USDA Natural Resources Conservation Service

Ecological site R083BY025TX
Clay Loam

Last updated: 9/19/2023
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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

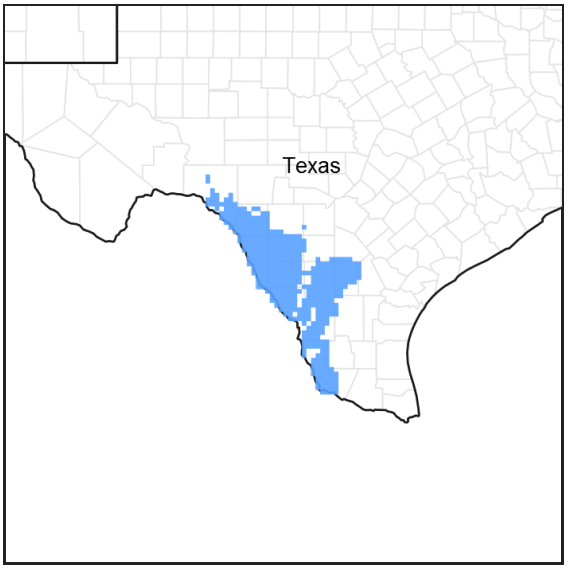


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 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 Clay Loam ecological site has deep to very deep clay loam soils and has high vegetative production.

Associated sites

R083BY002TX	**Shallow Ridge**
R083BY004TX	**Shallow Sandy Loam**
R083BY019TX	**Gray Sandy Loam**
R083BY001TX	**Igneous Hill**
R083BY005TX	**Shallow**
R083BY011TX	**Claypan Prairie**
R083BY015TX	**Saline Clay**
R083BY017TX	**Blackland**

Similar sites

R083AY026TX	**Eastern Clay Loam**
R083AY027TX	**Western Clay Loam**
R083CY025TX	**Clay Loam**
R083DY025TX	**Clay Loam**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Prosopis* (2) *Schaefferia cuneifolia*
Herbaceous	(1) *Schizachyrium scoparium* (2) *Bouteloua curtipendula*

Physiographic features

The soils occur on nearly level and very gently sloping linear convex and concave ridges, stream terraces, and interfluves of the inland, dissected Coastal Plains. Slopes range from 0 to 5 percent but are mainly less than 2 percent. Elevation ranges from 140 to 1,000 feet.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Ridge (2) Coastal plain > Stream terrace (3) Coastal plain > Interfluve
Runoff class	Negligible to high
Flooding frequency	None
Ponding frequency	None
Elevation	43–305 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) CRYSTAL CITY [USC00412160], Crystal City, 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) DEL RIO 2 NW [USC00412361], Del Rio, TX
- (8) EAGLE PASS 3N [USC00412679], Eagle Pass, TX

Influencing water features

Water does not influence this site.

Wetland description

N/A.

Soil features

Soils are deep to very deep, well drained, and have moderate to moderately slow permeability. Soils formed in calcareous alluvium derived from limestone or a variety of other sedimentary or igneous rocks. Surface textures are generally clay loam, but some may be sandy clay loam or silty clay loam. Soil series correlated to this site include: Acuna, Bookout, Chacon, Coahuila, Dant, Elindio, Garceno, Mavco, Palafox, Pryor, Uvalde, and Zavco.

Table 4. Representative soil features

Parent material	(1) Alluvium–sedimentary rock (2) Residuum–sedimentary rock
Surface texture	(1) Clay loam (2) Sandy clay loam (3) Silty clay loam
Family particle size	(1) Fine (2) Fine-loamy (3) Fine-silty (4) Very-fine

Drainage class	Moderately well drained to well drained
Permeability class	Very slow to moderate
Soil depth	102–203 cm
Surface fragment cover <=3"	0–1%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	7.62–17.78 cm
Calcium carbonate equivalent (0-101.6cm)	5–40%
Electrical conductivity (0-101.6cm)	0–16 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–12
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)	0–1%

