

Ecological site R082BY056OK Loamy

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): 082B–Wichita Mountains

This area is entirely in southwestern Oklahoma. It makes up about 1,060 square miles. The towns of Granite, Snyder, Medicine Park, and Meers are in this MLRA. U.S. Highways 62 and 183 intersect in the area, and Interstate 44 crosses the far eastern end. Quartz Mountain State Park, the Wichita Mountains Wildlife Refuge, and the Fort Sill Military Reservation are in this area.

The surface geology of this MLRA is dominated by intrusive igneous rocks (primarily granite) of Precambrian age with associated limestone, sandstone, dolomite, chert, and shale of Cambrian age. This area is underlain by both igneous and sedimentary rocks in a structurally complex setting. Igneous rocks primarily include granite, rhyolite, gabbro, and anorthosite of Precambrian age. Sedimentary rocks include limestone, sandstone, dolomite, and chert. A large outcrop known as the "Limestone Hills" is part of this unit. The Meers Fault is a prominent geologic feature in this area.

LRU notes

NA

Classification relationships

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

This area is included in EPA Level IV Ecoregion 27k "Wichita Mountains".

Ecological site concept

The Loamy ecological site occurs on loam and clay loam soils derived from granitic outwash on terraces and alluvial fans. The soils are deep and more productive than most other sites in the MLRA due to the deep loam soils and run on hydrology. The vegetation consists of warm-season tallgrasses and forbs with few woody species.

Similar sites

R080AY056OK	Loamy Upland This is a Loamy Upland just east of MLRA 082B.
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Table 1. Dominant plant species

Tree	(1) <i>Quercus stellata</i>
Shrub	Not specified

Physiographic features

The Loamy ecological site occurs on paleoterraces on alluvial plains. Slopes range from 0 to 8 percent.

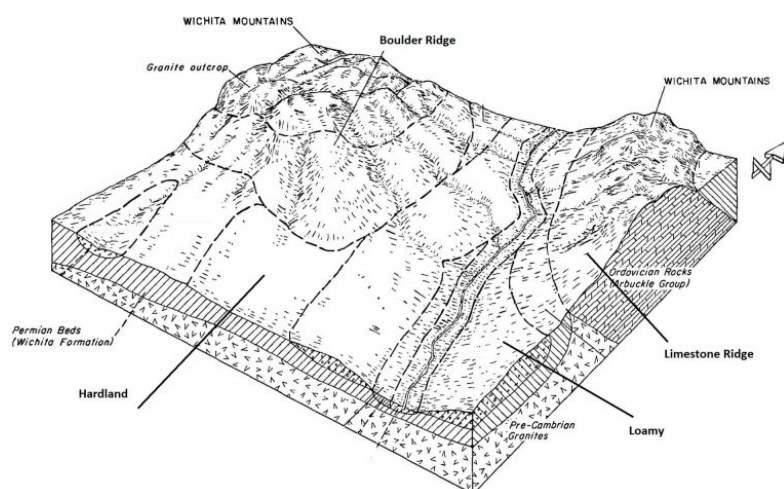


Figure 1.

Table 2. Representative physiographic features

Landforms	(1) Alluvial plain > Paleoterrace
Runoff class	Low to high
Elevation	1,000–2,000 ft
Slope	0–8%
Aspect	Aspect is not a significant factor

Climatic features

The climate is characterized by hot, often dry summers; mild autumns; mild to cold winters; and moist cool springs. There can be a wide fluctuation in annual and seasonal rainfall. Extremes in precipitation can range from as low as 10 inches to as high as 45 inches annually. Drought cycles occur at unpredictable intervals, range in duration from 3 to 5 years and occasionally last longer than 5 years. Approximately 75 percent of the total annual rainfall occurs during April to September.

Table 3. Representative climatic features

Frost-free period (characteristic range)	167-186 days
Freeze-free period (characteristic range)	185-230 days
Precipitation total (characteristic range)	31-34 in
Frost-free period (actual range)	158-189 days
Freeze-free period (actual range)	185-230 days
Precipitation total (actual range)	30-35 in
Frost-free period (average)	176 days
Freeze-free period (average)	200 days
Precipitation total (average)	33 in

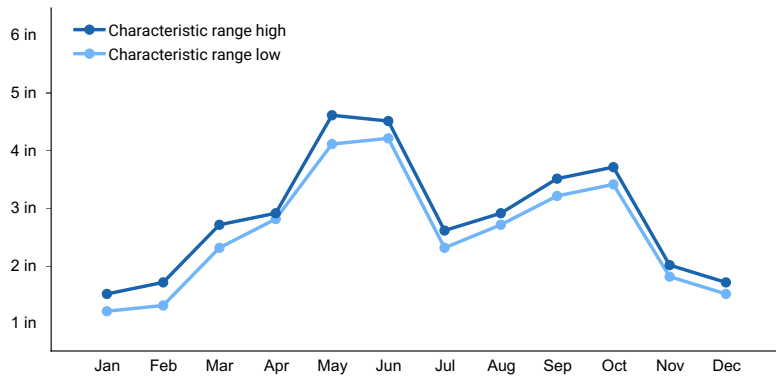


Figure 2. Monthly precipitation range

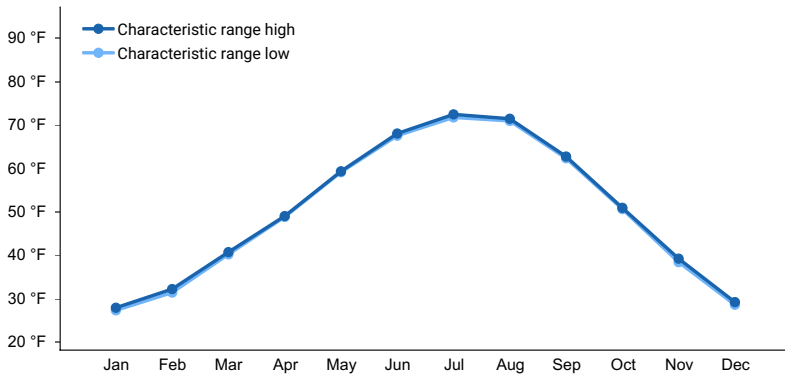


Figure 3. Monthly minimum temperature range

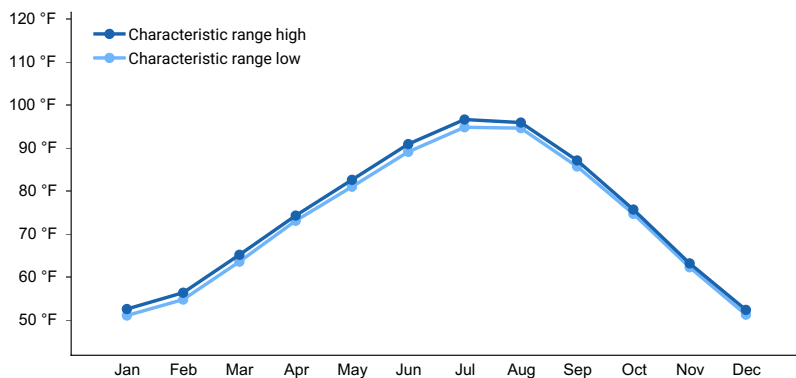


Figure 4. Monthly maximum temperature range

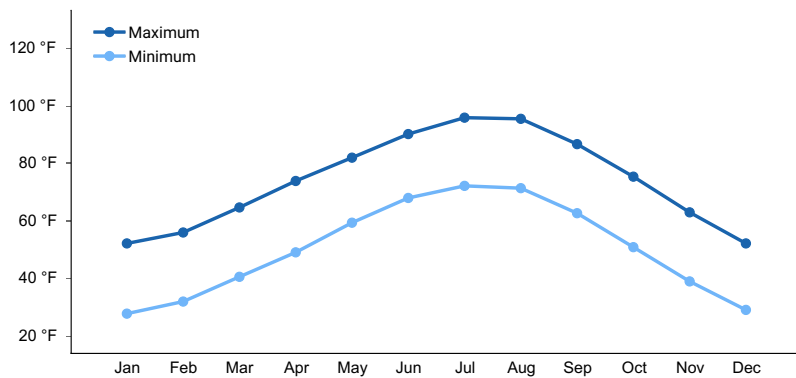


Figure 5. Monthly average minimum and maximum temperature

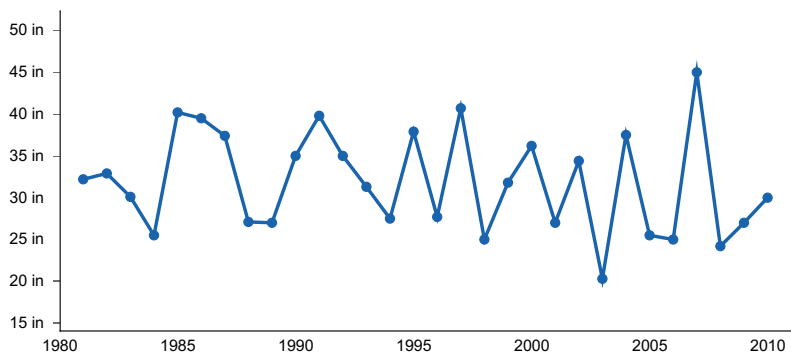


Figure 6. Annual precipitation pattern

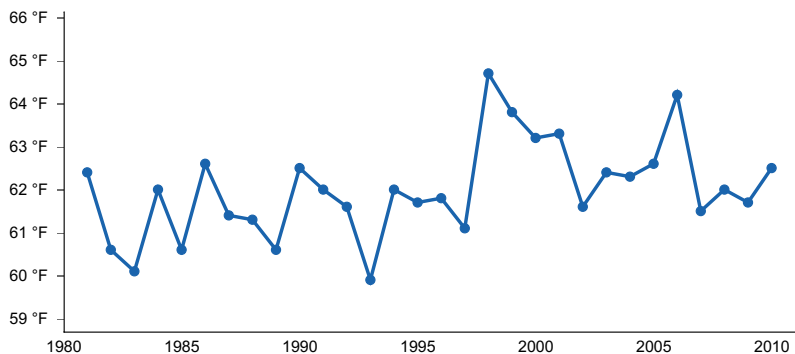


Figure 7. Annual average temperature pattern

Climate stations used

- (1) WICHITA MTN WR [USC00349629], N Central Comanche Cnty, OK
- (2) LAWTON MUNI AP [USW00003950], Lawton, OK
- (3) LAWTON [USC00345063], Lawton, OK
- (4) ALTUS DAM [USC00340184], Lone Wolf, OK

Influencing water features

The Loamy ecological site is an upland site, and not associated with any wetland or riparian system.

Wetland description

NA

Figure 7-1 The hydrologic cycle with factors that affect hydrologic processes

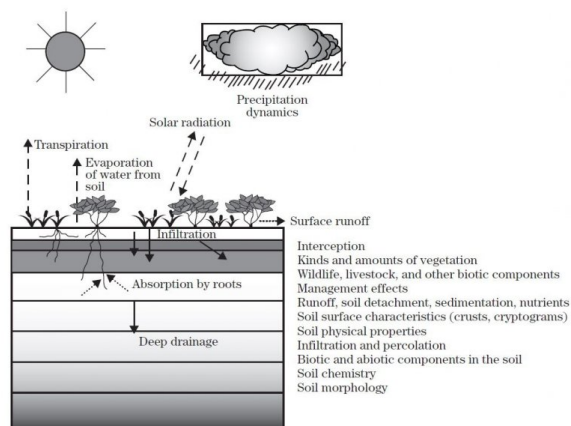


Figure 8.

Soil features

Soils on the Loamy ecological site are very deep, well drained soils that formed in loamy material weathered from old alluvium from granitic material and associated mixed rocks. Textures range from loam to clay loam. They are mollisols with argillic horizons and contain more than 35 percent clay in the control section.

Taxonomic Class: Fine, mixed, superactive, thermic Typic Argiustolls Representative Soil: Lawton soil series

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 percent 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.

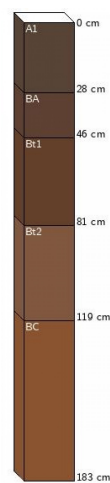


Figure 9.

Table 4. Representative soil features

Parent material	(1) Alluvium–granite
Surface texture	(1) Loam
Drainage class	Well drained
Permeability class	Moderately slow
Soil depth	62–80 in
Surface fragment cover <=3"	0–2%
Surface fragment cover >3"	0–2%
Available water capacity (0-40in)	5.4–8.2 in
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–6
Soil reaction (1:1 water) (0-40in)	6.1–8.4

Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0–2%

Ecological dynamics

The Loamy ecological site supports primarily warm-season tallgrasses, forbs, and few woody species. The soils are deep and have good moisture holding capacity and also good infiltration due to the variety of roots and ground cover provided by the grasses and forbs.

These grasslands evolved through periods of grazing, drought, and fire. The dominant species are adapted to all of these drivers. The plant communities on the site are dynamic and may fluctuate from year to year in both production and species composition.

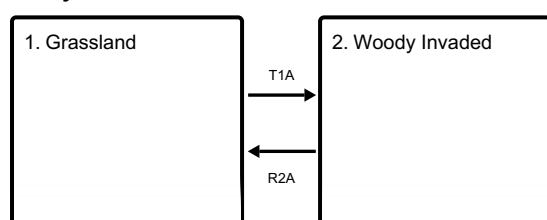
Time since fire is an important predictor of woody species abundance. While many of the woody species are capable of surviving and re-sprouting post-fire, periodic burning keeps them as a minor component of the community. Historic estimates place the fire return interval from 2 to 5 years in this region. Unlike adjacent sites, the Loamy ecological site does not have an abundance of large rock outcrops that protect vegetation from fires. Increases in woody species, mainly juniper and mesquite, have been noted in areas that have not been subjected to fire for many years.

While the plants on the site are adapted to periodic grazing, prolonged abusive grazing practices can lead to a shift in species composition. Palatable species are grazed heavier and non-palatable species are able to out-compete them for resources. If shortgrasses and/or bare ground increase, there may be an increased risk of precipitation runoff and decreased infiltration.

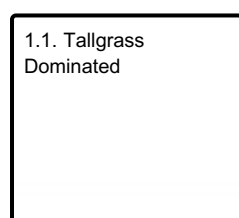
Drought can also have an impact on species composition, productivity, and vigor. Long-term drought, when coupled with abusive grazing, can exacerbate the decline of range health on the site.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1 Grassland

The Grassland State represents the range in variability under natural disturbances such as periodic grazing, fire, and drought. The dominant plant species are warm-season grasses with some forbs and few woody species.

Characteristics and indicators. The reference state is dominated by warm-season tallgrass species. Numerous forbs are present, and woody species canopy is less than 10 percent.

Resilience management. With periodic fire or alternative brush management, the Grassland State can be

maintained. Without these drivers, woody species will increase and may begin to dominate ecological functions.

Community 1.1
Tallgrass Dominated



Community phase 1.1 is an open tallgrass prairie dominated by little bluestem, big bluestem, sand bluestem, Indiangrass, and switchgrass. The major midgrasses and shortgrasses are sideoats grama, blue grama, meadow dropseed, and Scribner's panicum. This site also supports a variety of forbs and legumes including catclaw, sensitive-briar, leadplant, wild indigo, heath aster, Englemann's daisy, Maximillian sunflower, ashy sunflower, dotted gayfeather, western ragweed, Louisiana sagewort, Illinois bundleflower, pitcher sage, and others. The main lower successional species is prairie threeawn. Scattered mesquite, pricklypear cactus, and soapweed yucca may be found on this site. This plant community has evolved through the collective influence of extremes in temperature, rain, wind, drought, fire, and seasonal herbivory by large ungulates, primarily bison. Abusive grazing practices may decrease grasses such as big bluestem, sand bluestem, Indiangrass, and switchgrass as well as palatable forbs and legumes. Under this scenario, little bluestem, silver bluestem, mesquite, prairie threeawn, other annual and perennial grasses, and forbs may increase. An increased expression of woody plants such as, skunkbush, hackberry, and coralberry may appear in the absence of fire. The rate at which this occurs is dependent upon fire frequency, fuel load, and climatic patterns. Juniper invasion is a serious concern. Mesquite may be found in the southern portions of this ecological site.

Resilience management. Periodic fire is essential to maintain this community. The absence of grazing, the absence of fire, or both will result in litter buildup and some stagnation of ecological functions.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	2250	4275	5400
Forb	175	383	420
Shrub/Vine	50	95	120
Tree	25	47	60
Total	2500	4800	6000

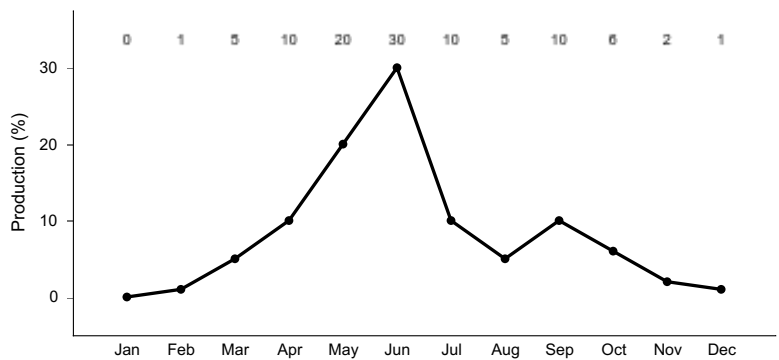


Figure 11. Plant community growth curve (percent production by month). OK0001, Native, Warm Season Grasses. Typically, the summer growing season for warm season grasses begins April 5 to 15 and ends October 15 to 25. Nearly three-fourths of the season production will occur before the first of July. This varies from year to year depending upon temperatures and precipitation..

State 2 Woody Invaded

The Woody Invaded State occurs when ecological processes such as hydrologic flow, energy flow, and nutrient cycling are controlled by woody species.

Characteristics and indicators. Woody species canopy is higher than 30 percent. Herbaceous community persists in the interspaces but may rapidly decline if grazing pressure remains heavy for long periods.

Resilience management. Depending on the infestation levels, some mechanical and/or chemical treatment may be necessary, along with burning to control woody species. Without any management, the Woody Invaded State can remain relatively stable for long periods depending on the frequency and intensity of wildfires.

Transition T1A State 1 to 2

Without periodic fire or alternative brush management, woody species may increase in abundance and canopy. This process can lead to mesophication and altering of the hydrology, nutrients, and energy flow of the site. Abusive grazing can also impact this process by limiting fuel loads that impact the effectiveness of fires.

Constraints to recovery. Recovery will depend highly on woody infestation levels and the vigor of remaining herbaceous vegetation.

Restoration pathway R2A State 2 to 1

With the implementation of a brush management strategy and prescribed burning, the woody invaded state may be restored back to a grassland state. Once the woody species are controlled, the energy and nutrient cycling maybe begin to be driven by the herbaceous community once again.

Context dependence. Treatment and restoration methods are highly dependent upon the species present(juniper vs mesquite) and the degree of infestation.

Conservation practices

Brush Management
Prescribed Burning

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1				2165–5310	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	636–1560	–
	Indiangrass	SORGH	<i>Sorghastrum</i>	636–1560	–
	big bluestem	ANGE	<i>Andropogon gerardii</i>	504–1235	–
	sand bluestem	ANHA	<i>Andropogon hallii</i>	504–1235	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	371–910	–
	eastern gamagrass	TRDA3	<i>Tripsacum dactyloides</i>	19–46	–
2				24–59	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	24–59	–
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	24–59	–
	vine mesquite	PAOB	<i>Panicum obtusum</i>	24–59	–
3				27–65	
	Scribner's rosette grass	DIOLS	<i>Dichanthelium oligosanthos</i> var. <i>scribnerianum</i>	27–65	–
	rough dropseed	SPCL	<i>Sporobolus clandestinus</i>	27–65	–
4				50–124	
	prairie threeawn	AROL	<i>Aristida oligantha</i>	50–124	–
	silver bluestem	BOSA	<i>Bothriochloa saccharoides</i>	50–124	–
Forb					
5				27–65	
	leadplant	AMCA6	<i>Amorpha canescens</i>	27–65	–
	white wild indigo	BAAL	<i>Baptisia alba</i>	27–65	–
	Illinois bundleflower	DEIL	<i>Desmanthus illinoensis</i>	27–65	–
	littleleaf sensitive-briar	MIMI22	<i>Mimosa microphylla</i>	27–65	–
6				74–182	
	common yarrow	ACMI2	<i>Achillea millefolium</i>	74–182	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	74–182	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	74–182	–
	Engelmann's daisy	ENPE4	<i>Engelmannia peristenia</i>	74–182	–
	Maximilian sunflower	HEMA2	<i>Helianthus maximiliani</i>	74–182	–
	ashy sunflower	HEMO2	<i>Helianthus mollis</i>	74–182	–
	whitest evening primrose	OEAL	<i>Oenothera albicaulis</i>	74–182	–
	azure blue sage	SAAZ	<i>Salvia azurea</i>	74–182	–
	white heath aster	SYER	<i>Symphotrichum ericoides</i>	74–182	–
Shrub/Vine					
7				50–124	
	pricklypear	OPUNT	<i>Opuntia</i>	50–124	–
	Chickasaw plum	PRAN3	<i>Prunus angustifolia</i>	50–124	–
	smooth sumac	RHGL	<i>Rhus glabra</i>	50–124	–
	coralberry	SYOR	<i>Symphoricarpos orbiculatus</i>	50–124	–
	soapweed yucca	YUGL	<i>Yucca glauca</i>	50–124	–

Tree				
8				27–65
	honey mesquite	PRGL2	<i>Prosopis glandulosa</i>	27–65
				–

Animal community

The Loamy ecological site supports a vast array of animals and birds. Many species are protected in their native habitat by the Wichita Mountains National Wildlife Refuge operated by the U.S. Fish and Wildlife Service. Over 50 mammal, 240 bird, 64 reptile and amphibian, 36 fish, and 806 plant species are protected within the park's borders, making it one of the most diverse wildlife refuges in the country. Herds of bison, deer, and elk roam through the park. Prairie-dog towns are also present. Thirteen separate lakes are managed by the Refuge, including Lakes Elmer Thomas, French, Jed Johnson, Lawtonka, Quahnah Parker, Rush, and more. Fish include large and smallmouth bass, sunfish, crappie, and channel catfish.

Hydrological functions

NA

Recreational uses

Camping, fishing, hunting, hiking, bird watching, are just a few of the many recreational activities offered in this ecological site.

Wood products

There are no significant wood products from this site other than firewood and fence posts.

Other products

None

Other information

None

Inventory data references

Draft ESDs, Oklahoma NRCS.
 Historic Range Site Descriptions, Oklahoma NRCS.
 Inventory Project, dated 1988, Oklahoma NRCS.
 Soil Survey Manuscripts, Comanche and Kiowa Counties, Oklahoma.
 Yields are estimates based on very limited clipping data.

Type locality

Location 1: Comanche County, OK	
Township/Range/Section	T1S R13W S20
Latitude	34° 27' 14"
Longitude	98° 35' 31"
General legal description	1,600 feet north and 100 feet east of southwest corner of sec. 20, T. 1 S., R. 13 W

Other references

Buck, Paul. 1964. Relationships of the woody vegetation of the Wichita Mountains Wildlife Refuge to geological formations and soil types. Ecology 45: 336-344.

Crockett, Jerry J. 1964. Influence of soils and parent materials on grasslands of the Wichita Mountains Wildlife Refuge, Oklahoma. Ecology 45: 326-335.

Contributors

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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, along with 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.

This site description, along with others in the MLRA 82B, is the product of the Provisional Ecological Site Description initiative from 2015 to 2020. The sites were described with limited field work and rely heavily on historical reports and documentation due to the scope of the initiative, time constraints, and staffing shortages. This ecological site will be further researched, sampled, and documented throughout the course of a Digital Soil Mapping update project commencing by the Altus Soil Survey Office staff.

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	05/01/2024
Approved by	Bryan Christensen
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:**
