11320

Central Mixedgrass Prairie

BpS Model/Description Version: Aug. 2020

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

Herbaceous

Map Zones

33

Model Splits or Lumps

This biophysical setting (BpS) is lumped with: 1148, 1150

Geographic Range

This type historically occurs in western Kansas, western Nebraska, eastern Colorado and northeastern New Mexico. This becomes more common proceeding east. This BpS comprises most of map zone (MZ)33. It occurs in every ECOMAP (Cleland et al. 2007) subsection of MZ33 and Colorado portion of MZ27. See map of Central Shortgrass Ecoregional Plan (The Nature Conservancy 1998) for mixedgrass and shortgrass prairie potential. In New Mexico, this type would be most prevalent along the eastern boundary of the map zone.

Biophysical Site Description

This type occurs on sandy loam, loamy or clayey upland sites of the southern Great Plains.

In New Mexico and Colorado, elevations range from 1,500-2,000m. In Kansas, elevations can be 1,000m.

Precipitation ranges from 14-22in, and occurs predominantly during the summer. Precipitation be as little as 10in.

Midgrasses and not shortgrasses would be on steeper slopes and rockier sites, but these are isolated occurrences. Away from the eastern edge of the map zone, this is the most common situation for this type in New Mexico, on rocky breaks and mesa slopes.

Vegetation Description

Historically, vegetation was co-dominated with tallgrass, midgrass, short grass, and shrubs. (Species in order of dominance in boxes.) Dominant species include mix of tall and short grass, e.g., side oats grama, needlegrasses, little bluestem, yellow indiangrass, big bluestem, switchgrass, blue grama, and western wheatgrass (most dominant in Colorado and Kansas), with intermingled forbs, e.g. American vetch.

On sandy loam sites, graminoid species such as *Andropogon hallii, Sporobolus cryptandrus* (in current more degraded sites, but not as much in historical), *Calamovilfa longifolia, Hesperostipa comate*, *Bouteloua gracilis,* and *Bouteloua hirsuta* can be found within this system. Shrub species include 5-7% Western sandcherry (*Prunus pumila* var. *besseyi*), but not in New Mexico). Yucca glauca is present, along with switchgrass, little bluestem, yellow indiangrass and, more rarely, western wheatgrass. Farther east, leadplant might appear. Sand bluestem occurs on sandy range sites in eastern portion whereas big bluestem occupies sandy foothills sites. However, a reviewer felt that ANGE big bluestem should rather be part of 1147 WGP Foothills and Piedmont Grassland; therefore, ANGE was removed from the dominant species list).

Shrubs included four-wing saltbush, winterfat, with lesser amounts of rabbitbrush, broom snakeweed, fringed sage, sunsedge, and plains prickly pear.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PASM | *Pascopyrum smithii* | Western wheatgrass |
| SCSC | *Schizachyrium scoparium* | Little bluestem |
| HECO26 | *Hesperostipa comata* | Needle and thread |
| BOGR2 | *Bouteloua gracilis* | Blue grama |
| BOCU | *Bouteloua curtipendula* | Sideoats grama |
| SONU2 | *Sorghastrum nutans* | Indiangrass |
| PAVI2 | *Panicum virgatum* | Switchgrass |

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

Disturbance Description

Historically, fire return intervals (FRIs) were probably approximately 20-25yrs (Dan Nosal, Rich Sterry, Terri Schulz, personal communications). Slightly shorter return interval (more frequent fire) and probably less variable than shortgrass prairie due to higher fuel loads, at least in eastern Colorado/western Kansas area. However, shortgrass prairie interval was changed to ~20-25yrs post-review; therefore, since it is thought that mixedgrass interval should be shorter than shortgrass, but because original mixedgrass model had a 20-25yr interval, RL changed the mean FRI for mixedgrass to approximately 15-20yrs. Also, Rapid Assessment model for R4PRMGs Mixedgrass Prairie south, was modeled with an interval of nine years. Map zone 34 (1132), Mixedgrass Prairie, was modeled with an interval of 11yrs. All modelers/reviewers were informed of changes.

There is uncertainty about mean FRI in general for the prairie ecosystems. There are few consistent records on fires and their extent and frequency, particularly in good condition sites. However, fires on the landscape-level occur frequently and generally burn in a mosaic pattern. They do not return to the same acreage frequently.

Mean FRI gets shorter east of MZs 27 and 33. Return interval for fire could be extended by ungulate grazing. Fire return intervals are now occurring more infrequently, e.g. over 50yrs, based on years of personal observation (Sprock et al.).

Prairie dogs would have occurred extensively. But, while there were some very large towns, there were also areas without them. When present, they would likely extend the mean FRI.

Episodic disturbance caused by insect infestation (grasshoppers, range caterpillars, and Mormon crickets).

Large herds of bison, elk, deer, and pronghorn went through this system. The dynamics of the herbivore populations is key to the mean FRI, because it creates a mosaic pattern of heavier and lighter grazed areas.

