USDA Natural Resources Conservation Service

Ecological site NX118A01Y006
Alkali Flat

Last updated: 9/22/2023
Accessed: 05/17/2024

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): 118A–Arkansas Valley and Ridges, Eastern Part

Major Land Resource Area 118A, Arkansas Valley and Ridges Eastern Part, is in Arkansas and Oklahoma. This MLRA is about 6,755 square miles (17,495 square kilometers). The Ozark National Forest and the northern portion of the Ouachita National Forest occur in this MLRA.

This area is mostly in the Arkansas Valley Section of the Ouachita Province of the Interior Highlands. Small areas in the southeast corner and the south-central part of the MLRA are in the Ouachita Mountains. This MLRA consists of long, narrow ridges and high flat-topped mountains capped with sandstone that trend northeastward. Crests are narrow and rolling on ridges, while broad and flat on mountaintops. The intervening valleys are broad and smooth. Elevations generally range from 310 feet (90 meters) to 760 feet (230 meters) with higher and lower elevations on the valleys and ridgetops.

The ridgetops and valleys in this MLRA are underlain by slightly folded to level beds of sandstone and shale of the Pennsylvanian age. The terrace deposits along the Arkansas River include a complex sequence of unconsolidated gravel, sandy gravel, sands, silty sands, silts, clayey silts, and clays. The individual deposits are commonly lenticular and discontinuous. At least three terrace levels are recognized with the lowest being the youngest.

The dominant soil orders in this MLRA are Ultisols. The soils in the area have a thermic soil temperature regime, a

udic soil moisture regime, and mixed or siliceous mineralogy.

Ecological site concept

The Alkali Flat ecological site is on hills and valleys along hillslopes and paleoterraces. This site has slopes between 0 and 3 percent with elevations ranging from 300 to 1,510 feet (90 to 460 meters). The soils associated with this site are deep and formed in residuum derived from sandstone and shale. Important abiotic characteristics associated with this site are a high sodium content. Soil aeration and crusting restrict vegetative growth.

Associated sites

NX118A01Y001	**Shallow Upland** This ecological site is differentiated from the Alkali Flat Ecological Site by a restriction layer within 20 inches of the soil surface.

Similar sites

NX118A01Y002	**Loamy Upland** This ecological site is differentiated from the Alkali Flat Ecological Site by a low sodium content.

Table 1. Dominant plant species

Tree	(1) *Quercus* (2) *Juniperus virginiana*
Shrub	Not specified
Herbaceous	(1) *Aristida oligantha* (2) *Andropogon virginicus*

Legacy ID

R118AY006OK

Physiographic features

This ecological site is on hills and valleys and along hillslopes and paleoterraces. This site has slopes between 0 and 3 percent. Elevations range from 300 to 1,510 feet (90 to 460 meters). Runoff class varies from high to very high, with no ponding or flooding.

Table 2. Representative physiographic features

Landforms	(1) Valley > Paleoterrace (2) Hills > Hillslope
Runoff class	High to very high
Flooding frequency	None
Ponding frequency	None
Elevation	91–460 m
Slope	0–3%
Water table depth	15–46 cm
Aspect	Aspect is not a significant factor

Climatic features

This ecological site is characterized by hot summers, cool winters, and mild spring and fall temperatures. Mean annual precipitation is 49 inches. The average frost-free period is 193 days, and the average freeze-free period is 212 days. The highest precipitation occurs in May (6 inches), and the lowest occurs in January (2.8 inches). The

warmest month of the year is August (94°F average high), and the coolest is January (26°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 hail-storms are also known to occasionally occur within this ecological site. According to the Oklahoma Water Resource Board, drought occurs on 5 to 10 year cycles. The EPA predicts that droughts will become more severe throughout Arkansas due to longer periods without rain and an increase in very hot days (EPA, 2016).

