USDA Natural Resources Conservation Service

# Ecological site R083BY023TX
# Sandy Loam

Last updated: 9/19/2023
Accessed: 04/28/2024

## 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.

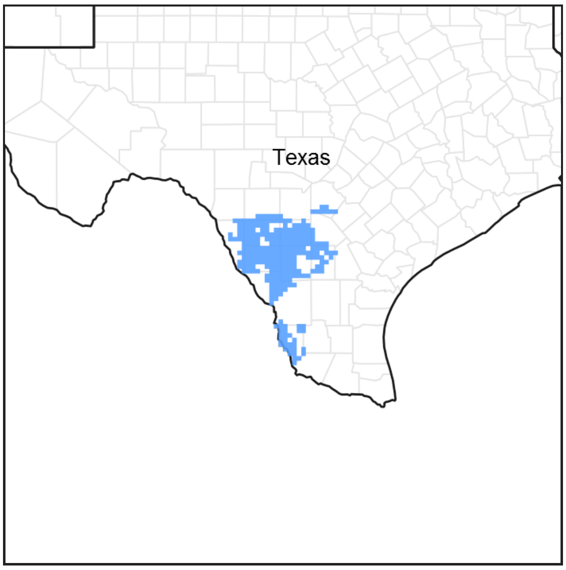



**Figure 1. Mapped extent**

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): 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

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

## Ecological site concept

The Sandy Loam ecological site typically has a fine sandy loam or very fine sandy loam surface. Sandy clay loam subsoil horizons are generally present 12 inches below the surface. The reference plant community was a grassland with some woody species.

## Associated sites

| | |
|---|---|
| R083BY003TX | **Gravelly Ridge** |
| R083BY011TX | **Claypan Prairie** |
| R083BY012TX | **Ramadero** |
| R083BY002TX | **Shallow Ridge** |
| R083BY013TX | **Loamy Bottomland** |

## Similar sites

| | |
|---|---|
| R083CY023TX | **Sandy Loam** |
| R083DY023TX | **Sandy Loam** |
| R083EY023TX | **Sandy Loam** |
| R083AY023TX | **Sandy Loam** |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | Not specified |
| Shrub | Not specified |
| Herbaceous | (1) *Heteropogon contortus*<br>(2) *Pappophorum bicolor* |

## Physiographic features

The soils are on nearly level to gently sloping toeslopes of interfluves and ridges on the inland, dissected coastal plain. Slope ranges from 0 to 5 percent. Elevation ranges from 150 to 800 feet.

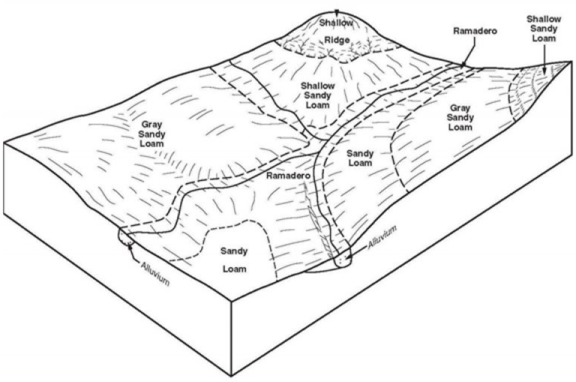



**Figure 2.**

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Coastal plain > Interfluve<br>(2) Coastal plain > Ridge |
| Runoff class | Low |
| Flooding frequency | None |
| Ponding frequency | None |
| Elevation | 46–244 m |
| Slope | 0–5% |

| | |
|---|---|
| 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) | 508 mm |
| Frost-free period (actual range) | 214-365 days |
| Freeze-free period (actual range) | 260-365 days |
| Precipitation total (actual range) | 483-533 mm |
| Frost-free period (average) | 270 days |
| Freeze-free period (average) | 340 days |
| Precipitation total (average) | 508 mm |

## Climate stations used

- (1) FALCON DAM [USC00413060], Roma, TX
- (2) LAREDO 2 [USC00415060], Laredo, TX
- (3) ZAPATA 1 S [USC00419976], Zapata, TX
- (4) DEL RIO INTL AP [USW00022010], Del Rio, TX
- (5) CATARINA [USC00411528], Asherton, TX
- (6) CRYSTAL CITY [USC00412160], Crystal City, TX
- (7) DEL RIO 2 NW [USC00412361], Del Rio, TX
- (8) EAGLE PASS 3N [USC00412679], Eagle Pass, 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, and slow to moderately slowly permeable. The surface texture is fine sandy loam or very fine sandy loam. The soils were formed in from alluvium. Soil series correlated to this site include: Brennan, Brystal, and Duval.