Ecological dynamics

The plant communities that can be found on this site range from a midgrass dominant to a brush-covered site with bare ground. This diversity in plant communities is in direct response to grazing management, fire, and drought. The reference plant community was composed of predominantly midgrasses such as false Rhodesgrass (Chloris crinita), multi-flower chloris (Chloris pluriflora), little bluestem (*Schizachyrium scoparium*), Arizona cottontop (*Digitaria californica*), feather bluestems (*Andropogon ternarius*), pink pappusgrass (*Pappophorum bicolor*), and sideoats grama (*Bouteloua curtipendula*), with a small percentage of woody species such as mesquite (*Prosopis glandulosa*), whitebrush (*Aloysia gratissima*), condalias (Condalia spp.), and wolfberry (*Lycium carolinianum*), and numerous perennial forbs. False Rhodesgrass will increase over multi-flower trichloris in the western side of the site. Similarly, twisted acacia (*Acacia schaffneri*) will increase over huicache (*Acacia farnesiana*) on the western range of the site.

Historically, the plant community was maintained by periodic grazing of roaming herds of wildlife, such as bison (Bos bison), and numerous fires that were set by lightning and Native Americans. Likely, this was a shifting mosaic over time over the landscape consisting of burned/grazed and unburn/ungrazed portions. The site was very productive and maintained a high percentage of ground cover with forage production. Runoff of rainfall was slow allowing the soil profile to fill to capacity. The fertility of the site was high.

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

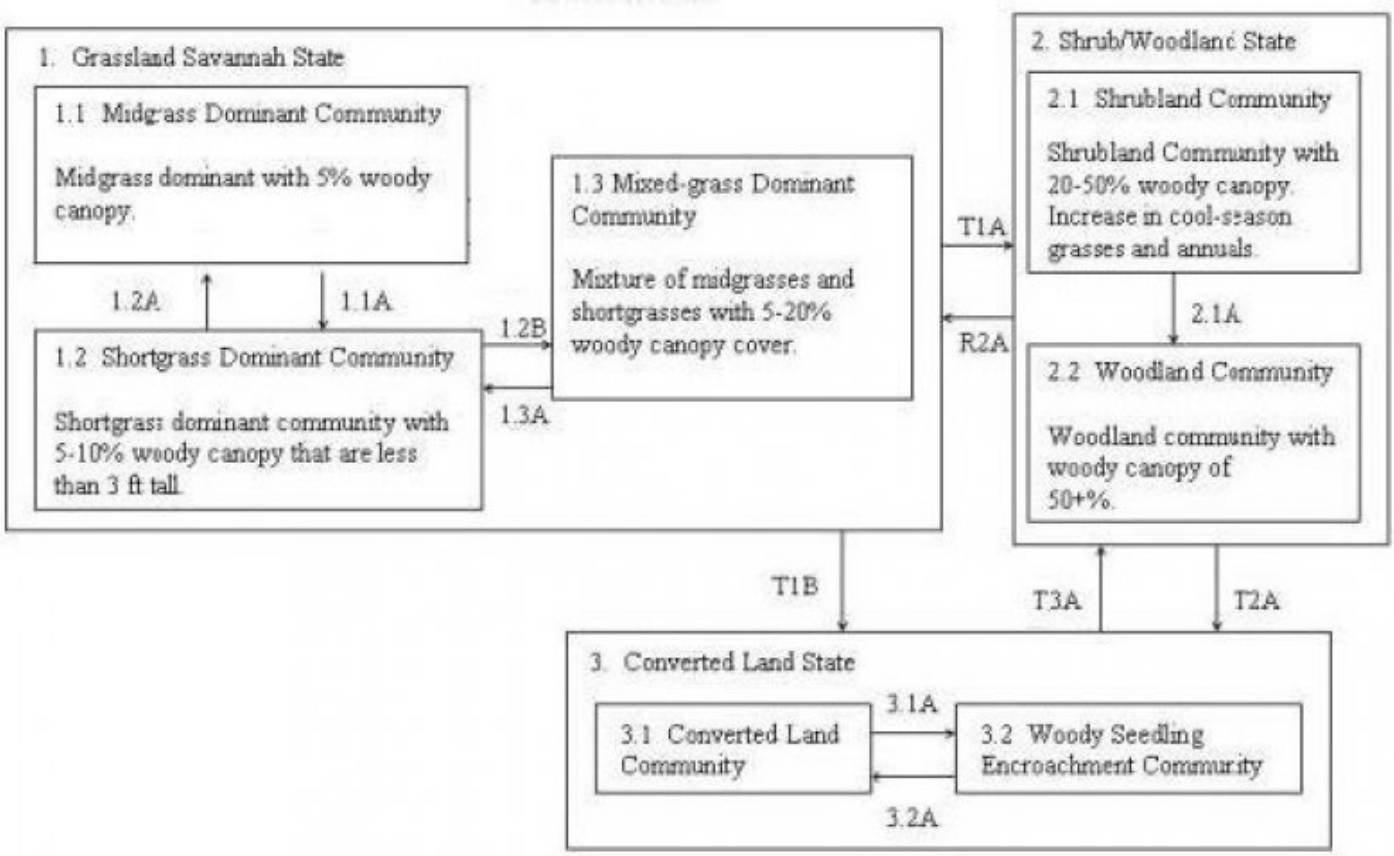
lower Rio Grande owning over 90,000 sheep and goats. By way of contrast, combined numbers of cattle, oxen, horses, mules and burros were less than 16,000." By the mid-1800's, according to Lehman's figures from the U. S. Census of 1889, "there were a minimum of 1,644,268 sheep-fully 45 percent of Texas 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.

