Ecological site R080AY095OK
Subirrigated Bottomland

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Accessed: 10/12/2024

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.

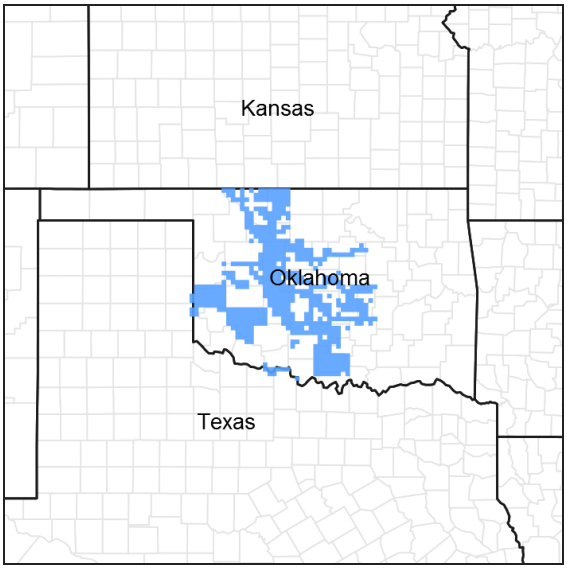


Figure 1. Mapped extent

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 sandy soils on floodplains. The soils contain a high water table within 40 inches of the surface for extended periods throughout the year. In the reference state, the plant community is dominated by a mix of tallgrasses and forbs with a few woody species. Due to the presence of water in the soil profile, vegetative productivity may not be as sensitive to precipitation patterns as the adjacent sites are. These areas are commonly

invaded by salt cedar.

Associated sites

R080AY022OK	**Dune** Sandy texture located at higher elevations above floodplain.
R080AY014OK	**Deep Sand** Sandy texture located at higher elevations above floodplain.

Similar sites

R080AY090OK	**Ponded Bottomland** Bottomland with episaturation.
R080AY050OK	**Loamy Bottomland** Similar landscape setting with loamy textured soils and no water table within 5 feet of the surface at any time of the year.
R080AY068OK	**Sandy Bottomland** Similar landscape setting with no water table within 5 feet of the surface at any time of the year.

Table 1. Dominant plant species

Tree	(1) *Salix nigra*
Shrub	(1) *Cephalanthus occidentalis*
Herbaceous	(1) *Panicum virgatum* (2) *Spartina pectinata*

Physiographic features

These sites occur on alluvial sediments on floodplains. Slopes are 0 to 2%.

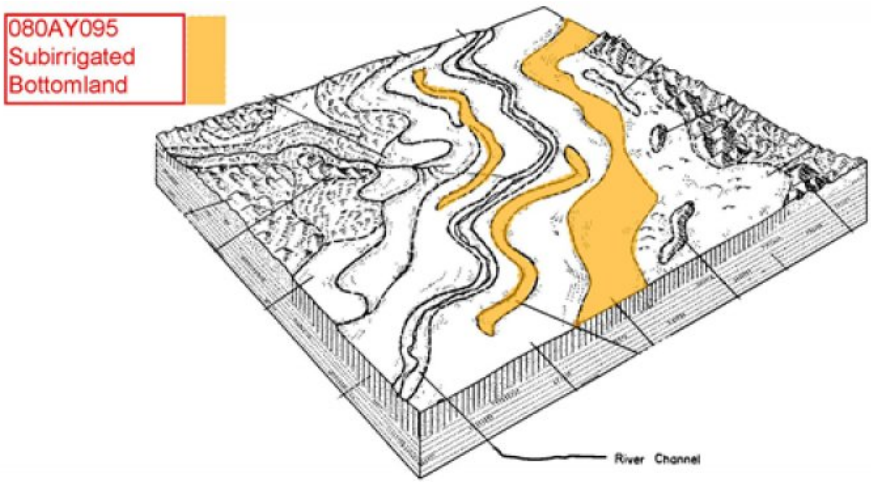


Figure 2. 080AY095

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	Occasional to frequent
Ponding frequency	None
Elevation	500–1,500 ft

Slope	0–2%
Water table depth	12–60 in
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Negligible to high
Flooding duration	Not specified
Flooding frequency	Not specified
Ponding 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)	173-187 days
Freeze-free period (characteristic range)	194-203 days
Precipitation total (characteristic range)	33-37 in
Frost-free period (actual range)	157-192 days
Freeze-free period (actual range)	191-208 days
Precipitation total (actual range)	32-39 in
Frost-free period (average)	179 days
Freeze-free period (average)	199 days
Precipitation total (average)	35 in

Climate stations used

- (1) OKEENE [USC00346629], Okeene, OK
- (2) WALTERS [USC00349278], Walters, OK
- (3) KINGFISHER [USC00344861], Kingfisher, OK
- (4) JEFFERSON [USC00344573], Medford, OK
- (5) CHEROKEE 4W [USC00341724], Cherokee, OK
- (6) WATONGA [USC00349364], Watonga, OK
- (7) PAULS VALLEY 4 WSW [USC00346926], Pauls Valley, OK
- (8) ANTHONY [USW00013980], Anthony, KS
- (9) STILLWATER 5 WNW [USW00053927], Stillwater, OK

