Ecological site R084BY168TX
Claypan 29-33" PZ

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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.

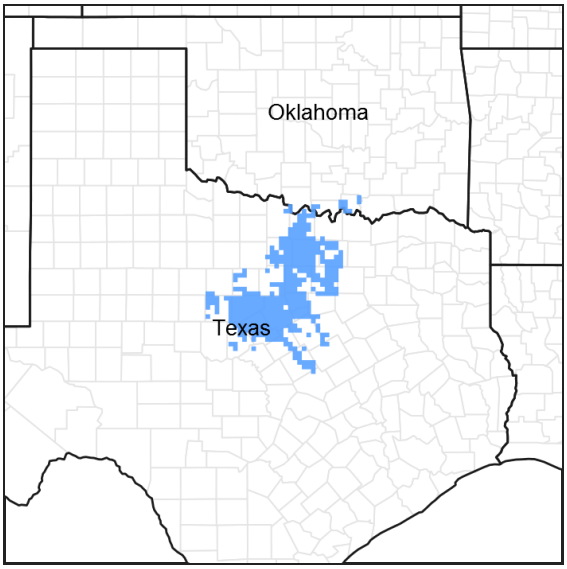


Figure 1. Mapped extent

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

These sites occur on loamy soils that have a somewhat dense clay layer below. The reference vegetation consists of native midgrasses with a variety of forbs and few woody species. In the absence of fire, these site may become dominated by brush species, especially mesquite. Many of these claypan sites have been cultivated for crop production and/or have been planted back to introduced pasture species.

Associated sites

R084BY172TX	**Sandy 29-33" PZ** Deep sandy soils on uplands.
R084BY174TX	**Sandy Loam 29-33" PZ** Deep sandy loam soils on uplands.

Similar sites

R084BY175TX	**Tight Sandy Loam 29-33" PZ** Clay or clay loam subsoils over sandstone or siltstone.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Bouteloua curtipendula* (2) *Panicum obtusum*

Physiographic features

This site occurs on stream terraces, drainageways, and depressions in the West Cross Timbers. Slopes are typically less than 3 percent.

Table 2. Representative physiographic features

Landforms	(1) Alluvial plain > Stream terrace (2) Hills > Drainageway
Runoff class	Negligible to very high
Elevation	600–2,100 ft
Slope	0–3%
Water table depth	12–30 in
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)	193-200 days
Freeze-free period (characteristic range)	220-225 days
Precipitation total (characteristic range)	31-33 in
Frost-free period (actual range)	192-204 days
Freeze-free period (actual range)	216-226 days
Precipitation total (actual range)	28-34 in
Frost-free period (average)	197 days
Freeze-free period (average)	222 days
Precipitation total (average)	32 in

Climate stations used

- (1) RISING STAR 1S [USC00417633], Rising Star, TX
- (2) PROCTOR RSVR [USC00417300], Comanche, TX
- (3) MINERAL WELLS AP [USW00093985], Millsap, TX
- (4) BRIDGEPORT [USC00411063], Bridgeport, TX
- (5) PUTNAM [USC00417327], Baird, TX

Influencing water features

These site receive some surface water runoff from adjacent site and also shed water to lower areas. Water infiltration is affected by the amount and composition of the plant community. These sites are not associated with wetlands.

Wetland description

NA

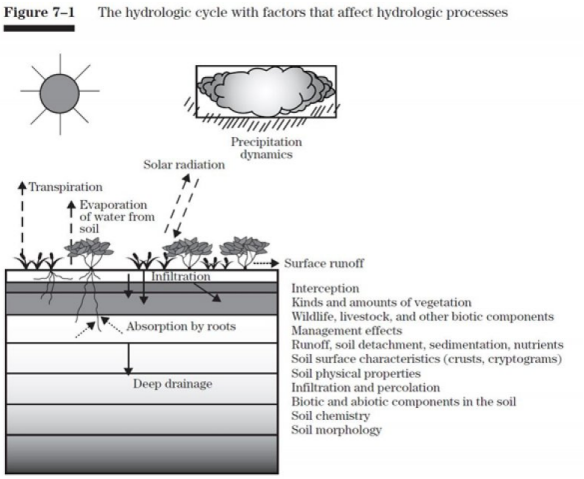


Figure 8.

