10322

Mediterranean California Red Fir Forest -- Southern Sierra

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
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| None | None | None | None |

Vegetation Type

Forest and Woodland

Map Zone

6

Model Splits or Lumps

This Biophysical Setting (BpS) is split into multiple models; 10322 is a relatively southern variant that includes significant western white pine and lacks white fir.

Geographic Range

Occurs from the vicinity of Crater Lake, Oregon, south through the Cascades and the Sierra Nevada into northern Kern County at Sunday Peak. An arm also extends south through the Coast Ranges to Snow Mountain in Lake County (Potter et al. 1992).

Biophysical Site Description

In the southern Sierra Nevada where this type is most dominant, it is found between 7,200ft and 9,800ft. At higher elevations and in the southern Sierra Nevada, fuels are relatively more discontinuous than northern locations because the terrain is broken up by natural breaks such as rock outcrops, lava reefs, wet meadows, etc. Fuels may be more continuous at the northern end of the range, where this vegetation type is found at lower elevations.

Vegetation Description

*Abies magnifica* is dominant, contributing ~75% of stand cover. *Pinus monticola* contributes 20% of the cover. *P. contorta* can contribute up to 20% cover. *Tsuga mertensiana* can be locally important on some northern exposures. *Abies concolor* is generally absent (<5% cover). Vegetation often contains a considerable abundance of shrubs.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| ABMA | *Abies magnifica* | California red fir |
| PIMO3 | *Pinus monticola* | Western white pine |
| PICO | *Pinus contorta* | Lodgepole pine |
| TSME | *Tsuga mertensiana* | Mountain hemlock |

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

Disturbance Description

This BpS is primarily in fire regime group III, but because of slow fuel accumulation rates it is possible to have 35- to 150-yr-frequency surface fire in some classes (lower frequency for BpS as a whole). The discontinuous nature of the fuels limits extent of fires, and although fires may burn less often, they may burn at high severities. Larger and more frequent moderate-intensity fires occur, on average, every 60-70yrs. High-intensity crown fires are rare, occurring every few hundred years. Overall mean fire return interval is approximately 35-50yrs (Pitcher 1987; Taylor 2000; Bekker and Taylor 2001; Skinner 2000).

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 293 | 18 |  |  |
| Moderate (Mixed) | 315 | 16 |  |  |
| Low (Surface) | 78 | 66 |  |  |
| All Fires | 51 | 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

None

Adjacency or Identification Concerns

Mixes at lower elevation with red fir-white pine (R1RFWF). White fir begins to contribute significantly to overstory cover in these lower elevation mixes.

Distinguished from 10321 by the co-dominance of western white pine. Another aspect that differentiates 10321 from 10322 is the more frequent occurrence of rock outcrops and/or high rock content in the soil.

This BpS has been logged in certain areas and, therefore, not as much exists currently as existed historically (Provencher, pers. comm.).

Issues or Problems

The limitations of the LANDFIRE modeling process (limited use of time-since-disturbance, five boxes, and inability to model climate variability) prevent our representing some of the nuances of this system. As a result, replacement fire appears to be too short, but the overall fire regime and landscape proportions are representative.

Native Uncharacteristic Conditions

Comments

None

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 | B | B | B | B | B | B |
| Tree | 25-50 | D | D | D | D | E | E | E | E | E | E |
| Tree | >50 | D | D | D | D | E | 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 8 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIMO3 | Pinus monticola | Western white pine | Upper |
| PICO | Pinus contorta | Lodgepole pine | Upper |
| ABMA | Abies magnifica | California red fir | Upper |

Description

Regeneration of *Pinus monticola* and *P. contorta* from seed following a stand-replacing fire. *Abies magnifica* comes in over time. Shrub cover (e.g., *Arctostaphylos* spp., *Ceanothus velutinus*, *Chrysolepis sempervirens*) is an important component.