Influencing water features

The unusual high water table enables growth of lush vegetation and is typically not affected by frequent dry periods during the growing season like other sites in this area. Wetland characteristics can be easily distinguished on this site and some obligate wetland plants can be found, but typically the site is dominated by facultative plants. These sites act as a filter for overland flow and can easily become saturated during heavy periods of rainfall especially

during the spring. Evaporation is minimized by tall and dense plant growth that shades the soil surface. The site contributes to the stability of the overall riparian system that occurs along major streams and rivers. While the subirrigated soils are subject to endosaturation (water moving vertically upward or horizontally into the profiles), flood events may produce periods episaturation (surface water becoming perched above a layer of low permeability) and lead to a temporary increase in hydrophitic vegetation.

Wetland description

A site specific assessment is needed to identify any wetland status.

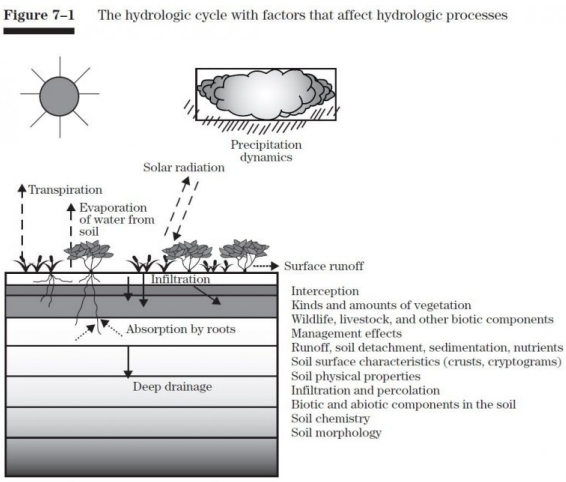


Figure 9.

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:
Gracemont & Gracemore

Subirrigated soils consist of very deep, somewhat poorly drained, moderately rapid to rapidly permeable soils formed in calcareous sandy alluvium of recent age. These soils are located on nearly level, broad flood plains or back water positions of the Central Rolling Red Prairies (MLRA-80A). They may have a loamy top with sandy texture throughout the profile. These soils are usually closest to the stream channel. Subirrigated soils are typically saturated late in winter and early in spring and are somewhat poorly drained with high runoff during these periods. The key series for this site are Gracemore and Gracemont soils which consist of very deep soils with a dark brown to reddish brown A horizon over single grained, loose fine sand or fine sandy loam. Slopes are 0 to 2 percent. Subirrigated soils are characterized by endosaturation and have a zone within 40 inches of the surface for one month or more during the year and within 18 inches from November through May that is saturated. The soils are frequently to occasionally flooded with brief or very brief duration during months of March through August. These nearly level to very gently sloping flood plain soils can be found on large braided river systems as well as on small tributaries throughout the MLRA. Native vegetation is tallgrasses and midgrasses with Buttonbush on the wettest areas and Cottonwood as the site becomes slightly drier and transitions into sandier soils.

Table 5. Representative soil features

Parent material	(1) Alluvium–sandstone
Surface texture	(1) Fine sandy loam
Drainage class	Somewhat poorly drained
Permeability class	Moderate to rapid
Soil depth	60 in
Surface fragment cover <=3"	0–7%
Surface fragment cover >3"	0–1%
Available water capacity (0-40in)	2.9–6.8 in
Electrical conductivity (0-40in)	0–16 mmhos/cm
Sodium adsorption ratio (0-40in)	0–4
Soil reaction (1:1 water) (0-40in)	4.5–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–9%

Ecological dynamics

The information contained in the State and Transition Diagram (STD) and the Ecological Site Description was developed using 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 reference plant community for this site is dominated by a mixture of tallgrasses with occasional midgrasses along with some grasslike plants, a variety of forbs, and a small component of shrubs and trees. Plants growing on this site are able to grow in wet and sometimes saturated soils. In many places throughout the site, hydrophitic species may be prevalent especially in the wettest areas. Subsurface water is available for plant growth during nearly all of the growing season even in dry periods. Plant production is typically very high as compared to other sites associated within the same areas during the growing season because of the sub surface water. These sites may be considered the highest producing sites in the MLRA. Shifts in the plant communities may occur due to high water tables for extended periods of times especially during wet periods following flood events. Plant diversity varies depending on the water fluctuation and the micro topography present on the landscape. Slightly saline sites may be dominated by only a few plants that are tolerant of the salty conditions within the soil, but the time needed for changes to salinity are highly dependent on the landscape position of the site and its proximity to the floodplain. Changes in the plant community are much more variable along the water course channels because of the likelihood of scouring and replacement of material as compared to backwater positions. There is a good variety of both cool-season and warm-season plants. Water table fluctuations can cause slight to extreme differences in plant species present and their production potential. Native trees such as Cottonwood (Populus spp.), and Willow (Salix spp.) will usually be present in the high areas and around the perimeter, but the total of all woody species will not exceed 10% canopy cover. Buttonbush (*Cephalanthus occidentalis*) is a common shrub especially on the wettest areas with False Indigo Bush(*Amorpha fruticosa*) commonly found on similar to slightly drier areas.

