**14230**

**Southeastern Great Plains Tallgrass Prairie**

BpS Model/Description Version: Aug. 2020

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**Vegetation Type**

Herbaceous

**Map Zones**

38

**Geographic Range**

This system is found primarily within the Flint Hills of Kansas and the Osage Plains of Oklahoma, ranging into the Ozarks. Found in ECOMAP (Cleland et al. 2007) subsections 251Ea and 251Eb, with scattered outliers to the west and south including the system of prairies and in the undissected portions of the Springfield Plateau region of Arkansas, Oklahoma and Missouri. In MZ38, this system is likely found in subsection 251Fb, Fd and 255Am along the western edge of the Flint Hills.

**Biophysical Site Description**

The alternating shale plains separated by limestone scarps that in a broad sense decrease in elevation in a stairstep pattern, from northwest to southeast. The flatter plains were formerly nearly continuous tallgrass prairie, while the scarped limestone areas were more dissected with bedrock outcrops and a mixture of prairie and savanna (Nigh and Schroeder 2002). Because of the presence of the rocky substrate close to the surface and the rolling topography, this area is relatively unsuitable for agriculture. Most occurrences are on gently to moderately rolling terrace developed predominantly in sandstones and shales of Pennsylvanian age. Soils are moderately fertile to sterile and well-drained. In addition, this region receives an annual precipitation total of two to six inches less than the surrounding regions due to a rainshadow produced by a combination of prevailing western winds and orographic effects.

**Vegetation Description**

Grasses form the matrix of the prairie with big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), prairie cordgrass (*Spartina pectinata*) and switchgrass (*Panicum virgatum)* dominating many Ozark Prairie and woodlands. A rich forb diversity is commonly present and includes *Helianthus* spp. (sunflower genus), panic grasses (*Dichanthelium* spp.), black-eyed susan (*Rudbeckia subtomentosa*), compass plant (*Silphiym laciniatum*), blazing star ((*Liatris* spp.), heath aster (*Symphyotrichum ericoides*), bush clover (*Lespedeza capitata),* goldenrods (*Solidago* spp.) and violet (*Viola pedatifida*) also occur. Wetter areas support a rich diversity of rushes and sedges including *Carex opaca, Carex oklahomensis, Carex buxaumii, Carex scoparia, Carex conjuncta, Carex davisii, Carex arkansasa,* and *Eleocharis tenuis.* Areas of deeper soil, especially lower slopes along draws, slopes and terraces, support indigo (*Baptisia alba* var. *macrophylla*), narrow-leaved blazing star (*Liatris pycnostachya*), and ironweed (*Vernonia missurica*).

Oak grubs characterize that portion of this vegetation sequence that experienced recurring fires in advanced oak regeneration, which stimulates the resprouting response evidenced by the ‘grubs’ or multi-stemmed stump sprouts of shingle oak (*Quercus imbricaria*), black oak (*Q. velutina*), blackjack oak (*Q. marilandica*), and others.

**BpS Dominant and Indicator Species**

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| SCSC | *Schizachyrium scoparium* | Little bluestem |
| ANGE | *Andropogon gerardii* | Big bluestem |
| SONU2 | *Sorghastrum nutans* | Indiangrass |
| PAVI2 | *Panicum virgatum* | Switchgrass |
| LIATR | *Liatris* | Blazing star |
| LECA8 | *Lespedeza capitata* | Roundhead lespedeza |
| SYER | *Symphyotrichum ericoides* | White heath aster |
| QUERC | *Quercus* | Oak |

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

**Disturbance Description**

Fire and grazing constitute the major dynamic processes for this region. Fires were frequent, primarily autumnal and of human origin. The grazing disturbance is considered in this model by reducing the average fire return interval probability in the grassland box. However, as oak-hickory regeneration becomes established, these species become largely fire resistant with age. Surface fires within woodland and forest types reduced duff layers and allowed recruitment of oak-hickory stems.

**Fire Frequency**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 3 | 96 |  |  |
| Moderate (Mixed) | 81 | 3 |  |  |
| Low (Surface) | 491 | 1 |  |  |
| 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**

This type occurs as small patch in map zone (MZ)38 and large patch in the neighboring zones (MZs 42 and 43).

Between 1984 and 2014, 1780 fires burned at least partially within the Southeastern Great Plains Tallgrass Prairie in MZs 38 and 43 (MTBS, 2016). Fires which intersected with Southeastern Great Plains Tallgrass Prairie in MZs 38 and 43 ranged from 10 to 261, 000+ acres in size, with a mean fire size of approximately 4700ac (MTBS, 2016).

**Adjacency or Identification Concerns**

It is distinguished from Central Tallgrass Prairie (CES205.683) by having more species with southwestern geographic affinities and the presence of a thin soil layer over sandstone and shale substrates, although some areas of deeper soils are found within the region, especially on lower slopes, draws, and terraces.

**Issues or Problems**

Although many of the native common plant species still occur, grazing does impact this region. Poor grazing practices can lead to soil erosion and invasion by cool-season grasses such as tall fescue (*Festuca arundinaria*) and smooth brome (*Bromus inermis*).

**Native Uncharacteristic Conditions**

Prairies are grown up in woody vegetation due to fire suppression and/or previous overgrazing. Some prairies today are forb-poor.

