

**10610**

## **Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland**

BpS Model/Description Version: Aug. 2020

| <b>Modelers</b>     |                        | <b>Reviewers</b> |      |
|---------------------|------------------------|------------------|------|
| Julia H. Richardson | jhrichardson@fs.fed.us | None             | None |
| Louis Provencher    | lprovencher@tnc.org    | None             | None |
| None                | None                   | None             | None |

### **Vegetation Type**

Forest and Woodland

### **Map Zones**

8, 9, 17

### **Geographic Range**

This ecological system occurs on montane slopes and plateaus in Utah, western Colorado, northern Arizona, eastern Nevada, southern Idaho, and western Wyoming. Elevations range from 1,700-2,800m (5,600-9,200ft).

### **Biophysical Site Description**

Occurrences are typically on gentle to steep slopes on any aspect, but are often found on clay-rich soils in intermontane valleys. Soils are derived from alluvium, colluvium, and residuum from a variety of parent materials, but most typically occur on sedimentary rocks.

### **Vegetation Description**

The tree canopy is composed of a mix of deciduous and coniferous species, co-dominated by *Populus tremuloides* and conifers, including *Abies concolor*, *Abies lasiocarpa*, *Picea engelmannii*, *Pinus flexilis*, and *Pinus ponderosa*. As the occurrences age, *Populus tremuloides* is slowly reduced until the conifer species become dominant. Common shrubs include *Amelanchier alnifolia*, *Prunus virginiana*, *Symphoricarpos oreophilus*, *Juniperus communis*, *Paxistima myrsinites*, *Rosa woodsii*, *Spiraea betulifolia*, *Symphoricarpos albus*, and *Mahonia repens*. Herbaceous species include *Bromus carinatus*, *Calamagrostis rubescens*, *Carex geyeri*, *Elymus glaucus*, *Poa* spp., *Achnatherum*, *Hesperostipa*, *Nassella*, and/or *Piptochaetium* spp. (= *Stipa* spp.), *Achillea millefolium*, *Arnica cordifolia*, *Asteraceae* spp., *Erigeron* spp., *Galium boreale*, *Geranium viscosissimum*, *Lathyrus* spp., *Lupinus argenteus*, *Mertensia arizonica*, *Mertensia lanceolata*, *Maianthemum stellatum*, *Osmorhiza berteroi* (= *Osmorhiza chilensis*), and *Thalictrum fendleri*.

### **BpS Dominant and Indicator Species**

| <b>Symbol</b> | <b>Scientific Name</b>     | <b>Common Name</b> |
|---------------|----------------------------|--------------------|
| POTR5         | <i>Populus tremuloides</i> | Quaking aspen      |
| ABCO          | <i>Abies concolor</i>      | White fir          |
| ABLA          | <i>Abies lasiocarpa</i>    | Subalpine fir      |
| PIFL2         | <i>Pinus flexilis</i>      | Limber pine        |

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

### **Disturbance Description**

This is a strongly fire-adapted community, more so than biophysical setting (BpS) 1011 (Rocky Mountain Aspen Forest and Woodland), with fire return intervals (FRIs) varying for mixed-severity fire with the encroachment of conifers. It is important to understand that aspen is considered a fireproof vegetation type that does not burn during the normal lightning season, yet evidence of fire scars and historical studies show that native burning was the only source of fire that occurred predominantly during the spring and fall. BpS 1061 has elements of Fire Regime Groups II, III, and IV. Mean FRI for replacement fire is ~60yrs on average in all development classes, except during Early Development, when no fire is present (as for stable aspen, BpS 1011). Mixed severity is less common in stands <80yrs and increases in stands >80yrs with conifer encroachment.

Under pre-settlement conditions, disease and insect mortality did not appear to have major impacts; however, older aspen stands would be susceptible to outbreaks. We assumed that 20% of outbreaks resulted in heavy insect/disease stand-replacing events, whereas 80% of outbreaks would thin older trees >40 yrs.

Some sites are prone to snowslides, mudslides, and rotational slumping. Flooding may also operate in these systems.

