Ecological site R083CY019TX
Gray Sandy Loam

Last updated: 9/19/2023
Accessed: 05/21/2024

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.

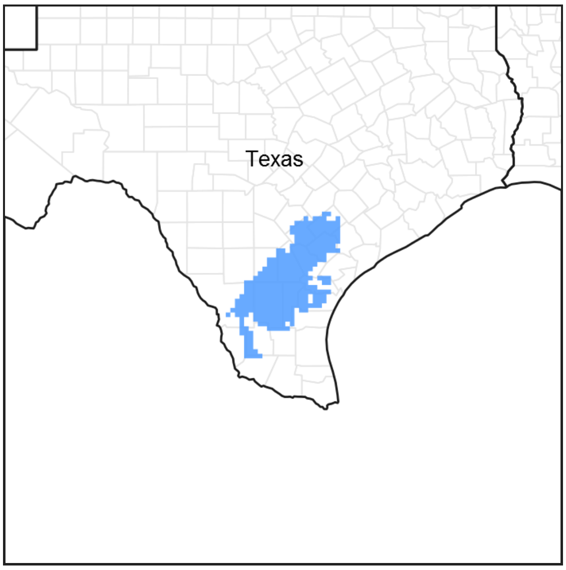


Figure 1. Mapped extent

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): 083C–Central Rio Grande Plain

Major Land Resource Area (MLRA) 83C makes up about 4,275 square miles (11,075 square kilometers). The towns of Freer, George West, and Hebbronville are in this area. The town of Alice is on the east edge of the area. U.S. Highways 59 and 281 cross the area. This area is comprised of inland, dissected coastal plains.

Classification relationships

USDA-Natural Resources Conservation Service, 2006.
-Major Land Resource Area (MLRA) 83C

Ecological site concept

The Gray Sandy Loam refers to the gray-colored, sandy loam surfaces found on the ecological site. High amounts of calcium carbonates in the upper soil profile are responsible for the gray colors and alkalinity.

Associated sites

R083CY012TX	**Ramadero**
R083CY013TX	**Loamy Bottomland**
R083CY017TX	**Blackland**
R083CY022TX	**Loamy Sand**
R083CY024TX	**Tight Sandy Loam**
R083CY025TX	**Clay Loam**
R083CY002TX	**Shallow Ridge**
R083CY004TX	**Shallow Sandy Loam**
R083CY023TX	**Sandy Loam**

Similar sites

R083AY019TX	**Gray Sandy Loam**
R083BY019TX	**Gray Sandy Loam**
R083DY019TX	**Gray Sandy Loam**

Table 1. Dominant plant species

Tree	(1) *Prosopis glandulosa var. glandulosa*
Shrub	(1) *Acacia rigidula* (2) *Leucophyllum frutescens*
Herbaceous	(1) *Heteropogon contortus* (2) *Setaria vulpiseta*

Physiographic features

The sites are on nearly level to moderately sloping areas on ridges, paleoterraces, and interfluves on inland, dissected coastal plains. Runoff is low on one to five percent slopes and medium on five to eight percent slopes. No ponding or flooding is expected for this site. Elevation ranges from 20 to 800 feet.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Paleoterrace (2) Coastal plain > Ridge (3) Coastal plain > Interfluve
Runoff class	Negligible to low
Flooding frequency	None
Ponding frequency	None
Elevation	6–244 m
Slope	0–5%
Aspect	Aspect is not a significant factor

Climatic features

MLRA 83C is subtropical, subhumid on the western boundary and subtropical humid on the eastern boundary. Winters are dry and mild and the summers are hot and humid. Tropical maritime air masses predominate throughout spring, summer, and fall. Modified polar air masses exert considerable influence during winter, creating a continental climate characterized by large variations in temperature. Peak rainfall, because of rain showers, occurs late in spring and a secondary peak occurs early in fall. Heavy thunderstorm activities increase in April, May, and June. July is hot and dry with little weather variations. Rainfall increases again in late August and September as tropical disturbances increase and become more frequent. Tropical air masses from the Gulf of Mexico dominate during the spring, summer, and fall. Prevailing winds are southerly to southeasterly throughout the year except in December when winds are predominately northerly.

Table 3. Representative climatic features

Frost-free period (characteristic range)	255-291 days
Freeze-free period (characteristic range)	365 days
Precipitation total (characteristic range)	584-660 mm
Frost-free period (actual range)	255-347 days
Freeze-free period (actual range)	365 days
Precipitation total (actual range)	533-660 mm
Frost-free period (average)	283 days
Freeze-free period (average)	365 days
Precipitation total (average)	635 mm

Climate stations used

- (1) CHOKE CANYON DAM [USC00411720], Three Rivers, TX
- (2) MCCOOK [USC00415721], Edinburg, TX
- (3) FREER [USC00413341], Freer, TX
- (4) CALLIHAM [USC00411337], Calliham, TX
- (5) HEBBRONVILLE [USC00414058], Hebbronville, TX

Influencing water features

Water features do not influence this site.