Currently, there is overgrazing, overstocking, and continuous grazing that creates more shortgrass and increases fire intervals (less fire).

This is a drought tolerant system. However, extended drought (over 3-4yrs) will reduce cover.

Historically, drought and grazing were probably the most important disturbances.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 15 | 100 |  |  |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) |  |  |  |  |
| All Fires | 15 | 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 is a matrix community in areas to the east. In Colorado and western Kansas (Central Shortgrass Prairie Ecoregion), it is considered a large patch system. Mixedgrass prairie can occur in small to large patches. Disturbances also vary in size from small to large patches. Driving variables are climate (drought, low rainfall, etc.), grazing, and, to a lesser extent, fire.

Adjacency or Identification Concerns

This system could be confused with shortgrass prairie. Production is less in shortgrass than in mixedgrass prairie; grasses are taller in mixedgrass prairie. These two systems are intermixed, with the shorter grasses tending further to the west where there is less precipitation (except for the foothills areas).

Mixedgrass and shortgrass can be distinguished by a higher occurrence of blue grama, which would indicate shortgrass. If there is more mixedgrasses (50% or more midgrasses), the system should be considered mixedgrass prairie.

Much of the historic mixedgrass in Colorado has been converted to row crops, cropland, agriculture, transportation corridors, and some shortgrass prairie because of continuous grazing. Agricultural conversion is the primary threat to this system today in New Mexico and Colorado. These were sites for extensive dryland cropping. Abandoned fields are in a different process than that of old field succession with some of the same species.

Some mixedgrass prairie has been converted to shortgrass prairie through continuous livestock grazing. Central Mixedgrass Prairie has also been greatly reduced currently due to agricultural conversion. In Colorado there was historically lower producing mixedgrass, but now it's shortgrass.

While we do not currently have much little bluestem in Colorado, there have been significant stands in the past.

Currently, there are some non-natives like cheatgrass, and kochia, but overall there is not a big invasives problem.

Currently, regardless of whether loamy, clayey or sandy loam soil, long-term continuous grazing changes plant composition to primarily sod-bound shortgrasses such as blue grama. However, this was questioned upon review for MZ27, especially on sandy soils, and where the conversion might be to *Sporobolis cryptandrus* and *Aristida purpurea longiseta* with longer periods of continuous grazing).

Issues or Problems

The successional class model used for this system was adopted from a draft version of a shortgrass system.

Native Uncharacteristic Conditions

When mixedgrass appears like shortgrass with shortgrass species, it is uncharacteristic.

Comments

This model for MZs 27 and 33 was adapted from the draft model for BpS 1149 shortgrass prairie for MZs 27 and 33 created by Terri Schulz, Harvey Sprock, Rich Sterry, Dan Nosal and Keith Schulz, who were also the modelers for 1132. Other modelers for MZs 27 and 33 for 1132 were Keith Schulz, and Randy Reichert. A reviewer for MZs 27 and 33 was Harvey Sprock.

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 | B | B | B | B | B | C | C |
| Herb | 0.5-1.0 | A | A | A | B | B | B | B | B | C | C |
| Herb | >1.0 | A | A | A | B | B | B | B | B | C | C |
| Shrub | 0-0.5 | C | C | C | C | C | C | C | UN | UN | UN |
| Shrub | 0.5-1.0 | C | C | C | C | C | C | C | UN | UN | UN |
| Shrub | 1.0-3.0 | C | C | C | C | C | C | C | UN | UN | UN |
| Shrub | >3.0 | C | C | C | C | C | C | C | UN | UN | UN |
| Tree | 0-5 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 5-10 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 10-25 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 25-50 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | >50 | UN | UN | UN | UN | UN | 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 6 Early Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ARIST | Aristida | Threeawn | Upper |
| VUOC | Vulpia octoflora | Sixweeks fescue | Lower |
| AMBRO | Ambrosia | Ragweed | Upper |
| SPCR | Sporobolus cryptandrus | Sand dropseed | Upper |

Description

Class A is early succession stage. Species include sand and tall dropseed, sixweeks fescue, Red three-awn, ragweed, and annual forbs. Currently, there are non-native annuals in this class, such as cheatgrass and kochia. There might also be non-native bindweed on prairie dog towns today, though not historically. Bare ground was common in this stage, with typical prairie dog towns and buffalo wallows. Today, it might return to crop land.)

Native grazing occurs. Bison inhabit ~5% of this class each year and do not cause a transition.

Fire might occur, but infrequently; the small occurrences are due to low fuels. It doesn't set back succession to zero, in terms of modeling. Fire would be more frequent in mixedgrass than in shortgrass due to higher fuel loads.

This class might move to the next stage more quickly due to higher precipitation levels. Modelers originally kept this age range the same as the original interval as in the draft model for shortgrass for eastern Colorado and western Kansas MZs 27 and 33. (Because of the mapzones of interest and similar large patch systems, modelers wanted it to be similar.) However, because the draft model subsequently changed post-review, the time spent in this class was changed. All modelers were informed and agreed.

