11410

Northwestern Great Plains Mixedgrass Prairie

BpS Model/Description Version: Aug. 2020

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

Herbaceous

Map Zones

29, 30

Model Splits or Lumps

This Biophysical Setting (BpS) is lumped with 1150.

Geographic Range

This vegetation group covers the northern prairies east of the Rocky Mountains from northcentral Montana to southeastern Montana and northeastern Wyoming.

This BpS occurs in every section throughout map zone (MZ) 20. It occurs predominantly in subsections 331Dh (central and eastern portion) and 331La.

Subsection 331La coincides quite closely to the Brown Central Glaciated Plains MLRA52, as defined by the NRCS. The central and eastern part of 331Dh coincides with Northern Glaciated Plains MLRA. Also -- MLRA 58a includes southeastern Montana. This BpS also resides in MLRA53A Northern Dark Brown Glaciated Plains, Northern Rolling High Plains, MLRAs 58A, B, C, D, and Pierre Shale Plains, MLRAs 60A and 60B.

This system's extent also coincides with EPA Ecoregions Level III and IV, 42-Northern Glaciated Plains, 43n-Montana Central Grasslands, 43m-Judith Basin Grasslands, 43o-Montana Unglaciated High Plains, and 43a-Missouri High Plateau (Woods et al. 2002).

Historically, this BpS could also have extended throughout the subsections for 331Kb, most of d, f, and e; presently, it might be more of a shrub community.

This BpS occurs in every subsection throughout MZs 29 and 30. It occurs predominantly depending on soil types and precipitation zones. It typically does not occur within mountain subsections. Mixedgrass prairie is the dominant vegetation type in the Northern Great Plains Steppe Ecoregion.

For the lump of 1150 Tallgrass Prairie: we would "have to have a fine-tooth comb" to map tallgrass prairie in these MZs. There are individual associations in extreme northeast Montana but not tallgrass communities. There might be 1/4ac of plant associations but not a whole system. It is thought that Tallgrass Prairie 1150 system occurs mostly in eastern Dakotas and Nebraska and maybe just small areas north of the Black Hills. This will not be found in the western part of MZ30 but rather only the eastern part of MZ30 in small patches.

Biophysical Site Description

Elevations range from 1,900-4,000ft or up to 6,500ft in MZ29. The continental climate entails long cold winters, hot summers with low humidity, and strong winds between November through April.

The northwestern part of this BpS is characterized by Chinook winds in winter, commonly resulting in "red belt mortality" in adjacent coniferous forests (Van Fossen, personal communication).

Mean annual precipitation is generally 10-15in with most falling as rain or snow from April through June. The western part of this BpS is characterized by C3-cool-season plants, and the eastern part of the BpS has an increase in abundance of C4-warm season plants, almost to the point of dominance in the plant community.

Occurs ubiquitously across soil types, except alkaline flats. Kinds, amounts, and proportions of plants vary widely relative to soil texture, soil depth, percent slope, and aspect. Bunchgrass communities dominate on shallow soils. Mid, short, and bunchgrass communities comprise the remainder.

Topography is level to sloping.

LANDFIRE National reviewers of this model (B.J. Rhodes, Bill Volk, and John Carlson) for MZ20 stated that this system resides in the soil survey studies done by NRCS and that their original modeling for this effort relied heavily on the Ecological Site Descriptions for MLRA 52 (NRCS 2004), 58A, and 60B (NRCS 2003). However, MLRA 52 is dominantly deep, well-drained clay loam, clay, and loam textures, whereas MLRA 58A and 60B have a significant component of moderately deep and shallow silt loam, silty clay loam, and loam soils (Van Fossen, personal communication). It has been suggested by one reviewer that Glaciated Plains be separated from Northern Rolling High Plains. However, this model was not split as such.

In terms of the tallgrass prairie 1150: From B. Martin: This BpS occurs in little depressional areas with >16in precipitation in the area; in riparian stringers. It is too dry in MZs 29 and 30 for this type to occur but rarely.

Vegetation Description

The vegetation is dominated by cool- and warm-season perennial grasses (50-85% canopy cover). Grama grasses, rhizomatous grasses (western and thickspike wheatgrass, etc.) dominate the visual aspect of the community, though bunchgrasses (bluebunch wheatgrass, needle grasses, etc.) often comprised >50% of the community composition.

