

# Ecological site R080AY011OK Claypan Upland (South)

Last updated: 9/19/2023  
Accessed: 05/02/2024

## 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.

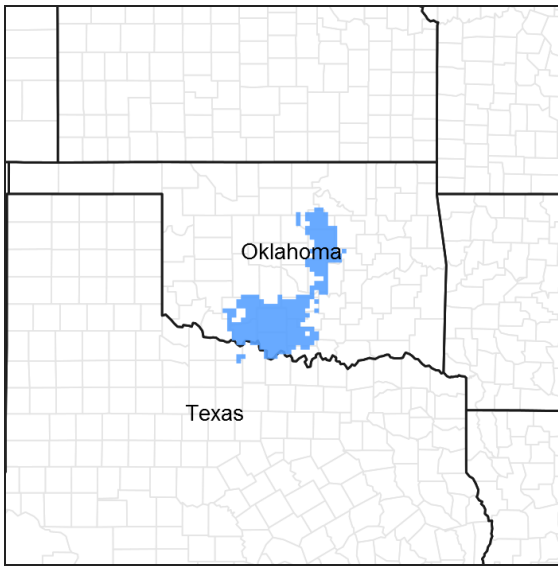


Figure 1. Mapped extent

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): 080A–Central Rolling Red Prairies

MLRA 80A is characterized by dark red Permian rocks that are exposed on gently sloping plains. These plains are dissected by rivers that flow from northwest to southeast. Major rivers of this MLRA include the Chickaskia and Bluff rivers in KS, the Salt Fork, Cimarron, North and South Canadian, Washita, Cache, Red River in OK, and branches of the Wichita River in TX. Soils are generally well drained, loamy or clayey deposits overlying Permian sandstones or shales.

## 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 upland topography and consist of open grasslands. The reference plant community is a mixture of tallgrasses, midgrasses, and forbs. Shrub species also occur and can exceed 10% canopy coverage if prescribed fire is not periodically applied. It can be difficult to find an intact Claypan Upland (S) site as many of them have been farmed to small grains. The site differs from the Loamy Upland site due to the dense clay subsoils

(Claypan) and the lower productivity. This site occurs on similar soils as the Claypan Upland (North) ESD. However, it differs in production, plant species, and response to management due to the warmer average temperatures.

### Associated sites

R080AY056OK	<b>Loamy Upland</b> Loamy Upland soils. No restrictive claypan
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### Similar sites

R080AY010OK	<b>Claypan Upland (North)</b> Similar site in the cooler northern portion of MLRA 80A.
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**Table 1. Dominant plant species**

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Schizachyrium scoparium</i> (2) <i>Panicum virgatum</i>

### Physiographic features

Claypan Upland South ecological sites are on deep, nearly level to gently sloping soils on uplands.

**Table 2. Representative physiographic features**

Landforms	(1) Plains > Hill (2) Alluvial plain remnant > Terrace (3) Plains > Interfluve
Runoff class	High to very high
Elevation	213–457 m
Slope	1–12%
Water table depth	107–152 cm
Aspect	Aspect is not a significant factor

### Climatic features

The climate is characterized by moist, cool, springs; hot, often dry summers; mild autumns; and mild to cold winters. Variation in timing and amounts of precipitation from year to year is quite common. Drought cycles range from three to five years duration with occasionally longer periods occurring at unpredictable intervals. Above normal rainfall cycles are usually just as random, but shorter in duration.

**Table 3. Representative climatic features**

Frost-free period (characteristic range)	185-193 days
Freeze-free period (characteristic range)	210-224 days
Precipitation total (characteristic range)	813-889 mm
Frost-free period (actual range)	184-204 days
Freeze-free period (actual range)	203-230 days
Precipitation total (actual range)	787-965 mm
Frost-free period (average)	191 days
Freeze-free period (average)	219 days

Precipitation total (average)	864 mm
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## Climate stations used

- (1) LAWTON [USC00345063], Lawton, OK
- (2) WAURIKA [USC00349395], Waurika, OK
- (3) ARCHER CITY 1E [USC00410313], Archer City, TX
- (4) WALTERS [USC00349278], Walters, OK
- (5) PAULS VALLEY 4 WSW [USC00346926], Pauls Valley, OK
- (6) HENRIETTA [USC00414093], Henrietta, TX

