USDA Natural Resources Conservation Service

# Ecological site NX118B01Y001
# Shallow Loamy Upland

Last updated: 9/22/2023
Accessed: 11/09/2024

## 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.

## MLRA notes

Major Land Resource Area (MLRA): 118B–Arkansas Valley and Ridges, Western Part

118B—Arkansas Valley and Ridges, Western Part Major Land Resource Area (MLRA) is entirely In Oklahoma and encompasses approximately 3,070 square miles (7,960 square kilometers). It contains the towns of Henryetta and McAlester, and the McAlester Army Ammunition Plant. Interstate 40 passes through the northern part of the area from east to west (USDA 2006).

Most of this MLRA is in the Osage Plains Section of the Central Lowland Province of the Interior Plains with parts of the east side in the Arkansas Valley and Ouachita Mountains Sections of the Ouachita Province of the Interior Highlands. The topography is characterized by long, narrow sandstone-capped ridges that trend northeastward. The ridges are dissected by valleys incised by streams at right angles to the ridges. The valleys and scarp areas are cut into less resistant shale units. Elevation ranges from 550 feet (170 meters) to 1,500 feet (455 meters). The North and South Canadian Rivers flow from the western part of the MLRA and merge at Eufaula Lake on the east side. A narrow extension catches part of the Arkansas and Verdigris Rivers southeast of Tulsa. The Arkansas River is heavily regulated by locks, dams, and reservoirs. It allows Mississippi River barge traffic to reach land-locked Tulsa, to the northwest.

MLRA 118B principally consists of hard and soft sandstone, shale, siltstone, limestone, and some conglomerates of the Cabaniss, Krebs, and Marmaton geologic groups. These are of Pennsylvanian age (formed approximately 300 million years ago) and may include economically viable coal deposits. The bedrock geology of the area is tilted 2 to 15 degrees from the horizontal and is gently folded in some places. Unconsolidated clay, silt, sand, and gravel are deposited in the river valleys.

## Classification relationships

This ecological site is found in Major Land Resource Area 118B - the Arkansas Valley and Ridges, Western Part. MLRA 118B is located within Land Resource Region N - the East and Central Farming and Forest Region (USDA 2006).

MLRA118B falls within area #37 of EPA Ecoregion Level III - the Arkansas Valley, and area #29 – Northern Cross Timbers (USEPA 2013). The Loamy Shallow Upland ecological site occurs mostly in United States Forest Service Ecoregion -255A - Prairie Parkland (Subtropical) Province (Bailey 1995). This ecological site is found within 37e – the Lower Canadian Hills and 29a – the Northern Cross Timbers sections of EPA Ecoregion IV (Woods et. al. 1996).

Crosstimbers Oak Forest and Woodland - CES205.682 (NatureServe 2017).

## Ecological site concept

The Shallow Loamy Upland ecological site is found on mountains and hills, occurring along mountain slopes and hill slopes. The soils associated with this site are shallow, well drained, and formed in residuum derived from sandstone

and shale. These sites have slopes between 3 and 12 percent. Elevations range from 620 to 1,800 feet. A fine sandy loam surface texture is common with a clay content ranging from 14 to 21 percent. These sites do not receive additional moisture from the surrounding landscape and have a shallow soil depth (less than 20 inches to a sandstone bedrock).

## Associated sites

| | |
|---|---|
| NX118B01Y003 | **Loamy Upland** |

## Similar sites

| | |
|---|---|
| R084AY075OK | **Sandy Loam Savannah** |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | (1) *Quercus stellata*<br>(2) *Quercus marilandica* |
| Shrub | (1) *Rhus glabra* |
| Herbaceous | (1) *Andropogon gerardii*<br>(2) *Schizachyrium scoparium* |

## Legacy ID

R118BY001OK

## Physiographic features

This ecological site is found on mountains and hills, occurring along mountain slopes and hill slopes. These sites have slopes between 3 and 12 percent. Elevations range from 620 to 1,800 feet. Runoff class varies from high to very high, with no ponding or flooding.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Mountains > Mountain slope<br>(2) Hills > Hillslope |
| Runoff class | High to very high |
| Elevation | 620–1,800 ft |
| Slope | 3–12% |
| Aspect | Aspect is not a significant factor |

## Climatic features

This ecological site is characterized by hot summers, cool winters, and mild spring/fall temperatures. Mean annual precipitation is 45 inches with an average frost free period of 194 days and an average freeze free period of 212 days. The highest precipitation occurs in May (6.3 inches), while the lowest occurs in January (2.2 inches). The warmest month of the year is August (94°F average high), while the coolest is January (27°F average low). Thunderstorms and heat waves are common and occur frequently during summer months. Catastrophic storm events such as tornados, ice storms, floods, and hailstorms are also known to occasionally occur within this ecological site. According to the Oklahoma Water Resource Board, droughts occur on 5 to 10 year intervals.

