11450

Rocky Mountain Subalpine-Montane Mesic Meadow

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
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Reviewer: Kori Blankenship

Vegetation Type

Herbaceous

Map Zones

22, 24, 28

Geographic Range

Found in the Rocky Mountains, restricted to the subalpine zone typically above 3,000m in the southern part, 1,500m in the north.

This Biophysical Setting (BpS) is most likely a very minor component of map zone (MZ) 22 and also most likely occurs only in small portions of mountainous sections that lie at the margins of the MZ, particularly those in the southwest -- M331D and perhaps M331E. It is highly unlikely to be found in the low mountain ranges that lie in the center of MZ22. The higher-elevation montane sites there probably belong in BpS 1139.

Biophysical Site Description

This Rocky Mountain BpS is restricted to sites in the subalpine zone where finely textured soils, snow deposition, and wind-swept dry conditions limit tree establishment. The soils are typically cryic and seasonally moist in the spring but if so will dry out later in the growing season. These upland communities occur on gentle to moderate-gradient slopes.

Vegetation Description

This BpS is often termed "tall forbs." Vegetation is typically forb-rich, with forbs contributing more to overall herbaceous cover than graminoids. Important taxa include *Agastache urticifolia*, *Chamerion angustifolium*, *Erigeron* spp., *Senecio* spp., *Helianthella* spp., *Mertensia* spp., *Penstemon* spp., *Campanula* spp., *Hackelia* spp., *Lupinus* spp., *Solidago* spp., *Ligusticum* spp., *Osmorhiza* spp., *Thalictrum* spp., *Valeriana* spp., *Balsamorhiza sagitatta*, *Wyethia* spp., *Bromus carinatus*, *Danthonia intermedia*, *Deschampsia caespitosa*, *Koeleria macrantha*, *Elymus tachycaulus*, *Phleum alpinum*, and *Dasiphora fruticosa*. Burrowing mammals can increase forb diversity.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| ERIGE2 | *Erigeron* | Fleabane |
| MERTE | *Mertensia* | Bluebells |
| PENST | *Penstemon* | Beardtongue |
| CAMPA | *Campanula* | Bellflower |
| LUPIN | *Lupinus* | Lupine |
| SOLID | *Solidago* | Goldenrod |
| DECA18 | *Deschampsia caespitosa* | Tufted hairgrass |
| KOELE | *Koeleria* | Junegrass |

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

Disturbance Description

Fires are primarily replacement. The lack of information on meadow disturbance histories in general makes assessment of fire frequency difficult. However, we estimated a fire frequency of 30-40yrs based on adjacent aspen, herbaceous, and sagebrush communities. Mixed-severity fire occurs in late-development meadows and removes shrubs. The ignition source is generally not in this type and probably associated with native burning in the fall and spring but spreads from an adjacent shrub- or tree-dominated site, such as mountain big sagebrush, ponderosa pine, and aspen.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 40 | 80 |  |  |
| Moderate (Mixed) | 162 | 20 |  |  |
| Low (Surface) |  |  |  |  |
| All Fires | 32 | 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

Range in size from <10ac to 300ac.

Adjacency or Identification Concerns

This BpS could be confused with low forb/alpine shrub communities. Often adjacent to aspen/tall forb communities and mountain or big sagebrush/tall forb communities. In degraded sites, this community may convert to silver sagebrush/tall forb.

This BpS is most likely a very minor component of MZ22. The higher-elevation montane sites in the center of MZ22 probably belong in BpS 1139.

**Issues or Problems**

There is not much information about this type. We estimated the fire frequency based on adjacent aspen, herbaceous, and sagebrush communities. Also, because fire was assumed to occur in the fall and spring when the summer's green and wet biomass would be dead and cured, replacement fire has little effect on annual tall forbs themselves. Fires would affect encroaching shrubs.