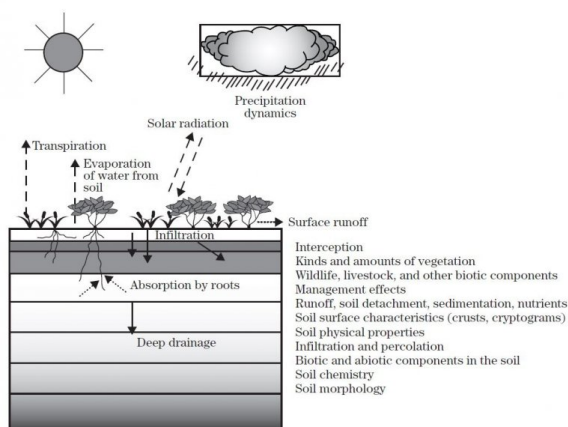
## Influencing water features

These upland sites are not associated with wetlands or flooding.

## Wetland description

NA

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



**Figure 8.**

## 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.

Representative soil components for this site include:

Agra, Kirkland, Renfrow

These soils have silt to silty clay surfaces with very compact clay subsoils. These subsoils restrict root and moisture penetration and cause poor internal drainage and poor aeration.

**Table 4. Representative soil features**

Parent material	(1) Residuum–clayey shale
Surface texture	(1) Silt loam (2) Silty clay loam (3) Silty clay
Drainage class	Moderately well drained to well drained
Permeability class	Very slow
Soil depth	157–203 cm
Surface fragment cover <=3"	0–2%
Surface fragment cover >3"	0–2%
Available water capacity (0-101.6cm)	15.24–17.27 cm
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–2
Soil reaction (1:1 water) (0-101.6cm)	5.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–4%
Subsurface fragment volume >3" (Depth not specified)	0–2%

## Ecological dynamics

The information contained in the State and Transition Diagram (STD) and the Ecological Site Description was developed using historical data, professional experience, and scientific studies. The information presented is representative of a very complex set of plant communities. Not all scenarios or plants are included. Key indicator plants, animals and ecological processes are described to inform land management decisions.

This site is nearly level to moderately sloping found on divides and upland slopes between natural drains. Soils have a loamy surface layer and loamy or clayey subsoil. The clayey subsoil restricts the penetration of water and roots. Due to the drouthy nature of the site, production is usually not very high. Vegetation recovery is very slow after site deterioration. Mesquite and cedar (*Juniperus* spp.) are the primary woody invaders in MLRA 080 South. Several plant communities can exist on this site. The significant plant communities are:

- 1) Tallgrass/Midgrass
- 2) Midgrass/Shortgrass
- 3) Shortgrass with Mesquite and/or Cedar dominance

### State and Transition Diagram:

A State and Transition Diagram for the Clay Upland (South) (R080AY11OK) is depicted below. Thorough 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 Plant Community is not necessarily the management goal; other vegetative states may be desired plant communities as long as the Range Health assessments are in the moderate and above category.

