10510

Southern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland

BpS Model/Description Version: Aug. 2020

|  |  |  |  |
| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
| Julia H. Richardson | jhrichardson@fs.fed.us | Louis Provencher | lprovencher@tnc.org |
| None | None | Steve Rust | srust@idfg.idaho.gov |
| None | None | Krista Wade | Krista\_Wade@blm.gov |

Vegetation Type

Forest and Woodland

Map Zones

18, 21

Geographic Range

Occurs throughout the southern Rockies, north and west into Utah, western Wyoming, and Idaho. Restricted to northern locations in map zone (MZ) 17. This Biophysical Setting (BpS) is restricted to dry, lower-elevation sites in the northwest portion of MZ18.

Biophysical Site Description

This type is generally located just above sagebrush ecosystems. These are mixed-conifer forests occurring on all aspects at elevations ranging from 1,200-3,300m (4,000-11,000ft). Rainfall averages <75cm (29in) per year, 40-60cm (16-24in) with summer "monsoons" during the growing season contributing substantial moisture in the eastern Great Basin. The composition and structure of overstory is dependent upon the temperature and moisture relationships of the site and the successional status of the occurrence. At lower elevations, this system occurs on north and east aspects. At higher elevations, all aspects may be represented.

Vegetation Description

*Abies concolor* with *Pseudotsuga menziesii* are most frequent; *Pinus ponderosa* is incidental but present more frequently in MZ18 (northwest area). *Pinus flexilis* is common in Nevada. *Pseudotsuga menziesii* forests occupy drier sites, mostly in the northeastern corner of MZ17. *Abies concolor*-dominated forests occupy cooler sites, such as upper slopes at higher elevations, canyon side slopes, ridge tops, and north- and east-facing slopes, which burn somewhat infrequently.

In MZ18, most occurrences of this system are dominated by a mix of *Pseudotsuga mensiesii* and *Pinus ponderosa* with lesser amounts of *Abies grandis*. Other typically seral species include *Pinus contorta*, *Pinus monticola*, and *Larix occidentalis*. *Picea engelmanii* and *Taxus brevifolia* become increasingly common toward the eastern edge of the range: *Tsuga heterophylla* and *Thuja plicata* may be associated on more mesic sites. *Abies grandis* (a fire-sensitive, shade-tolerant species) included on sites once dominated by *Pseudotsuga mensiesii* and *Pinus ponderosa*, which were formerly maintained by wildland fire. There are a number of cold-deciduous shrub and graminoid species common, including *Arctostaphylos uva-ursi*, *Mahonia repens*, *Paxistima myrsinites*, *Symphoricarpos oreophilus*, *Jamesia americana*, *Quercus gambelii*, *Festuca arizonica*, *Symphoricarpos oreophilus*, and *Ceanothus*.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| ABCO | *Abies concolor* | White fir |
| PIFL2 | *Pinus flexilis* | Limber pine |
| CAGA3 | *Carex garberi* | Elk sedge |
| CARU | *Calamagrostis rubescens* | Pinegrass |
| PSEUD7 | *Pseudotsuga* | Douglas-fir |
| PICO | *Pinus contorta* | Lodgepole pine |
| PIPO | *Pinus ponderosa* | Ponderosa pine |

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

Disturbance Description

Disturbance regime described here is for Douglas-fir. Fire regime is typically dominated by frequent low- and mixed-severity fires, but some portions of these sites are transition zones to fire regimes that are characterized by high-frequency, high-severity fires or moderate-frequency, low- and mixed-severity fires. Frequent surface and mixed-severity fires were the common fire regime characteristics. Surface fire intervals ranged from 10-50yrs, and replacement-severity occurred at intervals of 150-400yrs+ (Crane 1986; Barrett 1988; Bradley 1992a and 1992b; Brown 1994; Morgan et al. 1996). Mixed-severity fires were assumed to have an intermediate fire return interval of 45-75yrs on average. Stand-replacement fires were generally restricted to the closed canopy forest and the stand initiation conditions.

