USDA Natural Resources
Conservation Service

Ecological site R085BY026OK
Edgerock 38-42 PZ

Last updated: 9/21/2023
Accessed: 05/21/2025

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): 085B–Arbuckle Uplift

The Grand Prairie MLRA is characterized by predominately loam and clay loam soils underlain by limestone and shale. Topography transitions from steeper ridges and summits of the Lampasas Cut Plain on the southern end to the more rolling hills of the Fort Worth Prairie to the north. The Arbuckle Mountain area in Oklahoma is also within this MLRA. In the structurally complex Arbuckle Mountains of southern Oklahoma, outcropping rocks are primarily limestone, sandstone, dolomite, quartzite, and chert. These units are exposed as alternating beds of Paleozoic rocks that have been faulted, tilted, and deformed to form a tombstone-like topography. This area has significant exposures of granite, rhyolite, and gabbro of Precambrian age.

Classification relationships

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

Ecological site concept

These sites occur on rolling limestone hills with exposed bedrock uplifted to form

characteristic rows. The intervening areas of soils are often very shallow. However, some joints or cracks in the bedrock form deeper soil pockets that support tall and midgrasses intermixed with Shortgrasses and numerous forbs. Very few woody species are present in the reference state. In the absence of fire or other brush management woody species will increase across the site.

Associated sites

R085BY056OK	**Loamy Upland 38-42 PZ** Loamy soils on uplands
R085BY088OK	**Shallow Savannah 38-42 PZ** Oak savannahs on shallow soils
R085BY028OK	**Rhyolite Hills 38-42 PZ** Shallow soils over rhyolite

Similar sites

R085AY185TX	**Shallow 30-38" PZ** Shallow soils over limestone

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Bouteloua curtipendula* (2) *Sorghastrum nutans*

Physiographic features

This site occurs on dip slopes and scarp slopes of homoclinal ridges in the Arbuckle Uplift. This site is characteristically a water distributing site.

Table 2. Representative physiographic features

Landforms	(1) Hills > Homoclinal ridge (2) Hills > Hillslope
Runoff class	Medium to very high
Elevation	198–396 m
Slope	5–25%
Water table depth	152 cm
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Low to very high
Elevation	Not specified
Slope	1–45%
Water table depth	Not specified

Climatic features

The climate is moist subhumid with average annual rainfall from 37 to 42 inches per year. The highest percentages in rainfall occur during April, May and June. More years of below average rainfall can be expected than those above average. Winters are characterized by mild temperatures with occasional “Northers” which can produce severe cold for short periods of time. Average wind velocities can be high in the Southern Great Plains during February, March and April causing erosion on unprotected surfaces.

Table 4. Representative climatic features

Frost-free period (characteristic range)	187-200 days
Freeze-free period (characteristic range)	204-224 days
Precipitation total (characteristic range)	991-1,067 mm
Frost-free period (actual range)	184-207 days
Freeze-free period (actual range)	201-225 days
Precipitation total (actual range)	965-1,067 mm
Frost-free period (average)	194 days
Freeze-free period (average)	212 days
Precipitation total (average)	1,041 mm

Climate stations used

- (1) CHICKASAW NRA [USC00341745], Sulphur, OK
- (2) ARDMORE [USC00340292], Ardmore, OK
- (3) ADA [USC00340017], Ada, OK
- (4) PAULS VALLEY 4 WSW [USC00346926], Pauls Valley, OK
- (5) MADILL [USC00345468], Madill, OK

Influencing water features

These sites occur on upland and shed water to adjacent sites lower on the landscape. The presence of deep rooted tallgrasses can help facilitate percolation of water into the soil profile.

Wetland description

NA

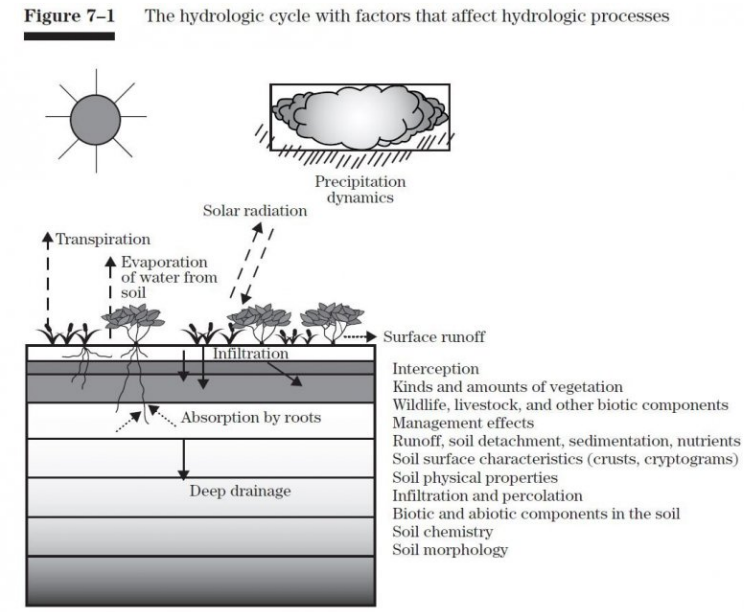


Figure 8.

