

Ecological site R084BY169TX Deep Sand 29-33" PZ

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.

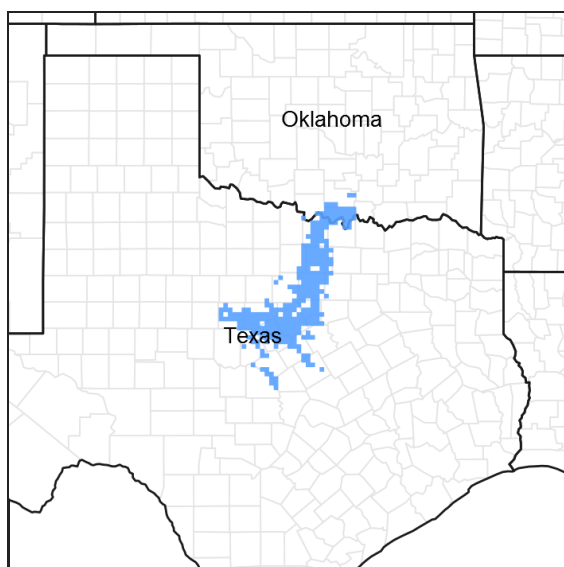


Figure 1. Mapped extent

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): 084B–West Cross Timbers

MLRA 84B is characterized by nearly level to strongly sloping, dissected plains with narrow valleys that deepen eastward. Soils are generally deep and formed in sediments of Cretaceous age. Average annual precipitation is 25 to 35 inches, and elevation ranges from 1000 to 1300 feet.

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.

Ecological site concept

This site occurs on very deep sandy soils on old dunes or terraces. The reference vegetation includes native tallgrasses with forbs, midgrasses, and scattered oaks. Without fire or other brush management, woody species may increase and dominate the site.

Associated sites

R084BY171TX	Loamy Sand 29-33" PZ More developed loamy sands on uplands. Higher production.
R084BY172TX	Sandy 29-33" PZ More developed sandy soils. Higher production.

Similar sites

R084BY172TX	Sandy 29-33" PZ More developed sandy soils. Higher production.
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Table 1. Dominant plant species

Tree	(1) <i>Quercus stellata</i> (2) <i>Quercus marilandica</i>
Shrub	Not specified
Herbaceous	(1) <i>Schizachyrium scoparium</i> (2) <i>Sorghastrum nutans</i>

Physiographic features

This site occurs on interfluvies and side slopes of hillslopes or on treads and risers of stream terraces in the West Cross Timbers. Slopes are typically less than 15 percent.

Table 2. Representative physiographic features

Landforms	(1) Hills > Hillslope (2) Hills > Ridge (3) Alluvial plain > Stream terrace
Runoff class	Negligible to very low
Elevation	183–640 m
Slope	0–15%
Water table depth	152 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate is subtropical. Precipitation varies from an average of 33 inches in the eastern part of the Cross Timbers to 29 inches in the western part. Winters are dry and summers are hot and humid. Tropical maritime air masses control the weather during the spring , summer and fall. Large variations in temperature sometimes accompany polar air masses in winter.

Table 3. Representative climatic features

Frost-free period (characteristic range)	193-201 days
Freeze-free period (characteristic range)	219-224 days
Precipitation total (characteristic range)	762-838 mm
Frost-free period (actual range)	192-204 days
Freeze-free period (actual range)	216-225 days
Precipitation total (actual range)	711-864 mm
Frost-free period (average)	197 days
Freeze-free period (average)	221 days
Precipitation total (average)	813 mm

Climate stations used

- (1) PUTNAM [USC00417327], Baird, TX
- (2) PROCTOR RSVR [USC00417300], Comanche, TX
- (3) BRIDGEPORT [USC00411063], Bridgeport, TX
- (4) MINERAL WELLS AP [USW00093985], Millsap, TX

Influencing water features

These sites shed water to lower areas on the landscape. However, good cover of deep rooted tallgrass species can help facilitate infiltration into the soil and limit runoff. These sites are not associated with wetlands.

Wetland description

NA

Figure 7-1 The hydrologic cycle with factors that affect hydrologic processes

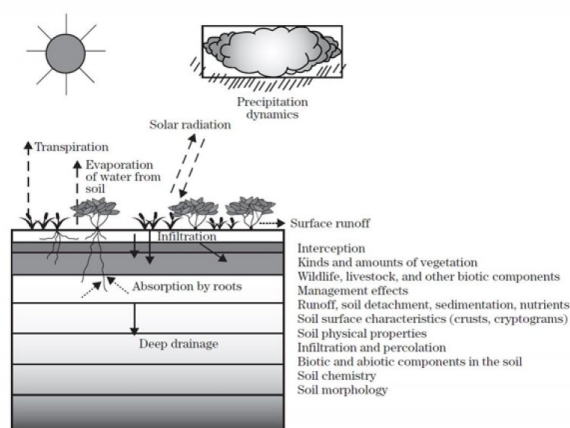


Figure 8.

