USDA Natural Resources Conservation Service

Ecological site PX135B01Y011
Sandy Terrace

Last updated: 9/22/2023
Accessed: 05/03/2024

General information

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

MLRA notes

Major Land Resource Area (MLRA): 135B–Cretaceous Western Coastal Plain

Major Land Resource Area 135B, Cretaceous Western Coastal Plain, is in Arkansas and Oklahoma. This MLRA is about 3,970 square miles (10,290 square kilometers).

This area is mostly in the West Gulf Coastal Plain Section of the Coastal Plain Province of the Atlantic Plain. It consists of nearly level to moderately sloping uplands, terraces, and flood plains. Valley floors, side slopes, and ridgetops are underlain by clay, marl, and chalk. These parent materials are highly erodible, causing gullies to form. Elevations generally range from 260 to 570 feet (80 to 170 meters), with lower and higher elevations found on valley floors and ridgetops.

Cretaceous marine sediments underlie most of this MLRA. Geologic members of the Lower Cretaceous include a basal member of gravel and conglomerate rocks. Members of the Upper Cretaceous consist of clay marls, thin limestones, sandy marls, and fine grained sands. Other formations consist of crystalline limestone, chalk, and marly chalk, some of which contain fossils.

The dominant soil orders in this MLRA are Inceptisols and Alfisols, with Entisols and Vertisols present to a lesser extent. The soils in the area have a thermic soil temperature regime, an ustic soil moisture regime, and smectitic or mixed mineralogy.

Ecological site concept

The Sandy Terrace Ecological Site is on dune fields along dunes and paleoterraces. This site has slopes between 1 and 10 percent and elevations ranging from 300 to 830 feet (90 to 250 meters). Soils are formed in residuum and colluvium derived from sandstone and are deep to very deep. Soils are somewhat excessively drained and have a rapid permeability class. This site is characterized by sand in the particle size control section and an acidic pH.

Associated sites

PX135B01Y013	**Poorly Drained Terrace** Found on coastal plains along terraces. This ecological site is differentiated from the Sandy Terrace Ecological Site by poorly drained soils in the winter and spring seasons.

Similar sites

PX135B01Y012	**Terrace** Found on coastal plains along terraces. This ecological site is differentiated from the Sandy Terrace Ecological Site by a clay soil texture in the particle size control section and a briefly perched water table in the winter and spring seasons.

Table 1. Dominant plant species

Tree	(1) *Quercus* (2) *Liquidambar*
Shrub	(1) *Rhus* (2) *Cornus*
Herbaceous	(1) *Andropogon gerardii* (2) *Schizachyrium scoparium*

Legacy ID

F135BY011AR

Physiographic features

This ecological site is found on dune fields along dunes and paleoterraces. This sites has slopes between 1 and 10 percent. Elevations range from 300 to 830 feet (90 to 250 meters). Runoff class varies from negligible to very low, with no ponding or flooding.

Table 2. Representative physiographic features

Landforms	(1) Dune field > Dune (2) Paleoterrace
Runoff class	Negligible to very low
Flooding frequency	None
Ponding frequency	None
Elevation	91–253 m
Slope	1–10%
Aspect	Aspect is not a significant factor

Climatic features

This ecological site is characterized by hot summers, cool winters, and mild spring and fall temperatures. Mean annual precipitation is 51 inches. The average frost-free period is 193 days, and the average freeze-free period is 217 days. The highest precipitation occurs in May (6.2 inches), and the lowest occurs in August (2.8 inches). Precipitation varies across the MLRA, with decreasing precipitation from east to west. The warmest month of the year is August (94°F average high), and the coolest is January (29°F average low).

Thunderstorms and heat waves are common and occur frequently during summer months. Catastrophic storm events such as tornados, ice-storms, floods, and hail-storms are also known to occasionally occur within this ecological site. According to the Oklahoma Water Resource Board, drought occurs on 5 to 10 year cycles. The EPA predicts that droughts will become more severe throughout Arkansas due to longer periods without rain and an increase in very hot days (EPA, 2016).

