# Ecological site NX119X01Y008
# Seasonally Wet Upland

Last updated: 9/22/2023
Accessed: 05/07/2024

## 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): 119X–Ouachita Mountains

Major Land Resource Area 119, the Ouachita Mountains, is in Arkansas and Oklahoma. This MLRA is about 11,885 square miles (30,800 square kilometers). Hot Springs National Park and the Ouachita National Forest reside in this MLRA.

This MLRA is located in the Ouachita Mountains section of the Ouachita Province of the Interior Highlands. The steep mountains are underlain by folded and faulted sedimentary and metamorphic rocks. Most of the valleys are narrow and have steep gradients while wide terraces and flood plains border the Ouachita River. Elevation ranges from 130 feet (40 meters) in the bottomlands to 2,670 feet (810 meters) on the mountain peaks.

These steep mountains are underlain by folded and faulted formations, dominantly of shale and sandstone. Ordovician-age shale and sandstone are included in the Collier Shale, Crystal Mountain Sandstone, and Womble Shale. Mississippian-age shale, sandstone, novaculite, and chert are included in the Arkansas Novaculite and the Stanley Shale. Pennsylvanian-age shale, slate, quartzite, and sandstone are included in the Jackfork Sandstone, Johns Valley Shale, and upper Atoka Formations. Alluvial deposits of silt, sand, and gravel are on the wide terraces and flood plains that border the Ouachita River.

The dominant soil orders in this MLRA are Ultisols and Inceptisols. The soils in this MLRA have a thermic soil temperature regime, a udic soil moisture regime, and mixed or siliceous mineralogy.

## Ecological site concept

The Seasonally Wet Upland ecological site is on hills and mountains along hillslopes and mountainsides. The soils associated with this site are deep to very deep and formed in alluvium, colluvium, and residuum derived from sandstone and shale. This site has slopes between 1 and 11 percent with elevations ranging from 300 to 1,990 feet (91 to 605 meters). Important abiotic characteristics associated with this site are a particle size control section with greater than 35 percent clay and a perched water table of 12 to 24 inches (30 to 60 cm) below the surface during the winter and spring.

## Associated sites

| | |
|---|---|
| NX119X01Y003 | **Shallow Upland**<br>This ecological site is differentiated from the Seasonally Wet Upland Ecological Site by a soil depth less than 20 inches. |

## Similar sites

| | |
|---|---|
| NX119X01Y007 | **Loamy Upland**<br>This ecological site is differentiated from the Seasonally Wet Upland Ecological Site by less than 35 percent clay in the particle size control section. |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | (1) *Pinus echinata*<br>(2) *Quercus* |
| Shrub | (1) *Rhus*<br>(2) *Cornus* |
| Herbaceous | (1) *Panicum virgatum*<br>(2) *Andropogon gerardii* |

## Legacy ID

F119XY008AR

## Physiographic features

This ecological site is on hills and mountains along hillslopes, mountainsides, and paleoterraces. This site has slopes between 1 and 11 percent. Elevations range from 300 to 1,990 feet (91 to 605 meters). Runoff class varies from high to very high, with no ponding or flooding.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Hills > Hillside<br>(2) Mountains > Mountainside<br>(3) Paleoterrace |
| Runoff class | High to very high |
| Flooding frequency | None |
| Ponding frequency | None |
| Elevation | 91–607 m |
| Slope | 1–11% |
| Water table depth | 15–91 cm |
| Aspect | SE |

## Climatic features

This ecological site is characterized by hot summers, cool winters, and mild spring and fall temperatures. Mean annual precipitation is 54 inches. The average frost-free period is 182 days, and the average freeze-free period is 207 days. The highest precipitation occurs in May (6.4 inches), and the lowest occurs in August (3.4 inches). Precipitation varies greatly across this ecological site, with increasing precipitation from west to east. The warmest month of the year is August (93°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 Environmental Protection Agency (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 Alum Fork, Battiest, Wilburton, Murfreesboro, Waldron, and Hot Springs 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) | 167-193 days |
| Freeze-free period (characteristic range) | 197-214 days |
| Precipitation total (characteristic range) | 1,295-1,448 mm |
| Frost-free period (actual range) | 163-198 days |
| Freeze-free period (actual range) | 196-225 days |
| Precipitation total (actual range) | 1,270-1,448 mm |
| Frost-free period (average) | 182 days |
| Freeze-free period (average) | 207 days |
| Precipitation total (average) | 1,372 mm |

