USDA Natural Resources Conservation Service

Ecological site R084AY088OK
Shallow Savannah

Last updated: 9/21/2023
Accessed: 05/11/2025

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 084A–North Cross Timbers

MLRA 84A “North Cross Timbers” is characterized by rolling to hilly uplands with oak trees, bedrock outcrops, and narrow stream valleys. It is believed that the Cross Timbers ecosystem is one the least disturbed forest types remaining in the Eastern US. Major rivers in this MLRA include the Verdigris River in Kansas and the Arkansas, Cimarron, and South Canadian Rivers in Oklahoma. The western parts of this MLRA are underlain by sandstone and shale of Permian age, while the eastern parts are underlain by sandstone and shale of Pennsylvanian age. There are also occurrences of Pleistocene age stream terraces along the rivers.

Classification relationships

This ecological site is correlated to soil components at the Major Land Resource Area (MLRA) level which is further described in USDA Ag Handbook 296.

Level IV EPA Ecoregions 27o “Crosstimbers Transition”, 29a “Northern Crosstimbers”, and 29h “Northwestern Crosstimbers”.

Ecological site concept

These sites occur on shallow soils formed from sandstone parent material. They are on summits and shoulders of low hills The reference vegetation consists of native midgrass and tallgrass species such as little bluestem and big bluestem with an overstory of Post Oak and Blackjack Oak, creating a savannah mosiac ecotype. Woody canopy is variable but averages 30 percent across the site. This plant community is disturbance driven and requires periodic fire to maintain the savannah community. When fire is removed from the system, the site is at risk of encroachment of woody species and buildup of leaf litter, altering the plant community and driving it towards a woodland system with little understory production. Slopes are generally less steep than the Savannah Breaks site and have fewer surface boulders.

Associated sites

R084AY079OK	**Savannah Breaks** Similar soils. >20% slopes with large rock outcrops.
R084AY075OK	**Sandy Loam Savannah** Similar vegetation with deeper soil resources. Generally more productive.

Similar sites

R084AY075OK	**Sandy Loam Savannah** Similar vegetation with deeper soil resources. Generally more productive.
R084AY079OK	**Savannah Breaks** Similar soils. >20% slopes with large rock outcrops.

Table 1. Dominant plant species

Tree	(1) *Quercus stellata* (2) *Quercus marilandica*
Shrub	Not specified
Herbaceous	(1) *Schizachyrium scoparium* (2) *Andropogon gerardii*

Physiographic features

This ecological site occurs on gently sloping to sloping summits and upper sideslopes of cuestas and hills within the Northern Crosstimbers MLRA. Slopes range from 0 to 20 but are typically 5 to 15 percent and rock outcrops are common.

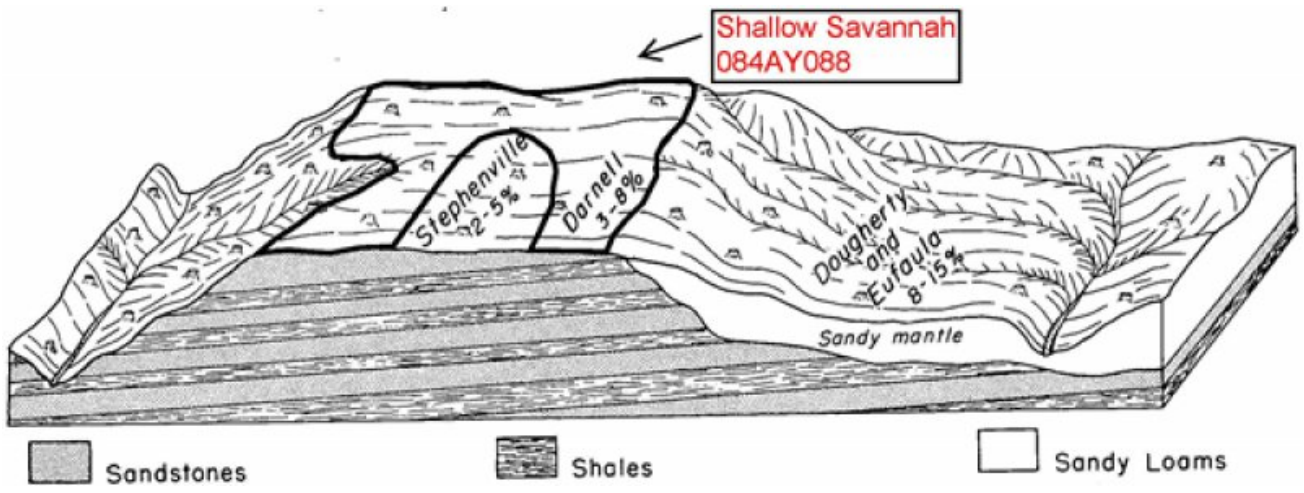


Figure 2. Shallow Savannah

Table 2. Representative physiographic features

Landforms	(1) Hills > Hill (2) Hills > Cuesta
Runoff class	Medium to very high
Elevation	700–1,300 ft
Slope	1–20%
Aspect	Aspect is not a significant factor

Climatic features

Climate is moist sub-humid with annual precipitation ranging from 30 to 45. There will be noticeable differences in precipitation and temperatures from north to south and east to west. The most intense rainfall occurs in late spring and early summer while warm season vegetation is growing rapidly. Frost free and freeze free days increase from north to south. Precipitation increases from west to east.

