

Ecological site NX117X01Y031 Clayey 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

117—Boston Mountains This area (shown in fig. 117-1) is in Arkansas (82 percent) and Oklahoma (18 percent). It makes up about 6,850 square miles (17,755 square kilometers). The town of Batesville, Arkansas, is at the east end of this area, and Fayetteville, Arkansas, is just outside the northern boundary in the western part of the area. There are no interstate highways in this area. The Ozark National Forest makes up a significant portion of the area.

Physiography This area is mostly in the Boston “Mountains” Section of the Ozark Plateaus Province of the Interior Highlands. The northern half of the western tip of the area is in the Springfield- Salem Plateaus Section of the same province and division. The southern half of the western tip is in the Arkansas Valley Section of the Ouachita Province of the Interior Highlands. This MLRA marks the southern extent of the Ozarks. It is an old plateau that has been deeply eroded. Ridgetops are narrow and rolling. Valley walls are steep. Elevation ranges from 660 feet (200 meters) on the lowest valley floors to 2,625 feet (800 meters) on the highest ridge crests. Local relief commonly exceeds 100 feet (30 meters). The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA is as follows: Upper White (1101), 53 percent; Lower Arkansas (1111), 45 percent; and Neosho-Verdigris (1107), 2 percent. The Mulberry, King, Buffalo, and Middle Fork Little Red Rivers are in the part of this area in Arkansas, and the Illinois River is in the part in Oklahoma. The Buffalo River is a National River, and Lee Creek, in the southwest corner of the area, in Arkansas, has been designated a National Wild and Scenic River.

Geology

Most of this area is underlain by level to slightly tilted shale, sandstone, and siltstone strata in the Pennsylvanian-age Atoka Formation and the Cane, Boyd Shale, and Prairie Grove members of the Hale Formation. Parts of the northern edge are underlain by the Mississippian-age Pitkin Limestone, Fayetteville Shale, and Batesville Sandstone. Alluvium consisting of an unconsolidated mixture of clay, silt, sand, and gravel is deposited in river valleys.

Water

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. Small ponds on individual farms provide water for livestock, and springs are numerous on the mountainsides and in the valleys. 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. Municipal and industrial wastewater discharges and nonpoint pollution have caused some local degradation of the water quality. 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. It is hard or very hard, so treatment to remove calcium and/or magnesium may be needed. The average concentration of total dissolved solids is about 270 parts per million (milligrams per liter). The shallow aquifers within this system have the highest average level of nitrate of all aquifers in Arkansas. The average concentration,

however, is still less than 1 part per million (milligram per liter).

Soils

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 well drained, and loamy. Hapludults (Enders, Linker, Mountainburg, and Steprock series) and Dystrudepts (Hector series) formed in residuum on hills, plateaus, and mountains. Paleudults formed in alluvium or colluvium over residuum (Allen and Nella series) and alluvium or colluvium (Leesburg series) on hills and terraces.

Biological Resources

This area supports hardwood forests. The primary overstory species are red oak, white oak, and hickory. Shortleaf pine and eastern redcedar are important on disturbed sites, on shallow soils, and on south or west aspects. Big bluestem, switchgrass, Indiangrass, and little bluestem are important understory species under medium to open forest canopy. Broadleaf uniola, longleaf uniola, wildrye, and low panicums are important species under heavy canopy. Some of the major wildlife species in this area are whitetailed deer, coyote, red fox, gray fox, bobcat, beaver, raccoon, opossum, skunk, muskrat, mink, cottontail, fox squirrel, gray squirrel, bobwhite quail, and mourning dove.

Land Use

Following are the various kinds of land use in this MLRA: Cropland—private, 1% Grassland—private, 22%; Federal, 3% Forest—private, 48%; Federal, 18% Urban development—private, 3% Water—private, 2%; Federal, 2% Other —private, 1% About two-thirds of this area is forested. The forested areas are mainly in farm woodlots, but large tracts in Arkansas are national forests. About one-fourth of the area is grazing land, and a small percentage is cropland. Small grains and hay for livestock are the main crops. Peach and apple orchards are important locally. Most of the pastures support cultivated grasses and legumes, but native grasses grow on the prairie outliers in the western part of the area. The major resource concerns in this area are gully and streambank erosion; plant productivity, health, and vigor; soil contaminants from applications of animal waste; and water for livestock. Conservation practices on cropland generally include critical area planting, protection of streambanks and shorelines, fencing, riparian forest buffers, forage harvest management, nutrient management, waste utilization, brush management, pest management, grade-stabilization structures, construction of ponds, and prescribed grazing.

Classification relationships

Nature Serve area: Ozark-Ouachita Shortleaf Pine-Oak Forest and Woodland

Summary: This system represents forests and woodlands of the Ouachita and Ozark mountains region of Arkansas, adjacent Oklahoma, and southern Missouri in which *Pinus echinata* is an important or dominant component. Although examples of this system occur throughout this region, there is local variation in the extent to which they were present. For example, in the Ozark Highlands, this system was historically prominent only in the southeastern part where sandstone-derived soils were common, and in the southern part on soils derived from chert, being excluded from or diminished in other areas by non-conductive soils. In contrast, pine was virtually ubiquitous in the historical forests of the Ouachitas. In nearly all cases (at least in the Ouachitas), *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 some examples of this system, the aggregate importance of hardwoods may be greater than pine, especially on subxeric and mesic sites.

Ecological site concept

Clayey upland and high terrace soils in MLRA 117.

Associated sites

NX117X01Y030	Flood Plain Loamy bottomlands are found lower on the landscape.
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Table 1. Dominant plant species

Tree	(1) <i>Quercus</i> (2) <i>Pinus echinata</i>
Shrub	(1) <i>Vaccinium</i>
Herbaceous	Not specified

Legacy ID

F117XY031AR

Physiographic features

This site is on uplands and older terraces.

Table 2. Representative physiographic features

Landforms	(1) Hills > Hill (2) Terrace (3) Hillside (4) Hillside or mountainside
Flooding frequency	None
Ponding frequency	None
Elevation	152–762 m
Slope	5–50%
Water table depth	152 cm
Aspect	Aspect is not a significant factor

Climatic features

Climate

The average annual precipitation in this area is 42 to 55 inches (1,065 to 1,395 millimeters). The maximum precipitation occurs in spring and fall, and the minimum occurs in midsummer. Most of the rainfall occurs as high-intensity, convective thunderstorms. Snowfall is uncommon in winter. The average annual temperature is 55 to 61 degrees F (13 to 16 degrees C). The freeze-free period averages 225 days and ranges from 200 to 245 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	166-181 days
Freeze-free period (characteristic range)	192-206 days
Precipitation total (characteristic range)	1,194-1,346 mm
Frost-free period (actual range)	160-183 days
Freeze-free period (actual range)	186-208 days
Precipitation total (actual range)	1,194-1,397 mm
Frost-free period (average)	173 days
Freeze-free period (average)	198 days
Precipitation total (average)	1,270 mm

