Ecological site R080BY143TX
Bouldery Hill
26-33

Last updated: 9/19/2023
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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): 080B–Texas North-Central Prairies

MLRA 80B consists of gently rolling, dissected plains with very steep hillsides and sideslopes and narrow flood plains associated with small streams. Loamy and clayey soils range from very shallow to deep and developed in sandstones, shales, and limestones of Pennsylvanian age.

Classification relationships

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

Ecological site concept

These sites occur on shallow soils with a high amount of surface boulders and stones. The reference vegetation includes a mosaic of mid and tallgrasses and oak trees and other woody shrubs and vines. Without periodic fire or brush management, woody canopy cover will increase and lead to a significant shift in the plant community. Production is often limited by the shallow soil resources and large amount of surface rock.

Associated sites

R080BY157TX	**Sandstone Hill 26-33" PZ** Savannah site with fewer boulders and more herbaceous vegetation.

Similar sites

R080BY157TX	**Sandstone Hill 26-33" PZ** Savannah site with fewer boulders and more herbaceous vegetation.

Table 1. Dominant plant species

Tree	(1) *Quercus stellata* (2) *Quercus marilandica*
Shrub	Not specified

Herbaceous	(1) *Schizachyrium scoparium* (2) *Bouteloua curtipendula*

Physiographic features

This site occurs on moderately steep to very steep side slopes of hillslopes and ridges in the Texas North-Central Prairies. This site is characteristically a water shedding site. Slopes range up to 50 percent but are typically 20 to 40 percent.

Table 2. Representative physiographic features

Landforms	(1) Hills > Hillslope (2) Hills > Ridge
Runoff class	High to very high
Elevation	230 – 730 m
Slope	20 – 40 %

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Elevation	Not specified
Slope	10 – 50 %

Climatic features

The climate is subtropical subhumid and is characterized by hot humid summers and relatively mild winters. Tropical maritime air controls the climate during spring, summer and fall. In winter and early spring, frequent surges of polar Canadian air cause sudden drops in temperatures and add considerable variety to the daily weather. The average first frost generally occurs about November 5 and the last freeze of the season usually occurs about March 19. The average frost free period ranges from 215 days in the northern counties, to 240 days in the south.

The average relative humidity in mid-afternoon is about 60 percent in the summer months. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 75 percent of the time possible during the summer and 50 percent in winter. The prevailing wind direction is from the southwest and highest windspeeds occur during the spring months.

Approximately 75% of annual rainfall occurs between April 1 and October 31. Rainfall during the months of April through September typically occurs during thunderstorms which tend to be intense and brief, resulting in large amounts of rain in a short time. The wettest months of the year are May, June, September, and October. The driest months during the growing season are July and August. The winter months of November, December, January, and February are the driest months overall.

Average annual precipitation for the entire MLRA is approximately 28 inches. There is a noticeable difference in the average annual precipitation in the northern counties in comparison to the southern and western counties of this Major Land Resource Area. Jack, Clay, Young, and Palo Pinto Counties all have an average annual precipitation of more than 31 inches. Stephens, Eastland, McCulloch, and San Saba Counties all have an average annual precipitation of less than 28 inches.

Winters tend to be mild, with occasional periods of very cold temperatures which can be accompanied by strong northerly winds and freezing precipitation. Snow is infrequent and significant accumulations are rare. These periods of very cold weather are generally short-lived. Summers tend to be hot and dry. Drought conditions are common during most summers. Air temperatures of more than 95oF are

common from mid-June through September. In the northern counties nearest to the Red River, temperatures are generally slightly cooler during winter months and slightly warmer during summer months than in the other counties in the North Central Prairie.

Table 4 Representative climatic features

Frost-free period (characteristic range)	190-200 days
Freeze-free period (characteristic range)	210-220 days
Precipitation total (characteristic range)	760-840 mm
Frost-free period (actual range)	180-200 days
Freeze-free period (actual range)	210-230 days
Precipitation total (actual range)	740-860 mm
Frost-free period (average)	190 days
Freeze-free period (average)	220 days
Precipitation total (average)	810 mm

- (1) BOWIE [USC00410984], Bowie, TX
- (2) JACKSBORO [USC00414517], Jacksboro, TX
- (3) GRAHAM [USC00413668], Graham, TX
- (4) BRECKENRIDGE [USC00411042], Breckenridge, TX
- (5) MINERAL WELLS AP [USW00093985], Millsap, TX
- (6) EASTLAND [USC00412715], Eastland, TX
- (7) BROWNWOOD 2ENE [USC00411138], Early, TX

Influencing water features

These sites are in water shedding upland positions with a high amount of surface rock. Therefore, a high amount of runoff can be expected. The presence of adequate ground cover and deep-rooted tallgrass species can help facilitate water infiltration into the soil profile. They are not associated with wetlands.

Wetland description

NA

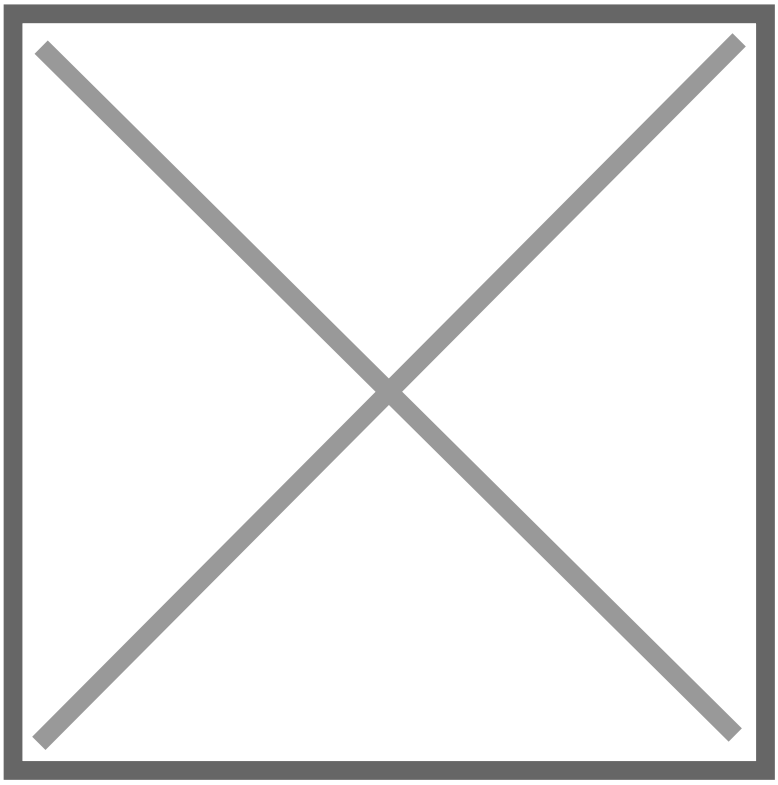

Figure 7.

Soil features

Representative soil components for this ecological site include: Shatruce

The site is characterized by moderately deep to conglomerate bedrock, rubbly to very rubbly, well drained soils.

Table 5. Representative soil features

Parent material	(1) Residuum – claystone (2) Residuum – conglomerate (3) Colluvium – claystone (4) Colluvium – conglomerate
Surface texture	(1) Gravelly sandy loam
Drainage class	Well drained
Permeability class	Very slow
Soil depth	50 – 100 cm
Surface fragment cover <=3"	0 – 20 %

Surface fragment cover >3"	20 – 70 %
Available water capacity (0-101.6cm)	10.16 – 15.24 cm
Electrical conductivity (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	4.5 – 7.3
Subsurface fragment volume <=3" (0-101.6cm)	0 – 50 %
Subsurface fragment volume >3" (0-101.6cm)	0 – 10 %

Ecological dynamics

Like many sites across the Great Plains, changes in disturbance initiated by permanent settlements has had a profound impact on the ecological dynamics of the ecological sites. Historically, the site was influenced by periodic fires during all seasons of growth. These fires were often the result of dry lightning strikes and/or anthropogenic fires set by Native Americans. The fire frequency during the period prior to settlement is estimated between 2-5 years for the southern Great Plains. These particular sites were rarely subject to the effects of grazing unlike the adjacent sites due to the steep, bouldery terrain.

With the removal of fire and the introduction of conventional livestock fencing, the landscape began to change to more homogenous vegetation patterns and altered plant communities. Gently sloping sites were often broken out for crop production also. This led to a highly fragmented, highly disturbed landscape we see today across much of the southern Great Plains.

While parts of the MLRA are still intact prairie, they often lack the evolutionary fire and grazing interactions that help shape the historic reference plant communities. Without these periodic fires, many sites have transitioned to a woody dominated state.

State and Transitional Pathways:
The following diagram suggests some pathways that vegetation on the ecological site might take in response to various treatments or natural stimuli over time. There may be other states that are not shown on this diagram. This information identifies the changes in plant communities that do occur due to management practices and natural factors. The plant communities described here are commonly observed on this ecological site. The local NRCS field office has information available to assist with planning and development of the plant community for specific purposes.

Changes in plant community makeup may be due to many factors. Change may occur slowly or in some cases, fairly rapidly. As vegetative changes occur, certain thresholds are crossed. A threshold means that once a certain point is reached during the transition of one community to another, a return to the previous state may not be possible without the input of some form of energy. This often means intervention with practices that are not part of natural processes. An example might be the application of herbicide to control some woody species to reduce their population and encourage more grass and forbs growth. Merely adjusting grazing practices would probably not accomplish any significant change in a plant community once certain thresholds are crossed. The amount of energy required to effect change in community would depend on the present vegetative state and the desired change.

State and transition model

Additional community tables

Animal community

Due to the rough terrain, wildlife species are the dominant grazers and browsers of the site. Various songbirds and small mammals may also find use of these areas. As the site changes towards the woody dominated community, the quality of the habitat may improve for some species and decline for others. Management must be applied to maintain a vegetative state in optimum habitat quality for the desired animal species.

Hydrological functions

These sites occur on uplands and shed water to adjacent sites lower on the landscape. With a high amount of surface rock, significant runoff may be expected. The presence of deep rooted tallgrasses can help facilitate percolation of water into the soil profile.

Recreational uses

NA

Wood products

NA

Other products

NA

Other information

NA

Inventory data references

Soil Survey Manuscript Young County, TX Soil Survey Manuscript Jack County, TX

References

. 2021 (Date accessed). **USDA PLANTS Database**. http://plants.usda.gov.

Fuhlendorf, S.D., D.M. Engle, J. Kerby, and R. Hamilton. 2009. **Pyric Herbivory: Rewilding Landscapes through the Recoupling of Fire and Grazing**. Conservation Biology 23:588–598.

Other references

These site descriptions were developed as part a Provisional ESD project using historic soil survey manuscripts, available range site descriptions, and low intensity field traverse sampling.

Contributors

Updates to legacy drafts by Colin Walden, Soil Survey Region 9

Approval

Bryan Christensen, 9/19/2023

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,

and 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	07/02/2026
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):**

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

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

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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):**

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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:

    Sub-dominant:

    Other:

    Additional:

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

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

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

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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:**

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17. **Perennial plant reproductive capability:**
