10610

Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
| Steve Barrett | sbarrett@mtdig.net | Kathy Roche | kroche@fs.fed.us |
| None | None | None | None |
| None | None | None | None |

Vegetation Type

Forest and Woodland

Map Zones

20, 29

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).

This biophysical setting (BpS) is thought to be very limited in extent in map zone (MZ) 20—less, even, than pure aspen.

For MZ29, this BpS is thought to occur in the Bighorns and a few places in central and southern MZ29, and the Laramie Range.

Biophysical Site Description

Description taken from MZ18: Occurrences are typically on gentle to steep slopes on any aspect, but are often found on clay-rich soils in inter-montane valleys. Soils are derived from alluvium, colluvium, and residuum from a variety of parent materials, but most typically occur on sedimentary rocks. In the northern portion of MZ18, this system occurs throughout the area on north, northeast, and southwest aspects with shallow soils.

Vegetation Description

The tree canopy is composed of a mix of deciduous and coniferous species. The BpS is a matrix of even-age *Populus tremuloides* patches interspersed among conifer stands including *Abies lasiocarpa*, *Picea engelmannii*, *Pinus flexilis*, *Juniperus occidentalis* (southwestern Idaho), and *Pseudotsuga menziesii*. As the occurrences age, *Populus tremuloides* is slowly reduced until the conifer species become dominant. Then, after fire, the aspen again become dominant for 60-120yrs.

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 nelsonii*; *Melica bulbosa*; and *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

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| POTR5 | *Populus tremuloides* | Quaking aspen |
| PIEN | *Picea engelmannii* | Engelmann spruce |
| ABLA | *Abies lasiocarpa* | Subalpine fir |
| PSME | *Pseudotsuga menziesii* | Douglas-fir |
| PIFL2 | *Pinus flexilis* | Limber pine |
| PICO | *Pinus contorta* | Lodgepole 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 BpS 1011 (Rocky Mountains Aspen Woodland and Forest), with fire return intervals (FRIs) varying for mixed-severity fire with the encroachment of conifers. BpS 1061 has elements of Fire Regime Groups II, III, and IV. Replacement fire occurs but is absent during early development (as for stable aspen, BpS 1011) and has an FRI between 80yrs and 100yrs in the open condition. The FRI of mixed-severity fire could increase from stands <100yrs to stands >100yrs with conifer encroachment. Episodic drought and fire could maintain the mean FRI of 60-100yrs. As modeled, fire was split between mixed and replacement fire.

Because this type has a fairly short FRI compared to other aspen types, it should be noted that aspen can act as a tall shrub. Bradley et al. (1992) state that Loope and Gruell estimated a fire frequency of 25-100yrs for a Douglas-fir forest with seral aspen in Grand Teton National Park (p. 39). In the Fontenelle Creek, Wyoming, drainage, the mean fire-free interval was estimated to be 40yrs. Fires in this area burned in a mosaic pattern of severities, from stand-replacement to low fires that scarred but did not kill the relatively thin-bark lodgepole pine on the site (p. 46).

Aspen stands tend to remain dense throughout most of their life span, hence the open-stand description was not used unless it described conifer coverage during initial encroachment. Although not dependent upon disturbance to regenerate, aspen was adapted to a diverse array of disturbances.

Under pre-settlement conditions, disease and insect mortality did not appear to have major effects; 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 >40yrs. Older conifers (>100yrs) would also experience insect/disease outbreaks.

Some sites are prone to snowslides, mudslides, and rotational slumping. Flooding may also operate in these systems. Bracken fern (*Pteridium* *aquilinum*) can indicate unstable slopes.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 117 | 46 | 50 | 300 |
| Moderate (Mixed) | 101 | 54 | 10 | 125 |
| Low (Surface) |  |  |  |  |
| All Fires | 54 | 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 Woodland and Forest) should be considered. The aspen-mixed conifer in the Black Hills probably doesn’t belong in this BpS. If aspen is absent, refer to 1051 or 1052.

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.

Fire suppression has resulted in more conifers and later successional stages as uncharacteristic conditions.

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.

Issues or Problems

In the western Rocky Mountains, Baker (1925) studied closely the pre-settlement period for aspen and noted fire scars on older trees. Bartos and Campbell (1998) support these findings. We interpreted ground fires that scarred trees as mixed-severity fire that also promoted abundant suckering. In the presence of conifer fuel, these would be killed and aspen suckering promoted.

In previous models from the Rapid Assessment (e.g., R2ASMClw), experts and modelers expressed different views about the frequency of all fires, citing FRIs longer than those noted by Baker (1925). The FRIs used here are a compromise between longer FRIs proposed by reviewers and the maximum FRI of Baker (1925).

Native Uncharacteristic Conditions

Comments

MZs 20 and 29 were combined during 2015 BpS Review.

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 | C | D | D | D | D | D |
| Tree | 25-50 | C | C | C | C | C | D | D | D | D | D |
| Tree | >50 | C | C | C | C | C | D | D | D | D | D |

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 9 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 <12ft tall. Fire is absent.

Class B 44 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 dominate. Aspen trees later in the stage. Canopy cover is highly variable. Conifer saplings and seedlings come in later in the stage.

Class C 34 Late Development 1 - Open

Upper Layer Lifeform: Tree

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| POTR5 | Populus tremuloides | Quaking aspen | Upper |
| ABLA | Abies lasiocarpa | Subalpine fir | Mid-Upper |
| PSME | Pseudotsuga menziesii | Douglas-fir | Mid-Upper |
| PICO | Pinus contorta | Lodgepole pine | Mid-Upper |

Description

Aspen and conifer co-dominate. Conifers that escape fire, or are the more fire-resistant species, will likely cause the progressive suppression of aspen.

Douglas-fir occurs sporadically in MZ29. MZ29 can also have lodgepole pine.

Class D 13 Late Development 1 - Closed

Upper Layer Lifeform: Tree

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PSME | Pseudotsuga menziesii | Douglas-fir | Upper |
| ABLA | Abies lasiocarpa | Subalpine fir | Upper |
| POTR5 | Populus tremuloides | Quaking aspen | Mid-Upper |
| PICO | Pinus contorta | Lodgepole pine | Upper |

Description

Conifers dominate. Uneven sizes of mixed conifer; main overstory is conifers. Trees can conceivably range in height.

Douglas-fir occurs sporadically in MZ29.

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:CLS | 9 |
| Mid1:CLS | 10 | Late1:OPN | 80 |
| Late1:OPN | 81 | Late1:OPN | 999 |
| Late1:CLS | 81 | 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** |
| Insects or Disease | Mid1:CLS | Early1:ALL | 0.001 | 1000 | Yes | 0 |
| Insects or Disease | Mid1:CLS | Mid1:CLS | 0.004 | 250 | No | 0 |
| Mixed Fire | Mid1:CLS | Mid1:CLS | 0.01 | 100 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 1 | 1 | Yes | 100 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.008 | 125 | Yes | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.012 | 83 | No | 0 |
| Insects or Disease | Late1:CLS | Late1:OPN | 0.003 | 333 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.01 | 100 | Yes | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.01 | 100 | Yes | 0 |

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