Ecological site NX117X01Y034
Shallow Upland

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 117X–Boston Mountains

This MLRA is about 6,850 square miles (17,775 square kilometers) and is in Arkansas (82 percent) and Oklahoma (18 percent). The Ozark National Forest makes up a significant portion of the MLRA. This area is predominantly in the Boston Mountains Section of the Ozark Plateaus Province of the Interior Highlands. This MLRA marks the southern extent of the Ozarks, a deeply eroded plateau. Ridges of the MLRA are narrow and rolling, and valley sides are steep. Elevation ranges from 570 feet (170 meters) to 1,860 feet (560 meters). Some lower and higher areas are on valley floors and crests of ridges, respectively. Level to slightly tilted shale, sandstone, and siltstone strata of geologic formations from the Pennsylvanian Subperiod underlie most of the MLRA. These formations include the Atoka Formation, the Bloyd Shale, and the Cane Hill and Prairie Grove Members of the Hale Formation. The Pitkin Limestone, Fayetteville Shale, and Batesville Sandstone Formations from the Mississippian Subperiod underlie parts of the northern edge of the MLRA. Alluvial deposits are in river valleys and consist of an unconsolidated mixture of clay, silt, sand, and gravel. The MLRA has a thermic soil temperature regime and a udic soil moisture regime. The dominant soil orders are Ultisols and Inceptisols. The soils are loamy and have mixed or siliceous mineralogy. They are shallow to very deep and are well drained. Hapludults and Dystrudepts formed in residuum on hills, plateaus, and mountains. Paleudults, on terraces and hills, formed in old alluvium over residuum or colluvium over residuum.

Ecological site concept

The Shallow Upland Ecological Site is on hills and mountains, specifically hillslopes and mountain slopes. The soils associated with this site are less than 20 inches (50 cm) deep, are well drained, and formed in residuum and colluvium from sandstone. Slope ranges from 4 to 40 percent, and elevation ranges from 500 to 2,500 feet. The soils have less than 35 percent clay in the particle-size control section.

Associated sites

NX117X01Y033	**Loamy Upland** This site is on mountains and hills, specifically mountain slopes and hillslopes. The soils associated with the site are greater than 20 inches deep.

Similar sites

NX117X01Y031	**Clayey Upland** This site is on mountains and hills, specifically hillslopes and mountain slopes. The soils associated with the site have 35 to 60 percent clay in the particle-size control section, and there is a layer of clay accumulation within eight inches of the soil surface.

Table 1. Dominant plant species

Tree	(1) *Quercus* (2) *Cornus*

Shrub	(1) *Vaccinium* (2) *Hamamelis*
Herbaceous	(1) *Schizachyrium scoparium* (2) *Sorghastrum nutans*

Legacy ID

R117XY034AR

Physiographic features

This ecological site is on hills and mountains, specifically hillslopes and mountain slopes. Slope ranges from 4 to 40 percent, and elevation ranges from 500 to 2,500 feet (150 to 762 meters). The runoff class is high or very high. The site is not subject to ponding or flooding.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope (2) Hills > Hillslope
Runoff class	High to very high
Flooding frequency	None
Ponding frequency	None
Elevation	150 – 850 m
Slope	0 – 40 %
Aspect	Aspect is not a significant factor

Climatic features

Hot summers, cool winters, and mild spring and fall temperatures are typical for the ecological site. The mean annual precipitation is 51 inches. The average frost-free period is 165 days, and the average freeze-free period is 191 days. The highest precipitation occurs in May (6.2 inches), and the lowest occurs in January (3.0 inches). The warmest month of the year is August (91°F average high), and the coolest is January (25°F average low). Thunderstorms and heat waves are common and occur frequently during the summer months.

Occasionally, catastrophic storm events, such as tornados, ice storms, floods, and hailstorms, will occur. According to the Oklahoma Water Resource Board, drought occurs every 5 to 10 years (Oklahoma Water Resources Board, 2022). The EPA predicts droughts will become more severe throughout Arkansas due to longer periods without rain and an increase in very hot days (EPA, 2016).

For detailed information visit the Natural Resources Conservation Service National Water and Climate Center athttp://www.wcc.nrcs.usda.gov/. The Deer, Fayetteville, Huntsville, Mountainburg, and Mountain View climate stations provided general climate data. Site-specific climate data is available through the National Weather Service.

