USDA Natural Resources Conservation Service

Ecological site R083BY003TX
Gravelly Ridge

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

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.

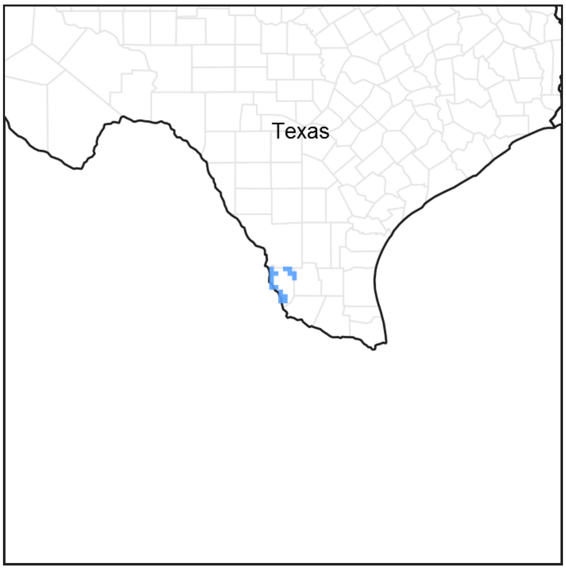


Figure 1. Mapped extent

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 modal concept of the Gravelly Ridge ecological site is 7 to 20 inches of loam textured soil underlain by indurated caliche. The site is located on paleoterraces with 0 to 30 percent slopes. Originally a grassland with shrubs, the soil surface has about 30 to 90 percent surface cover of rock fragments less than three inches diameter, and 1 to 10 percent cover of rock fragments greater than three inches diameter.

Associated sites

R083BY004TX	**Shallow Sandy Loam**
R083BY015TX	**Saline Clay**
R083BY019TX	**Gray Sandy Loam**
R083BY002TX	**Shallow Ridge**
R083BY005TX	**Shallow**
R083BY013TX	**Loamy Bottomland**
R083BY016TX	**Saline Clay Loam**
R083BY018TX	**Clay Flat**
R083BY023TX	**Sandy Loam**

Similar sites

R083AY003TX	**Gravelly Ridge**
R083CY003TX	**Gravelly Ridge**
R083DY003TX	**Gravelly Ridge**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Acacia rigidula* (2) *Leucophyllum frutescens*
Herbaceous	(1) *Pappophorum bicolor* (2) *Tridens muticus*

Physiographic features

The landform is nearly level to steeply sloping gravelly alluvium on paleoterraces of the Coastal Plains. This site is distinguished by the water worn gravels on the surface from the Uvalde Gravel of Pliocene or early Pleistocene age. Slope shape is linear convex and ranges from 1 to 8 percent. Elevation ranges from 100 to 1,000 feet. This area is comprised of inland, dissected coastal plains.

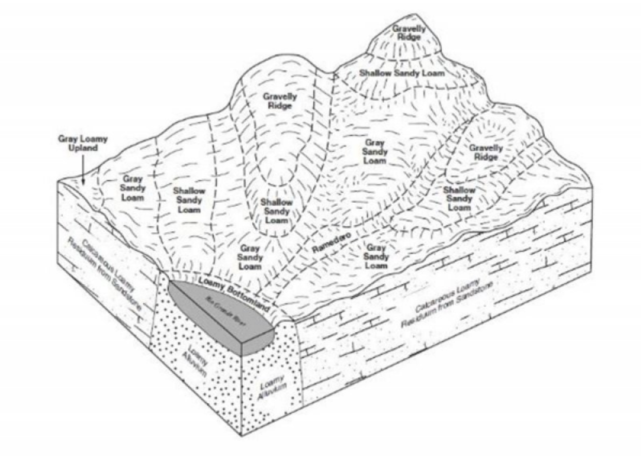


Figure 2.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Paleoterrace (2) Coastal plain > Ridge
Runoff class	Medium
Elevation	30–305 m
Slope	1–8%
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) DEL RIO INTL AP [USW00022010], Del Rio, TX
- (3) ZAPATA 1 S [USC00419976], Zapata, TX
- (4) CATARINA [USC00411528], Asherton, TX
- (5) DEL RIO 2 NW [USC00412361], Del Rio, TX
- (6) EAGLE PASS 3N [USC00412679], Eagle Pass, TX
- (7) FALCON DAM [USC00413060], Roma, TX
- (8) LAREDO 2 [USC00415060], Laredo, TX

Influencing water features

Water features do not influence this site.