Table 3. Representative climatic features

Frost-free period (characteristic range)	166-191 days
Freeze-free period (characteristic range)	196-209 days
Precipitation total (characteristic range)	37-42 in
Frost-free period (actual range)	166-195 days
Freeze-free period (actual range)	193-229 days
Precipitation total (actual range)	34-45 in
Frost-free period (average)	179 days
Freeze-free period (average)	205 days
Precipitation total (average)	40 in

Climate stations used

- (1) SEDAN [USC00147305], Sedan, KS
- (2) BARTLESVILLE F P FLD [USW00003959], Bartlesville, OK
- (3) PAWHUSKA [USC00346935], Pawhuska, OK
- (4) BARNSDALL [USC00340535], Barnsdall, OK
- (5) MANNFORD 6 NW [USC00345522], Cleveland, OK
- (6) BRISTOW [USC00341144], Bristow, OK
- (7) CHANDLER [USC00341684], Chandler, OK
- (8) NORMAN 3SSE [USC00346386], Norman, OK
- (9) ADA [USC00340017], Ada, OK
- (10) SEMINOLE [USC00348042], Seminole, OK
- (11) CHICKASHA EXP STATION [USC00341750], Chickasha, OK
- (12) ANADARKO 3 E [USC00340224], Anadarko, OK
- (13) LINDSAY 2 W [USC00345216], Lindsay, OK
- (14) DUNCAN [USC00342660], Duncan, OK
- (15) STILLWATER 5 WNW [USW00053927], Stillwater, OK

Influencing water features

These upland sites are not associated with any riparian or wetland system.

Wetland description

NA

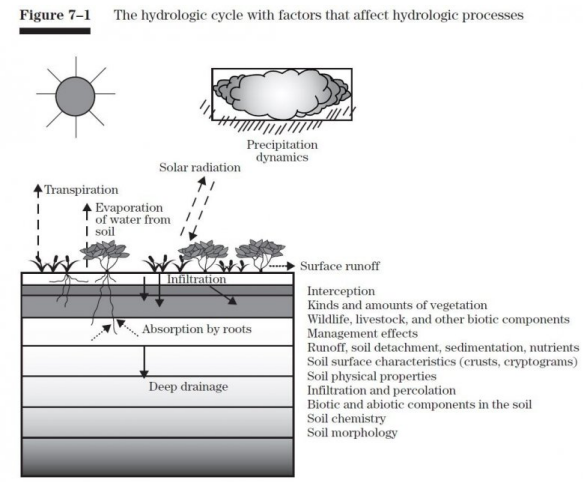


Figure 9.

Soil features

Representative soils: Bigheart, Darnell, Darsil

The soils of this site are shallow sandy loam soils formed over sandstone. The principal productivity limitation is shallow soil depths that limit moisture storage capacity. In areas, stoniness also limits productivity.

Soils are mapped for each county within the MLRA. Mapunits are representations of the major soil series component(s) and named accordingly. Each Mapunit is spatially represented on a digital soils map as polygons of different shapes and sizes. Within these Mapunits, there are often minor soil series components included. These minor components are soils that occur within a Mapunit polygon but are of small extent (15% or less of the Mapunit area). However, it is difficult to separate these minor soils spatially due to the scale of soil mapping.

Ecological sites are correlated at the component level of the soil survey. Therefore, a single Mapunit may contain multiple Ecological Sites just as it may contain multiple soil components. This is important to understand when investigating soils and Ecological Sites. A soil survey Mapunit may be correlated to a single Ecological Site based on the major component; however, there may be inclusional areas of additional Ecological Sites which are correlated to the minor components of that particular soil Mapunit.

