USDA Natural Resources Conservation Service

Ecological site R080AY045OK
Clay Bottomland

Last updated: 9/19/2023
Accessed: 05/02/2024

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.

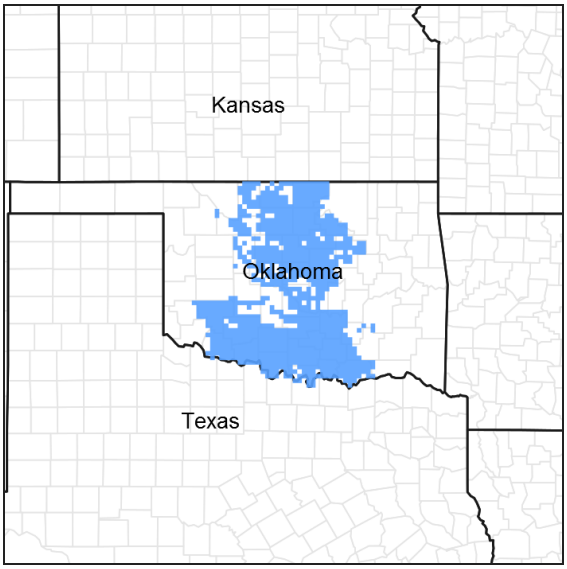

Figure 1. Mapped extent

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): 080A–Central Rolling Red Prairies

MLRA 80A is characterized by dark red Permian rocks that are exposed on gently sloping plains. These plains are dissected by rivers that flow from northwest to southeast. Major rivers of this MLRA include the Chikaskia and Bluff rivers in KS, the Salt Fork, Cimarron, North and South Canadian, Washita, Cache, Red River in OK, and branches of the Wichita River in TX. Soils are generally well drained, loamy or clayey deposits overlying Permian sandstones or shales.

Classification relationships

This ecological site is correlated to soil components at the Major Land Resource Area (MLRA) level which is further described in USDA Ag Handbook 296.

Ecological site concept

These sites occur on clayey alluvial soils on floodplains. In the reference state, the vegetation is dominated by native tallgrasses and forbs, with some scattered woody species. This vegetation type is the product of historical fire and grazing events. If fire is removed from the system, woody species may encroach and begin to dominate ecological processes. Due to the nature of the clay soils, these sites are often less productive than other

bottomland sites, especially during long dry periods.

Associated sites

R080AY050OK	**Loamy Bottomland** Similar landscape position with loamy soils.
R080AY090OK	**Ponded Bottomland** Bottomland site with episaturation (ponding)

Similar sites

R080AY050OK	**Loamy Bottomland** Similar landscape position with loamy soils.

Table 1. Dominant plant species

Tree	(1) *Carya illinoinensis*
Shrub	(1) *Rhus copallinum*
Herbaceous	(1) *Panicum virgatum* (2) *Andropogon gerardii*

Physiographic features

These sites occur on floodplains that range from rarely to frequently flooded. Slopes from 0 to 2 percent.

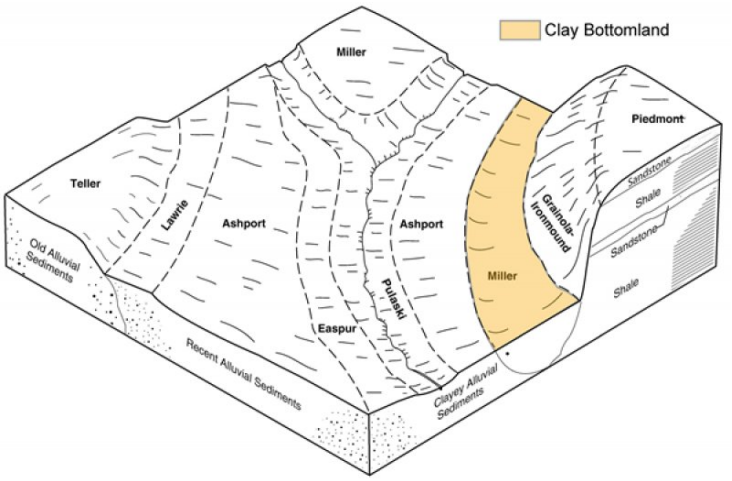

Figure 2. Clay Bottomland

Table 2. Representative physiographic features

Landforms	(1) Alluvial plain > Flood plain
Runoff class	Low to medium
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Occasional to frequent
Elevation	152–457 m
Slope	0–2%
Water table depth	203 cm
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Low to high
Flooding duration	Not specified
Flooding frequency	Not specified
Elevation	Not specified
Slope	Not specified
Water table depth	Not specified