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Residuum–sandstone |

| | |
|---|---|
| Surface texture | (1) Fine sandy loam<br>(2) Very fine sandy loam |
| Family particle size | (1) Fine-loamy |
| Drainage class | Well drained |
| Permeability class | Moderately slow to moderate |
| Soil depth | 102–203 cm |
| Surface fragment cover <=3" | 0% |
| Surface fragment cover >3" | 0% |
| Available water capacity (0-101.6cm) | 12.7–15.24 cm |
| Calcium carbonate equivalent (0-101.6cm) | 0–35% |
| Electrical conductivity (0-101.6cm) | 0–2 mmhos/cm |
| Sodium adsorption ratio (0-101.6cm) | 0–2 |
| Soil reaction (1:1 water) (0-101.6cm) | 6.6–8.4 |
| Subsurface fragment volume <=3" (Depth not specified) | 0–8% |
| 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.

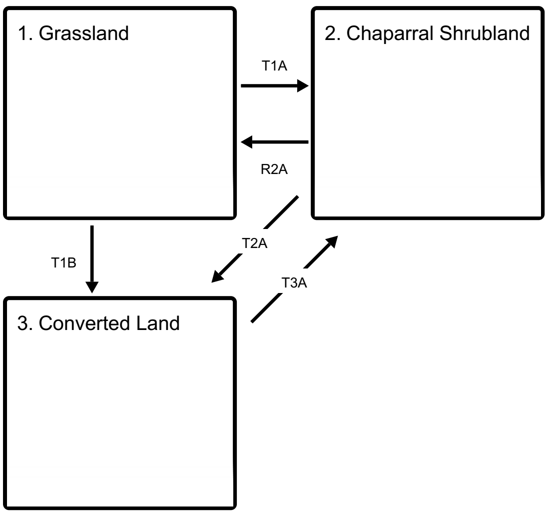
With the arrival of European man, the South Texas area was fenced and, in many instances, stocked beyond its capability to sustain forage. This overstocking led to a reduced fire frequency and intensity, creating an opportunity for woody shrubs to increase across the landscape. As the natural graze-rest 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).

At the present time, the Sandy Loam ecological site is mostly a community of woody shrubs exceeding 50 percent canopy, with the interspaces dominated by shortgrasses such as common fall witchgrass (Leptoloma cognata), Hall's panicum (*Panicum hallii*), perennial threeawn (*Aristida purpurea*), and tumblegrass (*Schedonnardus paniculatus*). 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.

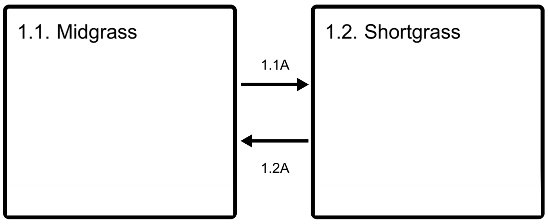
## State and transition model

**Ecosystem states**

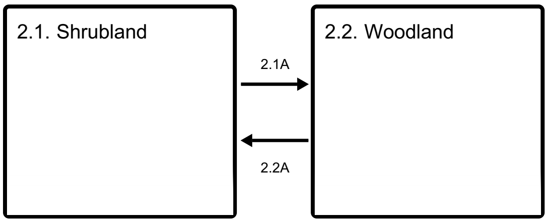



**T1A** - Absence of disturbance and natural regeneration over time coupled with excessive grazing pressure
**T1B** - Excessive soil disturbance followed by seeding improved forage species
**R2A** - Reintroduction of historic disturbance return intervals
**T2A** - Excessive soil disturbance followed by seeding improved forage species
**T3A** - Absence of disturbance and natural regeneration over time coupled with excessive grazing pressure