The timing of precipitation/precipitation flushes that occur in mid-June through mid-July, going from west to east geographically, result in warm-season grasses that are more prominent versus cool-season grasses as transitioning to east through the precipitation gradient. As we go farther east and north, in Montana and North Dakota, there is more typic ustic moisture regime, frigid temperature regimes. As we go farther west, more aridic ustic frigid. South Dakota more typic ustic; mesic as go farther south (Wyoming, south South Dakota) due to latitudinal gradients and elevational changes. Western (MLRA52) versus Eastern (MLRA53) Glaciated Plains -- typic ustic -- capture timing of precipitation changes. Eastern captures more warm-season grasses. So warm-season grasses, dominated by species such as sideoats grama, little bluestem, sand bluestem in sandy areas, big bluestem, prairie sandreed.

Thickspike wheatgrass (*Elymus macrourus*) (on lighter soils) is also present and western wheatgrass (on heavier soils). CALO can also be a dominant species. Idaho fescue is a community dominant in MZ29 where precipitation is >17in (Ashland Ranger District). Prairie sandreed and upland sedges occupy sandy-textured soils throughout MZs 29 and 30. Bluebunch wheatgrass is more prevalent within Wyoming and eastern Montana in MZ29. Bluebunch only occurs on shallow sites and occurs more on the west. Bluebunch more in MZ20 versus MZ29.

*Carex filifolia* also present but not that prominent.

A diverse array of perennial summer forbs (black samson, scurfpea, prairieclovers, flax, dotted gayfeather, and scarlet globemallow, etc.) occupies 10% of the community.

Shrubs and halfshrubs (Wyoming big sagebrush, silver sagebrush, rabbitbrush, fringed sagewort, western snowberry, etc.) obtain <5% cover. Most of the ground surface is covered, and bare ground is <10% on more mesic sites and 20% on more xeric sites (e.g., glacial till and claypan soils).

The most common shrub is silver sagebrush and resprouts after fire.

In pre-European conditions, there was a component of this BpS that had significant prairie dog impact and was characterized by broom snakeweed, prairie sagewort, sixweeks fescue, and plains pricklypear.

Current conditions are different -- please see Identification Concerns or Issues/Problems boxes.

In terms of the 1150 Tallgrass Prairie: The dominant grass is switchgrass. Big bluestem only occurs in Sidney, MT. We might have 1/4ac of the plant associations -- *andropogon, halii* -- but not a whole system.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PSSP6 | *Pseudoroegneria spicata* | Bluebunch wheatgrass |
| NAVI4 | *Nassella viridula* | Green needlegrass |
| PASM | *Pascopyrum smithii* | Western wheatgrass |
| HECOC8 | *Hesperostipa comata ssp. comata* | Needle and thread |
| SCSC | *Schizachyrium scoparium* | Little bluestem |
| KOMA | *Koeleria macrantha* | Prairie junegrass |
| POSE | *Poa secunda* | Sandberg bluegrass |
| BOGR2 | *Bouteloua gracilis* | Blue grama |

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

Disturbance Description

Grazing by large, concentrated herds of ungulates (bison, elk, pronghorn, and deer) along with aboriginal and natural fire maintained healthy, productive, and diverse grasslands. (This grazing regime is referred to as "Native Grazing" in the VDDT model.) Such grazing may have resulted in heavy defoliation and/or some soil churning but was transitory. Temporary impact followed by rest-recovery time is characteristic. A reviewer stated that ungulate grazing might have limited the potential for replacement fires at times, as there might have been significant areas that couldn't carry a fire for very long periods of time. However, this comment was not input into the model.

A small portion of the landscape was subjected to repeated or prolonged heavy animal impact, including heavy defoliation and repeated soil churning and/or compaction. Such areas included watering points for herds, bison or elk wallows, and prairie dog towns. This heavy animal impact disturbance was modeled as "Optional2" in the VDDT model and includes its impacts in its own class. Repetitive heavy animal impact sends the community to an alternative open successional pathway. This small, prairie-dog-impacted portion of the landscape was also characterized by different grasses (see Veg Description).

Periodic grazing and replacement fire, when it occurred in an intact community, resulted in removal of most of the above-ground biomass but resulted in little mortality and relatively rapid recovery times.

Because MLRA 52 versus MLRA 58A and 60B are physiographically different enough due to soils, etc., response to fire might change in different areas of the MZ (VanFossen, personal communication).

Historically, the fire return interval (FRI) averaged 8-12yrs for the region, but naturally occurring fuel breaks on slopes and badlands probably lengthened the mean interval. Fire-scarred tree rings from areas within and adjacent to the northern Great Plains provide intervals within the 0-35yr range over the past 500yrs (Henderson 2005).

Fuel load recovery times are an alternative means by which to estimate the minimum average return interval for grassland fires, though this approach has not been formally attempted. A general decrease in productivity of ungrazed northern mixedgrass prairie is reported for 1-3yrs post-burn, and litter loads may take 11-16yrs to completely recover (as per various studies) (Henderson 2005). The total standing crop of fuel, combining both current year production and litter, is capable of recovering to pre-burn conditions in 4-8yrs (Shay et al. 2001). Theoretically, for repeated fires to occur without altering long-term grassland productivity and species composition, the mean return interval should be 8yrs or greater (Henderson 2005).

Given a minimum return interval of 0.5yrs, mode of eight years, and 95% probability of a fire occurring within 35yrs, the resulting right-skewed distribution makes possible return intervals >35yrs but probably never longer than 100yrs (Henderson 2005).

A negative exponential distribution probably best describes the historic fire size distribution, with a large number <1ha, median 10-100ha, mean 1,000-10,000ha, and a low frequency of 50,000-1,000,000ha (Henderson 2005).

Grazing and prairie dog towns also reduced fuel loads, fire frequency, size, and intensity, with the most substantial impacts in valley bottom shrublands and grasslands and upland grasslands near water. Historically, the majority of human-caused ignitions were concentrated in spring and fall seasons, while lightning-caused fires were concentrated in late summer. However, in the north central part of Montana, in MZ20, lightning ignitions outside of the mountains are not primarily a late-summer phenomenon but rather a late-spring and early- to mid-summer phenomenon (not much happening after the end of July). Ignitions occur prior to green-up. If fall storms occur with lightning, those will also cause fires -- and are often associated with heavy winds.

The prairie dog towns would have shifted slightly over long periods of time -- becoming more flammable when the dogs move away (or periodically decrease). At their largest expansion periods, prairie dogs would have occupied up to 80% of their potential habitat. So this would have had, periodically, a huge effect on ungulate grazing, fire, and probably soil hydrology changes as they change with litter and dominant species (Lata, personal communication).

The absence of grazing and replacement fire for many years (e.g., 50yrs) would lead to an increased shrub component (snowberry and green ash) in precipitation zones >14in and a buildup of dead grass. (Buildups of litter generally result in decreased diversity and lower basal area of remaining grass plants.) Within 10-14in precipitation zones, Wyoming big sagebrush and silver sagebrush may also increase. Productivity of the grasses is decreased, resulting in greater mortality from smoldering fire.

Mormon crickets, grasshoppers, and Great Plains locust might have had more of an impact in this system than currently defined but unsure of historic impact and frequency (Siddoway).

Drought also occurs somewhat frequently. Some modelers felt it occurred every 30yrs, and some believed it occurred every 5yrs. Short-term precipitation variability may also influence species productivity. Drought periodicities centering around 58yrs were characteristic of southeastern Montana and eastern Wyoming for the last ~300yrs. A 22yr rhythm was characteristic of 1892- 1977 but less clear for 1801-1889 and did not occur in 1714-1801. Ten or more years without drought in any of the four areas occurred once or twice per century (Stockton and Meko 1983). A Northern Great Plains HRV draft study by Judy von Ahlefeldt states that the frequency of droughts was <5yrs in length for 2-300yrs (Weakley 1943).

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 14 | 100 | 2 | 40 |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) |  |  |  |  |
| All Fires | 14 | 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

Historically, natural grazing and fire generally encompassed 100s to 100,000s of acres. Repeated heavy animal impact such as prairie dog towns occurred at the scale of 10s-1,000s of acres, as well as ungulate impacts -- bison.

A negative exponential distribution probably best describes the historic fire size distribution, with a large number <1ha, median 10-100ha, mean 1000-10,000 ha, a low frequency of 50,000-1,000,000ha, and rare outliers >1,000,000ha (Henderson 2005).

Adjacency or Identification Concerns

Areas with similar soils but steeper topography (>15%) are less productive and have a higher dominance of shrubs.

