USDA Natural Resources Conservation Service

Ecological site R078BY076TX
Gyp 19-26" PZ

Last updated: 9/15/2023
Accessed: 05/13/2025

General information

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

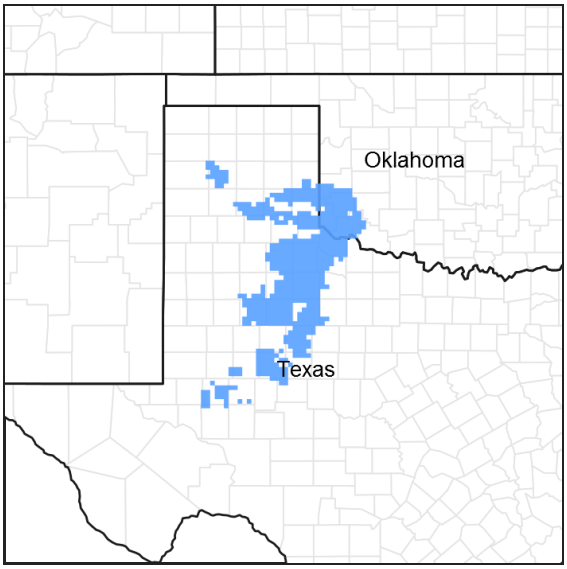


Figure 1. Mapped extent

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

MLRA notes

Major Land Resource Area (MLRA): 078B–Central Rolling Red Plains, Western Part

MLRA 78B is characterized by strongly dissected, rolling plains with prominent ridges and valleys and rolling to steep irregular topography. Loamy soils are generally well drained, range from shallow to deep, and developed in sediments of Triassic and Permian age.

LRU notes

NA

Classification relationships

This ecological site is correlated to soil components at the Major Land Resource Area (MLRA) level which is further described in USDA Ag Handbook 296.

Ecological site concept

These sites occur over shallow gypsiferous loam soils on uplands. Production is low and vegetation is often sparse, depending on the amount of surface gypsum. Reference vegetation consists of midgrasses and forbs with some

tallgrasses and few shrubs. Careful grazing management should be considered due to the amount of bare soil and sparse vegetation.

Associated sites

R078BY081TX	**Loamy Upland 19-26" PZ**
R078BY084TX	**Rough Breaks 19-26" PZ**
R078BY090TX	**Shallow Clay 19-26" PZ**

Similar sites

R078CY038OK	**Gyp** Gyp site in 78C

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Schizachyrium scoparium* (2) *Phacelia integrifolia*

Physiographic features

This site occurs as ridges, knobs, hilltops, and benches within the redbed geologic formations of the western rolling plains. In general, these sites do not comprise large acreage and are found within larger associated sites. Slopes range from nearly level to moderately steep. Raw gypsum is visible on the surface.

Landforms include ridge, hill, and bench.

Table 2. Representative physiographic features

Landforms	(1) Breaks > Ridge (2) Breaks > Structural bench
Runoff class	Negligible to high
Flooding frequency	None
Ponding frequency	None
Elevation	396–792 m
Slope	0–20%
Water table depth	152–203 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate of the western rolling plains is dry, sub-humid with hot summers and mild winters. Temperatures often reach 100 degrees F for several consecutive days during summer. Cold spells with temperatures less than 20 degrees F only last short periods of time. The soil is not frozen below the 3-inch depth for more than 2 to 3 days. Humidity is low during the winter and early spring months. Sometimes relative humidity is high enough to make summer days seem uncomfortable. Most of the precipitation comes in the form of rain and that in the spring and early summer principally. May is the wettest month followed by June. July and August are dryer and much hotter. Rainfall often comes as intense showers of relatively short duration. Rainfall rate per hour is often high and runoff is significant. Infiltration is diminished due to lack of opportunity time. The growing season begins in April and ends with the first killing frost in November. There is little snowfall with the average being about 10 inches. Rainfall averages about 22 inches.

There is a 70% chance that yearly precipitation will fall between 16 and 24 inches. About 55% of the time, the yearly rainfall is below the mean. Dry spells during the growing season are common and long-term droughts occur in cycles of about 20 years. Native vegetation is principally warm season.

Table 3. Representative climatic features

Frost-free period (characteristic range)	189-194 days
Freeze-free period (characteristic range)	204-222 days
Precipitation total (characteristic range)	584-610 mm
Frost-free period (actual range)	184-201 days
Freeze-free period (actual range)	202-223 days
Precipitation total (actual range)	559-635 mm
Frost-free period (average)	192 days
Freeze-free period (average)	213 days
Precipitation total (average)	584 mm

Climate stations used

- (1) WELLINGTON [USC00419565], Wellington, TX
- (2) PADUCAH [USC00416740], Paducah, TX
- (3) JAYTON [USC00414570], Jayton, TX
- (4) SNYDER [USC00418433], Snyder, TX
- (5) ROBERT LEE [USC00417669], Robert Lee, TX

Influencing water features

Gypsum is highly water soluble and numerous cavities can occur in these concentrated gyp deposits.

Wetland description

NA

Soil features

The soils of this site are very shallow to shallow well drained and moderately permeable. They are formed in loamy residuum over gypsum bedrock of Permian age. They are mostly gently sloping to steep and occur on summits and side slopes of hills and on ridges and benches in the western rolling red plains. The gypsum content varies and is the limiting factor as to kind and amount of vegetation.

Major Soil Taxonomic Units correlated to this site include: Cottonwood soils.

Table 4. Representative soil features

Parent material	(1) Residuum–rock gypsum
Surface texture	(1) Gypsiferous clay loam (2) Gypsiferous loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	8–76 cm
Surface fragment cover <=3"	0%

Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	1.52–12.95 cm
Calcium carbonate equivalent (0-101.6cm)	0–30%
Electrical conductivity (0-101.6cm)	1–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–4
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–3%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The plant community on this site is influenced by the gypsum content more than by any other factor. Where the gyp content is very high, the vegetation is sparse and plant species are very limited. Where there has been some significant soil formation over the gypsum beds, the vegetation is denser and there are a wider range of species present. At best, the production for the site is low and the plants are not very palatable to livestock. It is not a site that is attractive for livestock grazing. It generally occurs as fairly small areas occurring within an associated site of considerably more acres. The gypsum can occur as bedded strata, or as a platy crystalline form on the soil surface. Any sort of mechanical activity on this site (including heavy animal traffic) results in making the gypsum more concentrated. Livestock will sometimes graze the site but in general, overuse of the site is rare. It is a fragile site due to lack of plant growth to protect the soil surface. Since gypsum is highly water soluble, cavities can develop beneath the soil surface. Sometimes in walking over the site a hollow sound is produced and instances of “cave-ins” have occurred. Large “gyp sinks” sometimes occur in areas underlain by gypsum that has dissolved over the years.

The reference vegetation for the site consists of relatively few species compared to other sites. It is primarily a grassland community with a few forbs and very few shrubs. The grasses are mainly tall and midgrass species. Grass species found on this site include: little bluestem (*Schizachyrium scoparium*) (the predominant species), sideoats grama (*Bouteloua curtipendula*), wright threeawn (*Aristida purpurea* var. wrightii), sand dropseed (*Sporobolus cryptandrus*), hairy grama (*Bouteloua hirsuta*), blue grama (*Bouteloua gracilis*), tobosa (Phleuraphis mutica), and hairy tridens (*Erioneuron pilosum*) are found in varying amounts. On sites where more soil material exists, big bluestem (*Andropogon gerardii*) and Indiangrass (*Sorghastrum nutans*) can be found in small quantities.

The main forb species found are gyp bluecurls (*Phacelia integrifolia*), half-shrub sundrop (Calylophus serrulata), skullcap (Scuttelaria drummondii), broom snakeweed (*Gutierrezia sarothrae*), sand lilly (*Mentzelia strictissima*), Missouri primrose (Oenothera missouriensis), bushy primrose (*Oenothera drummondii*), false broomweed (*Haploesthes greggii*) and annual broomweed (Amphiachryis dracunculoides).The main shrubs and trees found on the site include: feather dalea (*Dalea formosa*), yucca (*Yucca glauca*), catclaw mimosa (*Mimosa aculeaticarpa* var. biuncifera), and occasionally skunkbush sumac (*Rhus aromatica*) and redberry juniper (*Juniperus pinchotii*). Prickly pear cactus (Opuntia polycantha) can be found in small amount also.

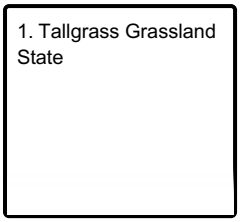
Fire may not have been as important on this site due to sparse cover which limited fuel for fire. Many of these sites do not produce enough continuity of fuels to allow a complete burn. There is limited use of the site by wildlife. Cover is sparse and woody plants few, thereby limiting it for habitat. Deer will sometimes graze the forbs and browse the short shrubs.