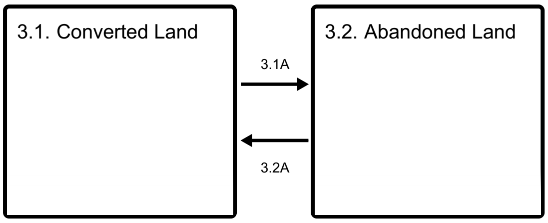
**State 1 submodel, plant communities**



**State 2 submodel, plant communities**




**State 3 submodel, plant communities**




## State 1
## Grassland

The Grassland State consists of approximately 85 percent grasses, 10 percent woody plants, and 5 percent forbs composition by air-dry weight. For interpretive purposes, the woody crown canopy can be approximately 20 percent. Two community phases exist, the Midgrass Community and the Shortgrass Community. Stocking rate calculations should be made from actual field data taken under current conditions. Plant production estimates below are only provided for comparison between sites and other informational purposes.

### Dominant plant species

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

## Community 1.1
## Midgrass

**Figure 9. 1.1 Midgrass Community on the Brystal soil series. Photo by Vivian Garcia, NRCS, 2014.**

This community was maintained by periodic grazing by wild populations and numerous fires; both natural and anthropogenic. Fire frequency is perceived to be variable and only 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. Runoff of rainfall was medium with good ground cover but could be quite high following episodic grazing events, fire, or extended drought. The soils of this site are capable of capping when denuded and in this condition shed most of the rainfall making the site slow to recover. Tanglehead (*Heteropogon contortus*) is perceived to have made up to 20 to 30 percent of the grass production with several midgrasses also occurring at various levels. Plains bristlegrass (*Setaria vulpiseta*), Rio Grande bristlegrass (*Setaria reverchonii*), hooded windmillgrass (*Chloris cucullata*), pink pappusgrass (*Pappophorum bicolor*), whiplash pappusgrass (*Pappophorum vaginatum*), Arizona cottontop (*Digitaria californica*), and longspike beardgrass (*Bothriochloa longipaniculata*) are all perceived to have been common on the site as well. A wide variety of forbs and legumes grow well on this site when conditions are favorable. Some forbs such as prairie acacia (*Acacia angustissima*), orange zexmenia (Wedelia texana), and cuman ragweed (*Ambrosia psilostachya*) are present in lesser amounts. The major woody plants were scattered mesquite (*Prosopis glandulosa*) along with smaller amounts of mixed brush throughout the site. 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 and short-lived grasses. Droughts hasten the process. Major grass increasers are slim tridens (*Tridens muticus*), southern witchgrass (*Panicum capillare*), fringed signalgrass (*Urochloa ciliatissima*), hairy grama (*Bouteloua hirsuta*), slender grama (*Bouteloua repens*), tumble lovegrass (Eragrostis sessiispica), and fall witchgrass (*Digitaria cognata*). A significant role for prescribed grazing is to build and maintain fine fuel amounts for effective prescribed burning.

**Table 5. Annual production by plant type**

| Plant Type | Low (Kg/Hectare) | Representative Value (Kg/Hectare) | High (Kg/Hectare) |
|---|---|---|---|
| Grass/Grasslike | 2018 | 3250 | 4483 |
| Forb | 56 | 168 | 280 |
| Shrub/Vine | 112 | 168 | 224 |
| Tree | – | 28 | 56 |
| **Total** | **2186** | **3614** | **5043** |

**Table 6. Ground cover**

| | |
|---|---|
| Tree foliar cover | 0-1% |
| Shrub/vine/liana foliar cover | 0-1% |
| Grass/grasslike foliar cover | 70-90% |
| Forb foliar cover | 5-10% |
| Non-vascular plants | 0% |
| Biological crusts | 0% |
| Litter | 75-85% |
| Surface fragments >0.25" and <=3" | 0-4% |
| 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% | 5-10% |
| >0.15 <= 0.3 | 0-1% | 0-1% | 10-40% | 5-10% |
| >0.3 <= 0.6 | 0-1% | 5-10% | 40-100% | 5-10% |
| >0.6 <= 1.4 | 0-1% | 10-15% | 30-70% | – |
| >1.4 <= 4 | 0-1% | – | – | – |
| >4 <= 12 | 0-1% | – | – | – |
| >12 <= 24 | – | – | – | – |
| >24 <= 37 | – | – | – | – |
| >37 | – | – | – | – |

**Figure 11. 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

Phase (1.2) of the Grassland State exhibits a grassland plant structure with a shift to weaker shortgrasses. These include hooded windmillgrass, slender grama, Rio Grande bristlegrass, and slim tridens. Abusive continuous grazing takes many of the midgrasses out of the site and reduces their vigor. Annual and perennial forbs can be more common in this phase. There is more bare ground. With continued abusive grazing, increaser grasses become much more common across the site. 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 shortgrass/forb communities are less productive than the midgrass communities 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 in size, density and total cover are unchallenged. With constructive grazing, midgrasses can regain dominance on the site and undesirable trends in soil organic matter, fertility, temperature, and erosion. However, this process is very difficult to 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 (Kg/Hectare) | Representative Value (Kg/Hectare) | High (Kg/Hectare) |
|---|---|---|---|
| Grass/Grasslike | 1121 | 1961 | 2802 |
| Forb | 56 | 168 | 280 |
| Shrub/Vine | 112 | 168 | 224 |
| Tree | 11 | 28 | 45 |
| **Total** | **1300** | **2325** | **3351** |

**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

A shift to the Shortgrass 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

Managerial activities that restore the hydrologic cycle, the energy capture by midgrasses, and restoring ground cover will tend to move the Shortgrass Community (1.2) toward the Midgrass Community (1.1). Utilizing historic ecological disturbances such as herbivory, selective brush management, and fire in constructive amounts can benefit the site. The time to shift back to the Midgrass Community (1.1) certainly is dependent upon favorable growing conditions and could take 5 to 10 years.

#### Conservation practices

| |
|---|
| Brush Management |
| Prescribed Burning |
| Prescribed Grazing |

### State 2
### Chaparral Shrubland

The Chaparral Shrubland State consists of the 2.1 Shrubland Community and the 2.2 Woodland Community. These are midgrass and shortgrass communities with a shrub/tree canopy of mixed brush with some herbaceous plants throughout the remaining interspaces.

#### Dominant plant species

- blackbrush acacia (*Acacia rigidula*), shrub
- Schaffner's wattle (*Acacia schaffneri*), shrub

### Community 2.1
### Shrubland

**Figure 14. 2.1 Shrubland Community on the Brystal soil series. Photo by Vivian Garcia, NRCS, 2014.**

**Figure 15. 2.1 Shrubland Community on the Brystal soil series. Photo by Vivian Garcia, NRCS, 2014.**

Lack of fire and continued heavy grazing causes a shift from grasslands with up to 20 percent shrub cover to shrublands with greater than a 30 percent brush cover. In the Shrubland Community (2.1), shrubs have now grown larger and more closely spaced. Some mesquite trees are now visible. Grasses compose the majority of the interspaces. Bison would have been a historic herbivore on the Sandy Loam ecological site. A threshold has been crossed once the site approaches the 30 percent canopy cover. Major shrub species include tasajillo (*Cylindropuntia leptocaulis*), blackbrush, (*Acacia rigidula*), twisted acacia (*Acacia schaffneri*), prickly pear (Opuntia spp.), mesquite, hogplum (*Colubrina texensis*), guayacan (*Guaiacum angustifolium*), shrubby blue sage (*Salvia ballotiflora*), and a whole suite of others. The herbaceous community is generally composed of slim tridens, red grama, threeawn, and other short grasses. The forb community is composed of orange zexmenia, false ragweed (*Parthenium hysterophorus*), dogweed (Dyssodia spp.), palofoxia (Palofoxia 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 because of a lack of fine fuel load. With continued abusive grazing and no brush management, woody cover will increase to more than 50 percent canopy.

**Table 9. Annual production by plant type**

| Plant Type | Low (Kg/Hectare) | Representative Value (Kg/Hectare) | High (Kg/Hectare) |
|---|---:|---:|---:|
| Grass/Grasslike | 448 | 897 | 1345 |
| Shrub/Vine | 224 | 336 | 448 |
| Forb | 56 | 112 | 168 |
| Tree | 28 | 84 | 140 |
| **Total** | **756** | **1429** | **2101** |

**Figure 17. 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 |

## Community 2.2
## Woodland

**Figure 18. 2.2 Woodland Community on the Brystal soil series. Photo by Vivian Garcia, NRCS, 2014.**

Lack of fire and continued heavy grazing causes a shift from grasslands with up to 20 percent shrub cover to shrublands with greater than a 50 percent brush cover. Dense shrub cover, scant herbaceous cover, and some large mesquite represent the Woodland Community (2.2). Major shrub species include tasajillo, blackbrush, twisted acacia, prickly pear, mesquite, hogplum, guayacan, shrubby blue sage, 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 orange zexmenia, false ragweed, dogweed, palofoxia, and many annuals. At this point, prescribed grazing alone will not restore this community. 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.