Data was provided by the Antlers, Hugo, Idabel, DeQueen, Nashville, and Arkadelphia climate stations. Site specific data should be obtained by accessing the database provided by the National Centers for Environmental Information (https://www.ncdc.noaa.gov/cdo-web/search).

Table 3. Representative climatic features

Frost-free period (characteristic range)	187-200 days
Freeze-free period (characteristic range)	211-223 days
Precipitation total (characteristic range)	1,219-1,372 mm
Frost-free period (actual range)	184-202 days

Freeze-free period (actual range)	204-226 days
Precipitation total (actual range)	1,194-1,397 mm
Frost-free period (average)	193 days
Freeze-free period (average)	217 days
Precipitation total (average)	1,295 mm

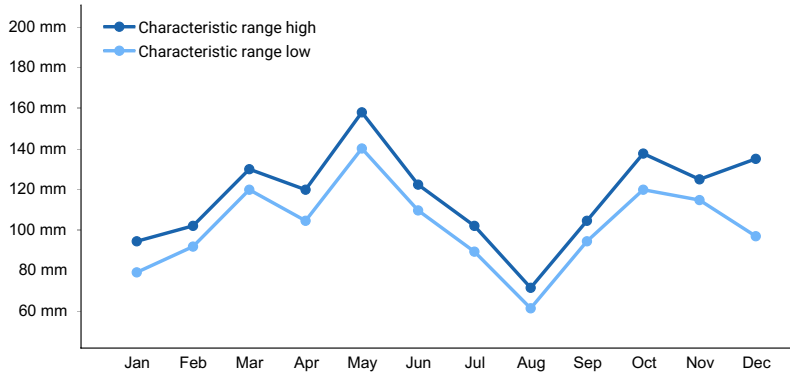


Figure 1. Monthly precipitation range

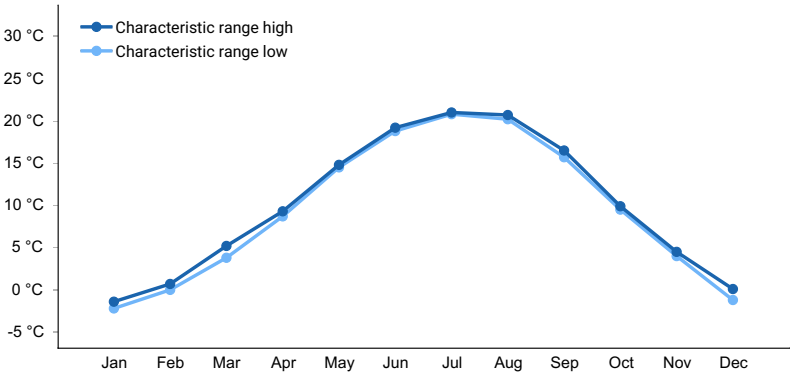


Figure 2. Monthly minimum temperature range

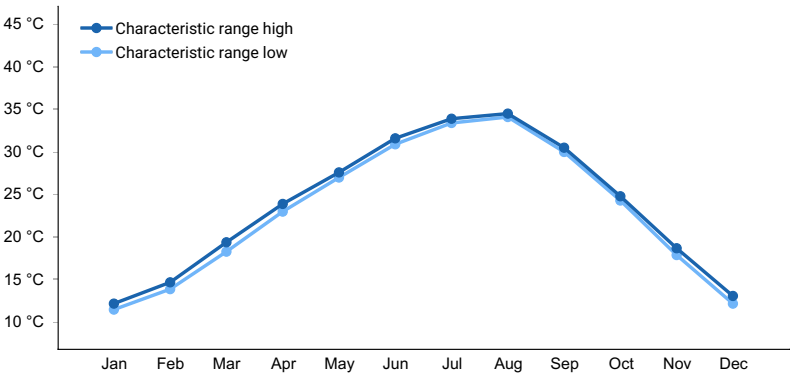


Figure 3. Monthly maximum temperature range

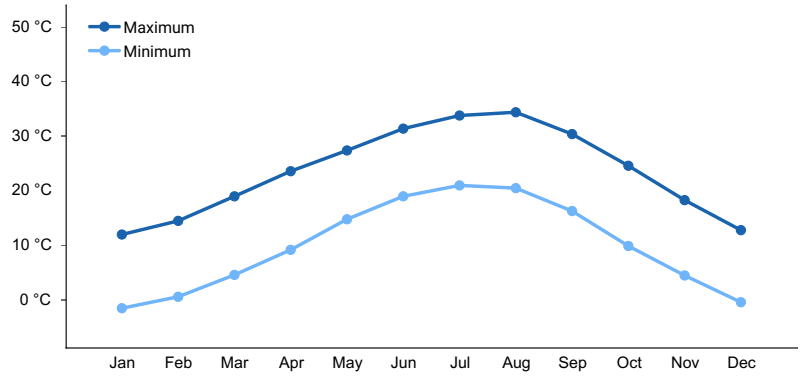


Figure 4. Monthly average minimum and maximum temperature