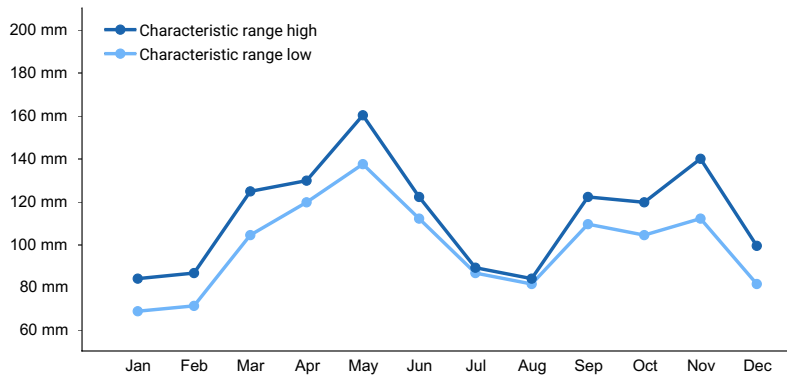


Figure 1. Monthly precipitation range

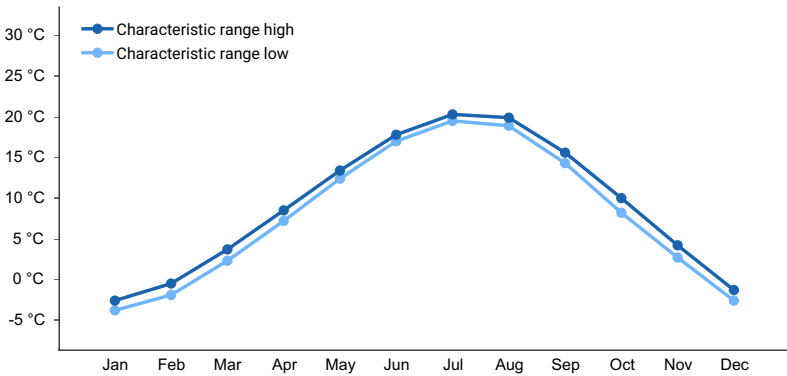


Figure 2. Monthly minimum temperature range

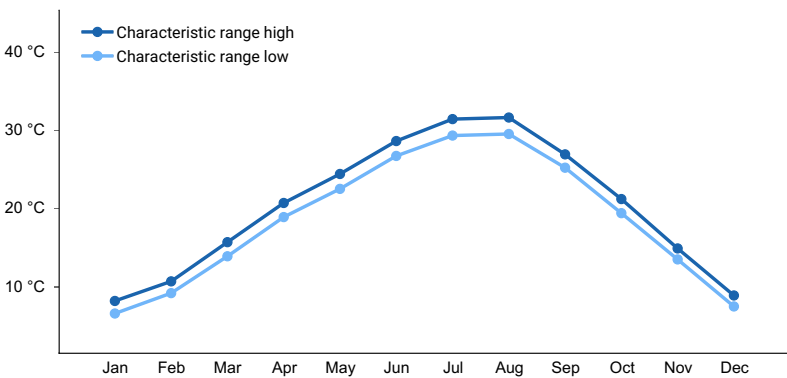


Figure 3. Monthly maximum temperature range

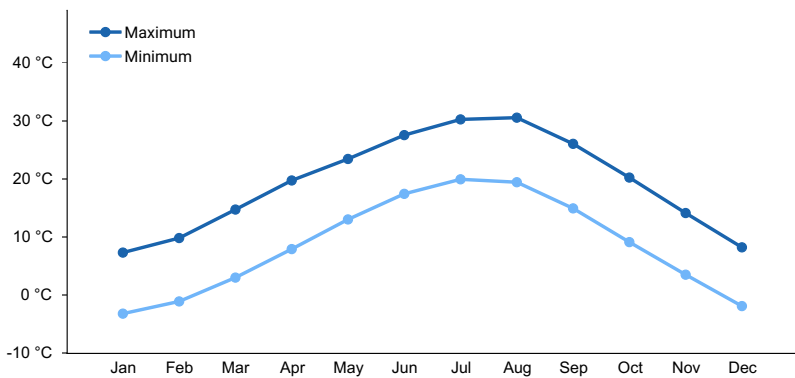


Figure 4. Monthly average minimum and maximum temperature

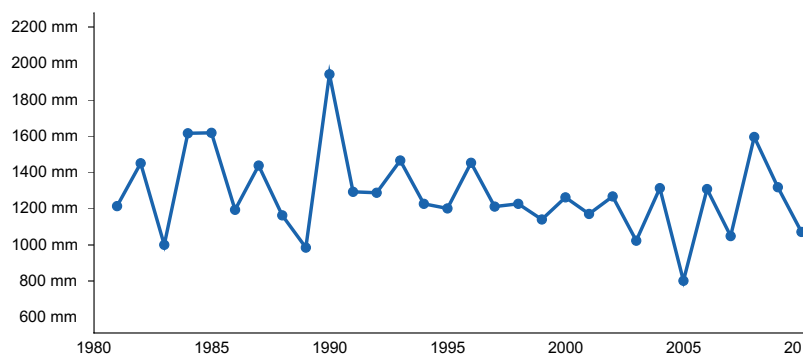


Figure 5. Annual precipitation pattern

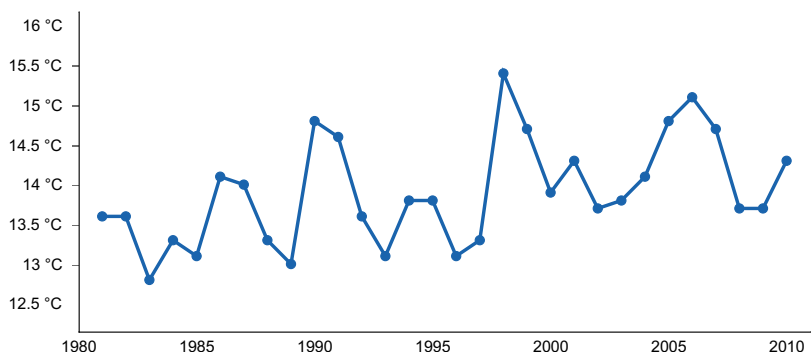


Figure 6. Annual average temperature pattern

Climate stations used

- (1) DEER [USC00031900], Deer, AR
- (2) HUNTSVILLE 1 SSW [USC00033544], Huntsville, AR
- (3) FAYETTEVILLE DRAKE FLD [USW00093993], Fayetteville, 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 is: Enders.

Enders is a deep, well drained, and very slow to moderate permeable soils, with very acidic soil reaction, and formed in residuum from acid shale.

Table 4. Representative soil features

Parent material	(1) Residuum–acid shale
Surface texture	(1) Gravelly fine sandy loam (2) Stony loam (3) Very gravelly sandy loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Very slow to moderate
Soil depth	122 cm
Available water capacity (0-101.6cm)	12.7–15.24 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)	4.5–5
Subsurface fragment volume <=3" (Depth not specified)	1–38%
Subsurface fragment volume >3" (Depth not specified)	1–50%

Ecological dynamics

Provisional Ecological Site (PES):
Clayey Uplands and Terraces
MLRA 117

This PES describes ecological communities likely to be found on soil in the PES soil grouping. Future field work is required to develop detailed and accurate ecological site descriptions (ESDs) that can be used by conservation planners for restoration and planning activities. This PES describes hypotheses based on available data from many different sources and scales and has not been developed using site-specific ecological field monitoring. Future ESD development may result in this initial PES group being split into more refined ecological communities.

Soil series currently included in this initial PES project are: Enders and Newnata. Some mapunits of Summit may be preliminarily included in this grouping. Additional soil series and/or mapunits may be added or removed from this group pending future field work.

Soil Description and Vegetation as listed in Official Soil Series Descriptions (OSDs):

Enders OSD: The Enders series consists of deep, well drained, very slowly permeable soils that formed in loamy and clayey residuum from shale, or interbedded shale and sandstone. These soils are on nearly level to moderately steep upland mountaintops and ridges and gently sloping to very steep mountain side slopes and footslopes. Slopes range from 1 to 65 percent.

USE AND VEGETATION: Most of this soil is in forest, but some is cropped to cotton, corn, and small grains. Native vegetation was post oak, red oak, white oak, hickory, and shortleaf pine

Newnata OSD: The Newnata series consists of deep, well drained, slowly permeable soils that formed in residuum weathered from interbedded limestone, alkaline shale and siltstone. These soils are on hillsides and ridges with slopes ranging from 3 to 60 percent.

USE AND VEGETATION: Principal use is woodland with some areas used for pasture. Forest vegetation includes eastern redcedar, northern red oak, shortleaf pine, black locust, hackberry, green ash, black gum, shagbark hickory, and white oak. Tame grasses are mainly bermudagrass and tall fescue. Native vegetation is mixed hardwoods and pine

Summit OSD: The Summit series consists of very deep, moderately well drained and somewhat poorly drained soils that formed in clayey colluvium or residuum weathered from shales of Pennsylvanian age. These soils are on interfluvies, divides, and hillslopes. Slope ranges from 0 to 12 percent.

Trees listed in NASIS for the mapunits within this PES group are southern red oak, "red oak", shortleaf pine, white oak, northern red oak, and eastern red cedar.

Listed trees for Enders and Newnata in the USDA-NRCS county soil surveys for counties in MLRA 117 include: shortleaf pine, southern red oak, white oak, scarlet oak, black oak, northern red oak, elm, blackgum, shagbark hickory, ash, red maple, and loblolly pine. Disturbance and successional species include eastern red cedar, black

locust, honey locust, and hackberry.

Ecological Dynamics

State 1, Phase 1.1: Plant species dominants:

Oak (*Quercus* spp.) – shortleaf pine (*Pinus echinata*) / blueberries (*Vaccinium* spp.) / little blue stem (*Schizachyrium scoparium*)

This PES describes a hardwood forest community clayey soils in uplands and on terraces in MLRA 117. Only two tree species can be selected for entry into the ESIS database as dominants: however, multiple tree species may be co-dominant on these sites.

Co-dominant tree layer on these sites may include southern red oak, scarlet oak, black oak, northern red oak, white oak, elm, shagbark hickory, pignut hickory, and blackgum. Drier mapunits, such as south and southwestern aspects, might favor hawthorns (*Crataegus* spp.), blackjack oak (*Quercus marilandica*), and post oak (*Quercus stellata*). Northern aspects may include more mesic species such as northern red oak (*Quercus rubra*), white oak (*Q. alba*), and mockernut hickory (*Carya tomentosa*).

The shrub/sub-canopy will include red maple (*Acer rubrum*), flowering dogwood (*Cornus florida*), persimmon (*Diospyros virginiana*), eastern red cedar (*Juniperus virginiana*) and hawthorns (*Crataegus* spp.). The understory vegetation will sparse in older communities and will include a variety of herbs, forbs and grasses. More field data is needed to define midstory and understory species dominance on these soils, as limited site-specific data is available. Future field monitoring of high quality sites will occur during the development of ecological site descriptions (ESDs) and will provide the detailed information needed to support conservation planning.

State 2. Pastureland

State 2, Phase 2.1: Managed Pasture.

Plant species dominants for a managed pasture state will be what is seeded and maintained based on management. Many of these sites are or have been pastured. NRCS county soil surveys list the following forage plants as suitable for these sites: tall fescue, bermudagrass, bahagrass, clover, and lespedeza.

Grass and legumes within this pasture phases will depend on the level of management inputs including seeding, weed management, and land uses. As with all sites, soil characteristics and management inputs will influence production levels. Species of both warm-season and cool-season grasses are feasible for these sites

Management of pasture sites should follow conservation planning standards and protocols which will benefit water quality, forage production, and soil health.

Transitioning this state to a reference condition would likely require extensive and long-term timber stand improvement practices including control of non-native vegetation and management for desired native tree, shrub and understory species.

State 3. Transitional Field

State 3, Phase 3.1: Plant species dominants: shortleaf pine (*Pinus echinata*) – maple (*Acer* spp.) / sumac (*Rhus* spp.) / broomsedge (*Andropogon virginicus*)

Tree species would be dependent upon several factors including severity and duration of disturbance, adjacent plant communities, available seed sources, post-disturbance management (control of invasive plants, grazing, etc.). A wide range of hardwood seedlings and saplings is possible in this successional stage and may include sweetgum, cottonwood, sycamore, maples, ashes, black cherry, black gum, pines, osage orange, and if seed sources are nearby, multiple species of oaks and hickories.

Shrub species may include coral berry (*Symphoricarpos orbiculatus*), blueberries (*Vaccinium* spp.), berries (*Rubus* spp.), sumac (*Rhus* spp.), wild roses (*Rosa* spp.),

Weedy species will be common if not managed. Species will depend on previous land use, ongoing disturbance

(mowing, herbicides, grazing, etc.) and seed sources. Species may include Chervil (*Chaerophyllum tainturieri*), poison hemlock (*Conium maculatum*), giant ironweed (*Vernonia gigantea*), wild carrot (*Daucus carota*), rattlesnake master (*Eryngium yuccifolium*), Common milkweed (*Asclepias syriaca*), ragweed (*Ambrosia artemisiifolia*), giant ragweed (*Ambrosia trifida*), lanceleaf ragweed (*Ambrosia bidentata*), mayweed (*Anthemis cotula*), bull thistle (*Cirsium vulgare*), wax goldenweed (*Grindelia ciliata*), bitter sneezeweed (*Helenium amarum*), stinkweed (*Pluchea camphorate*), goldenrods (*Solidago* spp.), cocklebur (*Xanthium strumarium*), morning glory (*Ipomoea* spp.), spurges (*Euphorbia* spp.), heal-all (*Prunella vulgaris*), plantain (*Plantago* spp.), and many other native and non-native forbs, herbs, and vines.

Some landowners may wish to maintain this successional state for wildlife habitat, hunting, or pollinator habitat. Transitioning this state to a reference condition will require long-term timber stand improvement practices to control non-native vegetation and manage for higher quality tree species.

Most of these sites have historically been disturbed either through logging, grazing, other agricultural practices or development. Currently a large portion of these soils are used as pasturelands or are in low-quality mixed hardwoods.

International Vegetation Classification (IVC) Section.

NatureServe ecological associations that may be found on these soils. Future field work is needed to confirm community composition for these soils prior to using this information for conservation planning. Possible community associations include:

Pinus echinata - *Quercus alba* / *Schizachyrium scoparium* Woodland

Translated Name: Shortleaf Pine - White Oak / Little Bluestem Woodland

Common Name: Shortleaf Pine - Oak Dry-Mesic Woodland

Unique Identifier: CEG002394

Classification Approach: International Vegetation Classification (IVC)

Summary: This shortleaf pine - oak woodland type is found in the central United States, in the Ozarks and Ouachita Mountains of Missouri and Arkansas, likely extending into Oklahoma. Stands occur on upper to middle, south-facing slopes, saddles, and flatter ridgelines. Soils are shallow to deep (25-100 cm), and well-drained. Parent material is a variety of sandstone and mixed sandstone/shale-derived substrates or, in parts of the Missouri Ozarks and central Ouachitas, chert substrates. The vegetation contains an open canopy. The canopy is dominated by *Pinus echinata* codominating with *Quercus alba*, *Quercus rubra*, or *Quercus velutina*, either singly or in combination. *Pinus echinata* often forms an emergent canopy over the oaks. Other woody species may be present in the shrub and sapling strata. Species from examples in the central Ouachita Mountains include *Acer rubrum*, *Amelanchier arborea*, *Carya tomentosa* (= *Carya alba*), *Castanea pumila* var. *ozarkensis* (= *Castanea ozarkensis*), *Cornus florida*, *Hamamelis virginiana*, *Nyssa sylvatica*, *Ostrya virginiana*, *Prunus serotina*, *Sassafras albidum*, *Toxicodendron radicans*, *Vaccinium arboreum*, *Vaccinium stamineum*, and *Vitis rotundifolia*. Cover of the herbaceous stratum is variable (20-50%) depending on crown closure and fire history and comprises a mixture of graminoid and forb species. The herbaceous layer is often dominated by *Schizachyrium scoparium* and *Dichanthelium linearifolium*, but a diversity of herbaceous species is present. Other herbaceous species can include *Antennaria plantaginifolia*, *Symphotrichum anomalum* (= *Aster anomalus*), *Baptisia bracteata* var. *leucophaea*, *Carex* sp., *Clitoria mariana*, *Cunila origanoides*, *Danthonia spicata*, *Desmodium marilandicum*, *Desmodium glutinosum*, *Lespedeza capitata*, *Lespedeza virginica*, *Dichanthelium latifolium*, *Dichanthelium sphaerocarpon* var. *isophyllum*, *Solidago caesia*, *Solidago petiolaris*, and *Solidago ulmifolia*.

Pinus echinata - *Quercus alba* - *Quercus rubra* / *Vaccinium arboreum* / *Chasmanthium sessiliflorum* Forest

Translated Name: Shortleaf Pine - White Oak - Northern Red Oak / Farkleberry / Longleaf Woodoats Forest

Common Name: Interior Highlands Dry-Mesic Shortleaf Pine - Oak Forest

Unique Identifier: CEG007489

Classification Approach: International Vegetation Classification (IVC)

Summary: This upland, subxeric to submesic shortleaf pine - oak forest community is the matrix forest community of the Ouachita Mountains and surrounding areas, ranging from eastern Oklahoma to western Arkansas and southern Missouri. Stands occur on upper to middle, south-facing slopes, saddles, and flatter ridgelines. Soils are

