13850

Western Great Plains Wooded Draw and Ravine

BpS Model/Description Version: Aug. 2020

Updated: 4/20/2018

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

Forest and Woodland

Map Zones

20

Geographic Range

Predominately west of the Missouri River in North Dakota and South Dakota, with minor extensions east of the Missouri River and south into Nebraska and in eastern and southeastern Montana.

It occurs in upland draws and ravines scattered throughout the Northern Mixed Grass Prairie and Northern Great Plains Steppe.

This Biophysical Setting (BpS) is thought to be very limited in abundance within map zone (MZ) 20. This occurs primarily around the island mountain ranges, such as the Highwoods and Little Rockies. Some of these occur around Glasgow, Montana, but are very limited especially in western portion of the map zone. This type occurs in MZ29 and 30 prominently.

This would occur in MZ20 in subsection 331La.

Biophysical Site Description

This BpS occurs in drainage ways that rarely have running water but trap snow during the winter, with extensions onto steep north-facing slopes. It's more common in landscapes with more topographic relief due to hydrology. There is very little running water in these systems, as in Badlands topography. The vegetation type is best developed in topographic conditions that have favorable hydrology; sometimes steeper and deeper depressions have better moisture because of groundwater and snow deposition. This BpS is heavily influenced by topographic situations that produce a combination of deeper soils, supplemental moisture from run-off, and snow catchment. Soils are silty and deep.

In Montana, this system is typically found in narrow ephemeral drainages, usually at the head of the draw but sometimes in downstream areas. There are often features of dissected landscapes, especially in the Little Sheep Mountains near the edge of MZ20, and in those parts of the state included in MZ29.

Vegetation Description

Intricate mix of western grassland and shrubland species, with elements of eastern deciduous woodlands. Northern extent occasionally supports quaking aspen, while southern extent supports Juniper species.

*Berberis repens* also occurs. Other shrubs include *Crataegus* spp, *Ribes* spp and *Prunus americana*.

Other forbs include *Viola canadensis, Smilacina stellata, Galium aparine*, and *Thalictrum* spp.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| FRPE | *Fraxinus pennsylvanica* | Green ash |
| ULAM | *Ulmus americana* | American elm |
| ACNE2 | *Acer negundo* | Boxelder |
| PRVI | *Prunus virginiana* | Chokecherry |
| SYOC | *Symphoricarpos occidentalis* | Western snowberry |
| CASP7 | *Carex sprengelii* | Sprengel's sedge |
| RIBES | *Ribes* | Currant |
| TORY | *Toxicodendron rydbergii* | Western poison ivy |

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

Disturbance Description

The Wooded Draw BpS forms an intimate association with adjacent mixedgrass prairie and shrublands where non-replacement fires through the treed portions are relatively frequent due to productive grass fuel and cycles of moisture and drought. Fires could burn through the tree stands without topkill. Even with topkill of all trees in this system, occasionally the trees regenerate (Peter Lesica, personal correspondence). The regeneration from seeds was not modeled due to lack of data. Only regeneration from stumps is considered for the model. Because seeds of green ash are very strong growers, they could have the same successional stages as regeneration from stumps. However, there are not enough data now.

Information on fire regimes in this system is rare. Fires were probably frequent because they were frequent in the surrounding grasslands. Severity was variable; mortality of green ash probably varied from 0-100%. Green ash is more likely to resprout after fire where it is a deeper, narrower draw in steeper terrain compared to a broad level draw. Resprouting after fire most likely depends on the vigor of the trees, so that young trees or trees with better water relations are more likely to sprout after fire (Lesica, personal communications). Less frequent replacement fires were generally associated with periods of exceptionally high moisture conditions immediately followed by severe dry conditions. More open stands also tend to be drier and are prone to more severe fires.

Native ungulates play a role in stand regeneration on sites where deer and elk concentrate for food, cover and shelter. It is thought that bison did not spend much time in this BpS type due to the topography. Many trees in this system regenerate from sprouts. Deer heavily browse on stump sprouts, select green ash, and rarely forage on snowberry. There is a large interplay between deer populations and vegetation regeneration of trees.

