USDA Natural Resources Conservation Service

Ecological site R083BY011TX
Claypan Prairie

Last updated: 9/19/2023
Accessed: 05/10/2025

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.

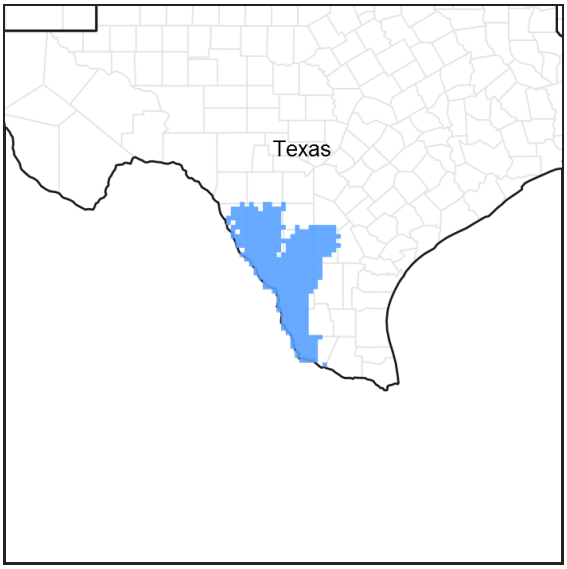


Figure 1. Mapped extent

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): 083B–Western Rio Grande Plain

Major Land Resource Area (MLRA) 83B It makes up about 9,285 square miles (24,060 square kilometers). The border towns of Del Rio, Eagle Pass, Laredo, and Zapata are in this MLRA. Interstate 35 crosses the area just north of Laredo. The Amistad National Recreation Area is just outside this MLRA, northwest of Del Rio, and the Falcon State Recreation Area is southeast of Laredo. Laughlin Air Force Base is just east of Del Rio. This area is comprised of inland, dissected coastal plains.

Classification relationships

Hierarchical Classification Relationships
USDA-Natural Resources Conservation Service, 2006.
-Major Land Resource Area (MLRA) 83B

Ecological site concept

The Claypan Prairie is a grassland site that occurs on nearly level, lower lying areas. Drainage in this site varies. The soils are characterized by a thing layer of fine sandy loam topsoil underlain by deep clay and clay loam subsoils.

Associated sites

R083BY015TX	**Saline Clay**
R083BY019TX	**Gray Sandy Loam**
R083BY025TX	**Clay Loam**
R083BY023TX	**Sandy Loam**

Similar sites

R083AY011TX	**Claypan Prairie**

Table 1. Dominant plant species

Tree	(1) *Prosopis glandulosa*
Shrub	(1) *Acacia schaffneri* (2) *Ziziphus obtusifolia*
Herbaceous	(1) *Trichloris pluriflora* (2) *Setaria macrostachya*

Physiographic features

This site occurs in the nearly level to gently sloping interfluves of the Texas Western Rio Grande Plain. This site is well drained. Elevation ranges from 200 to 600 feet. This area is comprised of inland, dissected coastal plains.

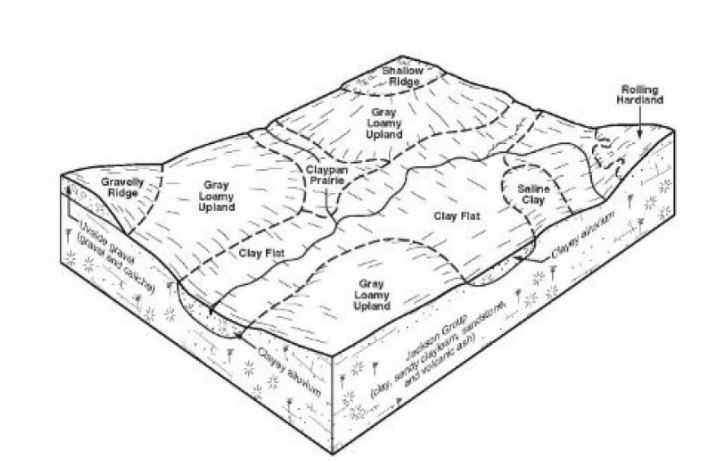


Figure 2.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Interfluve
Runoff class	Low to medium
Flooding frequency	None to rare
Ponding frequency	None
Elevation	200–600 ft
Slope	0–3%
Aspect	Aspect is not a significant factor

Climatic features

MLRA 83B mainly has a subtropical steppe climate along the Rio Grande River and subtropical subhumid climates in La Salle and McMullen counties. Winters are dry and mild and the summers are hot. 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 occurs late in spring and a secondary peak occurs early in fall. Most heavy thunderstorm activities occur during the summer months. 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 as the storms dissipate. 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)	231-321 days
Freeze-free period (characteristic range)	313-365 days
Precipitation total (characteristic range)	20 in
Frost-free period (actual range)	214-365 days
Freeze-free period (actual range)	260-365 days
Precipitation total (actual range)	19-21 in
Frost-free period (average)	270 days
Freeze-free period (average)	340 days
Precipitation total (average)	20 in

Climate stations used

- (1) EAGLE PASS 3N [USC00412679], Eagle Pass, TX
- (2) FALCON DAM [USC00413060], Roma, TX
- (3) LAREDO 2 [USC00415060], Laredo, TX
- (4) ZAPATA 1 S [USC00419976], Zapata, TX
- (5) DEL RIO INTL AP [USW00022010], Del Rio, TX
- (6) CATARINA [USC00411528], Asherton, TX
- (7) CRYSTAL CITY [USC00412160], Crystal City, TX
- (8) DEL RIO 2 NW [USC00412361], Del Rio, TX

Influencing water features

Sites are located on drainageways and may rarely flood. Length of flooding depends on size of event and current saturation of soil.