Since the majority of these sites are associated with fluvial systems, they are subject to the disturbances associated with watercourses and adjacent floodplains. Therefore, the classification of soils and ecological sites along these systems can be quite difficult do to the high potential for change. These floodplains may be shifting mosaics or relatively stable landforms depending on the frequency, season, and duration of flood events. The frequency and season of these flood events may be altered by anthropogenic or biotic factors or, many times, both. Historically, these floods varied in magnitude but generally occurred in conjunction with early spring rains. Flood control reservoirs, irrigation wells, and stream diversions can reduce flooding frequency and alter the timing of such events. However, a dense monoculture of salt cedars may obstruct the stream flow and lead to a more intense and

prolonged flood event. Regardless of the source, a major flood event can reset the “successional clock” and completely change the ecological dynamics and plant community in these areas. These changes can range from slight where the plant community is shifted to another phase, to severe where the site becomes part of the stream channel and transitions to an alternative state.

Natural fire likely played an important role in the function of most plains sites, especially the tallgrass communities and this site is no exception to that. Fire as well as seasonal flooding provided the needed disturbance to maintain plant health and in some situations reset plant succession especially in the drier areas of the MLRA. Tallgrasses such as Sand Bluestem (*Andropogon hallii*), Switchgrass (*Panicum virgatum*), Eastern Gamagrass (*Tripsacum dactyloides*), and Indiangrass (*Sorghastrum nutans*) were dependent upon stimulation from fire or flooding to remove old growth that would accumulate on the soil surface. Fire also kept shrubs suppressed and removed old fallen timber from trees such as cottonwood. Prairie Cordgrass (*Spartina pectinata*) and Grasslike plants such as rushes (Juncus spp.) and sedges (Carex spp.) also accumulate growth similar to tallgrass prairie species, and can sometimes become dominant in the wetter parts of this site. Fire helped keep a balance between the many different vegetation types. Wildlife habitat was improved by opening up canopies and removing barriers to movement. The wet soil acted as an insulator to protect plant roots and lower stems from heat damage so that plant re-growth was rapid.

The mixture of grasses, forbs, and woody plants make it excellent wildlife habitat. Also, the presence of water in the plains attracts all kinds of grazers and predators as well as birds and small mammals. This site has an abundance of all habitat factors required: water, nesting and escape cover, and a variety of food plants for turkey, quail, white tailed deer, as well as many other species of mammals and birds. Cattle find this site attractive as well, and will naturally spend a lot of time grazing and loafing in these areas. Even though cattle naturally gravitate to this site and usually overgraze the area if left unattended, the site can be grazed without damaging the plant community, or the riparian area, if proper grazing management is used. Continuous intensive grazing can lead to a decline in tallgrass species giving way to midgrass/shortgrass species that are better able to cope with grazing pressure. When the site is allowed to be overgrazed certain species can become dominant that are less desirable and since they thrive in wet soils these species will begin to dominate when improper management is employed over many years. The unique characteristics of the site and the vast differences from adjacent sites make special management techniques necessary. Often it may be beneficial to manage this site in such a way as to control and limit access by grazing animals that provides for use of this site exclusive to those around it. Occasional haying of this site may be a good alternative to grazing in some years due to the natural disturbances within any given year. Prescribed burning may be applicable in some cases to help sustain a diverse community along with many other types of management techniques

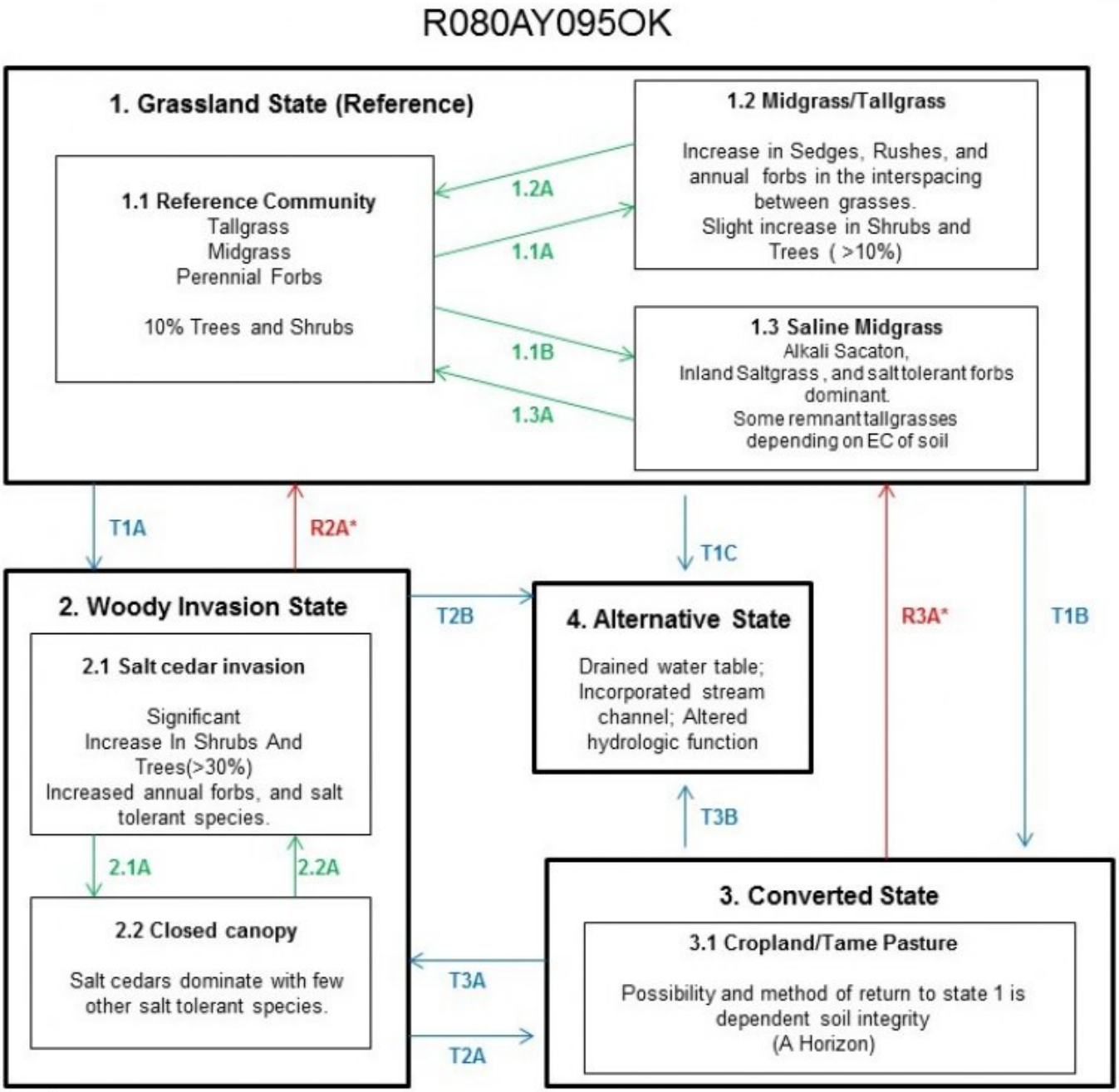
State and Transition Diagram:
A State and Transition Diagram for the Subirrigated Bottomland (R080AY095OK) is depicted below. Thorough descriptions of each state, transition, and pathway follow the model. Experts base this model on available experimental research, field observations, professional consensus, 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

Community Phase Pathway – Indicates movement between communities within a state.
Transitional Pathway - Indicates that the state either naturally moves or moves because of an input.
Restoration Pathway – Potential pathway for restoration to another state.
1.1A- Heavy Grazing, Lack of Fire, Lowered Water Table.
1.1B- Accumulated salts, Lowered Water Table.
1.2A- Prescribed Grazing, Prescribed Burning, Higher Water Table.
1.3A- Salts Leached from profile, Flood event.
2.1A- Heavy Grazing, No Brush Management.
2.2A- Brush Management, Prescribed Grazing.
T1A- Lack of Fire, Lowered Water Table, Increased Salinity, Invasion of Tamarisk, scouring from flood event.
T2A,T1B- Cultivation and land clearing.
T3A- Abandonment.
T1C,T2B,T3B – Flood event, Channel movement.
R2A*- Prescribed Burning, Chemical Brush Management, Mechanical Brush Management, Range Planting.
R3A*- Range Planting
* NOTE: The success of restoration projects on this site is dependent upon species selection, soil textures, hydrology, and precipitation cycles. Failure to carefully plan and implement rehabilitation efforts may result in recolonization of the site by salt cedar or other undesirable species. Changes in plant communities and transitions between states may be the result of any listed ecological driver or combination of many.

State 1
Grassland State

The following narratives describe the potential communities within the Grassland stable state. This state is dominated by herbaceous species with a minor woody component.

Dominant plant species

- willow (*Salix*), tree
- common buttonbush (*Cephalanthus occidentalis*), shrub
- switchgrass (*Panicum virgatum*), grass

Community 1.1
Reference Community Tallgrass/Midgrass/Perennial Forb

Figure 10. Reference Community

The reference plant community is a mixture of tallgrasses, midgrasses, shortgrasses, forbs, and very few if any woody shrubs and trees. The major grasses are Switchgrass (*Panicum virgatum*), Big Bluestem(*Andropogon gerardii*), Indiangrass (*Sorghastrum nutans*), Eastern Gamagrass (*Tripsacum dactyloides*), Canada Wildrye (*Elymus canadensis*), and Prairie Cordgrass (*Spartina pectinata*). Some midgrasses such as Western Wheatgrass (*Pascopyrum smithii*), Tall Dropseed (*Sporobolus compositus*), and Alkali Sacaton (*Sporobolus airoides*) are common but not nearly as productive as the tallgrasses. A few shortgrasses are present with Buffalograss (Buchloe dactyloides) being the most common. The forb component includes Maximilian Sunflower (*Helianthus maximilianii*), Gayfeather species(Liatris spp.), Baldwin Ironweed (*Vernonia baldwinii*), and Goldenrod species (Solidago spp.). Grasslikes include Sedges (Carex spp.), Rushes (Juncus spp.) and occasionally Cattails (Typha spp.). Shrubs include Button Bush (*Cephalanthus occidentalis*), False Indigo Bush (*Amorpha fruticosa*), and occasionally Roughleaf Dogwood (*Cornus drummondii*.) and Buckbrush (*Symphoricarpos orbiculatus*). Trees are Cottonwood (Populus deltoids), Willow (Salix spp.), Elm (Ulmus spp.), Hackberry (Celtis spp.), Pecan (Carya illinoensis), Walnut(Juglans Spp.), and Western Soapberry (*Sapindus saponaria*).

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	5600	6800	8000
Forb	700	850	1000
Shrub/Vine	350	425	500
Tree	350	425	500
Total	**7000**	**8500**	**10000**

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

Figure 13. Midgrass Community

This plant community is dominated by a mixture of midgrasses and tallgrasses including Dropseeds(Sporobolus spp.) and Little Bluestem(*Schizachyrium scoparium*). More palatable tallgrasses have declined and shortgrass species are increasing in abundance on the areas of bare ground along with annual forbs, sedges and rushes. Shrubs and trees such as Common Buttonbush(*Cephalanthus occidentalis*), Sandplum(*Prunus angustifolia*), Willow(Salix spp.) or other brush species increase in abundance with the increased risk of encroachment by Eastern Redcedar(*Juniperus virginiana*). If there is an increase in soil salinity, Alkali Sacaton(*Sporobolus airoides*), Inland Saltgrass(*Distichlis spicata*), and other saline-tolerant herbaceous species will begin to increase. Salt cedar saplings can begin to appear if there is a seed source. Cottonwood will usually be found on the areas of higher elevation and around the perimeter. This community pathway may also be the result of long term exclusion of fire or a slight lowering of the water table.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	4200	5100	6000
Forb	1750	2125	2500
Shrub/Vine	560	680	800
Tree	490	595	700
Total	**7000**	**8500**	**10000**

Figure 15. 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 1.3
Saline Midgrass

Figure 16. Saline Midgrass

This plant community is dominated by salt tolerant vegetation such as Inland Saltgrass(*Distichlis spicata*), Alkali Sacaton(*Sporobolus airoides*), and salt tolerant forbs. Salt tolerant trees and shrubs may begin to increase greater than 10% and there is a high risk of invasion by Salt cedar. Herbaceous production is limited in this community due to the lower production potential of the salt tolerant species.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	3200	4160	5120
Forb	1000	1300	1600
Shrub/Vine	400	520	640
Tree	400	520	640
Total	**5000**	**6500**	**8000**

Pathway 1.1A
Community 1.1 to 1.2

Reference Community Tallgrass/Midgrass/Perennial Forb

Midgrass/Tallgrass

If the subirrigated ecological site is subjected to continuous overgrazing, the plant community can transition to midgrass dominated vegetation. Other factors that can be attributed to this community shift in combination with overgrazing or as stand alone disturbances are the absence of prescribed burning or a decline in the water table below the rooting zone.

Pathway 1.1B
Community 1.1 to 1.3

Reference Community Tallgrass/Midgrass/Perennial Forb

Saline Midgrass

When this site is subjected to endosaturation by water with a high saline content, there is potential for accumulation of salts within the soil profile. If the water table recedes below the rooting zone of the plants in this community, the salts may remain within this zone or at the surface. This can lead to a shift in the plant community that is dominated by plants with a high to moderate salinity tolerance.

Pathway 1.2A
Community 1.2 to 1.1

Midgrass/Tallgrass

Reference Community Tallgrass/Midgrass/Perennial Forb

The plant community may be shifted back to the reference community through implementation of a prescribed burning and prescribed grazing program. However, if the water table has lowered slightly below the rooting zone of the palatable tallgrass species, deferment may be needed as part of a prescribed grazing plan.

Pathway 1.3A
Community 1.3 to 1.1

Saline Midgrass

Reference Community Tallgrass/Midgrass/Perennial Forb

If the accumulated salts within the soil profile are leached out, there is potential for this community to revert to the reference community. This may be the result of a flood event leaching the salts or the return of the elevated water table that supports the vegetation within the reference community.

State 2
Woody Invasion State

The following narratives describe the plant communities within the Woody state of this ecological site. In this state, woody vegetation begins to dominate the plant community.

Dominant plant species

- willow (*Salix*), tree
- tamarisk (*Tamarix*), tree
- sedge (*Carex*), other herbaceous
- bulrush (*Schoenoplectus*), other herbaceous

Community 2.1
Salt Cedar Invasion

Figure 18. Invasion

This community has been invaded by salt cedar. There is a significant increase in brush canopy cover (>30%) predominately made up of salt cedar. Salt tolerant forbs and grass species such as Inland Saltgrass(*Distichlis spicata*) and Alkali Sacaton(*Sporobolus airoides*) make up a significant portion of the herbaceous plant community. This community is of very little use for grazing animals due to the low palatability of the plants. Some wildlife species and insects will still utilize this site. The risk of wildfire is increased due to the dense growth habits of the salt cedars.

Table 9. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	2000	2600	3200
Tree	1500	1950	2400
Forb	1250	1625	2000
Shrub/Vine	250	325	400
Total	**5000**	**6500**	**8000**

Figure 20. 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 2.2
Closed Canopy Woodland

Figure 21. Closed Canopy

This plant community has been invaded by Salt cedar(Tamarisk spp.). The trees have formed a closed canopy stand with traces of other salt tolerant vegetation occurring in the understory.

Table 10. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	3750	4875	6000
Grass/Grasslike	750	975	1200
Shrub/Vine	250	325	400
Forb	250	325	400
Total	**5000**	**6500**	**8000**

Figure 23. 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 2.1A
Community 2.1 to 2.2

Salt Cedar Invasion **Closed Canopy Woodland**

Without brush management, this plant community can shift to a closed canopy plant community comprised mainly of invasive Salt cedar.

Pathway 2.2A
Community 2.2 to 2.1

Closed Canopy Woodland

Salt Cedar Invasion

Through limited implementation of brush managment, the closed canopy of this community may be opened up allowing for more herbaceous plants to persist. However, these herbaceous palnts will be comprised of mainly low production, salt tolerant species.

State 3
Converted State

This state has been converted to an agricultural site. Refer to appropriate Forage and Crop Suitability Reports for further information about vegetative production.

Dominant plant species

- Bermudagrass (*Cynodon dactylon*), grass

Community 3.1
Cropland/Tame Pasture

The higher islands and higher open areas may be cultivated for crops or introduced pasture species. Crop yields can be favorable due the available water on these sites. However, saturated soils at certain times of the year can be problematic for field operations.

State 4
Alternative State

The hydrology of this state differs from all other states within this ESD. This state may consist of scoured, bare areas, stream channels, or sites where the water table has been drained.

Dominant plant species

- saltgrass (*Distichlis spicata*), grass

Transition T1A
State 1 to 2

If there is a significant decrease in competition from native grasses, invasive salt cedars can begin to dominate this site. This can be caused by increased bare ground from overgrazing or by an increase in soil salinity from a prolonged drop in the water table. Salt cedar is a very prolific reproducer and can survive and multiply in both wet and dry conditions.

Transition T1B
State 1 to 3

If a site is suitable for cultivation, it may be converted to cropland or tame pasture through tillage and seeding.

Transition T1C
State 1 to 4

Due to the proximity of these sites to fluvial sytems(streams & rivers), there is potential for the transition to an alternative state. This can be the result of a significant, prolonged drop in the water table and the absence of endosaturation, scouring and relocation of the adjacent river channel, or sedimentation from a flood event that creates permanent or temporary inundation. Other factors could also play a role in altering the hydrologic function of this site and lead to the transition to an alternative state.

Restoration pathway R2A
State 2 to 1

The woody state of this site may be restored to a grassland state through a well planned rehabilitation program. Chemical or mechanical brush management must be used to eradicate the dense stands of salt cedar followed by revegetation with native species. The success of the rehab depends on many factors and can be limited. The length of time that the site has been in this state, soil texture and salinity, precipitation patterns, and hydrology should be carefully evaluated before starting a rehabilitation program. Failure to carefully plan and implement rehab efforts can result in recolonization of the site by salt cedar or other undesirable species.

Transition T2A
State 2 to 3

If a site is suitable for cultivation, it may be converted to cropland or tame pasture through tillage and seeding. However, this transition will require additional inputs such as brush management or land clearing prior to cultivation. Precautions should be taken when considering crop or pasture production on a site with high soil salinity.

Transition T2B
State 2 to 4

Due to the proximity of these sites to fluvial sytems(streams & rivers), there is potential for the transition to an alternative state. This can be the result of a significant, prolonged drop in the water table and the absence of endosaturation, scouring and relocation of the adjacent river channel, or sedimentation from a flood event that creates permanent or temporary inundation. Other factors could also play a role in altering the hydrologic function of this site and lead to the transition to an alternative state.

Restoration pathway R2A
State 3 to 1

Even though a Subirrigated site has been in cultivation for a substantial period of time, it is not always impossible for the site to return to something resembling the Reference Plant Community. Cultivation is definitely not a one-way street for this ecological site. The return of a cultivated field to the Reference Plant Community depends on the integrity of the soil's A horizon, length of time in cultivation, loss of organic matter, soil type, and water table depth. There are many examples in Oklahoma, Kansas, and Texas of abandoned cultivated fields that have re-vegetated; are in excellent condition; and closely resemble the HPC. Sometimes, however, it is very difficult to determine if fields were cultivated. Some of these sites may have been reseeded, others were not. If the soil resource has not been heavily degraded and given enough time, the site could get back to the HPC or something very close to it. The grasses are fastest to recover, the high seral forbs slowest. The soil resource (integrity of the soil) is the primary limiting factor.

Transition T3A
State 3 to 2

If a cultivated site is abandoned, there is potential for invasion by woody species. Depending on seed availability and soil salinity, this site can be invaded by Salt cedar(Tamarisk spp.) in a short amount of time.

Transition T3B
State 3 to 4

Due to the proximity of these sites to fluvial sytems(streams & rivers), there is potential for the transition to an alternative state. This can be the result of a significant, prolonged drop in the water table and the absence of endosaturation, scouring and relocation of the adjacent river channel, or sedimentation from a flood event that creates permanent or temporary inundation. Other factors could also play a role in altering the hydrologic function of this site and lead to the transition to an alternative state.

Additional community tables

Table 11. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Tallgrasses**			4480–6400	
	switchgrass	PAVI2	*Panicum virgatum*	1200–2000	–
	Indiangrass	SONU2	*Sorghastrum nutans*	580–960	–
	eastern gamagrass	TRDA3	*Tripsacum dactyloides*	580–960	–
	big bluestem	ANGE	*Andropogon gerardii*	580–960	–
	prairie cordgrass	SPPE	*Spartina pectinata*	380–640	–
	little bluestem	SCSC	*Schizachyrium scoparium*	190–320	–
	purpletop tridens	TRFL2	*Tridens flavus*	0–320	–
2	**Cool-Season Grasses**			560–800	
	Canada wildrye	ELCA4	*Elymus canadensis*	140–240	–
	western wheatgrass	PASM	*Pascopyrum smithii*	140–240	–
	foxtail barley	HOJU	*Hordeum jubatum*	50–80	–
	Heller's rosette grass	DIOL	*Dichanthelium oligosanthes*	50–80	–
	Carolina canarygrass	PHCA6	*Phalaris caroliniana*	20–40	–
	annual rabbitsfoot grass	POMO5	*Polypogon monspeliensis*	20–40	–
3	**Midgrass/Shortgrass**			140–200	
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	70–120	–
	alkali sacaton	SPAI	*Sporobolus airoides*	50–80	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	50–80	–
	saltgrass	DISP	*Distichlis spicata*	50–80	–
	silver beardgrass	BOLA2	*Bothriochloa laguroides*	50–80	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	40–60	–
	marsh muhly	MURA	*Muhlenbergia racemosa*	20–40	–
	knotgrass	PADI6	*Paspalum distichum*	20–40	–
	vine mesquite	PAOB	*Panicum obtusum*	20–40	–
	barnyardgrass	ECCR	*Echinochloa crus-galli*	0–20	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–20	–
	fall witchgrass	DICO6	*Digitaria cognata*	0–15	–
	purple threeawn	ARPU9	*Aristida purpurea*	0–15	–
4	**Grasslike**			420–600	
	sedge	CAREX	*Carex*	180–300	–
	bulrush	SCHOE6	*Schoenoplectus*	130–220	–
	scouringrush horsetail	EQHY	*Equisetum hyemale*	100–160	–
	rush	JUNCU	*Juncus*	60–100	–
	southern cattail	TYDO	*Typha domingensis*	0–20	–
Forb					
5	**Forbs/Legumes**			700–1000	
	lanceleaf fogfruit	PHLA3	*Phyla lanceolata*	40–60	–
	turkey tangle fogfruit	PHNO2	*Phyla nodiflora*	40–60	–
	pitcher sage	SAAZG	*Salvia azurea var. grandiflora*	30–50	–

	pitcher sage	[illegible]	*Salvia azurea var. grandiflora*	[illegible]	
	blazing star	LIATR	*Liatris*	30–50	–
	cardinalflower	LOCA2	*Lobelia cardinalis*	30–50	–
	prairie spiderwort	TROC	*Tradescantia occidentalis*	30–50	–
	Baldwin's ironweed	VEBA	*Vernonia baldwinii*	30–50	–
	hoary verbena	VEST	*Verbena stricta*	30–50	–
	wholeleaf rosinweed	SIIN2	*Silphium integrifolium*	30–50	–
	goldenrod	SOLID	*Solidago*	30–50	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	30–50	–
	Indianhemp	APCA	*Apocynum cannabinum*	20–30	–
	Illinois bundleflower	DEIL	*Desmanthus illinoensis*	20–30	–
	false boneset	BREU	*Brickellia eupatorioides*	20–30	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	20–30	–
	Maryland senna	SEMA11	*Senna marilandica*	0–20	–
	partridge pea	CHFA2	*Chamaecrista fasciculata*	0–20	–
	wild indigo	BAPTI	*Baptisia*	0–20	–
	prairie clover	DALEA	*Dalea*	0–20	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–20	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	0–10	–
	common sunflower	HEAN3	*Helianthus annuus*	0–10	–
	sawtooth sunflower	HEGR4	*Helianthus grosseserratus*	0–10	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–10	–
	great ragweed	AMTR	*Ambrosia trifida*	0–10	–
	whitemouth dayflower	COER	*Commelina erecta*	0–10	–
	hogwort	CRCA6	*Croton capitatus*	0–10	–
	annual marsh elder	IVAN2	*Iva annua*	0–10	–
	southern annual saltmarsh aster	SYDI2	*Symphyotrichum divaricatum*	0–10	–
	white heath aster	SYER	*Symphyotrichum ericoides*	0–10	–
	prairie gentian	EUSTO	*Eustoma*	0–10	–
	evening primrose	OENOT	*Oenothera*	0–5	–
	Pennsylvania smartweed	POPE2	*Polygonum pensylvanicum*	0–5	–
	annual buckwheat	ERAN4	*Eriogonum annuum*	0–5	–
Shrub/Vine					
6	**Shrub/Vine**			350–500	
	false indigo bush	AMFR	*Amorpha fruticosa*	75–125	–
	common buttonbush	CEOC2	*Cephalanthus occidentalis*	75–125	–
	willow baccharis	BASA	*Baccharis salicina*	0–50	–
	Chickasaw plum	PRAN3	*Prunus angustifolia*	30–50	–
	fragrant sumac	RHAR4	*Rhus aromatica*	0–25	–
	coralberry	SYOR	*Symphoricarpos orbiculatus*	0–25	–
	roughleaf dogwood	CODR	*Cornus drummondii*	0–25	–
	crimsoneyed rosemallow	HIMO	*Hibiscus moscheutos*	0–15	–
	sorrelvine	CITR2	*Cissus trifoliata*	0–15	–
	soapweed yucca	YUGL	*Yucca glauca*	0–10	–