The high-frequency, low- and mixed-severity fire regime characteristics were facilitated by understory vegetation dominated by fine fuel (grasses, sedges, and forbs), landscape position, and adjacency to other frequent fire BpSs. Much of the forest structure was open canopy overstory that resulted in an understory dominated by healthy and vigorous plants (grasses, sedges, and forbs) and generally continuous fine fuel layer. This fine fuel facilitated fire spread and thinning of the conifer or aspen seedlings (thus promoting aspen suckering).

Other disturbances include insect outbreaks, disease, drought, and wind and ice damage. Competition among trees was also a factor that increasingly slowed successional dynamics in more closed stands. Fire was by far the dominant disturbance agent.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 90 | 12 |  |  |
| Moderate (Mixed) | 77 | 14 |  |  |
| Low (Surface) | 14 | 74 | 10 | 50 |
| All Fires | 11 | 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 BpS occurs in patches ranging from 1,000-10,000s of acres in many western locations; however, in MZs 12 and 17, patch size may be much smaller (<100ac).

Adjacency or Identification Concerns

The BpS may be too small to be mappable in MZ18 and should probably be included in BpS 1052 (Rocky Mountain Mesic Montane Mixed Conifer Forest and Woodland) due to the dominance of white fire and limber pine in the Great Basin.

If aspen is present in large patches or if conifers are not coming in after ~30yrs, the BpS is probably misclassified, and one of the pure aspen types should be examined (BpS 1011 Rocky Mountain Aspen Forest and Woodland or BpS 1061 Intermountain Basins Aspen-Mixed Conifer Forest and Woodland). Sites with a larger grand fir component and more mesic sites might be better classified as BpS 1052 as this system has less frequent fire due to cooler moister conditions.

BpS is often transitional between non-forested areas or between *Pinus ponderosa* woodlands (at lower elevations) and spruce-fir at higher elevations.

Issues or Problems

Douglas-fir is rare to absent in Nevada and the west desert of Utah. The current model was clearly developed for dry Douglas-fir forests. It needs to be determined whether forests dominated by limber pine and white fir will exhibit the same fire regimes.

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 | B | B | B | B | B | B | B |
| 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 22 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| CARU | Calamagrostis rubescens | Pinegrass | Low-Mid |
| CAGA3 | Carex garberi | Elk sedge | Low-Mid |
| PSME | Pseudotsuga menziesii | Douglas-fir | Upper |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |

Description

Grass/forb/shrub/tree seedlings.

*Maximum Tree Size Class*  
Seedling <4.5ft

Class B 7 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PSEUD7 | Pseudotsuga | Douglas-fir | Upper |
| ABCO | Abies concolor | White fir | Upper |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| PICO | Pinus contorta | Lodgepole pine | Upper |

Description

Closed stand with trees, poles, saplings, grass, and scattered shrub, 75-100% PIPO, PSME, white fir, and limber pine.

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

Class C 12 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| PSEUD7 | Pseudotsuga | Douglas-fir | Upper |
| PIFL2 | Pinus flexilis | Limber pine | Upper |
| ABCO | Abies concolor | White fir | Upper |

Description

Open trees (poles and saplings) of Douglas-fir (if present in the area) and occasional ponderosa pine with grass and scattered shrubs.

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

Class D 58 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| PSEUD7 | Pseudotsuga | Douglas-fir | Upper |
| PIFL2 | Pinus flexilis | Limber pine | Upper |
| ABCO | Abies concolor | White fir | Upper |

Description

Open large tree/grass and scattered shrubs; Douglas-fir with occasional ponderosa pine.

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

Class E 1 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ABCO | Abies concolor | White fir | Upper |
| PIFL2 | Pinus flexilis | Limber pine | Upper |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| PSEUD7 | Pseudotsuga | Douglas-fir | Upper |

Description

Closed large trees of Douglas-fir, white fir, limber pine, and occasional lodgepole pine, scattered shrubs.

