

10520

## Southern Rocky Mountain Mesic Montane Mixed Conifer Forest and Woodland

BpS Model/Description Version: Aug. 2020

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

### Vegetation Type

Forest and Woodland

### Map Zone

18

### Geographic Range

Rocky Mountains west into the ranges of the Great Basin. Biophysical Setting (BpS) may be more common in eastern portions of map zones (MZs) 12, 17, and 18.

### Biophysical Site Description

Elevations range from 1,200-3,300m (4,000-11,000ft). Occurrences of this system are found on cooler and more mesic sites than Rocky Mountain Montane Dry-Mesic Mixed Conifer Forest and Woodland (1051). Such sites include lower and middle slopes of ravines; stream terraces; moist, concave topographic positions; and north- and east-facing slopes, which burn somewhat infrequently.

### Vegetation Description

*Abies concolor* is the most common canopy dominant typically co-occurring with *Picea engelmannii*, *Pinus flexilis*, and *Pinus longeava*. *Pseudotsuga menziesii* will be rare and restricted in northern Nevada and Utah. A number of cold-deciduous shrub species can occur, including snowberry, sticky currant, some willow, serviceberry, ceanothus, *Acer glabrum*, *Alnus incana*, *Betula occidentalis*, *Cornus sericea*, *Jamesia americana*, *Physocarpus malvaceus*, *Vaccinium membranaceum*, and *Vaccinium myrtillus*. Herbaceous species include *Bromus ciliatus*, *Carex geyeri*, *Carex rossii*, *Carex siccata*, *Muhlenbergia virescens*, *Pseudoroegneria spicata*, *Erigeron eximius*, *Fragaria virginiana*, *Luzula parviflora*, *Osmorhiza berteroi*, *Packera cardamine*, *Thalictrum occidentale*, and *Thalictrum fendleri*.

In MZ18, sites are dominated by PSME and ABLA in drainages or by ABGR in the northwestern portions of the MZ.

### BpS Dominant and Indicator Species

| Symbol | Scientific Name         | Common Name    |
|--------|-------------------------|----------------|
| ABCO   | <i>Abies concolor</i>   | White fir      |
| PIFL2  | <i>Pinus flexilis</i>   | Limber pine    |
| ABLA   | <i>Abies lasiocarpa</i> | Subalpine fir  |
| PICO   | <i>Pinus contorta</i>   | Lodgepole pine |

|      |                              |                         |
|------|------------------------------|-------------------------|
| PSME | <i>Pseudotsuga menziesii</i> | Douglas-fir             |
| AGBR | <i>Agastache breviflora</i>  | Transpecos giant hyssop |

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

### Disturbance Description

Naturally occurring fires are of variable return intervals and are mostly light, erratic, and infrequent due to the cool, moist conditions. These ecological systems are characterized by a moderate-frequency, low- and mixed-severity fire regime. Some portions of these sites are transition zones to high-frequency, low- and mixed-severity fire regimes or moderate-frequency, high-severity fire regimes. This vegetation is a transition between the frequent surface and mixed-severity fires and the more stand-replacement regimes common in high-elevation fir and spruce ecosystems.

Surface fire and mixed-severity fire intervals were ~35-50yrs (Brown et al. 1994). Stand-replacement fires occurred at intervals of 120-400yrs+ (Crane 1986; Barrett 1988; Bradley 1992a and 1992b, Brown et al. 1994; Morgan et al. 1996). Likelihood of stand-replacement fires increased with canopy closure and fuel ladders caused by grand fir, PSME, and white fir growth; however, ground fires acted as replacement fires during early stand development.

Other disturbances included insect, disease, drought, and wind and ice damage. Fire was by far the dominant disturbance agent.

### Fire Frequency

| Severity         | Avg FI | Percent of All Fires | Min FI | Max FI |
|------------------|--------|----------------------|--------|--------|
| Replacement      | 184    | 18                   | 120    | 400    |
| Moderate (Mixed) | 89     | 37                   |        |        |
| Low (Surface)    | 72     | 45                   |        |        |
| All Fires        | 33     | 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 100-1,000s of acres.