Soil features

Representative soil components for this ecological site include: Arenosa, Desan, Eufaula, and Patilo

The site is characterized by very deep nearly level to gently sloping sandy soils on uplands. They are somewhat excessively to well drained.

Table 4. Representative soil features

Parent material	(1) Alluvium—sandstone (2) Residuum—sandstone (3) Eolian sands—sandstone
Surface texture	(1) Fine sand (2) Loamy fine sand
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderately slow to rapid
Soil depth	183 cm
Surface fragment cover <=3"	0–2%
Surface fragment cover >3"	0–2%
Available water capacity (0-101.6cm)	7.62–15.24 cm

Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	4.5–7.3
Subsurface fragment volume <=3" (Depth not specified)	0–6%
Subsurface fragment volume >3" (Depth not specified)	0–2%

Ecological dynamics

The reference plant community for the Deep Sand site is a post oak, blackjack oak savanna with tall and midgrass understory. The grasses are primarily Indiangrass (*Sorghastrum nutans*), little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*) and sand lovegrass (*Eragrostis trichodes*). Little bluestem and Indiangrass are the most commonly occurring grass species. Smaller amounts of big bluestem and sand lovegrass occur as well. Shrubs and trees consist of post oak (*Quercus stellata*), blackjack oak (*Quercus marilandica*), plums (*Prunus* spp), hawthorns (*Crataegus* spp), greenbriar (*Smilax* spp), grapes (*Vitis* spp) coralberry (*Symphoricarpos orbiculatus*), hackberry (*Celtis occidentalis*) and bumelia (*Sideroxylon lanuginose*). Woody plants have increased on virtually all of the sandy sites over the past 100 to 150 years. The production potential of the site is low. Pre-settlement grazers included bison and deer. The grasses are palatable and the site provides year round grazing. The most limiting soil factor is erodibility followed closely by fertility. In very dry periods, the soils can appear rather droughty. When good rainfall is received, the site produces fairly well.

Fire played a role in the ecology of the site as is true for most of the grasslands. The main effect of fire on this site was to hold woody shrubs and cactus in check. The grass species such as little bluestem and Indiangrass are considered fire neutral as far as their response to fire. Climate and soils are the most important and limiting factors affecting grass vegetation on the site. Fire stimulated forbs growth if the timing was right and the fires of pre-settlement days were probably more severe due to more fuel being available which could have been more damaging to woody plants. Often prescribed fire will not produce much mortality in older woody plants. After brush has been controlled with herbicides or mechanically, fire can sometimes be used effectively to suppress regrowth. Small juniper can be killed by fire. Fuel loads are often the most limiting factor for the effective use of prescribed fire on this site. In general, the uses of fire on mature (larger) or dense stands of woody plants does not result in the same positive effects that burning has in tall/midgrass communities.

With abusive grazing practices, the vigorous Indiangrass and big bluestem will become lower in vigor while little bluestem will increase then secondary successional species such as sand dropseed (*Sporobolus cryptandrus*), and silver bluestem (*Bothriochloa laguroides*) will begin to increase along with an increase of woody plants. The little bluestem is a tough, resistant species tolerant of some fairly heavy grazing for long periods, but at some point, a threshold is crossed and the ground cover is opened up resulting in bare places where weedy species can establish. Western ragweed (*Ambrosia psilostachya*), crotons (*Croton setigerus*), and cool-season annuals will quickly invade if the principal species are in a weakened condition. Grazing management probably has minimal effect on the proliferation of woody plants, but a good cover of perennial grasses likely minimizes the seed to soil contact the woody plants need to establish. Prescribed fire where it can be safely carried out provides a much better method to control the spread of woody plants. Selective individual removal of woody plants is easy and economical when a few plants begin to show up on the site, but the increase of number of plants can be fairly rapid and the number of woody plants per acre will soon become too numerous for individual control to be feasible. Prescribed grazing with a reasonable stocking rate can sustain the grass species composition and production at a near reference level until the brush canopy is so dense that the shade starts to interfere with photosynthesis. The sandy site can be abused to the point that the perennial warm season grasses thin out and lower successional grasses along with annual forbs begin to dominate. This process of degradation usually takes many years and is further exacerbated by summer drought and above average winter moisture.