Wetland description

N/A

Soil features

The soils are very deep, moderately well drained, very slowly permeable, and formed in clayey residuum from shale. Laparita is the only soil series correlated to the Claypan Prairie.

Table 4. Representative soil features

Parent material	(1) Residuum–shale
Surface texture	(1) Clay loam (2) Loam (3) Sandy clay loam

Family particle size	(1) Fine
Drainage class	Well drained
Permeability class	Very slow to slow
Soil depth	80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	4 in
Calcium carbonate equivalent (0-40in)	0–10%
Electrical conductivity (0-40in)	0–16 mmhos/cm
Sodium adsorption ratio (0-40in)	0–20
Soil reaction (1:1 water) (0-40in)	6.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–2%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The accounts of early explorers and settlers suggest that the Rio Grande Plains was likely a vast mosaic of open grassland, savannah, and shrubland. While moving in 1691 out of Maverick County and into Zavala County, Don Domingo de Teran found after crossing the Nueces River “the country was level and covered with mesquites and cats’ claw.” In 1849, Michler described south Texas as “concerning the land both on the Frio and the Leona, from these rivers back, that it may be divided into four parallel strips-the first, next to the river, consisting of heavy timber, and a heavy black soil, the second, a mesquite flat, of small width, and the soil of a lighter nature, and very fertile; the third, a range of low hills, covered with loose stones, and thick chaparral; the fourth, a wide-open prairie.” Lehman indicates, “thus while it is quite true that the Rio Grande Plains once had fewer woody plants and more grass than now, it is also true that an ample seed stock of shrubs and trees has been widely distributed for as long as man has known.” The vegetation structure likely varied from place-to-place depending on topography, soil properties, and time since the last major disturbance.

Large numbers of domestic livestock grazed South Texas as early as the mid-1700’s. Formal deeds to properties from the Spanish and Mexican governments came in the late 1760’s with much larger blocks granted in the decades to follow. Lehman indicated, “in 1757, the official Spanish census showed residents of Camargo and Reynosa in the lower Rio Grande owning over 90,000 sheep and goats. By way of contrast, combined numbers of cattle, oxen, horses, mules and burros were less than 16,000.” By the mid-1800’s, according to Lehman’s figures from the U. S. Census of 1889, “there were a minimum of 1,644,268 sheep-fully 45 percent of Texas total population, grazing south of the Nueces River.” According to Inglis, “the Rio Grande Plains had the four-leading sheep producing counties in the state and ten of the top fifteen sheep producing counties were in South Texas. The peak decade was 1880 to 1890, at times exceeding two million head.” These domestic animals were in addition to bison, antelope, deer, and large herds of wild horses. It is obvious from early accounts, that much of the Rio Grande Plains was periodically grazed hard by both domestic animals and wild populations as early as the early to mid-1700’s. It may be that overgrazing by sheep and goats could have suppressed the many shrubs, reduced shrub canopy, and arrested shrub seedlings.

With the arrival of European man, the South Texas area was fenced and, in many instances, stocked beyond its capability to sustain forage. This overstocking led to a reduced fire frequency and intensity, creating an opportunity for woody shrubs to increase across the landscape. As the natural graze-rest cycles were altered and stocking rates continued to exceed the natural carrying capacity of the land, midgrasses were replaced by shortgrasses and the ground cover was opened so additional annual and perennial forbs also increased. Drought certainly enhanced this

effect. As prolonged overgrazing continued, shrub cover increased. Shortgrasses became dominant and forage production decreased. This change in plant cover and structure further decreased fire frequency and intensity, favoring shrub establishment and dominance.

The plant communities of this site are dynamic varying in relation to fire, periodic drought, and wet cycles. Periodic fires were set by either Native Americans or started naturally by lightning. Fire did not play as important a role on this site as in deeper more productive sites due to lower production of grasses to burn. Because of large amounts of gravel in the soil, available water holding capacity is greatly reduced. This causes highly variable forage production and minimal grass production during dry years. The historic community of this site was influenced to some extent by periodic grazing by herds of buffalo and wild horses. Herds of buffalo and wild horses would come into an area, graze it down, and then not come back for many months or even years depending upon the availability of water. This long deferment period allowed recovery of the grasses and forbs which served as fuel load. More than likely, fire occurred following years of good rainfall followed by a dry season. The fire frequency for this area is interpreted to be four to six years (Frost, 1998).