Native Uncharacteristic Conditions

With heavy grazing, these sites can convert to undesirable forbs and grasses such as *Circium* spp. (thistle, any species), *Galium* spp. (bedstraw), *Rudbeckia occidentalis* (coneflower), *Helenium hoopesii* (Orange sneezeweed), *Polygonum* spp. (knotweed), *Rumex* spp (sorrel or dock), *Taraxacom officinale* (dandelion), *Veratrum californicum* (false hellebore), *Wyethia amplexicaulis* (mulesears), *Potentilla gracilis* (cinquefoil), *Geum marcophyllum* (avens), *Arnica chamissonis* (arnica), *Collomia linearis* (tiny trumpet), *Madia glomerata* (mountain tarweed), *Descurainia* spp. (tansymustard), *Nemophila brevifolia* (basin blue eyes), *Poa pratensis* (Kentucky bluegrass), *Agrostis exarata* (bentgrass), *Dactylis glomerata* (orchardgrass), *Bromus inermis* (smooth brome), *Bromus tectorum* (cheatgrass), *Poa bulbosa* (bulbous bluegrass), and *Vulpia octoflora* (six-week fescue).

Roads and trails can impact these sites.

Comments

Kori Blankenship reviewed the use of mixed-severity fire in this model during the 2017 BpS Review to determine if its use was consistent with LANDFIRE’s definition of the term. LANDFIRE defines a fire that topkills 25-75% of the upper-layer lifeform as mixed-severity. In this model, mixed fire is used to transition from Late1 Open to Mid1 Open. Although fire would probably kill or topkill the shrubs in this BpS (according to Fire Effects Information System species reviews), comments from MZ13 and MZ16 note that fires probably burned in the fall and spring when the dominant forbs would be dead and cured and therefore not affected by fire. The MZ09/10/19 model variant also mentions the possible presence of trees in the Late1 Open class. In these circumstances, mixed fire seemed to be appropriate, and Blankenship decided to leave the model unchanged.

MZ22, MZ24, and MZ28 were combined during the 2017 BpS Review. During the Review, it was noted that MZ09, MZ10, and MZ19 have the same VDDT model as the combined zones, but due to species and s-class rule differences, MZ09, MZ10, and MZ19 will be combined and maintained as a unique model.

MZ22 model was adopted as is from the same BpS in MZ28, created by Cheri Howe and Julia Richardson and reviewed by G. Jones. MZ22 was reviewed by Nathan Williamson (Nathan\_Williamson@nps.gov), Chuck Kostecka, and Vic Ecklund. No one felt this type occurred frequently enough in MZ22 to change the model. For MZ28, minor edits were made to the description for mapping (Mike Babler, mbabler@tnc.org, 5/6/2005).

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 | B | B | B | B | B | B | B | B | B | B |
| Herb | >1.0 | B | B | B | B | B | B | B | B | B | B |
| Shrub | 0-0.5 | C | C | C | C | C | C | C | C | C | C |
| Shrub | 0.5-1.0 | C | C | C | C | C | C | C | C | C | C |
| Shrub | 1.0-3.0 | C | C | C | C | C | C | C | C | C | C |
| Shrub | >3.0 | C | C | C | C | C | C | C | C | C | C |
| Tree | 0-5 | C | C | C | C | C | UN | UN | UN | UN | UN |
| Tree | 5-10 | C | C | C | C | C | UN | UN | UN | UN | UN |
| Tree | 10-25 | C | C | C | C | C | UN | UN | UN | UN | UN |
| Tree | 25-50 | C | C | C | C | C | UN | UN | UN | UN | UN |
| Tree | >50 | C | C | C | C | C | UN | UN | UN | UN | UN |

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 5 Early Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ERIGE2 | Erigeron | Fleabane | Upper |
| LUPIN | Lupinus | Lupine | Upper |
| DECA18 | Deschampsia caespitosa | Tufted hairgrass | Upper |