*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** |
| Mixed Fire | Early1:ALL | Early1:ALL | 0.01 | 100 | No | 0 |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.04 | 25 | Yes | 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 |
| Wind or Weather or Stress | Mid1:CLS | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.007 | 143 | Yes | 0 |
| Insects or Disease | Mid1:CLS | Mid1:OPN | 0.01 | 100 | Yes | 0 |
| Competition or Maintenance | Mid1:CLS | Mid1:CLS | 0.01 | 100 | No | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.0222 | 45 | 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 | 0.004 | 250 | Yes | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.007 | 143 | Yes | 0 |
| Competition or Maintenance | Late1:CLS | Late1:CLS | 0.01 | 100 | No | 0 |
| Insects or Disease | Late1:CLS | Mid1:OPN | 0.0125 | 80 | Yes | 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 |

References

Barrett, S.W. 1988. Fire Suppression effects on Forest Succession within a Central Idaho Wilderness. Western J. of Applied Forestry. 3(3):76-80.

Barrett, S.W. 1994. Fire Regimes on the Caribou National Forest, Southern Idaho. Final Report – Contract No. 53-02S2-3-05071. September 1994.

Barrett, S.W. 2004. Altered fire intervals and fire cycles in the northern Rockies. Fire Management Today 64(2): 25-29.

Barrett, S.W. 2004. Fire regimes in the northern Rockies. Fire Management Today 64(2): 32-38.

Bradley, A.F., W.C. Fische and N.V. Noste. 1992. Fire Ecology of the Forest Habitat Types of Eastern Idaho and Western Wyoming. Intermountain Research Station, Ogden UT 84401. GTR-INT-290.

Bradley, A.F., N.V. Noste, and W.C. Fischer. 1992. Fire Ecology of the Forests and Woodland in Utah. Intermountain Research Station, Ogden UT 84401. GTR-INT-287.

Brown, J.K., S.F. Arno, S.W. Barrett and J.P. Menakis. 1994. Comparing the Prescribed Natural Fire Program with Presettlement Fires in the Selway-Bitterroot Wilderness. Int. J. Wildland Fire 4(3): 157-168.

Crane M.F. and W.C. Fischer. 1986. Fire Ecology of the Forest habitat Types of Central Idaho. General Technical Report INT-218. USDA Forest Service Intermountain Research Station, Ogden, Utah. 85 pp.

Mason, R.R., D.W. Scott, M.D. Loewen and H.D. Paul. 1998. Recurrent outbreak of the Douglas-fir tussock moth in the Malheur National Forest: a case history. USDS Forest Service. Pacific Northwest Research Station. General Technical Report PNW-GTR-402. 14 pp.

Morgan, P., S.C. Bunting, A.E. Black, T. Merrill and S. Barrett. 1996. Fire Regimes in the Interior Columbia River Basin: Past and Present. Final Report For RJVA-INT-94913: Course-scale classification and mapping of disturbance regimes in the Columbia River Basin. Submitted to: Intermountain Fire Science Lab., Intermountain Research Station, Missoula, Montana, USDA Forest Service.

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

Steele, R., R.D. Pfister, R.A. Ryker and J.A. Kittams. 1981. Forest Habitat Types of Central Idaho. USDA For. Serv. Tech. Rep. INT-114. Intermt. For. And Range Exp. Stn., Ogden, Utah 8440. 138 pp.

Swetnam, T.W., B.E. Wickman, H.G. Paul, and C.H. Baisan. 1995. Historical patterns of western spruce budworem and Douglas-fir tussock moth outbreaks in the northern Blue Mountains, Oregon, since A.D. 1700. USDA Forest Service. Pacific Northwest Research Station. Research Paper PNW-RP-484. 27 pp.