Wetland description

N/A

Soil features

The soils are deep to very deep, well drained soils formed in calcareous loamy alluvium. These soils will be slightly too violently effervescent throughout the soil profile. Soil series correlated to this site include: Aguilares, Annarose, Benavides, Choke, Copita, Hidalgo, Houla, Lomart, Pernitas, Pharr, Salco, Sarnosa, and Turcotte.

Table 4. Representative soil features

Parent material	(1) Alluvium–calcareous sandstone (2) Residuum–calcareous sandstone
Surface texture	(1) Fine sandy loam (2) Sandy clay loam (3) Loam
Family particle size	(1) Fine-loamy (2) Coarse-loamy
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Soil depth	51–203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%

Available water capacity (0-101.6cm)	10.16–17.78 cm
Calcium carbonate equivalent (0-101.6cm)	2–40%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–10
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (15-202.9cm)	0–14%
Subsurface fragment volume >3" (15-202.9cm)	0%

Ecological dynamics

The plant communities of this site are dynamic and vary in relation to grazing and drought. The reference plant community is open grassland with scattered mottes of woody shrubs. The dominant grasses include plains bristlegrass (*Setaria vulpiseta*), tanglehead (*Heteropogon contortus*), silver bluestem (*Bothriochloa laguroides*), hooded windmillgrass (*Chloris cucullata*), pink pappusgrass (*Pappophorum bicolor*), and false rhodesgrass (Trichloris crinata). The mixed brush is diverse and contains many different species including scattered brasil (*Condalia hookeri*), blackbrush acacia (*Acacia rigidula*), cenizo (*Leucophyllum frutescens*), and elbowbush (*Forestiera pubescens*). Grasses make up about 90 percent of the composition by weight.

Plant composition and productivity are affected by soil variations such as the extent of the argillic horizon development and the amount of carbonates within the profile. Landscape position is another factor that will affect the plant community. Because this site can occur on the summits or sideslopes of hills, the water shedding positions will be less productive than sites that receive runoff water. Once established shrubs such as blackbrush, guajillo (*Acacia berlandieri*), and cenizo tend to dominate and invade sites causing dense shrub communities that quickly grow and out-compete other plants for light, water, and nutrients.

