Ecological site F119XY015AR
Loamy Wet Bottomland

Last updated: 5/16/2025
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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): 119X–Ouachita Mountains

MLRA 119- Ouachita Mountains, is in Arkansas (57 percent) and Oklahoma (43 percent). It makes up about 11,885 square miles (30,800 square kilometers). This area is 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 stream valleys are narrow and have steep gradients, but wide terraces and flood plains border the Ouachita River in western Arkansas. Elevation ranges from 330 feet (100 meters) on the lowest valley floors to 2,625 feet (800 meters) on the highest mountain peaks. Local relief is generally 100 to 200 feet (30 to 60 meters), but it can exceed 980 feet (300 meters). 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 in this area. The average annual precipitation in most of this area is 50 to 66 inches (1,270 to 1,675 millimeters). It decreases to 41 to 49 inches (1,040 to 1,245 millimeters) along the western edge of the area. The precipitation is fairly evenly distributed throughout the year. The maximum occurs in spring and early in autumn. Most of the rainfall occurs as high-intensity, convective thunderstorms. Snowfall is not common in winter. The average annual temperature is 57 to 63 degrees F (14 to 17 degrees C). The freeze-free period averages 230 days and ranges from 205 to 255 days. The shorter freeze-free periods occur at the higher elevations on the major ridges. The dominant soil orders in this MLRA are Ultisols and Inceptisols. The soils in the area dominantly have a thermic soil temperature regime, a udic soil moisture regime, and mixed or siliceous mineralogy. They are shallow to very deep, generally somewhat excessively drained to somewhat poorly drained, and loamy. Dystrudepts and Hapludalfs formed in residuum on hills and mountains. Hapludults formed in colluvium, colluvium over residuum, and residuum on hills, mountains, and plateaus. Udifluvents formed in alluvium on flood plains. This area supports hardwood-pine forests. The primary overstory species are southern red oak, black oak, white oak, and hickories. Pine constitutes as much as 40 percent of the cover. It consists of shortleaf pine in the uplands and loblolly pine on the lower alluvial soils. Switchgrass, little bluestem, and Indiangrass are the primary grass species in the understory. Prairie cordgrass, plumegrass, low panicums, sedges, and rushes occur in smaller amounts. Some of the major wildlife species in this area are coyote, 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. More than 70 percent of this MLRA is forested. About one fourth of the forested acreage, mainly in Arkansas, is federally owned. Some of the forestland is in large holdings, but much of it is in farm woodlots. Timber production, wood-using industries, and recreation are important throughout the area. Nearly one-fifth of the MRLA is grazing land. Most of the pastures support a mixture of tame grasses and legumes, but some small prairie outliers in the western part of the area support native grasses. Forage and small grains are the major crops on the small acreage of cropland in the area.

Classification relationships

South-Central Interior Large Floodplain Summary: This floodplain system is found in the Interior Highlands as far west as eastern Oklahoma, as well as throughout the Interior Low Plateau, Cumberlands, Southern Ridge and Valley, and Western Allegheny Plateau, and lower elevations of the Southern Blue Ridge.

Ecological site concept

The loamy wet bottomland ecological site occurs on uplands and is found along flood plains. These sites have slopes between 3% and 35%. Elevations range from 300 to 1200 feet. Runoff class varies from very low to low with no ponding and occasional flooding. There are aquic moisture and thermic temperature regimes. The soils associated with this ecological site are formed in alluvium derived from sandstone and shale. The surface texture is a fine sandy loam. These soils are somewhat poorly drained, with a moderate permeability

class. Soil depth is 60 to 80 inches. The soil acid reaction is very acidic (4.5-6.5). Soils with a very acidic pH have low extractable calcium and magnesium along with a low availability of nitrogen and phosphorus, prohibiting the growth of certain plants. Important abiotic factors on this ecological site include the occasional flooding and seasonal water table.

Associated sites

F119XY004AR	**Loamy Wet Depression**
F119XY013AR	**Loamy Floodplain**

Similar sites

F133BY002TX	**Seasonally Wet Upland**
F133BY014TX	**Creek Bottomland**

Table 1. Dominant plant species

Tree	(1) *Platanus occidentalis*
Shrub	Not specified
Herbaceous	(1) *Carex*

Physiographic features

This ecological site occurs on uplands and is found along flood plains. These sites have slopes between 0 and 3 percent. Elevations range from 300 to 1200 feet. Runoff class varies from high to very high, with no ponding and occasional flooding.

