10210

Klamath-Siskiyou Lower Montane Serpentine Mixed-Conifer Woodland

BpS Model/Description Version: Aug. 2020

|  |  |  |  |
| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
| Ed Reilly | ereilly@blm.gov | Thomas Atzet | jatzet@budget.net |
| Pat Martinez | pmartinez@fs.fed.us | Diane White, Charley Martin, Ed Reilly | dewhite01@fs.fed.us | |
| Darren Borgias | dborgias@tnc.org | Hugh Safford/Dave Schmidt | hughsafford@fs.fed.us |

Reviewers: Darren Borgias, Clint Emerson, Kerry Metlen

Vegetation Type

Forest and Woodland

Map Zones

2, 3, 6, 7

Model Splits or Lumps

This BpS is lumped with: Klamath-Siskiyou Upper Montane Serpentine Mixed Conifer Woodland (BpS 10220). The descriptions and models are identical.

Geographic Range

This type occurs in the Klamath-Siskiyou region (California and Oregon). It occurs in southwest Oregon primarily in map zone (MZ) 2, but also in MZ07 and parts of northern California (MZ03).

Biophysical Site Description

This type occurs in all aspects. The serpentine, peridotite soil type is the significant factor that distinguishes this type from the more common mixed conifer. It occurs most often on low, mid, and upper slope positions. Typically occurs with wide range of precipitation: 35-130in annually. It is found from 1,200-4,500ft in the Siskiyous.

Vegetation Description

A wide variety of conifer trees are present. These include PSME, CADE27, PISA2, PILA, PIJE, and CHLA. In the northern range of this type and at higher elevations, PIMO3 is increasingly common. In the southern extent of this type, PISA2 and PILA can be significant components. Small amounts of PIAT and ABCO may be present. Hardwoods include LIDE3, CACH6, QUCH2, ARME, and UMCA. Shrub species include QUVA, GABU2, QUSA2, ARNE, RHOC, RHDI6, RHCA, ARPA6, and CECU. CHLA (Port Orford Cedar) is not present in all stands, but is found in a narrow band where proper climatic conditions occur.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PSME | *Pseudotsuga menziesii* | Douglas-fir |
| CADE27 | *Calocedrus decurrens* | Incense cedar |
| CHLA | *Chamaecyparis lawsoniana* | Port Orford cedar |
| PIJE | *Pinus jeffreyi* | Jeffrey pine |
| PIMO3 | *Pinus monticola* | Western white pine |
| LIDE3 | *Lithocarpus densiflorus* | Tanoak |

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

Disturbance Description

This type has a very limited distribution and, consequently, limited information for fire occurrence history. Adjacent mixed-conifer forest types have similar characteristics and are detailed later. Surface and mixed-severity fires occur at an average of about 10-15yrs (Taylor and Skinner 2003; Sensenig 2002; Taylor and Skinner 1998). Kilgore and Taylor (1979) reported a fire return interval of 19-39yrs (north/northeast aspects), which may favor mixed fires. With historic fire regimes, insect outbreaks may have been much reduced compared to current conditions. Snow breakage occurs in the mid-seral closed state (Class B) about every 5yrs (this is not modeled). Although model is aspatial, most medium- and high-severity fires may actually occur on mid and upper slope positions (Taylor and Skinner 1998; Taylor 2000; Bekker and Taylor 2001).

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 230 | 4 | 100 | 400 |
| Moderate (Mixed) | 71 | 13 | 36 | 100 |
| Low (Surface) | 12 | 83 | 3 | 35 |
| All Fires | 9 | 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 forest type occurs in a small to medium patch-size (10-100ac) mosaic, driven by soil type and variations in topography, historical fire patterns, and fire intensity. Insect-caused mortality has a minor contribution to overall forest pattern.

Adjacency or Identification Concerns

This type is found mostly on ultra-mafic soils. Adjacent types are dry and mesic mixed conifer. Klamath Siskiyou Xeromorphic Serpentine Savanna and Chaparral occurs along or adjacent to this type. The distinguishing characteristic is that more serpentine leads to more PIJE. This type is essentially the same as the Klamath Siskiyou Upper Montane Serpentine Mixed Conifer. The difference is that the Upper version is 4,500+ft and has some slight species changes. For example, Shasta Red fir is present in the Upper but not in the Lower.

Issues or Problems

This type can occur in very small patches and may be difficult to distinguish from mixed conifer. The difference is species composition driven by presence of ultra-mafic soil types. The model was criticized for not listing PIJE in any of the S-classes.