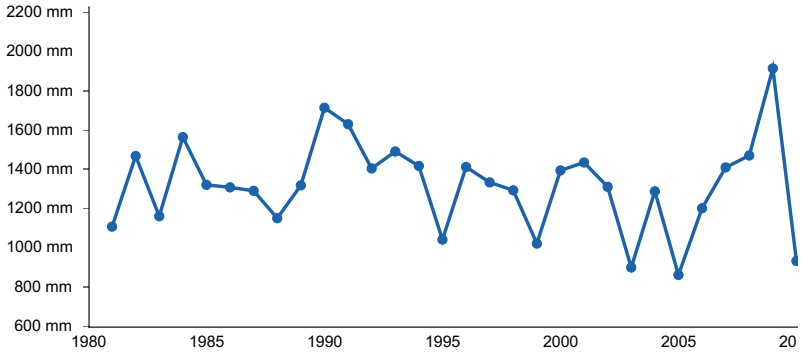


Figure 5. Annual precipitation pattern

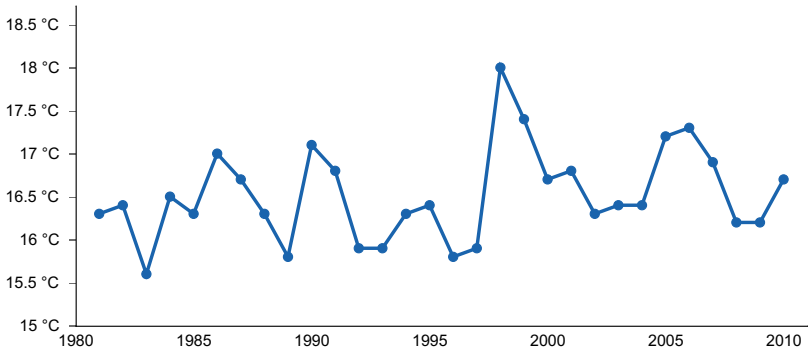


Figure 6. Annual average temperature pattern

Climate stations used

- (1) ANTLERS [USC00340256], Antlers, OK
- (2) HUGO [USC00344384], Hugo, OK
- (3) IDABEL [USC00344451], Broken Bow, OK
- (4) DEQUEEN [USC00031948], De Queen, AR
- (5) NASHVILLE [USC00035112], Nashville, AR
- (6) ARKADELPHIA 2 N [USC00030220], Arkadelphia, AR

Influencing water features

This ecological site is not significantly influenced by water features.

Wetland description

This ecological site is not significantly influenced by wetlands.

Soil features

The soils associated with this ecological site are formed in residuum and colluvium derived from sandstone. These soils are deep to very deep, somewhat excessively drained, and have a rapid permeability class. A loamy fine sand surface texture is common. Important abiotic characteristics associated with this site are an acidic pH and sand throughout the particle size control section.

The soil series associated with this site are Alaga and Glenpool.