Climatic features

The climate is characterized by moist, cool, springs; hot, often dry summers; mild autumns; and mild to cold winters. Variation in timing and amounts of precipition from year to year is quite common. Drought cycles range from three to five years duration with occasionally longer periods occurring at unpredictable intervals. Above normal rainfall cycles are usually just as random, but shorter in duration.

Table 4. Representative climatic features

Frost-free period (characteristic range)	174-190 days
Freeze-free period (characteristic range)	196-219 days
Precipitation total (characteristic range)	813-940 mm
Frost-free period (actual range)	167-193 days
Freeze-free period (actual range)	193-222 days
Precipitation total (actual range)	787-991 mm
Frost-free period (average)	183 days
Freeze-free period (average)	207 days
Precipitation total (average)	864 mm

Climate stations used

- (1) CHEROKEE 4W [USC00341724], Cherokee, OK
- (2) BLACKWELL [USC00340818], Blackwell, OK
- (3) PAULS VALLEY 4 WSW [USC00346926], Pauls Valley, OK
- (4) OKLAHOMA CITY WILL ROGERS AP [USW00013967], Oklahoma City, OK
- (5) GEARY [USC00343497], Calumet, OK
- (6) CARNEGIE 5 NE [USC00341504], Carnegie, OK
- (7) CHATTANOOGA [USC00341706], Chattanooga, OK
- (8) WAURIKA [USC00349395], Waurika, OK

Influencing water features

These sites are occasionally to frequently flooded. The severity and duration of these flood events can impact the plant communities and ecological dynamics creating bare ground and some soil loss. Aside from flooding, these sites also experience run on hydrology from the adjacent upland sites. The amount of this run on water depends greatly on the topography, vegetative cover, and range condition of the surrounding sites.

Wetland description

NA

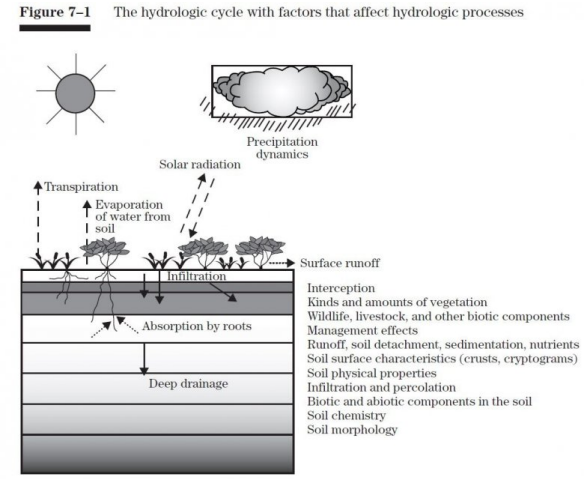

Figure 9.

Soil features

Soils are mapped for each county within the MLRA. Mapunits are representations of the major soil series component(s) and named accordingly. Each Mapunit is spatially represented on a digital soils map as polygons of different shapes and sizes. Within these Mapunits, there are often minor soil series components included. These minor components are soils that occur within a Mapunit polygon but are of small extent (15% or less of the Mapunit area). However, it is difficult to separate these minor soils spatially due to the scale of soil mapping.

Ecological sites are correlated at the component level of the soil survey. Therefore, a single Mapunit may contain multiple Ecological Sites just as it may contain multiple soil components. This is important to understand when investigating soils and Ecological Sites. A soil survey Mapunit may be correlated to a single Ecological Site based on the major component; however, there may be inclusional areas of additional Ecological Sites which are correlated to the minor components of that particular soil Mapunit.

These soils are deep, somewhat poorly drained with slow permeability. Soils are formed in alluvium from a clayey shale origin. The surface texture is a clay to sandy clay with no large surface fragments.