### Adjacency or Identification Concerns

This ecological system is often transitional between high-frequency, low-severity fire regimes and low-frequency, high-severity regimes at higher elevations. Sites are dry/steep montane with a variety of aspects (often northerly) and soil conditions. In MZs 12 and 17, BpS 1051 is uncommon and should be included in BpS 1052.

This system includes mixed-conifer/*Populus tremuloides* (aspen) stands. If aspen is present and soils show a clear organic layer, BpS 1061 Intermountain Basins Aspen-Mixed Conifer Forest and Woodland should be used.

### Issues or Problems

### Native Uncharacteristic Conditions

## Comments

BpS 1052 (MZs 12 and 17) was adopted with minor revisions for MZ18 (K. Wade-Gollnick 19 May 2005). Specifically, modifications included 1) addition of PSME ABGR as dominants and 2) addition of additional shrub species in vegetation description.

This model was adopted with minor edits on species composition from the MZ16 version created by Mark Loewen (mloewen@fs.fed.us), Doug Page (doug\_page@blm.gov), and Beth Corbin (ecorbin@fs.fed.us). Further review is needed to make sure this type is appropriately described for MZs 12 and 17 -- especially species occurrence.

## 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     | C     | B     | B     | B     | B     | B     | B      |
| 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

|                |           |                                             |
|----------------|-----------|---------------------------------------------|
| <b>Class A</b> | <b>14</b> | <b>Early Development 1 - All Structures</b> |
|----------------|-----------|---------------------------------------------|

### Indicator Species

| Symbol | Scientific Name | Common Name    | Canopy Position |
|--------|-----------------|----------------|-----------------|
| ABCO   | Abies concolor  | White fir      | Upper           |
| PICO   | Pinus contorta  | Lodgepole pine | Upper           |

### Description

Tree seedling-shrub-grass-forb.

### Maximum Tree Size Class

Seedling <4.5ft

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|                |           |                                   |
|----------------|-----------|-----------------------------------|
| <b>Class B</b> | <b>28</b> | <b>Mid Development 1 - Closed</b> |
|----------------|-----------|-----------------------------------|

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Indicator Species

| Symbol | Scientific Name | Common Name    | Canopy Position |
|--------|-----------------|----------------|-----------------|
| ABCO   | Abies concolor  | White fir      | Upper           |
| PICO   | Pinus contorta  | Lodgepole pine | Upper           |
| PIFL2  | Pinus flexilis  | Limber pine    | Upper           |

Description

Closed trees, sapling, large poles, grass, and scattered shrub; 75 to 100% white fir, some lodgepole pine, and spruces at higher elevations.

Maximum Tree Size Class

Medium 9-21" DBH

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|                |           |                                 |
|----------------|-----------|---------------------------------|
| <b>Class C</b> | <b>29</b> | <b>Mid Development 1 - Open</b> |
|----------------|-----------|---------------------------------|

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Indicator Species

| Symbol | Scientific Name  | Common Name    | Canopy Position |
|--------|------------------|----------------|-----------------|
| ABCO   | Abies concolor   | White fir      | Upper           |
| PICO   | Pinus contorta   | Lodgepole pine | Upper           |
| ABLA   | Abies lasiocarpa | Subalpine fir  | Upper           |

Description

Open pole-sapling/grass and scattered shrubs; maybe 90% white fir.

Maximum Tree Size Class

Medium 9-21" DBH

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|                |           |                                  |
|----------------|-----------|----------------------------------|
| <b>Class D</b> | <b>18</b> | <b>Late Development 1 - Open</b> |
|----------------|-----------|----------------------------------|

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Indicator Species

| Symbol | Scientific Name  | Common Name   | Canopy Position |
|--------|------------------|---------------|-----------------|
| ABCO   | Abies concolor   | White fir     | Upper           |
| PIFL2  | Pinus flexilis   | Limber pine   | Upper           |
| ABLA   | Abies lasiocarpa | Subalpine fir | Mid-Upper       |

Description

Open large tree/grass and scattered shrubs; potentially 90% white fir.