Data was provided by the McAlester, Centrahoma, Okmulgee, Lake Eufaula, Eufaula, Atoka, and Hanna climate stations. Site specific data should be obtained by accessing the database provided by the National Centers for Environmental Information (https://www.ncdc.noaa.gov/cdo-web/search).

**Table 3. Representative climatic features**

| | |
|---|---|
| Frost-free period (characteristic range) | 184-204 days |
| Freeze-free period (characteristic range) | 202-227 days |
| Precipitation total (characteristic range) | 44-47 in |
| Frost-free period (actual range) | 180-207 days |
| Freeze-free period (actual range) | 194-228 days |
| Precipitation total (actual range) | 42-47 in |
| Frost-free period (average) | 194 days |
| Freeze-free period (average) | 212 days |
| Precipitation total (average) | 45 in |

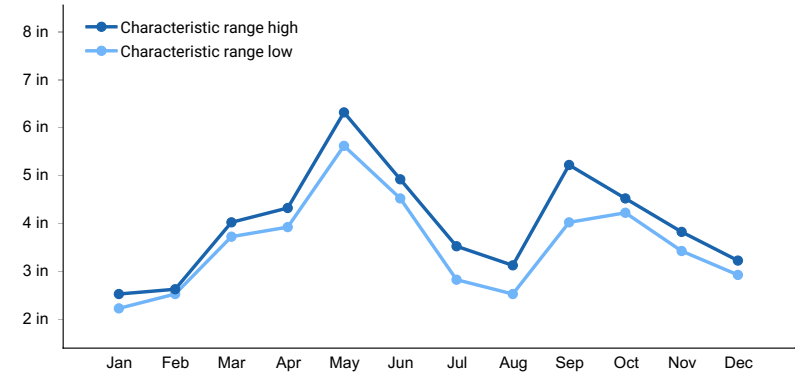



**Figure 1. Monthly precipitation range**

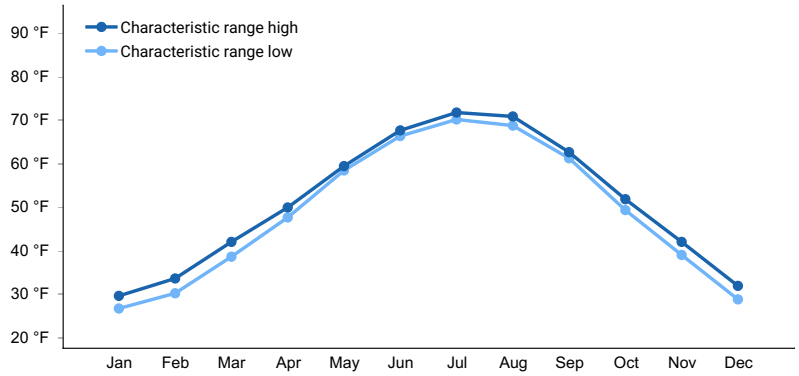



**Figure 2. Monthly minimum temperature range**

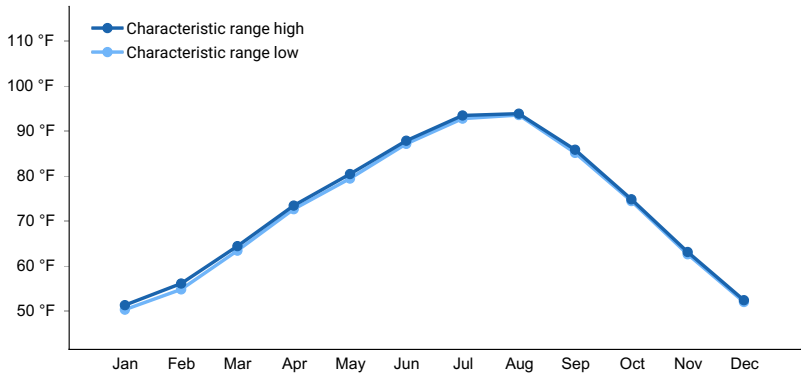



**Figure 3. Monthly maximum temperature range**

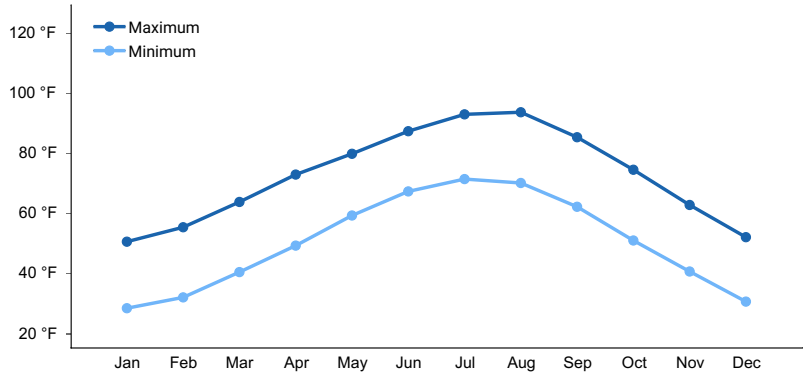



**Figure 4. Monthly average minimum and maximum temperature**

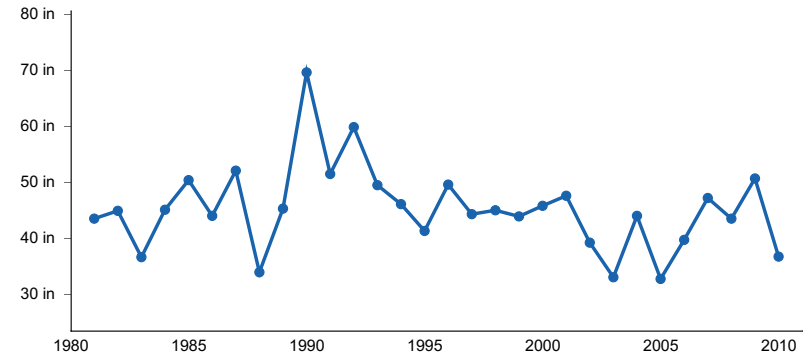