Table 2. Representative physiographic features

Landforms	(1) Upland > Flood plain
Runoff class	High to very high
Flooding frequency	None to occasional
Ponding frequency	None
Elevation	90 – 370 m
Slope	0 %

Water table depth	0 – 60 cm
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding frequency	Not specified
Ponding frequency	Not specified
Elevation	90 – 460 m
Slope	0 – 10 %
Water table depth	0 – 90 cm

Climatic features

This ecological site is characterized by hot summers, cool winters, and mild spring/fall temperatures. Mean annual precipitation is 56 inches with an average frost free period of 193 days and an average freeze free period of 215 days. Highest precipitation occurs in May (6.1 inches), the lowest occurs in August (3.1 inches). The warmest month of the year is August (92°F average high), the coolest is January (30°F average low). Thunderstorms and heat waves occur during summer months. Tornados, ice storms, droughts, and hailstorms are also known to occasionally occur within this ecological site.

Data was provided by the Hot Springs, Blakely, and Murfreesboro 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 4 Representative climatic features

Frost-free period (characteristic range)	190-200 days
Freeze-free period (characteristic range)	210-220 days
Precipitation total (characteristic range)	1,420-1,450 mm
Frost-free period (actual range)	190-200 days
Freeze-free period (actual range)	210-220 days
Precipitation total (actual range)	1,420-1,450 mm

Frost-free period (average)	190 days
Freeze-free period (average)	220 days
Precipitation total (average)	1,420 mm

- (1) HOT SPRINGS 1 NNE [USC00033466], Hot Springs National Park, AR
- (2) BLAKELY MTN DAM [USC00030764], Mountain Pine, AR
- (3) MURFREESBORO 1W [USC00035079], Murfreesboro, AR
- (4) HOT SPRINGS ASOS [USW00003962], Donaldson, AR

Influencing water features

High, seasonal water table depth (18-24 inches) can occur on this site.

Wetland description

This site is not significantly affected by wetlands.

Soil features

The soils associated with this ecological site are formed in alluvium derived from sandstone and shale. The surface texture is a fine sandy loam. The surface fragment cover consist of approximately 15 percent material less than 3 inches in length and around 3 percnet material greater then 3 inches in length. Subsurface fragment volume consists of approximately 2 percent material less than 3 inches in length and around 3 percent material greater than 3 inches in length.

These soils are somewhat poorly drained, with a moderate permeability class. Soil depth is 60 to 80 inches. The soil acid reaction is very acidic (4.5-6.5). Soils with a very acidic pH have low extractable calcium and magnesium along with a low availability of nitrogen and phosphorus, prohibiting the growth of certain plants.

The soil series associated with this site are the Boggy, Ceda, Guyton, Taft, Tamaha, Vian, Wrightsville, and Woodall series.

Table 5. Representative soil features

Parent material	(1) Alluvium – sandstone and shale
Surface texture	(1) Fine sandy loam
Family particle size	(1) Loamy
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Moderate
Soil depth	150 – 200 cm
Surface fragment cover <=3"	20 %

Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	13.97 – 22.35 cm
Soil reaction (1:1 water) (0-101.6cm)	4.5 – 6.5
Subsurface fragment volume <=3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

The historical reference state for this ecological site was old growth bottomland forest. Historically, loamy wet bottomland forests in the Ouachita Mountains were on relatively stable floodplain positions that flooded approximately once every 3 to 5 years. This state was dominated by a variety of mesic species such as sugar maple, northern red oak, and bitternut hickory. Maximum tree age was likely 150 to 200 years. The understory was complex, with multiple layers of shade-tolerant species. A highly diverse ground flora was also present.

Three states have been identified for this ecological site: Reference, Pasture, and Managed Forestland.

A bottomland forest community is the reference state. Mesic species such as sugar maple, northern red oak, and bitternut hickory dominated the overstory. Ecological form and function, as well as resource consumption and distribution are dominated by water tolerant tree species. This state is dominated by tree species but wherever sunlight can penetrate through the canopy, ground cover and understory species such as beaked panicum, little bluestem, switchgrass, uniola, yellow bluestem, and indiangrass occur. Community dynamics can shift depending on ecological processes, natural disturbances, and time.

Pastures occur when ecological form and function, as well as resource consumption and distribution switch from tree species domination to forage species domination. Two main community phases are found in this state, pastureland and silvopasture. Silvopasture is when you grow merchantable trees while grazing the forage, pastureland is maintaining the forage for maximum grazing production. Species such as little bluestem, uniola, beaked panicum, Virginia wildrye, yellow Indian grass, tall fescue, broom sedge bluestem, and red clover are found throughout this state. Periodic disturbance such as prescribed fire and managed grazing are needed to prohibit woody species encroachment and domination.