## Climate stations used

- (1) ALUM FORK [USC00030130], Paron, AR
- (2) BATTIEST [USC00340567], Bethel, OK
- (3) WILBURTON 9 ENE [USC00349634], Red Oak, OK
- (4) MURFREESBORO 1W [USC00035079], Murfreesboro, AR
- (5) WALDRON [USC00037488], Waldron, AR
- (6) HOT SPRINGS 1 NNE [USC00033466], Hot Springs National Park, AR

## Influencing water features

This ecological site has a perched water table of 12 to 24 inches (30 to 60 cm) below the soil surface during the winter and spring.

## Wetland description

This ecological site is not significantly influenced by wetlands.

## Soil features

The soils associated with this ecological site are formed in alluvium, colluvium, and residuum derived from sandstone and shale. These soils are deep to very deep, somewhat poorly to moderately well drained, and have a slow to moderate permeability class. A gravelly fine sandy loam, loam, or silt surface texture is common. Important abiotic characteristics associated with this site are a particle size control section with greater than 35 percent clay.

The soil series associated with this site are Stapp, Moyers, Sobol, Tamaha, and Mena.

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Alluvium–sandstone and shale<br>(2) Colluvium<br>(3) Residuum |
| Surface texture | (1) Gravelly fine sandy loam<br>(2) Loam<br>(3) Silt |
| Drainage class | Somewhat poorly drained to moderately well drained |
| Permeability class | Slow to moderate |
| Soil depth | 102–203 cm |
| Surface fragment cover <=3" | 1–14% |
| Surface fragment cover >3" | 0–2% |
| Available water capacity<br>(Depth not specified) | 10.41–19.56 cm |
| Soil reaction (1:1 water)<br>(Depth not specified) | 4.5–6.5 |
| Subsurface fragment volume <=3"<br>(Depth not specified) | 8–13% |
| Subsurface fragment volume >3"<br>(Depth not specified) | 0–3% |

## Ecological dynamics

The Seasonally Wet Upland reference state consists of a pine forest, characterized by a shortleaf pine overstory with a herbaceous forest floor. Loblolly pine and hardwood tree species can also be found on upland sites (Edlredge, 1937). Native grass species such as big bluestem, switchgrass, little bluestem, and Indiangrass are found in the herbaceous layer. (Arkansas Geological Survey, 2005).

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 wildfires 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).

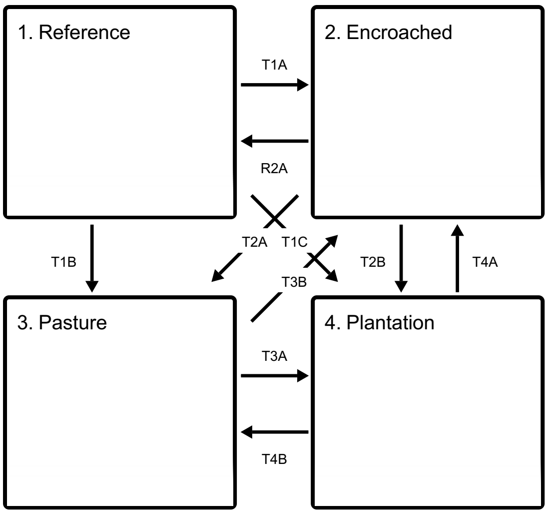
Climate related events, such as hail-storms, tornados, thunderstorms, and extreme precipitation, occur on these sites. Hail-storms can reduce canopy size, increase litter deposition, and increase tree bark removal. When paired with other disturbances, such as fire, the effects on tree species were much 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.