In the reference plant community, the midgrasses dominated the shortgrasses due to their ability to capture the sunlight and shade the shorter grasses. The midgrasses also had deeper root systems that allowed them to retain the deep moisture while the shortgrasses had shorter root systems and could capture only the shallow moisture. Many of the deep-rooted grasses also have more root hairs that allow them to be more efficient at extracting moisture from very dry soil. Due to these differences, the midgrasses maintained their dominance over the shortgrasses as they could produce much more food and maintain a high state of health and vigor even in times of drought.

When stocking rates exceed the carrying capacity of the land and the natural fire-graze-rest cycles are broken by continuous grazing, the midgrasses are grazed to the point they can no longer produce food in their leaves to maintain their health and vigor. When grazed to the point of little leaf area, root systems shrink. If overgrazing continues, respiration continued in the root system requiring plant energy. In time, with continued close grazing, the midgrass will become a very shallow rooted, small leaf area, weak plant that would be a casualty during the next drought. The result is the demise of the midgrasses and an increase of the shortgrasses on the site.

The collective long-term effect of no fire, abusive grazing and no brush management results in a shrub/woodland site with a canopy of brush that is 20 to 50 percent or more. The understory will range from a cover of short and midgrasses to bare ground. When bare ground exists, it develops a crust that limits water infiltration and seedling growth. This is the plant community that will exist until significant intervention is done to reduce the brush and maintain it. The area will probably need to be seeded with a seed source of native seeds coupled with prescribed grazing management to maintain the health and vigor of the desired plants community.

State and transition model



Legend

1.1A Heavy Continuous Grazing, No Fire
1.1B Heavy Continuous Grazing, No Fire, No Brush Management
1.2B Heavy Continuous Grazing, No Fire, No Brush Management
1.3A Prescribed Grazing, Prescribed Burning
T1A Heavy Continuous Grazing, No Fire, No Brush Management
R2A Prescribed Grazing, Brush Management, Prescribed Burning
2.1A Heavy Continuous Grazing, No Fire, No Brush Management, Brush Invasion
T1B Brush Management, Pasture Planting, Range Planting, Crop Cultivation, Prescribed Grazing
T2A Brush Management, Pasture Planting, Range Planting, Crop Cultivation, Prescribed Grazing
T3A Heavy Continuous Grazing, No Fire, No Brush Management, Brush Invasion
3.1A Heavy Continuous Grazing, No Fire, Brush Invasion
3.2A Brush Management, Range Planting, Pasture Planting, Crop Cultivation, Prescribed Grazing