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

Class B 10 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ABMA | Abies magnifica | California red fir | Upper |
| PIMO3 | Pinus monticola | Western white pine | Upper |

Description

More than 40% cover of mid-mature *Abies magnifica*, with various amounts of *Pinus monticola*. Usually minor amounts of shrubs and herbs, although *Arctostaphylos* spp. or *Chrysolepis sempervirens* can contribute to a dense understory.

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

Class C 20 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ABMA | Abies magnifica | California red fir | Upper |
| PIMO3 | Pinus monticola | Western white pine | Upper |

Description

Less than 40% cover of mid-mature *Abies magnifica*, with various amounts of *Pinus monticola*. Usually minor amounts of shrubs and herbs, although *Arctostaphylos* spp. or *Chrysolepis sempervirens* can contribute to a dense understory.

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

Class D 45 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ABMA | Abies magnifica | California red fir | Upper |
| PIMO3 | Pinus monticola | Western white pine | Upper |
| PICO | Pinus contorta | Lodgepole pine | Upper |
| TSME | Tsuga mertensiana | Mountain hemlock | Upper |

Description

Less than 40% cover of mature *Abies magnifica* and *Pinus monticola*, with a shrub cover of *Arctostaphylos nevedensis* and *Chrysolepis sempervirens*.

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

Class E 17 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ABMA | Abies magnifica | California red fir | Upper |
| PIMO3 | Pinus monticola | Western white pine | Upper |
| PICO | Pinus contorta | Lodgepole pine | Upper |
| TSME | Tsuga mertensiana | Mountain hemlock | Upper |

Description

More than 40% cover of mature *Abies magnifica* and *Pinus monticola*, with some *P. contorta* occurring in the understory.

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

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:CLS | 54 |
| Mid1:OPN | 55 | Late1:OPN | 159 |
| Mid1:CLS | 55 | Late1:CLS | 139 |
| Late1:CLS | 140 | Late1:CLS | 999 |
| Late1:OPN | 160 | Late1: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 | Mid1:OPN | 0.015 | 67 | Yes | 0 |
| Alternative Succession | Early1:ALL | Mid1:CLS | 0.015 | 67 | Yes | 0 |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.0167 | 60 | Yes | 0 |
| Alternative Succession | Mid1:OPN | Mid1:CLS | 1 | 1 | Yes | 100 |
| Mixed Fire | Mid1:OPN | Early1:ALL | 0.0005 | 2000 | Yes | 0 |
| Insects or Disease | Mid1:OPN | Mid1:OPN | 0.002 | 500 | No | 0 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.002 | 500 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.0025 | 400 | No | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.015 | 67 | No | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.0018 | 556 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Early1:ALL | 0.0018 | 556 | Yes | 0 |
| Surface Fire | Mid1:CLS | Mid1:OPN | 0.0035 | 286 | Yes | 0 |
| Surface Fire | Mid1:CLS | Mid1:CLS | 0.0035 | 286 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.0035 | 286 | Yes | 0 |
| Insects or Disease | Mid1:CLS | Mid1:OPN | 0.008 | 125 | Yes | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 1 | 1 | Yes | 100 |
| Mixed Fire | Late1:OPN | Early1:ALL | 0.0005 | 2000 | Yes | 0 |
| Insects or Disease | Late1:OPN | Late1:OPN | 0.001 | 1000 | No | 0 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.0015 | 667 | Yes | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.003 | 333 | No | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.018 | 56 | No | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.0017 | 588 | Yes | 0 |
| Mixed Fire | Late1:CLS | Early1:ALL | 0.0017 | 588 | Yes | 0 |
| Surface Fire | Late1:CLS | Late1:OPN | 0.0034 | 294 | Yes | 0 |
| Surface Fire | Late1:CLS | Late1:CLS | 0.0034 | 294 | No | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.0034 | 294 | Yes | 0 |
| Insects or Disease | Late1:CLS | Late1:OPN | 0.004 | 250 | Yes | 0 |

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