Data was provided by the Blue Mountain Dam, Clarksville, Greers Ferry Dam, Poteau, Sallisaw, and Subiaco 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)	191-194 days
Freeze-free period (characteristic range)	210-216 days
Precipitation total (characteristic range)	1,219-1,295 mm
Frost-free period (actual range)	189-195 days
Freeze-free period (actual range)	202-219 days
Precipitation total (actual range)	1,194-1,295 mm
Frost-free period (average)	193 days
Freeze-free period (average)	212 days
Precipitation total (average)	1,245 mm

Climate stations used

- (1) SUBIACO [USC00036928], Paris, AR
- (2) POTEAU WTR WKS [USC00347254], Poteau, OK
- (3) SALLISAW 2 NW [USC00347862], Sallisaw, OK
- (4) BLUE MTN DAM [USC00030798], Havana, AR
- (5) GREERS FERRY DAM [USC00032978], Tumbling Shoals, AR
- (6) CLARKSVILLE 6 NE [USC00031457], Clarksville, AR

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 are formed in residuum derived from sandstone and shale. These soils are deep, somewhat poorly to moderately well drained, and have a very slow to slow permeability class. A silt surface texture is common. Important abiotic characteristics associated with this site are a high sodium content.

The soil series associated with this site are Wing and Wister.

Table 4. Representative soil features

Parent material	(1) Residuum–sandstone and shale
Surface texture	(1) Silt

Drainage class	Somewhat poorly drained to moderately well drained
Permeability class	Very slow to slow
Soil depth	102–152 cm
Surface fragment cover <=3"	0–6%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	4.57–22.61 cm
Soil reaction (1:1 water) (Depth not specified)	5.6–7.9
Subsurface fragment volume <=3" (Depth not specified)	0–6%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The Alkali Flat reference state consists of sodium rich soils. Reference vegetation consists of oak, eastern redcedar, broomsedge bluestem and prairie threeawn. Other prairie species such as switchgrass, little bluestem, indiangrass, Canada wildrye, threeawn, Scribner panicum, Texas dropseed, and longspike tridens can be found at this site (Brinlee, 1975; Abernathy, 1983; Cox, 1975; Vodrazka, 1971).

The soils on this site include physical characteristics that considerably influence plant growth. First, plants have evolved in soils with dense clay subsoils that restrict vertical root development. Second, although subsoil water holding capacity is high, its slow release of water to plants causes the site to be droughty. Third, a plants ability to extract water from the subsoil is limited by the amount of exchangeable sodium present.

Fire has a significant influence on this ecological site. The historical average fire-return interval was likely between 3 and 25 years (Guyette and Spetich, 2003; Hallgren, DeSantic, and Burton, 2012). These fires would occur naturally through lightning strikes, but the majority were probably ignited by anthropogenic sources (DeSantis, Hallgren, and Stahle, 2010). Native species evolved with and responded well to fires (Spetich and Hong He, 2008; Engle and Bidwell, 2001). Fires on upland ecological sites are likely moderate to low severity, due to forested conditions and lower amounts of ground vegetation (Carey, 1992).

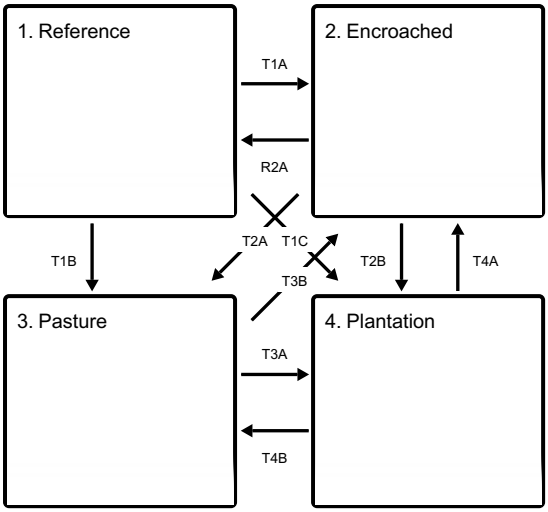
Climate related events, such as hail-storms, tornados, thunderstorms, and extreme precipitation, occur on these sites. Hail-storms can reduce canopy size, increase litter deposition, and increase tree bark removal. When paired with other disturbances, such as fire, the effects on tree species were much greater than in areas not affected by the hail-storm (Gower et al., 2015). Tornados have been shown to change plant community compositions in savanna ecosystems, favoring hardwoods and eliminating softwoods (Liu et al., 1997). Thunderstorms greatly effect ecosystem dynamics. Thunderstorms generally occur during summer months but can occur during every season. If a fire is started by a lightning strike, there will be different effects in the ecosystem depending on the season (Hiers, Wyatt, and Mitchell, 2000).

