will form a persistent emergent canopy over the oak.

The understory reflects the transitional nature of the woodlands. Species representative of the adjacent drier shrub-steppe and steppe communities are present as well as those more common in conifer associations upslope. Species present include: bitterbrush, bluebunch wheatgrass, sulfur lupine, yarrow, nine-leaf lomatium, Carey balsamroot, Sandberg bluegrass, showy phlox, fern-leaved lomatium, serviceberry, shiny-leaf spirea, Oregon grape, common snowberry, pinegrass, elk sedge, California hazel, rose, chokecherry, ocean-spray, and blue wildrye. In Oregon, the community may include Idaho fescue, bluebunch wheatgrass, prairie Junegrass, and squirreltail as dominant understory grass species.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| QUGA4 | *Quercus garryana* | Oregon white oak |
| PIPO | *Pinus ponderosa* | Ponderosa pine |
| PSME | *Pseudotsuga menziesii* | Douglas-fir |
| SYAL | *Symphoricarpos albus* | Common snowberry |
| FEID | *Festuca idahoensis* | Idaho fescue |
| STIPA | *Stipa* | Stipa |
| POSE | *Poa secunda* | Sandberg bluegrass |
| PSSP6 | *Pseudoroegneria spicata* | Bluebunch wheatgrass |

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

Disturbance Description

Historical fire frequency is between 5-30yrs in this type. Fire intensities were probably low in open stands but increased in severity as woodland vegetation transitioned to a denser, closed canopy type along water courses. Canopy is fire tolerant; therefore fire severity is low. The natural fire regime was a type I regime in the upland. In the more mesic river terraces and draws, fire frequency probably decreased with a fire interval of 50-60yrs. With the more dense vegetation and the occurrence of fuel ladders, fire severity would become mixed. The fire regime may reflect a type III in this more mesic habitat.

Insects and disease may impact individual trees (either ponderosa pine or white oak) locally. Armillaria root rot, western pine beetle, western oak looper, western tent caterpillar, and the pine engraver have the greatest potential for damage.

Cover of oak and pine often varies with fire frequency.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 380 | 7 |  |  |
| Moderate (Mixed) | 640 | 4 |  |  |
| Low (Surface) | 31 | 89 | 5 | 30 |
| All Fires | 27 | 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

This woodland type is usually a component in the low elevation landscape and creates a mosaic with shrub-steppe, steppe, and forested communities. Fire usually occurs at a scale of magnitude larger than the patch size -- in the 1,000s of acres during extreme weather conditions.

Adjacency or Identification Concerns

At lower elevations, these types butt against shrub-steppe types, and above they transition into ponderosa pine and mixed conifer forests.

This type is not found west of the Cascade crest. It transitions to the North Pacific Oak Woodland Biophysical Setting (BpS) near the Little White Salmon drainage near Augspurger Mountain in Washington (Rocchio 2011).

This BpS does not include oak types associated with wetlands or riparian settings; those should be classified as Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland or Columbia Basin Foothill Riparian Woodland and Shrubland (Rocchio 2011).

Issues or Problems

Growth rates of dominant species (QUGA4), diameters, and fire frequencies are based on observations and descriptive studies rather than ecology sampling. The type includes variation from arid to mesic sites supporting this vegetation type east of the Cascade Mountains in the Pacific Northwest.

Fire regime mixed between I and III possibly from arid to mesic ends of the BpS.

Cheatgrass, bulbus bluegrass, and dogtail can be major components of this type in the current landscape. The degree to which these understories depart from pre-settlement types is a measure of uncharacteristic vegetation and departure from historic conditions. Cheatgrass, in particular, may impact fire behavior, frequency, and intensity in the current landscape.

Much of this system has been converted to agriculture or urban land uses. Fire suppression has led to increased density and cover of oak and conifers. Conifer encroachment is possible on wetter sites, such as the White Salmon River drainage, but is not a widespread issue. Composition and structure of the BpS can be affected by grazing and logging. The Ecological Integrity Assessment for this Ecological System (Rocchio 2011) provides more information about these and other current stressors.

Native Uncharacteristic Conditions

Comments

During the 2016 BpS review, Kori Blankenship revised the description to clarify the distinction between this and other oak-conifer types found in the Pacific Northwest and added information about current stressors from Rocchio 2011.

The vegetation classes in this model reflect a spatial partitioning of the type rather than the more standard temporal modeling approach. The two closed canopy classes were modeled to include a mixed fire severity about every 60-70yrs, but no mixed fire was included in the open classes. Since the closed classes resulted in <10% of the landscape, the composite mixed fire frequency value appears particularly low.