State 1
Grassland

Dominant plant species

- false Rhodes grass (*Trichloris crinita*), grass
- multiflower false Rhodes grass (*Trichloris pluriflora*), grass
- little bluestem (*Schizachyrium scoparium*), grass

Community 1.1
Midgrass Dominant

This community represents the reference community. It is a fire climax, midgrass plant community that has less than five percent canopy of woody plants. The grasses are false Rhodesgrass, multi-flower chloris, little bluestem, Arizona cottontop, feather bluestems, pink pappusgrass, sideoats grama, buffalograss (*Bouteloua dactyloides*), curlymesquite (*Hilaria belangeri*), perennial threeawn (Aristida spp.), plains bristlegrass (Seteria spp.), Texas wintergrass (*Nassella leucotricha*), and hooded windmillgrass (*Chloris cucullata*). The woody species are mesquite,

whitebrush, condalias, spiny hackberry (Celtis pallida), cacti, Texas colubrine (*Colubrina texensis*), wolfberry, vine ephedra (Ephedra spp.), desert yaupon (*Schaefferia cuneifolia*), and guayacan (*Guaiacum angustifolium*). Forbs are Engelmann's daisy (*Engelmannia peristenia*), bundleflower (Desmanthus spp.), sensitive briar (Mimosa spp.), orange zexmenia (Wedelia texana), hairy ruellia (Ruellia spp.), Mexican sagewort (*Artemisia ludoviciana*), bushsunflower (*Simsia calva*), lazy daisy (Aphanostephus spp.), and annual forbs. Recurrent fire and grazing by bison and other wildlife were natural components of the ecosystem. Settlement by European man brought continuous overstocking with no natural fires and the eventual removal of sheep. These changes caused a drastic change in the plant communities. The midgrasses gave way to the shortgrasses and the brush started to increase, causing a shift to the Shortgrass Dominant Community (1.2) and the Mixed-grass Dominant Community (1.3). Each of these communities can be managed back to the Midgrass Dominant Community (1.1) using prescribed grazing and fire. The Mixed-grass Dominant Community (1.3) may also require selective brush management or Individual Plant Treatments (IPT). However, once the woody canopy exceeds 20 percent and is taller than three feet, the site transitions to the Shrub/Woodland State (2). In this case, energy in the form of heavy equipment, herbicides and prescribed grazing are required to shift the plant community back to the Grassland Savannah State (1). The Grassland Savannah State (1) can be converted to the Converted Land (3) state by controlling the brush and seeding to native or introduced grasses. It may also be plowed and converted to cropland.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1905	4091	5492
Shrub/Vine	224	280	616
Forb	112	168	616
Tree	–	–	–
Total	**2241**	**4539**	**6724**

Figure 9. 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 Dominant

This phase of the Grassland Savannah State still exhibits a savannah plant structure with the woody species canopy being as high as 10 percent, but less than three feet tall. This is a result of fire being removed as a component of the site. Heavy continuous grazing has taken many of the midgrasses out of the site and replaced them with shortgrasses such as buffalograss, curlymesquite, threeawn, tumblegrass (*Schedonnardus paniculatus*), and red grama (*Bouteloua trifida*). Other common Increasers to the site are leatherstem (*Jatropha dioica*), huisache (Acacia smallii), ragweed (Ambrosia spp.), and tasajillo (Opuntia leptocaulis).

