14950

Western Great Plains Depressional Wetland Systems

BpS Model/Description Version: Aug. 2020

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Vegetation Type

Herbaceous Wetland

Map Zones

30

Geographic Range

This occurs throughout lowland low elevation areas of map zone (MZ)22. These are wetlands that are saline playas. This model might also be used for MZ29. This system is very uncommon in MZ20.

Saline playas are not common in the Montana part of MZ29. However, this habitat does occur both north and west of Billings probably in 331k (Cleland et al. 2007). There may be more playas in the Bighorn basin of Wyoming. For MZ30, there is probably not any playa-type vegetation in northeastern Montana. However, there are some large areas on the Fort Peck Indian Reservation west of Froid that could be this type. These probably do also occur in the Dakotas.

Biophysical Site Description

The closed depression wetland has communities associated with the playa lakes in the southern areas of this province and the rainwater basins in Nebraska characterize this system. They are primarily upland depressional basins. This hydric system is typified by the presence of an impermeable layer such as a dense clay, hydric soil and is usually recharged by rainwater and nearby runoff. They are rarely linked to outside groundwater sources and do not have an extensive watershed. These closed depression wetland sites on the unglaciated great plains (i.e.: not prairie potholes) that are not Western Great Plains Saline Depressions CES303.669 are few and far between in MZ20.

In the open freshwater depression wetland, the system is composed of lowland depressions and also occurs along lake borders that have more open basins and a permanent water source through most of the year except during exceptional drought years. These areas are distinct from Western Great Plains Closed Depression Wetland (CES303.666) by having a large watershed and/or significant connection to the groundwater table. The system includes submergent and emergent marshes, and associated wet meadows and wet prairies. These types can also drift into stream margins that are more permanently wet and linked directly to basin via groundwater flow from/into the pond or lake.

Vegetation Description

In MZ20, vegetation is dominated by sparse to dense cover of graminoids, up to one meter tall, although typically 0.6m or shorter. *Pascopyrum smithii* usually dominates, with *Distichlis spicata*, *Hordeum jubatum*, *Eleocharis acicularis*, or *Eleocharis palustris* almost co-dominant. *Juncus balticus* will be present in areas where water stands for longer after a storm or where flooding occurs. Other graminoids include *Puccinellia nuttalliana*, *Bouteloua gracilis*, *Koeleria macrantha*, and *Hesperostipa comata* (HECO questionable, since it prefers sandy soils, and this type is developed on clay soils). Spartina gracilis has been documented in MZ20 but only in limited areas. Woody plants are rare, except for occassional *Gutierrezia sarothrae*, *Artemisia frigida*, *Artemisia cana*, or *Symphoricarpos occidentalis*. *Sarcobatus vermiculatus* and basin wildrye (*Elymus cinereus*) can also be associated with saline playa vegetation in MT, although they are probably not nearly as common as the listed dominants.

For MZ22, there is inland saltgrass, alkali sacaton, alkali cordgrass and Rocky Mountain glasswort. Vegetation is zones from the center of the depression and is dependent on the gradient of the depression. Other dominant species could be SPGR, SARU and SPAI.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PASM | *Pascopyrum smithii* | Western wheatgrass |
| DISP | *Distichlis spicata* | Inland saltgrass |
| HOJU | *Hordeum jubatum* | Foxtail barley |
| ELAC | *Eleocharis acicularis* | Needle spikerush |
| ELPA3 | *Eleocharis palustris* | Common spikerush |
| JUBA | *Juncus balticus* | Baltic rush |
| PUCCI | *Puccinellia* | Alkaligrass |

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

Disturbance Description

Plant communities providing saltgrass habitat are diverse and exhibit a wide range of fire frequencies. Saltgrass is found in desert shrub communities that have fire return intervals of <35-100yrs+ (Hauser 2006).

Prior to land use changes, grassland communities where saltgrass occurs burned regularly. While there is relatively little fire frequency information available on the time prior to the 1880s, it is estimated that fire occurred every 7-10yrs (Hauser 2006). However, the saltgrass in this biophysical setting (BpS) is in a wetland system and is therefore thought to burn much less frequently. Also, some of the wet clay and salt acts as a fire retardant. There is also little litter in these systems (Roche, pers comm).

Historical fire size is very dependent upon the surrounding vegetation. The minimum would be one acre. The maximum would be around 200ac. The average would be eight or nine. Logic is that if the average playa is about 10ac, the whole thing would rarely burn because of the wetness at the center --so say 80-90% of the playa would burn. Because the surrounding grasslands have an mean fire return interval (MFRI) of 10-20yrs, it was thought that small playas or depressional wetland systems would have similar MFRIs, because the fire would just move over them. However, if the playa/system is larger - i.e.: over an acre, then it would be less likely to burn. Therefore, an overall MFRI, considering both scenarios, was chosen to be 50yrs. This rationale was questioned by a reviewer who thought that the MFRI would be the same as the surrounding grassland or steppe because fire would occur when the playa and grass was dry and would be just as flammable as the uplands. However, many of the plants in these playas aren’t grass and just don’t dry out or don’t burn like grass (Collins and Uno 1983). And also because the MFRI was originally modeled at 100yrs, the lesser 50yrs was retained and not made it even more frequent. Because fire rotation is being considered, the longer interval was retained.

Return interval for fire could be extended by ungulate grazing.