Drought and moist cycles are major factors that interact with both fire and native grazing.

Trees in this BpS often are infected by heart rot resulting in limb breakage. This tends to keep the canopies open where this is prevalent. As one moves west and it gets drier, there is more heart rot; consequently, there are more open stands as one proceeds west (Lesica et al. 2003).

Some flooding disturbances probably occurred. Snowmelt deposits, thunderstorms, and other localized precipitation events promote more regeneration from seeds. Green ash seed recruitment occurs following disturbance because it does well in bare soil.

A reviewer for Rapid Assessment (RA) noted that Rocky Mountain locust eruptions presumably occurred with severe impacts although the frequency of these eruptions is unknown.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 47 | 39 | 30 | 100 |
| Moderate (Mixed) | 50 | 38 |  |  |
| Low (Surface) | 84 | 23 | 10 |  |
| All Fires | 19 | 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

Western stands are usually relatively small (<50ac). Larger areas, 50-100ac, occur infrequently on the eastern edge of distribution. Long, linear corridors could be <50m wide and snake through landscape for many miles. It's not necessarily a continuous system, however. Dendritic scale. This is somewhat like riparian scale.

Fires probably tended to be patchy because of topographic relief.

Adjacency or Identification Concerns

There might be intermediates of this type of green ash draw and cottonwood stands.

Might not burn as well due to over-grazing of adjacent grasslands, although this is speculation.

Poor livestock management and overgrazing causes loss of tree regeneration, reduction of shrub component, and understory dominance by exotic rhizomatous grasses (smooth brome and Kentucky bluegrass). Tree regeneration is less likely in competition with these grasses than in a sedge/forb-dominated native understory. Leafy spurge also occurs.

In the Badlands, this system might start to merge into juniper draws; however, this is not an issue in most areas.

Issues or Problems

Long, linear nature of distribution makes them difficult to map. Consequently, they are often listed as a complex in relatively small-scale mapping efforts.

Native Uncharacteristic Conditions

Comments

This model for MZ20 was adapted from the RA model R4WODR Northern Great Plains Wooded Draws and Ravines created by Jack Butler and Stefanie Wacker and reviewed by John Ortmann. For MZ20, major descriptive and quantitative changes were made in order to represent Montana better. The MZ20 model was changed to a three-box model.

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 | B | B | B | B | B | B | B | B | B | B |
| Tree | 5-10 | C | C | C | C | C | C | C | C | C | C |
| Tree | 10-25 | C | C | C | C | C | C | C | C | C | C |
| Tree | 25-50 | C | C | C | C | C | C | C | C | C | C |
| Tree | >50 | C | C | C | C | C | C | C | C | C | C |

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 20 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| CASP7 | Carex sprengelii | Sprengel's sedge | Lower |
| SYOC | Symphoricarpos occidentalis | Western snowberry | Upper |
| PRVI | Prunus virginiana | Chokecherry | Upper |

Description

This class is dominated by shrubs. Cover averages ~50%, and the minimum cover would never be as low as 0%. In the first year, herbaceous species might dominate. The herbaceous cover is high underneath the shrubs and would probably be 25-50%.

This class is similar to a snowberry rose coulee type. It contains chokecherry, snowberry with a mesic understory of CASP7, various woodland forbs, and poison ivy.

Grazing, which is dependent on weather cycles, would set this stage back to its beginning state Deer select green ash and there is also elk browsing.

Grazing alone was modeled but maintaining the class and not causing a transition.

The fire return intervals (FRIs) are similar to grassland systems. Replacement fire occurs.

*Maximum Tree Size Class*  
None

Class B 15 Mid Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PRVI | Prunus virginiana | Chokecherry | Mid-Upper |
| SYOC | Symphoricarpos occidentalis | Western snowberry | Low-Mid |
| CASP7 | Carex sprengelii | Sprengel's sedge | Low-Mid |
| FRPE | Fraxinus pennsylvanica | Green ash | Lower |

Description

This class is dominated by shrubs and trees and is a mid-development stage. Trees are coming in and growing taller in this stage at about 2/3 of a foot annually. Trees canopy cover of ~30% would be the average (Lesica 2001). This stage reaches approximately 30yrs of age. A true tree canopy has not yet developed.