Soil features

The major soil series for the Claypan 29-33” PZ ecological site are Hassee. These are nearly level to sloping soils on uplands. They have a fine sandy loam or loam surface layer and clayey subsoil.

Table 4. Representative soil features

Parent material	(1) Alluvium–clayey shale
Surface texture	(1) Fine sandy loam (2) Loam
Drainage class	Moderately well drained
Permeability class	Very slow
Soil depth	72 in
Surface fragment cover <=3"	0–12%
Available water capacity (0-40in)	8–9 in
Calcium carbonate equivalent (0-40in)	0–5%

Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	5.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–12%

Ecological dynamics

The reference plant community for the Claypan site is a midgrass prairie. The grasses are primarily sideoats grama (*Bouteloua curtipendula* var curtipendula) and vine-mesquite (*Panicum obtusum*). Few shrubs are present in reference condition. Where the site was once cultivated, mesquite (*Prosopis glandulosa*) tends to be one of the first woody plants to appear. Where there is a seed source close by, juniper (*Juniperus ashei* and *Juniperus virginiana*) will invade the site. In certain areas juniper has become a significant problem species along with mesquite.

Pre-settlement grazers included bison and deer. The grasses are fairly palatable and nutritious and the site provides year round grazing. Generally speaking, the soils on this site are less fertile than the Sandy Loam Site but more than the deeper sands of the Loamy Sand and Deep Sand sites. The most limiting soil factor is permeability followed by fertility. In very dry periods, the soils can appear rather droughty. When good rainfall is received, the site produces 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 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. Fire usually creates more diversity in this site for a year or two post-burn. Fire will usually 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 use 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. Woody plant suppression using safe approved herbicides is generally more practical, followed by prescribed fire.

With abusive grazing practices, the vigorous sideoats grama will become lower in vigor while vine mesquite and Texas wintergrass (*Nassella leucotricha*) will increase then secondary successional species such as sand dropseed (*Sporobolus cryptandrus*), and silver bluestem (Bothriochola laguriodes var. torreyana) will begin to increase along with an increase of woody plants. The Vine mesquite and Texas wintergrass are 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*) and cool-season annuals will quickly invade if the principal species are in a weakened condition. Mesquite and cactus will occupy the site when heavy grazing has occurred over a long period. The greatest contributor to the increase of mesquite is the domestic cow. The seed is consumed by animals after the seed pods ripen in late summer and when passed through the digestive system and excreted in the manure, the seed finds an excellent seedbed complete with moisture and nutrients. Some wildlife species rely heavily on mesquite beans and juniper berries for food and contribute to the spread of these species. It is possible for mesquite beans to lay dormant in the soil for many years and then germinate when ideal conditions occur. 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 needed 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 may 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 Claypan Prairie site can be abused to the point that the perennial warm-season grasses thin out and lower succession 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 can effect some change in plant communities.Especially when coupled with abusive grazing. 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. After the site crosses the threshold to a lower ecological condition, the effects of seasonal moisture and short term dry spells become more pronounced. Plant communities that consist of warm season perennial grass and the associated species of the reference plant community are able to persist and withstand climatic extremes with only minor shifts in the overall plant community.

