10260

Madrean Upper Montane Conifer-Oak Forest and Woodland

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
| Mike Babler | mbabler@tnc.org | Guy McPherson | grm@ag.arizona.edu |
| None | None | None | None |
| None | None | None | None |

Vegetation Type

Forest and Woodland

Map Zone

15

Geographic Range

Arizona, New Mexico. This ecological system occurs at the upper elevations in the Sierra Madre Occidental and Sierra Madre Orientale.

Biophysical Site Description

Restricted to northern and eastern aspects at high elevations (1,980-2,440m) in the Sky Islands (Chiricahua, Huachuca, Pinaleno, Santa Catalina, and Santa Rita mountains) and along the Nantanes Rim.

Vegetation Description

The vegetation is characterized by large- and small-patch forests and woodlands dominated by *Pseudotsuga menziesii*, *Abies coahuilensis*, and *Abies concolor*, and Madrean oaks such as *Quercus hypoleucoides* and *Quercus rugosa*.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PSME | *Pseudotsuga menziesii* | Douglas-fir |
| ABCO | *Abies concolor* | White fir |
| QUHY | *Quercus hypoleucoides* | Silverleaf oak |
| QURU4 | *Quercus rugosa* | Netleaf oak |

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

Disturbance Description

Data on fire regimes are limited. There is much uncertainty regarding fire frequency and intensity. Studies indicate significant site-to-site variability. Seasonality of fire is generally accepted as May-July. The mixed-conifer zones in the montane forest in the Madrean borderlands have a mixed fire regime. It is further stated that the mixed-conifer forests of southern Arizona and New Mexico have an understory fire regime (FEIS). In general, higher elevation forests had longer fire intervals than lower elevation forests in this geographic area, but it appears fire interval may be significantly impacted by fire in adjacent area. Mt. Graham is an example.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 309 | 3 |  |  |
| Moderate (Mixed) | 63 | 16 |  |  |
| Low (Surface) | 13 | 81 | 1 | 50 |
| All Fires | 10 | 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

Large patch. Patches of various sizes are common. Topography plays a significant role in patch size and distribution.

Adjacency or Identification Concerns

Issues or Problems

Interactions between grass fire, forest fire, and non-native grazing is not well known. High-elevation forest in Sierra de Los Ajos is dominated by shade-intolerant species compared to Animas Mountains in southern New Mexico (McPherson 2001). This probably is related to recurrent surface fires south of the border. Livestock grazing and consequent fire suppression in the United States likely have allowed fire-intolerant, shade-tolerant species to “fill in” the understory.

Native Uncharacteristic Conditions

Comments

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 | C | C | C | B | B | B | B | B | B | B |
| Tree | 10-25 | D | D | D | E | E | E | E | E | E | E |
| Tree | 25-50 | D | D | D | E | E | E | E | E | E | E |
| Tree | >50 | D | D | D | E | 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 12 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PSME | Pseudotsuga menziesii | Douglas-fir | All |
| ABCO | Abies concolor | White fir | All |
| QUHY | Quercus hypoleucoides | Silverleaf oak | All |
| QURU4 | Quercus rugosa | Netleaf oak | All |

Description

Tree seedlings, with grasses and forbs.

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

Class B 8 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PSME | Pseudotsuga menziesii | Douglas-fir | Upper |
| ABCO | Abies concolor | White fir | Upper |
| QUHY | Quercus hypoleucoides | Silverleaf oak | Upper |
| QURU4 | Quercus rugosa | Netleaf oak | Upper |

Description

Closed stand with trees, poles, saplings, grass, and scattered shrubs, 75-100% Douglas-fir and/or white fir.

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

Class C 14 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PSME | Pseudotsuga menziesii | Douglas-fir | Upper |
| ABCO | Abies concolor | White fir | Upper |
| QUHY | Quercus hypoleucoides | Silverleaf oak | Upper |
| QURU4 | Quercus rugosa | Netleaf oak | Upper |

Description

Open trees (poles, saplings) of Douglas-fir, with grass.

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

Class D 65 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PSME | Pseudotsuga menziesii | Douglas-fir | Upper |
| ABCO | Abies concolor | White fir | Upper |

Description

Open large tree/grass and scattered shrubs.

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

Class E 1 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PSME | Pseudotsuga menziesii | Douglas-fir | Upper |
| ABCO | Abies concolor | White fir | Upper |

Description

Closed large trees of Douglas-fir and white fir, and scattered shrubs. At this stage, oaks are absent from the overstory. They form scattered small trees in the mid story.

*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:CLS | 34 |
| Mid1:OPN | 35 | Late1:OPN | 104 |
| Mid1:CLS | 35 | Late1:CLS | 104 |
| Late1:OPN | 105 | Late1:OPN | 999 |
| Late1:CLS | 105 | 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 | 0.01 | 100 | Yes | 0 |
| Mixed Fire | Early1:ALL | Early1:ALL | 0.028 | 36 | No | 0 |
| Alternative Succession | Mid1:OPN | Late1:CLS | 1 | 1 | Yes | 68 |
| Wind or Weather or Stress | Mid1:OPN | Early1:ALL | 0.001 | 1000 | Yes | 0 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.0025 | 400 | Yes | 0 |
| Competition or Maintenance | Mid1:OPN | Mid1:OPN | 0.005 | 200 | No | 0 |
| Insects or Disease | Mid1:OPN | Mid1:OPN | 0.01 | 100 | No | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.013 | 77 | No | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.1 | 10 | No | 0 |
| Insects or Disease | Mid1:CLS | Mid1:OPN | 0.001 | 1000 | Yes | 0 |
| Wind or Weather or Stress | Mid1:CLS | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.028 | 36 | Yes | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 1 | 1 | Yes | 70 |
| Competition or Maintenance | Late1:OPN | Late1:OPN | 0.001 | 1000 | No | 0 |
| Wind or Weather or Stress | Late1:OPN | Early1:ALL | 0.001 | 1000 | Yes | 0 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.002 | 500 | Yes | 0 |
| Insects or Disease | Late1:OPN | Late1:OPN | 0.01 | 100 | No | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.013 | 77 | No | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.1 | 10 | No | 0 |
| Wind or Weather or Stress | Late1:CLS | Early1:ALL | 0.002 | 500 | Yes | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.002 | 500 | Yes | 0 |
| Competition or Maintenance | Late1:CLS | Late1:CLS | 0.01 | 100 | No | 0 |
| Insects or Disease | Late1:CLS | Late1:OPN | 0.0125 | 80 | Yes | 0 |
| Surface Fire | Late1:CLS | Late1:CLS | 0.02 | 50 | No | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.0222 | 45 | Yes | 0 |

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