Table 4. Representative soil features

Parent material	(1) Eolian sands–sandstone
Surface texture	(1) Loamy fine sand
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained
Permeability class	Rapid
Soil depth	152–203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	5.08–10.92 cm
Soil reaction (1:1 water) (Depth not specified)	5.6–6.5
Subsurface fragment volume <=3" (Depth not specified)	0–1%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The Sandy Terrace reference state consists of a bottomland hardwood forest. The common trees species for this state are oaks, hickories, loblolly pine, and sweet gum (Eldredge, 1937).

Fire has a significant influence on this ecological site. The historical average fire-return interval was likely between 3 and 25 years (Guyette and Spetich, 2003; Hallgren, DeSantic, and Burton, 2012). These wildfires would occur naturally through lightning strikes, but the majority were probably ignited by anthropogenic sources (DeSantis, Hallgren, and Stahle, 2010). Native species evolved with and responded well to fires (Spetich and Hong He, 2008; Engle and Bidwell, 2001). Fires on upland ecological sites are likely moderate to low severity, due to forested conditions and lower amounts of ground vegetation (Carey, 1992).

Grazing and farming can occur on this ecological site. Changes to the ecological dynamics are proportional to the intensity of livestock grazing and can be accelerated by overgrazing (Angerer, Fox, and Wolfe, 2013; Kohl, 2016). For example, desirable grasses and forbs are repeatedly grazed by livestock, weakening, and potentially killing or replacing these species with less desirable species (Smith, 1940).

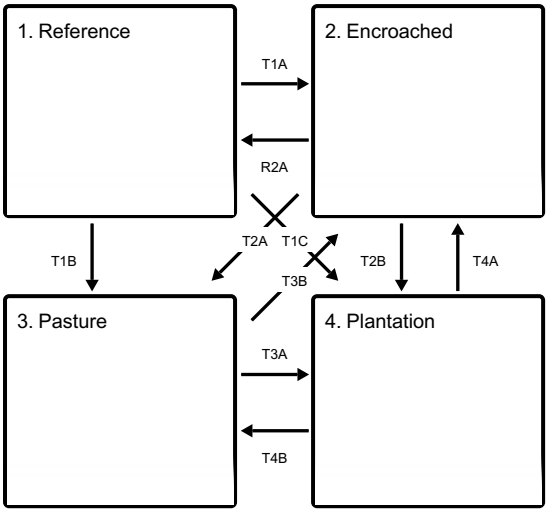
Climate related events, such as hail-storms, tornados, thunderstorms, and extreme precipitation, occur on these sites. Hail-storms can reduce canopy size, increase litter deposition, and increase tree bark removal. When paired with other disturbances, such as fire, the effects on tree species were much greater than in areas not affected by hail-storms (Gower et al., 2015). Tornados have been shown to change plant community compositions in savanna ecosystems, favoring hardwoods and eliminating softwoods (Liu et al., 1997). Thunderstorms greatly effect ecosystem dynamics. Thunderstorms generally occur during summer months but can occur during every season. If a fire is started by a lightning strike, there will be different effects in the ecosystem depending on the season (Hiers, Wyatt, and Mitchell, 2000).

A state and transition model has been created to explain this Ecological Site. However, sparse data availability only allowed basic principles to be explored and a small number of species to be recorded. More data will be collected to

provide a greater understanding of the ecological dynamics, as well as the resources consumption and distribution.

State and transition model

Ecosystem states



T1A - Absence of fire or alternative brush management, woody species encroachment.

T1B - Tree removal, mechanical and chemical woody vegetation suppression, tillage, introduce annual or perennial forage species.

T1C - Tree removal, brush management, plantation tree establishment and management.

R2A - Tree thinning, brush management, prescribed fire, and grazing.

T2A - Tree removal, mechanical and chemical woody vegetation suppression, tillage, introduce annual or perennial forage species.

T2B - Woody species removal, plantation tree planting, prescribed fire.

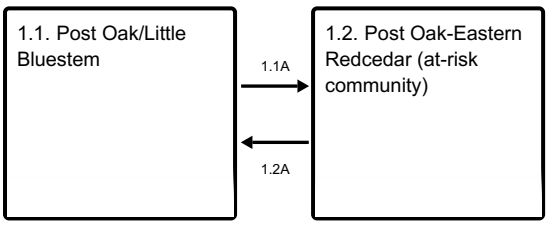
T3B - Lack of management or abandonment.

T3A - Forage species suppression, brush management, plantation tree establishment and management.

T4A - Lack of management or abandonment.

T4B - Woody species removal, prescribed fire, seeding, and grazing.

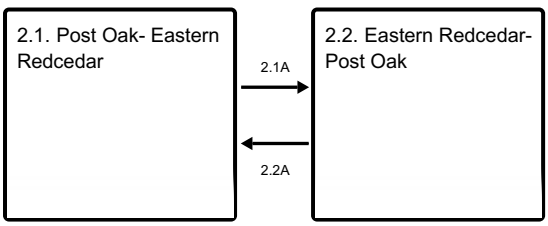
State 1 submodel, plant communities



1.1A - Absence of fire and natural regeneration over time

1.2A - Wildfire or other disturbance that reduces woody canopy

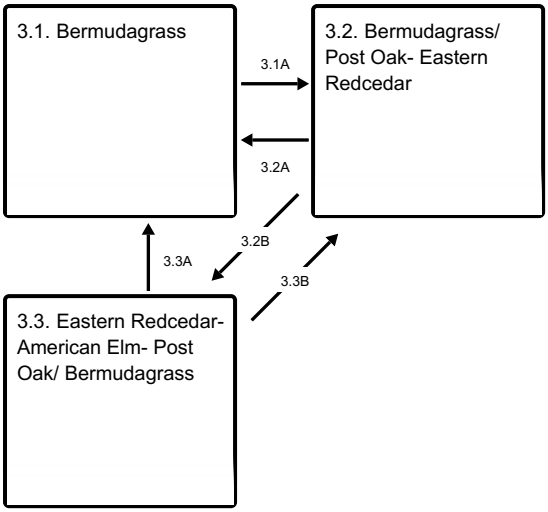
State 2 submodel, plant communities



2.1A - Fire suppression.

2.2A - Fire, mechanical tree removal.

State 3 submodel, plant communities



3.1A - Fire Suppression

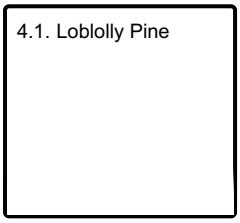
3.2A - Tree Removal, Brush Management

3.2B - Fire Suppression

3.3A - Tree Removal, Brush Management

3.3B - Tree Removal, Brush Management

State 4 submodel, plant communities



State 1
Reference

The Reference State is representative of the natural range of variability without major anthropogenic influences. Drivers: Fire frequency between 3 and 25 years, climate (decadal scale), insect and disease presence or establishment, and wildlife grazing or browsing. Feedbacks: Fire-tolerant species dominate the ecological site. Wildlife grazing or browsing decreases the amount of grass available, decreasing fire intensity and causing wildlife migration to a new grazing location.

Characteristics and indicators. The reference state consists of a bottomland hardwood forest. The common trees species for this state are oaks, hickories, loblolly pine, and sweet gum.

Dominant plant species

- oak (*Quercus*), tree
- hybrid hickory (*Carya*), tree
- loblolly pine (*Pinus taeda*), tree
- shortleaf pine (*Pinus echinata*), tree
- sumac (*Rhus*), shrub
- dogwood (*Cornus*), shrub
- big bluestem (*Andropogon gerardii*), grass
- little bluestem (*Schizachyrium*), grass
- Indiangrass (*Sorghastrum*), grass
- switchgrass (*Panicum virgatum*), grass

Community 1.1

Post Oak/Little Bluestem

This community phase is dominated by oak trees and warm-season, perennial tallgrasses. Dominant grasses are little bluestem, big bluestem, Indiangrass, and switchgrass. Common trees species include post oak, blackjack oak, white oak, and red oak.