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

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 9 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUGA4 | Quercus garryana | Oregon white oak | All |
| PSSP6 | Pseudoroegneria spicata | Bluebunch wheatgrass | Lower |
| LUSU5 | Lupinus sulphureus | Sulphur lupine | Lower |
| BACA3 | Balsamorhiza careyana | Carey's balsamroot | Lower |

Description

The early stage is the initial post-disturbance community dominated by white oak sprouts from coppice origin. Shrubs with closure between 20-50% and exceeding 3m height can dominate early on, but eventually the trees overtake the shrubs. Bunchgrasses and associated forbs dominate understory with bare ground and rock/gravel abundant in interspaces. Native herbivory may maintain oak sprouts in "shrub" form for extended period. Early stage includes oak sprouts or seedling/saplings growth to 4-6in DBH. Occasional sites with PIPO or PSME will have diameters up to eight inches.

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

Class B 7 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUGA4 | Quercus garryana | Oregon white oak | Upper |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| CARU | Calamagrostis rubescens | Pinegrass | Lower |
| AMAL2 | Amelanchier alnifolia | Saskatoon serviceberry | Middle |

Description

The mid-seral, closed stage occurs at the more mesic end of the environmental gradient and supports a dense canopy of oak and ponderosa pine and/or Douglas-fir. Oak diameter ranges from 6-12in DBH with crown closure approaching 70%. Ponderosa pine and Douglas-fir may be 8-20in DBH. Sod-forming grasses and shade-tolerant shrubs will be prominent on the majority of sites. Species from more arid sites may be remnants of earlier, more open post-fire communities.

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

Class C 8 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUGA4 | Quercus garryana | Oregon white oak | Upper |
| PUTR2 | Purshia tridentata | Antelope bitterbrush | Middle |
| PSSP6 | Pseudoroegneria spicata | Bluebunch wheatgrass | Lower |
| LUSU5 | Lupinus sulphureus | Sulphur lupine | Lower |

Description

The mid-seral, open stage occurs on arid slopes and benches and represents that portion of the environmental gradient where fire-tolerant communities develop as oak woodlands. Usually the dry site conditions limit tree density and canopy closure is relatively low (between 10-30%). Conifers may occur sporadically at low coverage. Oak diameter ranges from 6-10in DBH. Bunchgrasses and shade-intolerant shrubs, notably antelope bitterbrush (PUTR2), will be prominent on the majority of sites.

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

Class D 67 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUGA4 | Quercus garryana | Oregon white oak | Upper |
| PUTR2 | Purshia tridentata | Antelope bitterbrush | Middle |
| PSSP6 | Pseudoroegneria spicata | Bluebunch wheatgrass | Lower |
| BACA3 | Balsamorhiza careyana | Carey's balsamroot | Lower |

Description

The late seral, open stage is characterized by large, principally multi-stemmed (now, although historically wider spaced, giant-trunked trees were more common) white oaks in open stands with bunchgrass, forb, and shrub understories. These woodlands support crown closure between 10-30%. Diameters range from 10-18in DBH with ages over 350yrs for those individuals surviving fires. Mature, large conifers may occur sporadically at low coverage. Bunchgrasses (AGSP and FEID) and shade-intolerant shrubs, notably antelope bitterbrush (PUTR2), will be prominent on the majority of sites.

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

Class E 9 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| QUGA4 | Quercus garryana | Oregon white oak | Upper |
| SYAL | Symphoricarpos albus | Common snowberry | Low-Mid |
| COCO6 | Corylus cornuta | Beaked hazelnut | Lower |

Description

This stage has mature overstory ponderosa pine and/or Douglas-fir as emergents over a lower canopy layer of white oak. The conifers have survived a few burn cycles and may show fire scars; DBHs are 21+in. Oregon white oak may reach its largest diameters in eastside ecosystems in these river and stream terraces attaining a DBH of 18-20in. Canopy closure is high (frequently 60-80%) with a dense understory dominated by sod-forming grasses and shrubs.

*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:OPN | 49 |
| Mid1:OPN | 50 | Late1:OPN | 119 |
| Mid1:CLS | 50 | Late1:CLS | 199 |
| Late1:OPN | 120 | Late1:OPN | 969 |
| Late1:CLS | 200 | Late1:CLS | 969 |

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 | 0.002 | 500 | Yes | 0 |
| Alternative Succession | Early1:ALL | Mid1:CLS | 0.01 | 100 | Yes | 0 |
| Native Grazing | Early1:ALL | Early1:ALL | 0.033 | 30 | No | 0 |
| Surface Fire | Early1:ALL | Early1:ALL | 0.04 | 25 | No | 0 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.002 | 500 | Yes | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.02 | 50 | No | 0 |
| Alternative Succession | Mid1:OPN | Late1:CLS | 0.02 | 50 | Yes | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.002 | 500 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.01 | 100 | Yes | 0 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.002 | 500 | Yes | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.04 | 25 | No | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.009 | 111 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.01 | 100 | Yes | 0 |

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