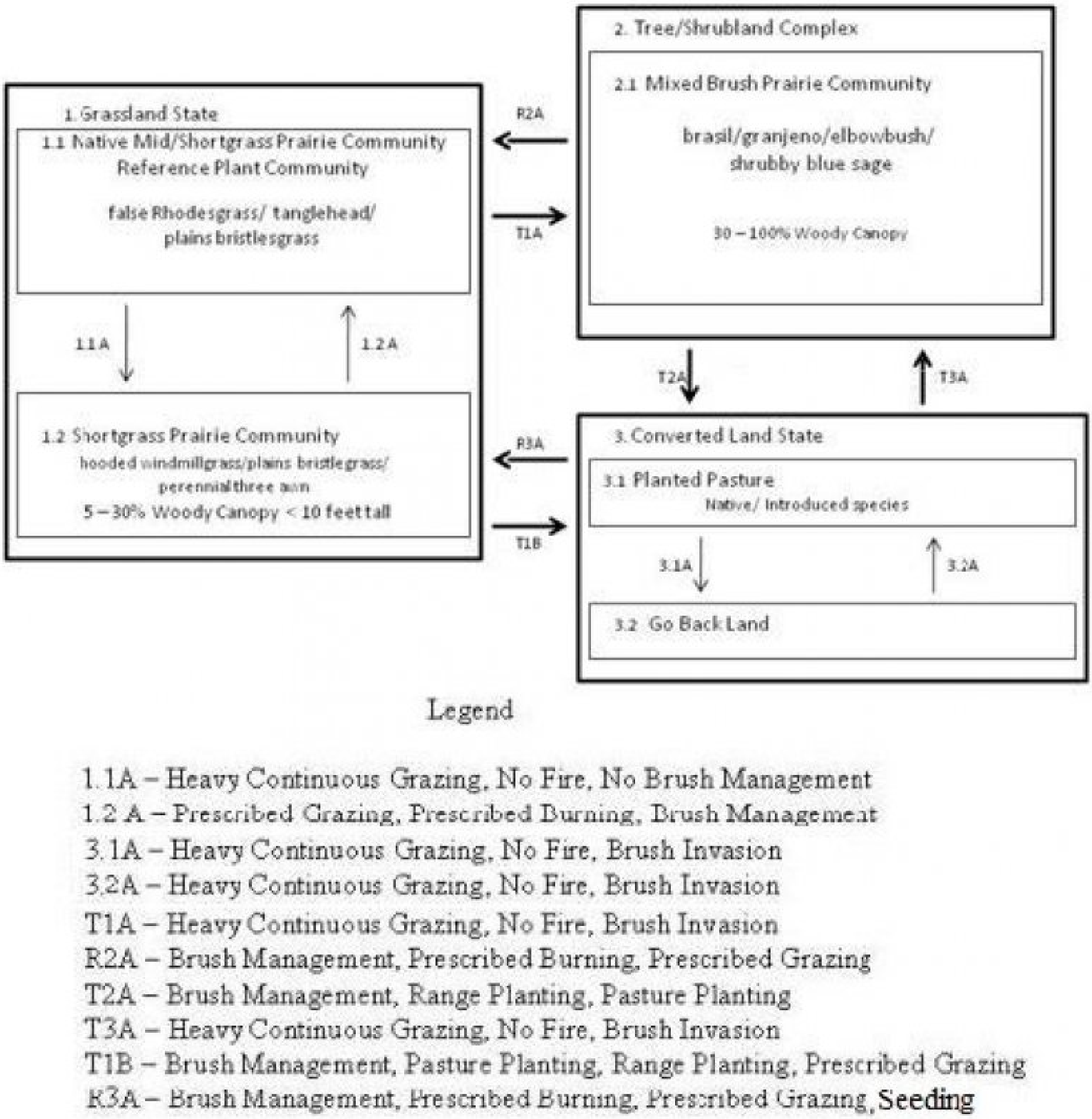
Climatic variation and topoedaphic heterogeneity interact to influence vegetation responses to disturbances such as fire and grazing. Plants evolved with grazing and fire. Prior to European settlement, fires would likely have been frequent, occurring every 5 to 10 years. These fires would have resulted from lightening during the hot, dry summer months or by native Americans. Fires promote grasses, while making it difficult for woody plants to achieve dominance. During the Pleistocene age, there were significant populations of large-bodied grazers and browsers. Most of these went extinct, so that by the Holocene (about 10,000 years ago) only bison (Bos bison), white-tailed deer (Odocoileus virginianus), and antelope (Antilocarpa americana) remained. Archeological evidence indicates that bison occurred in the region, but there is also evidence of centuries of absence. In addition, their numbers may have varied seasonally as herds migrated. When present, bison may have grazed certain areas heavily, but then moved on. Activities of other native herbivores (termites, cutter ants, soil nematodes, and kangaroo rats (Dipodomys spp.) also influenced vegetation productivity and dynamics.

Grazing and fire are two factors that critically influence the relative abundance of grasses and woody plants through time. By the early 1800's cattle (Bos spp.) and sheep numbers appear to have been quite high in the Rio Grande Plains, resulting in heavy, year-round grazing. The resulting reduction of late seral grasses lead to a decline in soil organic matter, a reduction in fire frequency/intensity (caused by a lack of fine fuels) and a shift from midgrass domination to shortgrasses. Common forb and shrub invaders include orange zexmenia (Wedelia texana) and shrubby blue sage (*Salvia ballotiflora*). These changes would have favored woody plants, most of which are unpalatable to livestock, and enabled them to establish and attain dominance. A few woody shrubs that would increase on this site, along with the climax species already listed, include lotebush (*Ziziphus obtusifolia*), mesquite (*Prosopis glandulosa*), condalia (Condalia spp.), granjeno (*Celtis ehrenbergiana*), and Texas kidneywood (*Diospyros texana*). The brush community on this site can be very diverse but it is not uncommon for a few species to dominate an area and drastically reduce both herbaceous and woody species diversity.

The shift from grass-to-woody plant domination became the impetus for brush management practices. By the 1950's, large-scale mechanized clearing was common, and by the 1970's aerial herbicide applications were widespread. However, by the 1980's it was clear that brush management practices were often treating symptoms rather than underlying problems. Some practices also had undesirable environmental consequences, including adverse effects on wildlife populations. Sites cleared of brush regenerated rapidly and often formed thickets that were denser and of lower diversity than the original stands. This realization, coupled with the fact that brush management treatments were typically short-lived, lead to the development of Integrated Brush Management Systems (IBMS). The IBMS approach takes a large-scale, long-term, ecosystem-based approach to brush management and recognizes multiple-use options for rangeland resources. Shrublands developing on former grasslands have other potential socioeconomic values that should be considered when contemplating brush management. These include alternate classes of livestock, lease hunting, white-tailed deer and exotic game ranching, and ecotourism.