The natural grazing regime has been replaced with domestic livestock grazing that is targeted toward "moderate" grazing intensity. This is often characterized by grazing each year with removal of herbage over an extended period of the growing season without adequate rest and recovery from grazing. This is contrasted with the expected historic shorter, episodic grazing patterns. One result is more structural homogeneity. Under this grazing regime, taller, palatable grasses such as green needlegrass and bluebunch wheatgrass decrease, and short grasses (western wheatgrass, needle-and-thread grass, blue grama, and sandberg bluegrass) increase. Also under this grazing regime, litter may increase (depending on precipitation and intensity of grazing) with the expected results of decreased diversity and decreased vigor of remaining grasses. Only under season-long grazing will warm-season grasses like little bluestem decrease. Season of use and/or twice-over grazing will impact the prevalence of little bluestem and other C4 plants.

Shrubs (Wyoming sagebrush, silver sagebrush, western snowberry, rabbitbrush, and fringed sagewort) increase greatly over the historic plant community. Compare the ecological site description to avoid using a shrub model for historic plant community when considering a grass site that has changed as a result of uncharacteristic grazing or unnaturally long FRIs. Unnaturally long intervals without fire may contribute to an increased shrub component (shrubs might include *Opuntia* spp. and *Yucca* spp. in Nebraska). Xeric sites will experience an increase in sagebrush, whereas western snowberry will increase in mesic areas.

In modern times, invasive grasses such as smooth brome (only in small areas), *Poa pratensis*, crested wheatgrass, and Kentucky bluegrass (Kentucky bluegrass and *Poa pratensis* only in small areas) have become widely established in some areas and are locally abundant and expanding. Other invasive species of concern include spotted, diffuse, and Russian knapweeds, often along roads and stream corridors; leafy spurge and Canadian thistle, along stream corridors; yellow sweetclover; dalmatian toadflax; and annual bromes, including Japanese brome. Dense clubmoss stands are also a problem in this class, as is blue grama -- limiting productivity and diversity in this system.

Long-term high-intensity grazing by domestic livestock without periods of rest and recovery can result in a conversion in the vegetation states from a mid-grass-dominated community to shortgrass-dominated communities (blue grama, sedges, and sandberg bluegrass, buffalograss in southern portions, and junegrass). This should be distinguished from the succession class (Class B), which is influenced more by presence of prairie dog towns -- which have a higher forb component with less of a mid-grass component than the other classes. In species composition, the prairie dog versus domestic grazed communities are very different.

In current conditions, there has also been an increase in the amount of woody vegetation on the plains, particularly increases in snowberry on mesic sites and expansion of ponderosa pine into grasslands and shrublands that were probably maintained in a grassland state under historic fire frequencies. The lack of fire has shifted grassland systems to shrublands or woodlands.

The expansion of ponderosa pine and shrubs, including snowberry, yucca, and pricklypear is noticeable but more so (at least for these species) in the eastern portion of MZs 29 and 30.

This BpS may be similar to the PNVG R4PRMGn from the Northern Plains model zone. Reviewers of this model (Rhodes, Volk, Adams) felt that the Northern Great Plains shrubland might have been a subcomponent of this BpS that was historically limited to less productive soil types and with a much longer fire cycle. However, other reviewers (VanFossen, personal communication) disagreed with that statement and stated that silver sagebrush, in particular, is and has been a natural component of deep, well-drained, productive soils.

In MZ20, historically, this BpS could also have extended throughout the subsections for 331K; in present, 331Kb,most of d, f, and e might be more of a shrub community. Big sagebrush more susceptible to fire and so probably less prevalent historically.

There could well have been areas that were surrounded by prairie dog towns and protected from fire in that way historically. As per Clarke McClung, it occurs as such in Nebraska (Lata, personal communication).

There might be places, as there are farther south and east of MZs 29 and 30, that now have crested wheatgrass as a major component, as it was heavily seeded in the 1930s (Lata, personal communication).

There is more woody species invasion farther east. At 20in precipitation, deciduous trees will invade from the draws; if the area is not burned, the prairie will be lost. In eastern North Dakota and South Dakota, there are trees that will cover up the prairie systems if they are not burned periodically. (But that's the tallgrass prairie, which is almost all agriculture now. Much of the mixedgrass prairie is converted to agriculture today.) That wouldn't occur in the west as much. Trees would be restricted to the microclimate situation or in draws (Martin, personal communication).

When thinking about similarity or departure from historic or uncharacteristic communities at landscape levels, the following situations might be useful to check mapping results against classification and model logic. The major influences on current vegetation composition and structure in the great plains are (diBenedetto, personal communication):

1) Conversion of grassland/shrublands to cropland (uncharacteristic types).

2) Introduction of introduced species, primarily crested wheatgrass, annual bromes, smooth brome, etc., and yellow sweetclover (uncharacteristic type).

3) Shift from mid-grass-dominated grassland communities to shortgrass-dominated communities through season-long heavy grazing (departure from historic, if percentage is outside range of variability). Prairie dog towns would fit into this category. This dynamic can be a response to long-term periodic drought as well (departure from historic range). The mid-grass to shortgrass change is a shift that has occurred historically in response to fluctuating climate (drought, above-normal precip cycles), grazing intensity/recovery. More may be in shortgrass, under current intensive pastoral grazing systems versus migratory grazing patterns that occurred historically. Grazing would shift mid-grass communities to shortgrass-dominated communities (bison may or may not have influenced this, but season-long heavy livestock grazing seems to cause this shift). So a high percentage of the landscape in shortgrass versus mid-grass would indicate a departure.

4) Shift from grassland communities to forest, wooded or shrub-dominated communities in absence of fire (departure or uncharacteristic for grass BpS). This may be a key shift that has occurred or is occurring on the Great Plains along with conversion of rangeland to cropland and planting of exotic grass species (CRP lands). Probably more meaningful in terms of fire disturbance relationships than the shortgrass/mid-grass shift.

With the exception of areas occupied by prairie dog towns, the characteristic late successional communities should be dominated by mid-grass-dominated plant communities. Tallgrass-dominated communities would only occur as unmapped inclusions associated with topo-edaphic positions. Tallgrass-dominated communities include those dominated by prairie sandreed, big bluestem, and prairie cordgrass.

DISTINGUISHING BETWEEN 1132 AND 1141:

This would be difficult to distinguish from BpS 1132. However, 1132 has more tallgrass species that wouldn't grow in Montana. Dominant species in 1132, however, as listed by NatureServe, are dominants in many other systems (Martin, personal communication).

There are slight nuances of the models of 1141 and 1132 that distinguish them, but they are inconsequential in terms of the mean fire return interval and percentages within classes and general functioning of the model. Nuances are due to differing modelers and perspective of disturbances.

The central mixedgrass prairie is not well defined but in general is a transition area between the tallgrass prairie and mixedgrass prairie. There is higher precip and taller grasses than in 1141. There are more shrubby species. 1141 is farther west. And has ARTR2, whereas 1132 has more chokecherry/sumac.

This BpS is easily confused with central mixedgrass prairie (BpS 1132). Main difference is 1132 has higher moisture regime, more tallgrass plants, and lack of fire, resulting in more shrubs and trees.

This wouldn't function differently than 1132. And it wouldn't key out differently (Cooper, personal communication). The only way you might be able to tell this apart is by geography. 1141 is farther west. Also -- chokecherry and sumac in 1132 versus ARTR2 in 1141.

Productivity might be lower in 1141 -- soils generally not quite as deep, less rain, and probably less litter buildup as well, although the higher moisture in 1132 would allow litter to decompose at a faster rate (Lata, personal communication).

Issues or Problems

This BpS covers a large diverse area with relatively little extensive data or published studies for vegetation classification. Fire frequency is based primarily on inference based on understanding of the plant community dynamics and anecdotes or historical research (mostly oral histories) regarding Indian burning.

Due to issues with mapping grass systems and separating out successional classes by height and cover of grasses, this model has been reduced to a two-box model.

Native Uncharacteristic Conditions

With lack of fire, increased shrub or tree cover would be uncharacteristic.

Comments

Model for MZs 29, 20, and 30 was originally adapted from Rapid Assessment model R0PGRn created by Shannon Downey. Model for MZ20 was originally modeled with five boxes -- by Shannon Downey and Steve Cooper. However, during a review session, reviewers (B.J. Rhodes, John Carlson, Rich Adams, and Bill Volk) suggested changes and changed this model to a three-box model. Agreement and input was received from the original modelers. Subsequent review of this model for adjacent MZs by modelers (Jeff DiBenedetto, Brian Martin, Cody Wienk, George Soehn, and Bobby Baker) led to adoption of a different three-box model. After agreement from original modelers and reviewers, this last three-box model is the one that was used for MZ20. Because the original five-box and other three-box models originally developed were abandoned, the details and the changes are not detailed here. Subsequent to s-class review for MZ20, model for MZs 29 and 30 was changed based on mapping constraints. Therefore, model for MZs 29 and 30 is different than that for MZ20 in succession class proportions, age ranges, and cover/height and boxes. Other reviewers for MZs 29 and 30 were Shannon Downey, Jeff Jones, Steve Cooper, and Mary Lata.