	soapwood yucca	YUCE	*Yucca glauca*	[illegible]	
	pricklypear	OPUNT	*Opuntia*	0–5	–
Tree					
7	**Tree**			350–500	
	black willow	SANI	*Salix nigra*	140–235	–
	eastern cottonwood	PODE3	*Populus deltoides*	90–150	–
	western soapberry	SASAD	*Sapindus saponaria var. drummondii*	0–25	–
	gum bully	SILAO	*Sideroxylon lanuginosum ssp. oblongifolium*	0–25	–
	American elm	ULAM	*Ulmus americana*	0–25	–
	pecan	CAIL2	*Carya illinoinensis*	0–25	–
	common hackberry	CEOC	*Celtis occidentalis*	0–25	–
	walnut	JUGLA	*Juglans*	0–15	–

Animal community

Native animals that occupy this site include bobwhite quail, whitetail deer, turkey, squirrel, various small mammals and grassland birds. The site provides roosting trees for turkey and cover and nesting habitat for both turkey and quail. Deer frequent the site for screening cover and escape cover. Many whitetail deer fawns are observed in the tall grass cover in the spring. Many species of small mammals find this site ideal habitat. Predators such as bobcats and coyotes are often seen also.

Hydrological functions

The usual high water table enables growth of lush vegetation. Wetland characteristics often prevail and the site acts as a filter for overland flow. Evaporation is minimized by tall and dense plant growth that shades the soil surface. The site contributes to the stability of the overall riparian system that occurs along major streams.

Recreational uses

Hunting, Camping, Hiking, Bird watching, Photography, Horseback Riding

Wood products

Several species of trees might be found on this site, but there is not enough for any appreciable harvest of wood products.

Other products

NA

Other information

NA

Inventory data references

Inventory data for this report was assembled from Oklahoma Range Site descriptions, 417s, field data collections, and discussions with other Oklahoma Rangeland Management Specialists. This data has been combined and correlated with the previous work completed on this ESD by the original author.

Type locality

Location 1: Caddo County, OK

General legal description	Caddo County, Oklahoma; 1 mile north of Gracemont; 855 feet north and 2550 feet west of the southeast corner of sec. 33, T. 9 N., R. 10 W

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

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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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)	Colin Walden (Modified from original worksheet developed by Kay Anderson, David Kraft, Mark Moseley, Jack Eckroat, Harry Fritzler, and Steve Glasgow 4/2005)
Contact for lead author	100 USDA, Suite 206, Stillwater, OK 74074
Date	09/05/2012
Approved by	Colin Walden
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** This site usually has flatter slopes and sandier soils. 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 little, if any, evidence of soil deposition or erosion (some possibly apparent after significant rain events). 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 <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:** None, drainages are represented as natural stable channels; vegetation is present with no signs of erosion.

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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 >6 inches on flatter slopes and may be doubled on steeper slopes 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):** Soil surface horizon intact. A horizon: 0 to 12 inches; brown fine sand, granular structure. B horizon: 12 to 30 inches; light yellowish brown. Loose.

   Refer to specific description of 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). Any changes in infiltration and runoff can be attributed to other factors (e.g. compaction).

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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 no 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 Cool-season perennials Midgrasses Forbs

    Sub-dominant: Midgrasses Forbs

    Other: Shrubs = Trees

    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 <1 inches deep.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** production is 7000 – 10,000 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:** Potential invasive plants include: Eastern redcedar and/or Salt cedar(Tamarisk)

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17. **Perennial plant reproductive capability:** All plants capable of reproducing at least every year. Seed stalks, stalk length and seedheads are vigorous. Overall health of plants is excellent.