**Figure 5. Annual precipitation pattern**

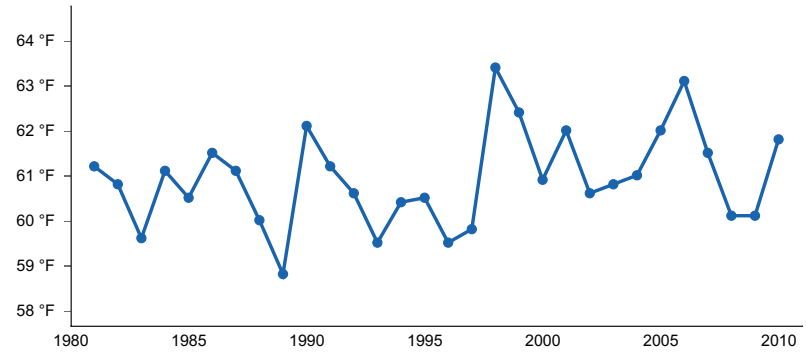



**Figure 6. Annual average temperature pattern**

## Climate stations used

- (1) LAKE EUFAULA [USC00344975], Checotah, OK
- (2) EUFAULA 6 SSW [USC00342993], Canadian, OK
- (3) ATOKA [USC00340391], Atoka, OK
- (4) HANNA [USC00343884], Hanna, OK
- (5) MCALESTER RGNL AP [USW00093950], McAlester, OK
- (6) CENTRAHOMA 2 ESE [USC00341648], Centrahoma, OK
- (7) OKMULGEE WTR WKS [USC00346670], Okmulgee, OK

## Influencing water features

This ecological site is not significantly influenced by water features.

## Wetland description

This ecological site is not significantly influenced by wetlands.

## Soil features

The soils associated with this ecological site formed in residuum derived from sandstone and shale. These soils are shallow to sandstone bedrock, well drained, and have a moderate permeability class. The typical soil profile is characterized by less than 35 percent clay (loamy or sandy loam texture) and less than 35 percent rock fragments by volume in the subsoil. A fine sandy loam surface texture is common, along with the gravelly or stony counter parts. Soils range from slightly acidic to strongly acidic (pH 6.5-4.5) throughout.