While periodic grazing can be a natural component of the ecosystem, overstocking and overgrazing by domestic animals has an impact on the site. With continuous abusive grazing, midgrasses tend to decrease and are replaced by shortgrasses and forbs such as red grama (*Bouteloua trifida*), purple threeawn (*Aristida purpurea*), slim tridens (*Tridens muticus*), curly mesquite (*Hilaria belangeri*), and oreja de perro (Tiguilia canescens). Heavy continuous grazing eliminates the possibility of fire. In this condition, a dense cover of brush dominated by blackbrush (*Acacia rigidula*), creosote (*Larrea tridentata*), cenizo (*Leucophyllum frutescens*), and guajillo (*Acacia berlandieri*) will occupy the site. In this condition, very few grasses or forbs will be visible on the site during dry periods. However, during periods of above average rainfall, a flush of annual forbs, annual grasses, and a few opportunistic perennial grasses will coexist with the dense brush. The specific species of plants that dominate this site will vary with the specific soil series present.

Presently, the Claypan Prairie is mostly a community of woody shrubs exceeding 50 percent canopy, with the interspaces dominated by shortgrasses such as common buffalograss (*Bouteloua dactyloides*), red grama (*Bouteloua trifida*), slim tridens (*Tridens muticus*), and lovegrass tridens (*Tridens eragrostoides*). If drought and/or grazing denude the site, soils will cap over and infiltration of rainfall will be reduced significantly. When in this condition, this site recovers very slowly, and mechanical manipulation will be required to reduce shrub canopy and break the soil crust.

State and transition model

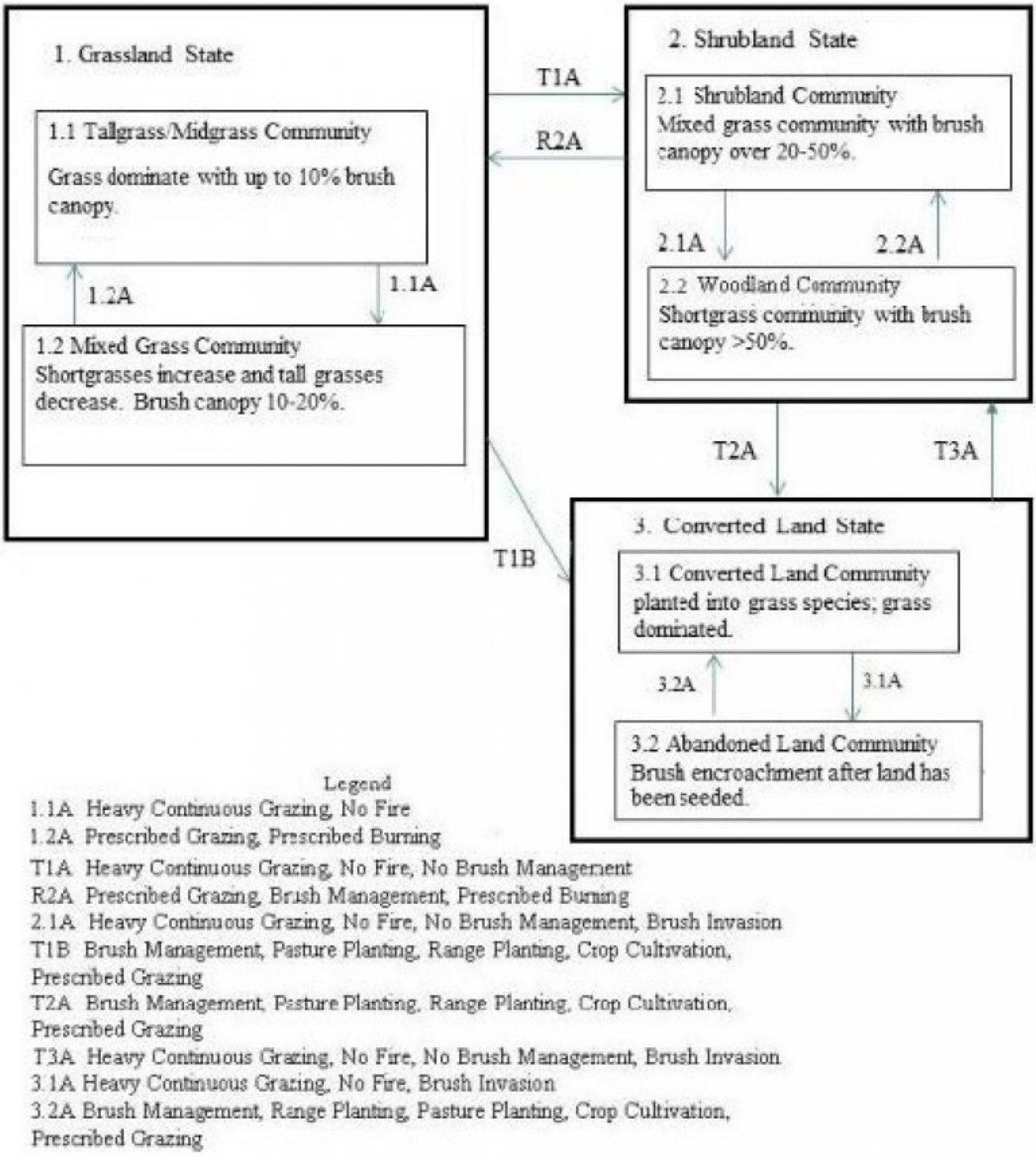


Figure 9. STM

State 1
Grassland

The grassland state consists of approximately 95 percent grasses, a trace of woody plants, and a 5 percent composition of forbs by air-dry weight. For interpretive purposes, the woody crown canopy can be approximately five percent. Two community phases exist: the Midgrass Community and the Midgrass/Shortgrass Community.