Description

Vegetation is typically forb-rich, with forbs contributing more to overall herbaceous cover than graminoids. Important taxa include *Agastache urticifolia*, *Chamerion angustifolium*, *Erigeron* spp., *Senecio* spp., *Helianthella* spp., *Mertensia* spp., *Penstemon* spp., *Campanula* spp., *Hackelia* spp., *Lupinus* spp., *Solidago* spp., *Ligusticum* spp., *Osmorhiza* spp., *Thalictrum* spp., *Valeriana* spp., *Balsamorhiza sagittata*, *Wyethia* spp., *Bromus carinatus*, *Danthonia intermedia*, *Deschampsia caespitosa*, *Koeleria macrantha*, *Elymus tachycaulus*, *Phleum alpinum*, and *Dasiphora fruticosa*. Replacement fire presumably occurred during the fall and spring, therefore removing completely dead biomass, but in these early-development meadows, fire would not cause an ecological setback (i.e., relative age = 0) because fire would simply remove dead annual forbs.

*Maximum Tree Size Class*  
None

Class B 47 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ERIGE2 | Erigeron | Fleabane | Upper |
| LUPIN | Lupinus | Lupine | Upper |
| DECA | Delphinium californicum | California larkspur | Upper |

Description

Vegetation is typically forb-rich, with forbs contributing more to overall herbaceous cover than graminoids. Shrubs may be present but will be <5% cover. Important taxa include *Agastache urticifolia*, *Chamerion angustifolium*, *Erigeron* spp., *Senecio* spp., *Helianthella* spp., *Mertensia* spp., *Penstemon* spp., *Campanula* spp., *Hackelia* spp., *Lupinus* spp., *Solidago* spp., *Ligusticum* spp., *Osmorhiza* spp., *Thalictrum* spp., *Valeriana* spp., *Balsamorhiza sagittata*, *Wyethia* spp., *Bromus carinatus*, *Danthonia intermedia*, *Deschampsia caespitosa*, *Koeleria macrantha*, *Elymus tachycaulus*, *Phleum alpinum*, and *Dasiphora fruticosa*. There will be some increase in the shrub component between Class A and Class B. Replacement fire removes shrubs.

*Maximum Tree Size Class*  
None

Class C 48 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ASTER | Aster | Aster | Middle |
| LUPIN | Lupinus | Lupine | Middle |
| ROWO | Rosa woodsii | Woods' rose | Middle |
| RIBES | Ribes | Currant | Middle |

Description

Vegetation is typically forb-rich, with forbs contributing more to overall herbaceous cover than graminoids. Forbs dominate, but trees (*Populus tremuloides*) or shrubs (*Artemisia cana*, *Artemisia tridentata*, *Rosa woodsii*, *Ribes* spp., and *Amelanchier* spp.) may be the upper-layer lifeform, with low canopy cover (<10%). Important taxa include *Agastache urticifolia*, *Chamerion angustifolium*, *Erigeron* spp., *Senecio* spp., *Helianthella* spp., *Mertensia* spp., *Penstemon* spp., *Campanula* spp., *Hackelia* spp., *Lupinus* spp., *Solidago* spp., *Ligusticum* spp., *Osmorhiza* spp., *Thalictrum* spp., *Valeriana* spp., *Balsamorhiza sagittata*, *Wyethia* spp., *Bromus carinatus*, *Danthonia intermedia*, *Deschampsia caespitosa*, *Koeleria macrantha*, *Elymus tachycaulus*, *Phleum alpinum*, and *Dasiphora fruticosa*. MZ24 listed *Bouteloua radicosa* and *Scrophularia* spp. as indicators. Mixed-severity fire removes shrubs from overstory.

*Maximum Tree Size Class*  
Seedling <4.5ft

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:OPN | 0 | Mid1:OPN | 2 |
| Mid1:OPN | 3 | Late1:OPN | 22 |
| Late1:OPN | 23 | Late1:OPN | 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:OPN | Early1:OPN | 0.025 | 40 | Yes | 0 |
| Replacement Fire | Mid1:OPN | Early1:OPN | 0.025 | 40 | Yes | 0 |
| Mixed Fire | Late1:OPN | Mid1:OPN | 0.013 | 77 | Yes | 0 |
| Replacement Fire | Late1:OPN | Early1:OPN | 0.025 | 40 | Yes | 0 |

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