The soil series associated with this site are the Coweta, Collinsville, Clebit, and Hector.

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Residuum–sandstone and shale |
| Surface texture | (1) Fine sandy loam<br>(2) Stony fine sandy loam<br>(3) Gravelly fine sandy loam |
| Family particle size | (1) Loamy |
| Drainage class | Well drained |
| Permeability class | Moderate to moderately rapid |
| Soil depth | 10–20 in |
| Surface fragment cover <=3" | 10–13% |
| Surface fragment cover >3" | 2–6% |
| Available water capacity (Depth not specified) | 1.2–2.5 in |
| Soil reaction (1:1 water) (Depth not specified) | 4.5–6.5 |
| Subsurface fragment volume <=3" (Depth not specified) | 16–23% |
| Subsurface fragment volume >3" (Depth not specified) | 10–13% |

## Ecological dynamics

The Shallow Loamy Upland ecological site is characterized by a savanna, an open grassland with trees and shrubs present in low numbers. The trees species for this state are mainly post oak, blackjack oak, black hickory, bitternut hickory, chinquapin oak, cedar elm, and other oak species. Dominate grasses consist of little bluestem, switchgrass, indiangrass, and big bluestem (Landfire 2010; NatureServe 2009).

Fire is a major ecological driver on this ecological site. The historical fire return interval was likely between 1 to 10 years (Hallgren, 2011). These wildfires would occur naturally through lightning strikes, but the majority were probably ignited by anthropogenic sources (DeSantis, 2010). Native grass species evolved with and responded well to fires, gaining an advantage compared with other plant species (Engle, 2001).

Grazing was also important to these ecological sites. As the practices of fencing and livestock husbandry replaced herds of bison, elk, and deer, the ecological dynamics of this site were altered (Kohl, 2013). Changes were usually proportional to the season and intensity of livestock grazing behavior and were accelerated by a combination of drought and overgrazing (when the consumption of vegetation biomass by livestock and other grazers exceeds the vegetations ability to recover in a timely fashion, thus exposing the soil and reducing the vegetations productive capacity (Angerer, 2013)). For example, palatable grasses and forbs are repeatedly grazed by livestock, weakening and potentially killing or replacing these species with less desirable species (Smith, 1940).

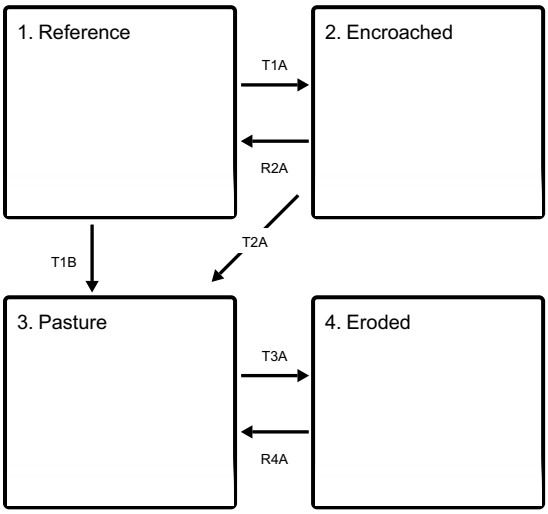
A variety of climate related events can occur that affect these ecological states such as hail storms, tornados, thunder storms, and extreme precipitation. Hail storms can reduce canopy size, increase litter deposition, and increase tree bark removal. When paired with other disturbances such as fire, the effects on tree species were

much greater than in areas not affected by the hail storm (Gower, 2015). Tornados have been shown to change plant community compositions in savanna ecosystems, favoring hardwoods and eliminating softwoods (Liu, 1997). Lightning storms greatly effect ecosystems and while they generally occur during summer months, they can occur during every season. If a fire is started by a lightning strike and allowed to burn, there will be different effects in the ecosystem depending on the season (Hiers, 2000). Drought occurs on 5 to 10 year intervals (Oklahoma Water Resource Board, 2011).

A state and transition model has been created to explain this ecological site. However, sparse data availability only allowed basic principles to be explored and a small number of species to be recorded. More data should be collected from this ecological site to provide a greater understanding of the ecological form and function, as well as the resources consumption and distribution. Four ecological states have been identified for this ecological site; Reference, Encroached, Pasture, and Eroded.