Dominant plant species

- Arizona cottontop (*Digitaria californica*), grass
- false Rhodes grass (*Trichloris crinita*), grass

Community 1.1
Midgrass

Figure 10. 1.1 Midgrass Community

The reference community is an open grassland dominated by midgrasses such as Arizona cottontop (*Digitaria californica*), false Rhodes grass (*Trichloris crinita*), multi-flowered false Rhodes grass (*Trichloris pluriflora*), longspike beardgrass (*Bothriochloa longipaniculata*), lovegrass tridens, sideoats grama (*Bouteloua curtipendula*), vine-mesquite (*Panicum obtusum*), and cane bluestem (*Bothriochloa barbinodis*). Also occurring, but in lesser amounts, are Texas bristlegrass (*Setaria texana*), buffalograss, plains bristlegrass (*Setaria vulpiseta*), hooded windmillgrass (*Chloris cucullata*), shortspike windmillgrass (Chloris subdolichostachya), and fall witchgrass (*Digitaria cognata*). Historically, this site is perceived to have had regular turnover in the herbaceous plant community between midgrasses, shortgrasses, and forbs because of drought and/or grazing. Individual grass species abundance is expected to fluctuate widely. This is because of the droughty nature of the soil and the site occasionally receiving water. Fire frequency is perceived to be variable and to occur in above average years followed by drought and/or prolonged dormant periods. The site is productive and maintained a high percentage of ground cover most of the time. During extended droughts, this ground cover of perennial grasses and forbs was often greatly reduced but had the resiliency to recover when favorable climatic conditions returned. A significant role for prescribed grazing is to build and maintain fine fuel amounts for effective prescribed burning. While periodic grazing was a natural component of the ecosystem, continuous abusive grazing has a strong negative impact on this site. Because of abusive grazing, the midgrasses decrease and are replaced by less palatable, short-lived grasses. Droughts hasten the process. Major grass increasers are slim tridens, red grama, buffalograss, curly mesquite, and lovegrass tridens. Mesquite (*Prosopis glandulosa*), twisted acacia (*Acacia schaffneri*), and prickly pear (Opuntia spp.) are the common plants that increase as abusive grazing persists.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1500	2250	3000
Shrub/Vine	75	125	175
Forb	50	100	150
Tree	10	25	40
Total	**1635**	**2500**	**3365**

Table 6. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	0-5%
Grass/grasslike foliar cover	75-95%
Forb foliar cover	5-10%
Non-vascular plants	0%

Biological crusts	0%
Litter	80-100%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	0-1%	0-2%	70-100%	1-5%
>0.5 <= 1	0-2%	0-2%	70-100%	1-10%
>1 <= 2	1-3%	0-4%	65-75%	5-15%
>2 <= 4.5	0-1%	1-5%	20-45%	5-10%
>4.5 <= 13	0-1%	1-5%	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Figure 12. 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
Mixed Grass

Figure 13. 1.2 Mixed Grass Community

The Mixed Grass Commnity of the Grassland State still exhibits a grassland plant structure with a shift toward weaker, less palatable shortgrasses such as hooded windmill, fall witchgrass, lovegrass tridens, and threeawn. Abusive continuous grazing takes many of the midgrasses out of the site and reduces their vigor. Increaser plants become much more common across the site. Annual and perennial forbs such as leatherstem can be more common in this phase. Woody plants that increase include mesquite, brasil, pear, granjeno, and twisted acacia.

There is an increase in bare ground. Plant production becomes more erratic. Drought interacts with grazing to trigger mid to shortgrass transitions. Termite activity often increases during low rainfall periods to further decrease production and ground cover. The shortgrasses and forbs are less productive than the midgrasses they replace. Reductions in aboveground cover and root biomass make this community more prone to runoff, erosion, and prolong the effects of drought. A reduction in ground cover leads to higher soil temperatures that, in conjunction with the reduction of leaf and root biomass inputs, can cause declines in soil organic matter. This reduces soil water holding capacity and fertility that further affects species composition and production. Fire frequency/intensity in this community is reduced because of low fine fuel load and continuity. As a result, woody plants increase unchallenged in size, density, and total cover. With constructive grazing, midgrasses can regain dominance on the site. Undesirable trends in soil organic matter, fertility, temperature, and erosion can be arrested and reversed. However, this process is very difficult to precisely predict. Restoration of fine fuel biomass and continuity enable use of prescribed fire to reduce the stature and cover of established woody plants. The extent to which the original Midgrass Community can be re-established will depend on the extent to which soil physical and chemical properties were altered during retrogression.