While shrublands on Gray Sandy Loam sites have traditionally been viewed as degraded from a livestock production standpoint, it is important to recognize that they are not necessarily degraded from the ecological perspectives of primary productivity, nutrient cycling, and biodiversity. The productivity of shrublands may be comparable to the grassland they replaced. In addition, shrubs modify soils and microclimate to increase levels of organic matter and nutrients in the upper four inches of the soil. Nutrient enrichment by shrubs can offset grazing and contribute to enhanced grass production when shrub cover is reduced by natural or management-induced means. While the development of shrub communities may have adverse impacts on grasses and grassland fauna, other plants and animals may benefit. While ecosystem biodiversity certainly changes, it does not necessarily decrease with a shift from grass-to-woody plant domination.

State and transition model



State 1
Grassland

Dominant plant species

- plains bristlegrass (*Setaria vulpiseta*), grass
- tanglehead (*Heteropogon contortus*), grass

Community 1.1
Native Mid/Shortgrass Prairie

Figure 8. 1.1 Mid/Shortgrass Prairie Community

This Mid/Shortgrass Prairie Community (1.1) developed under natural disturbance regimes spanning thousands of years. Composition of grasses makes up 90 percent of annual production. Late succession plants such as false rhodesgrass, Arizona cottontop (*Digitaria californica*), and tanglehead make up about 25 percent of this community. Increaser plants, or more resilient species, make up 65 percent. These grasses include plains bristlegrass, pink pappusgrass, silver bluestem, and hooded windmillgrass along with threeawns and other shortgrasses. Perennial forbs, shrubs, and woody species make up the remainder. Annual forbs occur in varying amounts in response to grazing intensity, fire, drought, or excessive precipitation. The occurrence of annual forbs is sporadic and usually short-lived, mostly depending on rainfall events. This community is productive and can be managed to attain many landowner goals for livestock, wildlife, or recreation. The droughty nature of this site increases competition between species for water and nutrients; this tends to promote a high diversity in species composition because no one species can easily dominate the plant community. Rainfall differences across the region will cause subtle changes ir plant community and overall productivity, which is displayed as high and low values in the annual production tables. Although the values provided in this report are representative, doing an onsite inventory of plant community and production when planning management decisions will help land managers make sound decisions based on actual conditions on the ground.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1681	2690	3699
Forb	112	168	224
Shrub/Vine	112	157	202
Tree	–	11	22
Total	**1905**	**3026**	**4147**

Table 6. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	0-5%
Grass/grasslike foliar cover	70-90%
Forb foliar cover	10-15%
Non-vascular plants	0%
Biological crusts	0%
Litter	5-25%
Surface fragments >0.25" and <=3"	0-1%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0-5%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	0-1%	0-1%	10-40%	10-15%
>0.15 <= 0.3	0-1%	0-1%	10-40%	10-15%
>0.3 <= 0.6	0-1%	0-5%	40-100%	10-15%
>0.6 <= 1.4	0-1%	0-5%	10-25%	–
>1.4 <= 4	0-1%	–	–	–
>4 <= 12	0-1%	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 10. Plant community growth curve (percent production by month). TX5125, Midgrass Grassland Community. Warm-season production from grass, forbs, and woody species..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1	5	15	20	20	5	5	10	10	5	3

Community 1.2
Shortgrass Prairie

Figure 11. 1.2 Shortgrass Prairie Community

The Shortgrass Prairie Community (1.2) developed as a result of continued heavy grazing, an absence of the historic fire regime, and lack of brush management. This community would also be driven by weather conditions and be more common on sites that have higher slopes and in areas of decreased rainfall. In comparison to the Reference Plant Community (1.1) the Shortgrass Prairie Community (1.2) has reduced biomass production and litter accumulation which causes subtle impacts to the water, mineral, and energy cycles. The loss of thermal protection and increased water runoff potential will start to negatively affect the plant available water in the soil. In this situation reduced rainfall and prolonged droughts will begin to have more of an impact on plant production. As midgrasses such as false rhodesgrass, plains bristlegrass, and tanglehead decrease, grasses such as hooded windmillgrass, red grama (*Bouteloua trifida*), and three awn species increase. As competition for resources from taller grasses decreases, curly mesquite will also begin to increase. Reduced fuel loads result in reduced fire frequency/intensity. Annual and perennial forbs often increase as a result of decreased competition for sunlight and moisture. Introduced grass species like Kleberg bluestem (*Dichanthium annulatum*) start to invade. Woody species such as lotebush, granjeno, blackbrush, brasil, and mesquite will begin to establish dominance and as their canopy cover increases herbaceous production will decrease. While the appearance of introduced plants prevents a full restoration to the Reference Plant Community, some of these plants do perform the same functions as native species. Management activities can slow down the increase of introduced plants if this is the management goal.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1345	1961	2578
Shrub/Vine	392	813	1233
Forb	168	224	280
Tree	–	28	56
Total	**1905**	**3026**	**4147**

Figure 13. Plant community growth curve (percent production by month). TX5128, Shortgrass Dominant Community. Shortgrass dominates the site with decreasing midgrasses and increasing shrubs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1	5	15	20	21	5	5	10	10	5	2