shallow to deep (25-100 cm). Parent material is a variety of sandstone and mixed sandstone-shale-derived substrates, or, in parts of the Missouri Ozarks, chert substrates. The canopy is dominated by *Pinus echinata* codominating with *Quercus alba*, *Quercus rubra*, or *Quercus velutina*, either singly or in combination. Shortleaf pine often forms an emergent canopy over the oaks. *Carya texana* or *Cornus florida* are typical subcanopy components. Other trees in the canopy and subcanopy can include *Acer rubrum*, *Amelanchier arborea*, *Carya tomentosa* (= *Carya alba*), *Nyssa sylvatica*, *Ostrya virginiana*, *Quercus falcata*, and *Quercus stellata*. There is little understory, and the shrub layer is typically open with *Vaccinium pallidum* common as a low shrub and *Vaccinium arboreum* as a locally abundant tall shrub. Other species in the shrub stratum vary among occurrences but can include *Callicarpa americana*, *Lyonia ligustrina*, *Morus rubra*, *Sassafras albidum*, *Styrax americanus*, and *Ulmus alata*, and the vines *Smilax glauca*, *Smilax bona-nox*, *Smilax rotundifolia*, *Toxicodendron radicans*, and *Vitis rotundifolia*. The density of the herbaceous stratum varies with age of the stand and disturbance history but increases with fire. Composition of the herbaceous stratum in these forests can be quite diverse but tends to vary among occurrences. Most examples of this association exist with sparse shrub and herb strata and ground cover dominated by leaf litter. Typical herbaceous species include *Antennaria parlinii*, *Antennaria plantaginifolia*, *Symphyotrichum anomalum* (= *Aster anomalus*), *Symphyotrichum patens* (= *Aster patens*), *Brachyelytrum erectum*, *Chasmanthium latifolium*, *Chasmanthium sessiliflorum*, *Danthonia spicata*, *Desmodium glabellum*, *Desmodium laevigatum*, *Desmodium nudiflorum*, *Desmodium rotundifolium*, *Dichanthelium linearifolium*, *Dichanthelium boscii*, *Dichanthelium commutatum*, *Helianthus divaricatus*, *Helianthus hirsutus*, *Helianthus x laetiflorus*, *Hieracium gronovii*, *Hypericum hypericoides* ssp. *hypericoides*, *Piptochaetium avenaceum*, *Schizachyrium scoparium*, *Solidago hispida*, *Solidago odora*, *Solidago ulmifolia*, and *Viola pedata*. Fire increases coverage by grasses (*Schizachyrium scoparium* and *Andropogon gyrans* (= *Andropogon elliottii*)) and legumes. Although this is one of the most widespread forest types in the region, high quality, mature examples are uncommon. Mature, fire-suppressed examples lose the shortleaf pine and fire-tolerant species and show increases in stem density and fire-intolerant species. Mature, fire-maintained examples are extremely rare. Much of this forest community is managed to maintain specific tree densities and overstory composition.

Unique Identifier: CEG007815

Pinus echinata / *Schizachyrium scoparium* - *Solidago ulmifolia* - *Monarda russeliana* - *Echinacea pallida* Woodland

Translated Name: Shortleaf Pine / Little Bluestem - Elmleaf Goldenrod - Red-purple Beebalm - Pale Purple Coneflower Woodland

Common Name: Ouachita Shortleaf Pine Savanna

Classification Approach: International Vegetation Classification (IVC)

These open *Pinus echinata* woodlands were more common historically. Currently few mature, high-quality examples of this community exist, and they are usually dependent on management including prescribed fire.

Summary: This upland subxeric woodland community was a matrix forest type in the Ouachita Mountains and, historically, north into parts of the Ozarks. This community occurs on a variety of sandstone and mixed sandstone/shale-derived substrates in the northern and western Ouachita Mountains and on chert/novaculite-derived substrates in the central Ouachitas. On the sharper ridges of the central Ouachitas (novaculite uplift), these woodlands are reduced in extent and bounded by submesic pine - oak forest on lower slopes and xeric oak woodlands on the ridgelines. This is a fire-maintained community where woody succession and canopy closure can be rapid with fire suppression. Virtually extirpated, these woodlands have been restored in part by thinning and prescribed burning. This woodland community has an open canopy dominated by *Pinus echinata* and a dense, diverse herbaceous layer. Scattered oaks (*Quercus alba*, *Quercus stellata*, *Quercus velutina*, *Quercus marilandica*) may appear in the canopy or subcanopy. These are expansive, open woodlands on gentle slopes, saddles and flatter ridgelines in eastern Oklahoma, western Arkansas, and southern Missouri. The dense herbaceous stratum is dominated by both graminoid and forb species. Dominant graminoids include *Schizachyrium scoparium*, *Danthonia spicata*, *Chasmanthium sessiliflorum*, *Scleria triglomerata*, and *Dichanthelium* spp. Other graminoid species include *Andropogon gyrans*, *Andropogon gerardii*, *Andropogon virginicus*, *Chasmanthium latifolium*, *Gymnopogon ambiguus*, *Muhlenbergia schreberi*, *Panicum virgatum*, *Paspalum* sp., *Sorghastrum nutans*, *Sporobolus compositus* (= *Sporobolus asper*), and *Tridens flavus*. Dominant forb species include *Solidago ulmifolia*, *Clitoria mariana*, *Lespedeza repens*, *Antennaria plantaginifolia*, *Symphyotrichum anomalum* (= *Aster anomalus*), *Symphyotrichum patens* (= *Aster patens*), *Erechtites hieraciifolius*, *Helianthus hirsutus*, and *Monarda russeliana*. Many other forb species are known from these woodlands. Some of the more typical ones include *Acalypha virginica*, *Amphicarpaea bracteata*, *Baptisia nuttalliana*, *Chamaecrista fasciculata* (= *Cassia fasciculata*), *Coreopsis tinctoria*, *Conyza canadensis*, *Cunila origanoides*, *Dalea candida*, *Desmodium ciliare*, *Echinacea pallida*, *Echinacea purpurea*, *Euphorbia corollata*, *Pseudognaphalium obtusifolium* (= *Gnaphalium obtusifolium*), *Hieracium gronovii*, *Lespedeza*