Plant Communities and Transitional Pathways (diagram):
The following diagram suggests some pathways that the vegetation on this site might take. There may be other states not shown on the diagram. This information is intended to show what might happen in a given set of circumstances; it does not mean that this would happen the same way in every instance. Local professional

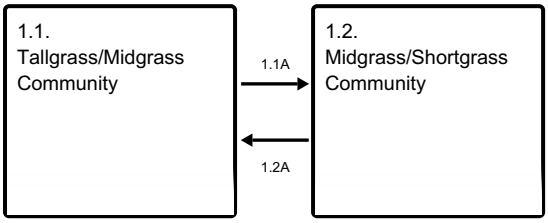
guidance should always be sought before pursuing a treatment scenario.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1
Tallgrass Grassland State

The assumed reference plant community, also known as the Tall/Midgrass Community, consisted of sparsely vegetative plant community composed of primarily little bluestem. A few scattered yucca and a few forbs are also present. Distance between plants of little bluestem average four feet.

Dominant plant species

- little bluestem (*Schizachyrium scoparium*), grass
- sideoats grama (*Bouteloua curtipendula*), grass
- gypsum phacelia (*Phacelia integrifolia*), other herbaceous

Community 1.1
Tallgrass/Midgrass Community

Figure 8. 1.1 Tallgrass/Midgrass Community

The reference plant community consisted of sparsely vegetative plant community composed of primarily little bluestem. A few scattered yucca and a few forbs are also present. Some tallgrass species may be found in cracks and depressions of deeper soils. Distance between plants of little bluestem average four feet.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	280	404	504
Forb	22	56	56
Shrub/Vine	11	34	34
Microbiotic Crusts	–	6	6
Tree	–	–	1
Total	**313**	**500**	**601**

Figure 10. Plant community growth curve (percent production by month). TX2024, Tall/midgrasses with shrubs/forbs - gypsum soil. Warm season native tall and midgrasses with shrubs and forbs. Plant population affected by gypsum soils..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	3	5	28	28	12	5	10	5	2	1

Community 1.2
Midgrass/Shortgrass Community

Figure 11. Community 1.2

Sparse vegetative community of midgrass and shortgrasses along with forbs and cacti occurs on this site. Halfshrub sundrop, wright three-awn, and scattered grama species are dominant species in this community. Yucca is also increasing on this site. Large bare areas are developing as plant density on the site decreases. Lower annual production is due to higher gyp content in the soil profile.

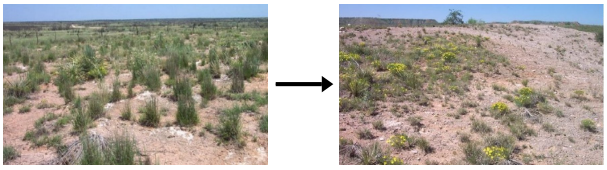
Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	84	135	168
Forb	28	34	45
Shrub/Vine	–	–	11
Tree	–	–	–
Microbiotic Crusts	–	–	–
Total	**112**	**169**	**224**

Figure 13. Plant community growth curve (percent production by month). TX2036, Sparse Community of Forbs and Grasses. Sparse community of forbs and grasses..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	3	5	28	28	12	5	10	5	2	1

Pathway 1.1A
Community 1.1 to 1.2

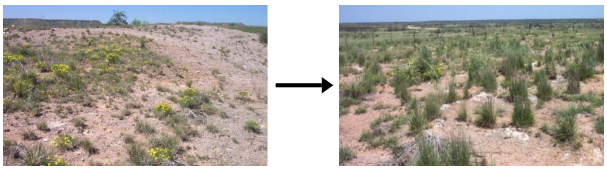


Tallgrass/Midgrass Community

Midgrass/Shortgrass Community

With abusive grazing practices and inadequate rest form grazing, the site may shift to community 1.2.

Pathway 1.2A
Community 1.2 to 1.1



Midgrass/Shortgrass Community

Tallgrass/Midgrass Community

With the implementation of a planned grazing system which includes growing season rest, the site may eventually shift back to community 1.1.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Tall/midgrasses**			213–392	
	little bluestem	SCSC	*Schizachyrium scoparium*	196–314	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	45–67	–
2	**Tallgrasses**			17–28	
	sand bluestem	ANHA	*Andropogon hallii*	6–17	–
	Indiangrass	SONU2	*Sorghastrum nutans*	6–17	–
3	**Midgrasses**			50–90	
	purple threeawn	ARPU9	*Aristida purpurea*	0–11	–
	black grama	BOER4	*Bouteloua eriopoda*	0–11	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–11	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	0–11	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	0–11	–
	Arizona cottontop	DICA8	*Digitaria californica*	0–11	–
	vine mesquite	PAOB	*Panicum obtusum*	0–11	–
	tobosagrass	PLMU3	*Pleuraphis mutica*	0–11	–
	Reverchon's bristlegrass	SERE3	*Setaria reverchonii*	0–11	–

	bristlegrass	SETAR	*Setaria*	0–11	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–11	–
	slim tridens	TRMUE	*Tridens muticus var. elongatus*	0–11	–
Forb					
4	**Forbs**			22–56	
	yellow sundrops	CASE12	*Calylophus serrulatus*	0–11	–
	lonely lily	ERAL	*Eremocrinum albomarginatum*	0–11	–
	longleaf buckwheat	ERLO5	*Eriogonum longifolium*	0–11	–
	Texas false broomweed	HAGRT	*Haploesthes greggii var. texana*	0–11	–
	hoary false goldenaster	HECA8	*Heterotheca canescens*	0–11	–
	dotted blazing star	LIPU	*Liatris punctata*	0–11	–
	plains blackfoot	MELE2	*Melampodium leucanthum*	0–11	–
	rock melicgrass	MEST	*Melica stricta*	0–11	–
	bigfruit evening primrose	OEMAM	*Oenothera macrocarpa ssp. macrocarpa*	0–11	–
	James' nailwort	PAJA	*Paronychia jamesii*	0–11	–
	gypsum phacelia	PHIN	*Phacelia integrifolia*	0–11	–
	green feathershank	SCDR	*Schoenocaulon drummondii*	0–11	–
	woodland germander	TESC	*Teucrium scorodonia*	0–11	–
	stiff greenthread	THFI	*Thelesperma filifolium*	0–11	–
	Rocky Mountain zinnia	ZIGR	*Zinnia grandiflora*	0–11	–
Shrub/Vine					
5	**Shrubs/Vines**			11–34	
	catclaw acacia	ACGR	*Acacia greggii*	0–6	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–6	–
	featherplume	DAFO	*Dalea formosa*	0–6	–
	jointfir	EPHED	*Ephedra*	0–6	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–6	–
	Berlandier's wolfberry	LYBE	*Lycium berlandieri*	0–6	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–6	–
	fragrant sumac	RHAR4	*Rhus aromatica*	0–6	–
	soapweed yucca	YUGL	*Yucca glauca*	0–6	–
	lotebush	ZIOB	*Ziziphus obtusifolia*	0–6	–
Tree					
6	**Trees**			0–11	
	Pinchot's juniper	JUPI	*Juniperus pinchotii*	0–11	–

Animal community

Small mammals, lizards, snakes, songbirds, scaled quail, and mule deer are present on this site. Lack of cover and composition of palatable plants limit animal usage on this site.

Hydrological functions

Contributes runoff to nearby drainages.

Recreational uses

Hunting, Camping, Hiking, Birdwatching, Photography, Horseback Riding.

Wood products

None.

Other products

None.

Other information

None.

Inventory data references

NRCS FOTG – Section II of the FOTG Range Site Descriptions and numerous historical accounts of vegetative conditions at the time of early settlement in the area were used in the development of this site description. Vegetative inventories were made at several site locations for support documentation.

NRCS FOTG – Section II - Range Site Descriptions
NRCS Clipping Data summaries over a 20 year period

Other references

J.R. Bell, RMS, NRCS, Amarillo, Texas (retired)
Natural Resources Conservation Service - Range Site Descriptions
USDA-Natural Resources Conservation Service - Soil Surveys & Website soil database
Rathjen, Frederick W., The Texas Panhandle Frontier, Rev. 1998, Univ. of Texas Press
Hatch, Brown and Ghandi, Vascular Plants of Texas (An Ecological Checklist)
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Approval

Bryan Christensen, 9/15/2023

Acknowledgments

Site Development and Testing Plan:

Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document.

Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

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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Contact for lead author	806-791-0581
Date	09/04/2007
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Slight to moderate.

2. **Presence of water flow patterns:** Slight to moderate.

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

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 50 to 70% bare ground.

5. **Number of gullies and erosion associated with gullies:** Slight to moderate.

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

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

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** The soil surface is very shallow, calcareous, well drained with loam to clay loam texture. Moderately rapid permeable due to high gypsum content. High erosion potential without adequate plant cover.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Very friable; common fine roots and pores; few fine concretions of calcium carbonates; moderately alkaline; abrupt boundary.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** A good grass cover is critical in the stability of this highly erosive site on steeper slopes.

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 tallgrasses >>

    Sub-dominant: Warm-season midgrasses > Warm-season shortgrasses =

    Other: Forbs = Shrubs/Vines > Trees

    Additional:

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

14. **Average percent litter cover (%) and depth (in):** Litter is dominantly herbaceous.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 300 to 500 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:** Redberry juniper can become invasive.

17. **Perennial plant reproductive capability:** All plant species should be capable of reproduction except during periods of prolonged drought conditions, heavy natural herbivory or intense wildfires.