Community 1.2
Post Oak-Eastern Redcedar (at-risk community)

This community phase has a moderately closed canopy with an understory of tallgrasses and midgrasses. The absence of fire has allowed post oak, blackjack oak, and eastern redcedar densities to increase. The competition from the increased canopy has led to a decrease in herbaceous plants.

Pathway 1.1A
Community 1.1 to 1.2

This pathway consists of absence of fire and the natural regeneration of woody species. It may also be coupled with excessive grazing pressure.

Pathway 1.2A
Community 1.2 to 1.1

This pathway consists of periodic wildfire that reduces the amount of woody vegetation. Drought and insect or disease outbreaks may also result in a reduced woody canopy.

Conservation practices

Prescribed Burning
Prescribed Grazing

State 2
Encroached

The encroached state is dominated by woody species. Driver: Absence of wildfire, seed dispersal by wildlife, climate (decadal scale), and canopy density. Feedbacks: Woody species dominate the ecological site, shading herbaceous species. As herbaceous species are outcompeted for resources, fire frequency decreases. Nutrient and water cycling are controlled by woody species.

Characteristics and indicators. The Encroached State consists of many woody species, especially eastern redcedar, where there is significant canopy closure. Time and fire frequency determine the community phases and species abundance and variation. As the woody canopy increases the hydrology of the site is altered. The increased canopy intercepts most of the precipitation. Understory species have less available water for growth and must compete with an extensive overstory root system.

Dominant plant species

- eastern redcedar (*Juniperus virginiana*), tree
- oak (*Quercus*), tree
- hybrid hickory (*Carya*), tree
- beech (*Fagus*), tree

Community 2.1
Post Oak- Eastern Redcedar

This community phase consists of oak, hickory, beech, and eastern redcedar. The canopy increases, causing a decrease in the herbaceous ground cover species. Eastern redcedar increases in size and quantity.

Community 2.2
Eastern Redcedar- Post Oak

This community phase is dominated by eastern redcedar. Oak, hickory, and beech species may be present. Oak, hickory, and beech species experience reduced vigor and reproductive capacity due shading and competition from eastern redcedar.

Pathway 2.1A
Community 2.1 to 2.2

This pathway consists of an absence of fire. The absence of fire and natural regeneration allows woody vegetation cover to increase.

Pathway 2.2A
Community 2.2 to 2.1

This pathway experiences a decrease in canopy cover, increasing the amount of sunlight that reaches the herbaceous vegetation on the ground. An increase in the herbaceous vegetation can lead to fires that reduce woody vegetation. Possible causes of decreased canopy cover are fire and mechanical tree removal.

State 3
Pasture

The Pasture State is characterized by the dominance of improved forage species. The quality and quantity of forb, grass, and legume species within this state will depend on the level of management inputs including seeding, weed management, and land uses. Species of both warm-season and cool-season grasses are feasible for these sites. Drivers: Mechanical soil disturbance and seed planting, climate (decadal scale), seed dispersal, and wildlife or livestock grazing or browsing. Feedbacks: Land managers use mechanical and chemical equipment to increase forage. Inputs of fertilizer and brush management are required to maintain high productivity. Wildlife and livestock grazing and browsing decrease the amount of available forage.

Characteristics and indicators. The Pasture State consists of species that are grown for specific management goals, mainly livestock grazing. Common pasture species include buffalograss, western wheatgrass, little bluestem, sideoats grama, Bermudagrass, and bahiagrass. Quality and quantity of forb, grass, and legume species within this state depend on the level of management inputs (seeding, weed management, and land uses). Species of both warm-season and cool-season grasses are feasible for these sites.

Dominant plant species

- Bermudagrass (*Cynodon*), grass
- sideoats grama (*Bouteloua curtipendula*), grass
- bahiagrass (*Paspalum notatum*), grass

Community 3.1
Bermudagrass

Herbaceous species have been planted to maximize forage production for grazing livestock.