## State and transition model

**Ecosystem states**




**T1A** - Absence of wildfire and natural regeneration over time. May be coupled with excessive grazing pressure.

**T1B** - Tree removal, brush management, forage seed establishment and management.

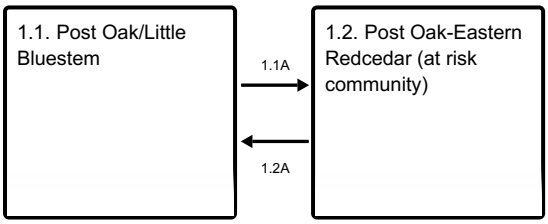
**R2A** - Tree thinning, brush management, prescribed fire, and grazing.

**T2A** - Woody species removal, prescribed fire, and grazing.

**T3A** - Abusive agricultural practices, drought.

**R4A** - Establish ground cover.

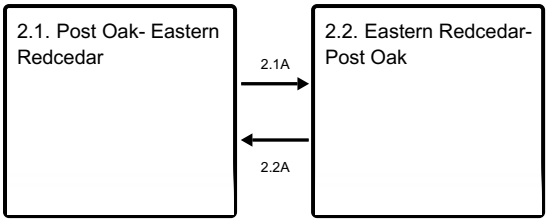
**State 1 submodel, plant communities**




**1.1A** - Absence of fire and natural regeneration over time

**1.2A** - Wildfire or other disturbance that reduces woody canopy

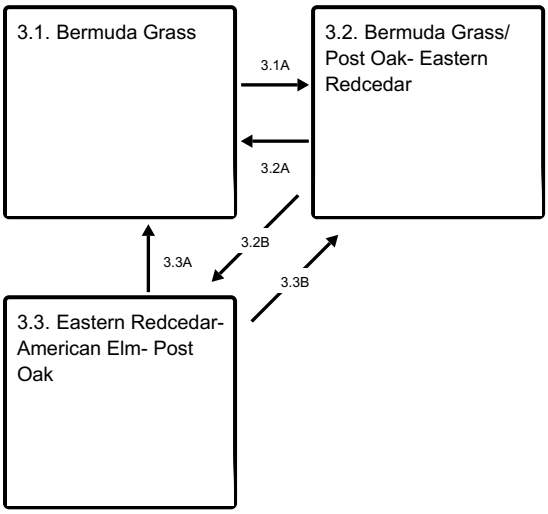
**State 2 submodel, plant communities**




**2.1A** - Fire suppression.

**2.2A** - Excessive fire, mechanical tree removal.

**State 3 submodel, plant communities**




**3.1A** - Fire Suppression

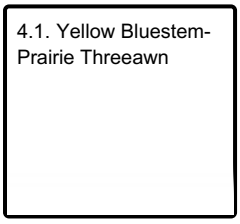
**3.2A** - Tree Removal, Brush Management

**3.2B** - Fire Suppression

**3.3A** - Tree Removal, Brush Management

**3.3B** - Tree Removal, Brush Management

**State 4 submodel, plant communities**




## State 1
## Reference

The reference state is considered to be representative of the natural range of variability without major anthropogenic influences. This state is characterized by a warm-season, perennial, tallgrass savanna with scattered oak trees. Total overstory canopy cover is less than 25 percent. Drivers- Fire frequency between 1 and 10 years (Hallgren, 2011), climate (decadal scale), insect and disease presence or establishment (oak wilt, beetles), and wildlife grazing or browsing. Feedbacks- Fire tolerant grasses dominate the ecological site, fire intervals suppress woody vegetation growth. Wildlife grazing/browsing decreases the amount of grass available, decreasing fire intensity and causing wildlife migration to a new grazing location.

**Characteristics and indicators.** The reference state is characterized by a savanna, an open grassland with trees and shrubs present in low numbers. The trees species for this state are mainly post oak, blackjack oak, black hickory, bitternut hickory, chinquapin oak, cedar elm, and other oak species. Dominate grasses consist of little

bluestem, switchgrass, indiangrass, and big bluestem (Landfire 2010; NatureServe 2009).

**Dominant plant species**

- post oak (*Quercus stellata*), tree
- blackjack oak (*Quercus marilandica*), tree
- smooth sumac (*Rhus glabra*), shrub
- big bluestem (*Andropogon gerardii*), grass
- little bluestem (*Schizachyrium*), grass
- Indiangrass (*Sorghastrum*), grass
- switchgrass (*Panicum virgatum*), grass

## Community 1.1
## Post Oak/Little Bluestem

This community phase is dominated by warm-season, perennial, tall grasses with scattered oak trees. Grasses are estimated to accounted for 55 to 65 percent of vegetative production by weight. Dominant grasses are little bluestem, big bluestem, Indiangrass, switchgrass, and Canada wildrye. Common trees species include post oak and blackjack oak.