The FRI is similar to that in a grassland system, although this system might experience somewhat less frequent intervals, as occasionally fires might not burn through this stage. Some replacement fires take out the stand, although this would be less frequent, depending on the year and drought conditions. Some fires might maintain the stand. Most of the fires would be mixed- and low-severity, although the frequency of types would be the same. Larger trees would experience less mortality. During episodes of drought and grazing, fuel for fire would be lacking. Fire was therefore modeled at an overall frequency, but split 30/50/20 percent between low, mixed and replacement fires. The low and mixed fires do not cause a transition to another stage.

The combined effect of drought and grazing was modeled but not causing a transition, and rather maintaining this class.

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

Class C 65 Late Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| FRPE | Fraxinus pennsylvanica | Green ash | Upper |
| PRVI | Prunus virginiana | Chokecherry | Mid-Upper |
| SYOC | Symphoricarpos occidentalis | Western snowberry | Middle |
| CASP7 | Carex sprengelii | Sprengel's sedge | Lower |

Description

This system includes both open and closed stages in this age range. An average canopy closure would be ~50%. Height can be between 40-70ft and approximately 45in DBH (USDA Forest Service 2002), although most mature ash trees in this type in Montana are 20-40ft high with a basal diameter of 20-30in. Tree canopy in this stage is now formed and the system takes on aspects of a woodland instead of a shrubland (the first two classes are more shrub communities).

The FRI is similar to that of a grassland, although this system might experience somewhat less frequent intervals, because fires might not burn through this stage. Although less frequent, some replacement fires and take out the stand, depending on the year and drought. Some fires might maintain the stand. Most of the fires would be mixed- and low-severity, although the frequency of types would be the same. Larger trees would experience less mortality. Fire was therefore modeled but split 30/50/20 percent between low, mixed and replacement fires. The low and mixed fires do not cause a transition to another stage.

The combined effect of drought and grazing was modeled to occur on 10% of this class on the landscape each year, but not causing a transition, rather, maintaining this class.

Disease might occur in this stage, which opens the stand (Lesica et al. 2003). This is more prominent in Montana than in the Dakotas. In the Dakotas, canopy closure could be 90%, whereas in Montana, open canopy would be about 40-45%. The relatively open nature of stands is probably due, in large part, to high rates of heart-rot disease. Disease is not as common further east, in the Dakotas, Nebraska, etc., and as one gets further east into higher precipitation zones. In the east, canopy cover would be higher and more closed. Disease was modeled as occurring on 20% of this class each year and causing no transition, but keeping it a more open stand. It does not cause a transition to another stage (i.e., B), however, because it was questionable as to whether the disease-caused, open, mature stand would be the same as the 9-30yrs old stand.

*Maximum Tree Size Class*  
Very Large >33"DBH

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:ALL | 9 |
| Mid1:ALL | 10 | Late1:ALL | 29 |
| Late1:ALL | 30 | Late1:ALL | 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 | 0.0667 | 15 | Yes | 0 |
| Optional 1 | Early1:ALL | Early1:ALL | 0.1 | 10 | Yes | 0 |
| Native Grazing | Early1:ALL | Early1:ALL | 0.25 | 4 | No | 0 |
| Replacement Fire | Mid1:ALL | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Surface Fire | Mid1:ALL | Mid1:ALL | 0.015 | 67 | No | 0 |
| Mixed Fire | Mid1:ALL | Mid1:ALL | 0.025 | 40 | No | 0 |
| Optional 1 | Mid1:ALL | Mid1:ALL | 0.1 | 10 | No | 0 |
| Replacement Fire | Late1:ALL | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Surface Fire | Late1:ALL | Late1:ALL | 0.015 | 67 | No | 0 |
| Mixed Fire | Late1:ALL | Late1:ALL | 0.025 | 40 | No | 0 |
| Optional 1 | Late1:ALL | Late1:ALL | 0.1 | 10 | No | 0 |
| Insects or Disease | Late1:ALL | Late1:ALL | 0.1 | 10 | No | 0 |

Optional Disturbances

Optional 1: grazing and drought together

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