The managed forestland state occurs when merchantable trees are planted. Resource consumption and distribution are dominated by tree species. However, human interaction and manipulation are much higher with a managed forestland and tree species are grown specifically to maximize merchantable timber.

Logging is a practice that continues to alter the form and function of oak-pine ecosystems. Depending on the timber harvesting method that is used (shelter wood, group, single tree, seed tree, retention, or clearcutting), ecosystem dynamics can have little noticeable changes or be completely altered in form and function (Clark, 2011). Forests have been removed to clear land for farming and grazing operations. Most existing forested sites have younger stands whose species composition and quality have been altered by timber harvesting practices, decreasing their ecological value (Guldin, 1991).

Wildfire plays and important role in oak-pine ecosystems. Prior to 1920, wildfire frequency was 5-10 years (Guyette, 2003). These wildfires could occur naturally through lightning strikes but the majority were probably ignited by anthropogenic sources (DeSantis, 2010). These periodic fires kept woodlands open, removed vegetative litter, and stimulated the growth of grasses and forbs. Consumption of large trees by wildfire would have opened up the forest floor for the growth of many species, including oaks and pines.

Grazing by large ungulates such as bison, elk, and deer occurred historically on this site. However, with the extirpation of bison and elk, the only large native ungulate left is the whitetail deer. Introduced species influence the growth and function of the oak-pine ecosystem.

Feral hogs impact forest regeneration dynamics through the consumption of seeds, soil disturbance, altering nutrient cycles, and by changing the vegetation composition (Siemann, 2009). Domestic cattle are found grazing throughout these sites and can cause soil compaction, soil erosion, and can alter plant species dynamics.

Several climate related events can affect the growth, form, and function of these ecological states. Ice storm damage has been known to affect tree structure and growth. Hardwood species are more resistant to ice storm damage than softwood species (Warrillow, 1999), changing forest dynamics and favoring hardwood species. Tornados have been recorded decreasing canopy cover by 50% following a storm event (Cannon, 2013). This allowed sunlight to fuel the growth of ground cover and midstory species. Hailstorms have been shown to damage pine trees. The greatest effect on pine trees were the surface wounds, allowing fungi to enter the wood and create pockets (Linzon, 1962). Oaks and pines are affected differently by severe drought. During a 14 year period, pine tree mortality significantly increased due to drought with no noticeable affect on oak species. This could alter the composition of pine-oak forests in the southeastern USA and favor oaks (Klos, 2009).

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

State and transition model

Additional community tables

Table 6. Community 1.1 plant community composition

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

Table 7. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height M	Canopy Cover (%)	Diameter Cm	Basal Area (square M/hectare)
Tree							
water hickory	CAAQ2	*Carya aquatica*	Native	–	–	–	–
northern red oak	QURU	*Quercus rubra*	Native	–	–	–	–
red maple	ACRU	*Acer rubrum*	Native	–	–	–	–
American sycamore	PLOC	*Platanus occidentalis*	Native	–	–	–	–
overcup oak	QULY	*Quercus lyrata*	Native	–	–	–	–

Table 8. Community 1.2 plant community composition

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

Table 9. Community 2.1 plant community composition

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

Table 10. Community 3.1 plant community composition

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

Inventory data references

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

Type locality

Location 1: Hot Spring County, AR

General legal description	Hot Spring County, Arkansas; 1.4 miles west of De Roche School on Arkansas Highway 84; then north on gravel road 0.3 miles; then west 200 feet in the SE1/4NE1/4NW1/4, sec. 6, T. 5 S., R. 19 W.
Location 2: Pike County, AR	
General legal description	Pike County, Arkansas; 1.5 miles west of Kirby on U.S. Highway 70, 1 mile north on Barrentine Road, approximately 50 yards east of Barrentine Road and 50 feet south of Gum Bottom Branch. NW1/4SW1/4SW1/4NE1/4 sec. 34, T.5 S., R.25 W., Latitude & Longitude:

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Other references

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Landfire: http://www.landfire.gov 2015 data

United States Department of Agriculture Handbook 296: Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin

NASIS database 2016 NASIS Client Version Number 6.4.1 and database model 7.2.5

Contributors

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Approval

Dean Stacy, 5/16/2025

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Doug Wallace and Fred Young at Missouri NRCS State office, personal communication and sharing of state and transition models. We thank all NRCS employees that have been involved 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	09/16/2026
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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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:**