*Spartina gracilis*, when present, can withstand fire because of deep rhizomes. *Sarcobatus* might be the only species that might be killed by fire.

Episodic disturbance is caused by insect infestation (grasshoppers, range caterpillars and Mormon crickets). This was not modeled.

Grazing by native ungulates such as buffalo and antelope can occur. During droughts, ungulates congregate in these areas.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 50 | 100 | 10 | 100 |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) |  |  |  |  |
| All Fires | 50 | 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

Documentation from outside of MZ22 says playas range from 2-800ac with an average of 17ac. For MZ22, big playas are non-existent --so the average would probably be smaller --maybe about 10ac. For MZ20, calling them playas is stretching the definition. We see these little semi-saline playa-type wetlands here and there but they are rarely much more than two acres. However, there are large alkali lakes in parts of the state, although these are much more saline. MZ20 also contains War Horse Lake, a large playa-type lake, Alkali Lake south of Browning as well as some large playas south of Fort Benton (White Lake, Big Lake, Shonkin Lake); all of these are on the order of ca. 1,000ac.

Historical fire size is very dependent upon the surrounding vegetation.

The minimum would be one acre. The maximum would be around 200ac. The average would be eight or nine. Logic is that if the average playa is about 10ac, the whole thing would rarely burn because of the wetness at the center --so say 80-90% of the playa would burn.

Adjacency or Identification Concerns

Adjacent to western great plains shortgrass and mixed-grass prairies, saltgrass meadow, greasewood shrubland, mixed desert shrubland and big sagebrush steppe (Knight 1994).

It would be difficult to confuse this system with others in MZ29, as it is so rarely found in MZ29. Using aerial photography it might be possible to confuse an irrigated pasture for this type. Otherwise there are few wetlands not closely associated with rivers or streams.

Large concentrations of ungulates could increase the percent of the landscape dominated by shrubs and forbs compared with reference conditions. Fire return intervals are now in the range of 30yrs plus.

Since the early 1900s, fire has been excluded and nonnative species such as Japanese brome (*Bromus japonicus*), smooth brome, Kentucky bluegrass, crested wheatgrass (*Agropyron cristatum*) and Canada thistle (*Cirsium arvense*) have taken a strong hold in the Great Plains mixed-grass prairies where saltgrass occurs (Hauser 2006).

*Bromus japonicus* is the most likely exotic to become common in this type. *Halogeton* could be common in Wyoming.

Shallow wetlands have sometimes been plowed and planted to crested wheatgrass in other parts of Montana.

Issues or Problems

Concentrations of ungulates could increase the percent of the landscape dominated by shrubs and forbs compared with reference conditions.

Native Uncharacteristic Conditions

Comments

This model for MZs 29 and 30 was adopted as-is from the same BpS from MZ20 which was reviewed by Linda Vance.

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 | UN | UN | UN | UN | UN |
| Herb | 0.5-1.0 | A | A | A | A | A | UN | UN | UN | UN | UN |
| Herb | >1.0 | A | A | A | A | A | UN | UN | UN | UN | UN |
| 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 | B | B | UN | UN | UN | UN | UN | 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 33 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PASM | Pascopyrum smithii | Western wheatgrass | Upper |
| DISP | Distichlis spicata | Inland saltgrass | Upper |
| HOJU | Hordeum jubatum | Foxtail barley | Upper |
| ELAC | Eleocharis acicularis | Needle spikerush | Upper |

Description

Dominated by resprouts and seedlings of grasses and post-fire associated forbs. Low to medium height with variable canopy cover. For MZ22, indicator species could also be PUCCI and SPAI.

Persists for a few decades and then succeeds to a mid-development closed stage. This long span was questioned by a reviewer. It was stated that the only way this would happen is if there was some pretty heavy livestock grazing.

Fire would cause little change in species composition except possible a temporary decline in *Puccinellia* and *Hordeum* (bunch grasses). However, in the southern end of MZ29, the dry cycles severely limit vegetation establishment; the southern part of MZ29 is drier and saltier, and gets different precipitation patterns, which slows down vegetation recovery compared to other parts of Montana. It takes a long time to get enough cover. It might be warranted that there be a different model for a more northern version, with the model cycling more quickly.

Native grazing and herbivory could be heavy (10% of this class each year).

Replacement fire occurs with somewhat longer than the MFRI of an adjacent grassland community. Since this is a wetland community, it is thought that fire would impact the landscape much less frequently.

*Maximum Tree Size Class*  
None

Class B 67 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PASM | Pascopyrum smithii | Western wheatgrass | Upper |
| DISP | Distichlis spicata | Inland saltgrass | Upper |
| PUCCI | Puccinellia | Alkaligrass | Upper |
| HOJU | Hordeum jubatum | Foxtail barley | Upper |

Description

Scattered shrubs may be present. For MZ22, indicator species could also be SPAI and SARU.

Native grazing and herbivory could be heavy.

Replacement fire occurs with a somewhat longer than the MFRI of an adjacent grassland community. Since this is a wetland community, it is thought that fire would impact the landscape much less frequently.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:CLS | 20 |
| Mid1:CLS | 21 | 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** |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.02 | 50 | Yes | 0 |
| Native Grazing | Early1:ALL | Early1:ALL | 0.1 | 10 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.02 | 50 | Yes | 0 |
| Native Grazing | Mid1:CLS | Mid1:CLS | 0.2 | 5 | No | 0 |

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