Grazing and farming can occur on this ecological site. Changes to the ecological dynamics are proportional to the intensity of livestock grazing and can be accelerated by overgrazing (Angerer, Fox, and Wolfe, 2013; Kohl, 2016). For example, desirable grasses and forbs are repeatedly grazed by livestock, weakening, and potentially killing or replacing these species with less desirable species (Smith, 1940).

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 will be collected to provide a greater understanding of the ecological dynamics, as well as the resources consumption and distribution.

State and transition model

Ecosystem states



T1A - Absence of fire or alternative brush management, woody species encroachment.

T1B - Tree removal, mechanical and chemical woody vegetation suppression, tillage, introduce annual or perennial forage species.

T1C - Tree removal, brush management, plantation tree establishment and management.

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

T2A - Tree removal, mechanical and chemical woody vegetation suppression, tillage, introduce annual or perennial forage species.

T2B - Woody species removal, plantation tree planting, prescribed fire.

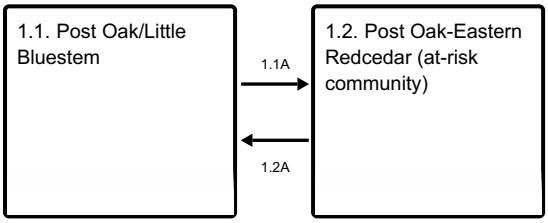
T3B - Lack of management or abandonment.

T3A - Forage species suppression, brush management, plantation tree establishment and management.

T4A - Lack of management or abandonment.

T4B - Woody species removal, prescribed fire, seeding, and grazing.

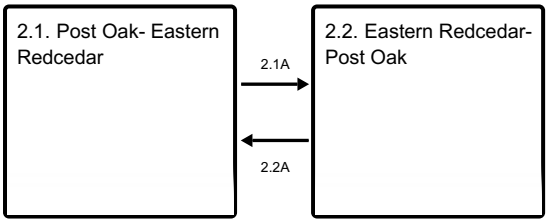
State 1 submodel, plant communities



1.1A - Absence of fire and natural regeneration over time

1.2A - Wildfire or other disturbance that reduces woody canopy

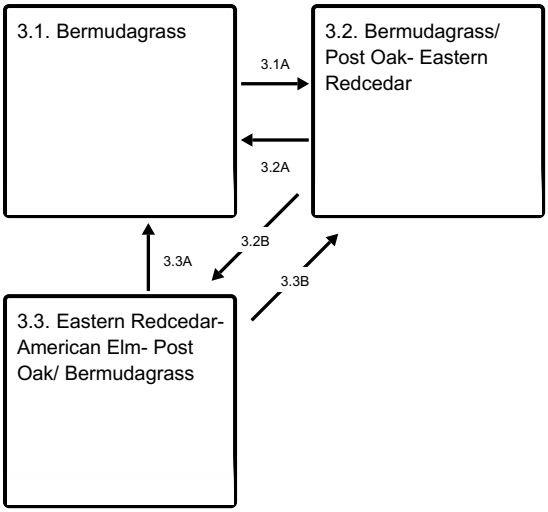
State 2 submodel, plant communities



2.1A - Fire suppression.

2.2A - Fire, mechanical tree removal.