Maximum Tree Size Class

Large 21-33" DBH

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|                |           |                                    |
|----------------|-----------|------------------------------------|
| <b>Class E</b> | <b>11</b> | <b>Late Development 1 - Closed</b> |
|----------------|-----------|------------------------------------|

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Indicator Species

| Symbol | Scientific Name  | Common Name   | Canopy Position |
|--------|------------------|---------------|-----------------|
| ABCO   | Abies concolor   | White fir     | Upper           |
| ABLA   | Abies lasiocarpa | Subalpine fir | Upper           |
| PIFL2  | Pinus flexilis   | Limber pine   | Upper           |

### Description

Closed medium to large trees, scattered shrubs; 60-100% white fir.

### 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    | 29            |
| Mid1:CLS   | 30             | Late1:CLS   | 99            |
| Mid1:OPN   | 31             | Late1:OPN   | 99            |
| Late1:OPN  | 100            | Late1:OPN   | 999           |
| Late1:CLS  | 100            | 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 |
|---------------------------|-----------------------|---------------------|-------------------------|-----------------------|-----------------------------------------------------|------------------------------|
| Wind or Weather or Stress | Early1:ALL            | Early1:ALL          | 0.007                   | 143                   | No                                                  | 0                            |
| Replacement Fire          | Early1:ALL            | Early1:ALL          | 0.008                   | 125                   | Yes                                                 | 0                            |
| Mixed Fire                | Early1:ALL            | Early1:ALL          | 0.02                    | 50                    | No                                                  | 0                            |
| Alternative Succession    | Mid1:OPN              | Mid1:CLS            | 1                       | 1                     | Yes                                                 | 35                           |
| Wind or Weather or Stress | Mid1:OPN              | Mid1:OPN            | 0.001                   | 1000                  | No                                                  | 0                            |
| Replacement Fire          | Mid1:OPN              | Early1:ALL          | 0.0025                  | 400                   | Yes                                                 | 0                            |
| Insects or Disease        | Mid1:OPN              | Mid1:OPN            | 0.01                    | 100                   | No                                                  | 0                            |
| Surface Fire              | Mid1:OPN              | Mid1:OPN            | 0.025                   | 40                    | No                                                  | 0                            |
| Wind or Weather or Stress | Mid1:CLS              | Mid1:OPN            | 0.005                   | 200                   | Yes                                                 | 0                            |
| Replacement Fire          | Mid1:CLS              | Early1:ALL          | 0.008                   | 125                   | Yes                                                 | 0                            |
| Insects or Disease        | Mid1:CLS              | Mid1:CLS            | 0.02                    | 50                    | No                                                  | 0                            |
| Mixed Fire                | Mid1:CLS              | Mid1:OPN            | 0.021                   | 48                    | Yes                                                 | 0                            |
| Alternative Succession    | Late1:OPN             | Late1:CLS           | 1                       | 1                     | Yes                                                 | 35                           |

|                           |           |            |        |      |     |   |
|---------------------------|-----------|------------|--------|------|-----|---|
| Wind or Weather or Stress | Late1:OPN | Late1:OPN  | 0.001  | 1000 | No  | 0 |
| Replacement Fire          | Late1:OPN | Early1:ALL | 0.0025 | 400  | Yes | 0 |
| Insects or Disease        | Late1:OPN | Late1:OPN  | 0.01   | 100  | No  | 0 |
| Surface Fire              | Late1:OPN | Late1:OPN  | 0.025  | 40   | No  | 0 |
| Wind or Weather or Stress | Late1:CLS | Late1:OPN  | 0.005  | 200  | Yes | 0 |
| Insects or Disease        | Late1:CLS | Mid1:OPN   | 0.008  | 125  | Yes | 0 |
| Replacement Fire          | Late1:CLS | Early1:ALL | 0.008  | 125  | Yes | 0 |
| Insects or Disease        | Late1:CLS | Late1:OPN  | 0.012  | 83   | Yes | 0 |
| Mixed Fire                | Late1:CLS | Late1:OPN  | 0.021  | 48   | Yes | 0 |
| Surface Fire              | Late1:CLS | Late1:CLS  | 0.021  | 48   | No  | 0 |

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