Soil features

Representative soil components for this ecological site include: Kiti

The site is characterized by well drained, extremely stony or rubbly, moderately permeable soils that are shallow to tilted Ordovician age limestone bedrock.

The surface soils are loamy and are underlain by hard consolidated limestone. Occasional seams or cracks in the limestone allow deeper root penetration. Up to 40% of the site is barren limestone outcrop. The soils are shallow and droughty and, therefore favor drought resistant shallow rooted plants. Tallgrasses and other deeper rooted plants will tend to locate in the seams, cracks and deeper soils.

Table 5. Representative soil features

Parent material	(1) Residuum–limestone
Surface texture	(1) Loam (2) Silty clay loam (3) Silt loam (4) Clay loam
Drainage class	Well drained

Permeability class	Moderate
Soil depth	10–51 cm
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	5–25%
Available water capacity (0-101.6cm)	2.54–5.08 cm
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	5–15%
Subsurface fragment volume >3" (Depth not specified)	20–45%

Ecological dynamics

Like many sites across the Great Plains, changes in disturbance initiated by permanent settlements has had a profound impact on the ecological dynamics of these sites. Historically, the site was influenced by periodic fires during all seasons of growth. These fires were often the result of dry lightning strikes and/or anthropogenic fires set by Native Americans. The fire frequency during the period prior to settlement is estimated between 2-5 years for the southern Great Plains. These frequent fires were often followed by grazing of migratory bison herds attracted to the new growth of grass. This led to a shifting mosaic between burned/grazed and unburned and ungrazed landscapes.

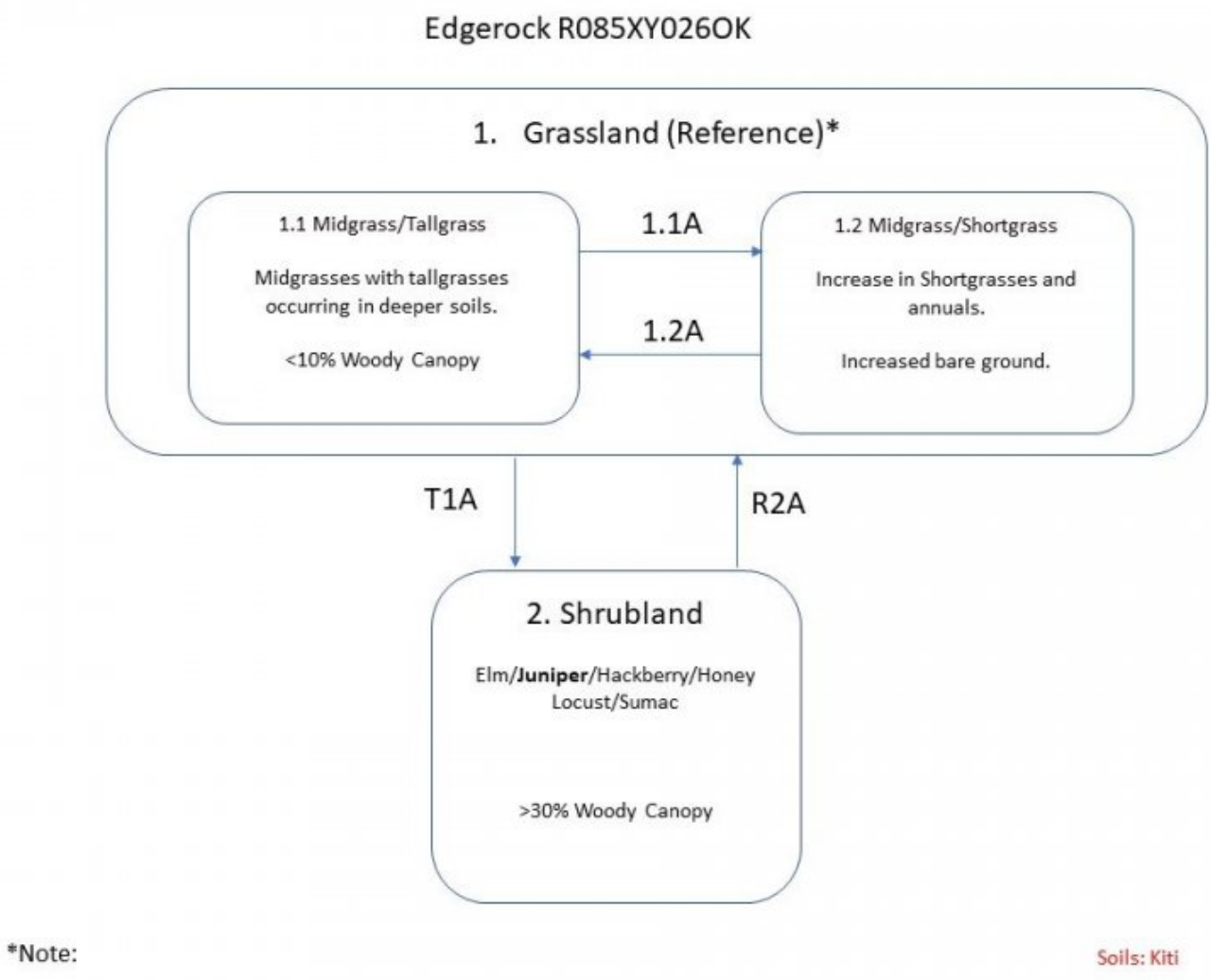
With the removal of fire and the introduction of conventional livestock fencing, the landscape began to change to more homogenous vegetation patterns and altered plant communities.
Less fire tolerant woody species are more prevalent in many areas due to fire suppression and/or the use of strictly dormant season fires. Abusive grazing can shift the plant community to less palatable grass species and lead to an increase in opportunistic forbs. Heavy grazing can also reduce fine fuel load and limit the ability to conduct a prescribed fire.