Wetland description

N/A

Soil features

The soils are very shallow to very deep, well drained and moderately slow to very slow permeable on uplands. Gravels are intermixed throughout the soil and were formed in thick beds of Uvalde Gravel. Soil series correlated include: Jimenez, Maverick, and Lupe.

Table 4. Representative soil features

Parent material	(1) Alluvium–sedimentary rock (2) Residuum–sedimentary rock
Surface texture	(1) Gravelly sandy clay loam (2) Extremely gravelly loam (3) Clay
Family particle size	(1) Loamy-skeletal (2) Fine
Drainage class	Well drained
Permeability class	Moderately slow to slow
Soil depth	18–203 cm
Surface fragment cover <=3"	20–60%
Surface fragment cover >3"	0–10%
Available water capacity (0-101.6cm)	2.54–10.16 cm
Calcium carbonate equivalent (0-101.6cm)	0–50%
Electrical conductivity (0-101.6cm)	0–16 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–16
Soil reaction (1:1 water) (0-101.6cm)	6.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	10–30%
Subsurface fragment volume >3" (Depth not specified)	0–10%

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.

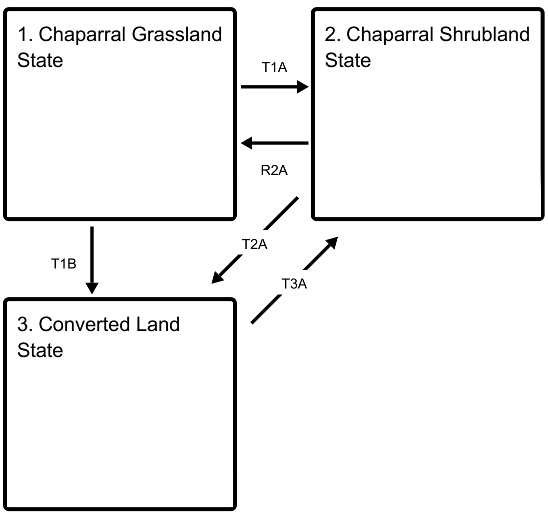
With the arrival of European man, the South Texas area was fenced and, in many instances, stocked beyond its capability to sustain forage. This overstocking led to a reduced fire frequency and intensity, creating an opportunity for woody shrubs to increase across the landscape. As the natural graze-rest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

State and transition model

Ecosystem states



T1A - Absence of disturbance and natural regeneration over time, coupled with excessive grazing pressure

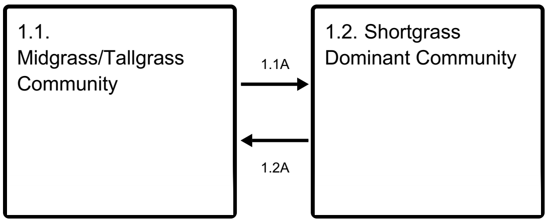
T1B - Extensive soil disturbance followed by seeding improved forage species

R2A - Reintroduction of historic disturbance return intervals

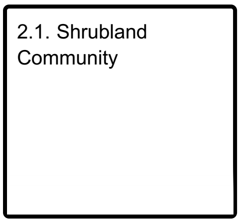
T2A - Extensive soil disturbance followed by seeding improved forage species

T3A - Absence of disturbance and natural regeneration over time, coupled with excessive grazing pressure