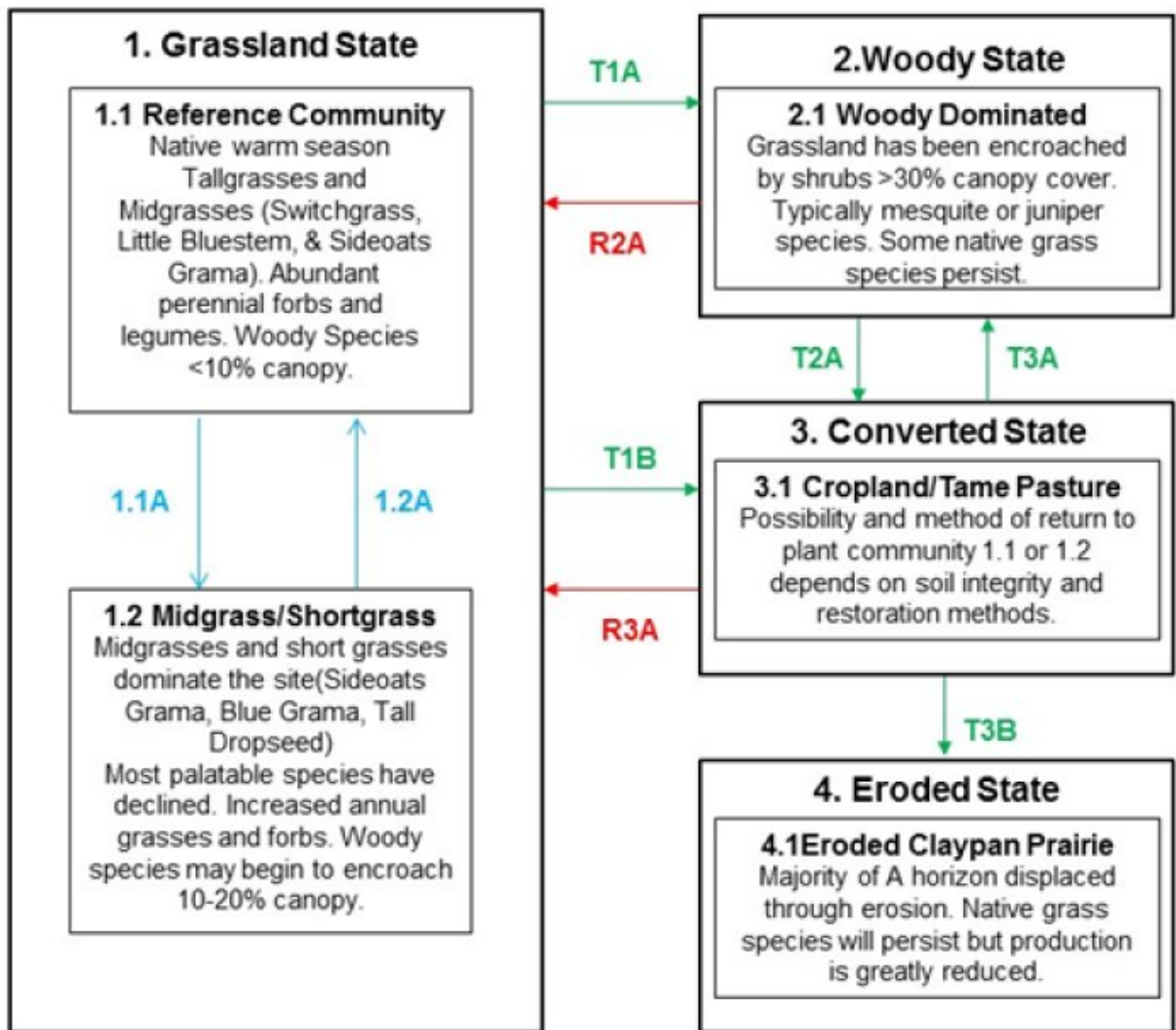
The biological processes on this site are complex. Therefore, representative values are presented in a land management context. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every situation or the full range of conditions, species, and responses for the site.

Composition by dry weight and percent canopy cover are provided to describe the functional groups. Most observers find it easier to visualize or estimate percent canopy for woody species (trees and shrubs).

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**

**Claypan Upland (South) 080AY011**



**Legend:**

- 1.1A: Continuous Heavy Grazing and/or Long Term Drought
- 1.2A: Prescribed Grazing(Deferment)
- T1A: Continuous Heavy Grazing, No Brush Management, No Fire
- T1B: Landuse Conversion(Tillage/Seeding)
- T2A: Landuse Conversion(Land Clearing, Tillage/Seeding)
- T3A: Abandonment
- T3B: Erosion of A horizon(depleted soil resources)
- R2A: Brush Management, Prescribed Grazing(Deferment), Prescribed Burning
- R3A: Range Planting or Fallowing with Brush Control measures

Figure 9. R080AY011OK

**State 1  
Grassland**

This is the reference or diagnostic community for the site. The description is based on early range site descriptions,

clipping data, professional consensus of experienced range specialists, and analysis of field work.

### Dominant plant species

- little bluestem (*Schizachyrium scoparium*), grass

## Community 1.1

### Mixed grass

The Reference Plant Community for this site is an open tallgrass/midgrass upland, dominated by switchgrass & little bluestem. Other significant grasses are big bluestem, Indiangrass, sideoats grama, & meadow dropseed (*Sporobolus R. Br.*). Significant forbs and legumes are leadplant, yellow neptunia, prairie clover, western ragweed, scurfpea, & green antelopehorn. This plant community has evolved through the collective influence of extremes of drought, rain, wind, temperature and seasonal migration of buffalo. Long term overgrazing decreases the tallgrasses, palatable forbs and legumes. Range management practices that include prescribed grazing, prescribed burning, fencing, water development, salt and mineral placement, and brush and weed control can maintain this plant community

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1905	3335	4764
Forb	269	471	673
Shrub/Vine	67	118	168
<b>Total</b>	<b>2241</b>	<b>3924</b>	<b>5605</b>

