11450

Rocky Mountain Subalpine-Montane Mesic Meadow

BpS Model/Description Version: Aug. 2020

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

Herbaceous

Map Zones

21

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.

Biophysical Site Description

Finely textured soils. Snow deposition. Windswept dry conditions limit tree establishment. On gentle to moderate gradient slopes. Soils seasonally moist in spring, and might occasionally dry out later in the growing season.

This is a tall forb, lush wet system.

Vegetation 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., *Veratrum* spp., *Delphinium* spp., *Aconitum* spp., and *Wyethia amplexicaulis*.

Burrowing mammals can increase density.

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 |
| DELPH | *Delphinium* | Larkspur |
| 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 and occur at rotations related to adjacent vegetation - aspen, herbaceous and sagebrush communities. Where near mountain big sagebrush, this may be 135yrs (MZ21 original modelers), and where near lodgepole pine, this may be 300yrs, which represents the MZ21 minimum and maximum intervals, respectively. (These intervals were questioned by some MZ21 reviewers.) The ignition source is generally not in this type and could possibly be associated with native burning in the fall and spring, but spreads from adjacent shrub or tree dominated sites, such as mountain big sagebrush, lodgepole pine, ponderosa pine and aspen.

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. In MZ21, fire occurrence would primarily be concentrated to the fall burning season due to narrower growing season at higher elevation fringes. Meadows only approach burning conditions in extreme drought or late season at higher elevation.

Hailstorms are another disturbance in this system.

It is debatable as to whether fire is needed at moderately high frequencies to keep sagebrush out of these grassland systems, or whether sagebrush is invading in current times due to overgrazing and/or climate change.

Sindelar (1981) in western MT did not think that grasslands invaded by ARTRV were primarily fire maintained and instead implicated livestock grazing removal of competition from grasses in ARTRV invasion. Mountain big sagebrush has colonized some mountain grasslands in present day, but not all.

Fire intervals (less fire) for MZ21 were originally decreased approximately 7x (from 30yrs to 200yrs). After an extensive model review process, LF leadership/guidance determined that the original modelers for MZ21 used an interpretation of the fire information available that did not represent the majority expert opinion/interpretation of the fire literature. The original MZ21 model was therefore altered to reflect majority opinion/interpretation of literature regarding the fire regime of this system and that used in MZs 10, 19 and 23. A FRI of 40yrs replacement fire was used. Mixed fire was removed from the model adapted from MZs 10 and 19 due to a new understanding of severity types.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 40 | 100 | 30 | 300 |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) |  |  |  |  |
| All Fires | 40 | 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 less than ten acres to 300ac. In MZ21, larger meadows are present in the Absaroka-Beartooth Range, 500-1,000ac in a few areas, noted in Yellowstone National Park as Big Game Ridge, Chicken Ridge, Pitchstone Plateau and Two Ocean Plateau.

Adjacency or Identification Concerns

This BpS could be confused with low forb/alpine shrub communities. Often adjacent to aspen/tall forb communities, mountain big sagebrush/tall forb communities and upper montane/subalpine spruce-fir communities.

Some grassland systems are invaded by sagebrush today in larger quantities. Pre-European settlement they would have been grassland systems, whereas today they might be confused for big sage systems.

Expansion of Douglas-fir along the perimeter of the habitat has produced some encroachment in MZ21.

With heavy grazing these sites can convert to undesirable forbs and grasses such as *Cirsium* spp. (thistle), *Galium* spp. (bedstraw), *Rudbeckia occidentalis* (coneflower), *Helenium hoopesii* (Orange sneezeweed), *Polygonum* spp. (knotweed), *Rumex* spp. (sorrel or dock), *Taraxacum officinale* (dandelion), *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), and *Poa bulbosa* (bulbous bluegrass). Roads and trails can impact these sites.

In MZ21, there is some invasion of spotted knapweed, *Centaurea biebersteinii*, along with dalmatian toadflax (*Linaria dalmatica*). These occur along recreational use activity corridors in the Yellowstone National Park area.

This system will appear departed due to grazing and species composition shifts/changes. Grazing could even shift this BpS to a grassland type currently. Weed spraying currently also could shift this community to tarweed.

Issues or Problems

There is not much information about this type.

Native Uncharacteristic Conditions

Comments

This model was adapted from the LANDFIRE model for the same BpS 1145 in MZs 10 and 19 created by by Cherie Howell (chowell02@fs.fed.us) and Julia Richardson (jrichardson@fs.fed.us) and reviewed by Nathan Williamson (Nathan\_Williamson@nps.gov), Vic Ecklund (vecklund@csu.org) and Chuck Kostecka (kostecka@webaccess.net). For MZ21, edits were made to the description, class percentages and model, and major changes were made to fire return intervals. FRI were lengthened (less fire) approximately 7x the original models. Changes to original model and description changed by original MZ21 modelers: John Simons (john\_simons@blm.gov), Tim Klukas (tim\_klukas@nps.gov) and an anonymous contributor. Reviewers for MZ21 were Bill Romme, Jim Ozenberger, Andy Norman, Sarah Canham (scanham@fs.fed.us), Brenda Fiddick (bfiddick@fs.fed.us) and Dave Tart. After an extensive model review process, LF leadership/guidance determined that the original modelers used an interpretation of the fire information available that did not represent the majority expert opinion/interpretation of the fire literature. The original MZ21 model was therefore altered to reflect majority opinion/interpretation of literature regarding the fire regime of this system and that used in MZs 10, 19 and 23, with some revisions based on understanding of severity definitions; therefore, original modeler names from MZs 10 and 19 were retained. Mixed fire was removed from the model by RL.

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 |
| DELPH | Delphinium | Larkspur | Upper |

Description

Vegetation is typically forb-rich, with forbs contributing more to overall herbaceous cover than graminoids.

Fire spread would occur in late summer to early fall. Removal of dead biomass would be highly variable, but in these early development meadows, fire would also remove dead annual forbs.

*Maximum Tree Size Class*  
None

Class B 38 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ERIGE2 | Erigeron | Fleabane | Upper |
| LUPIN | Lupinus | Lupine | Upper |
| DELPH | Delphinium | Larkspur | Upper |

Description

Vegetation is typically forb-rich, with forbs contributing more to overall herbaceous cover than graminoids. Some increase in shrub component, shrubs young and less than five percent cover and less than 0.5m.

*Maximum Tree Size Class*  
None

Class C 57 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. Five to 10% of cover in late seral may be woody species, ranging between 0.6m to greater than 3.1m tall, from adjacent plant communities such as *Populus tremuloides*, *Artemisia cana*, *Artemisia tridentata*, *Rosa woodsii*, *Ribes* spp., and *Amelanchier* spp.

*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 |
| Replacement Fire | Late1:OPN | Early1:OPN | 0.025 | 40 | Yes | 0 |

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