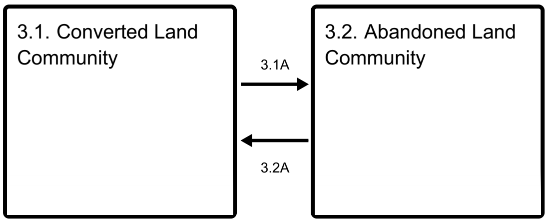
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Chaparral Grassland State

The Grassland State composition consists of approximately 75 percent grasses, 20 percent woody plants, and 5 percent forbs by air-dry weight. The woody crown canopy can be approximately 30 percent. Two community phases exist, the Midgrass/Tallgrass Community and the Shortgrass Dominant Community.

Dominant plant species

- tanglehead (*Heteropogon contortus*), grass
- sideoats grama (*Bouteloua curtipendula*), grass

Community 1.1
Midgrass/Tallgrass Community

Community (1.1) is perceived to be extremely rare, if not absent, due to thresholds being crossed over the last 200 years into the Chaparral Shrubland Community. This community represents the reference or diagnostic community. Because of the long history of impact on this site and the wide fluctuations in climate, this description of the reference or interpretive community for the site is based on early range site descriptions, clipping data, analysis of field work, and professional consensus of experienced range specialists. The chaparral grassland, consisted of approximately 75 percent grasses, 20 percent woody plants, and 5 percent forbs by weight. Dominant grasses are tall and midgrasses including tanglehead (*Heteropogon contortus*), sideoats grama (*Bouteloua curtipendula*), and bush muhly (*Muhlenbergia porteri*). Other grasses include whiplash pappusgrass (*Pappophorum vaginatum*), pink pappusgrass (*Pappophorum bicolor*), false Rhodesgrass (*Trichloris crinita*), tobosagrass (*Pleuraphis mutica*), Arizona cottontop (*Digitaria californica*), plains bristlegrass (*Setaria leucopila*), green sprangletop (*Leptochloa dubia*), cane bluestem (*Bothriochloa barbinodis*), and slender grama (*Bouteloua repens*). Arizona cottontop (*Digitaria californica*) and plains bristlegrass (*Setaria leucopila*) are the more opportunistic species on this site and respond quickly to timely rainfall. Orange zexmenia (Wedelia texana) is considered the major forb in this community. The shrub canopy is less than 30 percent. Blackbrush (*Acacia rigidula*), creosote (*Larrea tridentata*), cenizo (*Leucophyllum frutescens*), and guajillo (*Acacia berlandieri*) are the dominant woody species on this site depending upon the soil type.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1009	2186	3363
Shrub/Vine	168	280	392
Forb	45	67	90
Tree	–	–	–
Total	**1222**	**2533**	**3845**

Table 6. Ground cover

Tree foliar cover	0-2%
Shrub/vine/liana foliar cover	10-20%
Grass/grasslike foliar cover	70-80%
Forb foliar cover	0-5%
Non-vascular plants	0%
Biological crusts	0%
Litter	60-70%
Surface fragments >0.25" and <=3"	30-90%
Surface fragments >3"	1-10%
Bedrock	0%
Water	0%
Bare ground	5-15%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	0-1%	0-5%	70-80%	0-5%
>0.15 <= 0.3	0-2%	5-10%	70-80%	0-5%
>0.3 <= 0.6	0-2%	10-15%	60-70%	0-2%
>0.6 <= 1.4	0-2%	10-20%	5-15%	–
>1.4 <= 4	0%	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 10. Plant community growth curve (percent production by month). TX4541, Midgrass Dominant Community, 15-30% Canopy. Midgrasses dominate the site with 15-30% 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 1.2
Shortgrass Dominant Community