Community 3.2
Bermudagrass/ Post Oak- Eastern Redcedar

Herbaceous species have been planted to maximize forage production for grazing livestock. Management decisions allow the growth of woody species, such as eastern redcedar and oaks.

Community 3.3
Eastern Redcedar- American Elm- Post Oak/ Bermudagrass

Herbaceous species have been planted to maximize forage production for grazing livestock. Improper pasture

management and time have allowed for the growth of woody species such as eastern redcedar, oaks, and American elm. Woody species encroach on the pasture and dominate resources that were previously utilized by forage species.

Pathway 3.1A
Community 3.1 to 3.2

This pathway consists of absence of fire, improper management, and natural regeneration.

Pathway 3.2A
Community 3.2 to 3.1

This pathway consists of the removal or reduction of woody species.

Pathway 3.2B
Community 3.2 to 3.3

This pathway consists of absence of fire, improper management, and natural regeneration.

Pathway 3.3A
Community 3.3 to 3.1

This pathway consists of the removal or reduction of woody species.

Pathway 3.3B
Community 3.3 to 3.2

This pathway consists of the removal or reduction of woody species.

State 4
Plantation

The plantation state is characterized by the planting of merchantable trees species. The most common species for a plantation is loblolly pine. Community phases differ by tree type (softwood or hardwood) and the harvesting process. Drivers: Prescribed fires, pest management, vegetation management, canopy density. Feedbacks: Timber harvesting. Planted tree species dominate this ecological site, shading out other vegetation. Anthropogenic management decreases competition with other species and assists in growth.

Characteristics and indicators. A plantation state consists of tree species that are planted and managed to maximize the production of merchantable timber. The most common plantation species is loblolly pine, followed by hardwood trees. Community phases differ by tree type (softwood or hardwood), timber harvest method, management, and reforesting practices.

Dominant plant species

- loblolly pine (*Pinus taeda*), tree
- oak (*Quercus*), tree

Community 4.1
Loblolly Pine

Loblolly pine is planted to maximize timber production.

Dominant plant species

- loblolly pine (*Pinus taeda*), tree

Transition T1A

State 1 to 2

Trigger: The absence of wildfire allows woody species to increase and outcompete herbaceous species for nutrients, water, and sunlight. Slow variables: Increased competition for sunlight, nutrients, and moisture resources. Increased overstory competition results in decreased vigor and reproductive capacity of herbaceous understory species. Thresholds: Nutrient cycles shift from grass-and-leaf dominance to leaf-and-needle dominance. Increased woody canopy cover alters hydrologic cycles, potentially increasing runoff, decreasing infiltration, and increasing precipitation interception to woody species.

Transition T1B
State 1 to 3

Trigger: Mechanical and chemical woody vegetation suppression, tillage, and annual forage species introduction. Slow Variables: Increase production and management of forage species. Thresholds: Changes in soil properties, such as structure, organic matter, and nutrient cycling, as well as changes in type and frequency of disturbance.

Conservation practices

Brush Management
Prescribed Burning
Land Clearing
Prescribed Grazing

Transition T1C
State 1 to 4

Trigger: Native tree removal, mechanical and chemical woody vegetation suppression, introduce plantation tree species. Slow Variables: Increased production and management of plantation species. Thresholds: Changes in soil properties such as structure, organic matter, and nutrient cycling as well as changes in type and frequency of disturbance.

Restoration pathway R2A
State 2 to 1

Restoration efforts should begin through the mechanical and chemical treatment of undesirable woody vegetation and by seeding native species. Following the initial treatment of the ecological site, restoration must be accompanied by grazing management and the reintroduction of historic disturbance regimes. Returning to a historic fire interval through prescribed burning assists in woody vegetation suppression and invasive species management.

Conservation practices

Brush Management
Prescribed Burning

Transition T2A
State 2 to 3

Trigger: Mechanical and chemical woody vegetation treatment, tillage, and forage species introduction. Slow Variables: Increase production and management of forage species. Thresholds: Changes in soil properties, such as structure, organic matter, and nutrient cycling, as well as changes in type and frequency of disturbance.