Representative soil components for this site include:
Brewer, Lela, Miller

Table 5. Representative soil features

Parent material	(1) Alluvium–clayey shale
Surface texture	(1) Clay (2) Sandy clay
Drainage class	Somewhat poorly drained to moderately well drained
Permeability class	Very slow to slow
Soil depth	203 cm
Surface fragment cover <=3"	0–1%
Surface fragment cover >3"	0–1%
Available water capacity (0-101.6cm)	17.78–27.94 cm
Calcium carbonate equivalent (0-101.6cm)	0–1%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0

Soil reaction (1:1 water) (0-101.6cm)	6.5–8
Subsurface fragment volume <=3" (Depth not specified)	0–10%

Ecological dynamics

The information contained in the State and Transition Diagram (STD) and the Ecological Site Description was developed using archeological and historical data, professional experience, and scientific studies. The information presented is representative of a very complex set of plant communities. Not all scenarios or plants are included. Key indicator plants, animals and ecological processes are described to inform land management decisions.

The Clay Bottomland Ecological Site occupies narrow bands of well drained soils on nearly level flood plains of the rivers and streams in MLRA 80A. The site may be inundated once or twice a year. Small depressions, from old channels, occur throughout. The soils are fertile, but the fine soil texture often restricts plant growth. Formerly called, and sometimes still referred to as, Heavy Bottomland, the reference plant community is tallgrass/midgrass. This plant community found on the site by settlers in the early 1800's was a fire induced tallgrass, midgrass, shortgrass bottomland with a few scattered shrubs and trees along the drainage ways. This site evolved under frequent fire and periodic heavy grazing by bison, pronghorn antelope and deer. It is postulated that fires occurred as often as four to six-year intervals in this region (Frost 1998) prior to European settlement. The frequent fires favored grasses over woody plants and forbs. The fires were likely more influential in shaping the reference plant community into an open tallgrass plant community than the grazing by bison and pronghorn antelope and periodic droughts. There is a natural flux in vegetation composition within the reference plant community. This continuing flux is directly related to changes in the amount of water present on site. Amounts and species of tallgrasses, midgrasses, shortgrasses, and forbs are always in continuous change (dynamic equilibrium). This site is not only driven by local climate, but can also be affected by off-site precipitation accumulations that eventually drain into the area. Site plant community composition will generally be approximately 78% grasses and grasslike, 10% Forbs and 12% woodies. Individual tallgrass species composition will be approximately: switchgrass (15-35%), big bluestem (10-20%), Indiangrass (10-20%), and little bluestem (5-15%). Other grasses, ranging from a trace to 15%, are eastern gamagrass, prairie cordgrass, Florida paspalum, Canada wildrye, switchcane, broadleaf uniola, western wheatgrass, sideoats grama, sedges, Scribner's panicum, purpletop, fringeleaf paspalum, tall dropseed, meadow dropseed, longspike tridens, knotroot bristlegrass, beaded panicum, white tridens and Texas wintergrass. Smartweed and sedges occupied wetter depressions. Some of the common forbs were compassplant, tall gayfeather, Heath's aster, goldenrod, sagewort, leadplant, Illinois bundleflower and prairie scurfpea.

The tallgrass plant community was relatively stable and resilient within the climate, soil, and fire regime until European settlement in the 1800s. The mid 1800's brought elimination of the bison herds, removal of the American Indian, and a large increase in domestic livestock. The development of the windmill and barbed wire fencing during the 1880's promoted overgrazing throughout the region. Overstocking by domestic livestock induced a reduction of cattle-palatable grasses and forbs. Total herbage production declined as the grazing-resistant midgrasses and forbs began replacing the tallgrasses and climax forbs. There was a corresponding decline in vegetative ground cover, mulch, and soil organic matter. The shift in composition of the plant communities and decline in soil properties favored woody plant encroachment. This, along with the reduction in intensity and frequency of fires, allowed the invasion of species from adjacent sites and the increase of more grazing resistant species. Under this fire reduction scenario, the reference transitioned into a tallgrass/shrubland community. In this plant community, grasses still dominate, but the encroaching woody species begin to contribute increasing amounts to total annual vegetative production. During the dynamics of this stage, the transition to a shrubland can be reversed by mechanical and/or chemical brush control methods and prescribed grazing management that provides fine fuel loadings necessary for prescribed burning at the natural four- to six-year intervals. Prescribed burning generally does not kill mesquite once the plants reach greater than 2 years of age, but fire can suppress mesquite of any age if the fire can cause top kill. Easter redcedar can usually be controlled by fire, provided a good fuel load is present, until a height of approximately 6 feet, then, control becomes more difficult and more input extensive.

