14220

Southern Blackland Tallgrass Prairie

BpS Model/Description Version: Aug. 2020

|  |  |  |  |
| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
| Jim Eidson | jeidson@tnc.org | None | None |
| Roger Mangham | rmangham@tnc.org | None | None |
| None | None | None | None |

**Reviewers:** Tim Christiansen and Charlotte Reemts

Vegetation Type

Herbaceous

Map Zones

32, 35, 36, 37

Geographic Range

This Biophysical Setting (BpS) extends through north-central Texas from the Red River to near the southern Gulf Coast bordered by the Coastal Prairie (Kuchler: bluestem-*sacahuista*), to the east bordering and mingling with oak-hickory forest (savanna), in central portions bounded by eastern and western Cross Timbers, to the west bordered by the mesquite-buffalograss and bluestem-grama vegetation types (Kuchler 1964) (text from Masters 2004).

Biophysical Site Description

The main belt of the Blackland Prairie is divided into four narrow, geomorphic areas aligned in a north-south direction. These include -- from west to east -- the Eagle Ford Prairie, the White Rock Cuesta, the Taylor Black Prairie, and the Eastern Marginal Prairie (Montgomery 1993). The soils of the Eagle Ford and Taylor Black Prairies are primarily clays of the order vertisol, while the soils of the White Rock Cuesta are mollisols and the Eastern Marginal Prairie of the order alfisol. Alfisols are the important soil order in the San Antonio prairie, while both alfisols and vertisols are important in the Fayette Prairie. Microtopography such as gilgai on vertisols and mima mounds on alfisols are important microhabitats. Gilgai are shallow microdepressions one to several meters across formed by pedoturbation of montmorillonitic clays. Mima mounds are small circular hills, which are variable in size but may be >1m high and 1-14m across. The origins of mima mounds are not clear and are probably of variable origin (Diamond and Smeins 1993). The climate is warm temperate to subtropical and humid. Precipitation ranges from 762mm on the western edge to 1,016mm on the east (Eidson and Smeins 2001).

Vegetation Description

Little bluestem (*Schizachyrium scoparium*) and Indiangrass (*Sorghastrum nutans*) are frequently dominants on Blackland Prairie alfisols and vertisols. Big bluestem (*Andropogon gerardii*) is of variable importance on vertisols and is frequently a dominant on Blackland Prairie mollisols. Gamagrass-switchgrass (*Tripsacum dactyloides*-*Panicum virgatum*) prairies are associated with bottomland sites throughout the region and are also found on upland sites of the northern main belt vertisols, where they are especially associated with gilgai microtopography. *Silveanus* dropseed-mead’s sedge (*Sporobolus silveanus*-*Carex meadii*) prairies are found over low pH soils of the northern main belt. Little bluestem-brownseed *paspalum* (*S. scoparium*-*Paspalum plicatulum*) prairie is associated with Fayette Prairie alfisols. Each community differs further in secondary florae. For example, eastern forb species such as prairie blazing star (*Liatris pycnostachya*) and largeflower tickseed (*Coreopsis grandiflora*) are largely limited to the alfisols of the Eastern Marginal prairies, while grasses such as hairy grama (*Bouteloua hirsuta*) and seep muhly (*Muhlenbergia reverchonii*), as well as a diversity of species in the genus *Dalea* (prairie clover), are generally found on the mollisols of the White Rock Cuesta (Eidson and Smeins 2001).

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| SCHIZ4 | *Schizachyrium* | Little bluestem |
| SONU2 | *Sorghastrum nutans* | Indiangrass |
| ANGE | *Andropogon gerardii* | Big bluestem |
| TRIPS | *Tripsacum* | Gamagrass |
| PAVI2 | *Panicum virgatum* | Switchgrass |
| SPSI2 | *Sporobolus silveanus* | Silveus' dropseed |
| TRST2 | *Tridens strictus* | Longspike tridens |
| PAPL3 | *Paspalum plicatulum* | Brownseed paspalum |

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

Disturbance Description

The Blackland Prairie was a disturbance-maintained system. Prior to European settlement (pre-1825 for the southern half and pre-1845 for the northern half), important natural landscape-scale disturbances included fire and periodic grazing by large herbivores, primarily bison and, to a lesser extent, pronghorn (*Antilocapra americana*). Infrequent but intense fire combined with short-duration grazing suppressed woody species and invigorated herbaceous prairie species. The latter were adapted to fire and grazing by virtue of maintaining perenniating tissues below ground. It has been suggested that second only to climate, fire has been the most important determinant of the spread and maintenance of grasslands (Anderson 1990). Fire frequency in the pre-settlement Blackland Prairie is unclear but may have occurred at intervals of 1-3yrs (Pyne 1982). The majority of fires in grasslands were stand-replacement fires (topkilling >75% of the grass), with surface fires and mixed fires occurring more frequently in woody stands. Both natural (i.e., lightning strike) and anthropogenic ignition sources are recognized. Bison were probably extirpated from the region by the 1850s (Eidson and Smeins 2001).