Community (1.2) is perceived to be extremely rare, if not absent, due to thresholds being crossed over the last 200 years into the Chaparral Shrubland Community. This narrative is based on early range site descriptions, clipping data, analysis of field work, and professional consensus of experienced range specialists. This phase of the Chaparral Grassland State (1) still exhibits a chaparral plant structure with the woody species canopy being as much as 30 percent. Heavy continuous grazing takes many of the midgrasses out of the site which are replaced by shortgrasses such as pink pappusgrass (*Pappophorum bicolor*), threeawn (*Aristida purpurea*), slim tridens (*Tridens muticus*), red grama (bouteloua trifida), and curly mesquite (*Hilaria belangeri*). Prolonged drought can also encourage a shift from midgrasses to shortgrasses on this site. However, a shift due to drought is perceived to be part of a normal cycle back-and-forth between midgrasses and shortgrasses. The shrub component will be much the same as the Midgrass/Tallgrass Community. A prescribed grazing plan, which includes proper stocking rates, will be essential to restore the Shortgrass Dominant Community (1.2) back to the Midgrass/Tallgrass Community (1.1). In this community phase there are sufficient remnants of Midgrass/Tallgrass Community plants from which to make a comeback. Prescribed amounts of rest from grazing, along with favorable growing conditions, may be needed to restore this plant community but it may take 5 to 10 years. Once the tallgrass/midgrass species begin to respond, it may be possible to use fire, when the conditions are right to suppress the brush species. A lack of fuel continuity can easily make fire impractical on this site. Grazing management alone may not fully restore the Reference Community, but can provide one reasonably close.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	448	785	1233
Shrub/Vine	168	280	392
Forb	45	67	90
Total	**661**	**1132**	**1715**

Figure 12. Plant community growth curve (percent production by month). TX4542, Shortgrass Dominant Community, 15-30% canopy. Shortgrasses dominate after midgrasses decline. Woody canopy approaches 15-30%..

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 1.1A
Community 1.1 to 1.2

A shift to the Shortgrass Community occurs if the Midgrass/Tallgrass 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, energy capture by midgrasses, and restoring ground cover will tend to move the Shortgrass Dominant Community (1.2) toward the Midgrass/Tallgrass Community (1.1). Utilizing ecological disturbances such as herbivory, selective brush management, and fire in constructive amounts may benefit the site. The time to shift back to the Midgrass/Tallgrass Community (1.1) is dependent upon favorable growing conditions and could take 5 to 10 years.

Conservation practices

Brush Management
Prescribed Burning

State 2
Chaparral Shrubland State

This State has one community, the 2.1 Shrubland Community. Woody cover exceeds 35 percent and is characterized by mid and short grasses.

Dominant plant species

- guajillo (*Acacia berlandieri*), shrub
- blackbrush (*Coleogyne ramosissima*), shrub

Community 2.1
Shrubland Community

Figure 13. 2.1 Shrubland Community on the Quemado soil. Photo by Jason Hohlt, NRCS, 2014.

This community is a result of an irreversible transition from the Chaparral Grassland State (1) to the Shrubland State (2). Brush canopy levels may vary widely but can easily exceed 50 percent; especially on long-term disturbed sites. The herbaceous understory is very limited in production due to the competition for sunlight, water, and nutrients. Rest from grazing will have limited impact on restoring the grasses with canopy this dense. Prescribed burning tends to be impractical in this community due to a lack of fine fuel. Major grasses include purple threeawn, red grama, and fall witchgrass (Digitaria cognate). Annual forbs increase. There is an increase of woody shrubs and the site is generally dominated by blackbrush, guajillo, cenizo, and others in varying abundance. Cool-season annual forbs are produced by fall and winter rains. Bare ground has increased and has crusted to the point that there is little water infiltration and little seedling emergence. Lichen crusts can be common. Water infiltration does occur directly under some of the woody species. Energy flow is predominantly through the shrubs and most nutrients are used by the shrubs. During extended dry cycles and/or on specific soil series, this plant community may begin to resemble a Chihuahuan Desert Plant Community. This state can be converted to the Converted Land State (3) by controlling the brush and seeding to native or introduced grasses. Due to the gravelly soils of this site, care should be taken in the selection of soil disturbance equipment. Removing the brush and reseeding represents the crossing of another threshold.