**Table 10. Annual production by plant type**

| Plant Type | Low (Kg/Hectare) | Representative Value (Kg/Hectare) | High (Kg/Hectare) |
|---|---:|---:|---:|
| Grass/Grasslike | 168 | 364 | 560 |
| Shrub/Vine | 336 | 448 | 560 |
| Tree | 56 | 140 | 224 |
| Forb | 28 | 56 | 112 |
| **Total** | **588** | **1008** | **1456** |

**Figure 20. 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 Woodland Community occurs if the Shrubland Community is weakened by excessive leaf removal. Drought hastens the process. A lack of brush management allows existing brush to gain in stature and invasion by seedlings. A reduction in midgrass also corresponds in a reduction of fuel loading needed for fire to effectively suppress woody species.

### Pathway 2.2A
### Community 2.2 to 2.1

Woodland

Shrubland

Managerial activities that restore the hydrologic cycle, the energy capture by midgrasses, and restoring ground cover will tend to move the Woodland Community (2.2) with 50 to 100 percent canopy toward the Shrubland Community (2.1) canopy of 20 to 50 percent. Selective brush management is needed to accomplish the desired canopy and arrangement of woody species. Integrated brush management and utilizing historic ecological disturbances such as herbivory and fire in constructive amounts is needed to maintain the desired brush densities. The time to shift back to the Shrubland Community (2.1) is dependent upon favorable growing conditions and could take three to five years.

#### Conservation practices

| |
|---|
| Brush Management |
| Prescribed Burning |
| Prescribed Grazing |

## 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 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. Mechanical treatments selected for use on this site should be carefully considered due to the shallow nature of the soils. Previous attempts at native seeding in this region were met with mixed results due to the seed source not being locally adapted to the region. Presently, many of the grass species listed in the reference community are commercially available from collections made in south Texas. The locally adapted species are expected to be more successful in seeding efforts compared to seed developed several hundred miles outside the region. However, proper seedbed preparation, planting techniques, and favorable growing conditions are essential for success. The most common introduced grass species seeded on this site in the western Rio Grande plains is buffelgrass (Cenchrus ciliaris). Seeding this species should be cautiously considered due to its aggressive nature to dominate plant communities and reduce herbaceous diversity. Further, conversion of buffelgrass-dominated areas back to native grass is extremely difficult and rarely successful. The decision of species to seed is a management decision based on clearly defined goals for livestock and wildlife. The use of introduced species does provide good forage for cattle and can provide some habitat for wildlife. However, once these species are introduced, it is difficult 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. The role of prescribed grazing is to keep the grasses healthy to compete against invasion of seedlings and to preserve fuel for maintenance fires.

**Table 11. Annual production by plant type**

| Plant Type | Low (Kg/Hectare) | Representative Value (Kg/Hectare) | High (Kg/Hectare) |
|---|---|---|---|
| Grass/Grasslike | 1681 | 3082 | 4483 |
| Shrub/Vine | 112 | 224 | 336 |
| Forb | 56 | 168 | 280 |
| Tree | – | – | – |
| **Total** | **1849** | **3474** | **5099** |

**Figure 22. 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

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 prickly pear are the most common woody plants or shrubs found on this site following root plowing. 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 Chaparral Shrubland State (2) which will require application of energy in the form of machinery or herbicides 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 12. Annual production by plant type**

| Plant Type | Low (Kg/Hectare) | Representative Value (Kg/Hectare) | High (Kg/Hectare) |
|---|---|---|---|
| Grass/Grasslike | 897 | 1625 | 2242 |
| Shrub/Vine | 224 | 336 | 448 |
| Forb | 56 | 168 | 280 |
| Tree | – | – | – |
| **Total** | **1177** | **2129** | **2970** |

**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. Prescribed burning can suppress the canopy of the established woody plants.

