

13080

Cross Timbers Oak Forest and Woodland

BpS Model/Description Version: Aug. 2020

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None	None	None	None

Vegetation Type

Forest and Woodland

Map Zones

38, 43, 44

Geographic Range

This Biophysical Setting (BpS) lies in central parts of Texas, Oklahoma, and Kansas.

Biophysical Site Description

This BpS generally has sandy to loamy Ustalf soils that are moderately deep to shallow (NatureServe 2005). Moderate rainfall region with periodic severe drought (Johnson and Risser 1971, 1973). The vegetation occurs in bands across the landscape and is associated strongly with soil type. Available soil water (dictated by soil depth, texture, and topographic position) also has a major influence on vegetation.

Vegetation Description

Historical accounts describe post-replacement shrub-scrub (early coppice) areas of Cross Timbers in addition to open- and closed-canopy conditions. The Cross Timbers is an ecotone between prairie and eastern deciduous forests. The black-capped vireo's (*Vireo atricapilla*) historic range was associated with the post-replacement Cross Timbers' vegetation type. Washington Irving and others have described areas of Cross Timbers that were evidently mid-seral closed and possibly late-seral closed, because of their inability to penetrate the forest on horseback and their description of the branching present in those stands. Yet others describe stands within the Cross Timbers that were easily traversed via wagon. Based on historical accounts and limited analysis of General Land Office survey data, more closed-canopy conditions occurred on the landscape than might be expected for a frequent fire regime.

The vegetation is dominated by post oak (*Quercus stellata*) and, to a lesser extent, blackjack oak (*Q. marilandica*). In the eastern extent, hickory (*Carya* spp.) and black oak (*Q. velutina*) may be a constituent, with occasional elm (*Ulmus americana*), ash juniper (*Juniperus ashei*) on western extent, and eastern red-cedar (*J. virginiana*) in protected areas. In open conditions, the understory and canopy openings are dominated by big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), Indiangrass (*Sorghastrum nutans*), and various annual and perennial forbs, with prevalence dictated by stand density and overstory canopy cover. In closed-canopy conditions, groundcover has little to no herbaceous cover and is dominated by oak leaf litter. Other important woody plants include chittamwood (*Bumelia lanuginosa*), roughleaf dogwood (*Cornus drummondii*), greenbrier (*Smilax* spp.), sumac (*Rhus* spp.), and poison ivy

(*Toxicodendron radicans*). Dense structure is found from the lower to upper mid-story in closed-canopy conditions, with persistent branches composing much of structure along with numerous small- to medium-diameter stems. In the eastern extent, blueberry (*Vaccinium* spp.) may contribute to lower mid-story structure in closed-canopy stands. The Cross Timbers is generally found within a landscape matrix of tallgrass prairie and/or mixed-grass prairie in the western extents.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
QUST	<i>Quercus stellata</i>	Post oak
QUMA3	<i>Quercus marilandica</i>	Blackjack oak
SCHIZ4	<i>Schizachyrium</i>	Little bluestem
ANGE	<i>Andropogon gerardii</i>	Big bluestem

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 forested ecosystems. The limited information available on fire chronologies is supportive of this assumption. Fire regimes are assumed to be a result of both aboriginal and lightning origin. Fire history studies from southwest Missouri and southeast Oklahoma suggest a mean fire return interval of 3-4yrs. Major drought cycles occur at approximately 20-yr intervals and may influence periodic stand-replacement fire, depending on the season of fire. 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 when 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. Historical prairie fires have been noted to slow down or stop at the border of Cross Timbers vegetation, presumably when leaf moisture was high. Surface fire would penetrate or burn completely through late-seral open stands.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	158	3		
Moderate (Mixed)	94	5		
Low (Surface)	5	92		
All Fires	5	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

The size and connectedness of patches varies, from small patches of 200ac to landscape size of well over 100,000ac.

Adjacency or Identification Concerns

The BpS occurs adjacent to tallgrass or mixed prairie, or within in a landscape matrix with patches of prairie. Oaks encroach into prairie areas of the Cross Timbers without fire. The deep alluvial soils of the bottomlands are not included in this BpS.

Issues or Problems

Areas of Cross Timbers existed in fire shadows at the juncture of rivers or larger streams. In areas that were rocky, these areas may have limited fire influence and were essentially locked up on the landscape in late seral stages (Clark 2003; Clark and Hallgren 2004). These areas varied in canopy closure depending on soil type. Some of these protected areas may have had a high surface rock component with less canopy cover, and soil types with less rock may have been denser with near-complete canopy closure. Little information is available on disturbance and successional history in the Cross Timbers region. Also, lack of historical information makes determining the percentage of landscape in each class difficult.

Native Uncharacteristic Conditions

Comments

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	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN
Herb	0.5-1.0	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN
Herb	>1.0	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN
Shrub	0-0.5	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN
Shrub	0.5-1.0	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN
Shrub	1.0-3.0	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN
Shrub	>3.0	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	0-5	A	A	A	A	A	A	A	A	A	A
Tree	5-10	C	C	C	C	C	C	B	B	B	B
Tree	10-25	D	D	D	D	D	D	E	E	E	E
Tree	25-50	D	D	D	D	D	D	E	E	E	E
Tree	>50	D	D	D	D	D	D	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 15 Early Development 1 - All Structures

Upper Layer Lifeform Is Not the Dominant Lifeform

Initially, grasses are the dominant life form but are rapidly overtaken and shaded out (to some extent) by coppice regeneration. As long as grasses are dominant lifeform, the fire behavior fuel model is 3, but fire behavior fuel model 8 as the class moves toward the later years.

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUST	<i>Quercus stellata</i>	Post oak	Upper
QUMA3	<i>Quercus marilandica</i>	Blackjack oak	Mid-Upper
SCHIZ4	<i>Schizachyrium</i>	Little bluestem	Lower
ANGE	<i>Andropogon gerardii</i>	Big bluestem	None

Description

Oak reproduction (often coppice) to 15ft tall. Community of forbs and perennial grasses. More persistent on shallow soils. Openings may be small to extensive and have scattered live trees. Early on, bluestems are in the upper canopy but are overtaken by the coppice oak sprouts.

Maximum Tree Size Class

Sapling >4.5ft; <5" DBH

Class B	21	Mid Development 2 - Closed
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Upper Layer Lifeform Is Not the Dominant Lifeform

There is an east-to-west decline in average tree height and diameter corresponding to a decreasing moisture gradient. Figures given reflect the central part of the range. As one goes farther west, trees may actually drop a height and size class for minimum and maximum height and size class. Trees do not move up a class going to the east.

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUST	Quercus stellata	Post oak	Upper
QUMA3	Quercus marilandica	Blackjack oak	Mid-Upper

Description

Mid seral with closed-canopy sapling to pole-size oak with little or no herbaceous understory. Often coppice origin. Dense structure is found from the lower to upper mid-story in closed-canopy conditions, with persistent branches composing much of structure along with numerous small- to medium-diameter stems. In the eastern extent, *Vaccinium* spp. may contribute to lower mid-story structure in closed-canopy stands.

Maximum Tree Size Class

Pole 5-9" DBH

Class C	29	Mid Development 1 - Open
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Upper Layer Lifeform Is Not the Dominant Lifeform

There is an east-to-west decline in average tree height and diameter corresponding to a decreasing moisture gradient. Figures given reflect the central part of the range. As one goes

Indicator Species

Description

Maximum Tree Size Class

Class D	25	Late Development 1 - Open
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Upper Layer Lifeform Is Not the Dominant Lifeform

Indicator Species

Description

Maximum Tree Size Class

Class E	10	Late Development 2 - Closed
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Upper Layer Lifeform Is Not the Dominant Lifeform

There is an east-to-west decline in average tree height and diameter corresponding to a decreasing moisture gradient. Figures given reflect the central part of the range. As one goes farther west, trees may actually drop a height and size class for minimum and maximum height and size class. Trees do not move up a class going to the east.

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUST	Quercus stellata	Post oak	Upper
QUMA3	Quercus marilandica	Blackjack oak	Mid-Upper

Description

Late-seral, closed-canopy oak-dominated overstory community. Little to no herbaceous cover and some shrub component. Varying from east to west. Dense structure is found from the lower to upper mid-story in closed-canopy conditions, with persistent branches composing much of structure along with numerous small- to medium-diameter stems. In the eastern extent, *Vaccinium* spp. may contribute to lower mid-story structure in closed canopy stands.

Maximum Tree Size Class

Medium 9-21" DBH

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	0	Mid1:OPN	19
Mid1:OPN	20	Late1:OPN	79
Mid2:CLS	20	Late2:CLS	79
Late1:OPN	80	Late1:OPN	999
Late2:CLS	80	Late2: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	Mid2:CLS	1	1	Yes	10
Replacement Fire	Early1:ALL	Early1:ALL	0.01	100	Yes	0
Mixed Fire	Early1:ALL	Early1:ALL	0.04	25	No	0
Surface Fire	Early1:ALL	Early1:ALL	0.25	4	No	0
Alternative Succession	Mid1:OPN	Mid2:CLS	1	1	Yes	10
Wind or Weather or Stress	Mid1:OPN	Early1:ALL	0.005	200	Yes	0
Replacement Fire	Mid1:OPN	Early1:ALL	0.005	200	Yes	0
Surface Fire	Mid1:OPN	Mid1:OPN	0.25	4	No	0

Competition or Maintenance	Mid2:CLS	Mid2:CLS	0.005	200	No	0
Wind or Weather or Stress	Mid2:CLS	Early1:ALL	0.005	200	Yes	0
Replacement Fire	Mid2:CLS	Early1:ALL	0.007	143	Yes	0
Mixed Fire	Mid2:CLS	Mid1:OPN	0.015	67	Yes	0
Surface Fire	Mid2:CLS	Mid2:CLS	0.05	20	No	0
Alternative Succession	Late1:OPN	Late2:CLS	1	1	Yes	15
Competition or Maintenance	Late1:OPN	Late1:OPN	0.005	200	No	0
Wind or Weather or Stress	Late1:OPN	Early1:ALL	0.005	200	Yes	0
Replacement Fire	Late1:OPN	Early1:ALL	0.005	200	Yes	0
Surface Fire	Late1:OPN	Late1:OPN	0.25	4	No	0
Wind or Weather or Stress	Late2:CLS	Late1:OPN	0.005	200	Yes	0
Replacement Fire	Late2:CLS	Early1:ALL	0.007	143	Yes	0
Competition or Maintenance	Late2:CLS	Late2:CLS	0.01	100	No	0
Mixed Fire	Late2:CLS	Late1:OPN	0.015	67	Yes	0
Surface Fire	Late2:CLS	Late2:CLS	0.05	20	No	0

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