### Fire Frequency

| Severity         | Avg FI | Percent of All Fires | Min FI | Max FI |
|------------------|--------|----------------------|--------|--------|
| Replacement      | 68     | 39                   | 50     | 300    |
| Moderate (Mixed) | 44     | 61                   | 10     | 50     |
| Low (Surface)    |        |                      |        |        |
| All Fires        | 27     | 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 type occurs in a landscape mosaic from moderate (10ac) to large (1,000ac) patches.

### Adjacency or Identification Concerns

If conifers are not present in the landscape or represent <25% relative cover, the stable aspen model (BpS 1011, Rocky Mountain Aspen Forest and Woodland) should be considered, especially in western and central Nevada.

This type is more highly threatened by conifer replacement than stable aspen. Most occurrences currently represent a late-seral stage of aspen changing to a pure conifer occurrence. Nearly 100yrs of fire suppression and livestock grazing have converted much of the pure aspen occurrences to the present-day aspen-conifer forest and woodland ecological system.

Under current conditions, herbivory can significantly affect stand succession. Kay (1997, 2001a-c) found the impacts of burning on aspen stands were overshadowed by the impacts of herbivory. In the reference state, the density of ungulates was low due to efficient Native American hunting, so the impact of ungulates was low. Herbivory was therefore not included in the model.

### Issues or Problems

East of the Great Basin, Baker (1925) studied closely the pre-settlement period for aspen and noted fire scars on older trees. Bartos and Campbell (1998) support these findings. Results from

[illegible]

|      |       |   |   |   |   |   |   |   |   |   |   |
|------|-------|---|---|---|---|---|---|---|---|---|---|
| Tree | 0-5   | A | A | A | A | A | A | A | A | A | A |
| Tree | 5-10  | D | D | D | D | B | B | B | B | B | B |
| Tree | 10-25 | D | D | D | D | C | C | C | C | C | C |
| 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 13

### Early Development 1 - All Structures

Upper Layer Lifeform: Tree

#### *Indicator Species*

| Symbol | Scientific Name           | Common Name        | Canopy Position |
|--------|---------------------------|--------------------|-----------------|
| POTR5  | Populus tremuloides       | Quaking aspen      | Upper           |
| SYOR2  | Symphoricarpos oreophilus | Mountain snowberry | Middle          |
| RIBES  | Ribes                     | Currant            | Middle          |

#### *Description*

Grass/forb and aspen suckers <6ft tall. Fire is absent.

### Class B 39

### Mid Development 1 - Closed

Upper Layer Lifeform: Tree

#### *Indicator Species*

| Symbol | Scientific Name           | Common Name        | Canopy Position |
|--------|---------------------------|--------------------|-----------------|
| POTR5  | Populus tremuloides       | Quaking aspen      | Upper           |
| SYOR2  | Symphoricarpos oreophilus | Mountain snowberry | Low-Mid         |
| RIBES  | Ribes                     | Currant            | Low-Mid         |

#### *Description*

Aspen saplings >6ft tall dominate. Canopy cover is highly variable. Replacement fire occurs. Mixed-severity fire consumes litter and woody debris, and may stimulate suckering.

### Class C 36

### Mid Development 2 - Closed

Upper Layer Lifeform: Tree

#### *Indicator Species*

| Symbol | Scientific Name | Common Name | Canopy Position |
|--------|-----------------|-------------|-----------------|
|--------|-----------------|-------------|-----------------|

|       |                           |                    |        |
|-------|---------------------------|--------------------|--------|
| POTR5 | Populus tremuloides       | Quaking aspen      | Upper  |
| SYOR2 | Symphoricarpos oreophilus | Mountain snowberry | Middle |
| RIBES | Ribes                     | Currant            | Middle |

Description

Aspen trees dominate. Canopy cover is highly variable. Conifer seedlings and saplings may be present.