Other LANDFIRE National reviewers for this model for MZ20 were Steve Barrett, Mary Manning (USFS), Steve VanFossen (NRCS), and Jon Siddoway (NRCS).

A LANDFIRE National reviewer felt that drought could occur more often (i.e., about every 5yrs) than it was modeled, but because most wanted to model it longer, it was left unchanged.

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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 | B | B | B | B | B | B |
| Herb | 0.5-1.0 | A | A | A | A | B | B | B | B | B | B |
| Herb | >1.0 | A | A | A | A | B | B | B | B | B | B |
| Shrub | 0-0.5 | B | B | UN | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 0.5-1.0 | B | B | UN | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 1.0-3.0 | B | B | UN | UN | UN | UN | UN | UN | UN | UN |
| Shrub | >3.0 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 0-5 | B | B | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 5-10 | B | B | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 10-25 | B | B | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 25-50 | B | B | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | >50 | B | B | 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 26 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PASM | Pascopyrum smithii | Western wheatgrass | Upper |
| HECO26 | Hesperostipa comata | Needle and thread | Upper |
| BOGR2 | Bouteloua gracilis | Blue grama | Upper |
| ARFR | Arenaria franklinii | Franklin's sandwort | Upper |

Description

Class A is the post-fire early-seral stage, combined with the very short-stature vegetation resulting from prairie dog disturbance or repeated high-intensity herbivory or trampling (e.g., watering points, buffalo wallows).

This class may also be a short-term response to severe drought, combined with other impacts (Optional 1 -- but causing a transition all the way back to the beginning). (NOTE: Previously, in MZ20, this class was defined as just a prairie dog stage with the herbivory/trampling and severe drought components -- and defined as a Class B instead of A. But due to mapping constraints and inability of mapping to distinguish grass species and grass heights at a fine level and therefore a prairie dog stage vs. an early successional or mid successional stage, all early post-replacement and very short-stage grasses were placed into this Class A.)

A variety of forb species such as fetid marigold, scarlet globemallow, and curlycup gumweed tend to dominate this class. Common grass species include purple three-awn, buffalo grass, Sandberg bluegrass, blue grama, and western wheatgras. Fringed sagebrush can also be a component of this class.

Also -- this represents the immediate post-disturbance intact historic plant community functioning under grazing and/or fire, dominated by cool- and warm-season rhizomatous perennial grasses, as well as bunchgrasses. Little bluestem, prairie sandreed, and bluebunch wheatgrass occur as dominant species in small patches. Other species in this class are *Artemisia*, grama grasses, western yarrow, and prairie junegrass. Other species might include blue grama and western yarrow. STIPA, PSSP6, and SCSC might also be indicators.

Due to the combination of the prairie dog stage (indicator species: BOGR2, POSE, ARFR, and DYPA) and the early successional stage (indicator species: PASM, NAVI4, HECO26, and BOGR2), the indicator species were combined for this class.

Because this is the post-fire early regeneration stage or a prairie dog stage, this is generally a shortgrass functional group, which are communities dominated by species such as: *poas*, dryland sedges, blue grama, buffalograss, clubmoss, junegrass, and forbs either singly or in combination; may also be characterized by higher bare soil. This might be a shortgrass EVT. A higher proportion of this class on the landscape today would indicate departure.

This class lasts only a few years. If in a prairie dog state, then the class would last longer in order to transition out of it; however, this is accounted for by having a prairie dog disturbance in the model, resetting succession, and keeping it in this class. The current interval attempts to capture what would happen post-fire or post-drought. (Also -- post heavy grazing in current conditions would take longer to transition out of this class.)

Native grazing (bison, pronghorn, and prairie dog) can be locally heavy due to increased succulence of young grasses but keeping it in this stage. This was split 50/50 between native grazing and Optional 2, prairie dog grazing. Prairie dog grazing takes this stage back to the beginning, whereas grazing just occurs without causing a transition.

Replacement fire occurs but not as frequently, due to lack of fuel.