## Community 1.2
## Post Oak-Eastern Redcedar (at risk community)

This community phase has a moderately closed canopy with an understory of tallgrasses and midgrasses. The absence of fire has allowed post oak, blackjack oak, and eastern redcedar densities to increase. The overstory tree canopy is around 25%. The competition from the increased canopy has led to a decrease in herbaceous understory plants.

## Pathway 1.1A
## Community 1.1 to 1.2

Absence of fire and the natural regeneration of woody species. This transition may also be coupled with excessive grazing pressure.

## Pathway 1.2A
## Community 1.2 to 1.1

Periodic wildfire reduces size and number of trees and shrubs. This community phase pathway may follow years with above average herbaceous production, resulting in more fine fuels. Drought and insect/disease outbreaks may also result in reduced woody canopy.

**Conservation practices**

| |
|---|
| Prescribed Burning |
| Prescribed Grazing |

## State 2
## Encroached

The encroached state is dominated by tree species. Canopy cover is greater than 25%. Driver- Absence of wildfire, seed dispersal by wildlife, climate (decadal scale), and canopy density. Feedbacks- Tree species dominate the ecological site, causing shading of grass species and shorter woody species. Less ground cover will decrease fire risk. Nutrient and water cycling will be controlled by tree species.

**Characteristics and indicators.** The encroached state consists of many tree species, especially eastern redcedar, where there is significant canopy closure. Depending on how long this state has been present on the ecological site, the plant community will vary from oak, to hickory, to eastern redcedar. As the woody canopy increases and an encroached state occurs, the hydrology of the site is altered. The increased canopy intercepts most of the

precipitation and changes hydrological patterns to favor tree species over grass species. Understory species will generally have less available water for growth and will have to compete with an extensive redcedar root system (Zou, 2018).

**Dominant plant species**

- oak (*Quercus*), tree
- eastern redcedar (*Juniperus virginiana*), tree

### Community 2.1
### Post Oak- Eastern Redcedar

This community phase is characterized by overstory canopy cover ranging from 25 to 50 percent. Overstory consists mainly of oak species with hickory with eastern red cedar present.

### Community 2.2
### Eastern Redcedar- Post Oak

This community phase is characterized by an overstory canopy cover ranging from 50 to 75 percent. Overstory consists mainly of eastern redcedar. Oak and hickory trees may be present, however, ecosystem dynamics are dominated by eastern redcedar.

### Pathway 2.1A
### Community 2.1 to 2.2

A possible reason for increased canopy cover is the absence of wildfire (less fire=more woody vegetation growth). The absence of wildfire and natural regeneration allows tree and shrub cover to increase.

### Pathway 2.2A
### Community 2.2 to 2.1

Canopy cover decreases, increasing the amount of sunlight that reaches the ground and understory vegetation. An increase in the ground vegetation can lead to fires that are able to control woody vegetation. This community will generally occur when canopy cover is between 25-50%. Possible reasons for decreased canopy cover are excessive fire (more fire= less woody vegetation) and mechanical tree removal.

## State 3
## Pasture

The pasture state consists of introduced grass species that are planted to maximize livestock forage production. Drivers- Mechanical soil disturbance and seed planting, climate (decadal scale), seed dispersal, and wildlife/livestock grazing or browsing. Feedbacks- Land managers use mechanical or chemical equipment to manipulate the ecological site. Wildlife and livestock grazing/browsing decrease the amount of available forage. Inputs of fertilizer and brush management are required to maintain high productivity across this ecological state.

**Characteristics and indicators.** The pasture state will comprise species that are planted and grown for specific management goals, mainly livestock grazing. Common pasture species include buffalograss, western wheatgrass, little bluestem, sideoats grama, composite dropseed, silver beardgrass, winter bentgrass, purple lovegrass, kentucky bluegrass, tumblegrass, fall panicgrass, little barley, white sagebrush, slimflower scurfpea, and missouri goldenrod. Quality and quantity of forb, grass and legume species within this state will depend on the level of management inputs including seeding, weed management, and land uses. Species of both warm-season and cool-season grasses are feasible for these sites.

