

15190

East-Central Texas Plains Post Oak Savanna and Woodland

BpS Model/Description Version: Aug. 2020

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Vegetation Type

Forest and Woodland

Map Zones

32, 35, 36, 37

Geographic Range

This Biophysical Setting (BpS) occupies ~5.3 million ha situated between the Blackland Prairies and the east Texas pineywoods. It extends irregularly from the northeast (Bowie County) to southwest beyond the Guadalupe River to Goliad and Wilson Counties (Diggs et al. 2006). Post oak savanna occurs in map zone (MZ) 37: ECOMAP (Cleland et al. 2007) subsections 255Ca, Cc, Cd, Ch.

NOTE: Local experts in MZ37 consider 255Ba and Cf to be Post Oak Savanna instead of Blackland Prairie.

Biophysical Site Description

This BpS generally has sandy to loam alfisol soils that are from moderately acid to neutral (Brown et al. 1969). Rainfall averages 40-45in annually; however, this is interrupted by periodic severe drought (Griffiths and Orton 1968). Historic vegetational conditions were described as chiefly oak savannahs where grasses are climax dominants (Weaver and Clements 1938). The post oak savanna is best described as a gently rolling, moderately dissected woodland plain with elevations from 300-800ft above sea level (Hatch et al. 1999; MacRoberts et al. 2002).

Vegetation Description

Vegetation in this BpS is graminoid-dominated. Dominant species were little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), and indiangrass (*Sorghastrum nutans*), with various annual and perennial forbs. Diggs et al. (2006) and others describe the area as significant areas of savannas, open woodlands, and dense forests of post oak (*Quercus stellata*) and blackjack oak (*Q. marilandica*) with tallgrass understory, i.e., a complex mosaic of plant communities. However, historical accounts suggest that there were also dense woody thickets. These areas were widely spread and existed mostly in the southern region of the post oak savanna (Diggs et al. 2006). Dyksterhuis (1948) classified this as a grassland forest with limited tree diversity and high grass diversity and dominance.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
SCHIZ4	<i>Schizachyrium</i>	Little bluestem

SONU2	<i>Sorghastrum nutans</i>	Indiangrass
ANGE	<i>Andropogon gerardii</i>	Big bluestem
QUMA3	<i>Quercus marilandica</i>	Blackjack oak
CATE9	<i>Carya texana</i>	Black hickory
QUST	<i>Quercus stellata</i>	Post oak

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

Disturbance Description

This BpS is fire regime group I, with frequent surface fires. Fire frequency is considered to be similar to adjacent prairie ecosystems, i.e., 3-5yrs. Fire regimes are assumed to be a result of lightning origin. Fires have been reported to occur during and following drought periods. Mosaic fire or mixed-severity fire is thought to play some role associated with drought cycles where leaves and grass are the primary fuel for carrying a fire. Surface fires were primarily wind-driven fires in open (prairie) conditions over a fuel bed of predominantly grass although occasionally surface fires might have occurred in leaf litter given dry conditions.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	57	8		
Moderate (Mixed)	53	8		
Low (Surface)	5	84		
All Fires	4	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, this BpS existed as a fairly narrow band 40-60km wide, from the Red River to the San Antonio River (it goes into Atascosa County on “Carrizo soils”). It occurred with more closed-canopy savannas occurring on the eastern edge and more open prairies on the west.

Adjacency or Identification Concerns

This BpS occurs adjacent to tallgrass prairie as an ecotone transitioning to deciduous forest.

Issues or Problems

Not much historical data and a highly altered system lead to many inferences at historical scale on this.

Native Uncharacteristic Conditions

Other woody species have taken on more dominance in more recent altered fire regimes. These include cedar elm (*Ulmus crassifolia*), hackberry (*Celtis reticulata*), black hickory (*Carya texana*), honey mesquite (*Prosopis glandulosa*), eastern red cedar (*Juniperus virginiana*), and yaupon (*Ilex vomitoria*), with the latter two severely altering species composition at the landscape scale.

The increase in shrubs may decrease the grassland density, which in turn may increase soil loss under shrubs. Climate forecasts indicate an increase in severe storms with an increase in lightning. Surface fires may increase, which could decrease grass recovery and increase shrub

cover and shrub type. Invasive plant species could become more dominant due to a decrease in native grasses caused by an increase in fire frequency.

Comments

This model was developed in the MZ37 workshop in Shreveport LA (Jan 2007) and then modified in the MZ32 and MZ35 workshop in Austin, TX (April 2007). The model and description are the same for all three zones. Suggested reviewers for MZ32 and MZ35 include Jim Eidson (TNC North Texas FO), Dr. Bruce Hoagland (Natural Heritage Inventory, University of Oklahoma), Carl Frentress (Advanced Ecology LTD, Center, TX), Corey Mason (TPWD, Athens, TX), and Jason Singhurst (TPWD).

Early succession could change due to an increase in invasive plants and a decrease in native species. Height could change and grass cover could decrease with an increase of shrub cover and shrub/grass types.

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	A	A	A	A	A	B	B	B	B	B
Tree	5-10	C	C	C	C	C	B	B	B	B	B
Tree	10-25	D	D	D	D	D	E	E	E	E	E
Tree	25-50	D	D	D	D	D	E	E	E	E	E
Tree	>50	D	D	D	D	D	E	E	E	E	E

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 14 Early Development 1 - All Structures

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
SCHIZ4	Schizachyrium	Little bluestem	All
ANGE	Andropogon gerardii	Big bluestem	All
SONU2	Sorghastrum nutans	Indiangrass	All

Description

Prairie vegetation will dominate throughout this class, and the presence of oaks at this stage will be negligible. When frequent fires, heavy grazing by bison, or other disturbances minimize fire for a several years, or allow for the occurrence of very low-severity fires, oaks will become established. Replacement and mixed fires each occur due to the influence of grazing.

Maximum Tree Size Class

None

Class B	6	Mid Development 1 - Closed
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUST	Quercus stellata	Post oak	Upper
QUMA3	Quercus marilandica	Blackjack oak	Upper
CATE9	Carya texana	Black hickory	Lower

Description

Dense woody thickets of young oak resprouts, growing to trees after sometimes forming mottes. These areas were widely scattered and existed mostly in the southern region of the post oak savanna (Diggs et al. 2006). Surface fire occurs very frequently. Replacement events like fire and drought occur rarely. Mixed fire occurs more often than replacement fire.

Maximum Tree Size Class

Sapling >4.5ft; <5" DBH

Class C	4	Mid Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUST	Quercus stellata	Post oak	Upper
SCHIZ4	Schizachyrium	Little bluestem	Lower
SONU2	Sorghastrum nutans	Indiangrass	Lower
ANGE	Andropogon gerardii	Big bluestem	Lower

Description

Herbaceous is the dominant lifeform.

Prairie vegetation still dominates at this stage. Oaks and hickories have made it to sapling stage, large enough to either survive a surface fire or to quickly resprout following disturbance. Surface fire is the dominant disturbance, every 4yrs. Replacement fire is rare due to the stability of the oak species.

Maximum Tree Size Class

Large 21-33" DBH

Class D	58	Late Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUST	Quercus stellate	Post oak	Upper
SCHIZ4	Schizachyrium	Little bluestem	Lower
SONU2	Sorghastrum nutans	Indiangrass	Lower
ANGE	Andropogon gerardii	Big bluestem	Lower

Description

Herbaceous is the dominant lifeform.

Late seral stages are driven by prairie vegetation; however, large oaks are now present and widely scattered. This is a prairie-dominated system with high grass diversity and low tree density and diversity. Surface fire is the dominant disturbance, every 4yrs. Replacement fire and drought events are rare due to the stability of the oak species.

Maximum Tree Size Class

Large 21-33" DBH

Class E	18	Late Development 1 - Closed
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUST	Quercus stellate	Post oak	Upper
QUMA3	Quercus marilandica	Blackjack oak	Upper
CATE9	Carya texana	Black hickory	Upper

Description

Dense woody thickets of mature oaks, sometimes forming mottes. These areas were widely scattered and existed mostly in the southern region of the post oak savanna (Diggs et al. 2006). Surface fire occurs every 7yrs. Replacement events like fire and drought occur rarely. Mixed fire occurs more frequently.

Maximum Tree Size Class

Large 21-33" DBH

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	0	Mid1:OPN	20
Mid1:CLS	21	Late1:CLS	39
Mid1:OPN	21	Late1:OPN	39
Late1:OPN	40	Late1:OPN	999
Late1:CLS	40	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:CLS	1	1	Yes	10
Replacement Fire	Early1:ALL	Early1:ALL	0.1	10	Yes	0
Mixed Fire	Early1:ALL	Early1:ALL	0.1	10	No	0
Alternative Succession	Mid1:OPN	Mid1:CLS	1	1	Yes	15
Replacement Fire	Mid1:OPN	Early1:ALL	0.003	333	Yes	0
Surface Fire	Mid1:OPN	Mid1:OPN	0.25	4	No	0
Wind or Weather or Stress	Mid1:CLS	Mid1:OPN	0.005	200	Yes	0
Replacement Fire	Mid1:CLS	Early1:ALL	0.005	200	Yes	0
Mixed Fire	Mid1:CLS	Mid1:OPN	0.02	50	Yes	0
Surface Fire	Mid1:CLS	Mid1:CLS	0.15	7	No	0
Alternative Succession	Late1:OPN	Late1:CLS	1	1	Yes	15
Wind or Weather or Stress	Late1:OPN	Early1:ALL	0.002	500	Yes	0
Replacement Fire	Late1:OPN	Early1:ALL	0.004	250	Yes	0
Surface Fire	Late1:OPN	Late1:OPN	0.25	4	No	0
Wind or Weather or Stress	Late1:CLS	Late1:OPN	0.002	500	Yes	0
Replacement Fire	Late1:CLS	Early1:ALL	0.004	250	Yes	0
Mixed Fire	Late1:CLS	Late1:OPN	0.02	50	Yes	0
Surface Fire	Late1:CLS	Late1:CLS	0.15	7	No	0

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