Long-term droughts that occur only three to four times in a century can effect some change in plant communities. Short-term droughts are common and usually do not have a lasting effect in changing stable plant communities, although production will be affected. When a brush canopy becomes established which shades the ground sufficiently it tends to favor cool season annual species. Once a state of brush and cool-season annuals is reached, recovery to a good perennial grass cover is unlikely without major input with brush management and reseeding. In summary, the change in states of vegetation depend on the type of grazing management applied over many years, and the rate of invasion and establishment of woody species. The effects of seasonal moisture and short-term dry spells become more pronounced after the site crosses thresholds to a lower ecological condition, Plant communities that consist of warm-season perennial grasses such as little bluestem are able to persist and withstand climatic extremes with only minor shifts in the overall plant community.

This site was inhabited by grassland wildlife species such as bison, grassland birds and small mammals. Over the years, as the site has changed to a more mixed grass and shrub community, more wildlife species have come to utilize it for habitat. Woody plants provide cover for white-tailed deer and bob-white quail. These wildlife species have both increased along with the brushy plants due to the cover that these plants provide. According to most wildlife biologists, both species prefer a lower successional plant community than was present in historic climax. More forbs are needed to meet these species food requirements and woody plants for browse are important for deer. It is often the objective of many land owners to strike a balance in plant community so that these wildlife species can exist along with domestic livestock. This can be accomplished by a carefully thought out grazing and brush management program. It must be realized that managing at a lower successional level may meet some wildlife species requirements very well, but may not be nearly as productive for grazing purposes, and may not be as capable of satisfying functions such as nutrient cycling, hydrologic protection, plant community stability or soil protection. A proper balance can be achieved with careful planning that considers all resources.

Hydrologically, the site contributes runoff to the various draws, creeks, and streams that are common in the MLRA. If the perennial grass cover is maintained in good vigor, then maximum infiltration occurs and runoff is reduced. More water getting into the ground means a healthier, more productive plant community. If infiltration is minimal, then the effect is an artificially shallow soil with plant roots retreating to near the soil surface. More perennial grass cover means less runoff may result; but the runoff that does occur is less laden with sediment. Overall watershed protection is enhanced by a healthy grassland community, as is nutrient cycling.

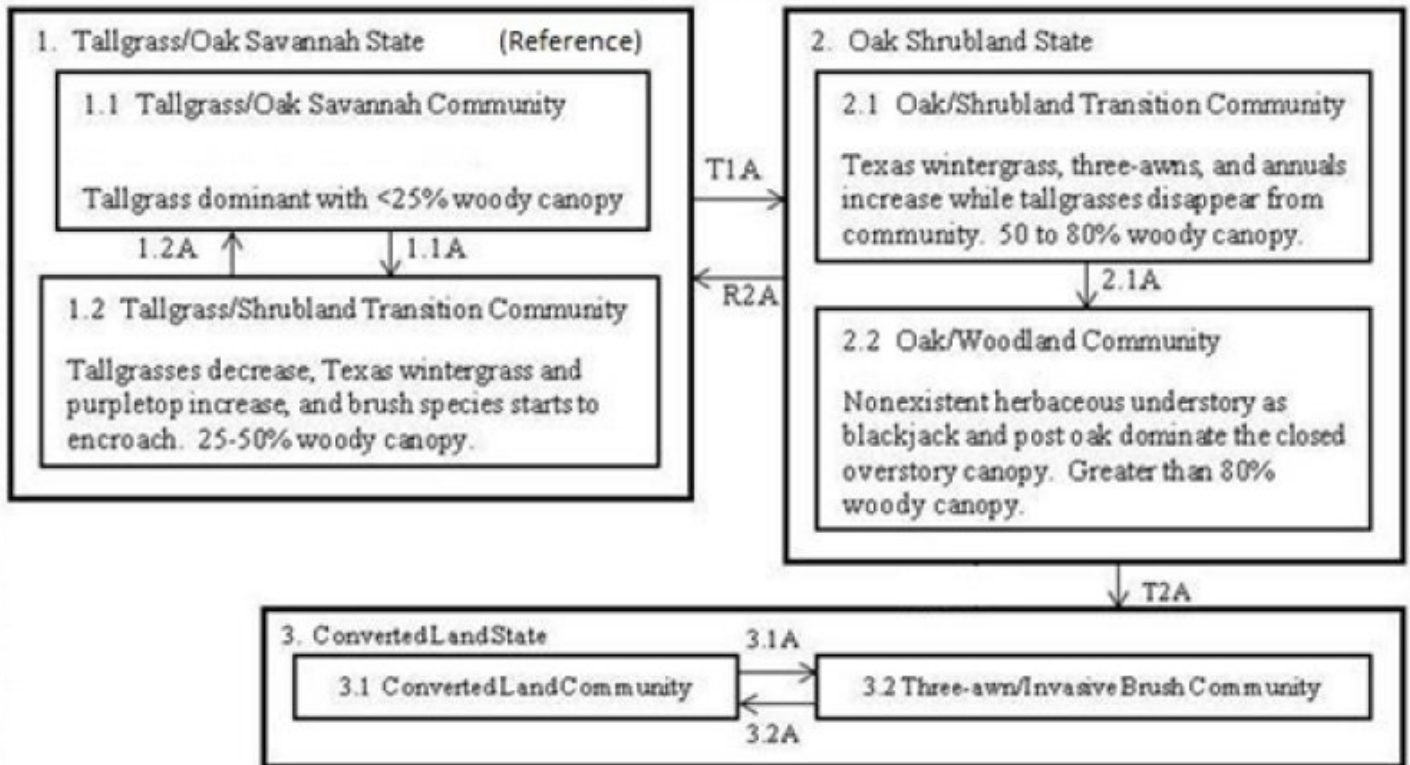
State and Transitional Pathways: Narrative