It is possible that this type shows greater variability in northern California and in MZ03, and that it will need to be modeled in its component parts.

Native Uncharacteristic Conditions

Due to fire exclusion, many of these stands currently exhibit higher density of understory species and young conifer and hardwoods.

Comments

During the 2016 review period, it was recognized that there were only slight differences in the modeled fire frequency between the zone 2 and zone 3/6/7 models, and that otherwise the models and descriptions were nearly identical. Reviewers Darren Borgias, Clint Emerson, and Kerry Metlen suggested that one model could cover zones 2, 3, and 7, although there was some uncertainty about the extent to which this model fit in California. It was assumed by K. Blankenship that the zone 6 model could also be combined because it was quantitatively identical to the zone 3 and 7 models. Descriptive differences were rectified, and the model from zones 3/6/7 was adopted for all zones.

LANDFIRE National Review Comments:

One reviewer felt that combining 1021 with 1022 glossed over very real differences in replacement fire frequency, especially in the late-open condition.

One reviewer felt that the return interval was too low, and suggested 20-30yrs. It should have a less frequent fire than 1031 -- PIPO-PIJE. Two anonymous reviewers felt there should be a separate model for *Pinus attenuata* because it occurs in large patches and has a distinct fire regime that can be described separately from this type. However, another reviewer indicated that *P*. *attenuata* did not occur in large patches and that it would not be necessary to map in Oregon.

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 | C | C | C | C | B | B | B | B | B |
| Tree | 25-50 | D | D | D | D | D | E | E | E | E | E |
| Tree | >50 | D | D | D | D | D | E | 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 19 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| LIDE3 | Lithocarpus densiflorus | Tanoak | All |
| PSME | Pseudotsuga menziesii | Douglas-fir | All |
| CADE27 | Calocedrus decurrens | Incense cedar | All |
| QUCH2 | Quercus chrysolepis | Canyon live oak | All |

Description

Early succession. Vegetation comprised of grass, shrubs, and shade-intolerant tree species seedlings, saplings, and poles. Snags are typically present. Initial stages of this type are dominated with shrubs; later, tree-form species start to express dominance. Tree cover >40% is unlikely. This type has great variation in which species will express early dominance. Both precipitation and existing vegetation patterns contribute to the early seral species composition: RHDI6 in dryer situations; LIDE3 in moister sites.

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

Class B 1 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| LIDE3 | Lithocarpus densiflorus | Tanoak | Low-Mid |
| PSME | Pseudotsuga menziesii | Douglas-fir | All |
| CADE27 | Calocedrus decurrens | Incense cedar | All |
| QUCH2 | Quercus chrysolepis | Canyon live oak | Low-Mid |

Description

Pole to large conifers (up to 30in DBH). These stands are comprised of conifers along with hardwood trees and shrubs. Ladder fuels and sub-canopy may provide conditions to allow crown fire initiation. Surface fuels moderate. Closed conditions occur with less frequent fires or on more productive sites. These younger patches tend to occur on southern and western slopes.

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

Class C 24 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| LIDE3 | Lithocarpus densiflorus | Tanoak | Low-Mid |
| PSME | Pseudotsuga menziesii | Douglas-fir | All |
| CADE27 | Calocedrus decurrens | Incense cedar | All |
| QUCH2 | Quercus chrysolepis | Canyon live oak | Low-Mid |

Description

Pole to large conifers (up to 30in DBH). These stands are comprised of conifers along with hardwood trees and shrubs. Ladder fuels and sub-canopy may provide conditions to allow crown fire initiation. Surface fuels moderate. Open conditions occur with more frequent fires or on less productive sites.

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

Class D 53 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| LIDE3 | Lithocarpus densiflorus | Tanoak | Low-Mid |
| PSME | Pseudotsuga menziesii | Douglas-fir | All |
| CADE27 | Calocedrus decurrens | Incense cedar | All |
| QUCH2 | Quercus chrysolepis | Canyon live oak | Low-Mid |

Description

Generally older stands may have larger trees, but never in the numbers or size of better sites, such as mixed-conifer sites. These stands are comprised of conifers along with hardwood trees and shrubs. Ladder fuels and sub-canopy may provide conditions to allow crown fire initiation. Surface fuels moderate. Open conditions occur with more frequent fire or on less productive sites.