Pathway 1.1A
Community 1.1 to 1.2

Native Mid/Shortgrass Prairie

Shortgrass Prairie

The Mid/Shortgrass Prairie Community (1.1) is the reference plant community that would have dominated the Gray Sandy Loam ecological site for thousands of years. Because of human influence this community is rarely found today. The midgrasses that dominated the landscape are highly preferred by livestock and are easily eliminated from the plant community with heavy continuous grazing. Climate also plays a large role on this site. During drought conditions, increaser plants continue growing while more productive plants are less able to thrive. The site will begin to be dominated by shortgrasses and increased bare ground. The historic fire regime has also been changed so that intermittent fires every three to seven years, which would decrease woody plant encroachment and encourage midgrass dominance, have been prevented to protect livestock and societal interests. These factors cause a shift from a Native Mid/Shortgrass Prairie Community (1.1) to a Shortgrass Prairie Community (1.2).

Pathway 1.2A
Community 1.2 to 1.1

Shortgrass Prairie

Native Mid/Shortgrass Prairie

The restoration to the Reference Plant Community (1.1) can be accomplished by installation of prescribed grazing with appropriate stocking rates. If the herbaceous component of this community remains healthy and maintains at least 85 to 90 percent ground cover, including live plants and litter, the woody component of this site will remain stable and new seedling growth will be inhibited. Individual Plant Treatment (IPT) and prescribed burning will be the most efficient and economical ways to manage brush species encroachment. The use of prescribed fire in conjunction with prescribed grazing enhances the recovery process, but because of the droughty nature of this site timing and weather conditions are critical to successful restoration efforts. Mechanical or chemical brush management is also feasible and relatively economical because this community has less than a 30 percent canopy of woody species. Once initial woody plant management has been achieved, periodic burning, reduced stocking, and prescribed grazing will cause a transition towards the Reference Plant Community over time. If the landowner wants to speed this transition, some range planting can be done to increase the number of desired species.

State 2
Tree/Shrubland

Dominant plant species

- lotebush (*Ziziphus obtusifolia*), shrub
- spiny hackberry (*Celtis ehrenbergiana*), shrub

Community 2.1
Mixed Brush Prairie

Figure 14. 2.1 Mixed Brush Prairie Community

Figure 15. 2.1 Mixed Brush Prairie Community

A threshold has been crossed between the Grassland State (1) and the Tree/Shrubland Complex (2). This Mixed Brush Prairie Community (2.1) has developed because of continuous heavy grazing, loss of fire as a management tool, greatly altered water and energy cycles, and invasion of woody plants. Episodic droughts will hasten this process. The shift from the Shortgrass Prairie Community (1.2) to the Mixed Brush Prairie Community (2.1) can happen within a period of three to seven years under certain conditions. In most cases the shrub community is diverse and no one species will account for more than 20 percent of the shrub canopy, but occasionally guajillo, blackbrush, cenizo, or mesquite can create nearly 100 percent canopy cover. Other woody species such as lotebush, granjeno, guajillo, desert yaupon (Schaefferia cuneifloia), prickly pear (*Opuntia engelmannii*), elbowbush, brasil, lime pricklyash (*Zanthoxylum fagara*), guayacan (*Guaiacum angustifolium*), and shrubby blue sage will occur as part of the plant community. Shrubby blue sage and cenizo are very common invaders on this site and will dominate open areas between shrub mottes; this reduces or even prevents herbaceous production. Average shrub canopy cover in this state is about 60 percent, but can range from 30 to 100 percent. The amount of bareground and herbaceous production will vary with weather conditions, grazing pressure, and as the grass community diminishes. Soils with a more developed argillic horizon will support a denser shrub community. Shrub canopy height typically ranges from 6 to 10 feet, but in areas with relatively old plants mesquite trees can be more than 15 feet tall with dense understory of mixed brush creating large mottes. Grass production is severely reduced in this state and shortgrasses like perennial three awn, Hall’s panicum (*Panicum hallii*), red grama (*Bouteloua trifida*), and lovegrass tridens (*Tridens eragrostoides*) will be most common. On the northeastern range of this ecological site, live oak trees (*Quercus virginiana*) will become part of the landscape and may make up a small portion of the plant community. This community may be much better wildlife habitat than the previous state because of the increased amount of woody cover and browse. With increased emphasis on white-tailed deer and bobwhite quail, many landowners choose to manage their land in this condition to enhance wildlife populations.