For many regions in MZ38 and the western region of MZ43, Eastern redcedar is highly abundant and is encroaching into open prairie at alarming rates due to fire suppression and plantings.

**Comments**

For MZ38 this model was adopted from the same Biophysical Settings (BpS) in MZ44 by Randy Swaty (rswaty@tnc.org). Based on reviewer comments, the fire return intervals were changed; as a result, Randy Swaty is the modeler of record.

***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 | UN | UN |
| Shrub | 0.5-1.0 | B | B | B | B | B | B | B | B | UN | UN |
| Shrub | 1.0-3.0 | B | B | B | B | B | B | B | B | UN | UN |
| Shrub | >3.0 | B | B | B | B | B | B | B | B | UN | UN |
| Tree | 0-5 | B | B | C | C | C | C | C | C | UN | UN |
| Tree | 5-10 | B | B | C | C | C | C | C | C | UN | UN |
| Tree | 10-25 | C | C | C | C | C | C | C | C | 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 96 Early Development 1 - All Structures

*Indicator Species*

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| SCSC | Schizachyrium scoparium | Little bluestem | Upper |
| ANGE | Andropogon gerardii | Big bluestem | Upper |
| SONU2 | Sorghastrum nutans | Indiangrass | Upper |
| PAVI2 | Panicum virgatum | Switchgrass | Upper |

*Description*

Grassland class. Dominated by little bluestem, big bluestem, Indiangrass, prairie cordgrass, and switchgrass. Numerous forbs such as *Helianthus* spp. (sunflower genus), prairie clovers (*Petalostemum* spp.), and coneflowers (*Echinacea pallida* and *Ratibida pinnata*), among many others, were present. Fuel complexes consisted of short- or tall-grass prairie forbs and shrubs with little or no tree regeneration. Replacement fire maintains the class.

Upper Layer Lifeform is not the dominant lifeform. Shrub and tree species are relatively infrequent and, if present, constitute <10% cover in the area.

*Maximum Tree Size Class*  
None

Class B 3 Mid Development 1 - Closed

*Indicator Species*

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| SCSC | Schizachyrium scoparium | Little bluestem | Lower |
| ROSE2 | Rosa setigera | Climbing rose | Middle |
| SAHU2 | Salix humilis | Prairie willow | Upper |
| RHUS | Rhus | Sumac | Upper |

*Description*

This class represents a shrubby prairie. Grass and forb species remain the same as in Class A. Shrub species include climbing rose (*Rosa setigera*); prairie rose (*Rosa caroliniana*); leadplant (*Amorpha canescens*); Prairie willow (*Salix humilis*); smooth sumac (*Rhus glabra*); winged sumac (*Rhus copalina*); rough dogwood (*Cornus drummondii*); persimmon (*Diospyros virginian*a); oak sapplings (*Quercus* spp.) The fuel model in this class starts at a 3; however, with increased leaf litter, the fuel model moves to a 2. Mixed fires and surface fires maintain the class.

*Maximum Tree Size Class*  
None

Class C 1 Mid Development 1 - Open

*Indicator Species*

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUVE | Quercus velutina | Black oak | Upper |
| QUMA3 | Quercus marilandica | Blackjack oak | Upper |
| DIVI5 | Diospyros virginiana | Common persimmon | Upper |
| FRAM2 | Fraxinus americana | White ash | Upper |

*Description*

This tree class is dominted by white ash (*Fraxiunus americana*), persimmon, shingle oak (*Quercus imbricaria*), slippery elm (*Ulmus rubra*), blackjack oak (*Quercus marilandica*), and black oak (*Quercus velutina*). Class B succeeds to C without fire. Trees in this class will be at least 3m tall and will range to 20m tall. The oak trees especially will increase in DBH in the open instead of increasing in height. Surface fire maintains the class. Rare mixed fires and weather/stress events move the class to B. Replacement fires every 40yrs move the class to A.

Add successional class to account for encroachment of Eastern redcedar and the potential for a closed-canopy juniper woodland state in MZ38 and the western region of MZ43. An example of a late development class consisting of closed-canopy juniper woodland is described in BpS 11320–31.

With a fire sensitive species like Eastern redcedar both surface and mixed fires can cause a shift to early (or mid) successional stages depending on patterns of variability in fire severity (Twidwell et al. 2009, 2013). Also, resprouting species such as dogwood can withstand replacement fires therefore, a dogwood dominated area could remain dogwood dominated following replacement fire (Heisler et al. 2004)

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

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Early1:ALL | 999 |
| Mid1:CLS | 10 | Mid1:CLS | 999 |
| Mid1:OPN | 20 | Mid1:OPN | 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:CLS | 0.01 | 100 | Yes | 0 |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.4 | 3 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:CLS | 0.001 | 1000 | Yes | 0 |
| Wind or Weather or Stress | Mid1:OPN | Mid1:CLS | 0.002 | 500 | Yes | 0 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.025 | 40 | Yes | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.042 | 24 | No | 0 |
| Alternative Succession | Mid1:CLS | Mid1:OPN | 0.01 | 100 | Yes | 0 |
| Surface Fire | Mid1:CLS | Mid1:CLS | 0.05 | 20 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.3 | 3 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:CLS | 0.4 | 3 | No | 0 |

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