If fire is excluded, and the tallgrass community continues to be overgrazed, the transition toward woody plant dominance continues. In certain areas within MLRA 80A, salt cedar may also become invasive on this site. Grazing resistant grasses increase as cattle-palatable climax forbs and tallgrasses continue to decline. Grass cover, litter and soil organic matter decline as bare ground, erosion and other desertification processes increase. The

microclimate in the grassland areas becomes more arid. When the woody plant component reaches 25 to 35 percent canopy, grazing management strategies, such as rest from grazing, generally may, or may not, reverse the transition. A combination of proper grazing and prescribed burning should be successful in, at least, maintaining this grass dominant community's status quo. However with continued heavy livestock grazing and no brush management the tallgrass/midgrass community will continue its transition into a woody overstory of hardwood trees where woody plants dominate. American elm, oak, sumac, ash, walnut, pecan, Indigobush, bumelia, western soapberry, coralberry, hackberry and roughleaf dogwood are common trees.

Natural fertility, presence of shade, proximity to water, and nutritious forage make this site a preferred grazing area. The wet nature of the site protects it from grazing during wet conditions, but during dry conditions it is often the first site to be overused. If overgrazing continues and brush control practices are not applied, the woody canopy will increase in size and density until a dense woody plant dominant community develops. Dominance occurs at about 50 percent woody plant canopy cover. At this threshold, the grassland component will not produce enough fine fuel for fires to effectively suppress the woody plants. At this point, the site completes the transition into a new plant community type, the hardwood overstory/mixed-brush understory community. This state is dominated by hardwoods and mixed-brush to the exclusion of most climax herbaceous species except buffalograss and annuals in the woody plant interspaces. Once canopy cover exceeds 35 to 50 percent woody plants, forage production is very limited except in wet periods when annuals provide extra forage. Shortgrasses and cool-season grasses and forbs are present but sparse due to shading and competition from the woody plants. Easter redcedar, mesquite and understory brush continue to increase in size and density regardless of grazing management. Large areas of bare ground may appear between woody plants where small depressions occur. Desertification, including erosion, continues in the interspaces until maximum ground cover by woody species is approached. Once shrub cover reaches potential, the hydrologic processes, energy flow and nutrient cycling stabilize under the woody vegetation environment.

Major expense and energy are required to restore the hardwood and mixed-brush community back to a grassland plant community state. Restoration of site in this stage is very difficult to accomplish because of soil characteristics. An integrated approach is required. Mechanical or herbicide treatments such as dozing, individual plant treatments (IPT), herbicide spraying and range planting followed by grazing deferment, prescribed grazing and prescribed burning, are essential for the site to return to near the postulated historic climax community. The brushy species, namely redcedar and mesquite, are hard to control with herbicides on this site. Re-invasion occurs due to the residual seed bank. Mechanical control such as grubbing or root plowing can destroy the perennial grass cover and more often than not, annuals or broom snakeweed prevails for two or three years, even with reseeding. Radical land clearing with bulldozers may ultimately be necessary. The restoration process may take several years of repeated treatments. Therefore, maintaining the site in at least the hardwood 25 to 30% stage, or better, through proper stocking and brush management, including the use of prescribed burning, is highly recommended.

State and Transition Diagram:
A State and Transition Diagram for the Clay Bottomland (R080AY045OK) is depicted below. Thorough descriptions of each state, transition, and pathway follow the model. Experts base this model on available experimental research, field observations, professional consensus, and interpretations. It is likely to change as knowledge increases.
Plant communities will differ across the MLRA because of the natural variability in weather, soils, and aspect. The Reference Plant Community is not necessarily the management goal; other vegetative states may be desired plant communities as long as the Range Health assessments are in the moderate and above category.

The biological processes on this site are complex. Therefore, representative values are presented in a land management context. 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. Composition by dry weight and percent canopy cover are provided to describing the functional groups. Most observers find it easier to visualize or estimate percent canopy for woody species (trees and shrubs).