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 3 | 92 |  |  |
| Moderate (Mixed) | 169 | 1 |  |  |
| Low (Surface) | 34 | 7 |  |  |
| All Fires | 2 | 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

Stand-replacement fires identified by early settlers are described as ranging over wide areas. It is worth noting that bison impacts to fuel beds would have been eliminated by those mid-1800s descriptions, allowing for more widespread growth of fires. One could estimate this dominant fire type (in the grasslands) to regularly spread from thousands to tens of thousands of acres, moving through uplands between riparian areas. Grazing disturbances likely varied widely with short-duration, high-impact bison herds moving through 1,000s of acres at a time but less frequently than in other areas of the Great Plains. Numerous other grazers were noted, including deer and pronghorn, that would have had more widespread but less intense impacts. Fires through grazed areas would not have spread extensively, unless able to break out into heavier, ungrazed prairie fuel.

Adjacency or Identification Concerns

The modern landscape has been converted to croplands, tame pasture, and urban areas. Natural Heritage surveys suggest only 2% of this BpS cover may have survived to the 21st century. Some pastures may contain native species or warm season grasses that give similar signatures from remote sensing.

Issues or Problems

There is an eastern extension of Blackland Prairie that occurs in southern Arkansas and in Mississippi into Albama. This eastern blackland type is in a higher rainfall area and is smaller in contiguous extent and adjacent to southern woodland cover types. This model type focuses on the contiguous Texas prairies.

Native Uncharacteristic Conditions

The grass and herbaceous types may change due to climate change. If they do change, then the fire regime/cycle may also be changed in the succession classes. The increase of growing degree days could influence flowering plans if pollinators do not also change their cycles with the flowering plants.

Comments

For map zones (MZs) 32 and 35, this model was developed using the RA model R5PRBL -- Blackland Prairie by Blane Heumann (bheumann@tnc.org) and reviewed by Douglas Zollner and Maria Melnechuck. Changes to the description and the model resulted in a change in the model. Suggested reviewers for MZ32 and MZ35 include Dave Diamond (MORAP, Columbia, MO).

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 | B | B | B | B | B | B | B | B | B | B |
| Shrub | 0.5-1.0 | B | B | B | B | B | B | B | B | B | B |
| Shrub | 1.0-3.0 | B | B | B | B | B | B | B | B | B | B |
| Shrub | >3.0 | B | B | B | B | B | B | B | B | B | B |
| Tree | 0-5 | B | B | B | B | C | C | C | C | C | C |
| Tree | 5-10 | B | B | B | B | 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 91 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| SCHIZ4 | Schizachyrium | Little bluestem | Upper |
| ANGE | Andropogon gerardii | Big bluestem | Upper |
| SONU2 | Sorghastrum nutans | Indiangrass | Upper |
| SPAS | <NOT FOUND IN NRCS> | <NOT FOUND IN NRCS> | Upper |

Description

This stage will persist indefinitely with disturbance. Post-replacement herbaceous vegetation with open structure and minimal thatch. Diverse expression of forbs and annual species in the open herbaceous structure. Dominant and characteristic species vary across major soil types. Replacement fire and grazing are the dominant disturbance types. Drought is also an important disturbance factor that can replace this class.

*Maximum Tree Size Class*  
None

Class B 3 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PRRI | Prunus rivularis | Creek plum | Upper |
| CRATA | Crataegus | Hawthorn | Upper |
| ULCR | Ulmus crassifolia | Cedar elm | Upper |
| CELA | Celtis laevigata | Sugarberry | Upper |

Description

This class includes Sugarberry (*C. laevigata*), cedar elm (*U. crassifolia*), honey locust (*Gleditsia triacanthos*), creek plum (*P. rivularis*), and hawthorn (*Crataegus* spp). (Note: these are tree species but are in their shrubby form.) Replacement fire is the dominant disturbance type in this class. Drought is also an important disturbance factor, but it does not replace this class.

