

Ecological site R078BY094TX

Clayey Breaks

Last updated: 9/15/2023
Accessed: 09/14/2026

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

This site occurs on shallow clay soils on steep slopes and escarpments. Badland areas are often intermingled with these sites. Production is low and highly variable depending on soil resources, slope, and aspect. Reference vegetation consists of shortgrasses with some midgrasses and forbs along with scattered shrubs. While grazing may not be associated with this site due to the slope, periodic fires have shaped the plant community. Without periodic fire, the woody species canopy may expand on the site.

Associated sites

R078BY090TX	Shallow Clay 19-26" PZ Similar clay soils but deeper and less slope.
R078BY092TX	Very Shallow Clay 19-26" PZ Same soils. Less slope. Tends to have more invading mesquite. More likely to have grazing impacts.

Similar sites

R078CY006OK	Clayey Breaks This is a very similar site in the northern portions of the rolling red plains.
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Table 1. Dominant plant species

Tree	(1) <i>Juniperus pinchotii</i>
Shrub	(1) <i>Dalea formosa</i> (2) <i>Rhus trilobata</i>
Herbaceous	(1) <i>Bouteloua hirsuta</i> (2) <i>Bouteloua curtipendula</i>

Physiographic features

These sites are located along clayey ridges and escarpments with slopes ranging from 12-40%. With slopes in this range, land use and management practices are quite limited when compared to adjacent sites.

Figure 1. R078BY094TX

Figure 2. R078BY094TX

Table 2. Representative physiographic features

Landforms	(1) Breaks > Hill (2) Breaks > Escarpment
Runoff class	Very high
Flooding frequency	None
Ponding frequency	None
Elevation	310 – 610 m
Slope	10 – 40 %
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 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)	170-190 days
Freeze-free period (characteristic range)	200-220 days
Precipitation total (characteristic range)	560-640 mm
Frost-free period (actual range)	170-200 days
Freeze-free period (actual range)	200-220 days
Precipitation total (actual range)	560-690 mm
Frost-free period (average)	190 days
Freeze-free period (average)	210 days
Precipitation total (average)	610 mm

- (1) ROBERT LEE [USC00417669], Robert Lee, TX
- (2) SHAMROCK 2 [USC00418236], Shamrock, TX
- (3) COPPER BREAKS SP [USC00411995], Quanah, TX
- (4) POST [USC00417206], Post, TX
- (5) ROSCOE [USC00417743], Roscoe, TX
- (6) CLARENDON [USW00023072], Clarendon, TX

Influencing water features

These sites are in an upland position of "Run-Off" hydrology. Water is shed from these sites on to to lower positions on the landscape.

Wetland description

NA

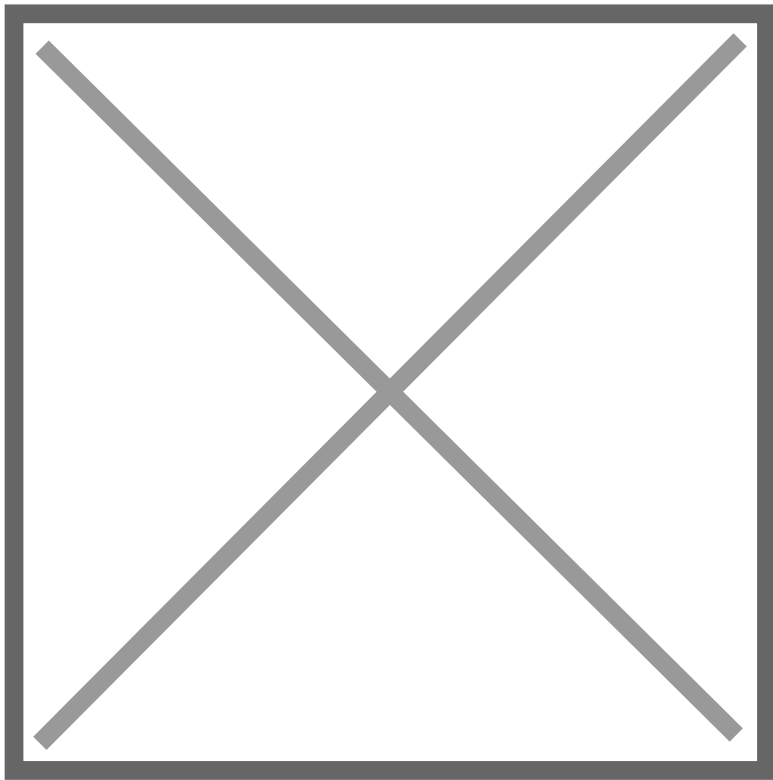


Figure 9. Hydrologic Cycle

Soil features

Soils are mapped for each county within the MLRA. Mapunits are representations of the major soil series component(s) and named accordingly. Each Mapunit is spatially represented on a digital soils map as polygons of different shapes and sizes. Within these Mapunits, there are often minor soil series components included. These minor components are soils that occur within a Mapunit polygon but are of small extent (15% or less of the Mapunit area). However, it is difficult to separate these minor soils spatially due to the scale of soil mapping.

Ecological sites are correlated at the component level of the soil survey. Therefore, a single Mapunit may contain multiple Ecological Sites just as it may contain multiple soil components. This is important to understand when investigating soils and Ecological Sites. A soil survey Mapunit may be correlated to a single Ecological Site based on the major component; however, there may be inclusional areas of additional Ecological Sites which are correlated to the minor components of that particular soil Mapunit.

The soils associated with this ecological site consist of very shallow and shallow, well drained, very slowly permeable soils that formed in residuum over dense non-cemented claystone bedrock of Permian age. These soils are on very steep ridges, sideslopes, on uplands. Slopes range from 12 to 40 percent.

Representative soil is Knoco.

Table 4. Representative soil features

Parent material	(1) Residuum – claystone
Surface texture	(1) Clay (2) Clay loam (3) Sandy clay
Family particle size	(1) Clayey

Drainage class	Well drained
Permeability class	Very slow
Soil depth	10 – 50 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	2.03 – 5.08 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 10 %
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)	0 – 10 %

Ecological dynamics

The vegetation within the reference state is a mixture of grasses, forbs, shrubs, and a few trees. The percent of bare ground can sometimes be fairly high in comparison to adjacent sites. Aspect, climate, soil depth, percent slope, and disturbance factors are all important determinants in the overall species composition and production of the plant community. This is especially true for a Clayey Breaks site. Generally the north and east facing exposures have a greater variety of plants present and slightly higher production due to slightly cooler and wetter conditions. Forage production is generally less than sites with deeper soil resources. Accessibility is limited due to steep slopes.

Midgrass, tallgrass, and shortgrass species are found on the site along with several species of forbs and shrubs. Little bluestem (*Schizachyrium scoparium*) and sideoats grama (*Bouteloua curtipendula*) are often the most common grasses; however, other grasses such as hairy grama (*Bouteloua hirsuta*), blue grama (*Bouteloua gracilis*), and perennial three-awn (*Aristida purpurea*) are also found on the shallower areas. Big bluestem (*Andropogon gerardii*), Indiangrass (*Sorghastrum nutans*), and dropseed species (*Sporobolus* spp.) are usually found in crevices and deeper soil areas. Common shrubs are feather dalea (*Dalea* spp.), skunkbush sumac (*Rhus trilobata*), and redberry juniper (*Juniperus pinchotii*). Areas occur within the site where the shrubs may be quite prominent and make up a fairly large percent of the total biomass; and there will be areas where grasses and forbs dominate. This site is not a preferred grazing area for most domestic livestock due to accessibility (steep slopes) and shallow soils. Therefore, this site is seldom heavily grazed. Browsing wildlife species such as white tailed deer frequent this site because of the good variety of forbs and shrubs providing food and cover in the canyons. A considerable amount of geologic erosion usually takes place on this site; therefore, any amount of native plant cover that can be supported is desirable. Both natural and anthropogenic fire played a role in the ecology of this site as is true for most Central Rolling Red Plains sites. The general effects of these fires were woody plant suppression and increased vigor of herbaceous plants. However, some of the steeper slopes and canyon walls escaped fire altogether. In general, the rocky soils and steep terrain of this site have much more influence on the plant community than does any external ecological influence. The sparse vegetation and lower production affects fine fuel continuity, and the heat generated by natural fire may have limited the degree of damage to woody plants. It is important to note that it might take this site longer to recover from a burn than most associated sites due to sparse plant density and droughty soils. Since the site is not normally heavily grazed, the overall ecological condition will not be affected as much due to animal use. There are places where on the most accessible part of the site, there is evidence of grazing by cattle. The grazing tends to be somewhat seasonal and for shorter duration than more productive less sloping terrain. However, if the site were grazed by goats instead of cattle, then overgrazing and browsing could be more of a potential problem. Most species of deer utilize the site readily, but in most places , deer populations are not dense enough to place a lot of pressure on primary browse. In most cases, this site is more important for wildlife habitat than for livestock grazing.

A State and Transition Diagram for the Clayey Breaks site is depicted below. Descriptions of each state, transition, and pathway follow the model. Experts base this model on available experimental research, field observations, professional consensus, and interpretations. It is likely to change as knowledge increases.

Plant communities will differ across the MLRA because of the natural variability in weather, soils, and aspect. The Reference State may not always be the management goal. The biological processes on this site are complex. Therefore, representative values are presented in a land management context. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every situation or the full range of conditions, species, and responses for the site.

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 (%)
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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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Animal community

The Clayey Breaks site is used by deer for cover and browsing. Small mammals and predators also frequent the site. Many species of songbirds utilize this site. Cattle seasonally graze the more accessible parts of this site, but because of slope, they graze Clayey Break areas less frequently than associated sites.

Hydrological functions

Runoff is rapid from this site due to little infiltration and steep slopes. Runoff eventually reaches the drainages below. As the site transitions to the shrub dominated state, the will be more water losses to canopy interception/evaporation.

Inventory data references

NRCS FOTG-Section II of the FOTG Range Site Descriptions, NRI data and numerous historical accounts of vegetative conditions at the time of early settlement in the area were used in the developement of this site description.

Other references

USDA, Natural Resources Conservation Service Range Site Descriptions

USDA, Natural Resources Conservation Service Soil Survey Reports

Contributors

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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.

Author(s)/participant(s)	
Contact for lead author	
Date	09/14/2026
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. Number and extent of rills:

2. Presence of water flow patterns:

3. Number and height of erosional pedestals or terracettes:

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

5. Number of gullies and erosion associated with gullies:

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

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

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

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

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

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

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

Dominant:

Sub-dominant:

Other:

Additional:

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

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

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

16. Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:

17. Perennial plant reproductive capability:
