

Ecological site R083BY003TX

Gravelly Ridge

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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.

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) <i>Acacia rigidula</i> (2) <i>Leucophyllum frutescens</i>
Herbaceous	(1) <i>Pappophorum bicolor</i> (2) <i>Tridens muticus</i>

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.

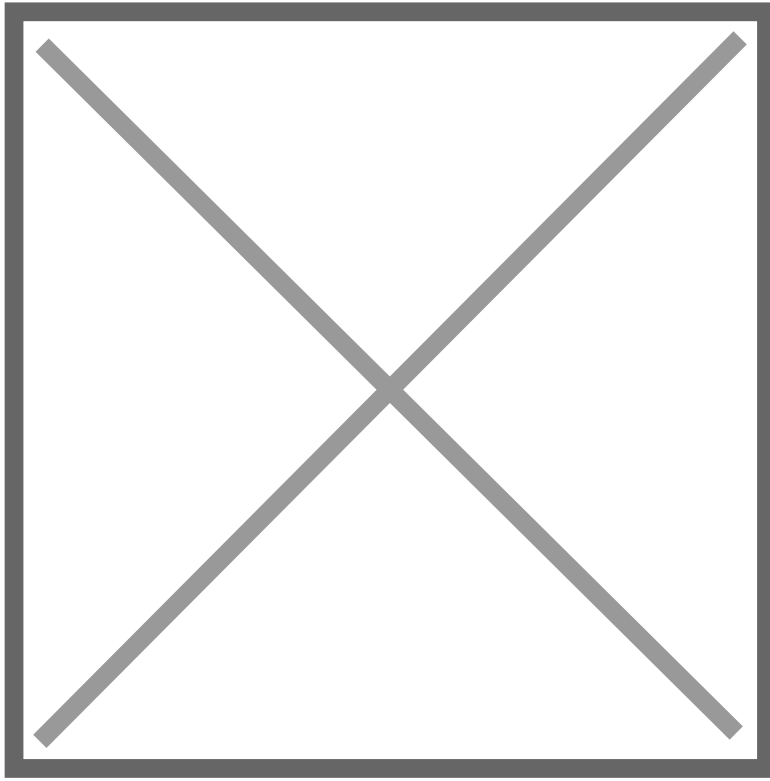


Figure 1.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Paleoterrace (2) Coastal plain > Ridge
Runoff class	Medium
Elevation	30 – 310 m
Slope	0 – 10 %
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)	230-320 days
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Freeze-free period (characteristic range)	310-370 days
Precipitation total (characteristic range)	510 mm
Frost-free period (actual range)	210-370 days
Freeze-free period (actual range)	260-370 days
Precipitation total (actual range)	480-530 mm
Frost-free period (average)	270 days
Freeze-free period (average)	340 days
Precipitation total (average)	510 mm

- (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
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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	20 – 200 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 – 20 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0 – 20
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 %
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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 (*Tigullia 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

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Bunchgrasses			448-1457	

	tanglehead	HECO10	<i>Heteropogon contortus</i>	0-1457	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	0-1121	–
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	0-785	–
	multiflower false Rhodes grass	TRPL3	<i>Trichloris pluriflora</i>	0-785	–
2	Midgrasses			504-897	
	pink pappusgrass	PABI2	<i>Pappophorum bicolor</i>	112-785	–
	whiplash pappusgrass	PAVA2	<i>Pappophorum vaginatum</i>	112-785	–
	Arizona cottontop	DICA8	<i>Digitaria californica</i>	0-673	–
	green sprangletop	LEDU	<i>Leptochloa dubia</i>	0-560	–
	plains bristlegrass	SEVU2	<i>Setaria vulpiseta</i>	112-560	–
3	Short grasses			224-1009	
	slender grama	BORE2	<i>Bouteloua repens</i>	0-673	–
	curly-mesquite	HIBE	<i>Hilaria belangeri</i>	0-673	–
	slim tridens	TRMU	<i>Tridens muticus</i>	56-336	–
	red grama	BOTR2	<i>Bouteloua trifida</i>	0-168	–
Forb					
4	Forbs			45-90	
	bundleflower	DESMA	<i>Desmanthus</i>	0-45	–
	pricklyleaf dogweed	THAC	<i>Thymophylla acerosa</i>	11-34	–
	littleleaf sensitive-briar	MIMI22	<i>Mimosa microphylla</i>	0-22	–
	bladderpod	LESQU	<i>Lesquerella</i>	0-22	–
	dutchman's breeches	DICU	<i>Dicentra cucullaria</i>	0-11	–
	spurge	EUPHO	<i>Euphorbia</i>	0-6	–
	menodora	MENOD	<i>Menodora</i>	0-6	–
	twinleaf senna	SEBA3	<i>Senna bauhinoides</i>	0-6	–
Shrub/Vine					
5	Shrubs/Vines			168-392	
	guajillo	ACBE	<i>Acacia berlandieri</i>	112-224	–
	blackbrush acacia	ACRI	<i>Acacia rigidula</i>	112-224	–
	creosote bush	LATR2	<i>Larrea tridentata</i>	112-168	–
	Texas barometer bush	LEFR3	<i>Leucophyllum frutescens</i>	112-168	–
	featherplume	DAFO	<i>Dalea formosa</i>	28-56	–
	jointfir	EPHED	<i>Ephedra</i>	28-56	–
	Texas kidneywood	EYTE	<i>Eysenhardtia texana</i>	28-56	–
	shrubby bullseye	GOHY	<i>Gochnatia hypoleuca</i>	28-56	–
	Texas lignum-vitae	GUAN	<i>Guaiaacum angustifolium</i>	28-56	–
	leatherstem	JADI	<i>Jatropha dioica</i>	28-56	–
	coyotillo	KAHU	<i>Karwinskia humboldtiana</i>	28-56	–
	shrubby blue sage	SABA5	<i>Salvia ballotiflora</i>	28-56	–
	desert yaupon	SCCU4	<i>Schaefferia cuneifolia</i>	28-56	–
	resinbush	VIST	<i>Viguiera stenoloba</i>	28-56	–
	desert myrtlecroton	BEOB	<i>Bernardia obovata</i>	28-56	–
	pricklypear	OPUNT	<i>Opuntia</i>	0-34	–
	pitaya	ECEN2	<i>Echinocereus enneacanthus</i>	0-28	–
	Amargosa niterwort	NIMO	<i>Nitrophila mohavensis</i>	0-28	–
	crown of thorns	KOSP	<i>Koeberlinia spinosa</i>	0-28	–

	ratany	KRAME	<i>Krameria</i>	0-28	–
	Texas paloverde	PATE10	<i>Parkinsonia texana</i>	0-28	–
	devilqueen	PHSP2	<i>Phaulothamnus spinescens</i>	0-28	–
	fairyduster	CAER	<i>Calliandra eriophylla</i>	0-28	–
	boxthorn fiddlewood	CIBR3	<i>Citharexylum brachyanthum</i>	0-28	–
	Christmas cactus	CYLE8	<i>Cylindropuntia leptocaulis</i>	0-28	–
	mariola	PAIN2	<i>Parthenium incanum</i>	0-17	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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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.

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Approval

Bryan Christensen, 9/19/2023

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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	
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): Minimal.

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.
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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: Red grama, threeawn, King Ranch bluestem, buffelgrass, blackbrush acacia, creosote, guajillo, cenizo, and pear.
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17. Perennial plant reproductive capability: All plants should reproduce each year.
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