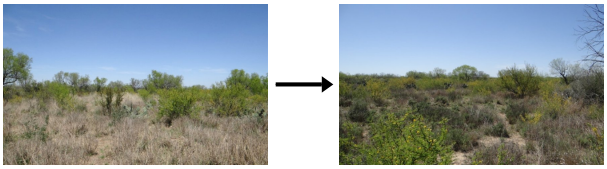
Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1000	1750	2500
Forb	50	150	250
Shrub/Vine	100	150	200
Tree	10	25	40
Total	**1160**	**2075**	**2990**

Figure 15. 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



Midgrass **Mixed Grass**

A shift to the Mixed Grass Community occurs if the Midgrass Community is weakened by excessive leaf removal. Drought hastens the process. A reduction in midgrass also corresponds in a reduction of fuel loading needed for fire to effectively suppress woody species.

Pathway 1.2A
Community 1.2 to 1.1

Mixed Grass **Midgrass**

Managerial activities that restore the hydrologic cycle, the energy capture by midgrasses, and ground cover will move the Mixed Grass Community (1.2) toward the Midgrass Community (1.1). Utilizing historic ecological disturbances such as herbivory and fire in constructive amounts are needed. Selective brush management may

also be needed. The time to shift back to the Midgrass Community (1.1) is dependent upon favorable growing conditions and could take 5 to 10 years.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

State 2
Tree Shrubland

The Shrubland State consists of two communities; Shrubland Community (2.1) with a brush canopy of 20 to 50 percent, and the Woodland Community (2.2) with a brush canopy of greater than 50 percent. These communities are mid and shortgrass communities with a shrub canopy of mixed brush and trees.

Dominant plant species

- Christmas cactus (*Cylindropuntia leptocaulis*), shrub
- blackbrush (*Coleogyne ramosissima*), shrub

Community 2.1
Shrubland

Figure 16. 2.1 Shrubland Community

Lack of fire and continued abusive grazing causes a shift from grasslands with up to 20 percent shrub cover to shrublands with greater than a 50 percent brush cover. A threshold has been crossed once the site approaches the 20 percent canopy cover. Major shrub species include tasajillo (*Cylindropuntia leptocaulis*), blackbrush, twisted acacia, pricklypear, mesquite, guayacan (*Guaiacum angustifolium*), and a whole suite of others. The herbaceous community is generally composed of slim tridens, red grama, threeawn species, and other short grasses. The forb community is made up of cuman ragweed (*Ambrosia psilostachya*), dogweed (Dyssodia spp.), and many annuals. At this point, prescribed grazing alone will not restore this community back to the Grassland State (1). During the growing season, light showers are captured in the canopy of the shrubs and evaporate before reaching the soil surface. Energy flow is predominately through the shrubs and most nutrients are used by the shrubs. Annual forbs can be produced by rainfall at any time of the year. With these conditions, prescribed fire is a very limited option due a lack of fine fuel load. With continued abusive grazing and without brush management, woody cover will increase to more than 50 percent canopy.

Community 2.2
Woodland

Figure 17. 2.2 Woodland Community

The community components are very similar to community (2.1), but the stature and density is greater. Major shrub species include tasajillo, blackbrush, twisted acacia, prickly pear, mesquite, guayacan, and a whole suite of others. The herbaceous community is generally composed of slim tridens, red grama, threeawn species, and other short grasses. The forb community is composed of cuman ragweed, dogweed, and many annuals. At this point, prescribed grazing alone will not restore this community back to the Grassland State (1). During the growing season, light showers are captured in the canopy of the shrubs and evaporate before reaching the soil surface. Energy flow is predominately through the shrubs and most nutrients are used by the shrubs. Annual forbs can be produced by rainfall at any time of the year. With these conditions, prescribed fire is a very limited option due a lack of fine fuel load. Aggressive brush management and constructive grazing management is required to convert the system back to the grassland state or something resembling the grassland state. Re-seeding of perennial warm-season grasses may be necessary and has potential to speed up the restoration process. Reseeding of adapted native plants may also have potential to limit establishment of aggressive, introduced grasses such as Kleberg bluestem.

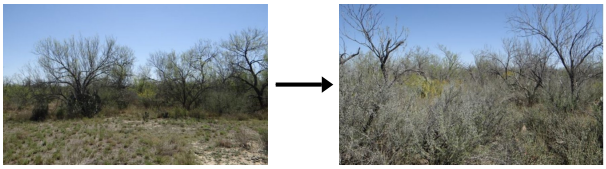
Table 9. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	300	400	500
Grass/Grasslike	150	325	500
Tree	50	125	200
Forb	25	50	100
Total	**525**	**900**	**1300**

Figure 19. Plant community growth curve (percent production by month). TX5130, Short/Midgrass Shrubland Complex 20-50% woody canopy. Shrubland Community with 20-50% woody canopy..

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 2.1A
Community 2.1 to 2.2



Shrubland **Woodland**

A shift to the Tree/Shrubland Community (2.2) occurs if brush management is not accomplished. Drought hastens

the process. A lack of brush management allows existing brush to gain in stature. Seedlings are introduced through droppings from livestock and wildlife. A reduction in midgrass also corresponds in a reduction of fuel loading needed for fire to effectively suppress woody species, although fire is a questionable at this point.

Pathway 2.2A
Community 2.2 to 2.1

Woodland | Shrubland

Managerial activities that restore the hydrologic cycle, such as the energy captured by midgrasses, and restored ground cover will tend to move the Woodland Community (2.2) toward the Shrubland Community (2.1). Selective brush management is needed to accomplish the desired canopy level and spatial arrangement of woody species. Integrated brush management and utilizing historic ecological disturbances such as herbivory and fire in are needed to maintain the desired brush densities. The time to shift back to the Tree/Shrubland Community (2.1) is dependent upon favorable growing conditions and could take three to five years.

Conservation practices

Brush Management

State 3
Converted Land

The Converted Land State is the result of mechanical intervention along with range planting to either native or adapted introduced species.

Dominant plant species

- buffelgrass (*Pennisetum ciliare*), grass

Community 3.1
Converted Land

This plant community is developed by applying brush management and seeding. The conversion can actually come from any of the previously mentioned communities where brush needs to be reduced and a seed source added to establish a desired plant community. In some instances, an adequate seed source may already exist in the soil. When rootplowing is applied as brush management on this site, long term forb and woody plant diversity will be greatly reduced. Previous attempts at native seeding in this region were met with mixed results because of the seed source not being locally adapted to the region. Many of the grass species listed in the reference plant community are commercially available from collections made in south Texas. The locally adapted species are expected to be more successful in seeding efforts as compared to seed developed several hundred miles outside the region. However, proper seedbed preparation, planting techniques, and timely rainfall are essential for success. The most common introduced grass species seeded is buffelgrass (Cenchrus ciliare). Seeding this species should be cautiously considered due to its aggressive nature to dominate plant communities and reduce herbaceous diversity. Once planted, conversion of buffelgrass dominated areas back to native grass is extremely difficult and rarely successful. The decision of which species to seed is a management decision based on clearly defined goals for livestock and wildlife. Careful consideration should be taken prior to seeding introduced species. Once introduced species are seeded, it is often difficult or impractical to remove them should objectives change. Because of the residual seed source of woody plants, encroachment is inevitable. To help maintain this plant community, prescribed grazing along with fire and some integrated brush management will be needed.

Table 10. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1500	2750	4000
Shrub/Vine	100	200	300
Forb	50	150	250
Total	**1650**	**3100**	**4550**

Figure 21. Plant community growth curve (percent production by month). TX5133, Converted Land Community - Native Grass Seeding. Developed by applying brush management, land clearing and seeding to any of the other plant communities where brush needs to be reduced and a seed source added to establish the desired plant community. .

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

Community 3.2
Abandoned Land

Figure 22. 3.2 Abandoned Land Community

This community develops from the Converted Land Community (3.1) through neglect or abandonment. Without follow-up brush management, seedlings of shrubs establish and spread. Mesquite, twisted acacia, and pricklypear are the most common woody plants or shrubs found on this site following rootplowing. Maintaining healthy grass cover on the site through prescribed grazing might slow brush seedling encroachment however, brush encroachment at some rate is inevitable. If the seedlings are not managed, the plant community will cross a threshold to the Shrubland State (2) which will require application of chemical or mechanical brush management to reduce the canopy. If left untreated too long, reseeding might be needed to restore the grass. As the canopy of the shrubs expands, grass and forb production will be reduced.

Table 11. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	800	1450	2000
Shrub/Vine	200	300	400
Forb	50	150	250
Total	**1050**	**1900**	**2650**

Figure 24. Plant community growth curve (percent production by month). TX5138, Converted Land Community - Woody Seedling Encroachment. Abandoned croplands and land seeded with exotic or native grasses are prone to encroachment by woody plants and with heavy grazing or the absence of fire, can revert to shrublands..

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

A shift to the Abandoned Land Community occurs when management activities such as prescribed grazing, brush management, or fire are not accomplished as brush invades. Drought worsens the process. A reduction in planted grasses also corresponds in a reduction of fuel loading needed for fire to effectively suppress woody species.

Pathway 3.2A
Community 3.2 to 3.1

Brush management along with prescribed grazing can recover the Converted Land Community. Some replanting may be needed and can be done in conjunction with brush management.

Transition T1A
State 1 to 2

The Grassland State will cross a threshold to Shrubland (State 2) with abusive grazing and without brush management or fire. Severe drought is also a significant factor to accelerate this crossing of a threshold. In State 2 more rainfall is being utilized by woody plants than the herbaceous plants. Because of the increased canopy, sunlight is being captured by the woody plants and converted to energy instead of the herbaceous plants.

Transition T1B
State 1 to 3

The transition to the Converted Land State is triggered by major ground disturbing mechanical treatment and planting to native or introduced forages. Planting is usually done following brush management.