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	785	1681	2242
Shrub/Vine	448	560	897
Forb	28	56	560
Tree	–	–	–
Total	**1261**	**2297**	**3699**

Figure 11. 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

Community 1.3
Mixed-grass Dominant

This phase of the Grassland Savannah State still exhibits the savannah plant structure even though the woody canopy cover may be as high as 20 percent. The understory can still be a midgrass plant community, a shortgrass community, or a mixture of midgrasses and shortgrasses depending on the grazing management regime that it has received. A lack of fire and brush management is the major component driving the plant community toward Shrub/Woodland State (2). A threshold is being approached, but is still reversible by prescribed fire, brush management, and grazing management. There is still sufficient fuel production to carry a fire and the shrubs are small enough to still be affected.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	336	1121	1681
Shrub/Vine	673	1121	1681
Forb	28	56	560
Tree	–	–	–
Total	**1037**	**2298**	**3922**

Figure 13. Plant community growth curve (percent production by month). TX5129, Mixed-grass Dominant Community. Declining mid and shortgrasses with 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

The reference community (1.1) will transition to the Shortgrass Dominant Community (1.2) with lack of fire, continued overgrazing, insufficient rest cycles, and/or natural disturbances, like prolonged drought.

Pathway 1.2A
Community 1.2 to 1.1

This phase can be managed back to the Midgrass Dominant Community (1.1) but will take the reintroduction of fire to the ecosystem or some method of brush management that allows selective removal of the plants. A prescribed grazing plan will be essential to reverse the trend and return the midgrasses back to the plant community over an extended period time.

Pathway 1.2B
Community 1.2 to 1.3

If heavy continuous grazing continues with the exclusion of fire, the phase will transition to the Mixed-Grass Dominant Community (1.3).

Pathway 1.3A
Community 1.3 to 1.2

This phase can be managed back to the Community 1.2, and eventually 1.1 but will take the reintroduction of fire to

the ecosystem or some method of brush management that allows selective removal of the plants. A prescribed grazing plan will be essential to reverse the trend and returning the shortgrasses, and eventually the midgrasses back to the plant community over an extended period time.

State 2
Shrub/Woodland

Dominant plant species

- Christmas cactus (*Cylindropuntia leptocaulis*), grass
- pricklypear (*Opuntia*), grass

Community 2.1
Shrubland

This plant community is a result of a transition from the Grassland Savannah (1) to the Shrubland/Woodland State (2). This threshold is passed when the woody canopy becomes such that insufficient fuel is produced to carry a fire that will control the woody canopy. The understory is limited in production due to the competition for sunlight, water, and nutrients. There is an increase in tasajillo, prickly pear (Opuntia spp.), yucca (Yucca spp.), annual grasses, and forbs.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	757	1345	2522
Grass/Grasslike	224	841	1121
Forb	28	56	280
Tree	–	–	–
Total	**1009**	**2242**	**3923**

Figure 15. 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

This plant community is the culmination of continued heavy grazing and a lack of fire or brush management. At this point the woody species have dominated the site and there is very little understory production. Bare ground has increased and caused crusting to the point that there is little water infiltration and little seedling emergence. Water infiltration does occur directly under some of the woody species, such as mesquite, as it moves down the trunk of the tree to the base. During the growing season, light showers are captured in the canopy of the trees and evaporate. Energy flow is predominantly through the shrubs as is the nutrient uptake. Winter rains can produce understory forage from cool-season annual forbs and grasses and perennials such as Texas wintergrass.

Table 9. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	1681	2242	3363
Forb	–	112	224
Grass/Grasslike	–	112	224
Tree	–	–	–
Total	**1681**	**2466**	**3811**

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

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

Pathway 2.1A
Community 2.1 to 2.2

Continued heavy grazing coupled with lack of fire will cause this community to transition to the Woodland Community (2.2). Brush density and height will continue to increase and shade the ground.

Pathway 2.2A
Community 2.2 to 2.1

To transition Community 2.2 back to 2.1, the land manager will need to apply prescribed grazing, prescribed burning (if enough fuel loads still exist), and brush management. The key is lessening the canopy cover by woody species.