#### Conservation practices

| |
|---|
| Brush Management |
| Prescribed Burning |
| Prescribed Grazing |

### Transition T1A
### State 1 to 2

The Grassland State will cross a threshold to Chaparral Shrubland (State 2) with abusive grazing with no brush management and subsequently no 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. Because of the increased canopy, sunlight is being captured by the woody plant 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 (usually following brush management).

### Restoration pathway R2A
### State 2 to 1

If the management goal is to restore to State 1, significant inputs of energy will be needed. An integrated approach to brush management (Scifres et al., 1985) with mechanical treatment, herbicides, and fire will initially reduce the woody species providing opportunity for at least partial recovery of the hydrologic cycle and the energy cycle. Seeding may be needed and can be done in conjunction with ground disturbance methods of brush management.

#### Conservation practices

| |
|---|
| Brush Management |
| Prescribed Burning |
| Prescribed Grazing |

### 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 (usually following brush management).

### Transition T3A
### State 3 to 2

The transition from the Converted Land State to the Chaparral Shrubland State is triggered by neglect or no management over a long period of time. Shrubs re-establish from the inevitable seed bank and introduction from wildlife and livestock.

### Additional community tables

**Table 13. Community 1.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production (Kg/Hectare) | Foliar Cover (%) |
|---|---|---|---|---|---|
| **Grass/Grasslike** | | | | | |
| 1 | **Bunchgrasses** | | | 504–1121 | |
| | tanglehead | HECO10 | *Heteropogon contortus* | 504–1121 | – |
| 2 | **Midgrasses** | | | 1009–2242 | |
| | pink pappusgrass | PABI2 | *Pappophorum bicolor* | 0–1121 | – |
| | whiplash pappusgrass | PAVA2 | *Pappophorum vaginatum* | 112–560 | – |
| | tumble windmill grass | CHVE2 | *Chloris verticillata* | 112–560 | – |
| | large-spike bristlegrass | SEMA5 | *Setaria macrostachya* | 112–560 | – |
| | Rio Grande bristlegrass | SERER | *Setaria reverchonii ssp. ramiseta* | 56–336 | – |
| | cane bluestem | BOBA3 | *Bothriochloa barbinodis* | 0–336 | – |
| | longspike beardgrass | BOLO | *Bothriochloa longipaniculata* | 0–336 | – |
| | Arizona cottontop | DICA8 | *Digitaria californica* | 0–224 | – |
| | little bluestem | SCSC | *Schizachyrium scoparium* | 0–224 | – |
| | multiflower false Rhodes grass | TRPL3 | *Trichloris pluriflora* | 0–224 | – |
| 3 | **Shortgrasses** | | | 504–1121 | |
| | knot grass | SEREF | *Setaria reverchonii ssp. firmula* | 56–336 | – |
| | Hall's panicgrass | PAHA | *Panicum hallii* | 0–168 | – |
| | lovegrass tridens | TRER | *Tridens eragrostoides* | 0–112 | – |
| | slim tridens | TRMU | *Tridens muticus* | 0–90 | – |
| | Texas fluffgrass | TRTE2 | *Tridens texanus* | 0–90 | – |
| | fringed signalgrass | URCI | *Urochloa ciliatissima* | 0–90 | – |
| | thin paspalum | PASE5 | *Paspalum setaceum* | 0–90 | – |
| | sand dropseed | SPCR | *Sporobolus cryptandrus* | 0–90 | – |
| | hairy grama | BOHI2 | *Bouteloua hirsuta* | 0–90 | – |
| | red grama | BOTR2 | *Bouteloua trifida* | 0–90 | – |
| | tumble lovegrass | ERSE2 | *Eragrostis sessilispica* | 0–90 | – |
| | witchgrass | PACA6 | *Panicum capillare* | 0–90 | – |
| **Forb** | | | | | |
| 4 | **Forbs** | | | 56–280 | |
| | prairie acacia | ACAN | *Acacia angustissima* | 0–112 | – |
| | Cuman ragweed | AMPS | *Ambrosia psilostachya* | 0–56 | – |
| | bluestem pricklypoppy | ARAL3 | *Argemone albiflora* | 0–56 | – |
| | littleleaf sensitive-briar | MIMI22 | *Mimosa microphylla* | 0–56 | – |
| | uhaloa | WAIN | *Waltheria indica* | 0–56 | – |
| | croton | CROTO | *Croton* | 0–45 | – |
| | bundleflower | DESMA | *Desmanthus* | 0–45 | – |
| | Indian blanket | GAPU | *Gaillardia pulchella* | 0–34 | – |
| | plains dozedaisy | APRA | *Aphanostephus ramosissimus* | 0–34 | – |
| | palafox | PALAF | *Palafoxia* | 0–34 | – |