Restoration pathway R2A
State 2 to 1

Brush management is the key driver in restoring Shrub/Woodland State (2) back to the Grassland Savannah State (1). Reduction in woody canopy below 20 percent will take large energy inputs depending on the canopy cover. A prescribed grazing plan and prescribed burning plan will keep the state functioning.

Transition T2A
State 2 to 3

The transition to the Converted Land State is triggered by major ground disturbing mechanical treatment and planting to native or introduced forages. Planting is usually done following brush management.

Transition T3A
State 3 to 2

The transition from the Converted Land State to the Shrubland State is triggered by neglect or no management over long periods of time. Shrubs re-establish from the seed bank and introduction from wildlife and livestock. A complete return to a previous state is not possible if adapted non-native plants have been established.

Additional community tables

Table 12. Community 1.1 plant community composition

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

1	**Warm-season midgrasses**			1200–2400	
	multiflower false Rhodes grass	TRPL3	*Trichloris pluriflora*	400–2400	–
	large-spike bristlegrass	SEMA5	*Setaria macrostachya*	400–1500	–
	pink pappusgrass	PABI2	*Pappophorum bicolor*	100–700	–
	hooded windmill grass	CHCU2	*Chloris cucullata*	100–500	–
	Arizona cottontop	DICA8	*Digitaria californica*	0–500	–
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	0–500	–
	longspike beardgrass	BOLO	*Bothriochloa longipaniculata*	0–500	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	50–450	–
	curly-mesquite	HIBE	*Hilaria belangeri*	0–400	–
	Texas bristlegrass	SETE6	*Setaria texana*	50–300	–
	whiplash pappusgrass	PAVA2	*Pappophorum vaginatum*	0–250	–
	white tridens	TRAL2	*Tridens albescens*	0–250	–
	buffalograss	BODA2	*Bouteloua dactyloides*	0–250	–
2	**Warm season shortgrasses**			300–600	
	red grama	BOTR2	*Bouteloua trifida*	0–200	–
	lovegrass tridens	TRER	*Tridens eragrostoides*	0–200	–
	slim tridens	TRMU	*Tridens muticus*	0–200	–
Forb					
3	**Forbs**			50–150	
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–50	–
	bundleflower	DESMA	*Desmanthus*	0–40	–
	dogfennel	DYSOD	*Dysodiopsis*	0–30	–
	Lindheimer's bladderpod	LELI2	*Lesquerella lindheimeri*	0–30	–
	pepperweed	LEPID	*Lepidium*	0–30	–
	plains dozedaisy	APRA	*Aphanostephus ramosissimus*	0–30	–
	wild petunia	RUELL	*Ruellia*	0–30	–
	vervain	VERBE	*Verbena*	0–30	–
	awnless bushsunflower	SICA7	*Simsia calva*	0–20	–
	globemallow	SPHAE	*Sphaeralcea*	0–20	–
	fogfruit	PHYLA	*Phyla*	0–20	–
Shrub/Vine					
4	**Shrubs/Vines**			75–175	
	pricklypear	OPUNT	*Opuntia*	10–50	–
	lotebush	ZIOB	*Ziziphus obtusifolia*	25–50	–
	desert yaupon	SCCU4	*Schaefferia cuneifolia*	0–30	–
	Texas lignum-vitae	GUAN	*Guaiacum angustifolium*	0–30	–
	leatherstem	JADID	*Jatropha dioica var. dioica*	0–30	–
	blackbrush acacia	ACRI	*Acacia rigidula*	0–30	–
	Schaffner's wattle	ACSC2	*Acacia schaffneri*	10–30	–
	whitebrush	ALGR2	*Aloysia gratissima*	0–30	–
	Texan goatbush	CAERT	*Castela erecta ssp. texana*	0–30	–
	spiny hackberry	CEEH	*Celtis ehrenbergiana*	10–30	–
	Texas persimmon	DITE3	*Diospyros texana*	10–30	–

	pitaya	ECEN2	*Echinocereus enneacanthus*	0–20	–
	stretchberry	FOPU2	*Forestiera pubescens*	0–20	–
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	10–20	–
Tree					
5	**Trees**			10–40	
	honey mesquite	PRGL2	*Prosopis glandulosa*	10–40	–

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. 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.

Converted Land 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

In the Shrubland State (2), annual evapotranspiration from shortgrass/forb herbaceous zones were comparable to those from woody plant patches. Surface runoff and deep drainage were only slightly higher in grass dominated patches (Weltz and Blackburn, 1995). Increasing water yield by converting shrub-dominated areas to grass domination is thus marginal and limited to years when winter and spring rainfall is high. There is little evidence that increases in percolation and surface runoff from converted communities could be reliably captured and dependably made available off-site. The main benefit of brush management is to release moisture in the soil profile to be utilized by herbaceous plants.

Recreational uses

Hunting and bird watching are common activities.

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.

Other references

Archer, S. 1995. Herbivore mediation of grass-woody plant interactions. Tropical Grasslands, 29:218-235.

Archer, S. 1995. Tree-grass dynamics in a Prosopis-thornscrub savanna parkland: reconstructing the past and predicting the future. Ecoscience, 2:83-99.