The following diagram suggests some pathways that the vegetation on this site might take in response to various treatment or natural stimuli over time. There may be other states that are not shown on this diagram. This information is to show that changes in plant community do occur due to management and natural factors; and can be changed by implementing certain practices. The plant communities described are commonly observed on this site. Before making plans for plant community manipulation for specific purposes, consult local professionals.

As a site changes in plant community makeup, the changes may be due to many factors. Change may occur slowly or in some cases, fairly rapidly. As vegetative changes occur, certain thresholds are crossed. This means that once a certain point is reached during the transition of one community to another, a return to the first state may not be possible without the input of some form of energy. This often means intervention with practices that are not part of natural processes. An example might be the application of herbicide to control some woody species in order to reduce its population and encourage more grass and forbs growth. Merely adjusting grazing practices would probably not accomplish any significant change in plant community once certain thresholds are crossed. The amount of energy required to effect change in community would depend on the present vegetative state and the desired change.

State and transition model

Deep Sand 29-33" PZ
R084BY169TX



Legend

- 1.1A Heavy Continuous Grazing, No Fire, Idle
- 1.2A Prescribed Grazing, Brush Management, Prescribed Burning
- T1A Heavy Continuous Grazing, No Fire, Idle
- R2A Prescribed Grazing, Brush Management, Range Planting, Prescribed Burning
- 2.1A Heavy Continuous Grazing, No Fire, Idle
- T2A Pasture Planting, Crop Cultivation, Pest Management, Nutrient Management
- 3.1A Heavy Continuous Grazing, No Brush Management, Idle
- 3.2A Pasture & Hay Planting, Crop Cultivation, Pest Management, Nutrient Management, Prescribed Grazing, Brush Management, and Range Planting

State 1

Tallgrass/Oak Savannah State - Reference

The interpretive plant community for this site is the Tallgrass/Oak Savannah Community. The community is dominated by warm-season perennial grasses (tallgrasses) with blackjack oak and post oak. The major perennial grass species are well dispersed through the community. Perennial forbs and shrubs are well represented throughout the community. Annual production ranges from 1500 to 3000 pounds per acre and 55% of species composition is composed of grasses while 30% is composed of trees/shrubs. The Tallgrass/Shrubland Transition Community consists of post oak, blackjack oak and elm starts regeneration and the tallgrasses will start to disappear from the plant community. Invader brush species appears and becomes established. Bumelia and hackberry starts to increase. Texas wintergrass and purpletop tridens increases as brush canopy increases. The plant community consists of about a 15 percent canopy of mature trees with an understory canopy of shrubs and young oaks, elm and pecan. Annual production ranges from 1500 to 3000 pounds per acre with 35% grasses and 45% trees/shrubs.

Dominant plant species

- post oak (*Quercus stellata*), tree
- blackjack oak (*Quercus marilandica*), tree
- little bluestem (*Schizachyrium scoparium*), grass

Community 1.1

Tallgrass/Oak Savannah Community

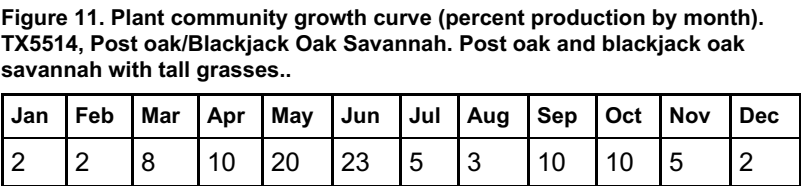


Figure 9. 1.1 Tallgrass/Oak Savannah Community

The interpretive plant community for this site is the tallgrass savanna. The community is dominated by warm-season perennial tallgrasses with blackjack oak and post oak. The major perennial grass species are well dispersed through the community. Perennial forbs and shrubs are well represented throughout the community. This plant community evolved with a short duration of heavy use by large herbivores followed by long rest periods due to herd migration along with occasional fire. Annual production ranges from 1500 to 3000 pounds per acre and 55% of species composition is composed of grasses while 30% is composed of trees/shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	925	1390	1849
Tree	420	628	841
Forb	252	381	504
Shrub/Vine	84	123	168
Total	1681	2522	3362