(Note about identifying in current conditions: Long-term high-intensity grazing by domestic livestock without periods of rest and recovery can result in a conversion in the vegetation states from a mid-grass-dominated community to shortgrass-dominated communities [blue grama, sedges, and sandberg bluegrass, buffalograss in southern portions, and junegrass]. This is different in species composition than a prairie dog community. However, for LANDFIRE mapping purposes, it is not possible to distinguish between the different types of short grasses occurring.)

Prairie dog disease is also a potential impact, but because prairie dog stage was combined with early succession, this disturbance was not modeled for MZs 29 and 30.

It is thought that a prairie dog class should comprise ~5-8% of the landscape and no more than 10% (Dan Uresk, personal communication). Research for historical Northern Great Plains vegetation would have prairie dog communities within an early successional stage of max 10-15% across an entire landscape. So only a portion of the early successional stage would be a prairie-dog-type community -- i.e., maybe 5-8%.

*Maximum Tree Size Class*  
None

Class B 74 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PASM | Pascopyrum smithii | Western wheatgrass | Upper |
| NAVI4 | Nassella viridula | Green needlegrass | Upper |
| HECO26 | Hesperostipa comata | Needle and thread | Upper |
| BOGR2 | Bouteloua gracilis | Blue grama | Upper |

Description

Class B represents the intact historic plant community functioning under grazing and/or fire, dominated by taller, cool- and warm-season rhizomatous perennial grasses, as well as bunchgrasses. This is the all-encompassing, mid-late-development, functioning fine stage.

This model was originally created as a three-box model; however, post-s-class-review for an adjacent MZ resulted in a decision to change the model to a simpler version for LANDFIRE mapping constraints.

Little bluestem, prairie sandreed, and bluebunch wheatgrass occur as dominant species in small patches. Other species in this class are *Artemisia*, grama grasses, western yarrow, and prairie junegrass. Other species might include blue grama and western yarrow. STIPA, PSSP6, and SCSC might also be indicators.

Little below-ground mortality occurs after replacement fire, and resprouting of perennial grasses and forbs often occurs within days or weeks, depending on season. Grasses show greater vigor; some forb establishment may occur as a result of exposure of mineral soil. Canopy cover recovers quickly after resprouting.

Shrub species could be present at 0-10% cover. Silver sagebrush and winterfat (on deeper soils) are the most common shrub and would start resprouting. Wyoming big sagebrush can also be a component (on shallower soils) of this BpS, although a small component. Less common would be skunkbush sumac, mostly on slopes and shallow soils.

Club moss might be present in Glaciated Plains at 0-5% cover but not on shallow clay sites or dense clay sites, sands, saline upland, saline lowland, sub-irrigated or wet meadow.

Native grazing by large ungulates could have occurred, including bison grazing. It is likely heavy locally due to increased succulence of young grasses.

Native grazing by prairie dogs could also occur on a small portion of the landscape.

Insect/disease occurs very infrequently. It has been suggested that grasshoppers and Mormon crickets might have a larger impact historically than the probability assigned here. However, unsure of impact and frequency.

With a lack of fire, this class might shift to having more shrubs and tree invasion.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:CLS | 3 |
| Mid1:CLS | 4 | Mid1: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** |
| Optional 1 | Early1:ALL | Early1:ALL | 0.001 | 1000 | No | 0 |
| Wind or Weather or Stress | Early1:ALL | Early1:ALL | 0.03 | 33 | No | 0 |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.05 | 20 | Yes | 0 |
| Optional 2 | Early1:ALL | Early1:ALL | 0.1 | 10 | Yes | 0 |
| Native Grazing | Early1:ALL | Early1:ALL | 0.1 | 10 | No | 0 |
| Insects or Disease | Mid1:CLS | Mid1:CLS | 0.0001 | 10000 | No | 0 |
| Optional 2 | Mid1:CLS | Early1:ALL | 0.001 | 1000 | Yes | 0 |
| Optional 1 | Mid1:CLS | Early1:ALL | 0.001 | 1000 | Yes | 0 |
| Wind or Weather or Stress | Mid1:CLS | Mid1:CLS | 0.0333 | 30 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.083 | 12 | Yes | 0 |
| Native Grazing | Mid1:CLS | Mid1:CLS | 0.2 | 5 | No | 0 |

Optional Disturbances

Optional 1: drought + native bison grazing + small fire portion

Optional 2: prairie dog grazing

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