

Ecological site F119XY009AR Loamy Chert-Novaculite 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.



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

This ecological site is found in MLRA 119: Ouachita Mountains.

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).

Classification relationships

Ozark-Ouachita Shortleaf Pine-Bluestem Woodland

Summary: This system represents woodlands of the Ouachita and Ozark mountains region of Arkansas, adjacent Oklahoma, and southern Missouri in which *Pinus echinata* is the canopy dominant, and the understory is characterized by *Andropogon gerardii*, *Schizachyrium scoparium*, and other prairie plants. Although examples of this system occur throughout this region, there is local variation in the extent to which they were present. The center of distribution is the northern and western Ouachita Mountains, and it is best developed in large, dry, and flat to gently undulating portions of the landscape which carry fire well, creating extensive natural fire compartments. In the Ouachitas, the system occurs on the northern Hogback Ridges excluding the Novaculite areas to the south.

These are large, gently sloping, east/west-trending ridges of sandstone and shale, the south-facing slopes of which constitute large fire compartments. In nearly all examples, *Pinus echinata* occurs with a variable mixture of hardwood species. The exact composition of the hardwoods is much more closely related to aspect and topographic factors than is the pine component. In the Ozark Highlands this system is less extensive but was historically prominent where sandstone-derived soils are common. In Missouri and Oklahoma, this system occurs on gently dissected upland cherty plains (in addition to sandstone ridges).

Ecological site concept

This site is a woodland on less than 15 percent slopes in the uplands with udic moisture and thermic temperature regimes. It has Loamy skeletal soils derived from Novaculite chert with less than 3 inches of Available water.

Table 1. Dominant plant species

Tree	(1) <i>Pinus echinata</i>
Shrub	Not specified
Herbaceous	(1) <i>Andropogon</i>

Physiographic features

These sites are on 1 to 20 percent slopes on hill sides and mountain sides.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Mountain slope
Flooding frequency	None
Ponding frequency	None
Elevation	274–610 m
Slope	1–20%
Ponding depth	0 cm
Aspect	SE

Climatic features

Table 3. Representative climatic features

Frost-free period (average)	196 days
Freeze-free period (average)	218 days
Precipitation total (average)	1,448 mm

Climate stations used

- (1) NIMROD DAM [USC00035200], Perryville, AR
- (2) TUSKAHOMA [USC00349023], Tuskahoma, OK
- (3) ALUM FORK [USC00030130], Paron, AR
- (4) BLAKELY MTN DAM [USC00030764], Mountain Pine, AR
- (5) BATTIEST [USC00340567], Bethel, OK
- (6) HOT SPRINGS 1 NNE [USC00033466], Hot Springs National Park, AR

Influencing water features

This ecological site is not influenced by wetland or riparian water features.

Soil features

The soil series associated with this site are: Zafra, Yanush, Carnasaw, Bigfork, Avant. They are Moderately deep to very deep, Well drained, and Slow to Moderately rapid permeable soils, with very acidic to slightly acidic soil reaction, that formed in Colluvium and Residuum from Novaculite.

Table 4. Representative soil features

Parent material	(1) Colluvium–chert
Surface texture	(1) Very gravelly fine sandy loam (2) Extremely cobbly silt loam (3) Very stony loam
Drainage class	Well drained
Permeability class	Slow to moderately rapid
Soil depth	64–165 cm
Surface fragment cover <=3"	0–60%
Surface fragment cover >3"	0–60%
Available water capacity (0-101.6cm)	3.56–14.22 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	4.8–6.1
Subsurface fragment volume <=3" (Depth not specified)	1–60%
Subsurface fragment volume >3" (Depth not specified)	0–70%

Ecological dynamics

Information contained in this section was adapted from a Missouri ESD. The information presented is representative of very complex vegetation communities. Key indicator plants, animals and ecological processes are described to help inform land management decisions. Plant communities will differ across the MLRA because of the naturally occurring variability in weather, soils, and aspect. The Reference Plant Community is not necessarily the management goal. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every situation or the full range of conditions, species, and responses for the site.

Fire played an important role in the maintenance of these systems. It is likely that these ecological sites burned at least once every 5 to 10 years. These periodic fires kept woodlands open, removed the litter, and stimulated the growth and flowering of the grasses and forbs. During fire free intervals, woody understory species increased and the herbaceous understory diminished. The return of fire would open the woodlands up again and stimulate the abundant ground flora.

This ecological site was also subjected to occasional disturbances from wind and ice, as well as grazing by native large herbivores, such as bison, elk, and deer. Wind and ice would have periodically opened the canopy up by knocking over trees or breaking substantial branches off canopy trees. Grazing by native herbivores would have effectively kept understory conditions more open, creating conditions more favorable to oak reproduction and sun-loving ground flora species.

Today, these ecological sites have been cleared and converted to pasture or have undergone repeated timber harvest and domestic grazing. Most existing forested ecological sites have a younger (50 to 80 years) canopy layer whose species composition and quality has been altered by timber harvesting practices. In the long term absence of fire, woody species, especially hickory, encroach into these woodlands. Once established, these woody plants can quickly fill the existing understory increasing shade levels with a greatly diminished ground flora. Removal of the younger understory and the application of prescribed fire have proven to be effective restoration means.

Domestic grazing has also impacted these communities, further diminishing the diversity of native plants and introducing species that are tolerant of grazing, such as buckbrush, gooseberry, and Virginia creeper. Grazed sites also have a more open understory. In addition, soil compaction and soil erosion can be a problem and lower productivity.

These ecological sites are only moderately productive, especially when compared to protected slopes and deeper loess covered units. Oak regeneration is typically problematic. Sugar maple, red elm, and hickories are often dominant competitors in the understory. Maintenance of the oak component will require disturbances that will encourage more sun adapted species and reduce shading effects.

Single tree selection timber harvests are common in this region and often results in removal of the most productive trees (high grading) in the stand leading to poorer quality timber and a shift in species composition away from more valuable oak species. Better planned single tree selection or the creation of group openings can help regenerate and maintain more desirable oak species and increase vigor on the residual trees.

Clearcutting also occurs and results in dense, even-aged stands dominated by oak. This may be most beneficial for existing stands whose composition has been highly altered by past management practices. However, without some thinning of the dense stands and prescribed burning the ground flora diversity can be shaded out and diversity of the stand may suffer. Characteristic plants in the ground flora can be used to gauge the restoration potential of a stand along with remnant open-grown old-age trees, and tree height growth.

A State and Transition Diagram is depicted in Figure 1. Detailed descriptions of each state, transition, plant community, and pathway follow the model. This model is based on available experimental research, field observations, professional consensus, and interpretations. It is likely to change as knowledge increases.