Community 1.2

Tallgrass/Shrubland Transition Community



Figure 12. 1.2 Tallgrass/Shrubland Transition Community

This transition state occurs with yearlong grazing or no grazing without fire or brush management. Post oak, blackjack oak and elm starts regeneration and the tallgrasses will start to disappear from the plant community. Invader brush appears and becomes established. Bumelia and hackberry starts to increase. Texas wintergrass and purpletop tridens increases as brush canopy increases. The plant community consists of about a 15 percent canopy of mature trees with an understory canopy of shrubs and young oaks, elm and pecan. This transition state can revert back to the tallgrass savannah with prescribed burning and/or prescribed grazing. Without prescribed burning and/or prescribed grazing, this transition state will continue to shift toward the Oak Shrubland State. Annual production ranges from 1500 to 3000 pounds per acre with 35% grasses and 45% trees/shrubs.

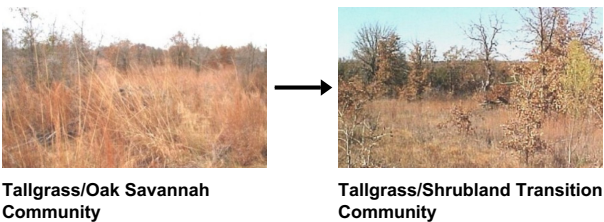
Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	588	885	1177
Tree	504	757	1009
Forb	336	504	673
Shrub/Vine	252	381	504
Total	1680	2527	3363

Figure 14. Plant community growth curve (percent production by month). TX5512, Oak Shrubland Transition. Continued increase of invader species and post oaks maturity. Approximately 50-80 percent canopy cover..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1	3	10	30	30	5	5	8	5	1	1

**Pathway 1.1A
Community 1.1 to 1.2**



With heavy continuous grazing, no fires, and idled land, the Tallgrass/Oak Savannah Community shifted to the Tallgrass/Shrubland Transition Community.

**Pathway 1.2A
Community 1.2 to 1.1**



Tallgrass/Shrubland Transition Community



Tallgrass/Oak Savannah Community

With Prescribed Grazing, Brush Management and Prescribed Burning conservation practices, the Tallgrass/Shrubland Transition Community can be shifted back to the Tallgrass/Oak Savannah Community.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

State 2

Oak Shrubland State

The Oak Shrubland Transition Community consists of 50 to 80% canopy of woody plants. As the shrubland community ages, oak matures and the invader species increase. Warm-season perennial tallgrasses such as Indiangrass and switchgrass have all but disappeared. In the early stages of this transition stage, little bluestem tends to dominate the grasses. However as brush canopy continues to increase, Texas wintergrass, three-awns and annuals continue to increase while the little bluestem decreases. Mesquite and/or juniper dominate the woody vegetation, but post oak and blackjack oak are beginning to occur. The grass species that dominate the site are splitbeard bluestem, silver bluestem, Texas wintergrass and threeawns along with the seeded introduced grass species. Annual production ranges from 1500 to 3000 pounds per acre with 20% of production composed of grasses and 55% production of trees and shrubs. The Oak Woodland Community is a closed overstory (greater than 80% canopy) woodland dominated by blackjack oak and post oak. Other species present in small amounts are hackberry, bumelia and prickly ash. Understory shrubs and sub-shrubs include skunkbush sumac and flameleaf sumac. Woody vines are also present and include greenbriars, poisonoak, and grapes. The herbaceous understory is almost nonexistent. Shade-tolerant species such as purpletop tridens and Canada wildrye occur in small amounts. Small isolated clearings will contain little bluestem, perennial three-awns, Texas wintergrass and small amounts of other grasses. At the Due to the presence of shade the amount of grass cover is greatly reduced which in turn reduces forage production from the historic state. Annual production ranges from 1500 to 3000 pounds per acre with 5% grasses and 90% trees/shrubs.

Dominant plant species

- post oak (*Quercus stellata*), tree
- Ashe's juniper (*Juniperus ashei*), tree
- Texas wintergrass (*Nassella leucotricha*), grass