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

Class E 3 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| LIDE3 | Lithocarpus densiflorus | Tanoak | Low-Mid |
| PSME | Pseudotsuga menziesii | Douglas-fir | All |
| CADE27 | Calocedrus decurrens | Incense cedar | All |
| QUCH2 | Quercus chrysolepis | Canyon live oak | Low-Mid |

Description

Generally, older stands may have larger trees, but never in the numbers or size of better sites, such as mixed-conifer sites. Canopy cover >80% is unlikely. These stands are comprised of conifers along with hardwood trees and shrubs. Ladder fuels and sub-canopy may provide conditions to allow crown fire initiation. Surface fuels moderate. Closed conditions occur with less frequent fire or on more productive sites at the bottoms of canyons and in riparian areas.

*Maximum Tree Size Class*  
Large 21-33" 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 | 150 |
| Mid1:CLS | 50 | Late1:CLS | 150 |
| Late1:OPN | 151 | Late1:OPN | 999 |
| Late1:CLS | 151 | 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** |
| Alternative Succession | Early1:ALL | Mid1:CLS | 1 | 1 | Yes | 45 |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.006 | 167 | Yes | 0 |
| Mixed Fire | Early1:ALL | Early1:ALL | 0.013 | 77 | No | 0 |
| Surface Fire | Early1:ALL | Early1:ALL | 0.08 | 13 | No | 0 |
| Alternative Succession | Mid1:OPN | Mid1:CLS | 1 | 1 | Yes | 45 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.0065 | 154 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.015 | 67 | No | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.09 | 11 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.007 | 143 | Yes | 0 |
| Surface Fire | Mid1:CLS | Mid1:CLS | 0.08 | 13 | No | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 1 | 1 | Yes | 45 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.0025 | 400 | Yes | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.015 | 67 | No | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.09 | 11 | No | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.007 | 143 | Yes | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Surface Fire | Late1:CLS | Late1:CLS | 0.08 | 13 | No | 0 |

References

Atzet, Thomas, Diane White, Lisa McCrimmon, Patricia Martinex, Paula Reid Fong, Vince Randall. 1996. Field Guide to the Forested Plant Associations of Southwest Oregon, Tech. Paper R6-NR-ECOL-TP-17-96.

Beaty R.M. and A H. Taylor. 2001 Spatial and temporal variation of fire regimes in a mixed conifer forest landscape, Southern Cascades, California, USA Department of Geography, The Pennsylvania State University, University Park, PA, USA. Journal of Biogeography 28: 955-966.

Bekker, M.F. and A.H. Taylor. 2001. Gradient Analysis of Fire Regimes in Montane Forests of the Southern Cascade Range, Thousand Lakes Wilderness, California, USA. Plant Ecology 155: 15-28.

Frost, Evan J. and Rob Sweeney. 2000. Fire Regimes, Fire History and Forest Conditions in the Klamath-Siskiyou Region: An Overview and Synthesis of Knowledge. Wildwood Environmental Consulting. Prepared for the World Wildlife Fund, Klamath-Siskiyou Ecoregion Program, Ashland, OR. December 2000.

Kilgore, B.M. and D. Taylor. 1979. Fire history of a sequoia-mixed conifer forest. Ecology 60(1), 1979. 129-142.

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

Sensenig, T. 2002. Development, fire history, and current and past growth of old-growth and young growth forest stands in the Cascade, Siskiyou, and mid-Coast mountains of southwestern Oregon. PhD thesis. Corvallis, OR: Oregon State University.

Skinner, Carl N. 1997. Fire history in riparian reserves of the Klamath Mountains. In: Cooper, Sandra and Neil Sugihara, eds. Proceedings of Fire in California Ecosystems: Integrating Ecology, Prevention and Management. 17-20 November 1997. San Diego, CA: California Association for Fire Ecology.

Skinner, C.N. 2003. A tree-ring based fire history of riparian reserves in the Klamath Mountains. In: Farber, P.M., ed. Proceedings of the 2001 Riparian Habitat and Floodplains Conference--California Riparian Systems: Processes and Floodplain Management, Ecology, and Restoration. Sacramento, CA: Riparian Habitat Joint Venture. 116-119.

Taylor, A.H. and C.N. Skinner. 1998. Fire history and landscape dynamics in a late-successional reserve, Klamath Mountains, California, USA. Forest Ecology and Management 111: 285-301.

Taylor, A.H. and C.N. Skinner. 2003. Spatial patterns and controls on historical fire regimes and forest structure in the Klamath Mountains. Ecological Applications 13: 704-719.

Taylor, A.H. 2000. Fire regimes and forest changes in mid and upper montane forests of the southern Cascades, Lassen Volcanic National Park, California, USA. Journal of Biogeography 27: 87–104.