Table 9. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	1177	1821	2466
Grass/Grasslike	560	953	1345
Tree	112	168	224
Forb	56	84	112
Total	**1905**	**3026**	**4147**

Figure 17. Plant community growth curve (percent production by month). TX5131, Shrubland Complex Community, >50% woody canopy. Woodland Community with 50-80% woody canopy cover..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	2	5	10	18	15	5	9	15	9	5	5

State 3
Converted Land

Dominant plant species

- buffelgrass (*Pennisetum ciliare*), grass

Community 3.1
Planted Pasture

Figure 18. 3.1 Planted Pasture

Typically dozing and raking or Rhome disking is utilized to remove the woody vegetation in transition from State 1 and 2. A seedbed is then prepared, and the area is planted into grass, or rarely will it be planted into crops or wildlife food plots. This site does not generally receive enough rainfall to create successful crops year after year, so cash crops are not typical. If introduced species are planted this site may be more productive than the original plant community. Inputs such as fertilizer, herbicide, and adequate precipitation may be necessary to maintain high productivity. Now, because of the availability of seed, landowners can also replant with native species. To maintain this seeded state, herbicides must be used to control woody seedlings that seek to invade as soon as the pasture is established. Not only is there a long-lived seed source, additional seeds are brought in by grazing animals and domestic livestock.

Table 10. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1905	3026	4147
Total	**1905**	**3026**	**4147**

Figure 20. Plant community growth curve (percent production by month). TX5132, Converted Land Community - Pastureland. Converting into pastureland by planting native and introduced grass species..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1	5	15	20	20	5	5	15	8	4	1

Community 3.2
Go Back Land

Figure 21. 3.2 Go Back Land

This community develops after land has been left to fallow without management inputs or after unsuccessful brush management practices. It is typified by the dominance of woody species, very little herbaceous grass production, and large areas covered by tree-leaf litter or bare ground. This plant community has low species diversity and is commonly dominated by mesquite, cenizo, or guajillo. Re-infestation of woody seedlings happens in a relatively short time period of two to five years on abandoned cropland or pastures.

Table 11. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	0-1%	0-1%	10-30%	10-15%
>0.15 <= 0.3	0-1%	0-1%	20-50%	10-15%
>0.3 <= 0.6	0-1%	40-60%	10-30%	–
>0.6 <= 1.4	10-20%	40-60%	–	–
>1.4 <= 4	10-20%	40-60%	–	–
>4 <= 12	10-20%	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 22. Plant community growth curve (percent production by month). TX5136, Converted Land Community - Woody Seedling Encroachment. Converted Land Community that has been encroached by woody seedlings due to abandonment of crop and pastureland..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	2	5	10	18	15	5	9	15	9	5	5

Pathway 3.1A
Community 3.1 to 3.2

Planted Pasture

Go Back Land

The transition from Planted Pasture (3.1) to Go Back Land (3.2) occurs when fields or pastures are left to fallow without management. Woody species begin to invade the site and will continue to grow and eventually dominate the plant community. Generally, pastureland will transition to the Tree/Shrubland Complex (2) and not to the Go Back Land plant community, but this depends on pasture management and the amount of time the grass community is healthy and dominant.

Pathway 3.2A
Community 3.2 to 3.1

Go Back Land

Planted Pasture

Many land managers may want to utilize this site as pastureland. To achieve this transition practices such dozing and raking will be necessary. After the land has been cleared and an appropriate seedbed prepared the pasture can be planted.

Transition T1A
State 1 to 2

The transition from the Grassland State (1) to the Tree/Shrubland Complex (2) can happen within three to seven years. This transition can be driven by persistently dry weather conditions, grazing management, and the lack of fire and brush management practices. Overstocking the site with grazing animals will put pressure on the herbaceous plant component of the community. Increased bare ground becomes a large problem affecting the hydrologic cycle. As herbaceous ground cover decreases runoff and evaporation during rainfall events will increase, causing less water to infiltrate into the soil available for plant use. If the woody component is not managed, it will begin to dominate the landscape and out-compete grasses and forbs for water, sunlight, and resources.

Transition T1B
State 1 to 3

Land managers may want to utilize this site as pastureland. To achieve this transition from the Grassland State (1) brush management and heavy disking with a Rhome disk, or other heavy implement, will be necessary to incorporate the vegetation into the soil. Prescribed burning can also be used prior to the disking operation to eliminate excessive vegetation. After the land has been cleared and an appropriate seedbed prepared the pasture can be planted. This site is not typically used as cropland.

Restoration pathway R2A
State 2 to 1

Major inputs are required to restore this community to the Grassland State (1). Mechanical brush management practices such as dozing or using a Rhome disk are the most common options. Chaining and roller chopping are mechanical practices which will be short-lived and will typically result in thicker, harder to manage brush stands and will encourage brush seedlings. Chemical brush management is more difficult because of the highly diverse mixed brush community. Follow-up conservation practices such as Individual Plant Treatment for woody re-growth and new seedlings and prescribed grazing will be necessary for several years after the initial brush management to maintain an improved plant community. Depending on local conditions it may also be necessary to re-introduce a seed source for desired native plant species through range planting. Successful restoration of the Mid/Shortgrass Prairie Community (1.1) is highly dependent on rainfall and follow up management activities which promote the establishment of native grasses and forbs.