State and Transitional Pathways:
The following diagram suggests some pathways that vegetation on the site might take in response to various treatments or natural stimuli over time. There may be other states that are not shown on this diagram. This information identifies the changes in plant communities that do occur due to management practices and natural factors. The plant

communities described here are commonly observed on this ecological site. The local NRCS field office has information available to assist with planning and development of the plant community for specific purposes.

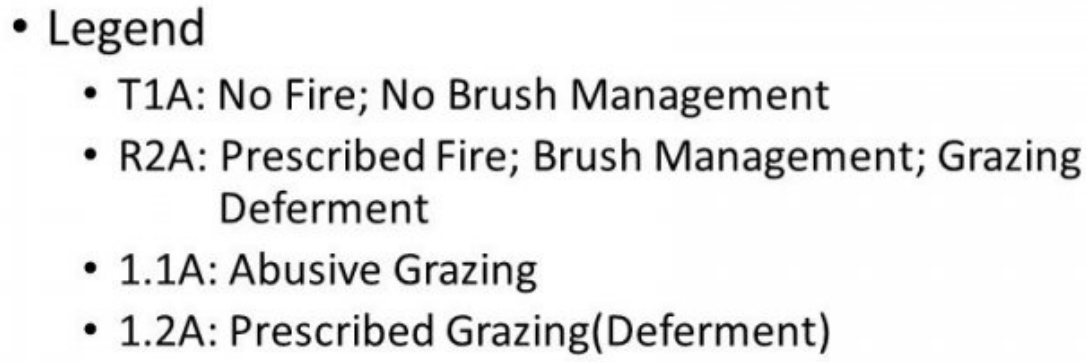
Changes in plant community makeup may be due to many factors. Change may occur slowly or in some cases, fairly rapidly. As vegetative changes occur, certain thresholds are crossed. A threshold means that once a certain point is reached during the transition of one community to another, a return to the previous state may not be possible without the input of some form of energy. This often means intervention with practices that are not part of natural processes. An example might be the application of herbicide to control some woody species to reduce their population and encourage more grass and forbs growth. Merely adjusting grazing practices would probably not accomplish any significant change in a plant community once certain thresholds are crossed. The amount of energy required to effect change in community would depend on the present vegetative state and the desired change.

State and transition model



*Note:

Soils: Kiti



State 1
Grassland

This is the reference state for the Edgerock ecological site. It represents the historic range of variability in the plant communities with the periodic disturbance of fire and grazing. It is dominated by a tall and midgrasses with numerous forbs and few woody species.

Dominant plant species

- sideoats grama (*Bouteloua curtipendula*), grass
- Indiangrass (*Sorghastrum nutans*), grass

Community 1.1
Midgrass/Tallgrass

Figure 9. Kiti soils. Murray County, OK

The dominant grasses are big bluestem, Indiangrass, switchgrass, sideoats grama and little bluestem. Other grasses include dropseeds, silver bluestem, blue grama, hairy grama, texas wintergrass and Scribner's panicum. Dominant forbs include sunflowers, goldenrods, black sampson, basketflower, gayfeathers, western ragweed, heath aster, poppymallows and. Legumes include Illinois bundleflower, sensitive-briar, scurfpea, and native lespedezas. Woody species include greenbriar, prairie rose, coralberry, hackberry and American elm. The Edgerock site is estimated to produce between 1,600– 3,000 pounds of vegetative production per year in reference condition. Midgrasses = Tallgrasses Forbs Minor component: Trees, Shrubs, Cool season grass/grasslike