spp., *Liatris squarrosa*, *Phlox* spp., *Polygala alba*, *Pycnanthemum tenuifolium*, *Rudbeckia hirta*, *Solidago hispida*, *Solidago odora*, *Solidago radula*, *Stylosanthes biflora*, and *Tephrosia virginiana*. Shrubs are sparse, especially in more frequently burned locations. Shrub density is related to fire frequency, and many shrubs are coppices, sprouting from stumps. Some common shrubs and vines include *Baptisia bracteata* var. *leucophaea*, *Carya tomentosa* (= *Carya alba*), *Carya texana*, *Ceanothus* spp., *Crataegus crus-galli*, *Mimosa microphylla*, *Prunus serotina*, *Quercus stellata*, *Rhus copallinum*, *Rhus glabra*, *Rubus* spp., *Toxicodendron radicans*, *Ulmus alata*, *Vaccinium arboreum*, *Vaccinium pallidum*, *Viburnum rufidulum*, and *Vitis rotundifolia*, but many others can occur. The type location is in Scott County, Arkansas.

Quercus alba - *Quercus stellata* - *Quercus velutina* / *Schizachyrium scoparium* Woodland

Translated Name: White Oak - Post Oak - Black Oak / Little Bluestem Woodland

Common Name: Ozark White Oak - Post Oak / Bluestem Woodland

Unique Identifier: CEGLO02150

Classification Approach: International Vegetation Classification (IVC)

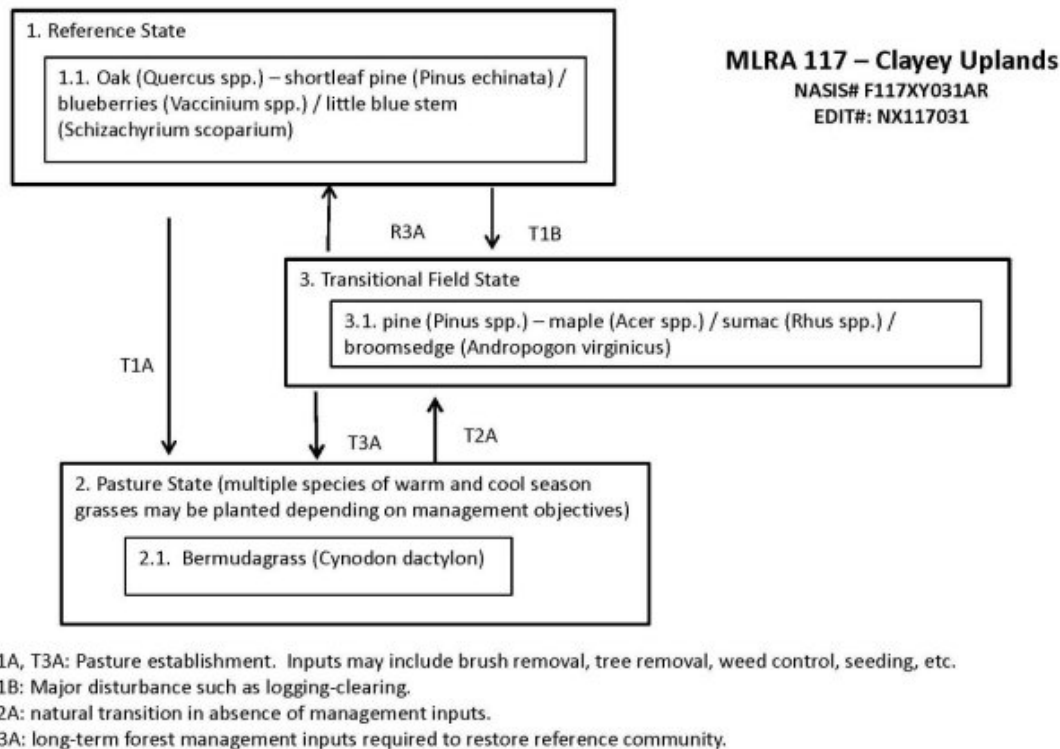
Summary: This white oak - post oak woodland community is found in the Ozarks and adjacent regions of the United States. Stands occur on gentle to steep hills, plains, ridges, and flats of all aspects. The soils are well- to very rapidly drained, and very shallow to deep (0-100 cm). The parent material is chert, sandstone, or igneous with areas of bedrock or rock residuum present at the surface. This woodland community has 20-60% tree canopy cover, which is short to medium in height (7-20 m) and dominated by species such as *Crataegus* spp., *Pinus echinata*, *Quercus alba*, *Quercus marilandica*, *Quercus stellata*, and *Quercus velutina*. The trees are often limby or shrubby in areas of sparse cover where bedrock is exposed. When an understory is present it is variable, consisting of a mosaic of scattered shrubs or groups of small trees. Shrubs include *Rhus aromatica*, *Vaccinium arboreum*, and *Vaccinium pallidum*. The ground cover is dominated by grasses such as *Andropogon gerardii*, *Schizachyrium scoparium*, and *Sorghastrum nutans*, with sparse to mixed forbs. Mosses and lichens are often present.