Prairie dogs are not as extensive in mixedgrass as in shortgrass in MZs 27 and 33. Higher proportion of this area wouldn't be suitable due to steeper slopes. Prairie dogs were modeled as Option 1 and maintaining this stage.

The composition in class A implies significantly different edaphic conditions from class B, not just fire succession. In fact, it seems more of old-field conditions or long-term prairie dog occupation possibly coupled with drought; *B. curtipendula* would be part of the mix, regardless.

*Maximum Tree Size Class*  
None

Class B 91 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PASM | Pascopyrum smithii | Western wheatgrass | Upper |
| HECO26 | Hesperostipa comata | Needle and thread | Upper |
| SCSC | Schizachyrium scoparium | Little bluestem | Upper |
| BOCU | Bouteloua curtipendula | Sideoats grama | Upper |

Description

This is the historic climax plant community with a mix of short, mid and tall grasses. The mid and tall grasses are much more common in this type than in shortgrass prairie. Species include western wheatgrass, little bluestem, needle and thread, sideoats grama, and, in lesser amounts, blue grama, prairie sandreed (on sandy loam soils), green needle grass (loamy and clayey soils), buffalograss, galleta grass (southern area), fringed sage, fourwing saltbush, winterfat, switchgrass, sand bluestem (eastern part), and big bluestem (western/foothill part).

Because there's higher precipitation in mixed than in shortgrass, taller grasses and higher canopy cover.

Continuous grazing practices currently have turned this more into shortgrass and sod. Continuous, heavy grazing can also bring this class to C, which didn't happen often historically.

Native grazing is frequent but doesn't cause a transition.

Prairie dog impact occurs, taking this class back to a regeneration state.

Replacement fires occur more often in this class. It doesn't set succession back to 0, because grasses come back within 1-5yrs depending on climate following the fire. Fires would occur more frequently in mixedgrass than in shortgrass.

Drought occurs but does not cause a transition.

Currently, there probably isn't this much of class B due to conversion to ag/cropland. Many areas that haven't been converted to row crops have been changed due to continuous grazing currently.

Scattered shrubs that may be present (up to 10%, or up to 1m) include four wing saltbush, winterfat (loamy and clayey sites), Western sandcherry, and yucca (sandy sites).

*Maximum Tree Size Class*  
None

Class C 3 Late Development 2 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| BOGR2 | Bouteloua gracilis | Blue grama | Lower |
| BUDA | Buchloe dactyloides | Buffalograss | Lower |
| OPPO | Opuntia polyacantha | Plains pricklypear | Low-Mid |
| YUGL | Yucca glauca | Soapweed yucca | Upper |

Description

This sod class would have been a very small, localized condition historically; today it would be prevalent. Historically, there would have been small areas of continuous grazing or migration corridors consisting of buffalograss (not on sandy sites) and blue grama sod. Forbs might include scarlet globemallow. Scattered shrubs that may be present include snakeweed, prickly pear cactus, and yucca.

Currently, most of this system is in this class due to continuous livestock grazing practices. This occurs (Option 2) on most of this class annually.

Replacement fires occur infrequently in this class due to lower fuels. They don't set succession back but rather maintain this stage, in terms of modeling.

Prairie dog impact occurs infrequently and would take this class back to a regeneration state.

Drought occurs and might cause a transition back to the historic climax state.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:OPN | 0 | Late1:CLS | 15 |
| Late1:CLS | 16 | Late1:CLS | 999 |
| Late2:CLS | 16 | Late2: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:OPN | Early1:OPN | 0.01 | 100 | No | 0 |
| Native Grazing | Early1:OPN | Early1:OPN | 0.05 | 20 | No | 0 |
| Optional 1 | Early1:OPN | Early1:OPN | 0.1 | 10 | No | 0 |
| Optional 2 | Late1:CLS | Late2:CLS | 0.001 | 1000 | Yes | 0 |
| Optional 1 | Late1:CLS | Early1:OPN | 0.004 | 250 | Yes | 0 |
| Wind or Weather or Stress | Late1:CLS | Late1:CLS | 0.025 | 40 | No | 0 |
| Replacement Fire | Late1:CLS | Late1:CLS | 0.07 | 14 | No | 0 |
| Native Grazing | Late1:CLS | Late1:CLS | 0.7 | 1 | No | 0 |
| Optional 1 | Late2:CLS | Early1:OPN | 0.004 | 250 | Yes | 0 |
| Replacement Fire | Late2:CLS | Late2:CLS | 0.02 | 50 | No | 0 |
| Wind or Weather or Stress | Late2:CLS | Late1:CLS | 0.025 | 40 | Yes | 0 |
| Optional 2 | Late2:CLS | Late2:CLS | 0.9 | 1 | No | 0 |

Optional Disturbances

Optional 1: prairie dogs

Optional 2: continual grazing

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