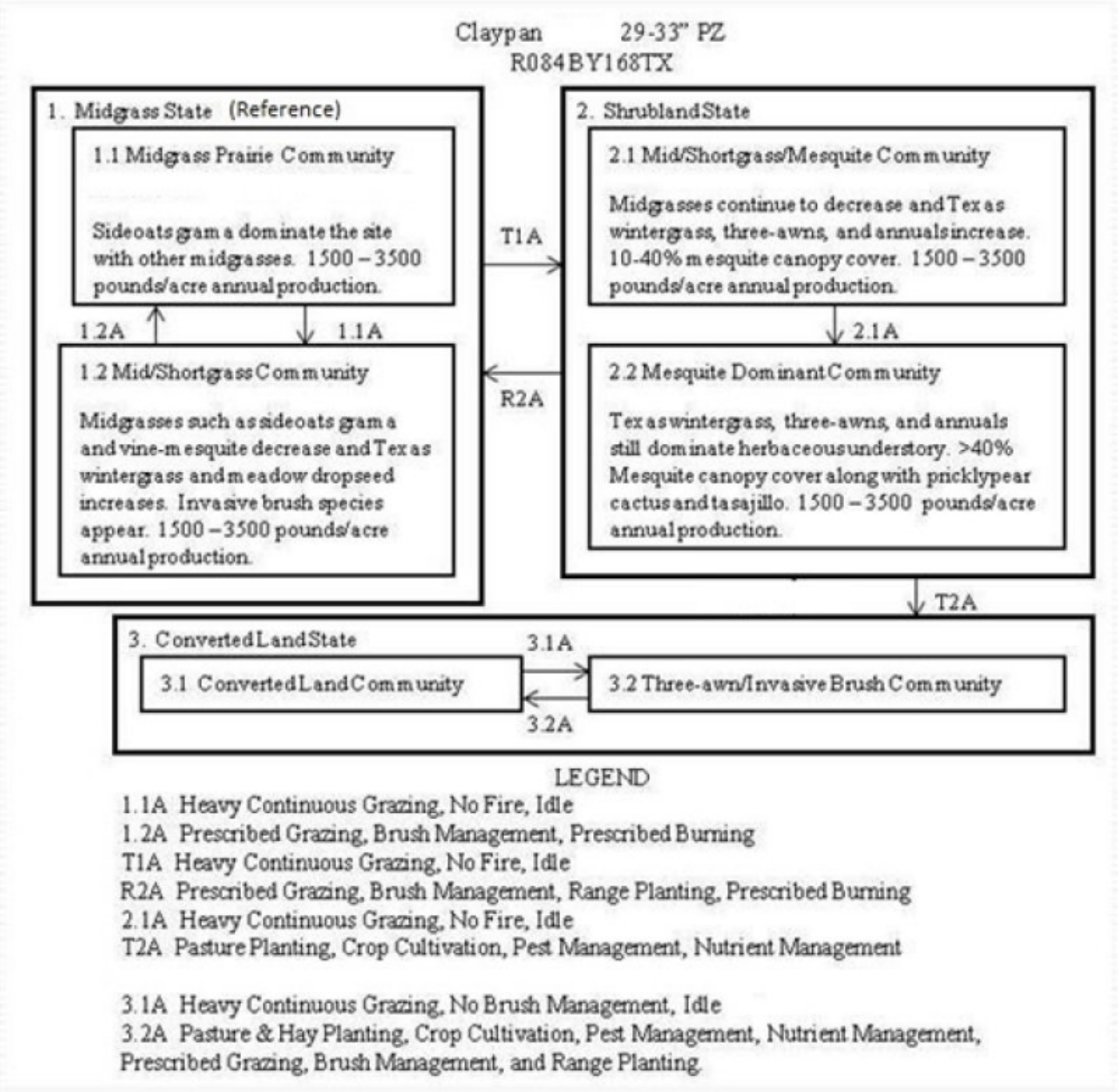
This site was historically inhabited by grassland wildlife species such as bison, grassland birds and small mammals. Over the years, as the site has changed to a more mixed grass and shrub community, more wildlife species have come to utilize it for habitat. Woody plants provide cover for white-tailed deer and bob-white quail. These wildlife species have both increased along with the brushy plants due to the cover that these plants provide. 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:
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 as a result of 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



State 1
Midgrass Prairie State

The interpretive plant community for this site is the reference plant community 1.1. This site is a midgrass prairie. The community is dominated by warm-season perennial grasses. 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 3500 pounds per acre and 90% of production consisted of grasses and grasslikes and less than 5% trees/shrubs. In the Mid/Shortgrass Community, the more palatable plants such as sideoats grama decrease and the less palatable grasses such as Texas wintergrass increase. Invader brush species such as mesquite, juniper, cactus, and etc. appears. Annual production ranges from 1500 to 3500 pounds per acre and grasses only compose of 75% of species composition and trees/shrubs make up 10%.

