Ecological site R078BY079TX
Loamy
19-26" PZ

Last updated: 9/15/2023
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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.

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 on deep loam and clay loam soils on uplands. The reference vegetation consists of midgrasses with some shortgrasses and forbs. Few woody species persist in the reference plant community. Abusive grazing practices can lead to a shift in the plant community. Without periodic fire or alternative brush management, woody species may encroach on the site.

Associated sites

R078BY070TX	**Clayey Bottomland 19-26" PZ** Downhill from site.
R078BY080TX	**Loamy Bottomland 19-26" PZ** Downhill from site.
R078BY081TX	**Loamy Upland 19-26" PZ** Upslope and adjacent to the site.

Table 1. Dominant plant species

Tree	Not specified

Shrub	Not specified
Herbaceous	(1) *Bouteloua curtipendula* (2) *Bothriochloa barbinodis*

Physiographic features

These soils formed in loamy, calcareous eolian sediments and are on nearly level to moderately sloping plains adjacent to draws or escarpments. Slopes dominantly range from 3 to 5 percent slopes and generate runoff onto sites lower on the landscape. Elevation ranges from 1400 to 2870 feet.

Table 2. Representative physiographic features

Landforms	(1) Plains > Stream terrace (2) Plains > Hillslope
Runoff class	Low to medium
Flooding frequency	None
Ponding frequency	None
Elevation	430 – 880 m
Slope	0 – 10 %
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 uncomfortable. Most of the precipitation comes in the form of rain and occurs during 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 Nov. 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)	190-190 days

Freeze-free period (characteristic range)	200-220 days
Precipitation total (characteristic range)	580-610 mm
Frost-free period (actual range)	180-200 days
Freeze-free period (actual range)	200-220 days
Precipitation total (actual range)	560-640 mm
Frost-free period (average)	190 days
Freeze-free period (average)	210 days
Precipitation total (average)	580 mm

- (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

None.

Wetland description

NA

Soil features

Loamy soils consist of very deep, well-drained, moderately permeable soils. Parent material kind is calcareous loamy stream terraces and colluvial deposits. Parent material origin is shale and siltstone from the Blaine Formation of Permian age.

Associated soil series include Acme loam, Aspermont silty clay loam, and Snyder clay loam.

Table 4. Representative soil features

Parent material	(1) Colluvium – shale and siltstone
Surface texture	(1) Clay loam (2) Silty clay loam (3) Loam

Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	150 – 190 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	6.86 – 20.83 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 40 %
Electrical conductivity (0-101.6cm)	0 – 10 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	0 – 10 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

The reference plant community of the Loamy Ecological Site in MLRA 78B was a fire influenced Midgrass Prairie Community (1)1 with occasional woody plants and a good variety of forbs. Pre-settlement influences included grazing or browsing by endemic pronghorn antelope, deer and migratory bison, severe droughts and frequent fires. Wildfires occurred at 7-12 years intervals or less (Frost 1998)

maintaining woody species at less than five percent canopy on this level to rolling site. The frequent fires favor grasses over woody plants and forbs, but there are a wide variety of forbs present. Sideoats grama (Bouteloua curtipendula) is the dominant species throughout the MLRA contributing as much as 35 percent of the plant annual production. Other characteristic midgrasses found include little bluestem(Schizachyrium scoparium), cane bluestem(Bothriochloa barbinodis) and silver bluestem (Bothriochloa laguroides). Blue grama (Bouteloua gracilis) and buffalograss (Bouteloua dactyloides) are common shortgrasses. See the Plant Composition and Annual Production Table below for estimated composition of the species.

The Midgrass Prairie Community (1.1) is relatively stable and resilient within the climate, soil and fire regime until the advent of animal husbandry and fencing in the late 1800s. Not understanding the limits of rangeland productivity European settlers, and the ranchers that followed, overstocked the area with domesticated livestock almost universally. As overgrazing occurred on the Loamy site, there was a reduction of midgrasses, a decline in mulch and organic matter and consequently a reduction in intensity of fires. The shift in plant cover and decline in soil properties favored woody plant encroachment. The woody, and herbaceous, invaders were generally endemic species released from competition and fire suppression. In the resulting Midgrass/Shortgrass Community (1.2) the more palatable midgrasses gave way to less palatable or more grazing resistant midgrasses and shortgrasses. Midgrasses, especially sideoats grama, vegetation still dominated annual herbage production, but the encroaching woody species increased in the proportion of production compared to the Midgrass Prairie Community (1.1).

When the Midgrass/Shortgrass Community (1.2) is continually overgrazed and fire is excluded, ecological succession transitions the plant community into one that is dominated by woody plants. More grazing resistant grasses such as blue grama, buffalograss and less palatable forbs begin replacing the midgrasses. As the midgrass cover declines, litter, mulch and soil organic matter decline and bare ground, erosion and other desertification processes increase. The microclimate in the grassland areas becomes more arid. Increasing woody dominants are primarily mesquite, pricklypear and broom snakeweed. Rest from grazing will generally not restore the grassland community when the woody plant community exceeds 10 to 15 percent canopy on this site and/or the plants reach fire resistant age (two years) and/or size (about four feet in height). When this occurs, the site transitions into a new plant community: a Shortgrass/Mixed-Brush Community (2.1). This threshold also marks the beginning of a new state, the Shrubland State (2).

Pricklypear (Opuntia polycantha) and/or broom snakeweed (Gutierrezia sarothrae) and sometimes mesquite dominate the Shortgrass/Mixed-Brush Community (2.1). Mesquite (Prosopis glandulosa) is often limited by high calcareous soil conditions. The grass component is a mixture of low palatability midgrasses, shortgrasses and low quality forbs. With continued livestock overgrazing, the midgrasses are replaced by grazing resistant shortgrasses, such as buffalograss, sand dropseed (Sporobolus cryptandrus) and three-awns (Aristida spp.) and western ragweed (Ambrosia psilostachya). Sideoats grama often persists because of the high calcium content of the soils. Cool-season grasses such as Texas wintergrass (Nassella leucotricha) and Texas bluegrass (Poa arachnifera) also increase.

During this stage the process of retrogression can be reversed with relatively inexpensive brush control practices such as individual plant treatments and good grazing management that allows the application of prescribed burning. If these practices are not applied and overgrazing continues, the woody canopy will continue to increase in dominance and ground cover and a woody-plant dominated community, the Mixed–Brush/Shortgrass Community (2.2) occurs. Once the brush canopy exceeds 30 to 35 percent, annual production for the understory becomes limited and is generally made up of unpalatable shrubs, grasses and forbs within tree/shrub interspaces. Brushy species such as mesquite, prickly pear, yucca (Yucca spp.) and wolfberry (Lycium berlandieri) often form thickets. Shortgrasses, cool-season grasses and annual weeds persist, but in weakened condition.

Until maximum ground cover by woody species is reached erosion continues in the interspaces. Considerable litter and soil movement occurs from exposed soil during heavy rains. The exposed soil crusts readily, creating opportunity for further soil and wind erosion. The microclimate becomes drier as interception losses increase with canopy cover. Once canopy cover reaches potential, however, the hydrologic processes, energy flow and nutrient cycling stabilize under the shrubland environment.

Major, high cost and high energy, accelerating practices are required to restore the Mixed-Brush/Shortgrass Community (2.2) back to the Grassland State. Generally, mechanical or herbicidal brush management practices such as aerial spraying, dozing and/or individual plant treatments (IPT) along with other conservation practices such as range planting, grazing deferment, prescribed grazing and prescribed burning are necessary for the ecological site to return to the reference community.

The soils of the Loamy Ecological Site are deep loams that are calcareous to the surface. The soils have favorable plant-soil-moisture relationships and a high calcium content enabling the site to produce good quality forage plants. If unprotected by vegetation the soil is moderately susceptible to water and wind erosion. The site is moderately resistant to grazing and will maintain a turf under heavy grazing and responds readily to good grazing management.

The Loamy site is used primarily as rangeland. The soils on the flatter areas are arable, however these slopes occur only in small acreages as the site is often dissected by small drainages. The site is moderately erodible and should be cultivated with care, if at all. Most fields previously cultivated for crops have been returned to native or introduced grass species. Most areas of the Loamy site re-vegetated to these introduced grasses are managed as range.

NOTE: Rangeland Health Reference Worksheets have been posted for this site on the Texas NRCS website (www.tx.nrcs.usda.gov) in Section II of the eFOTG under (F) Ecological Site Descriptions.

Plant Communities and Transitional Pathways (diagram) Narrative:

The following diagram depicts the vegetation pathways and states that will most likely occur with heavy livestock grazing/browsing under the prevailing climate. There may be alternative trajectories or states, depending on various natural or man-influenced disturbances, which are not shown on this diagram. Local professional guidance should always be sought before pursuing a treatment scenario.