Table 4. Representative soil features

Parent material	(1) Residuum–sandstone
Surface texture	(1) Very stony fine sandy loam (2) Gravelly loamy fine sand
Drainage class	Moderately well drained to excessively drained
Permeability class	Moderately slow to moderately rapid
Soil depth	10–20 in
Surface fragment cover <=3"	0–12%
Surface fragment cover >3"	0–35%
Available water capacity (0-40in)	0.8–2.3 in
Calcium carbonate equivalent (0-40in)	0–1%
Electrical conductivity (0-40in)	0–1 mmhos/cm
Sodium adsorption ratio (0-40in)	0–1
Soil reaction (1:1 water) (0-40in)	5.5–7.3

Subsurface fragment volume <=3" (Depth not specified)	0–18%
Subsurface fragment volume >3" (Depth not specified)	0–16%

Ecological dynamics

The reference ecological state is an oak savannah interspersed with tallgrasses, forbs and shrubs. The general aspect of the vegetation is savannah; a grassland with an overstory of scattered trees. The site is predominately tallgrasses and midgrasses, consisting of big bluestem, little bluestem, Indiangrass and switchgrass. Secondary grasses included purpletop, sand lovegrass, purple lovegrass, sand dropseed Canada wildrye and Virginia wildrye. Overstory trees of post oak, blackjack oak and various species of hickory formed a canopy of approximately 15 to 20 percent. However, it is important to note that woody canopy has always varied from 70+ to <10 in a mosaic pattern.Common species of shrubs were smooth sumac, skunkbush, and leadplant. Major legumes included Illinois bundleflower, sessile tickclover, Illinois tickclover, catclaw sensitivebrier, Virginia tephrosia, slender lespedeza, Steuve's lespedeza and roundhead lespedeza.

Grazing and fire are critical elements in maintaining a balance of vegetation types. Without periodic burning, woody plants gradually thicken, further reducing the amount of herbaceous vegetation in the understory. The estimated historical fire return in 2-5 years (Frost 1998). The lack of fire has changed much of the historical ecosystem. On some savannah locations, tree canopies have thickened to the point that only sparse amounts of shade tolerant herbaceous plants remain in the understory. Long term overgrazing by domestic animals, primarily cattle, usually results in a decrease of the tallgrasses and more cattle-palatable forbs and shrubs. These plants are gradually replaced by less palatable plants for domestic grazing stock, but not necessarily less desirable plants for other management goals.

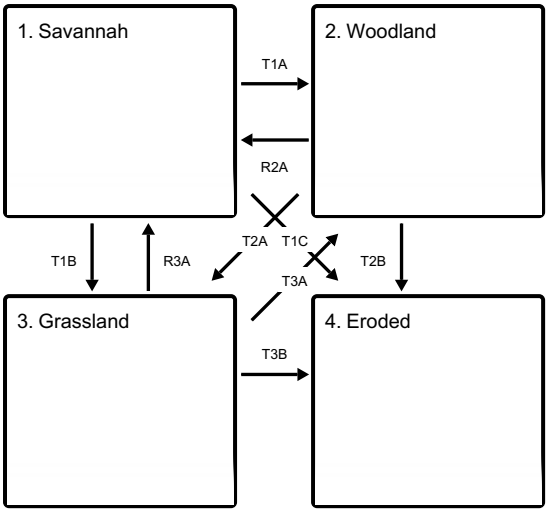
In other areas, eastern redcedar has invaded the site. Seeds of redcedar are usually deposited by birds and germinate in the leaf mulch. Cedar can form an understory component of varying heights and density, but if left unchecked eastern redcedar will eventually completely overtake the site rendering it unproductive and uninhabitable for most animal and bird species. Considerations should be taken regarding removal eastern redcedar before or during canopy thinning treatments to avoid a surge after thinning.

Variations in the timing and intensity of fire can produce different effects on both structure and amount of both woody and herbaceous vegetation. Summer burns, especially in July and August, have the ability to cause changes in woody structure and composition. Late winter and spring fires tend to be effective in keeping smaller woody plants and seedlings in check, but have only minor effects on more mature woody species. Heavy grazing reduces fuel load and, therefore, minimizes the intensity and the effectiveness of fires.

A large number of acres of Savannah sites have had an attempt at clearing woody species through chemical herbicide use. Mid-century use of 2,4,5-T and other similar chemicals led to large areas of timber kill. However, many of these areas re-sprouted into thicker and denser "scrub oak" mottes. More recently, tebuthiuron pellets have been used in attempts to open up more grazable acres for cattle production. Some have had success, however, many times the canopy release leads to secondary invasions by eastern redcedar, sericea lespedeza, and broomsedge bluestem. Careful planning and consideration should be used before attempting chemical application in the cross timbers.

State and transition model

Ecosystem states



T1A - No brush management, No fire

T1B - Chemical brush management, Prescribed burning

T1C - Soil erosion

R2A - Selective thinning, Prescribed burning

T2A - Chemical brush management, Prescribed burning

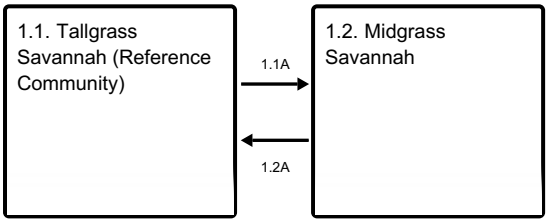
T2B - Soil erosion

R3A - Prescribed burning 4+ year interval, Prescribed grazing

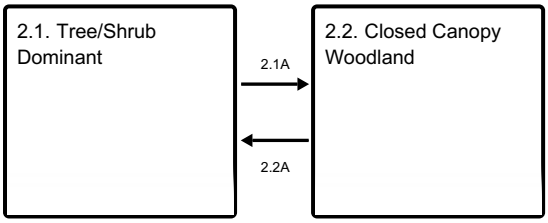
T3A - No fire, No brush management

T3B - Soil erosion

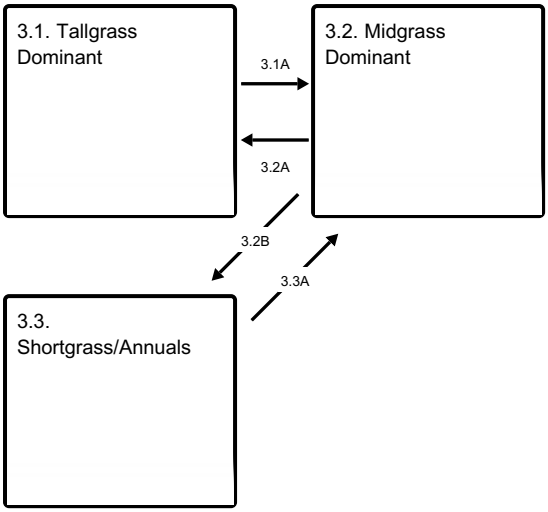
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Savannah

This ecological state consists of native grasses and forbs with an overstory of oak trees. The average canopy coverage of tree species ranges from 20-40%.

Characteristics and indicators. The average canopy coverage of tree species ranges from 20-40%.

Resilience management. Without periodic fire or alternative brush management, woody species may continue to encroach and eventually dominate the site.

Dominant plant species

- post oak (*Quercus stellata*), tree
- blackjack oak (*Quercus marilandica*), tree
- black hickory (*Carya texana*), tree
- coralberry (*Symphoricarpos orbiculatus*), shrub
- saw greenbrier (*Smilax bona-nox*), shrub
- little bluestem (*Schizachyrium scoparium*), grass
- big bluestem (*Andropogon gerardii*), grass
- goldenrod (*Solidago*), other herbaceous

Community 1.1
Tallgrass Savannah (Reference Community)

The Reference Plant Community for this site was formed by the collective influence of fire, herbivory, drought, and extremes of temperature. This site is dominated by a mixture of tall and midgrasses with scattered woody species. The dominant grasses include big bluestem, little bluestem, switchgrass, and indiangrass. The major woody species

are oaks, elms, hickory, sumacs, wild plum, redbud and other understory species. This plant community evolved with a fire frequency of every 3-5 years.

Dominant plant species

- post oak (*Quercus stellata*), tree
- blackjack oak (*Quercus marilandica*), tree
- black hickory (*Carya texana*), tree
- coralberry (*Symphoricarpos orbiculatus*), shrub
- smooth sumac (*Rhus glabra*), shrub
- little bluestem (*Schizachyrium scoparium*), grass
- big bluestem (*Andropogon gerardii*), grass
- goldenrod (*Solidago*), other herbaceous

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	980	2100	2600
Tree	350	480	600
Forb	70	320	400
Shrub/Vine	60	300	375
Total	**1460**	**3200**	**3975**

Figure 11. Plant community growth curve (percent production by month). OK0003, Warm season tallgrasses, forbs, and a few woody species.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	2	6	9	21	24	14	6	11	4	2	1

Community 1.2
Midgrass Savannah

Within this community phase, the more palatable tallgrasses and forbs have decreased. They have been replaced by species such as tall dropseed, silver bluestem, and sideoats grama. The less palatable annual forbs, such as broomweed and western ragweed have increased also. Total herbacious production may remain the same as the reference community, however, the composition has been altered significantly.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	980	2100	2600
Tree	350	480	600
Forb	70	320	400
Shrub/Vine	60	300	375
Total	**1460**	**3200**	**3975**

Figure 13. Plant community growth curve (percent production by month). OK0003, Warm season tallgrasses, forbs, and a few woody species.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	2	6	9	21	24	14	6	11	4	2	1

Pathway 1.1A
Community 1.1 to 1.2

Abusive grazing practices will result in a quick reduction of tall grass species and palatable forbs.

Pathway 1.2A
Community 1.2 to 1.1

Through a properly implemented prescribed grazing system that includes some degree of growing season rest, this community phase may be reverted to the reference plant community. The length of deferment and time required for this restoration is dependent upon precipitation and management system used.

State 2
Woodland

This vegetative state is composed of an overstory of trees and shrubs that will slowly eliminate most herbaceous vegetation from the plant community if left unchecked.

Characteristics and indicators. The major species are post oak and black jack oak with elm, hackberry and eastern redcedar.

Resilience management. There is a high potential for encroachment by eastern redcedar in this ecological state if proper management is not applied.

Dominant plant species

- blackjack oak (*Quercus marilandica*), tree
- post oak (*Quercus stellata*), tree
- sugarberry (*Celtis laevigata*), tree
- American elm (*Ulmus americana*), tree
- saw greenbrier (*Smilax bona-nox*), shrub
- sedge (*Carex*), grass
- Canada wildrye (*Elymus canadensis*), grass
- poverty oatgrass (*Danthonia spicata*), grass

Community 2.1
Tree/Shrub Dominant

This plant community is composed of an overstory of post oak and blackjack oak. There are occasional elm, hackberry, and hickory also. The understory is composed of buckbrush, sumac, and other shrubby woody plants. The grasses include shade tolerant species such as Canada wildrye, nimblewill, and others. Some warm season grasses occur where sunlight penetrates the overstory. Forbs include ironweed, goldenrod, and others. Woody canopy has increased greater than 35 percent.

Figure 14. Plant community growth curve (percent production by month). OK0006, MLRA 84A, Oak/Cedar. Mature oak overstory .

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	3	5	10	18	25	10	5	8	5	4	5

Community 2.2
Closed Canopy Woodland

This plant community is composed of an overstory of mature post oak and blackjack oak with a midstory of eastern redcedar. Birds sit in the oak trees and through defecation, deposit eastern redcedar seeds into the leaf litter. The leaf litter makes an ideal site for winter germination of the cedar. There is very little herbaceous plant cover. Herbaceous cover is represented by shade tolerant species such as Canada wildrye and Scribner's panicum. Some warm season grasses include little bluestem, purpletop, and big bluestem where sunlight is sufficient. Goldenrod, sagewort, and ragweeds are the main forb components.

Pathway 2.1A
Community 2.1 to 2.2

Tree/Shrub Dominant **Closed Canopy Woodland**

In the absence of fire or brush managment, the trees and shrubs in this plant community will continue to out-compete the herbaceous vegetation for sunlight and resources. With time, it will become a closed canopy woodland community.

Pathway 2.2A
Community 2.2 to 2.1

Closed Canopy Woodland **Tree/Shrub Dominant**

Through a program of brush management and prescribed fire, the closed canopy plant community can be reverted to the tree/shrub dominant community. This pathway can be accomplished by opening the canopy and allowing more sunlight to reach the soil surface.

State 3
Grassland

In this state, the shallow savannah has been transitioned to an open grassland dominated by tallgrasses and forbs.

Resilience management. Without management, this state may return to a savannah state within a short time. It is important to note that maintaining this state will require significant inputs.

Dominant plant species

- little bluestem (*Schizachyrium scoparium*), grass
- big bluestem (*Andropogon gerardii*), grass
- broomsedge bluestem (*Andropogon virginicus*), grass

Community 3.1
Tallgrass Dominant

This community is dominated by tallgrass species such as little bluestem, big bluestem, switchgrass, and indiangrass. Some perenial forbs may persist, deopending on the herbicide used on the oak trees. Grazing management plays a key role in the maintenance of this plant community. If tebuthiuron pellets are used to control woody species, it is important to rememeber that there is a period of years following treatment that it is inadvisable to burn. Therefore special caution should be taken when stocking pastures to ensure that the tallgrass community remains dominant. Other invaders such as sericia lespedeza and eastern redcedar also thrive once released from the oak canopy.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1000	2100	2800
Forb	70	250	400
Tree	50	100	200
Shrub/Vine	20	50	100
Total	**1140**	**2500**	**3500**

Figure 16. Plant community growth curve (percent production by month). OK0006, MLRA 84A, Oak/Cedar. Mature oak overstory .

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	3	5	10	18	25	10	5	8	5	4	5

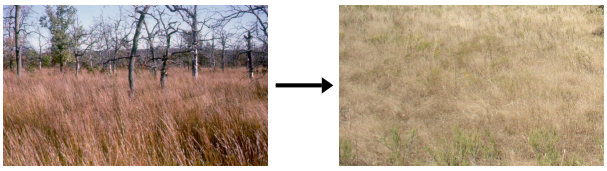
Community 3.2
Midgrass Dominant

This community is dominated by less palatable midgrass species. Abusive grazing has resulted in the decline of palatable tallgrasses and forbs. Little bluestem will persist, along with dropseed species, silver bluestem, native lovegrasses, sideoats grama, and broomsedge bluestem(in eastern portions of MLRA). Annual forbs increase in abundance. Total site production may be similar to community 3.1 but composition has change significantly.

Community 3.3
Shortgrass/Annuals

This community is the result of long term abusive grazing. The plant community consists some perennial shortgrass species, a large amount of annual grasses and forbs, and increased bare ground. Over time this site will become susceptible to water erosion. There is very little grazing or wildlife value remaining on this site.

Pathway 3.1A
Community 3.1 to 3.2



Tallgrass Dominant **Midgrass Dominant**

Abusive grazing can push this tallgrass dominated plant community towards a community that is dominated by less palatable midgrass species.

Pathway 3.2A
Community 3.2 to 3.1

Midgrass Dominant **Tallgrass Dominant**

Through a properly implemented prescribed grazing system that includes some degree of growing season rest, this community phase may be reverted to the reference plant community. The length of deferment and time required for this restoration is dependent upon precipitation and management system used.

Pathway 3.2B
Community 3.2 to 3.3

If grazing management is not altered, this site will continue to decline. Long term abusive grazing will push this site to a plant community of shortgrasses and annuals.

Pathway 3.3A
Community 3.3 to 3.2

It can be difficult to shift this site to another grassland community. Long term rest will be required to allow tall and midgrasses to re-establish. The length of deferment and time required for this restoration is dependent upon precipitation and management system used.

State 4
Eroded

This state is the result of water erosion over bare soil. Most of the "A" horizon of the soil profile has been displaced. The remaining subsoil is very low in fertility. Some native grasses and forbs will persist in this state, however, production is greatly reduced. The return of soil properties to reference condition may not be achievable, post cultivation. Range planting can be used to establish reference vegetation, however, this restoration effort may take many years.

Dominant plant species

- silver beardgrass (*Bothriochloa laguroides*), grass
- threeawn (*Aristida*), grass

Transition T1A
State 1 to 2

In the absence of fire or brush management, this savannah state will transition to a woodland state of tree/shrub dominance.

Transition T1B
State 1 to 3

Through intensive chemical brush management, the savannah state may be transitioned to a grassland state dominated by tallgrasses or midgrasses with very few trees and shrubs. It is important to note that maintaining this state will require significant inputs.

Transition T1C
State 1 to 4

If this ecological site is subjected to soil disturbances such as land clearing, ripping, or plowing that leave large amounts of exposed soil, the site may become very susceptible to water erosion. Once the "A" horizon has been displace through erosion, this site has transitioned to an Eroded Sate.

Restoration pathway R2A
State 2 to 1

Implementing a brush management plan that includes mechanical thinning and the use of prescribed fire can restore the woodland state to an open canopy savannah state.

Transition T2A
State 2 to 3

Through intensive chemical brush management, the woodland state may be transitioned to a grassland state dominated by tallgrasses or midgrasses with very few trees and shrubs. It is important to note that maintaining this state will require significant inputs.

Transition T2B
State 2 to 4

If this ecological site is subjected to soil disturbances such as land clearing, ripping, or plowing that leave large amounts of exposed soil, the site may become very susceptible to water erosion. Once the "A" horizon has been displace through erosion, this site has transitioned to an Eroded Sate.

Restoration pathway R3A
State 3 to 1

This state may be restored to the savannah state with the exclusion of chemical brush management. However, a prescribed fire program must be imoplemented to control resprouting woody species and maintain an open savannah canopy. Otherwise, the site could transition to the woody dominated state.

Transition T3A
State 3 to 2

In the absence of fire or brush management, this grassland state will transition to a woodland state of tree/shrub dominance.

Transition T3B
State 3 to 4

If this ecological site is subjected to soil disturbances such as land clearing, ripping, or plowing that leave large amounts of exposed soil, the site may become very susceptible to water erosion. Once the "A" horizon has been displace through erosion, this site has transitioned to an Eroded Sate.

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Tallgrasses**			336–890	
	Indiangrass	SONU2	*Sorghastrum nutans*	187–495	–
	big bluestem	ANGE	*Andropogon gerardii*	187–495	–
	switchgrass	PAVI2	*Panicum virgatum*	140–370	–
2	**Little Bluestem**			420–1115	
	little bluestem	SCSC	*Schizachyrium scoparium*	420–1115	–
3	**Wildryes**			75–200	
	Canada wildrye	ELCA4	*Elymus canadensis*	75–200	–
4	**Mid/Shortgrasses**			150–400	
	dropseed	SPORO	*Sporobolus*	93–250	–
	purpletop tridens	TRFL2	*Tridens flavus*	70–185	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	70–185	–
	blue grama	BOGR2	*Bouteloua gracilis*	70–185	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	70–185	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	47–125	–
	sand lovegrass	ERTR3	*Eragrostis trichodes*	47–125	–
	cylinder jointtail grass	COCY	*Coelorachis cylindrica*	35–93	–
	tufted lovegrass	ERPEP2	*Eragrostis pectinacea var. pectinacea*	25–62	–
Forb					
5	**Forbs**			35–200	

5	**Forbs**			35–200	
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	10–65	–
	prairie sagewort	ARFR4	*Artemisia frigida*	10–65	–
	blacksamson echinacea	ECAN2	*Echinacea angustifolia*	10–65	–
	ashy sunflower	HEMO2	*Helianthus mollis*	10–65	–
	dotted blazing star	LIPU	*Liatris punctata*	10–65	–
	fringeleaf wild petunia	RUHU	*Ruellia humilis*	10–65	–
	goldenrod	SOLID	*Solidago*	10–65	–
6	**Legumes**			35–200	
	leadplant	AMCA6	*Amorpha canescens*	60–100	–
	prairie clover	DALEA	*Dalea*	10–65	–
	lespedeza	LESPE	*Lespedeza*	10–65	–
	Nuttall's sensitive-briar	MINU6	*Mimosa nuttallii*	10–65	–
	ticktrefoil	DESMO	*Desmodium*	10–65	–
	prairie clover	DALEA	*Dalea*	30–50	–
	zarzabacoa comun	DEIN3	*Desmodium incanum*	30–50	–
	lespedeza	LESPE	*Lespedeza*	30–50	–
	Nuttall's sensitive-briar	MINU6	*Mimosa nuttallii*	30–50	–
Shrub/Vine					
7	**Minor Shrubs**			20–125	
	leadplant	AMCA6	*Amorpha canescens*	6–38	–
	Virginia creeper	PAQU2	*Parthenocissus quinquefolia*	6–38	–
	greenbrier	SMILA2	*Smilax*	6–38	–
	western poison ivy	TORY	*Toxicodendron rydbergii*	6–38	–
	grape	VITIS	*Vitis*	6–38	–
8	**Major Shrubs**			40–250	
	New Jersey tea	CEAM	*Ceanothus americanus*	20–125	–
	plum	PRUNU	*Prunus*	20–125	–
	sumac	RHUS	*Rhus*	20–125	–
	coralberry	SYOR	*Symphoricarpos orbiculatus*	20–125	–
	blackberry	RUBUS	*Rubus*	15–95	–
	dwarf chinquapin oak	QUPR	*Quercus prinoides*	14–88	–
Tree					
9	**Trees**			350–600	
	blackjack oak	QUMA3	*Quercus marilandica*	220–375	–
	post oak	QUST	*Quercus stellata*	220–375	–
	American elm	ULAM	*Ulmus americana*	36–63	–
	black hickory	CATE9	*Carya texana*	36–63	–
	eastern redbud	CECA4	*Cercis canadensis*	36–63	–

Table 9. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)	Diameter (In)	Basal Area (Square Ft/Acre)
Tree							
blackjack oak	QUMA3	*Quercus marilandica*	Native	–	10–25	–	–
post oak	QUST	*Quercus stellata*	Native	–	10–25	–	–
black hickory	CATE9	*Carya texana*	Native	–	1–5	–	–

Table 10. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)

Table 11. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1				700–850	
	Indiangrass	SONU2	*Sorghastrum nutans*	300–400	–
	big bluestem	ANGE	*Andropogon gerardii*	300–400	–
	switchgrass	PAVI2	*Panicum virgatum*	200–300	–
2				700–800	
	little bluestem	SCSC	*Schizachyrium scoparium*	700–800	–
3				140–160	
	Canada wildrye	ELCA4	*Elymus canadensis*	140–160	–
4				150–384	
	sideoats grama	BOCU	*Bouteloua curtipendula*	100–150	–
	blue grama	BOGR2	*Bouteloua gracilis*	100–150	–
	purpletop tridens	TRFL2	*Tridens flavus*	100–150	–
	sand lovegrass	ERTR3	*Eragrostis trichodes*	50–100	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	50–100	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	80–100	–
	tufted lovegrass	ERPEP2	*Eragrostis pectinacea var. pectinacea*	30–50	–
Forb					
5				50–288	
	prairie sagewort	ARFR4	*Artemisia frigida*	30–50	–
	blacksamson echinacea	ECAN2	*Echinacea angustifolia*	30–50	–
	ashy sunflower	HEMO2	*Helianthus mollis*	30–50	–
	dotted blazing star	LIPU	*Liatris punctata*	30–50	–
	fringeleaf wild petunia	RUHU	*Ruellia humilis*	30–50	–
	goldenrod	SOLID	*Solidago*	30–50	–
6				20–112	
	leadplant	AMCA6	*Amorpha canescens*	30–50	–
	prairie clover	DALEA	*Dalea*	30–50	–
	zarzabacoa comun	DEIN3	*Desmodium incanum*	30–50	–
	lespedeza	LESPE	*Lespedeza*	30–50	–

Shrub/Vine					
7				20–100	
	New Jersey tea	CEAM	*Ceanothus americanus*	10–30	–
	Virginia creeper	PAQU2	*Parthenocissus quinquefolia*	10–30	–
	plum	PRUNU	*Prunus*	10–30	–
	dwarf chinquapin oak	QUPR	*Quercus prinoides*	10–30	–
	sumac	RHUS	*Rhus*	10–30	–
	blackberry	RUBUS	*Rubus*	10–30	–
	greenbrier	SMILA2	*Smilax*	10–30	–
	roundleaf snowberry	SYRO	*Symphoricarpos rotundifolius*	10–30	–
	western poison ivy	TORY	*Toxicodendron rydbergii*	10–30	–
	grape	VITIS	*Vitis*	10–30	–
Tree					
8				50–200	
	blackjack oak	QUMA3	*Quercus marilandica*	50–75	–
	post oak	QUST	*Quercus stellata*	50–75	–
	American elm	ULAM	*Ulmus americana*	30–50	–
	black hickory	CATE9	*Carya texana*	30–50	–
	eastern redbud	CECA4	*Cercis canadensis*	30–50	–

Animal community

This plant community has value for grazing cattle. It also provides cover and food for many species of wildlife including whitetail deer and bobwhite quail. Coyote, red fox, squirrel, cottontail rabbit, opossum and raccoon are common. Numerous song birds and woodpeckers may be found on the site.

Hydrological functions

The water cycle on this site functions to the existing plant community and the management of that plant community. The water cycle is most functional when the site is dominated by tall bunchgrasses. As ground cover decreases, sediment loss may increase.

Recreational uses

Savanna sites offer scenic opportunities for outdoor recreation including photography, trail rides, camping, and hunting.

Wood products

Firewood is the major wood product from this site. This site index is not sufficient to support commercial harvest.

Other products

NA

Other information

NA

Inventory data references

Clipping data and other observations on file in the Oklahoma NRCS State Office:
Suite 206
100 USDA
Stillwater, Oklahoma 74074

The original information presented here was derived from field observations of Dr. Jack Eckroat, in the summer of 2007, correlated to office files and old Range Site Technical Descriptions (1961 USDA/SCS). Species compositions are as complete as possible. Production will vary by species from within years, from year to year, and from site to site.

Type locality

Location 1: Osage County, OK	
Township/Range/Section	T26N R10E S12
General legal description	State Park

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Approval

Bryan Christensen, 9/21/2023

Acknowledgments

Site Development and Testing Plan:

Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document. Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	Colin Walden, Brandon Reavis
Contact for lead author	100 USDA, Suite 206, Stillwater, OK. 74074
Date	05/28/2020
Approved by	Brandon Reavis
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** There are few, if any, rills (then no more than 2” wide and 4” deep) and there is no active headcutting and sides are covered with vegetation.

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2. **Presence of water flow patterns:** There is slight evidence of water flow patterns around vegetation, particularly after significant rain events, but water generally flows evenly over the entire landscape.

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3. **Number and height of erosional pedestals or terracettes:** No pedestals or terracettes under reference conditions.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** There is some variability, but it should average <25% bare ground on this site. Bare areas are small and not connected.

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5. **Number of gullies and erosion associated with gullies:** No gullies under reference condition. Some evidence of geological erosion.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** No wind erosion on site.

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7. **Amount of litter movement (describe size and distance expected to travel):** Uniform distribution of litter. Litter rarely moves >12 inches on flatter slopes and may be as much as doubled on steeper slopes, then only during high intensity storms.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Average of scores 5 or higher.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A horizon 0 to 6 inches; reddish brown very gravelly silty clay loam, dark reddish strong medium granular structure. B horizon: 6 to 28 inches; reddish brown silty clay loam, reddish brown moderate medium granular structure. Refer to soil specific description for component sampled.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Infiltration and runoff are not affected by any changes in plant community composition and distribution. (Tallgrass/Midgrass/Tree canopy dominant).

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** There is no compaction layer.

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: Tree = Little Bluestem

    Sub-dominant: Tallgrasses , Other Midgrasses

    Other: Forb+Legume , cool season grasses, Shrub

    Additional: Tree species should be predominately oak and hickory

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Plant mortality and decadence is highly variable on this site due to the droughty nature of the soils, (especially after a severe drought), but will primarily average <10%. This is more likely in the absence of fire and herbivory.

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14. **Average percent litter cover (%) and depth (in):** Litter should cover 50-75% of the area between plants with

accumulations of <1/2 inch deep. Variable with time since fire.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Normal production is 2500-3200 pounds/ac per year.

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Invasives include: eastern redcedar, elm, hackberry, greenbriar, privet, sericea lespedeza and non-natives (introduced species).

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17. **Perennial plant reproductive capability:** All plants capable of reproducing at least every year.