The following diagram suggests some pathways that the vegetation on this site might take. There may be other states not shown on the diagram. This information is intended to show what might happen in a given set of circumstances. It does not mean that this would happen the same way in every instance. Local professional guidance should always be sought before pursuing a treatment scenario.

State and transition model

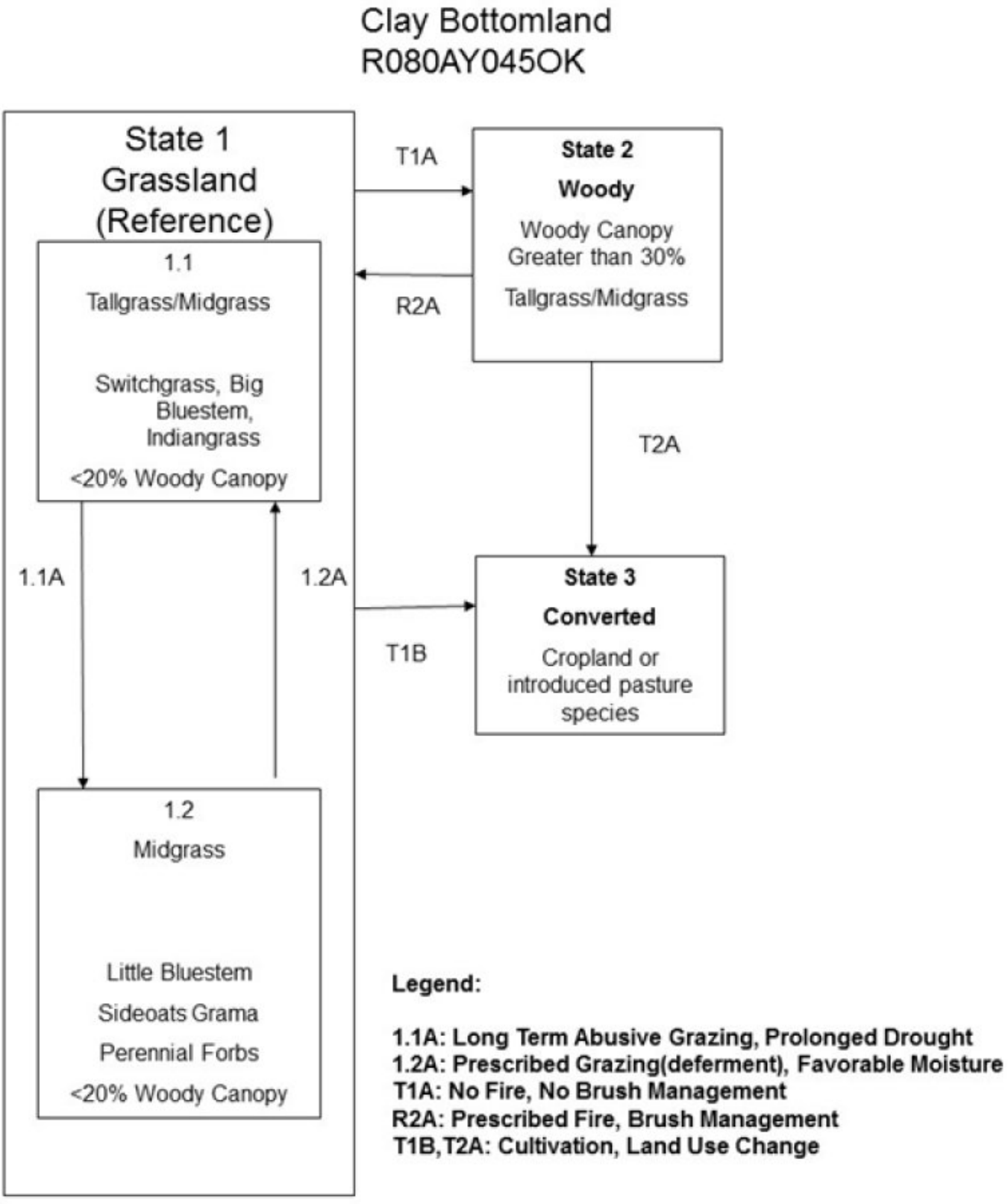

Figure 10. R080AY045OK

State 1
Grassland (Reference)

This is the reference or diagnostic community for the site. The descriptions are based on early range site descriptions, clipping data, professional consensus of experienced range specialists, and analysis of field work.

Dominant plant species

- pecan (*Carya illinoinensis*), tree
- switchgrass (*Panicum virgatum*), grass

Community 1.1
Tallgrass/Midgrass

Figure 11. Clay Bottomland Community 1.1

The Tallgrass/Midgrass Community is the interpretative plant community for the Clayey Bottomland Ecological Site. It is an open bottomland dominated by tall and midgrasses. Trees such as Pecan, hackberry, western soapberry and American elm grew along the drainage ways. The plant community provides good ground cover and protection from erosion during infrequent flooding events. Smartweed and low growing sedges may be found in the small depressions made by old drainages. Species composition varies from east to west in the MLRA, and from south to north, because of precipitation and temperature differences. Sideoats grama, vine mesquite, silver bluestem, Arizona cottontop and white tridens are common midgrasses. Buffalograss and blue grama were common shortgrasses with lesser amounts of bristlegrass, sand dropseed, fall witchgrass, plains bristlegrass and panicum species. Texas wintergrass and western wheatgrass were important parts of the cool-season grass component. Forbs included western ragweed, heath aster, gaura, verbena, greenthread, trailing ratany and other annual forbs. The site may produce as much as 2,500 to 5,500 pounds herbage. Production is often limited by the tight, droughty soils but could also exceed expectation during favorable growing conditions. Grasses and forbs contributed up to 95 percent of the total annual production in reference conditions. The midgrasses aided in the infiltration of rainfall into the very slowly permeable soil and reduced runoff. The depressions probably received more extra moisture from adjacent areas than from infrequent flooding events. Litter and organic matter buildup was limited by the dry climate and low herbage production. The tallgrass/midgrass community furnished good forage for grass-eating type animals such as bison before settlement and for horses and cattle after settlement. These grassland conditions can be maintained with proper stocking, prescribed grazing and frequent prescribed burning. Stocking rates must consider the kind of livestock and balance their numbers with current annual forage production and competition from other herbivores. Flexibility in animal numbers is important because of the tight nature of the soil and infrequent flooding events. Livestock overgrazing, decrease in intensity and frequency of fires and no brush management will allow this plant community to transition into a midgrass dominated community, which is relatively open grassland with various amounts of invading shrubs.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	2186	3497	4808
Forb	280	448	616
Tree	224	359	493
Shrub/Vine	112	179	247
Total	**2802**	**4483**	**6164**

Community 1.2
Midgrass

If abusive grazing continues or, as dry conditions continue, or as both overgrazing and drier conditions continue, the plant community moves towards a midgrass phase of sideoats grama, little bluestem, tall dropseed, and perennial forb plant community. Trees and shrubs remain less than 10 percent. When adequate moisture returns to the site and domestic animals are either removed, or placed under a prescribed grazing regime, the site will move back towards the tallgrass community phase.

Pathway 1.1A
Community 1.1 to 1.2

If the site is subjected to abusive grazing for multiple growing seasons and the more palatable tallgrass species are not allowed adequate recovery, the plant community will begin to transition to a Midgrass dominated plant community(1.2). This community shift may also occur as a result of long term drought as the Midgrass and Shortgrass species are better adapted to dry climates. This pathway is not a one-way street and it is important to remember that this community shift occurred often, historically, and represents the variability within this Reference Sate.

Pathway 1.2A
Community 1.2 to 1.1

With adequate rest from grazing pressure and favorable growing conditions, this plant community may be able to return to the reference plant community (1.1).

State 2
Woody

With the continued absence of fire, the tree canopy and understory of shrubs continue to increase. In this state, the tree canopy cover is now greater than 30%. Shrubs have increased to the point of substantial understory. It is possible, but not easy, to return to the reference state using land clearing, brush management, prescribed grazing, and prescribed burning.

Dominant plant species

- pecan (*Carya illinoinensis*), tree
- elm (*Ulmus*), tree
- hackberry (*Celtis*), tree
- sumac (*Rhus*), shrub

State 3
Converted

In this state, the trees and brush have been cleared from the site and the site has been tilled and seeded to cropland or introduced pasture. This is common for this site. Both the soil structure, biology, and hydrology have been altered.

Dominant plant species

- Bermudagrass (*Cynodon dactylon*), grass

Transition T1A
State 1 to 2

Without fire in the ecosystem, woody species may grow and reproduce unchecked. These species may be endemic or species introduced to the site by animals (eastern redcedar) or plantings (black locust/honey locust). These woody species have the ability to grow deep roots and locate resources within the soil that herbaceous species may not have access to. This gives them a competitive edge for resources and allows them to expand across the landscape. As this woody encroachment occurs, the site may transition to state 2 where the woody species begin to dominate the ecological functions of the plant community.

Transition T1B
State 1 to 3

Some of these sites have been plowed for farming purposes over the last century. Once the site is cultivated, it transitions to an alternative state (3). The soils structure, organic matter, and biota have been altered and will no longer function the same as the soils in the reference state.

Restoration pathway R2A
State 2 to 1

A carefully planned program can restore the Woody state to a close resemblance to a grassland state. If the current vegetation structure is difficult to burn (but susceptible to wildfires), some brush management intervention will be needed. Brush management either mechanical, chemical or an integration of both, will allow sunlight energy and soil moisture to be used by tall grasses rather than invasive brush. Careful grazing management will be required for this plant community to be restored to the grassland state (1). A field inventory along with monitoring will be needed to evaluate recovery.

Transition T2A
State 2 to 3

Some of these sites have been plowed for farming purposes over the last century. Once the site is cultivated, it transitions to an alternative state (3). The soils structure, organic matter, and biota have been altered and will no longer function the same as the soils in the reference or woody state.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				–	
	switchgrass	PAVI2	*Panicum virgatum*	–	–
	big bluestem	ANGE	*Andropogon gerardii*	–	–
	Indiangrass	SORGH	*Sorghastrum*	–	–
	little bluestem	SCHIZ4	*Schizachyrium*	–	–
	eastern gamagrass	TRDA3	*Tripsacum dactyloides*	–	–
	prairie cordgrass	SPPE	*Spartina pectinata*	–	–
	Canada wildrye	ELCA4	*Elymus canadensis*	–	–
	switchcane	ARTE4	*Arundinaria tecta*	–	–
	western wheatgrass	PASM	*Pascopyrum smithii*	–	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	–	–
	purpletop tridens	TRFL2	*Tridens flavus*	–	–
	dropseed	SPORO	*Sporobolus*	–	–
	panicgrass	PANIC	*Panicum*	–	–
	Texas wintergrass	NALE3	*Nassella leucotricha*	–	–
	bristlegrass	SETAR	*Setaria*	–	–
Forb					
2				–	
	compassplant	SILA3	*Silphium laciniatum*	–	–
	aster	ASTER	*Aster*	–	–
	goldenrod	OLIGO3	*Oligoneuron*	–	–
	sweet sagewort	ARAN3	*Artemisia annua*	–	–
	leadplant	AMCA6	*Amorpha canescens*	–	–
	Illinois bundleflower	DEIL	*Desmanthus illinoensis*	–	–
	scurfpea	PSORA2	*Psoralidium*	–	–

Animal community

This site is suited for the production of domestic livestock and provides habitat for native wildlife and certain species of exotic wildlife. Cow-calf operations are the primary livestock enterprise although stocker cattle are also grazed. Sustainable stocking rates have declined drastically over the past 100 years because of deterioration of the historic plant community. Initial starting stocking rates should be determined with the landowner or decision maker based on the merits of the existing plants for the desired animals.

Many species will utilize this site for at least a portion of their habitat needs but rely on a more extensive landscape to meet all their needs. Some animals may only utilize one plant community of this site to fulfill their habitat needs.

Smaller mammals include many kinds of rodents, jackrabbit, cottontail rabbit, raccoon, skunks, opossum, and armadillo. Mammalian predators include coyote, fox, and bobcat. Many species of snakes and lizards are native to the site.

Many species of birds are found on this site including game birds, songbirds, and birds of prey. Major game birds that are economically important are Rio Grande turkey, bobwhite quail, and mourning dove. Turkey prefers plant communities with substantial amounts of shrubs and trees interspersed with grassland. Quail prefer plant communities with a combination of low shrubs, bunch grass, bare ground, and low successional forbs. The different species of songbirds vary in their habitat preferences. In general, habitat that provides a diversity of grasses, forbs, shrubs, vines and trees, and a complex of grassland, savannah, shrubland, and woodland will support a variety and

abundance of songbirds. Birds of prey are important to keep the numbers of rodents, rabbits, and snakes in balance. The different plant communities of the site will sustain different species of raptors.

Hydrological functions

These sites occur on floodplains and drainageways on deep, alluvial soils. These areas receive run-on water from adjacent upland sites. Run off is usually slow due to the low slopes of the floodplain. The presence of deep rooted tallgrasses can help facilitate percolation of water into the soil profile.

Recreational uses

NA

Wood products

NA

Other products

NA

Other information

NA

Inventory data references

Soil Survey Manuscripts in Oklahoma.
Range Site Descriptions, Oklahoma NRCS
Draft ESDs Oklahoma NRCS

Type locality

Location 1: Pawnee County, OK	
General legal description	Pawnee County, Oklahoma; about 0.5 mile north of Pawnee on east side of Oklahoma Highway 18; 200 feet east and 900 feet north of the southwest corner of sec. 29, T. 22 N., R. 5 E.

References

Frost, C.C. 1998. Presettlement Fire Frequency Regimes of the United States: A First Approximation. Plant Conservation Program. North Carolina Department of Agriculture and Consumer Services, Raleigh, NC.

Other references

USDA-NRCS (Formerly Soil Conservation Service) Range Site Descriptions (1960s)
USDA-NRCS (Formerly Soil Conservation Service) Ag Handbook 296 (2006)

Contributors

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Edits by Colin Walden, Soil Survey Region 9 Stillwater, OK

Approval

Bryan Christensen, 9/19/2023

Acknowledgments

Site Development and Testing Plan:

Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document. Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

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)	Mark Moseley, Harry Fritzler, Steve Glasgow, Jack Eckroat
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Date	04/04/2005
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** This site usually has flatter slopes. There are few, if any, rills (only in lowest area where flooding occurs) and there is no active headcutting and sides are covered with vegetation.

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2. **Presence of water flow patterns:** There is some evidence of soil deposition or erosion (particularly after a flood event). Water generally flows evenly over the entire landscape.

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3. **Number and height of erosional pedestals or terracettes:** There should not be any evidence of erosional pedestals or terracettes on this site.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** There is 0-5% bare ground on this site. Bare areas are small and not connected.

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5. **Number of gullies and erosion associated with gullies:** Usually none. Most drainages are represented as natural stable channels; vegetation is common with no signs of erosion. Some nick points can occur where trees are uprooted from floods.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None.

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7. **Amount of litter movement (describe size and distance expected to travel):** Uniform distribution of litter. Litter rarely moves >12 inches on flatter slopes and may be as much as doubled on steeper slopes, then only during high intensity storms.

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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):** Surface soil is stabilized (Stability Score 5 – 6). Stability scores based on a minimum of 6 samples tested.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Ap horizon: 0 to 7 inches, reddish brown clay, weak medium granular structure. A1 horizon: 7 to 14 inches; reddish brown clay, moderate fine blocky structure.

   Refer to specific description for component sampled.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Infiltration and runoff are not affected by any changes in plant community composition and distribution. (Tallgrass/Midgrass dominated).

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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):** There is usually no compaction layer. Clayey soil layers may be mistaken for a compaction layer.

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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: Tallgrasses Midgrasses

    Sub-dominant: Forbs Cool season perennial grass

    Other: Trees, Shrubs, Shortgrasses, Annuals

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** There is some plant mortality and decadence on the perennial grasses, especially in the absence of fire and herbivory, but usually <5%.

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14. **Average percent litter cover (%) and depth (in):** Litter should cover 50 - 75% of the area between plants with accumulations of .5 - 1 inches deep.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Reference production is 2500 - 5500 pounds per year.

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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:** No invasive species. Invasives might include: eastern redcedar, locust, salt cedar, Russian olive, annuals and non-natives. Also mesquite in the south.

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17. **Perennial plant reproductive capability:** All plants capable of reproducing at least every year.