Transition T2A
State 2 to 3

Land managers may want to utilize this site as pastureland. To achieve this transition from the Mixed Brush Prairie Community (2.1) brush management and heavy disking with a Rhome disk, or other heavy implement, will be necessary to incorporate the vegetation into the soil. Prescribed burning can also be used prior to the disking operation to eliminate excessive vegetation. After the land has been cleared and an appropriate seedbed prepared, the pasture can be planted.

Transition T3A
State 3 to 2

In time, this site will revert to the Tree/Shrubland Complex (2) on its own, but usually this timeline is impractical for landowners. Prescribed grazing along with various brush management practices will be necessary to achieve this transition. This phase is very unproductive for herbaceous plants and it could take years for desirable plant species to begin to re-establish.

Additional community tables

Table 12. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					

1	**Tall/Midgrasses**			448–1121	
	tanglehead	HECO10	*Heteropogon contortus*	112–392	–
	false Rhodes grass	TRCR9	*Trichloris crinita*	112–392	–
	multiflower false Rhodes grass	TRPL3	*Trichloris pluriflora*	112–392	–
2	**Midgrasses**			841–1793	
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	224–448	–
	silver beardgrass	BOLA2	*Bothriochloa laguroides*	168–392	–
	pink pappusgrass	PABI2	*Pappophorum bicolor*	168–392	–
	Arizona cottontop	DICA8	*Digitaria californica*	140–224	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	140–224	–
	Texas bristlegrass	SETE6	*Setaria texana*	84–168	–
3	**Shortgrasses**			392–785	
	hooded windmill grass	CHCU2	*Chloris cucullata*	84–140	–
	fall witchgrass	DICO6	*Digitaria cognata*	34–112	–
	curly-mesquite	HIBE	*Hilaria belangeri*	34–112	–
	Texas wintergrass	NALE3	*Nassella leucotricha*	0–112	–
	vine mesquite	PAOB	*Panicum obtusum*	0–112	–
	lovegrass tridens	TRER	*Tridens eragrostoides*	34–112	–
	slim tridens	TRMU	*Tridens muticus*	34–112	–
	threeawn	ARIST	*Aristida*	34–112	–
	buffalograss	BODA2	*Bouteloua dactyloides*	34–112	–
Forb					
4	**Forbs**			112–224	
	Forb, annual	2FA	*Forb, annual*	6–28	–
	Forb, perennial	2FP	*Forb, perennial*	6–28	–
	Texas Indian mallow	ABFR3	*Abutilon fruticosum*	6–28	–
	prairie broomweed	AMDR	*Amphiachyris dracunculoides*	6–28	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	6–28	–
	Illinois bundleflower	DEIL	*Desmanthus illinoensis*	6–28	–
	slimleaf heliotrope	HETO	*Heliotropium torreyi*	6–28	–
	yellow puff	NELU2	*Neptunia lutea*	6–28	–
	bushsunflower	SIMSI	*Simsia*	6–28	–
	silverleaf nightshade	SOEL	*Solanum elaeagnifolium*	6–28	–
	woody crinklemat	TICAC	*Tiquilia canescens var. canescens*	6–28	–
Shrub/Vine					
5	**Shrubs**			112–202	
	blackbrush acacia	ACRI	*Acacia rigidula*	17–34	–
	guajillo	ACBE	*Acacia berlandieri*	17–34	–
	Texas barometer bush	LEFR3	*Leucophyllum frutescens*	17–34	–
	desert yaupon	SCCU4	*Schaefferia cuneifolia*	11–22	–
	lime pricklyash	ZAFA	*Zanthoxylum fagara*	11–22	–
	lotebush	ZIOB	*Ziziphus obtusifolia*	11–22	–

	Texas persimmon	DITE3	*Diospyros texana*	11–22	–
	Texas kidneywood	EYTE	*Eysenhardtia texana*	11–22	–
	stretchberry	FOPU2	*Forestiera pubescens*	11–22	–
	Texas lignum-vitae	GUAN	*Guaiacum angustifolium*	11–22	–
	catclaw acacia	ACGR	*Acacia greggii*	11–22	–
	spiny hackberry	CEEH	*Celtis ehrenbergiana*	11–22	–
	Brazilian bluewood	COHO	*Condalia hookeri*	11–22	–
	Texan hogplum	COTET	*Colubrina texensis var. texensis*	11–22	–
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	6–11	–
	Rio Grande beebrush	ALMA9	*Aloysia macrostachya*	6–11	–
Tree					
6	**Trees**			0–22	
	honey mesquite	PRGLG	*Prosopis glandulosa var. glandulosa*	11–34	–
	live oak	QUVI	*Quercus virginiana*	0–22	–

Animal community

As a historic tall/midgrass prairie, this site was occupied by bison, antelope, deer, quail, turkey, and dove. This site was also used by many species of grassland songbirds, migratory waterfowl, and coyotes. This site now provides forage for livestock and is still used by quail, dove, migratory waterfowl, grassland birds, coyotes, and deer.