Table 9. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	56	336	673
Shrub/Vine	280	420	560
Forb	45	67	90
Total	**381**	**823**	**1323**

Figure 15. Plant community growth curve (percent production by month). TX4544, Shrubland Community, 30+% woody canopy. Shrubs dominate the site with heavy continuous grazing and no brush management. Woody canopy exceeds 30%. Grasses are in further decline..

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

State 3
Converted Land State

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 Community

Figure 16. 3.1 Converted Land Community on the Quemado soil. Photo by Vivian Garcia, NRCS, 2014.

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 10. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1345	2802	4483
Shrub/Vine	168	252	336
Forb	56	112	168
Total	**1569**	**3166**	**4987**

Figure 18. Plant community growth curve (percent production by month). TX4531, Converted Land - Introduced Grass Seeding. Seeding Coverted Land into Introduced grass species..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	10	20	15	5	10	15	10	5	5

Community 3.2
Abandoned Land Community

Figure 19. Garcia, NRCS, 2014, Quemada Soil.

This community developed from the Converted Land Community (3.1). Brush management efforts on this site include the risk that disking or roller chopping tend to only manipulate the above ground part of brush species. Brush will resprout from the root crown and from the existing seed bank within the soil. If the seedlings are not controlled, 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. Intervention should be done quickly, or this community will revert back to a Shrubland Community. The role of prescribed grazing is to retain grass vigor to compete against seedling establishment and preserve fuel for maintenance burns.

Table 11. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1121	1681	2242
Shrub/Vine	224	336	448
Forb	56	112	168
Total	**1401**	**2129**	**2858**

Figure 21. Plant community growth curve (percent production by month). TX4534, Converted Land - Woody Seedlings Encroachment. Woody seedling encroachment on converted lands such as abandoned cropland, native seeded land, and introduced seeding lands..

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

Converted Land Community

Abandoned Land Community

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

Abandoned Land Community

Converted Land Community

Brush management along with prescribed grazing can recover the Converted Land Community. The timely use of fire can suppress the encroaching brush before the brush crosses an economic threshold. Some replanting may be needed and can be done in conjunction with brush management.

Conservation practices

Brush Management
Range Planting
Prescribed Grazing

Transition T1A
State 1 to 2

The Chaparral Grassland State will cross a threshold to Chaparral Shrubland State (State 2) with heavy continuous grazing, 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, limiting the growth 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 (usually following brush management) and planting to native or introduced forages.

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.

Transition T2A
State 2 to 3

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

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 practices over long periods of time.

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	**Bunchgrasses**			448–1457	
	tanglehead	HECO10	*Heteropogon contortus*	0–1457	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	0–1121	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	0–785	–
	multiflower false Rhodes grass	TRPL3	*Trichloris pluriflora*	0–785	–
2	**Midgrasses**			504–897	
	pink pappusgrass	PABI2	*Pappophorum bicolor*	112–785	–
	whiplash pappusgrass	PAVA2	*Pappophorum vaginatum*	112–785	–
	Arizona cottontop	DICA8	*Digitaria californica*	0–673	–
	green sprangletop	LEDU	*Leptochloa dubia*	0–560	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	112–560	–
3	**Short grasses**			224–1009	
	slender grama	BORE2	*Bouteloua repens*	0–673	–
	curly-mesquite	HIBE	*Hilaria belangeri*	0–673	–
	slim tridens	TRMU	*Tridens muticus*	56–336	–
	red grama	BOTR2	*Bouteloua trifida*	0–168	–
Forb					
4	**Forbs**			45–90	
	bundleflower	DESMA	*Desmanthus*	0–45	–
	pricklyleaf dogweed	THAC	*Thymophylla acerosa*	11–34	–
	littleleaf sensitive-briar	MIMI22	*Mimosa microphylla*	0–22	–
	bladderpod	LESQU	*Lesquerella*	0–22	–
	dutchman's breeches	DICU	*Dicentra cucullaria*	0–11	–
	spurge	EUPHO	*Euphorbia*	0–6	–
	menodora	MENOD	*Menodora*	0–6	–
	twinleaf senna	SEBA3	*Senna bauhinioides*	0–6	–
Shrub/Vine					
5	**Shrubs/Vines**			168–392	
	guajillo	ACBE	*Acacia berlandieri*	112–224	–