De Leon, A. 2003. Itineraries of the De Léon Expeditions of 1689 and 1690. In Spanish Exploration in the Southwest, 1542-1706. Edited by H. E. Bolton. Charles Scribner's Sons, New York, NY.

Dillehay T. 1974. Late quaternary bison population changes on the Southern Plains. Plains Anthropologist, 19:180-96.

Duaine, C. L. 1971. Caverns of Oblivion. Packrat Press, Oak Harbor, WA.

Everitt, J. H., D. L. Drawe, and R. I. Leonard. 2002. Trees, Shrubs, and Cacti of South Texas. Texas Tech University Press, Lubbock, TX.

Everitt, J. H., D. L. Drawe, and R. I. Lonard. 1999. Field Guide to the Broad-Leaved Herbaceous Plants of South Texas. Texas Tech University Press. Lubbock, TX.

Frost, C. C. 1998. Presettlement fire frequency regimes of the United States: a first approximation. In Fire in ecosystem management: shifting the paradigm from suppression to prescription. Tall Timbers Fire Ecology Conference Proceedings. 20:70-81.

Gilbert, L. E. 1982. An ecosystem perspective on the role of woody vegetation, especially mesquite, in the Tamaulipan biotic region of South Texas. Proceeding Symposium of the Tamaulipan Biotic Province, Corpus Christi, TX.

Hanselka, W., R. Lyons, and M. Moseley. 2009. Grazing Land Stewardship: A Manual for Texas Landowners. Texas AgriLife Extension Service, College Station, TX.

Hart, C. R., T. Garland, A. C. Barr, B. B. Carpenter, and J.C. Reagor. 2003. Toxic Plants of Texas: Integrated Management Strategies to Prevent Livestock Losses. Texas Cooperative Extension Bulletin B-6103 11-03.

Heitschmidt R. K., Stuth J. W., eds. 1991. Grazing management: an ecological perspective. Timberline Press, Portland, OR.

Inglis, J. M. 1964. A history of vegetation of the Rio Grande Plains. Texas Parks and Wildlife Department Bulletin No. 45, Austin, TX.

Lehman, V. W. 1969. Forgotten legions: sheep in the Rio Grande Plains of Texas. Texas Western Press, University of Texas at El Paso, El Paso, TX.

McGinty A., D. N. Ueckert. 2001. The Brush Busters success story. Rangelands, 23:3-8.

McLendon T. 1991. Preliminary description of the vegetation of South Texas exclusive of coastal saline zones. Texas Journal of Science, 43: 13-32

Norwine, J. 1978. Twentieth-century semiarid climates and climatic fluctuations in Texas and northeastern Mexico. Journal of Arid Environments, 1:313-325.

Norwine, J. and R. Bingham. 1986. Frequency and severity of droughts in South Texas: 1900-1983, 1-17. In Livestock and wildlife management during drought. Edited by R. D. Brown. Caesar Kleberg Wildlife Research Institute, Kingsville, TX.

Parvin, R. W. 2003. Rio Bravo Resource Conservation and Development. Llanos Mestenos South Texas Heritage Trail. Zapata, TX.

Scifres, C. J. and W. T. Hamilton. 1993. Prescribed burning for brushland management: the South Texas example. Texas A&M Press, College Station, TX.

Scifres C. J., W. T. Hamilton, J. R. Conner, J. M. Inglis, and G. A. Rasmussen. 1985. Integrated Brush Management Systems for South Texas: Development and Implementation. Texas Agricultural Experiment Station, College Station, TX.

Texas Parks and Wildlife Department. 2007. List of White-tailed Deer Browse and Ratings. District 8.

Thurow, T. L. and J. W. Hester. 1997. How an increase or reduction in juniper cover alters rangeland hydrology. Juniper Symposium Proceedings. Texas A&M University, San Angelo, TX.

Weltz, M. A. and W. H. Blackburn. 1995. Water budget for south Texas rangelands. Journal of Range Management, 48:45-52.

Wright, B. D., R. K. Lyons, J. C. Cathey, and S. Cooper. 2002. White-tailed deer browse preferences for South Texas and the Edwards Plateau. Texas Cooperative Extension Bulletin B-6130.

Approval

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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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Date	04/02/2015
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Approval date	

Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

2. **Presence of water flow patterns:** None.

3. **Number and height of erosional pedestals or terracettes:** None.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** None.

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

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

7. **Amount of litter movement (describe size and distance expected to travel):** Short, less than one foot except during overflow events.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil Stability Rating 5 to 6.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Subangular blocky, A-horizon 1 to 12 inches and 1 to 1.5 percent SOM.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Tall and midgrasses reduce ronoff to minial amounts except in exceptional rainfall events.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None.

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: Warm-Season Grasses

Sub-dominant: Forbs

Other: Shrubs

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** None

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1,600 to 3,400 air-dry 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:** Hooded windmill, threeawn, King Ranch bluestem, lovegrass tridens, fall witchgrass, annual forbs, twisted acacia, mesquite, brasil, granjeno, and pear.

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17. **Perennial plant reproductive capability:** All plants should reproduce each year.