Feral hogs (Sus scrofa) can be found on most ecological sites in Texas. Damage caused by feral hogs each year includes, crop damage by rutting up crops, destroyed fences, livestock watering areas, and predation on native wildlife, and ground-nesting birds. Feral hogs have few natural predators, thus allowing their population to grow to high numbers.

Wildlife habitat is a complex of many different plant communities and ecological sites across the landscape. Most animals use the landscape differently to find food, shelter, protection, and mates. Working on a conservation plan for the whole property, with a local professional, will help managers make the decisions that allow them to realize their goals for wildlife and livestock.

Grassland State (1): This state provides the maximum amount of forage for livestock such as cattle. It is also utilized by deer, quail and other birds as a source of food. When a site is in the reference plant community phase (1.1) it will also be used by some birds for nesting, if other habitat requirements like thermal and escape cover are near.

Tree/Shrubland (2): This state can be maintained to meet the habitat requirements of cattle and wildlife. Land managers can find a balance that meets their goals and allows them flexibility to manage for livestock and wildlife. Forbs for deer and birds like quail will be more plentiful in this state. There will also be more trees and shrubs to provide thermal and escape cover for birds as well as cover for deer.

Seeded State (3): The quality of wildlife habitat this site will produce is extremely variable and is influenced greatly by the timing of rain events. This state is often manipulated to meet landowner goals. If livestock production is the main goal, it can be converted to pastureland. It can also be planted to a mix of grasses and forbs that will benefit both livestock and wildlife. A mix of forbs in the pasture could attract pollinators, birds and other types of wildlife. Food plots can also be planted to provide extra nutrition for deer.

This rating system provides general guidance as to animal preference for plant species. It also indicates possible competition between kinds of herbivores for various plants. Grazing preference changes from time to time, especially between seasons, and between animal kinds and classes. Grazing preference does not necessarily reflect the ecological status of the plant within the plant community. For wildlife, plant preferences for food and plant suitability for cover are rated. Refer to habitat guides for a more complete description of a species habitat needs.

Hydrological functions

Peak rainfall periods occur in May and June from thunderstorms and in September and October from tropical systems. Rainfall events may be high (three to five inches per event) and intense. Extended periods (45 to 60 days) of little to no rainfall during the growing season are common. Because of the topography of this site, erosion may be significant, especially in the Tree/Shrubland Complex (2), where there is less herbaceous cover and more bare ground. This increase in bare ground will also negatively affect the amount of water that is amble to infiltrate into the soil during rain events. This site provides little water for aquifer recharge because when wet, infiltration is slow.

Recreational uses

Hunting, bird watching, and photography are common activities.

Wood products

In the prairie state, few wood products are available. In a wooded state, the site may grow large numbers of shrubs and trees which can be cut for firewood.

Other products

Landowners have the opportunity to explore the many facets of ecotourism, and the potential of the natural resources of their property, to create value from their land.

Inventory data references

Information presented was derived from the revised Range Site, literature, limited NRCS clipping data (417s), field observations, and personal contacts with range-trained personnel.

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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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Approval date	

Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None.

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2. **Presence of water flow patterns:** Few water flow pattens are normal for this site due to landscape position and slopes.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals would have been uncommon for this site.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Less than five percent bare ground.

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5. **Number of gullies and erosion associated with gullies:** None.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None.

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7. **Amount of litter movement (describe size and distance expected to travel):** Small-to-medium sized litter may move short distances during intense 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):** Soil surface is resistant to erosion. Soil stability class range is expected to be 4 to 6.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface struture is 6 to 12 inches thick with colors ranging from very dark gray to pale brown with subangular blocky structure. SOM is less than three percent.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** A high canopy cover of bunch, rhizomatous, and stoliniferous grasses will help minimize runoff and maximize infiltration. Grasses should comprise approximately 90 percent of total annual production by weight. Shrubs will comprise about five percent by weight.

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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):** None.

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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: Perennial Midgrasses > Perennial Tall/Midgrasses >>

Sub-dominant: Perennial Shortgrasses > Forbs > Shrubs > Trees

Other:

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Potential for 5 to 15 percent plant mortality of perennial bunchgrasses during extreme drought

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14. **Average percent litter cover (%) and depth (in):** 5 to 15 percent litter cover.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1,700 to 4,200 pounds per acre.

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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:** Cenizo, blackbrush, guajillo, mesquite, Old World bluestems, and buffelgrass.

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17. **Perennial plant reproductive capability:** All species should be capable of reproducing.