	blackbrush acacia	ACRI	*Acacia rigidula*	112–224	–
	creosote bush	LATR2	*Larrea tridentata*	112–168	–
	Texas barometer bush	LEFR3	*Leucophyllum frutescens*	112–168	–
	featherplume	DAFO	*Dalea formosa*	28–56	–
	jointfir	EPHED	*Ephedra*	28–56	–
	Texas kidneywood	EYTE	*Eysenhardtia texana*	28–56	–
	shrubby bullseye	GOHY	*Gochnatia hypoleuca*	28–56	–
	Texas lignum-vitae	GUAN	*Guaiacum angustifolium*	28–56	–
	leatherstem	JADI	*Jatropha dioica*	28–56	–
	coyotillo	KAHU	*Karwinskia humboldtiana*	28–56	–
	shrubby blue sage	SABA5	*Salvia ballotiflora*	28–56	–
	desert yaupon	SCCU4	*Schaefferia cuneifolia*	28–56	–
	resinbush	VIST	*Viguiera stenoloba*	28–56	–
	desert myrtlecroton	BEOB	*Bernardia obovata*	28–56	–
	pricklypear	OPUNT	*Opuntia*	0–34	–
	pitaya	ECEN2	*Echinocereus enneacanthus*	0–28	–
	Amargosa niterwort	NIMO	*Nitrophila mohavensis*	0–28	–
	crown of thorns	KOSP	*Koeberlinia spinosa*	0–28	–
	ratany	KRAME	*Krameria*	0–28	–
	Texas paloverde	PATE10	*Parkinsonia texana*	0–28	–
	devilqueen	PHSP2	*Phaulothamnus spinescens*	0–28	–
	fairyduster	CAER	*Calliandra eriophylla*	0–28	–
	boxthorn fiddlewood	CIBR3	*Citharexylum brachyanthum*	0–28	–
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	0–28	–
	mariola	PAIN2	*Parthenium incanum*	0–17	–

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

This site is in a ridge position and does not receive runoff. Additionally, the soil profile can contain large amounts of gravel, which limits its water holding capacity. Therefore, this site is typically droughty with little available moisture to support grass production. In the Chaparral State, light showers are captured in the canopy of the shrubs and evaporate quickly, rendering these showers ineffective to grow grass. In higher rainfall event, the shrubs intercept and channel rainfall via the stems and trunks to the ground.

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

Bryan Christensen, 9/19/2023

Acknowledgments

Reviewers and Contributors:
Vivian Garcia, RMS, NRCS, Corpus Christi, Texas

Jason Hohlt, RMS, NRCS, Kingsville, Texas
Forrest Smith, South Texas Natives, Kingsville, Texas
Dusty Crowe, DC, NRCS, Carrizo Springs, Texas
Shanna Dunn, RSS, NRCS, Corpus Christi, Texas
Gary Harris, MSSL, NRCS, Robstown, Texas
Mark Moseley, ESS, NRCS, San Antonio, Texas
Ann Kinney, Editor, NRCS, Temple, Texas

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)	Vivian Garcia, RMS, Corpus Christi
Contact for lead author	361-241-0609, Corpus Christi Zone Office
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, except after heavy rains.

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

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 10 percent.

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):** Minimial.

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

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

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** This site has well drained soils with high canopy, basal cover and density, and small interspaces to make rainfall impact negligible.

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 mid/tall grasses>>

    Sub-dominant: forbs>shrubs

    Other:

    Additional:

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

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):** 1,000 to 3,000 air-dry pounds per acre.

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:** Red grama, threeawn, King Ranch bluestem, buffelgrass, blackbrush acacia, creosote, guajillo, cenizo, and pear.

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