State 3
Converted Land

Dominant plant species

- buffelgrass (*Pennisetum ciliare*), grass

Community 3.1
Converted Land

This plant community is a phase of the Converted Land State developed by applying brush management and seeding. The area can be seeded to native grasses, forbs, and desirable woody species, singly or as a mix. To maintain the native planting, prescribed grazing and some form of brush control will be needed on a continuing basis or the plant community will develop into the Woody Seedling Encroachment Community (3.2). Some land managers have chosen to seed introduced grasses instead of native species. To maintain the introduced grass planting, prescribed grazing and some form of brush control will be needed on a continuing basis or the plant community will develop into the Woody Seedling Encroachment Community (3.2). This community can also be attained by converting cropped fields into pastures. Some sites remain in cropland today, typically small grain production for stocker-cattle grazing. While restoration of this site to a semblance of the midgrass grassland is possible with range planting, prescribed grazing, and prescribed burning, complete restoration of the reference community in a reasonable time is very unlikely due to deterioration of the soil structure and organisms. If cropping is abandoned, this land is usually planted to introduced grasses and forbs and managed as pastureland or encroachment by woody seedlings occur.

Table 10. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	2242	4522	6783
Shrub/Vine	–	–	–
Tree	–	–	–
Forb	–	–	–
Total	**2242**	**4522**	**6783**

Figure 19. Plant community growth curve (percent production by month). TX4806, Converted Land Community - Introduced Seeding. Seeded into introduced grass species..

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

Community 3.2
Woody Seedling Encroachment

This plant community develops from native seeding, introduced seeding, and abandoned cropland communities. Seedlings of shrubs establish and spread due to the lack of fire or some other method of brush management. If the seedlings are not controlled, the Converted Land Community (3.1) will transition to the Woody Seedling Encroachment Community (3.2) and will require the application of energy in the form of machinery or herbicides to reduce the canopy. Production of the seeded species depends on the grazing management that has been applied since seeding, and the canopy of the shrubs invading or increasing on the site. As the canopy of the shrubs expands, grass and forb production will be reduced. Production will depend on the grass and forb species that invade the site as well as the canopy of the shrub invasion. It is unlikely that the Converted Land State (3) will ever fully return to the Grassland Savannah State (1). If neglected for a long time, it will transition into a Shrub/Woodland.

Table 11. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1905	4091	5492
Shrub/Vine	224	269	646
Forb	112	161	646
Tree	–	–	–
Total	**2241**	**4521**	**6784**

Figure 21. Plant community growth curve (percent production by month). TX4812, Converted Land Community - Woody Seedling Encroachment. Converted Land Community that has been encroached by woody seedlings due to abandonment of crop and pastureland..

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

Pathway 3.1A
Community 3.1 to 3.2

Like State 1 and 2, without prescribed grazing, fire, and/or brush management the site will eventually be invaded by brush. Without keeping woody species under control, this community will transition in the Wood Seedling Encroachment Community (3.2).

Pathway 3.2A

Community 3.2 to 3.1

In order to return to the Converted Land Community (3.2), the land manager must control the woody encroachment. This can be attained by mechanical or chemical brush management techniques. Proper grazing and fire may help if the system is planted in grass. If the system is being cropped, other mechanical and chemical means are necessary to return the site to full agricultural productivity.

Transition T1A
State 1 to 2

Once the woody canopy exceeds approximately 20 percent and is taller than three feet, a threshold will have been passed to the Shrub/Woodland State (2). In this case energy in the form of heavy equipment and/or herbicides will be required along with prescribed grazing to shift the plant community back to the Grassland Savannah State (1).

Transition T1B
State 1 to 3

The Grassland Savannah State (1) can be converted to the Converted Land State (3) by controlling the brush and seeding to native or introduced grasses. It may also be plowed and converted to cropland.

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 Shrub/Woodland State (2) can be converted to the Converted Land State (3) by controlling the brush and seeding to native or introduced grasses. It may also be plowed and converted to cropland.