Table 3 Representative climatic features

Frost-free period (characteristic range)	160-180 days
Freeze-free period (characteristic range)	190-200 days
Precipitation total (characteristic range)	1,220-1,350 mm
Frost-free period (actual range)	160-180 days
Freeze-free period (actual range)	190-210 days
Precipitation total (actual range)	1,190-1,400 mm
Frost-free period (average)	170 days
Freeze-free period (average)	200 days
Precipitation total (average)	1,300 mm

- (1) MTN VIEW [USC00035046], Mountain View, AR
- (2) DEER [USC00031900], Deer, AR
- (3) HUNTSVILLE 1 SSW [USC00033544], Huntsville, AR
- (4) FAYETTEVILLE DRAKE FLD [USW00093993], Fayetteville, AR
- (5) MOUNTAINBURG 2 NE [USC00035018], Mountainburg, AR

Influencing water features

Water features do not significantly influence this ecological site.

Wetland description

Wetlands do not significantly influence this ecological site.

Soil features

The soils associated with this ecological site formed in residuum from sandstone, siltstone, and shale. The soils are shallow, are well drained, and have a moderately rapid permeability class. The surface texture is commonly gravelly or stony fine sandy loam. There is a restrictive layer less than 20 inches (50cm) from the surface. The soils have less than 35 percent clay and greater than 35 percent rock fragment by volume in the particle-size control section.

The soil series associated with this site are the Hector, Mountainburg, and Montevallo Series.

Table 4. Representative soil features

Parent material	(1) Residuum – sandstone and shale (2) Siltstone

Surface texture	(1) Gravelly fine sandy loam (2) Stony sandy loam
Drainage class	Well drained
Permeability class	Moderately rapid
Depth to restrictive layer	50 cm
Soil depth	30 – 50 cm
Surface fragment cover <=3"	10 – 20 %
Surface fragment cover >3"	20 – 30 %
Available water capacity (Depth not specified)	1.52 – 4.57 cm
Soil reaction (1:1 water) (Depth not specified)	4.5 – 10
Subsurface fragment volume <=3" (Depth not specified)	20 – 30 %
Subsurface fragment volume >3" (Depth not specified)	20 – 40 %

Ecological dynamics

The Reference State for this ecological site consists of a hardwood forest characterized by mixed hardwood species and a vegetative ground cover. The characteristic tree species for this state are hardwoods such as oak, beech, and hickory (Foti, 2004). Native grass species such as big bluestem, switchgrass, little bluestem, and Indiangrass grow in canopy openings and throughout the understory (Owen, 1858).

Fire significantly influences this ecological site. Historically, the average fire-return interval was likely between 3 and 25 years (Guyette and Spetich, 2003; Hallgren et al., 2012). Some of these wildfires occurred naturally through lightning strikes, but human activities probably caused most of these fires (DeSantis et al., 2010). Native species evolved with and responded well to fire (Spetich and He, 2008; Engle and Bidwell, 2001). Fires on similar upland ecological sites today are likely of moderate to low severity due to forested conditions and lower amounts of ground vegetation (Carey, 1992).

Climate-related events, such as hailstorms, tornados, thunderstorms, and extreme precipitation, occur on this site. Hailstorms 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 hailstorm (Gower et al., 2015). Tornados can change plant community

compositions in savanna ecosystems, favoring hardwoods and eliminating softwoods (Liu et al., 1997). Lightning storms greatly affect ecosystems. Lightning storms generally occur during summer months but can occur during any season. If a fire starts with a lightning strike, the effects on the ecosystem vary depending on the season (Hiers et al., 2000).

Grazing and farming are feasible for this ecological site. Changes to the ecological dynamics are proportional to the intensity of livestock grazing and can accelerate through overgrazing (Angerer et al., 2016). For example, desirable grasses and forbs repeatedly grazed by livestock become weak and can die, and less desirable species may replace preferable ones (Smith, 1940).

The state-and-transition model for the Shallow Upland Ecological Site consists of three identified states: Reference, Encroached, and Pasture. Because of sparse data availability, the model only explored basic principles and included only a small number of species. Further data collection from this ecological site would provide a greater understanding of ecological form and function and of resource consumption and distribution.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 10. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 11. Community 3.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Animal community

Common wildlife species in this MLRA include whitetail deer, coyote, red fox, gray fox, bobcat, beaver, raccoon, opossum, skunk, muskrat, mink, cottontail, fox squirrel, gray squirrel, bobwhite quail, and mourning dove.

Hydrological functions

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

Recreational uses

In this MLRA, mountain biking, camping, fishing, hiking, horseback riding, hunting, mineral prospecting, nature viewing, off-highway vehicle riding, and water activities are available where permitted on public land, and where allowed on private land. The Ozark National

Forest makes up a significant portion of this MLRA.

Wood products

Public and private timberland cover large areas throughout this MLRA. Loblolly pine is the most popular species to harvest and provides timber for lumber, pulpwood, posts, and poles. Hardwood species provide timber for 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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National Centers for Environmental Information
University of Arkansas
Oklahoma State University
Arkansas Department of Forestry
Oklahoma Department of Forestry

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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	09/23/2026
Approved by	

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:

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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:**