| | | | | | |
|---|---|---|---|---|---|
| | feverfew | PARTH2 | *Parthenium* | 0–34 | – |
| | wild petunia | RUELL | *Ruellia* | 0–34 | – |
| | vervain | VERBE | *Verbena* | 0–34 | – |
| | woody crinklemat | TICA3 | *Tiquilia canescens* | 11–28 | – |
| | bladderpod | LESQU | *Lesquerella* | 0–28 | – |
| | low menodora | MEHE2 | *Menodora heterophylla* | 0–22 | – |
| | pepperweed | LEAP6 | *Lepidium apetalum* | 0–22 | – |
| | fanpetals | SIDA | *Sida* | 0–22 | – |
| | globemallow | SPHAE | *Sphaeralcea* | 0–22 | – |
| | groundcherry | PHYSA | *Physalis* | 0–22 | – |
| | bristly nama | NAHI | *Nama hispidum* | 0–22 | – |
| | Texas sleepydaisy | XATE | *Xanthisma texanum* | 0–22 | – |
| **Shrub/Vine** | | | | | |
| 5 | **Shrubs** | | | 56–224 | |
| | lime pricklyash | ZAFA | *Zanthoxylum fagara* | 0–56 | – |
| | Texas persimmon | DITE3 | *Diospyros texana* | 0–45 | – |
| | Texan hogplum | COTE6 | *Colubrina texensis* | 0–45 | – |
| | pricklypear | OPUNT | *Opuntia* | 0–45 | – |
| | spiny hackberry | CEEH | *Celtis ehrenbergiana* | 0–45 | – |
| | blackbrush acacia | ACRI | *Acacia rigidula* | 0–45 | – |
| | Schaffner's wattle | ACSC2 | *Acacia schaffneri* | 0–45 | – |
| | junco | ADIN | *Adolphia infesta* | 0–45 | – |
| | Texan goatbush | CAERT | *Castela erecta ssp. texana* | 0–34 | – |
| | paloverde | PARKI2 | *Parkinsonia* | 0–34 | – |
| | shrubby blue sage | SABA5 | *Salvia ballotiflora* | 0–34 | – |
| | Christmas cactus | CYLE8 | *Cylindropuntia leptocaulis* | 0–34 | – |
| | jointfir | EPHED | *Ephedra* | 0–34 | – |
| | Texas kidneywood | EYTE | *Eysenhardtia texana* | 0–34 | – |
| | stretchberry | FOPU2 | *Forestiera pubescens* | 0–34 | – |
| | Texas lignum-vitae | GUAN | *Guaiacum angustifolium* | 0–34 | – |
| | leatherstem | JADID | *Jatropha dioica var. dioica* | 0–34 | – |
| | Berlandier's wolfberry | LYBE | *Lycium berlandieri* | 0–34 | – |
| | Texas barometer bush | LEFR3 | *Leucophyllum frutescens* | 0–22 | – |
| | whitebrush | ALGR2 | *Aloysia gratissima* | 0–22 | – |
| **Tree** | | | | | |
| 6 | **Trees** | | | 0–56 | |
| | honey mesquite | PRGL2 | *Prosopis glandulosa* | 0–56 | – |

## 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.

Shrubland State (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 Complex (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.

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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 |
| Approved by | Bryan Christensen |
| 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.

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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):** Short, less than one foot except during overflow events.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil Stability Rating is 4 to 5.

---

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Subangular blocky, A-horizon 6 to 15 inches, one percent SOM.

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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 minimal amounts except in exceptional rainfall events.

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

    Sub-dominant: Forbs>shrubs>Trees

    Other:

    Additional:

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Grasses will almost always show some mortality and decadence.

---

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):** 2,000 to 3,500 air-dry pounder 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:** Slim tridens, red grama, threeawn, King Ranch bluestem, dogweed, false ragweed, palafoxia, mesquite, hog plum, pear, twisted acacia, and guayacan.

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

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