Transition T3A
State 3 to 2

If the Woody Plant Seedling Encroachment Community (3.2) is left alone, eventually the woody plants will create a moderate to heavy canopy. At this point, the desired understory grasses, forbs, and/or crops will be shaded out and the site will transition into a Shrub/Woodland State (2).

Additional community tables

Table 12. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Midgrasses**			560–1569	
	little bluestem	SCSCS	*Schizachyrium scoparium var. scoparium*	560–1121	–
	false Rhodes grass	TRCR9	*Trichloris crinita*	560–1121	–
	multiflower false Rhodes grass	TRPL3	*Trichloris pluriflora*	560–1121	–
2	**Midgrasses**			1793–2354	
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	336–785	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	336–785	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp.*	336–785	

	silver beardgrass	BOLA1	*Bothriochloa laguroides ssp. torreyana*	336–785	–
	Arizona cottontop	DICA8	*Digitaria californica*	336–785	–
	pink pappusgrass	PABI2	*Pappophorum bicolor*	336–785	–
3	**Midgrasses**			448–897	
	hooded windmill grass	CHCU2	*Chloris cucullata*	224–448	–
	Texas wintergrass	NALE3	*Nassella leucotricha*	0–448	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	224–448	–
4	**Shortgrasses**			224–560	
	buffalograss	BODA2	*Bouteloua dactyloides*	112–448	–
	curly-mesquite	HIBE	*Hilaria belangeri*	112–448	–
5	**Shortgrass**			56–112	
	threeawn	ARIST	*Aristida*	56–112	–
Forb					
6	**Forbs**			112–616	
	Forb, annual	2FA	*Forb, annual*	0–112	–
	Riddell's dozedaisy	APRI	*Aphanostephus riddellii*	56–112	–
	white sagebrush	ARLUM2	*Artemisia ludoviciana ssp. mexicana*	56–112	–
	bundleflower	DESMA	*Desmanthus*	56–112	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	56–112	–
	sensitive plant	MIMOS	*Mimosa*	56–112	–
	fringeleaf wild petunia	RUHU	*Ruellia humilis*	56–112	–
	awnless bushsunflower	SICA7	*Simsia calva*	56–112	–
Shrub/Vine					
7	**Shrubs/Vines**			224–616	
	mesquite	PROSO	*Prosopis*	56–336	–
	desert yaupon	SCCU4	*Schaefferia cuneifolia*	56–224	–
	sweet acacia	ACFA	*Acacia farnesiana*	0–224	–
	Schaffner's wattle	ACSC2	*Acacia schaffneri*	0–224	–
	whitebrush	ALGR2	*Aloysia gratissima*	56–224	–
	spiny hackberry	CEEH	*Celtis ehrenbergiana*	56–224	–
	snakewood	CONDA	*Condalia*	56–224	–
	Texan hogplum	COTE6	*Colubrina texensis*	56–224	–
	vine jointfir	EPPE	*Ephedra pedunculata*	56–224	–
	Texas lignum-vitae	GUAN	*Guaiacum angustifolium*	56–224	–
	Berlandier's wolfberry	LYBE	*Lycium berlandieri*	56–224	–
	pricklypear	OPUNT	*Opuntia*	56–224	–

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

The Grassland, Shrubland, and Woodland Communities all the water from rainfall events. Research has shown that the evapotranspiration rate on all three communities is nearly the same. Very little water can be harvested from this site if the woody plant community is replaced by a grass-dominated community. Some crusting occurs on the sites which will decrease infiltration and increase runoff. There is also some entrapment of small showers in the canopy of the woody plants that will evaporate before reaching the ground. During heavy rains, the structure of the woody plants tends to funnel water down the stem to the base of the tree.

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.

Author(s)/participant(s)	
Contact for lead author	
Date	05/12/2025
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not**

bare ground):

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

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

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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

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:

    Sub-dominant:

    Other:

    Additional:

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

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

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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:**

17. **Perennial plant reproductive capability:**