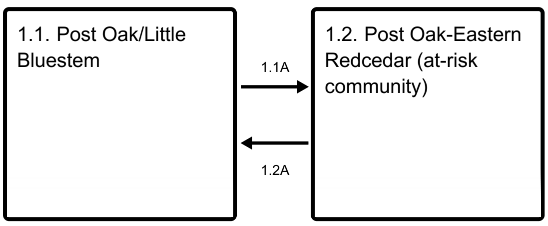
**T3B** - Lack of management or abandonment.

**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.

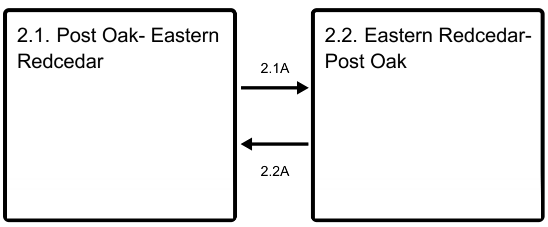
**State 1 submodel, plant communities**




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

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

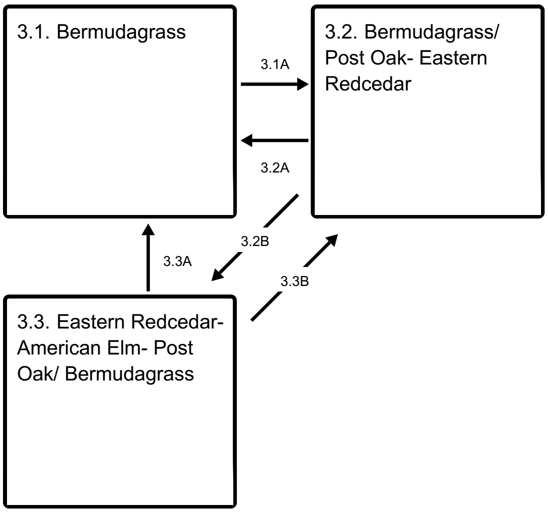
**State 2 submodel, plant communities**




**2.1A** - Fire suppression.

**2.2A** - Fire, mechanical tree removal.

**State 3 submodel, plant communities**




**3.1A** - Fire Suppression

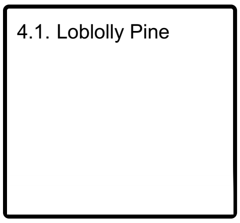
**3.2A** - Tree Removal, Brush Management

**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 wildfire, 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, species abundance, and species 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 in this area include coyote, whitetail deer, bobcat, beaver, raccoon, otter, skunk, opossum, muskrat, mink, cottontail, armadillo, gray squirrel, and turkey. The species of fish in the area include largemouth bass, bluegill, redear sunfish, channel catfish, spotted bass, white bass, crappie, flathead catfish, sucker, bullhead, bowfin, and gar.

## Hydrological functions

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

Public supply— surface-water, 26.5%; ground-water, 0.3%
Livestock— surface-water, 9.6%; ground-water, 0.3%
Irrigation— surface-water, 0.6%; ground-water, 0.0%

Other— surface-water, 62.6%; ground-water, 0.0%

The total withdrawals average 155 million gallons per day (585 million liters per day). About 1 percent is from ground-water sources, and 99 percent is from surface-water sources. The high precipitation, perennial streams, and reservoirs provide abundant water. Several large reservoirs are used for water storage, flood control, and recreation. In the valleys, small ponds and springs are the main sources of water for domestic use and for livestock. The surface-water is typically of very good quality in this mountainous area.

In the valleys, shallow wells in alluvium are the main sources of water for domestic use and for livestock. None of the bedrock aquifers in Arkansas or Oklahoma occur in this area. The quality of the shallow ground-water is very similar to the quality of the water in the streams and rivers. The ground-water 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 Ouachita National Forest is throughout this MLRA, encompassing nearly 1.8 million acres of public land.

### 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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### Approval

Bryan Christensen, 9/22/2023

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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 | 05/07/2024 |
| 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):**

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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:**

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