State 3 submodel, plant communities



3.1A - Fire Suppression

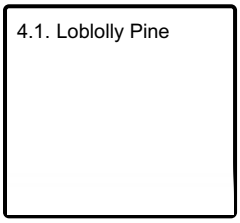
3.2A - Tree Removal, Brush Management

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 representative of the natural range of variability without major anthropogenic influences. Drivers: Fire frequency between 3 and 25 years, climate (decadal scale), insect and disease presence or establishment, and wildlife grazing or browsing. Feedbacks: Fire-tolerant species dominate the ecological site. Wildlife grazing or 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 consists of a hardwood forest, characterized by mixed hardwood species. Gaps in the canopy allow sunlight to reach the herbaceous layer, allowing grass and forb species to grow. Softwood species such as loblolly pine and shortleaf pine are also present.

Dominant plant species

- oak (*Quercus*), tree
- beech (*Fagus*), tree
- hybrid hickory (*Carya*), tree
- 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 oak trees and warm-season, perennial tallgrasses. Dominant grasses are

little bluestem, big bluestem, Indiangrass, and switchgrass. Common trees species include post oak, blackjack oak, white oak, and red 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 competition from the increased canopy has led to a decrease in herbaceous plants.

Pathway 1.1A
Community 1.1 to 1.2

This pathway consists of an absence of fire and the natural regeneration of woody species. It may also be coupled with excessive grazing pressure.

Pathway 1.2A
Community 1.2 to 1.1

This pathway consists of periodic fire that reduces the amount of woody vegetation. Drought and insect or disease outbreaks may also result in a reduced woody canopy.

Conservation practices

Prescribed Burning
Prescribed Grazing

State 2
Encroached

The encroached state is dominated by woody species. Driver: Absence of fire, seed dispersal by wildlife, climate (decadal scale), and canopy density. Feedbacks: Woody species dominate the ecological site, shading herbaceous species. As herbaceous species are outcompeted for resources, fire frequency decreases. Nutrient and water cycles are controlled by woody species.

Characteristics and indicators. The Encroached State consists of many woody species, especially eastern redcedar, where there is significant canopy closure. Time and fire frequency determine the community phases and species abundance and variation. As the woody canopy increases the hydrology of the site is altered. The increased canopy intercepts most of the precipitation. Understory species have less available water for growth and must compete with an extensive overstory root system.

Dominant plant species

- eastern redcedar (*Juniperus virginiana*), tree
- oak (*Quercus*), tree
- hybrid hickory (*Carya*), tree
- beech (*Fagus*), tree

Community 2.1
Post Oak- Eastern Redcedar

This community phase consists of oak, hickory, beech, and eastern redcedar. The canopy increases, causing a decrease in the herbaceous ground cover species. Eastern redcedar increases in size and quantity.

Community 2.2
Eastern Redcedar- Post Oak

This community phase is dominated by eastern redcedar. Oak, hickory, and beech species may be present. Oak, hickory, and beech species experience reduced vigor and reproductive capacity due to shading and competition from eastern redcedar.

Pathway 2.1A
Community 2.1 to 2.2

This pathway consists of an absence of fire. The absence of fire and natural regeneration allows woody vegetation cover to increase.

Pathway 2.2A
Community 2.2 to 2.1

This pathway experiences a decrease in canopy cover, increasing the amount of sunlight that reaches the herbaceous vegetation on the ground. An increase in the herbaceous vegetation can lead to fires that reduce woody vegetation. Possible causes of decreased canopy cover are fire and mechanical tree removal.

State 3
Pasture

The Pasture State is characterized by the dominance of improved forage species. The 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. Drivers: Mechanical soil disturbance and seed planting, climate (decadal scale), seed dispersal, and wildlife or livestock grazing or browsing. Feedbacks: Land managers use mechanical and chemical equipment to increase forage. Inputs of fertilizer and brush management are required to maintain high productivity. Wildlife and livestock grazing and browsing decrease the amount of available forage.