Dominant plant species

- sideoats grama (*Bouteloua curtipendula*), grass
- vine mesquite (*Panicum obtusum*), grass

Community 1.1
Midgrass Prairie Community

Figure 9. 1.1 Midgrass Prairie Community

The interpretive plant community for this site is this plant community. This site is a midgrass prairie. The community is dominated by warm-season perennial grasses. 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 3500 pounds per acre and 90% of production consisted of grasses and grasslikes and less than 5% woody species.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1350	2250	3150
Shrub/Vine	75	125	175
Forb	75	125	175
Tree	0	0	0
Total	**1500**	**2500**	**3500**

Figure 11. Plant community growth curve (percent production by month). TX5522, Midgrass Dominant Prairie Community. Midgrass dominant with shortgrasses. 5% forbs and 5% shrubs. No trees..

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

Community 1.2
Midgrass/Shortgrass Community

This transition state occurs with yearlong grazing or no grazing without fire or brush management. As heavy grazing continues, the more palatable plants such as sideoats grama decrease and the less palatable grasses such as Texas wintergrass increase. Invader brush species such as mesquite, juniper, cactus, etc. appears. This transition state can revert back to the midgrass prairie with sideoats grama as the dominate grass with prescribed burning and/or prescribed grazing. Without prescribed burning and/or prescribed grazing mesquite and other brush will continue to increase and transition into the Shrubland State. Annual production ranges from 1500 to 3500 pounds per acre and grasses only compose of 75% of species composition and trees/shrubs make up 10%.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1125	1875	2625
Forb	225	375	525
Tree	75	125	175
Shrub/Vine	75	125	175
Total	**1500**	**2500**	**3500**

Figure 13. Plant community growth curve (percent production by month). TX5521, Midgrass/Shortgrass Transition. Mid and shortgrasses with some mesquite canopy. Texas wintergrass dominant..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	4	5	15	25	20	8	5	5	5	3	3

Pathway 1.1A
Community 1.1 to 1.2

With heavy continuous grazing and no fires, the Midgrass Prairie Community will shift to the Mid/Shortgrass Community.

Pathway 1.2A
Community 1.2 to 1.1

With Prescribed Grazing, Brush Management and Prescribed Burning Conservation Practices, the Mid/Shortgrass Community can be reverted to the Midgrass Prairie Community.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Planned Grazing System

State 2
Shrubland State

This transition state consists of 10 to 40% canopy of woody plants primarily mesquite. As the shrubland community ages, oak matures and the invader species increase. Palatable warm-season perennial grasses have all but disappeared. Three-awns are beginning to dominate the grasses. Annual production ranges from 1500 to 3500 pounds per acre with 60% grasses and 20% trees. The Mesquite Dominant Community is mesquite dominated (greater than 40% canopy). Other species present are pricklypear cactus and tasajillo. The herbaceous understory is primarily Texas wintergrass, threeawns and annuals. 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 3500 pounds per acre and grasses make up 30% species composition while trees/shrubs make up 45%.

Dominant plant species

- honey mesquite (*Prosopis glandulosa*), shrub
- Texas wintergrass (*Nassella leucotricha*), grass

Community 2.1
Mid/Shortgrass/Mesquite Community

Figure 14. 2.1 Mid/Shortgrass/Mesquite Community

This transition state consists of 10 to 40% canopy of woody plants primarily mesquite. As the shrubland community ages, oak matures and the invader species increase. Palatable warm-season perennial grasses have all but disappeared. In the early stages of this transition stage Texas wintergrass tends to dominate the grasses; however, as brush canopy continues to increase, three-awns (Aristida spp) and annuals continue to increase. Where cropland has been abandoned mesquite and/or juniper may dominate the site. Continuous 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 cactus dominate the woody vegetation. Three-awns are beginning to dominate the grasses. This state can be reverted back to near reference condition by some means of brush suppression and good grazing management. Without this treatment, the site will continue to shift toward mesquite dominating the site along with cacti. Annual production ranges from 1500 to 3500 pounds per acre with 60% grasses and 20% trees.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	900	1500	2100
Tree	300	500	700
Forb	225	375	525
Shrub/Vine	75	125	175
Total	**1500**	**2500**	**3500**

Figure 16. Plant community growth curve (percent production by month). TX5519, Shortgrass/Midgrass/Mesquite community. Short and midgrasses with brush invading species such as mesquite and prickly pear. Texas wintergrass is dominating the site..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	3	10	30	25	10	5	5	5	2	2