**Dominant plant species**

- Bermudagrass (*Cynodon*), grass
- sideoats grama (*Bouteloua curtipendula*), grass

### Community 3.1
### Bermuda Grass

Grass and forb species have been planted to maximize production for grazing livestock.

### Community 3.2
### Bermuda Grass/ Post Oak- Eastern Redcedar

Grass and forb species have been planted to maximize production for grazing livestock. Tree species are encroaching.

### Community 3.3
### Eastern Redcedar- American Elm- Post Oak

Grass and forb species have been planted to maximize production for grazing livestock. Tree species have encroached this site and cover significant amounts of grazing land.

### Pathway 3.1A
### Community 3.1 to 3.2

Absence of fire and natural regeneration over time.

### Pathway 3.2A
### Community 3.2 to 3.1

Removal/reduction of trees and shrubs.

### Pathway 3.2B
### Community 3.2 to 3.3

Absence of fire and natural regeneration over time.

### Pathway 3.3A
### Community 3.3 to 3.1

Removal/reduction of trees and shrubs.

### Pathway 3.3B
### Community 3.3 to 3.2

Removal/reduction of trees and shrubs.

### State 4
### Eroded

The eroded state consists of an area where the soil and plant communities are not stable due to wind and water erosion. Drivers- Loss of soil and site stability, active soil erosion, climate (decadal scale), and wildlife/livestock grazing or browsing. Feedbacks- Reduced basal cover and increased bare ground resulting in increased overland flow leading to rills and gullies.

**Characteristics and indicators.** The eroded state consists of an area where the soil and plant communities are not stable due to wind and water erosion. In addition to destroying the original plant community, over plowing (degrading soil through cultivation) has resulted in major soil condition changes. Reductions in organic matter, mineral levels, soil structure, oxygen levels, water holding capacity, and populations of soil dwelling organisms are common in this state. The extent of these changes depend upon duration of over plowing, as well as the species of crops grown and other management practices. Where vegetation is able to grow, this states plant community is predominately prairie threeawn interspersed in remnants of perennial grasses such as alkali sacaton, blue grama,

sideoats grama and buffalograss. Numerous annuals are usually found on this state.

**Dominant plant species**

- prairie threeawn (*Aristida oligantha*), grass
- fall panicgrass (*Panicum dichotomiflorum*), grass

## Community 4.1
## Yellow Bluestem- Prairie Threeawn

Significant amounts of bare ground are present with grasses and forbs that establish quickly in poor soil conditions.

## Transition T1A
## State 1 to 2

Trigger- Absence of wildfire and excessive grazing pressure (when the consumption of vegetation biomass by livestock and other grazers exceeds the vegetations ability to recover in a timely fashion (Angerer, 2013)) reduce competition woody species seedling Slow variables: increased competition for sunlight, nutrients and moisture resources. Increased overstory results in decreasing vigor and reproductive capacity of herbaceous understory species. Thresholds: changing nutrient cycles from grass dominated to leaf/needle dominated. Increased woody canopy changes hydrologic cycling resulting in increased runoff and intercept and decreased infiltration.

## Transition T1B
## State 1 to 3

Trigger- Mechanical tree removal, mechanical and chemical woody vegetation suppression (removing brush by use of mechanical cutter, chopper, or other equipment followed by an application of chemicals in order to reduce fuel loading and improve ecological site condition, (NRCS 314)), introducing annual/ perennial grass and forb species, prescribed fire (applying controlled fire to a predetermined area of land, (NRCS 338)), and prescribed grazing ( managing the harvest of vegetation with grazing and-or browsing animals, (NRCS 528)). Slow Variables: Increased production and management of introduced species. Thresholds: Native seed sources are removed and suppressed from the ecological site.

**Conservation practices**

| |
|---|
| Brush Management |
| Prescribed Burning |
| Land Clearing |
| Prescribed Grazing |

## Restoration pathway R2A
## State 2 to 1

Trigger- Mechanical tree removal, mechanical and chemical woody vegetation suppression (removing brush by use of mechanical cutter, chopper, or other equipment followed by an application of chemicals to reduce fuel loading and improve ecological site condition, (NRCS 314)), and prescribed fire that will kill trees and suppress woody vegetative growth (applying controlled fire to a predetermined area of land, (NRCS 338)). Slow Variables: Removal of tree species decreases the amount of shade, allowing grass species to receive nutrients. Nutrient and water cycles shift from complete tree domination to a combination of tree and grass dominated. Thresholds: Canopy cover becomes less than 25%.