Characteristics and indicators. The Pasture State consists of species that are grown for specific management goals, mainly livestock grazing. Common pasture species include buffalograss, western wheatgrass, little bluestem, sideoats grama, Bermudagrass, and bahiagrass. Quality and quantity of forb, grass, and legume species within this state depend on the level of management inputs (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
- bahiagrass (*Paspalum notatum*), grass

Community 3.1
Bermudagrass

Herbaceous species have been planted to maximize forage production for grazing livestock.

Community 3.2
Bermudagrass/ Post Oak- Eastern Redcedar

Herbaceous species have been planted to maximize forage production for grazing livestock. Management decisions allow the growth of woody species, such as eastern redcedar and oaks.

Community 3.3
Eastern Redcedar- American Elm- Post Oak/ Bermudagrass

Herbaceous species have been planted to maximize forage production for grazing livestock. Improper pasture management and time have allowed for the growth of woody species such as eastern redcedar, oaks, and American elm. Woody species encroach on the pasture and dominate resources that were previously utilized by forage

species.

Pathway 3.1A
Community 3.1 to 3.2

This pathway consists of an absence of fire, improper management, and natural regeneration.

Pathway 3.2A
Community 3.2 to 3.1

This pathway consists of the removal or reduction of woody species.

Pathway 3.2B
Community 3.2 to 3.3

This pathway consists of an absence of fire, improper management, and natural regeneration.

Pathway 3.3A
Community 3.3 to 3.1

This pathway consists of the removal or reduction of woody species.

Pathway 3.3B
Community 3.3 to 3.2

This pathway consists of the removal or reduction of woody species.

State 4
Plantation

The plantation state is characterized by the planting of merchantable trees species. The most common species for a plantation is loblolly pine. Community phases differ by tree type (softwood or hardwood) and the harvesting process. Drivers: Prescribed fires, pest management, vegetation management, canopy density. Feedbacks: Timber harvesting. Planted tree species dominate this ecological site, shading out other vegetation. Anthropogenic management decreases competition with other species and assists in growth.

Characteristics and indicators. A plantation state consists of tree species that are planted and managed to maximize the production of merchantable timber. The most common plantation species is loblolly pine, followed by hardwood trees. Community phases differ by tree type (softwood or hardwood), timber harvest method, management, and reforesting practices.

Dominant plant species

- oak (*Quercus*), tree
- loblolly pine (*Pinus taeda*), tree

Community 4.1
Loblolly Pine

Loblolly pine is planted to maximize timber production.

Dominant plant species

- loblolly pine (*Pinus taeda*), tree

Transition T1A
State 1 to 2

Trigger: The absence of fire allows woody species to increase and outcompete herbaceous species for nutrients, water, and sunlight. Slow variables: Increased competition for sunlight, nutrients, and moisture resources. Increased overstory competition results in decreased vigor and reproductive capacity of herbaceous understory species. Thresholds: Nutrient cycles shift from grass-and-leaf dominance to leaf-and-needle dominance. Increased woody canopy cover alters hydrologic cycles, potentially increasing runoff, decreasing infiltration, and increasing precipitation interception to woody species.

Transition T1B
State 1 to 3

Trigger: Mechanical and chemical woody vegetation suppression, tillage, and annual forage species introduction. Slow Variables: Increase production and management of forage species. Thresholds: Changes in soil properties, such as structure, organic matter, and nutrient cycling, as well as changes in type and frequency of disturbance.

Conservation practices

Brush Management
Prescribed Burning
Land Clearing
Prescribed Grazing

Transition T1C
State 1 to 4

Trigger: Native tree removal, mechanical and chemical woody vegetation suppression, introduce plantation tree species. Slow Variables: Increased production and management of plantation species. Thresholds: Changes in soil properties such as structure, organic matter, and nutrient cycling as well as changes in type and frequency of disturbance.

Restoration pathway R2A
State 2 to 1

Restoration efforts should begin through the mechanical and chemical treatment of undesirable woody vegetation and by seeding native species. Following the initial treatment of the ecological site, restoration must be accompanied by grazing management and the reintroduction of historic disturbance regimes. Returning to a historic fire interval through prescribed burning assists in woody vegetation suppression and invasive species management.

Conservation practices

Brush Management
Prescribed Burning

Transition T2A
State 2 to 3

Trigger: Mechanical and chemical woody vegetation treatment, tillage, and forage species introduction. Slow Variables: Increase production and management of forage species. Thresholds: Changes in soil properties, such as structure, organic matter, and nutrient cycling, as well as changes in type and frequency of disturbance.

Conservation practices

Brush Management
Prescribed Burning
Land Clearing

Prescribed Grazing

Transition T2B
State 2 to 4

Trigger: Native tree removal, mechanical and chemical woody vegetation suppression, introduce plantation tree species. Slow Variables: Increased production and management of plantation species. Thresholds: Changes in soil properties such as structure, organic matter, and nutrient cycling as well as changes in type and frequency of disturbance.

Transition T3B
State 3 to 2

Triggers: Lack of management or abandonment. Slow Variables: Increase in the establishment and size of woody species. Thresholds: Woody species dominate ecological processes. This reduces vigor and reproduction of understory species due to shading and increased competition for soil moisture, nutrients, and sunlight.

Transition T3A
State 3 to 4

Trigger: Forage species removal and suppression, mechanical and chemical woody vegetation suppression, introduce and manage plantation tree species. Slow Variables: Increased production and management of plantation species. Thresholds: Changes in soil properties such as structure, organic matter, and nutrient cycling as well as changes in kind and frequency of disturbance.

Transition T4A
State 4 to 2

Triggers: Lack of management or abandonment. Slow Variables: Increase in the establishment and size of woody species. Thresholds: Woody species dominant ecological processes resulting in reduced vigor and reproduction of herbaceous species in the understory due to shading and increased competition for soil moisture, nutrients, and sunlight.

Transition T4B
State 4 to 3

Trigger: Tree removal, mechanical and chemical woody vegetation suppression, tillage, introduce annual or perennial forage species. Slow Variables: Increase production and management of forage species. Thresholds: Changes in soil properties such as structure, organic matter, and nutrient cycling as well as changes in type and frequency of disturbance.

Additional community tables

Animal community

Common wildlife species include whitetail deer, coyote, armadillo, beaver, raccoon, skunk, opossum, muskrat, cottontail, mourning dove, turkey, fox squirrel, and gray squirrel.

Hydrological functions

Following are the estimated withdrawals of freshwater by use in this MLRA:

Public supply—surface-water, 24.4%; ground-water, 5.1%
Livestock—surface-water, 8.1%; ground-water, 0.6%
Irrigation—surface-water, 0.0%; ground-water, 0.0%
Other—surface-water, 61.8%; ground-water, 0.0%

The total withdrawals average 95 million gallons per day (360 million liters per day). About 6 percent is from ground-water sources, and 94 percent is from surface-water sources. The moderately high precipitation is adequate for crops and pasture. Large reservoirs on a few of the major streams are sources of municipal water and provide flood control and opportunities for recreation. The surface water is generally of good quality and is suitable for most uses. Shallow wells are the principal sources of water for domestic use. Deep wells are needed to obtain moderate to large quantities of ground water. Water from the Ozark aquifer system in the northern half of this area is suitable for drinking.

Recreational uses

Mountain biking, camping, fishing, hiking, horseback riding, hunting, mineral prospecting, nature viewing, off-highway vehicle riding, and water activities can all be enjoyed throughout this MLRA on public land where permitted and on private land where allowed. The Ozark National Forest is throughout this MLRA.

Wood products

Public and private timberland comprise large areas throughout this MLRA. Loblolly pine is the most popular species to harvest and produces products such as lumber, pulpwood, posts, and poles. Hardwood species are also harvested and used to produce lumber, flooring, and pulpwood.

Other products

Poultry production is a major industry throughout the MLRA. Small grains, soybeans, and hay are major crops.

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University of Arkansas
Oklahoma State University
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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	05/17/2024
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:**

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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:**