Conservation practices

Brush Management
Prescribed Burning
Land Clearing

Prescribed Grazing

Transition T2B
State 2 to 4

Trigger: Native tree removal, mechanical and chemical woody vegetation suppression, introduce plantation tree species. Slow Variables: Increased production and management of plantation species. Thresholds: Changes in soil properties such as structure, organic matter, and nutrient cycling as well as changes in type and frequency of disturbance.

Transition T3B
State 3 to 2

Triggers: Lack of management or abandonment. Slow Variables: Increase in the establishment and size of woody species. Thresholds: Woody species dominate ecological processes. This reduces vigor and reproduction of understory species due to shading and increased competition for soil moisture, nutrients, and sunlight.

Transition T3A
State 3 to 4

Trigger: Forage species removal and suppression, mechanical and chemical woody vegetation suppression, introduce and manage plantation tree species. Slow Variables: Increased production and management of plantation species. Thresholds: Changes in soil properties such as structure, organic matter, and nutrient cycling as well as changes in kind and frequency of disturbance.

Transition T4A
State 4 to 2

Triggers: Lack of management or abandonment. Slow Variables: Increase in the establishment and size of woody species. Thresholds: Woody species dominant ecological processes resulting in reduced vigor and reproduction of herbaceous species in the understory due to shading and increased competition for soil moisture, nutrients, and sunlight.

Transition T4B
State 4 to 3

Trigger: Tree removal, mechanical and chemical woody vegetation suppression, tillage, introduce annual or perennial forage species. Slow Variables: Increase production and management of forage species. Thresholds: Changes in soil properties such as structure, organic matter, and nutrient cycling as well as changes in type and frequency of disturbance.

Additional community tables

Animal community

Major wildlife species include whitetail deer, coyote, armadillo, bobcat, beaver, raccoon, skunk, mink, cottontail rabbit, turkey, and mourning dove. Fish species include channel catfish, flathead catfish, white bass, largemouth bass, black bass, and bluegill.

Hydrological functions

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

Public supply—surface-water, 11.6%; ground-water, 6.6%
Livestock—surface-water, 1.9%; ground-water, 2.4%
Irrigation—surface-water, 0.0%; ground-water, 1.2%
Other—surface-water, 70.3%; ground-water, 6.1%

Total withdrawals average 82 million gallons per day (310 million liters per day). About 16 percent is from ground-water sources with the remaining 84 percent from surface-water sources. Precipitation and perennial streams are important sources of water in this area. Ponds provide water for livestock and are used locally for recreation. A few large reservoirs are available for recreational uses. Surface-water is used for industrial production and for cooling thermoelectric power plants, as well as by some communities for their public water supply.

The principal sources of ground-water in this area are bedrock aquifers, including the Antlers aquifer in Oklahoma and the Nacatoch aquifer in Arkansas. The ground-water in this area is used primarily for public supply. Most rural landowners also rely on the bedrock aquifers for domestic water. The ground-water is soft to hard in Arkansas and very hard in Oklahoma.

Recreational uses

Mountain biking, camping, fishing, hiking, horseback riding, hunting, mineral prospecting, nature viewing, off-highway vehicle riding, and water activities can all be enjoyed throughout this MLRA on public land where permitted and on private land where allowed.

Wood products

Public and private timberland comprise large areas throughout this MLRA. Loblolly pine is the most popular species to harvest and produces products such as lumber, pulpwood, posts, and poles. Hardwood species are also harvested and used to produce lumber, flooring, and pulpwood.

Other products

Poultry production is a major industry throughout the MLRA. Small grains, soybeans, and hay are major crops. Sand, gravel, clay, bauxite, gypsum, and petroleum are found in industrially significant quantities.

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Oklahoma State University
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Approval

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Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators

are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	05/03/2024
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

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

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

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

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

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

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

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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

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17. **Perennial plant reproductive capability:**