Figure 11. Plant community growth curve (percent production by month). OK0008, Native Warm Season - Southern Oklahoma. This is the estimated growth curve for the southern half of Oklahoma where mean annual air temperatures are greater than 60 degrees F. Plant growth can vary from year to year depending on air temperature and timing and amount of precipitation. These figures are merely a representative example for warm season native plants in the geographic area..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		6	15	20	25	10	4	10	10		

## Community 1.2

### Midgrass/Shortgrass

This site is dominated by sideoats grama, blue grama and meadow dropseed comprising approximately 50-70% of the total annual production for the site with remnants of other perennial grasses such as switchgrass, little bluestem, Indiangrass, big bluestem, and western wheatgrass. Long term overgrazing contributes to the dominance of the midgrasses/shortgrasses and the suppression of the taller grasses. Applying prescribed grazing will shift the competition and allow switchgrass, big bluestem, little bluestem, Indiangrass, forbs and legumes to increase. This shift can occur in 2-5 years depending on rainfall.

### Pathway 1.1A

#### Community 1.1 to 1.2

Continuous abusive grazing may drive the plant community to 1.2. This community shift could also be the result of a long term drought.

## State 2 Woody

The description for this plant community is derived from analysis of limited field data and professional consensus of range trained individuals.

### **Dominant plant species**

- eastern redcedar (*Juniperus virginiana*), tree
- honey mesquite (*Prosopis glandulosa*), shrub

### **Community 2.1 Woody Invasion**

This site is predominantly mesquite or cedar 60-75% with small remnants of sideoats grama, blue grama & buffalograss. A variety of early successional annual and perennial grasses and forbs occur on this site such as meadow dropseed, prairie threeawn, silver bluestem, Japanese brome, western ragweed, common broomweed, fall witchgrass, and pricklypear cactus. Many of these sites were formerly cultivated and never reseeded. Bulldozing and root plowing then reseeding along with deferred and prescribed grazing will be needed to return this site to optimum grass production. Hydrology and energy flow have been significantly altered in this community. Woody species now drive most of the nutrient and water cycles.

### **State 3 Converted**

#### **Dominant plant species**

- wheat (*Triticum*), grass

### **Community 3.1 Cropland**

Even though a Claypan Upland (South) site was in cultivation for a substantial period of time, it is not always impossible for the site to return to something resembling the reference state. The restoration of a cultivated field depends on the length of time in cultivation, erosion, loss of organic matter, soil type, and precipitation zone (and probably others).

### **State 4 Eroded**

#### **Dominant plant species**

- silver beardgrass (*Bothriochloa laguroides*), grass
- threeawn (*Aristida*), grass

### **Community 4.1 Eroded**

The driver for this ecological state is cultivation. As a result of this cultivation and subsequent rainfall events, at least 25 percent of the original A horizon (Topsoil) of the soil profile has been lost through erosion. Farming practices have ceased and the site has been planted to perennial cover. Most commonly, these perennial species are Old World Bluestem (*Bothriochloa ischaemum*), Bermudagrass (*Cynodon dactylon*), or a native grass mixture. There is a large amount of variability within the vegetative production and species present on these eroded sites. This is primarily determined by the amount of the A horizon remaining intact in the soil profile, the duration of the cultivation, and time since cultivation ended. It may take many years of vegetative cover to develop the amount of organic matter and soil structure necessary for plant vigor to return. While some species will thrive on these eroded sites, it is important to remember that the ecological function of these sites will never return to the quality of the reference state.

### **Transition T1A State 1 to 2**

Without brush management or prescribed fire, woody species may encroach on this site. Continuous abusive grazing may compound this issue by reducing fuel loads available for prescribed fire.



## Transition T1B

### State 1 to 3

Many of these sites have been cultivated for crop production in the past. Some are still in production and others have been planted to introduced pasture species.

## Restoration pathway R2A

### State 2 to 1

With the implementation of brush management and prescribed fire, the site may transition back to reference conditions. Careful grazing management will be required during and after the restoration.

## Transition T2A

### State 2 to 3

Many of these sites have been cultivated for crop production in the past. Some are still in production and others have been planted to introduced pasture species.

## Transition T3A

### State 3 to 2

Ending cultivation with a continued brush management or prescribed fire program can result in woody species encroachment and dominance.

## Transition T3B

### State 3 to 4

Erosion events can lead to a significant loss of the soils A horizon. The resulting state is an Eroded State.

## Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
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Table 7. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
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Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
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Table 9. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
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## Animal community

This site is excellent for grazing cattle. Quail utilize the site for food and occasional cover. Quail have been observed flying into large colonies of big bluestem and Indiangrass for escape cover. Coyote, badger, skunk, cottontail rabbit and ground squirrels are common. There is some site use by whitetail deer. Long-billed curlew visit the site in late spring and early summer. Hawks, including the red-tailed hawk, Coopers' hawk, Rough-legged hawk, sparrow hawk and marsh hawk utilize this site for hunting prey. The marsh hawk often nests in clumps of tallgrasses.

## Hydrological functions

These sites shed water to lower adjacent sites. The presence of good ground cover and perennial grass can help aid water infiltration into the soil.

## Recreational uses

NA

## Wood products

There are few, if any, wood products derived from this ecological site. There may be occasional wood cut for firewood and fence posts.

## Other products

NA

## Other information

NA

## Inventory data 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.

## Type locality

Location 1: Stephens County, OK	
Township/Range/Section	T3S R9W S15
General legal description	15-T3S-R9W Waurika WMA

## References

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

Frost, C.C. 1998. Presettlement Fire Frequency Regimes of the United States: A First Approximation. Plant Conservation Program. North Carolina Department of Agriculture and Consumer Services, Raleigh, NC.

## Other references

USDA-NRCS (Formerly Soil Conservation Service) Range Site Descriptions (1960s)

USDA-NRCS (Formerly Soil Conservation Service) Ag Handbook 296 (2006)

## Contributors

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Edits by Colin Walden, Soil Survey Region 9

Jack Eckroat, Resource Conservationist, USDA/NRCS

## 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, quality control, and quality assurance reviews of the ESD will be needed to produce the final document.

This ESD is in need of an update project to both verify the concepts and validate production numbers.

Following the 2015-2020 Provisional ES push, this will be a high priority project for MLRA 80A. 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)	Mark Moseley, Harry Fritzler, Steve Glasgow, Jack Eckroat
Contact for lead author	100 USDA Suite 206 Stillwater, OK 74074
Date	04/01/2005
Approved by	Colin Walden
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

- 1. Number and extent of rills:** There are few, if any, rills and there is no active headcutting and sides are covered with vegetation.

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- 2. Presence of water flow patterns:** There is some evidence of soil deposition or erosion, particularly after significant rain events, but water generally flows evenly over the entire landscape.

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- 3. Number and height of erosional pedestals or terracettes:** There should not be any evidence of erosional pedestals or terracettes on this site.

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- 4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** There is ~5% bare ground on this site. Bare areas are small and not connected.

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- 5. Number of gullies and erosion associated with gullies:** None, drainages are represented as natural stable channels; vegetation is common with no signs of erosion.

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

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7. **Amount of litter movement (describe size and distance expected to travel):** Uniform distribution of litter. Litter rarely moves >6 inches on flatter slopes and may be as much as doubled on steeper slopes, then only during high intensity storms.

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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):** Surface soil is stabilized (Stability Score 5 – 6). Stability scores based on a minimum of 6 samples tested.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A horizon 0 to 13 inches; silt loam, clay loam, medium granular structure. Btssl horizon: 13 to 25 inches; reddish brown clay, moderate medium blocky structure.

Refer to specific description for component sampled.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Infiltration and runoff are not affected by any changes in plant community composition and distribution. (Tallgrass dominated). Any changes in infiltration and runoff can be attributed to other factors (e.g. compaction).

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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):** There is usually no compaction layer. Naturally dense subsoil may be mistaken for a compaction layer.

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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: Tallgrasses

Sub-dominant: Midgrasses, Shortgrasses

Other: Forbs, Cool-Season Perennial Grasses, Shrubs

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** There is some plant mortality and decadence on the perennial grasses, especially in the absence of fire and herbivory, but usually <5%.

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14. **Average percent litter cover (%) and depth ( in):** Litter should cover 50-75% of the area between plants with accumulations of .25-1 inch deep.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Normal production is 2838-4964 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:** No invasive species. Invasives might include: eastern redcedar, bois d'arc, mesquite, annuals and non-natives.

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17. **Perennial plant reproductive capability:** All plants capable of reproducing at least every 2 years. Seed stalks, stalk length, and seedheads are numerous and what would be expected. Overall health of plants is what would be expected.

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