1 Numbers in parentheses identify plant community types produced by the Shallow ecological site and correspond with the vegetation states depicted in the State and Transitions Diagram below.
2 Scientific names for plants mentioned in the text can be found in the Plant Preference Tables.

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	**Midgrass**			532-846	
	sideoats grama	BOCU	*Bouteloua curtipendula*	532-846	–
2	**Tall/midgrasses**			151-242	
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	0-242	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	0-242	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0-242	–
3	**Midgrasses**			76-121	
	black grama	BOER4	*Bouteloua eriopoda*	0-121	–
	vine mesquite	PAOB	*Panicum obtusum*	0-121	–
	large-spike bristlegrass	SEMA5	*Setaria macrostachya*	0-121	–
4	**Shortgrasses**			454-729	
	blue grama	BOGR2	*Bouteloua gracilis*	303-482	–
	buffalograss	BODA2	*Bouteloua dactyloides*	151-247	–
5	**Mid/Shortgrasses**			76-121	
	threeawn	ARIST	*Aristida*	0-121	–
	hooded windmill grass	CHCU2	*Chloris cucullata*	0-121	–
	fall witchgrass	DICO6	*Digitaria cognata*	0-121	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	0-121	–
	Hall's panicgrass	PAHA	*Panicum hallii*	0-121	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0-121	–
6	**Cool-season grasses**			76-121	
	Texas wintergrass	NALE3	*Nassella leucotricha*	76-121	–
Forb					
7	**Forbs**			84-135	
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0-135	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0-135	–
	leather flower	CLEMA	*Clematis*	0-135	–
	prairie clover	DALEA	*Dalea*	0-135	–
	purple prairie clover	DAPU5	*Dalea purpurea*	0-135	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	0-135	–
	beeblossom	GAURA	*Gaura*	0-135	–
	hoary false goldenaster	HECA8	*Heterotheca canescens*	0-135	–
	trailing krameria	KRLA	*Krameria lanceolata*	0-135	–
	dotted blazing star	LIPU	*Liatris punctata*	0-135	–
	littleleaf sensitive-briar	MIMI22	*Mimosa microphylla*	0-135	–

	evening primrose	OENOT	*Oenothera*	0-135	–
	awnless bushsunflower	SICA7	*Simsia calva*	0-135	–
	globemallow	SPHAE	*Sphaeralcea*	0-135	–
	vervain	VERBE	*Verbena*	0-135	–
	Rocky Mountain zinnia	ZIGR	*Zinnia grandiflora*	0-135	–
Shrub/Vine					
8	**Shrubs/Vines**			84-135	
	acacia	ACACI	*Acacia*	0-135	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0-135	–
	prairie clover	DALEA	*Dalea*	0-135	–
	desert-thorn	LYCIU	*Lycium*	0-135	–
	littleleaf sumac	RHMI3	*Rhus microphylla*	0-135	–
	yucca	YUCCA	*Yucca*	0-135	–
Tree					
9	**Tree**			0-1	
	hackberry	CELTI	*Celtis*	0-1	–

Table 6. Community 1.2 plant community composition

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

Table 7. Community 2.1 plant community composition

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

Table 8. Community 2.2 plant community composition

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

Animal community

Many types of grassland insects, reptiles, birds and mammals used the Loamy Ecological Site, either as their base habitat or from the adjacent sites. Small mammals include many kinds of rodents, jackrabbit, cottontail rabbit, raccoon, skunk, opossum and armadillo. Predators include coyote, red fox, gray fox, bobcat and occasionally mountain lion. Game birds, songbirds, and birds of prey were indigenous or frequent users. Most are still plentiful. Bison and pronghorn antelope, however, are no longer present, but white-tailed deer and mule deer utilize the Loamy site in its various states. Deer, turkey and quail particularly favor the habitat provided by the Midgrass/Shortgrass (1.2) and Mixed-Brush/Shortgrass (2.1) plant communities. Deer, turkey, quail and dove hunting is an important sport, or commercial enterprise, providing considerable income to land owners. The site is very suited to primary grass eaters such as bison and cattle. As retrogression occurs, and woody plants invade, it becomes better habitat for sheep, goats, deer and other wildlife because of the browse and cool season grasses. Predators, however, may preclude sheep and goats. Livestock should be stocked in proportion to the available grass, forb and browse forage, keeping deer competition for forbs and browse in mind. If the animal numbers are not kept in balance with herbage and browse production through grazing management and good wildlife population management, the late Mixed-Brush/Shortgrass Community (2.2) will have little to offer as habitat except cover.

Hydrological functions

The Loamy Ecological Site is a moderately permeable Loamy upland with nearly level to gentle slopes. Runoff is negligible on 0 to 1 percent slopes, very low on 1 to 3 percent slopes, and low on 3 to 5 percent slopes. However, soil crusting can cause erosion from bare ground on steeper slopes if plant cover is removed. Under reference condition, the grassland vegetation intercepts and utilizes much of the incoming rainfall in the soil solum. Only during extended rains or heavy thunderstorms is there much runoff. Litter and soil movement was slight. Standing plant cover, duff and organic matter decrease and surface runoff increases as the Midgrass Prairie Community (1.1) transitions to the Midgrass/Shortgrass Community (1.2). These processes continue in the interstitial spaces in the Shortgrass/Mixed-Brush Community (2.1). Evaporation and interception losses are higher, resulting in less moisture reaching the soil. If overgrazing continues, the plant community deteriorates further and desertification processes continue. Biomass production is reduced relative to the reference and production shifts from primarily grasses to primarily woody plants. The deeper-rooted woody plants are able to extract water from greater depths than the short grasses, so less water will be available for down-slope movement. The woody plants compete for moisture with the remaining grasses and forbs further reducing production and ground cover in openings. Decreased litter and more bare ground allow erosion from soils in openings between shrubs. Once the Mixed-Brush/Shortgrass Community canopy surpasses 70

percent the hydrological and ecological processes, nutrient cycling and energy flow, stabilize within the woody plant canopy.

Recreational uses

The Loamy site occurs in narrow bands with Loamy Bottomland and Loamy Prairie sites. Together, these sites are well suited for many outdoor recreational uses including recreational hunting, hiking, camping, equestrian and bird watching. The Loamy site, along with adjacent uplands, provides diverse scenic beauty and many opportunities for recreation and hunting.

Wood products

None, except for firewood and fence posts.

Other products

Jams and jellies are made from many fruit bearing species. Seeds are harvested from many plants for commercial sale. Grasses and forbs are harvested by the dried-plant industry for sale in dried flower arrangements. Honeybees are utilized to harvest honey from the many flowering plants, such as mesquite.

Other information

None.

Inventory data references

The information in this document is based on observation of range sites over many years and knowledge of where well managed rangelands are found. It is also based on the review of data such as NRCS 417 data, old range inventories going back many years, and from range site descriptions prepared by NRCS specialists. Many historical accounts of pre-settlement times have been reviewed.

Other references

1. Archer S. 1994. Woody plant encroachment into southwestern grasslands and savannas: rates, patterns and proximate causes. In Ecological implications of livestock herbivory in the West, pp.13-68. Edited by M. Vavra, W. Laycock, R. Pieper, Society for Range Management Publication. , Denver, CO.
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Contributors

Dr. Joseph Schuster, Range & Wildlife Habitat Consultants, Bryan, TX
PES Edits by Tyson Morley, MLRA Soil Scientist, Altus, Oklahoma

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.

Author(s)/participant(s)	Stan Bradbury, Zone RMS, NRCS, Lubbock, Texas
Contact for lead author	806-791-0581
Date	09/04/2007
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** **None to slight.**

2. **Presence of water flow patterns:** **None to slight.**

3. **Number and height of erosional pedestals or terracettes:** **None to slight.**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** **20-25% bare ground.**

5. **Number of gullies and erosion associated with gullies:** **None to slight.**

6. **Extent of wind scoured, blowouts and/or depositional areas:** **None to slight.**

7. **Amount of litter movement (describe size and distance expected to travel):** None to slight.

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

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

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Basal cover and density with small interspaces should make rainfall impact minimal. This site has moderately permeable soil, runoff is medium to high depending on slope and available water holding capacity is medium.

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

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: Warm-season midgrasses >

    Sub-dominant: Warm-season shortgrasses >

    Other: Warm-season tallgrasses > Forbs = Shrubs/Vines

    Additional:

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

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1,500 to 2,400 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: Yucca, pricklypear and broom snakeweed can be invasive.

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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.**