Community 2.2
Mesquite Dominant Community

Figure 17. 2.2 Mesquite Dominant Community

This plant community is mesquite dominated (greater than 40% canopy). Other species present are pricklypear cactus and tasajillo. The herbaceous understory is primarily Texas wintergrass, threeawns and annuals. Continuous grazing by domestic livestock has accelerated the shift. This state has developed due to the absence of fire (or some other method of brush suppression). Livestock grazing yearlong accelerates the shift. The midgrass prairie 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 is usually a good option for treatment on a large scale. Mechanical treatment of this site along with seeding is a good method for conversion back to a midgrass prairie; however, the cost of doing this type of treatment is usually so expensive as to be not economically feasible. The soils of this site are sensitive to erosion. Sheet and rill erosion and in some instances wind erosion has accelerated and by the time it has reached this State the topsoil depth is greatly reduced. This in turn has reduced the soils natural fertility. While in the transition stages the organic matter in the soil is also reduced and may never be what was present in the midgrass prairie. At this State the amount of litter cover is similar to the Historic State but this cover is now leaves and annuals. 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 tendencies for the litter to drift until it stops at obstacles on the landscape. When this state 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. When this state is reached following abandonment of cropland or pastureland of introduced grasses, severe erosion has occurred quite often. The absence of topsoil has greatly reduced water infiltration which in turn increases runoff. Annual production ranges from 1500 to 3500 pounds per acre and grasses make up 30% species composition while trees/shrubs make up 45%.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	525	875	1225
Grass/Grasslike	450	750	1050
Forb	375	625	875
Shrub/Vine	150	250	350
Total	**1500**	**2500**	**3500**

Figure 19. Plant community growth curve (percent production by month). TX5518, Mesquite Dominant with threeawns, wintergrass, annuals. Mesquite dominant with threeawns, wintergrass, and annuals. Greater than 40 percent canopy cover of mesquite/tasajillo/prickly pear..

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

Pathway 2.1A

Community 2.1 to 2.2

Mid/Shortgrass/Mesquite Community

Mesquite Dominant Community

With heavy continued grazing, no fires, and idled land, the Mid/Shortgrass/Mesquite Community will shift to the Mesquite Dominant 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. With continued absence of added fertility the Three-awn/Invasive Brush community will continue change toward a brushy condition. The shrubs will continue to thicken especially mesquite and as the brush ages the historic hardwoods start to appear. The grass changes toward more perennials, where the fertility is especially low. At this state the introduced grasses have almost disappeared. Annual production ranges from 3500 to 4600 pounds per acre.

Dominant plant species

- Bermudagrass (*Cynodon dactylon*), grass

Community 3.1
Converted Land Community

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. While restoration of this site to some semblance of the midgrass prairie is possible with seeding, prescribed grazing and prescribed burning; a complete restoration of the historic plant community in a reasonable time is very unlikely for cropland fields. In recent years if cropping is abandoned the land is usually planted to introduced grass species and managed 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 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. 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 such as mesquite. Refer to pastureland suitability groups for species suitability, production potentials and limitations.

Figure 20. 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 21. 3.2 Three-awn/Invasive Brush Community

With continued absence of added fertility the plant community will continue change toward a brushy condition. The shrubs will continue to thicken especially mesquite and as the brush ages the historic hardwoods start to appear. The grass changes toward more perennials, where the fertility is especially low. Splitbeard bluestem appears and may dominate the grasses. At this state the introduced grasses have almost disappeared. Annual production ranges from 3500 to 4600 pounds per acre.

Table 9. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1050	1750	2450
Forb	300	500	700
Shrub/Vine	75	125	175
Tree	75	125	175
Total	**1500**	**2500**	**3500**

Figure 23. Plant community growth curve (percent production by month). TX5517, Threeawn/Invasive Shrubs Community. Threeawns and Invasive Shrub dominant community. Converted from old cropland into threeawn shrub community..

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
Forage and Biomass Planting
Prescribed Grazing
Range Planting
Nutrient Management
Integrated Pest Management (IPM)

Transition T1A
State 1 to 2

The Midgrass State will transition to the Shrubland State due to continued heavy grazing pressure, no fire, and idled land.

