10610

Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
| Krista Waid-Gollnick | krista\_waid@blm.gov | Jon Bates | jon.bates@oregonstate.edu |
| Sarah Heide | sarah\_heide@blm.gov | None | None |
| None | None | None | None |

Vegetation Type

Forest and Woodland

Map Zones

18

Geographic Range

This ecological system occurs on montane slopes and plateaus in UT, western CO, northern AZ, eastern NV, southern ID and western WY. 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. 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, co-dominated by *Populus tremuloides* and conifers, including *Abies concolor*, *Abies lasiocarpa*, *Picea engelmannii*, *Pinus flexilis*, *Juniperus occidentalis* (southwestern ID), *Pseudotsuga menzesii*, 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*, or *Mahonia repens*. Herbaceous species include *Bromus carinatus*, *Calamagrostis rubescens*, *Carex geyeri*, *Elymus glaucus*, *Poa* spp., *Achnatherum nelsonii*, *Melica bulbosa*, *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 |
| ABCO | *Abies concolor* | White fir |
| ABLA | *Abies lasiocarpa* | Subalpine fir |
| PSME | *Pseudotsuga menziesii* | Douglas-fir |
| PIFL2 | *Pinus flexilis* | 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 BpS 1011 (Rocky Mountains Aspen Woodland and Forest), with FRIs varying for mixed severity fire with the encroachment of conifers. It is important to understand that aspen is considered a fire-proof vegetation type that does not burn during the normal lightening season, yet evidence of fire scars and historical studies show that native burning was the only source of fire that occurred mostly during the spring and fall. Replacement fire is absent during early development (as for stable aspen, BpS 1011). The FRI of mixed severity fire increases in stands <100yrs versus stands >100yrs with conifer encroachment.

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.

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 | 75 | 37 | 50 | 300 |
| Moderate (Mixed) | 45 | 63 | 10 | 50 |
| Low (Surface) |  |  |  |  |
| All Fires | 28 | 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 sized patches (1,000ac).

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, especially in the southwestern portion of MZ18. If aspen is absent, refer to 1051 or 1052.

This type is more highly threatened by conifer replacement than stable aspen. Most occurrences at present represent a late-seral stage of aspen changing to a pure conifer occurrence. Nearly a hundred years 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.

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, probably started by Native Americans, as mixed severity fire that also promoted abundant suckering. In the presence of conifer fuel, these older trees 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 were a compromise between longer FRIs proposed by reviewers and the maximum FRI of Baker (1925).

Native Uncharacteristic Conditions

Comments

D Major made changes to vegetation class structural values in response to MTD v3.1 updates (K Pohl 7/18/05 request). These changes have not been reviewed and accepted by model developers as of 7/24/05.

Comments by Jon Bates (reviewer) were minor: 1) Species were added to reflect the western range of this system. 2) The description of aspen height was increased in the description of class A because aspen can easily reach 12ft tall after 3-4yrs in the Owyhee mountains of southern ID. Therefore, max height was changed from 6ft to 12ft (this applies to class B also). 3) Average fire size was increased to 50ac from 10ac. 4) Finally, the reviewer commented on the age of conifer invasion that would prevent the recovery of aspen - assumed rare in the pre-settlement condition.

As this type has a fairly short fire return interval compared to other aspen types, it should be noted that aspen can act as a tall shrub. Bradley, et al. (1992) state that Loope & Gruell estimated a fire frequency of 25-100 years for a Douglas-fir forest with seral aspen in Grand Teton National Park (p39). They later state that fire frequencies of 100-300yrs appear to be appropriate for maintaining most seral aspen stands. 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-barked lodgepole pine on the site (p46).

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. While not dependent upon disturbance to regenerate, aspen was adapted to a diverse array of disturbances.

Under current conditions, herbivory can significantly affect stand succession. Kay (1997, 2001a, b, 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 impacts of ungulates were low. Herbivory was therefore not included in the model.

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 | 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

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. Generally, this is expected to occur 1-3yrs post-disturbance. Fire is absent.

*Maximum Tree Size Class*  
Sapling >4.5ft; <5"DBH

Class B 34 Mid Development 1 - Closed

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. Canopy cover is highly variable. Replacement fire occurs. Mixed severity fire does not change the successional age of these stands, although this fire consumes litter and woody debris and may stimulate suckering.

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

Class C 27 Mid Development 2 - Closed

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 5-16in DBH. Canopy cover is highly variable. Conifer seedlings and saplings may be present. Replacement fire occurs. Mixed severity fire, while thinning some trees, promotes suckering and maintains vegetation in this class. Insect/diseases outbreaks occur causing stand thinning and stand replacement.

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

Class D 25 Late Development 1 - Open

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 |
| PSME | Pseudotsuga menziesii | Douglas-fir | Mid-Upper |

Description

Aspen and conifer co-dominate. Conifers which escape fire, or are the more fire-resistant species, will likely cause the progressive suppression of aspen. Mixed severity fire keeps this stand open, kills young conifers and maintains aspen. Replacement fire occurs. In the absence of any fire the stand will eventually become closed with conifers.

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

Class E 1 Late Development 1 - Closed

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 | Upper |
| PIFL2 | Pinus flexilis | Limber pine | Upper |

Description

Conifers dominate. Aspen over 16in DBH, uneven sizes of mixed conifer and main overstory is conifers. Greater than 50% conifer in the overstory. Replacement fire occurs. Insect/disease outbreaks will thin older conifers.

*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 | 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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **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 | 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 | Late1:OPN | 0.025 | 40 | Yes | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 1 | 1 | Yes | 100 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Mixed Fire | Late1:OPN | Mid2:CLS | 0.025 | 40 | 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 | 0.05 | 20 | Yes | 0 |

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