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**Class D      11                                      Late Development 1 - Open**

Upper Layer Lifeform: Tree

Indicator Species

| Symbol | Scientific Name     | Common Name   | Canopy Position |
|--------|---------------------|---------------|-----------------|
| POTR5  | Populus tremuloides | Quaking aspen | Upper           |
| ABCO   | Abies concolor      | White fir     | Mid-Upper       |
| ABLA   | Abies lasiocarpa    | Subalpine fir | Mid-Upper       |
| PIFL2  | Pinus flexilis      | Limber pine   | Mid-Upper       |

Description

Aspen dominate. Conifers that escape fire, or are the more fire-resistant species, are present in the understory and will likely cause the progressive suppression of aspen. In the absence of any fire, the stand will eventually become closed and dominated by conifers.

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**Class E      1                                      Late Development 1 - Closed**

Upper Layer Lifeform: Tree

Indicator Species

| Symbol | Scientific Name     | Common Name   | Canopy Position |
|--------|---------------------|---------------|-----------------|
| ABLA   | Abies lasiocarpa    | Subalpine fir | Upper           |
| ABCO   | Abies concolor      | White fir     | Upper           |
| POTR5  | Populus tremuloides | Quaking aspen | Mid-Upper       |
| PIFL2  | Pinus flexilis      | Limber pine   | Upper           |

Description

Conifers dominate. Uneven sizes of mixed conifer; main overstory is conifers.

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**Model Parameters**

**Deterministic Transitions**

| <b>From Class</b> | <b>Begins at (yr)</b> | <b>Succeeds to</b> | <b>After (years)</b> |
|-------------------|-----------------------|--------------------|----------------------|
| Early1:ALL        | 0                     | Mid1:CLS           | 9                    |
| Mid1:CLS          | 10                    | Mid2:CLS           | 39                   |
| Mid2:CLS          | 40                    | Late1:OPN          | 79                   |
| Late1:OPN         | 80                    | Late1:OPN          | 999                  |
| Late1:CLS         | 100                   | Late1:CLS          | 999                  |

### **Probabilistic Transitions**

| <b>Disturbance Type</b> | <b>Disturbance occurs In</b> | <b>Moves vegetation to</b> | <b>Disturbance Probability</b> | <b>Return Interval (yrs)</b> | <b>Reset Age to New Class Start Age After Disturbance?</b> | <b>Years Since Last Disturbance</b> |
|-------------------------|------------------------------|----------------------------|--------------------------------|------------------------------|------------------------------------------------------------|-------------------------------------|
| Replacement Fire        | Mid1:CLS                     | Early1:ALL                 | 0.017                          | 59                           | Yes                                                        | 0                                   |
| Mixed Fire              | Mid1:CLS                     | Mid1:CLS                   | 0.025                          | 40                           | No                                                         | 0                                   |
| Insects or Disease      | Mid2:CLS                     | Early1:ALL                 | 0.001                          | 1000                         | Yes                                                        | 0                                   |
| Insects or Disease      | Mid2:CLS                     | Mid1:CLS                   | 0.004                          | 250                          | Yes                                                        | 0                                   |
| Replacement Fire        | Mid2:CLS                     | Early1:ALL                 | 0.017                          | 59                           | Yes                                                        | 0                                   |
| Mixed Fire              | Mid2:CLS                     | Mid2:CLS                   | 0.025                          | 40                           | No                                                         | 0                                   |
| Alternative Succession  | Late1:OPN                    | Late1:CLS                  | 1                              | 1                            | Yes                                                        | 100                                 |
| Replacement Fire        | Late1:OPN                    | Early1:ALL                 | 0.017                          | 59                           | Yes                                                        | 0                                   |
| Mixed Fire              | Late1:OPN                    | Mid2:CLS                   | 0.0333                         | 30                           | Yes                                                        | 0                                   |
| Insects or Disease      | Late1:CLS                    | Late1:OPN                  | 0.003                          | 333                          | Yes                                                        | 0                                   |
| Replacement Fire        | Late1:CLS                    | Early1:ALL                 | 0.017                          | 59                           | Yes                                                        | 0                                   |
| Mixed Fire              | Late1:CLS                    | Late1:OPN                  | 0.0333                         | 30                           | Yes                                                        | 0                                   |

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