*Maximum Tree Size Class*  
None

Class C 6 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| CELA | Celtis laevigata | Sugarberry | Upper |
| ULCR | Ulmus crassifolia | Cedar elm | Upper |
| GLTR | Gleditsia triacanthos | Honeylocust | Upper |
| SMBO | Smelowskia borealis | False candytuft | Lower |

Description

Woodland to forest community. Forms closed mottes scattered throughout the grassland. Replacement fire is a rare event. Mixed and low-intensity fires are more likely. Drought is also an important disturbance type in this system; regular drought maintains this class.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Early1:ALL | 999 |
| Mid1:OPN | 10 | Late1:CLS | 20 |
| Late1:CLS | 21 | Late1: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** |
| Alternative Succession | Early1:ALL | Mid1:OPN | 1 | 1 | Yes | 10 |
| Wind or Weather or Stress | Early1:ALL | Early1:ALL | 0.02 | 50 | No | 0 |
| Native Grazing | Early1:ALL | Early1:ALL | 0.15 | 7 | No | 0 |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.4 | 3 | Yes | 0 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.02 | 50 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.067 | 15 | No | 0 |
| Wind or Weather or Stress | Mid1:OPN | Mid1:OPN | 0.07 | 14 | No | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.33 | 3 | No | 0 |
| Wind or Weather or Stress | Late1:CLS | Early1:ALL | 0.02 | 50 | Yes | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.02 | 50 | Yes | 0 |
| Wind or Weather or Stress | Late1:CLS | Late1:CLS | 0.067 | 15 | No | 0 |
| Mixed Fire | Late1:CLS | Late1:CLS | 0.067 | 15 | No | 0 |
| Surface Fire | Late1:CLS | Late1:CLS | 0.33 | 3 | No | 0 |

References

Anderson, R.C. 1990. The historic role of fire in the North American Grassland. In: L. Wallace and S. Collins [eds.], Fire in tallgrass prairie ecosystem. University of Oklahoma Press, Norman, OK. 8–18.

Diamond, D.D. and F.E. Smeins. 1993. The native plant communities of the Blackland Prairie. In: M.R. Sharpless and J.C. Yelderman, eds. The Texas Blackland Prairie, land, history, and culture. Baylor Univ. Program for Regional Studies, Waco, TX. 66-81.

Eidson, J. and F. Smeins. 2001. Terrestrial ecoregions of North America: a conservation assessment. Island Press, Washington D.C.

Kuchler, A.W. 1964. Potential Natural Vegetation of the Conterminous United States, American Geographical Society, Special Publication No. 36.

Masters, Ron. 2004. Fire Regime Condition Class (FRCC) Interagency Handbook Reference Conditions. Blackland Prairie (Kuchler Type 76 and 88-Fayette Prairie and also San Antonio Prairie which was not mapped by Kuchler) - PRAR6. Available online: http://www.frcc.gov/docs/PNVG/EastNew/PRAR6\_Description.pdf.

NatureServe. 2007. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA, U.S.A. Data current as of 10 February 2007.

Packard, S. and C.F. Mutel. 1997. The Tallgrass Restoration Handbook: For Prairies, Savannahs, and Woodlands. Island Press, Washington, D.C./Covelo, California, USA.

Pyne, S.J. 1982. Fire in America: A cultural history of wildland and rural fire. Princeton, NJ: Princeton University Press.

Texas Parks and Wildlife. 1978. Ecological Regions in Texas. From LBJ School of Public Affairs, Preserving Texas' Natural Heritage. LBJ School of Public Affairs Policy Research Report #31.

Texas Parks and Wildlife. Post Oak Savannah and Blackland Prairie Wildlife Management. 4200 Smith School Road, Austin, TX.

United States Department of Agriculture. Dec. 1981. Alabama, Mississippi, and Arkansas Blackland Prairie. Land Resource Regions and Major Land Resource Areas of the United States. USDA Soil Conservation Service Handbook 296. Pages 97-98.

United States Department of Agriculture. Dec. 1981. Texas Blackland Prairie. Land Resource Regions and Major Land Resource Areas of the United States. USDA Soil Conservation Service Handbook 296. Pages 62-63.

World Wildlife Fund. 2001. Texas blackland prairies (NA0814). Terrestrial ecoregions of North America: a conservation assessment. Island Press, Washington D.C.