Community 2.1

Oak/Shrubland Transition Community



Figure 15. 2.1 Oak/Shrubland Transition Community

The Oak Shrubland Transition Community consists of 50 to 80% canopy of woody plants. As the shrubland community ages, oak matures and the invader species increase. Warm-season perennial tallgrasses such as Indiangrass and switchgrass have all but disappeared. In the early stages of this transition stage, little bluestem tends to dominate the grasses. However as brush canopy continues to increase, Texas wintergrass, three-awns (*Aristida* spp) and annuals continue to increase while the little bluestem decreases. Where severe erosion has occurred or cropland has been abandoned mesquite and/or juniper may dominate the site. Abusive grazing by domestic livestock has accelerated the shift. The shift to this state has occurred due to the absence of fire or other means of brush suppression. Where this state has been reached from cropland or pasture, mesquite and/or juniper dominate the woody vegetation, but post oak and blackjack oak are beginning to occur. The grass species that dominate the site are splitbeard bluestem (*Andropogon ternarius*), silver bluestem (*Bothriochloa laguroidesa*), Texas wintergrass and threeawns along with the seeded introduced grass species. This state can be reverted back to near refeence condition by some means of brush suppression and good grazing management. Without this treatment the site will continue to shift toward the Oak Woodland State. Annual production ranges from 1500 to 3000 pounds per acre with 20% of production composed of grasses and 55% production of trees and shrubs.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Tree	504	757	1009
Shrub/Vine	420	628	841
Forb	420	628	841
Grass/Grasslike	336	504	673
Total	1680	2517	3364

Figure 17. Plant community growth curve (percent production by month). TX5512, Oak Shrubland Transition. Continued increase of invader species and post oaks maturity. Approximately 50-80 percent canopy cover..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1	3	10	30	30	5	5	8	5	1	1

Community 2.2

Oak/Woodland Community



Figure 18. 2.2 Oak/Woodland Community

This plant community is a closed overstory (greater than 80% canopy) woodland dominated by blackjack oak and post oak. Other species present in small amounts are hackberry, bumelia and prickley ash. Understory shrubs and sub-shrubs include skunkbush sumac, flameleaf sumac. Woody vines are also present and include greenbriars, poisonoak (*Toxicodendron* spp), and grapes. The herbaceous understory is almost nonexistent. Shade tolerant species such as purpletop tridens (*Tridens flavus*) and Canada wildrye (*Elymus canadensis*) occur in small amounts. Small isolated clearings will contain little bluestem, perennial threeawns, Texas wintergrass and small amounts of other grasses. Abusive grazing by domestic livestock has accelerated the shift. This Oak/Woodland Community has developed due to the absence of fire (or some other method of brush suppression). Livestock grazing yearlong accelerates the shift. The tallgrass savannah can be restored by prescribed burning but will require many years of burning due to light fuel load of fine fuel and the absence of a seed source for the tallgrasses. Chemical control alone is usually not a good option for treatment on a large scale due to the resistance of some of the woody plant species to herbicides. Mechanical treatment of this site along with seeding is generally the best method for conversion back to a tallgrass savannah. The cost of doing this type of treatment is usually so expensive as to be not economically feasible so in most instances it is planted to introduced grass species and converted to pastureland. At the Woodland State the amount of litter cover is similar to the State 1 but this cover is now mostly leaves. The leaves of the trees and underbrush intercept rainfall from lighter intensity rainfall which evaporates before reaching the ground resulting in less water reaching the soil surface. When runoff does occur there are more tendencies for the litter to drift until it catches on the stems of dense underbrush or what little grass is present. When the woodland is grazed the amount of litter decreases along with a decrease of surface vegetation which increases the drifting of the litter with runoff. Due to the presence of shade the amount of grass cover is greatly reduced which in turn reduces forage production from the historic state. Annual production ranges from 1500 to 3000 pounds per acre with 5% grasses and 90% trees/shrubs.

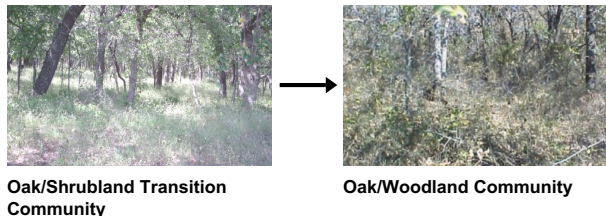
Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	841	1261	1681
Tree	673	1009	1345
Forb	84	123	168
Grass/Grasslike	84	123	168
Total	1682	2516	3362

Figure 20. Plant community growth curve (percent production by month). TX5513, Post oak Woodland. Post oak dominated closed overstory with over 80 percent canopy cover..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1	2	10	50	14	5	5	5	5	1	1

Community 2.1 to 2.2



With Heavy Continuous Grazing, No Fires, and Idled Land, the Oak/Shrubland Transition Community will shift to the Oak/Woodland Community.

State 3 Converted Land State

Conversion of the midgrass prairie to cropland (mainly for cotton production) occurred from first settlement by European settlers during the middle 1800's and continued until early 1900's. Some remains in cropland today. The early cropping with little regard for erosion control leads to severe erosion by water. Erosion changes fertility, soil structure and moisture holding capacity of the soil. Refer to cropland capability classes for production potentials and limitations. This site is often planted to introduced grasses following crop production or brush control. These grasses are planted mostly for livestock grazing and some hay production. Typical species planted include bermudagrass varieties and yellow bluestems. Many of these species are invasive and once established they are difficult to remove and hinders the establishment of native species.