Classification Confidence: Moderate

Classification Comments: Only a few occurrences of this community are known. Most of the original sites have been destroyed by logging, grazing, conversion to forest because of fire suppression, or invasion by exotic species.

Global Range: This white oak - post oak woodland community is found in the Ozark region of the United States, particularly in Missouri and Arkansas.

State and transition model



State 1 Reference

This community is a shortleaf pine / mixed oak and hickory forest.

Dominant plant species

- southern red oak (*Quercus falcata*), tree
- northern red oak (*Quercus rubra*), tree
- black oak (*Quercus velutina*), tree
- white oak (*Quercus alba*), tree
- pine (*Pinus*), tree
- hybrid hickory (*Carya*), tree
- blueberry (*Vaccinium*), shrub
- flowering dogwood (*Cornus florida*), shrub
- hawthorn (*Crataegus*), shrub

Community 1.1 Reference: Forestland

This community consists of oaks, shortleaf pine, and other eastern hardwood tree species. The understory consist of a variety of shrubs, herbs, forbs, and vines.

Dominant plant species

- southern red oak (*Quercus falcata*), tree

- white oak (*Quercus alba*), tree
- northern red oak (*Quercus rubra*), tree
- shortleaf pine (*Pinus echinata*), tree
- hybrid hickory (*Carya*), tree
- northern red oak (*Quercus rubra*), tree
- blueberry (*Vaccinium*), shrub
- flowering dogwood (*Cornus florida*), shrub
- hawthorn (*Crataegus*), shrub

State 2

Pastureland

Species depend on management objectives. Numerous species of warm season, cool season, native and non-native grasses may be utilized on these sites. Forbs and legume may be added to improve pasture quality. Information on pasture production for soils in this group can be found in NRCS County Soil Surveys.

Dominant plant species

- Bermudagrass (*Cynodon dactylon*), grass
- tall fescue (*Schedonorus arundinaceus*), grass
- red clover (*Trifolium pratense*), grass

Community 2.1

Pastureland

Species will depend on management. Multiple species of warm season, cool season, native and non-native grasses may be utilized. Forbs and legumes may be added to improve pasture quality.

Dominant plant species

- Bermudagrass (*Cynodon dactylon*), grass
- tall fescue (*Schedonorus arundinaceus*), grass
- red clover (*Trifolium pratense*), grass

State 3

Transitional

This is a successional state that is characterized by tree seedling and sapling, various native and non-native shrubs, and a wide variety of native and non-native grasses, forbs, herbs and vines. Variation in community composition will occur based on slope and aspect. Species on site, especially grasses, will be dependent upon the characteristics of the previous state (pasture or woodland), past disturbances, on-going disturbances, nearby seed sources, and management inputs, if applicable. Therefore, many species, both cool and warm season grasses, native and non-native grasses, may be on these sites. This state is often found when a pasture has been abandoned and the natural succession is moving the community toward a woodland state. These communities often have a high level of benefits for wildlife and pollinators, and are often managed as such.

Dominant plant species

- pine (*Pinus*), tree
- maple (*Acer*), tree
- tuliptree (*Liriodendron tulipifera*), tree
- blackgum (*Nyssa sylvatica*), tree
- blackberry (*Rubus*), shrub
- sumac (*Rhus*), shrub

Community 3.1

Transitional

This is a successional state that is characterized by tree seedling/sapling, various native and non-native shrubs, and

a wide variety of native and non-native grasses, forbs, herbs and vines. Variation in community composition will occur based on slope and aspect. Species on site, especially grasses, will be dependent upon the characteristics of the previous state (pasture or woodland), past disturbances, on-going disturbances, nearby seed sources, and management inputs, if applicable. Therefore, many species, both cool and warm season grasses, native and non-native grasses, may be on these sites. This state is often found when a pasture has been abandoned and the natural succession is moving the community toward a woodland state. These communities often have a high level of benefits for wildlife and pollinators, and are often managed as such.

Dominant plant species

- maple (*Acer*), tree
- pine (*Pinus*), tree
- blackberry (*Rubus*), shrub
- sumac (*Rhus*), shrub

Transition T1A

State 1 to 2

logging/clearing of forest. pasture establishment

Transition T1B

State 1 to 3

Large scale disturbance such as clear cutting.

Transition T2A

State 2 to 3

Natural succession.

Restoration pathway R3A

State 3 to 1

Forest management inputs will be required to transition to a restored pine-oak forest. Practices may include tree planting, brush control, non-native plant control, prescribed burning, and timber stand improvement work. Inputs will be determined by the plant community on site, the degree of succession, available seed sources, and management objectives.

Conservation practices

Brush Management
Tree/Shrub Establishment
Forest Stand Improvement
Restoration and Management of Natural Ecosystems

Transition T3A

State 3 to 2

Pasture establishment.

Conservation practices

Brush Management
Forage and Biomass Planting
Grazing Management Plan - Written
Grazing Management Plan - Applied

Additional community tables

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

Approval

Nels Barrett, 8/22/2019

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:

17. Perennial plant reproductive capability:
