USDA Natural Resources Conservation Service

Ecological site R080AY068OK
Sandy Bottomland

Last updated: 9/19/2023
Accessed: 05/13/2024

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.

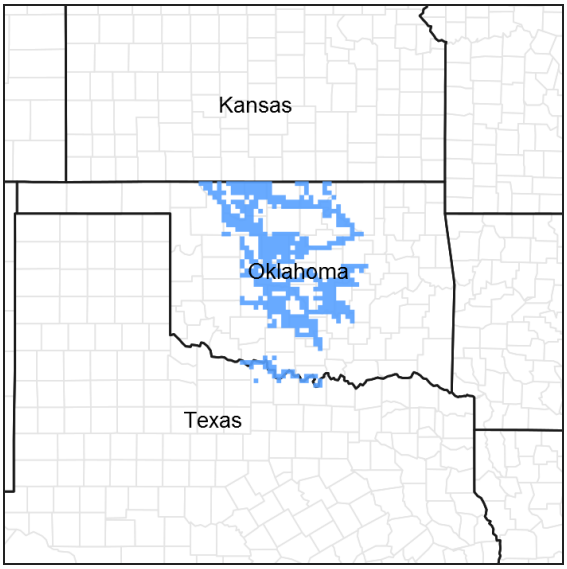


Figure 1. Mapped extent

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 Chickaskia 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 flood plains with coarse textured soils. Unlike the Subirrigated Bottomland ecological site, the Sandy Bottomland sites lack subsurface water within 60 inches. The dominate reference vegetation is tallgrasses intermixed with forbs and some woody species. These woody species include sandplum, sumac, and cottonwood. In the absence of fire, woody species can begin to dominate the site. Long term abusive grazing practices can

damage the productive tallgrass species and lead to a plant community with an abundance of less palatable species.

Associated sites

R080AY095OK	**Subirrigated Bottomland** Sometimes incorporated within Sandy Bottomland Sites. Similar landscape position with a water table within 60 inches of surface.

Similar sites

R080AY050OK	**Loamy Bottomland** Similar landscape position with finer textured soils and better water holding capacity for plant growth.
R080AY095OK	**Subirrigated Bottomland** Sandy alluvial soils with high water table.

Table 1. Dominant plant species

Tree	(1) *Populus deltoides*
Shrub	(1) *Prunus angustifolia*
Herbaceous	(1) *Panicum virgatum* (2) *Andropogon hallii*

Physiographic features

These are located on sandy soils on flood plains. Slopes range from 0 - 3 %.

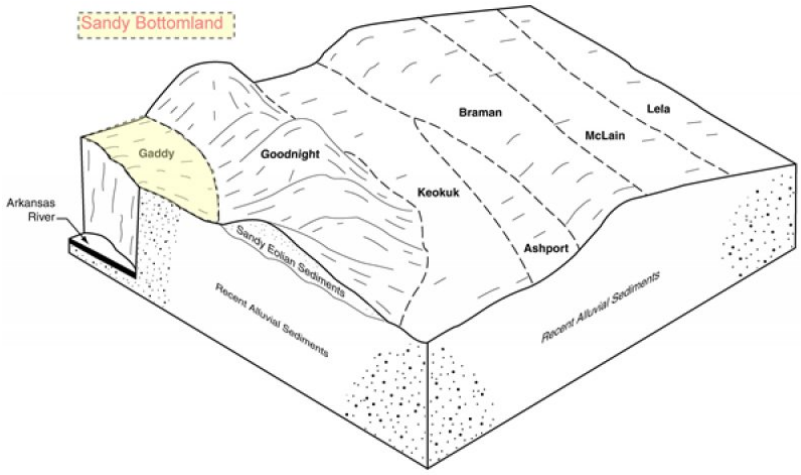


Figure 2. Sandy Bottomland

Table 2. Representative physiographic features

Landforms	(1) Alluvial plain > Flood plain
Runoff class	Negligible to low
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to frequent
Elevation	152–457 m
Slope	0–3%
Water table depth	152 cm
Aspect	Aspect is not a significant factor

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 3. Representative climatic features

Frost-free period (characteristic range)	180-190 days
Freeze-free period (characteristic range)	200-219 days
Precipitation total (characteristic range)	813-991 mm
Frost-free period (actual range)	165-192 days
Freeze-free period (actual range)	195-223 days
Precipitation total (actual range)	787-1,041 mm
Frost-free period (average)	183 days
Freeze-free period (average)	207 days
Precipitation total (average)	914 mm

Climate stations used

- (1) MEEKER 5 W [USC00345779], Meeker, OK
- (2) CHANDLER [USC00341684], Chandler, OK
- (3) SEMINOLE [USC00348042], Seminole, OK
- (4) ALVA 1W [USC00340193], Alva, OK
- (5) GREAT SALT PLAINS DAM [USC00343740], Jet, OK
- (6) BILLINGS [USC00340755], Billings, OK
- (7) PONCA CITY MUNI AP [USW00013969], Ponca City, OK
- (8) STILLWATER 5 WNW [USW00053927], Stillwater, OK
- (9) CUSHING [USC00342318], Cushing, OK
- (10) OKEENE [USC00346629], Okeene, OK
- (11) WATONGA [USC00349364], Watonga, OK
- (12) GUTHRIE MUNI AP [USW00053913], Guthrie, OK
- (13) OKLAHOMA CITY WILL ROGERS AP [USW00013967], Oklahoma City, OK
- (14) LAWTON [USC00345063], Lawton, OK
- (15) WAURIKA [USC00349395], Waurika, OK
- (16) PAULS VALLEY 4 WSW [USC00346926], Pauls Valley, OK

Influencing water features

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.

Wetland description

NA

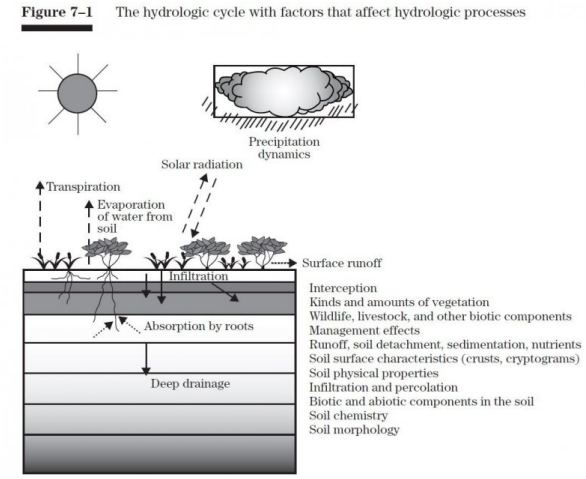


Figure 9.

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.

Representative soil components for this site include:
Gaddy

This site is associated with sandy alluvial soils that may be moderately acid to calcareous. Surface soils are fine sandy loams to fine sand, and are reddish brown to pale brown in color. The underlying strata are loamy fine sand to fine sand with occasional layers of finer textured materials. They are droughty and susceptible to wind erosion. These soils occupy nearly level, low terraces and floodplains that are rarely to frequently flooded. The soils on this site, as well as the forage plants produced, show little effect of sub-irrigation.

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone
Surface texture	(1) Fine sand (2) Loamy fine sand
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderately rapid to very rapid
Soil depth	152 cm
Surface fragment cover <=3"	1–2%
Surface fragment cover >3"	0–1%
Available water capacity (0-101.6cm)	5.08–15.24 cm
Calcium carbonate equivalent (Depth not specified)	0–1%

Electrical conductivity (Depth not specified)	0–1 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0–1
Soil reaction (1:1 water) (0-101.6cm)	5.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	1–2%

Ecological dynamics

The information contained in the State and Transition Diagram (STD) and the Ecological Site Description was developed using 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.

Under abusive grazing by cattle, palatable perennial grasses such as big bluestem, Indiangrass and switchgrass tend to decrease in the plant population. Little bluestem, broadleaf uniola, purpletop, Virginia wildrye, tall dropseed, beaked panicum, Florida paspalum, Carolina jointtail and Scribner’s panicum will become more dominant in the plant community as grazing pressure continues. Long term overgrazing fosters lower successional plants such as broomsedge bluestem, arrowfeather threeawn, oldfield threeawn, cheatgrass, and mat sandbur. Woody species, primarily cottonwood, black willow and sycamore, will overtake this site. Fire suppression for extended periods of time will foster a dominance of hardwood trees. Potential herbaceous forage production is significantly decreased when woody species become the dominant plants.

If these areas have been cultivated, plant composition can vary significantly from the previous scenario. When cultivation is in the history of the site, there will usually be much lower percentages of higher successional plants and much higher percentages of lower successional plants. The site will usually be invaded by introduced species (i.e. Japanese brome). Recovery of these areas can take long periods of time, and in many cases, may require the replanting of native grass species in order to recover to the site's ultimate potential.

Reclamation can usually be performed through the use of herbicides, prescribed fire, or a combination of both, coupled with proper management of livestock grazing. If these areas have been dominated by woody canopy for an extended period of time, there may not be sufficient native grass species seed stock to enable a full recovery on it's own.

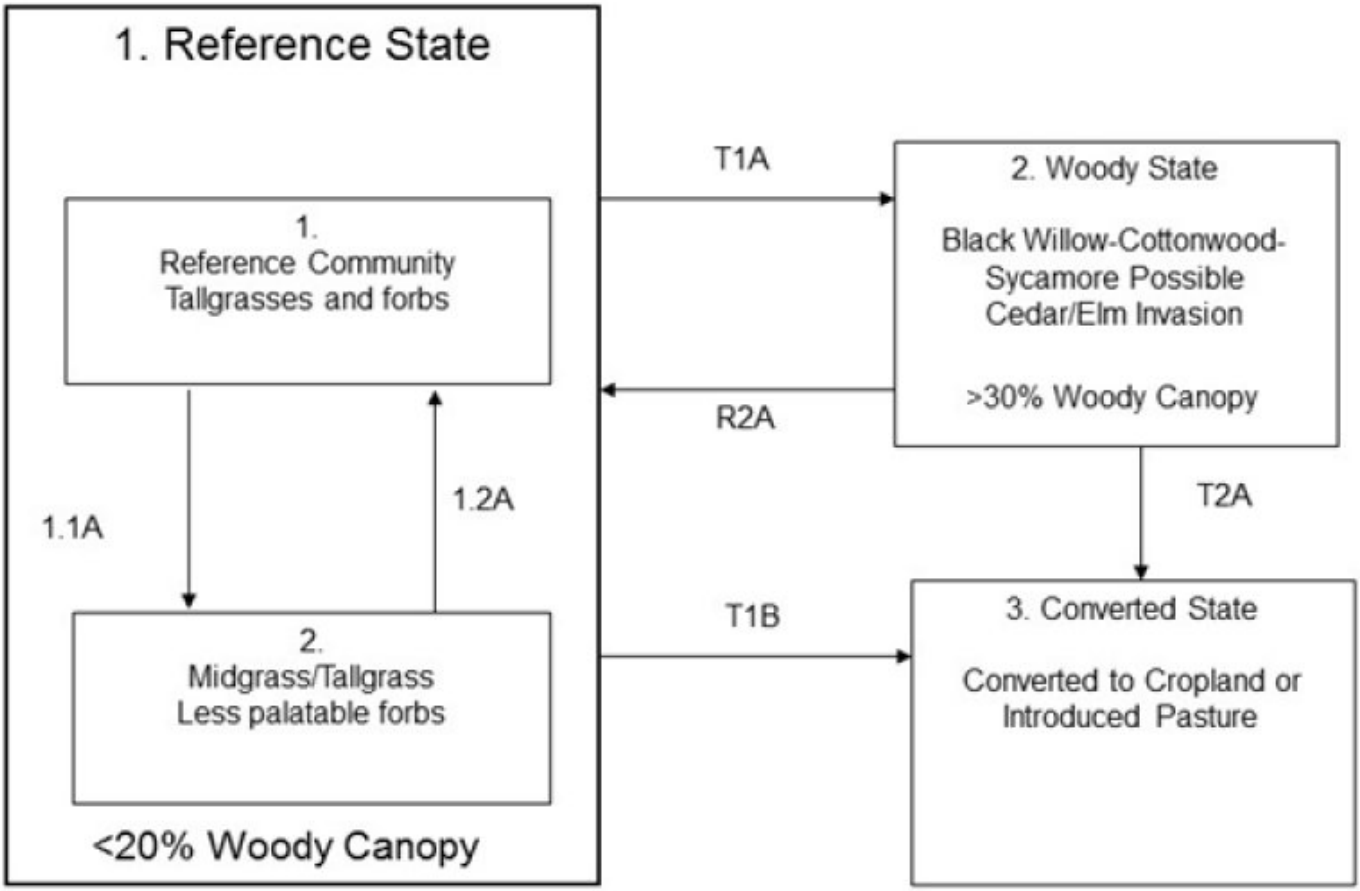
State and Transition Diagram:
A State and Transition Diagram for the Sandy Bottomland (R080AY068OK) site is depicted below. Thorough descriptions of each state, transition, and pathway follow the model. Experts base this model on available experimental research, field observations, professional consensus, 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



Legend:

1.1A : Long term abusive grazing; Long term drought
1.2A : Prescribed Grazing(deferment); Adequate growing season precipitation
T1A : No Fire; No Brush management
R2A : Prescribed Fire; Brush management
T1B/T2A: Cultivation & Seeding

Figure 10. R080AY068OK

State 1

Grassland

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

Dominant plant species

- eastern cottonwood (*Populus deltoides*), tree
- switchgrass (*Panicum virgatum*), grass

Community 1.1
Tallgrasses

Warm season perennial grasses dominate the reference community. All of the major perennial grass species on this site are well dispersed throughout the plant community. Perennial forbs and a few species of trees and shrubs are well represented on this site. This site is open grassland with occasional trees and shrubs, especially along streambanks. The historic plant community evolved under natural conditions, including fire and herbivory by native animals such as buffalo, white-tailed deer, elk and others. Fire probably occurred with a frequency of once every 1 to 5 years.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1383	2363	3342
Tree	521	893	1264
Forb	183	323	463
Shrub/Vine	101	175	253
Total	**2188**	**3754**	**5322**

Figure 12. Plant community growth curve (percent production by month). OK0001, Native, Warm Season Grasses. Typically, the summer growing season for warm season grasses begins April 5 to 15 and ends October 15 to 25. Nearly three-fourths of the season production will occur before the first of July. This varies from year to year depending upon temperatures and precipitation..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	5	10	20	30	10	5	10	6	2	1

Community 1.2
Midgrass/Tallgrass

This plant community develops from continuous heavy grazing by livestock. It is initially characterized by a reduction in composition of big bluestem, Indiangrass and switchgrass and an increase in composition of little bluestem, purpletop, tall dropseed, Florida paspalum, beaked panicum and Carolina jointtail. There are also increases in splitbeard bluestem and broomsedge bluestem. A slight to moderate increase in forb and woody species may also occur in the initial transition depending on the amount of fire implemented in the management plan. Continued heavy grazing will result in a plant community dominated by broomsedge bluestem, splitbeard bluestem, purpletop, Carolina jointtail and tall dropseed. There will also be a significant increase in woody species, especially black willow and cottonwood. This community can usually be converted back to near historic conditions through the use of prescribed grazing, prescribed burning, and brush management (if needed).

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	940	1868	2997
Tree	572	896	1165
Forb	327	457	506
Shrub/Vine	83	142	205
Total	**1922**	**3363**	**4873**

Figure 14. Plant community growth curve (percent production by month). OK0001, Native, Warm Season Grasses. Typically, the summer growing season for warm season grasses begins April 5 to 15 and ends October 15 to 25. Nearly three-fourths of the season production will occur before the first of July. This varies from year to year depending upon temperatures and precipitation..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	5	10	20	30	10	5	10	6	2	1

Pathway 1.1A
Community 1.1 to 1.2

If the site is subjected to abusive grazing practices such as stocking above carrying capacity without rest, the reference community may shift toward community 1.2. This shift may also be facilitated by long term(multiyear) drought.

Pathway 1.2A
Community 1.2 to 1.1

The implementation of a prescribed grazing program which includes growing season deferment may facilitate the shift back to the reference plant community. This shift often requires favorable precipitation during the growing season to occur.

State 2
Woody

This plant community is basically a result of the absence of fire. Fire was an important element in suppressing woody plants during the ecological evolution of this site. So, when fire was suppressed, and continues to be suppressed for many years, the plant community naturally and gradually shifted towards woody plant dominance. Areas protected from both fire and grazing for 20 to 150 years, or longer, have transitioned from open grassland to closed canopy woodland. Some areas, due to their juxtaposition to streams, were historically protected from reoccurring fires. In 19th century pictures taken in and around MLRA 80A, these sites have very few, if any, trees. So, apparently, periodic fires kept the woody species in check. Species composition of woody plants will vary from area to area. But generally, tree species will be bur oak, hackberry, elm, ash, sycamore or pecan. Eastern redcedar is invading this site and becoming more prominent in the plant community. Shrubs and vines common to the site are buckbrush, sumac, blackberry, poison ivy, grape and greenbrier. Combined trees and shrubs may form an overstory canopy of 70 to 80 percent. The understory is dominated by shade tolerant plants such as Virginia wildrye, Canada wildrye, sedges, Scribner’s panicum, Indian woodoats, sweet woodreed and various muhlys. Suitable livestock forage production in this state, is limited. This state of the Sandy Bottomland site provides shelter for both livestock, deer and numerous small mammals. Many species of birds frequent this state because of the trees.

Dominant plant species

- elm (*Ulmus*), tree
- hackberry (*Celtis*), tree
- ash (*Fraxinus*), tree
- eastern redcedar (*Juniperus virginiana*), tree

- wildrye (*Elymus*), grass

State 3
Converted

This state represents a conversion in land use. The soil, plant, and hydrological properties have been altered. Many sites are still in commodity crop production. Others have been planted to an introduced monoculture pasture planting, principally Bermudagrass.

Dominant plant species

- Bermudagrass (*Cynodon dactylon*), grass

Transition T1A
State 1 to 2

In the absence of prescribed fire or alternative brush management practices, woody species may encroach and eventually dominate the ecological processes on the site.

Transition T1B
State 1 to 3

Through cultivation and seeding, the site will be transitioned to the converted state. The soil properties have been altered significantly.

Restoration pathway R2A
State 2 to 1

With the implementation of prescribed burning and or mechanical brush management, the woody state may be restored to the reference state. It is often necessary to follow specific grazing management guidelines during this process to ensure the recovery of the herbaceous plant community.

Transition T2A
State 2 to 3

Through cultivation and seeding, the site will be transitioned to the converted state. The soil properties have been altered significantly.

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				759–1830	
	switchgrass	PAVI2	*Panicum virgatum*	380–916	–
	big bluestem	ANGE	*Andropogon gerardii*	189–457	–
	Indiangrass	SORGH	*Sorghastrum*	189–457	–
	little bluestem	SCSC	*Schizachyrium scoparium*	161–390	–
2				421–1019	
	Canada wildrye	ELCA4	*Elymus canadensis*	49–118	–
	Florida paspalum	PAFL4	*Paspalum floridanum*	49–118	–
	purpletop tridens	TRFL2	*Tridens flavus*	33–78	–
	dropseed	SPORO	*Sporobolus*	17–39	–

	Indian woodoats	CHLA5	*Chasmanthium latifolium*	17–39	–
	cylinder jointtail grass	COCY	*Coelorachis cylindrica*	17–39	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	17–39	–
3				35–86	
	prairie threeawn	AROL	*Aristida oligantha*	12–30	–
	splitbeard bluestem	ANTE2	*Andropogon ternarius*	11–28	–
	broomsedge bluestem	ANVI2	*Andropogon virginicus*	11–28	–
4				168–407	
	sedge	CAREX	*Carex*	84–204	–
Forb					
5				43–110	
	dotted blazing star	LIPU	*Liatris punctata*	15–37	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	13–36	–
6				50–129	
	Texas bullnettle	CNTE	*Cnidoscolus texanus*	15–37	–
	white heath aster	SYER	*Symphyotrichum ericoides*	15–37	–
	Missouri goldenrod	SOMI2	*Solidago missouriensis*	13–36	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	8–19	–
7				90–224	
	white snakeroot	AGAL5	*Ageratina altissima*	9–22	–
	lanceleaf ragweed	AMBI2	*Ambrosia bidentata*	9–22	–
	wild indigo	BAPTI	*Baptisia*	9–22	–
	partridge pea	CHFA2	*Chamaecrista fasciculata*	9–22	–
	Illinois bundleflower	DEIL	*Desmanthus illinoensis*	9–22	–
	sessileleaf ticktrefoil	DESE	*Desmodium sessilifolium*	9–22	–
	sneezeweed	HEAM	*Helenium amarum*	9–22	–
	lespedeza	LESPE	*Lespedeza*	9–22	–
	goldenrod	SOLID	*Solidago*	9–22	–
	Baldwin's ironweed	VEBA	*Vernonia baldwinii*	9–22	–
Shrub/Vine					
8				17–40	
	grape	VITIS	*Vitis*	29–69	–
	western poison ivy	TORY	*Toxicodendron rydbergii*	28–67	–
	Chickasaw plum	PRAN3	*Prunus angustifolia*	28–67	–
	smooth sumac	RHGL	*Rhus glabra*	17–40	–
Tree					
9				337–815	
	eastern cottonwood	PODE3	*Populus deltoides*	270–651	–
	American sycamore	PLOC	*Platanus occidentalis*	67–164	–
	blue wild indigo	BAAU	*Baptisia australis*	9–22	–
10				168–407	
	black willow	SANI	*Salix nigra*	84–204	–

	gum bully	SILAL3	*Sideroxylon lanuginosum ssp. lanuginosum*	43–102	–
	elm	ULMUS	*Ulmus*	43–102	–
	partridge pea	CHFA2	*Chamaecrista fasciculata*	9–22	–
11				16–43	
	common persimmon	DIVI5	*Diospyros virginiana*	3–8	–
	sassafras	SAAL5	*Sassafras albidum*	3–8	–
	blackhaw	VIPR	*Viburnum prunifolium*	2–7	–
	blackjack oak	QUMA3	*Quercus marilandica*	2–7	–
	northern red oak	QURU	*Quercus rubra*	2–7	–
	post oak	QUST	*Quercus stellata*	2–7	–

Animal community

Numerous animal and bird species utilize this site as habitat. Small mammals, song birds, predators, along with traditional game species such as turkey, bobwhite quail, whitetail deer, mule deer, and others frequent this site. The combination of grasses, forbs, trees and woody shrubs that occur in the presumed historic plant community provide suitable habitat for all the above species, at least at some time during the year. Surface water, in the form of ponds, springs, and flowing streams provide water for species that require daily watering. Many different species move in and out of the site. Predators such as coyotes and bobcats may utilize the site for hunting prey and hiding during the day.

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

Hunting, Fishing, Camping, Hiking, Bird Watching, Photography, Horseback Riding, etc..

Wood products

There are limited wood products taken from this site. Trees can be used for most wood products indigenous to the species. Several species of trees are found on this site, but there is seldom any harvesting of wood products other than firewood for cooking, heat and fence posts.

Other products

Fruits, blackberries, other berries and pecans are harvested from this site.

Other information

NA

Inventory data references

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

Type locality

Location 1: Pottawatomie County, OK	
General legal description	Pottawatomie County, Oklahoma; about 2 miles east and 1 mile south of Shawnee; about 2,100 feet west and 200 feet south of the northeast corner of sec. 28, T. 10 N., R. 4 E.

References

Anderson, R.C. 1982. An evolutionary model summarizing the roles of fire, climate, and grazing animals in the origin and maintenance of grasslands. Pages 297–308 in , , and , editors. Grasses and grasslands: systematics and ecology.

Other references

This site was included in an update project during 2013. The ESD was edited to fit the new ESIS format. The concepts and vegetative data contained therein was not altered. The entire ESD will be reviewed, updated, and subjected to the QC/QA processes as part of a future project. CW

USDA-NRCS (Formerly Soil Conservation Service) Range Site Descriptions (1960s)

USDA-NRCS (Formerly Soil Conservation Service) Ag Handbook 296 (2006)

Contributors

Edits by Colin Walden, Soil Survey Office, Stillwater, OK
Dr. Jack Eckroat, Grazing Lands Specialist, NRCS, Oklahoma

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, Jack Eckroat
Contact for lead author	100 USDA Suite 206, Stillwater, OK 74074
Date	07/09/2004
Approved by	Colin Walden
Approval date	

Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None

2. **Presence of water flow patterns:** None, although some possible following out of bank flow.

3. **Number and height of erosional pedestals or terracettes:** None

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** < 2%

5. **Number of gullies and erosion associated with gullies:** None

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

7. **Amount of litter movement (describe size and distance expected to travel):** Minimal. Short distance movement. Only litter movement would be during high intensity storms with out of bank flow. Some litter will lodge against other plants and debris.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Stability Class 6. Very stable with abundant organic matter in surface.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Ap: 0 to 9 inches; brown silt loam, weak fine and medium granular structure. A1: 9 to 14 inches; reddish brown silt loam, weak fine and medium granular structure. A2: 14 to 30 inches; reddish brown silt loam, weak fine and medium granular structure.

   Refer to specific description for component sampled.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Tallgrass and tree component provide high infiltration and retention of rainfall. The main runoff will be during high rainfall events.

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

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: Warm season tallgrasses

    Sub-dominant: warm season midgrasses

    Other: trees and shrubs perennial forbs cool season perennial grasses.

    Additional: Warm season tallgrasses warm season midgrasses trees and shrubs perennial forbs cool season perennial grasses.

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Some mortality and decadence can be expected but not much <5%.

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14. **Average percent litter cover (%) and depth (in):** 50 - 75% covers at a depth of .5 - 1 inches.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Total production is about 4500 – 8500 pounds per acre.

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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:** Eastern redcedar is a native that will increase without fire. Other woody plants such as elm, willow, cottonwood, and buckbrush can increase to the point of crossing a threshold.

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17. **Perennial plant reproductive capability:** All species are capable of reproducing, both vegetatively and with seed.