Dominant plant species

- Bermudagrass (*Cynodon dactylon*), grass

Community 3.1 Converted Land Community

Conversion of the Tallgrass-Oak Savannah to cropland occurred from first settlement by European settlers during the middle 1800's and continued until early 1900's. Some remains in cropland today. The early cropping with little regard for erosion control leads to severe erosion by water and wind. Erosion changes fertility, soil structure and moisture holding capacity of the soil. In recent years if cropping is abandoned the land is usually planted to introduced grass and manages as pastureland. Refer to cropland capability classes for production potentials and limitations. This site is often planted to introduced grasses following crop production or brush control. These grasses are planted mostly for livestock grazing and some hay production. Typical species planted are bermudagrass varieties. These species are invasive and once established they are difficult to remove and hinders the establishment of native species. The establishment and maintenance of these species requires fertilization, weed control and prescribed grazing management. Without the annual application of these cultural practices the plant community will move toward a transition of invasive brush species. Refer to pastureland suitability groups for species suitability, production potentials and limitations.

Figure 21. Plant community growth curve (percent production by month).
TX5520, Pastureland. Coastal Bermudagrass or Introduced Species..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	21	22	10	5	14	10	8	0

Community 3.2 Three-awn/Invasive Brush Community



Figure 22. 3.2 Threeawn/Invasive Brush Community

Without the annual application of the cultural practices, especially fertilization, the plant community will move toward a transition of invasive brush species such as mesquite and/or cactus. The introduced grass species will start to disappear and be replaced by threeawns and annuals.

Table 9. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1233	1412	1592
Forb	1009	1171	1334
Tree	897	1042	1188
Shrub/Vine	785	913	1042
Total	3924	4538	5156

Figure 24. Plant community growth curve (percent production by month). TX5523, Midgrass & Invasive Brush Community. old cropland field dominated by plant community consisting of midgrasses and invasive brush..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	2	8	10	20	23	5	3	10	10	5	2

Pathway 3.1A Community 3.1 to 3.2

With Heavy Continuous Grazing, No Brush Management and Idled land, the Converted Land Community will shift over to the Three-awn/Invasive Brush Community.

Pathway 3.2A Community 3.2 to 3.1

The Three-awn/Invasive Brush Community will transition into the Converted Land Community with the use of various conservation practices including Pasture & Hay Planting, Crop Cultivation, Pest Management, Nutrient Management, Prescribed Grazing, Brush Management, and Range Planting.

Conservation practices

Brush Management
Conservation Crop Rotation
Prescribed Burning
Forage and Biomass Planting

Prescribed Grazing
Range Planting
Nutrient Management
Integrated Pest Management (IPM)

Transition T1A
State 1 to 2

With heavy continuous grazing, no fires, and idled land, the Tallgrass/Oak Savannah State will transition into the Oak Shrubland State.

Restoration pathway R2A
State 2 to 1

With the use of Prescribed Grazing, Brush Management, Range Planting, and Prescribed Burning, the Oak Shrubland State can be restored to the Tallgrass/Oak Savannah State.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

Transition T2A
State 2 to 3

With the application of various conservation practices including Pasture/Hay Planting, Crop Cultivation, Pest Management, and Nutrient Management, the Oak Shrubland State will transition into the Converted Land State.

Additional community tables

Table 10. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	Tallgrass			252–504	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	252–504	–
2	Tallgrass			168–336	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	0–336	–
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	0–336	–
3	Cool Season			84–168	
	Scribner's rosette grass	DIOLS	<i>Dichanthelium oligosanthos</i> var. <i>scribnerianum</i>	84–168	–
4	Midgrass			84–168	
	purpletop tridens	TRFL2	<i>Tridens flavus</i>	84–168	–
5	Midgrass			168–336	
	sand lovegrass	ERTR3	<i>Eragrostis trichodes</i>	168–336	–
6	Midgrass			84–168	
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	84–168	–
7	Midgrass			84–168	
	crowngrass	PASPA2	<i>Paspalum</i>	84–168	–
8	Midgrass			0–1	
	red lovegrass	ERSE	<i>Eragrostis secundiflora</i>	0–1	–
Forb					
9	Forbs			252–504	
	whitemouth dayflower	COER	<i>Commelina erecta</i>	0–140	–
	bundleflower	DESMA	<i>Desmanthus</i>	0–140	–
	lespedeza	LESPE	<i>Lespedeza</i>	0–140	–
	evening primrose	OENOT	<i>Oenothera</i>	0–140	–
	amberique-bean	STHE9	<i>Strophostyles helvola</i>	0–140	–
Shrub/Vine					
10	Shrub/Vines			336–673	
	fragrant sumac	RHAR4	<i>Rhus aromatica</i>	0–673	–
	roundleaf greenbrier	SMRO	<i>Smilax rotundifolia</i>	0–673	–
Tree					
11	Trees			420–841	
	post oak	QUST	<i>Quercus stellata</i>	252–504	–
	blackjack oak	QUMA3	<i>Quercus marilandica</i>	168–336	–
	bully	SIDER2	<i>Sideroxylon</i>	0–56	–
	Hercules' club	ZACL	<i>Zanthoxylum clava-herculis</i>	0–56	–
	hackberry	CELT1	<i>Celtis</i>	0–56	–
	hawthorn	CRATA	<i>Crataegus</i>	0–56	–