**Conservation practices**

| |
|---|
| Brush Management |
| Prescribed Burning |

### Transition T2A
### State 2 to 3

Trigger- Mechanical tree removal, mechanical and chemical woody vegetation suppression (removing brush by use of mechanical cutter, chopper, or other equipment followed by an application of chemicals to reduce fuel loading and improve ecological site condition, (NRCS 314)), prescribed fire that will suppress woody vegetative growth (applying controlled fire to a predetermined area of land, (NRCS 338)), prescribed grazing ( managing the harvest of vegetation with grazing and-or browsing animals, (NRCS 528)), and introduced species planting/establishment. Slow Variables: Removal of tree species decreases the amount of shade, allowing grass species to receive nutrients. Nutrient and water cycles shift from complete tree domination to a combination of tree and grass dominated. Introduced species are established. Thresholds: Introduced species become a significant environmental factor at the ecological site.

**Conservation practices**

| |
|---|
| Brush Management |
| Prescribed Burning |
| Land Clearing |
| Prescribed Grazing |

### Transition T3A
### State 3 to 4

Trigger- Drought, over-plowing (degrading soil through cultivation), and overgrazing (when the consumption of vegetation biomass by livestock and other grazers exceeds the vegetations ability to recover in a timely fashion, thus exposing the soil and reducing the vegetations productive capacity (Angerer, 2013)). Slow Variables: Vegetation quantity and quality will decrease over time. Ground cover will decrease, increasing water and wind erosion. New vegetation will quickly be consumed by livestock/wildlife when it becomes available. Thresholds: Significantly reduced ground cover, increasing water and wind erosion. Feedbacks- Any vegetation that is grown will quickly be consumed by livestock, destabilizing the soil and continuing erosion.

### Restoration pathway R4A
### State 4 to 3

Stop practices that are causing harm such as overgrazing (when the consumption of vegetation biomass by livestock and other grazers exceeds the vegetations ability to recover in a timely fashion, thus exposing the soil and reducing the vegetations productive capacity (Angerer, 2013)), over-plowing (degrading soil through cultivation), and other unsustainable agricultural practices. Establish ground cover, preferably using non-invasive species. Following ground cover establishment, plant species that will increase site stabilization. Manage for desirable site conditions.

## Additional community tables

## Animal community

Common wildlife species include whitetail deer, black bear, turkey, quail, racoons, opossums, groundhogs, chipmunks, armadillos, roadrunners, and coyotes. Eagles, vultures, red-tailed hawks and a variety of songbirds are viewed periodically during seasonal migrations.

Uncommon and threatened/endangered species include the rich mountain salamander, mountain redback salamander, red-cockaded woodpecker, and a variety of bat species.

Feral hogs are present and can disrupt plant communities.

Cattle are grazed throughout this ecological site. Cattle grazing can alter vegetative communities and disrupt nutrient distribution.

## Hydrological functions

Hydrological function will be altered depending on the state of this ecological site. When trees are present, rain will make contact with trees before hitting the ground, slowing the momentum of raindrops. Evapotranspiration changes depending on the type of vegetation present. Overland and ground water flow patterns will also be altered depending on the ecological state.

## Recreational uses

Hunting, hiking, camping, and wildlife viewing are the primary recreational uses of these sites.

## Wood products

There are no significant wood products produced on this site.

## Inventory data references

This site description was developed as part of the provisional ecological site initiative using historic soil survey manuscripts, literature reviews, and low intensity field sampling.

Inventory Data References
Information presented here has been derived from limited NRCS clipping data, research from Oklahoma State University, and field observations of range trained personnel.

Other Inventory Data References
Data source Number of records Sample period State County
417 2 1970-1971 Oklahoma Noble
Range 417 2 1969-1970 Oklahoma Osage

Inventory Data References
Clipping Data and various other files on file at Oklahoma NRCS State Office, 100 USDA, Suite 206, Stillwater, Oklahoma 74074.

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## Acknowledgments

Doug Wallace and Fred Young at Missouri NRCS State office, and Kevin Godsey, Soil Scientist, Springfield, MO: personal communication and sharing of state and transition models.
Dr. Jack Eckroat, Grazing Lands Specialist, OK - author of draft ESDs
We thank all NRCS employees that assisted in the development of this ecological site description.

## 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 | 11/09/2024 |
| 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:**