**10110**

Rocky Mountain Aspen Forest and Woodland

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
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Vegetation Type

Forest and Woodland

Map Zones

16, 23, 24

Geographic Range

Great Basin and throughout the western United States on drier, higher sites. Typically found in Nevada, Utah, California, Arizona, New Mexico, Colorado, Idaho, Wyoming, Montana, and eastern Oregon.

Biophysical Site Description

This type occurs on flat to moderately steep terrain (<50% slope) on all aspects. Elevation ranges from 1,800-3,300m. Within the Utah High Plateaus MZ16) elevations range from 6000-8000ft north of US Highway 6; south of US Highway 6 elevations typically range from 7000-9000ft. Soils are highly variable, but generally cool. This type occurs above the pinyon-juniper and/or sagebrush, but below the spruce-fir. Soils are generally deep, mollic, and moist. Bare ground does not exceed 2% of soil surface cover.

Vegetation Description

As a species, aspen are adapted to a much broader range of environments than most plants found associated with it. This ecological system occurs commonly as multi-storied stands that are usually closed. Aspen suckers 5-15ft tall are present in all classes (minimum, 500 stems per acre). Conifers are usually absent in this type. Where it is adjacent to conifer, an occasional conifer seedling may occur, but this does not drive the fire regime. Stable upland aspen typically occur above pinyon-juniper and adjacent to mountain big sagebrush. At elevations <1,950m, this group grades into black and narrowleaf cottonwood types along riparian corridors. In part of the Utah High Plateau, stable aspen are associated with sites too dry to support conifers and may be surrounded by small acreages of sagebrush. On Great Basin ranges, stable aspen are found both on dry sites and in more mesic areas where fir species are largely absent.

The understory consists of abundant herbaceous and shrub components. Commonly, species of tall forbs, perennial grasses and shrubs are found in the understory. Common shrubs include *Acer glabrum*, *Amelanchier alnifolia*, *Artemisia tridentata*, *Juniperus communis*, *Prunus virginiana*, *Rosa woodsii*, *Shepherdia canadensis*, *Symphoricarpos oreophilus*, and the dwarf-shrubs *Mahonia repens* and *Vaccinium* spp. The herbaceous layers may be lush and diverse. Common graminoids may include *Bromus carinatus*, *Calamagrostis rubescens*, *Carex siccata* (=*Carex foenea*), *Carex geyeri*, *Carex rossii*, *Elymus glaucus*, *Elymus trachycaulus*, *Festuca thurberi*, and *Hesperostipa comata*. Associated forbs may include *Achillea millefolium*, *Eucephalus engelmannii* (=*Aster engelmannii*), *Delphinium* spp., *Geranium viscosissimum*, *Heracleum sphondylium*, *Ligusticum filicinum*, *Lupinus argenteus*, *Osmorhiza berteroi* (=*Osmorhiza chilensis*), *Pteridium aquilinum*, *Rudbeckia occidentalis*, *Thalictrum fendleri*, *Valeriana occidentalis*, *Wyethia amplexicaulis*, and many others.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| POTR5 | *Populus tremuloides* | Quaking aspen |

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

Disturbance Description

Baker (1925) offers the best description of the pre-Euro-American settlement condition. This is a strongly fire-adapted forest type. Mean fire intervals vary from 15-30yrs based on biophysical variation. Native American burning would have been the primary ignition source, especially for surface fires. It is important to understand that aspen are considered a fire-proof vegetation type that does not burn during the normal lightning season, yet evidence of frequent fire scars and historical studies show that native burning was the only source of fire that occurred mostly during the spring and fall.

Periodic fires kept the incidence of disease and insect infestation at levels lower than those observed today. Insect/disease were more common in older stands (mean return interval of 200-300yrs). Disturbance effects would also have varied from clone to clone. Many aspen clones situated on steep slopes are prone to disturbance caused by avalanches and mud-/rockslides. Riparian aspen are prone to flooding.

Secondary disturbances may include 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 | 58 | 46 | 50 | 300 |
| Moderate (Mixed) | 49 | 54 | 20 | 60 |
| 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

Patch size for this type ranges from tens to thousands of acres.

Adjacency or Identification Concerns

This type may be very difficult to identify on the ground today because of conifer encroachment due to fire suppression. For mapping, if any aspen are present today, this is probably the correct type (or 1061 at lower elevations). If conifers are present, please review Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland (1061) as an option for lower elevations.

Sagebrush groups, especially mountain big sagebrush and high-elevation Wyoming big sagebrush, occur below and in places, around this group.

Lack of suckers is representative of an uncharacteristic class. Another uncharacteristic class is indicated where sagebrush and rabbitbrush cover is >10% (in Utah and Nevada). Stands that lack a shrub or tall forb component, or stands dominated by *Wyethia* spp. (mule ears) are uncharacteristic. Exotic grasses such as the perennials *Poa pratensis* and *Bromus inermis*, and the annual *Bromus tectorum* are often common in occurrences disturbed by grazing.

Aspen decline varies across the region. Declines have been documented in Utah, Nevada, Arizona, and New Mexico, but not in Colorado (especially southwestern Colorado).

Large, grazing ungulates are currently impacting many stands throughout the western United States.

Issues or Problems

Under current conditions, herbivory can significantly affect stand succession. Kay (1997, 2001a, 2001b, 2001c) 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 and predator-prey cycles, so the impacts of ungulates were low. Herbivory was therefore not included in the model. The probabilities for insect infestation/disease outbreak in the older development state have potentially a large effect on the model.

Aspen stands tend to remain dense throughout most of their life span, hence the open-stand descriptions were not used. These are typically self-perpetuating stands. Although not dependent upon disturbance to regenerate, aspen were adapted to a diverse array of disturbances. For example, there are ground fires that burn small areas throughout these stands. These fires do not set succession back.

Native Uncharacteristic Conditions

Comments

Map zones 23 and 24 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 | D | D | D | D | B | B | B | B | B | B |
| Tree | 10-25 | D brdlf | D brdlf | D brdlf | D brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf |
| Tree | 10-25 | D con | D con | D con | D con | E con | E con | E con | E con | E con | E con |
| Tree | 10-25 | D mix | D mix | D mix | D mix | E mix | E mix | E mix | E mix | E mix | E mix |
| Tree | 25-50 | D brdlf | D brdlf | D brdlf | D brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf |
| Tree | 25-50 | D con | D con | D con | D con | E con | E con | E con | E con | E con | E con |
| Tree | 25-50 | D mix | D mix | D mix | D mix | E mix | E mix | E mix | E mix | E mix | E mix |
| Tree | >50 | E | E | E | 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 49 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| POTR5 | Populus tremuloides | Quaking aspen | Upper |

Description

Aspen suckers and saplings. Grass and forbs are present. Replacement fire occurs. Mixed-severity fire does not change vegetation dynamics.

*Maximum Tree Size Class*  
Seedling <4.5ft

Class B 24 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| POTR5 | Populus tremuloides | Quaking aspen | Upper |

Description

Aspen >6ft tall dominate. Canopy cover highly variable. Replacement fire occurs. Mixed-severity fire does not change the succession age of these stands, although this fire consumes litter and woody debris and may stimulate suckering.

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

Class C 6 Mid Development 2 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| POTR5 | Populus tremuloides | Quaking aspen | Upper |

Description

True stable aspen trees 5-16in DBH. Canopy cover is highly variable. The fire return interval of mixed-severity fire does not change with age. Insect/disease affects older trees.

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

Class D 18 Late Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| POTR5 | Populus tremuloides | Quaking aspen | Upper |
| PSEUD7 | Pseudotsuga | Douglas-fir | Mid-Upper |
| ABLA | Abies lasiocarpa | Subalpine fir | Mid-Upper |
| ABCO | Abies concolor | White fir | Mid-Upper |

Description

Conifers begin to dominate with aspen in the understory or co-dominant. Aspen5-16in DBH; Mixed conifer, mixed sizes. Conifers are assumed more resistant to fire than aspen and will likely cause the progressive suppression of aspen

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

Class E 3 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PSEUD7 | Pseudotsuga | Douglas-fir | Upper |
| ABLA | Abies lasiocarpa | Subalpine fir | Upper |
| ABCO | Abies concolor | White fir | Upper |
| POTR5 | Populus tremuloides | Quaking aspen | Mid-Upper |

Description

Conifers dominate at 150yrs+. Aspen >16in DBH; mixed conifer, mixed sizes; main overstory is conifers. Greater than 50% conifer in the overstory. Succession maintains conifer dominance.

*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 | 39 |
| Mid1:CLS | 40 | Late1:ALL | 79 |
| Mid2:CLS | 80 | Mid2:CLS | 999 |
| Late1:ALL | 80 | Late1:CLS | 149 |
| Late1:CLS | 150 | 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 | Early1:ALL | Early1:ALL | 0.017 | 59 | Yes | 0 |
| Mixed Fire | Early1:ALL | Early1:ALL | 0.02 | 50 | No | 0 |
| Alternative Succession | Mid1:CLS | Mid2:CLS | 0.006 | 167 | Yes | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.017 | 59 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:CLS | 0.02 | 50 | No | 0 |
| Insects or Disease | Mid2:CLS | Mid1:CLS | 0.005 | 200 | Yes | 0 |
| Replacement Fire | Mid2:CLS | Early1:ALL | 0.017 | 59 | Yes | 0 |
| Mixed Fire | Mid2:CLS | Mid2:CLS | 0.02 | 50 | No | 0 |
| Replacement Fire | Late1:ALL | Early1:ALL | 0.017 | 59 | Yes | 0 |
| Mixed Fire | Late1:ALL | Late1:ALL | 0.02 | 50 | No | 0 |
| Insects or Disease | Late1:CLS | Late1:ALL | 0.003 | 333 | Yes | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.017 | 59 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:ALL | 0.02 | 50 | Yes | 0 |

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