Restoration pathway R2A
State 2 to 1

With Prescribed Grazing, Brush Management, Range Planting, and Prescribed Burning conservation practices, the Shrubland State can be reverted to the Midgrass State.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

Transition T2A
State 2 to 3

The Shrubland State will transition into the Converted Land State with the use of various conservation practices including Pasture & Hay Planting, Crop Cultivation, Pest Management, Nutrient Management, Prescribed Grazing, Brush Management, and Range Planting.

Additional community tables

Table 10. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Midgrasses**			900–2100	
	sideoats grama	BOCU	*Bouteloua curtipendula*	300–1000	–
	Arizona cottontop	DICA8	*Digitaria californica*	300–1000	–
	vine mesquite	PAOB	*Panicum obtusum*	300–1000	–
2	**Midgrasses**			225–525	
	buffalograss	BODA2	*Bouteloua dactyloides*	0–150	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	0–150	–
	Texas wintergrass	NALE3	*Nassella leucotricha*	0–150	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	0–150	–
3	**Midgrasses**			225–525	
	purple threeawn	ARPU9	*Aristida purpurea*	0–150	–
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	0–150	–
	western wheatgrass	PASM	*Pascopyrum smithii*	0–150	–
	Drummond's dropseed	SPCOD3	*Sporobolus compositus var. drummondii*	0–150	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–150	–
	white tridens	TRAL2	*Tridens albescens*	0–150	–
Forb					
4	**Perennial Forbs**			75–175	
	Drummond's onion	ALDR	*Allium drummondii*	0–50	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–50	–
	sagebrush	ARTEM	*Artemisia*	0–50	–
	bundleflower	DESMA	*Desmanthus*	0–50	–
	Engelmann's daisy	ENGEL	*Engelmannia*	0–50	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	0–50	–
	ratany	KRAME	*Krameria*	0–50	–
	dotted blazing star	LIPU	*Liatris punctata*	0–50	–
	Nuttall's sensitive-briar	MINU6	*Mimosa nuttallii*	0–50	–
	bushsunflower	SIMSI	*Simsia*	0–50	–
	white heath aster	SYER	*Symphyotrichum ericoides*	0–50	–
	greenthread	THELE	*Thelesperma*	0–50	–
Shrub/Vine					
5	**Shrubs**			75–175	
	clapweed	EPAN	*Ephedra antisyphilitica*	0–150	–
	lotebush	ZIOB	*Ziziphus obtusifolia*	0–150	–

Animal community

This site 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 Mesquite dominate, 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 soils of this site are 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

Mesquite is used for firewood and barbecue wood.

Other products

None.

Other information

None.

Inventory data references

Information presented here has been derived from limited NRCS clipping data and field observations of range trained personnel: Lemuel Creswell Range Management Specialist (RMS), Comanche; Earl V. Hogan RMS, James Luton RMS, Montague; William Donham, Agronomist, Granbury; Kent Ferguson RMS, Weatherford.

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:
Homer Sanchez, State Rangeland Management Specialist, NRCS, Temple, Texas
Mark Moseley, State Rangeland Management Specialist, NRCS, Stillwater, Oklahoma
Kent Ferguson, Zone Rangeland Management Specialist, NRCS, Weatherford, Texas
Dr. Jack Eckroat, Grazing Lands Specialist, NRCS, Stillwater, Oklahoma
Justin Clary, Rangeland Management Specialist, NRCS, Temple, Texas

Contributors

Earl V. Hogan
PES edits by Colin Walden, Stillwater Soil Survey Office

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, Range Management Specialist, Soil Survey Region 9.
Contact for lead author	colin.walden@ok.usda.gov
Date	01/19/2018
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.

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.

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):** Ap horizon may be present. Other wise A--0 to 7 inches; dark grayish brown (10YR 4/2) fine sandy loam.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Presence of native midgrasses and few tallgrasses allow for good infiltration across landscape. However, some runoff still expected due to the nature of the clay subsoils.

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.

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 Midgrasses (Group 1)

    Sub-dominant: Native Tallgrasses, Cool Season Grasses, Native Shortgrasses, Native Forbs/Legumes (Group 2-4)

    Other: Native Shrubs (Group 5)

    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 2,500 lb/ac. Ranging from 1,500 to 3,500.

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:** Mesquite and Juniper(ashe juniper/eastern redcedar) most common invaders.

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17. **Perennial plant reproductive capability:** Plants should be capable of reproducing every year with exception of prolonged growing season drought.