State and transition model

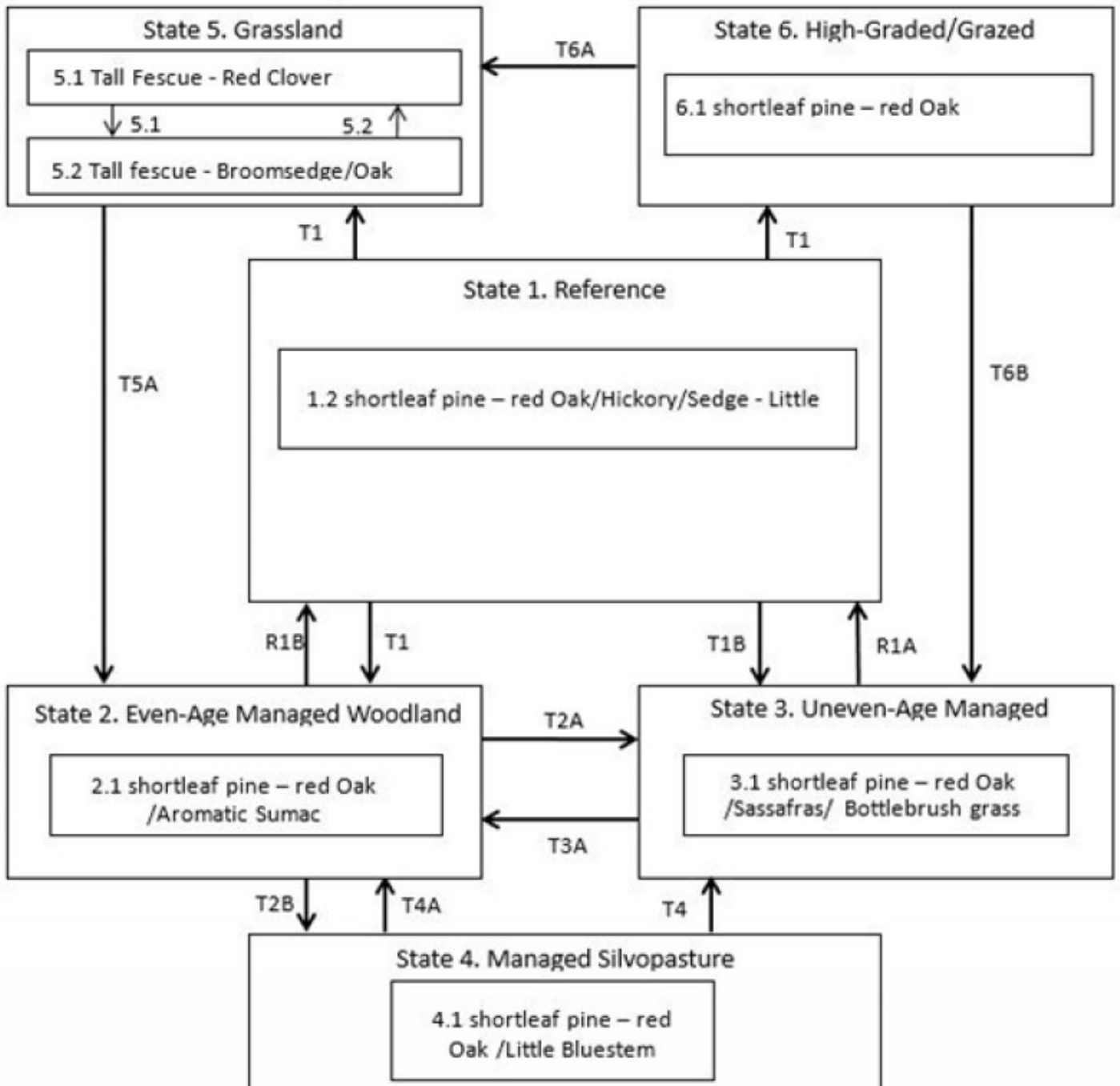


Figure 6. F119XY009AR, Loamy Chert-Novaculite Upland

Code	Event/Process
T1A	Even-aged management
T1B	Fire suppression; uneven-age management
T2B	Prescribed fire; thinning; grazing management
T1C, T6A	Clearing & pasture planting
T1D	Poorly planned harvest & uncontrolled grazing
T2A	Uneven-age management
T3A	Even-age management
T5A	Tree planting; long-term succession; no grazing
T6B	Uneven-age management; tree planting
T4A	Uneven-age management; no grazing
T4B	Even-age management; no grazing
1.1	No disturbance (10+ yrs)
5.1A	Over grazing; no fertilization
5.2A	Brush management; grassland seeding; grassland management
R1A	Prescribed fire & extended rotations
R1B	Uneven-age mgt, extended rotations

Figure 7. F119XY009AR, Loamy Chert-Novaculite Upland

State 1 Reference

The historical reference state for this ecological site was old growth, oak woodland. The reference state was dominated by shortleaf pine and southern red oak. Maximum tree age was likely 150 to 300 years. Periodic disturbances from fire, wind or ice maintained the woodland structure and diverse ground flora species. Long

disturbance-free periods allowed an increase in both the density of trees and the abundance of shade tolerant species.

Other references

NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia.
Available <http://explorer.natureserve.org>. (Accessed: October 27, 2015).

Official Soil Survey, USDA-NRCS: <https://soilseries.sc.egov.usda.gov/osdname.asp>

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

Kevin Godsey

Acknowledgments

Doug Wallace and Fred Young at Missouri NRCS State office, personal communication and sharing of state and transition models.

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	
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:
-
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**
-
14. **Average percent litter cover (%) and depth (in):**
-
15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-**

production):

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**
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17. **Perennial plant reproductive capability:**
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