Animal community

The historic oak-tallgrass savannah was habitat to migratory bison herds, deer, turkey, migratory birds and large predators such as wolves, coyotes, mountain lions and black bear. White-tail deer, turkey, bobcats and coyotes

along with resident and migratory birds and small mammals find suitable habitat today. Domestic livestock and white-tail deer are the dominant grazers and browsers of the site. As the savannah changes through the various vegetative states towards the Oak Woodland, the quality of the habitat may improve for some species and decline for others. Management must be applied to maintain a vegetative state in optimum habitat quality for the desired animal species.

Hydrological functions

Peak rainfall periods occur in April, May, June, September and October. Rainfall amounts may be high (3 to 10 inches per event) and events may be intense. The soil of this site are very susceptible to erosion and severe erosion occurs where adequate herbaceous cover is not maintained and on heavy use areas such as roads and livestock trails. Periods of 60 plus days of little or no rainfall during the growing season are common. The hydrology of this site may be manipulated with management to yield higher runoff volumes or greater infiltration to groundwater. Management for less herbaceous cover will favor higher surface runoff while dense herbaceous cover favors ground water recharge. Potential movement of soil (erosion), pesticides and both organic and inorganic nutrients(fertilizer) should always be considered when managing for higher volumes of surface runoff.

Recreational uses

Hunting, hiking, camping, equestrian, bird watching and off road vehicle use.

Wood products

Oaks and mesquite are used for firewood. Mesquite is also used for barbecue wood.

Other products

None.

Other information

None.

Inventory data references

Data from the following county was used in the ESIS Database review: Wise County

References

. 2021 (Date accessed). USDA PLANTS Database. <http://plants.usda.gov>.

Other references

White-tailed Deer, Their Foods and Management in the Cross Timbers
By Kenneth L. Gee, Michael D Porter, Steve Demarais, Fred C. Bryant, and Gary Van Vreede. A Samuel Roberts Noble Foundation Publication, 1991

Technical Review:

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Contributors

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.

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Contact for lead author	colin.walden@ok.usda.gov
Date	01/26/2018
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Minimal evidence of current or past rill formation.

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2. **Presence of water flow patterns:** Few water flow patterns on steep areas. Short and stable, not incising.

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3. **Number and height of erosional pedestals or terracettes:** No pedestals terracettes present.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground less than 10 percent. Bare areas small and not connected.

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5. **Number of gullies and erosion associated with gullies:** No gullies present.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** No wind scoured areas.
-
7. **Amount of litter movement (describe size and distance expected to travel):** Litter movement less than 3 feet. Vegetative cover should restrict litter movement over long distances. Only herbaceous litter less than .25 inches expected to move.
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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):** Soil stability scores of 5 or greater expected.
-
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Eufaula - Ap--0 to 15 cm (0 to 6 in); pale brown (10YR 6/3) loamy fine sand, brown (10YR 5/3) moist; massive;
- Patilo - A--0 to 4 inches; light brownish gray (10YR 6/2) fine sand, dark grayish brown (10YR 4/2) moist; single grained;
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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Presence of perennial tall and midgrasses help to facilitate percolation into the soil. Some runoff expected on steeper slopes during moderate precipitation events.
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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):** No compaction under reference conditions. Beware texture change of Bt horizon not product of compaction.
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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: Native Tallgrasses (groups 1,2)
- Sub-dominant: Forbs (9)
- Trees (11)
- Other: All other groups
- Additional:
-
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Possible mortality only during prolonged drought. Less than 5%.
-
14. **Average percent litter cover (%) and depth (in):** Litter expected to be at 75% cover at average .25 inch depth.
-
15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-**

production): Annual production 2300 lb/acre. ranging from 1500 to 300 lbs.

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: Juniper(ashe juniper/eastern redcedar) most common invader. Also greenbriar, poison ivy, and other woodies will increase without fire.
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17. **Perennial plant reproductive capability:** Plants should be capable of reproducing every year with exception of prolonged growing season drought.
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