Table 6. Annual production by plant type

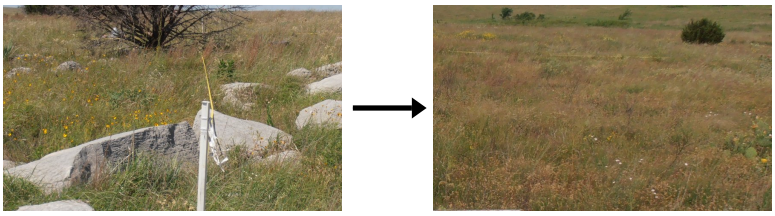
Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1524	2191	2858
Forb	179	258	336
Shrub/Vine	72	103	135
Tree	18	26	34
Total	**1793**	**2578**	**3363**

Community 1.2
Midgrass/Shortgrass

Figure 11. Kiti soils. Murray County, OK

This community has shifted to predominately midgrass and shortgrass species such as sideoats grama, Carolina joint-tail, dropseeds, blue grama, hairy grama and buffalograss with some remnant tallgrasses such as little bluestem remaining. Woody species canopy cover may increase due to lack of fire. Cool season grasses and sedges may increase as shade increases. Fine fuel loads have decrease and may limit effectiveness of prescribed fires making the community at risk of transitioning to a shrubland state.

Pathway 1.1A
Community 1.1 to 1.2



Midgrass/Tallgrass **Midgrass/Shortgrass**

Abusive grazing practices can lead to a reduction in palatable tallgrasses and forbs. Coupled with the absence of fire or brush management, the site may shift to the Midgrass/Shortgrass community.

Pathway 1.2A
Community 1.2 to 1.1

Midgrass/Shortgrass **Midgrass/Tallgrass**

With adequate rest from grazing the site may shift back to the Midgrass/Tallgrass community.

State 2
Shrubland

Figure 12. Kiti soils. Murray County, OK

This state is often the result of fire suppression for multiple years. Non fire-tolerant woody species such as elms, hackberry and juniper have increased and created a shaded environment with a heavy accumulation of leaf litter. Ecosystem processes are significantly altered and the herbaceous community is dominated by shade tolerant understory species. Greenbriar, grape and other shrubs and vines may create a dense understory layer.

Dominant plant species

- eastern redcedar (*Juniperus virginiana*), shrub
- Ashe's juniper (*Juniperus ashei*), shrub

Transition T1A
State 1 to 2

In the absence of fire or other forms of brush management, woody species will continually increase on these sites. As woody plants begin to dominate ecological processes, the site will transition to the Shrubland state.

Restoration pathway R2A
State 2 to 1

At this point it will take significant inputs to remove woody species and restore the grass

dominated pasture. However, it may be achieved through prescribed fire or brush management and a prescribed grazing plan which allows ample rest for the re-establishment of grasses. Effectiveness of prescribed fire depends upon fine fuel load and continuity and burning conditions.

Additional community tables

Animal community

Domestic livestock and white-tail deer are the dominant grazers and browsers of the site. Various songbirds and small mammals may also find use of these areas. As the site changes towards the woody dominated community, the quality of the habitat may improve for some species and decline for others. Management must be applied to maintain a vegetative state in optimum habitat quality for the desired animal species.

Hydrological functions

These sites occur on upland and shed water to adjacent sites lower on the landscape. 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 Murray, Carter, Johnston counties in Oklahoma.
Range Site Descriptions, Oklahoma NRCS
Draft ESDs Oklahoma NRCS

Type locality

Location 1: Murray County, OK	
Township/Range/Section	T2S R1E S24

References

. 2021 (Date accessed). USDA PLANTS Database. http://plants.usda.gov.

Other references

These site descriptions were developed as part a Provisional ESD project using historic soil survey manuscripts, available range site descriptions, and low intensity field traverse sampling.

Contributors

Colin Walden, Soil Survey Region 9

Approval

Bryan Christensen, 9/21/2023

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, and 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)	Harry Fritzler, Steve Glasgow, Jack Eckroat, Mark Moseley
Contact for lead author	
Date	07/01/2005
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Due to limestone soils, there are usually no rills

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2. **Presence of water flow patterns:** There is little, if any, evidence of soil deposition or erosion (some possibly apparent along the rock crevasses between the limestone ridges after significant rain events, if the ridges and crevasses run up and down the slope).

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3. **Number and height of erosional pedestals or terracettes:** Pedestaled plants or rocks are very rare. Terracettes very uncommon.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Variable, but should average ~20% 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 due to limestone soils.

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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):** Soil surface intact A horizon: 0 to 15 inches, dark grayish brown flaggy silty clay loam, medium granular structure R horizon: 15 to 18 inches, hard fractured limestone; tilted 20-85 degrees.

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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 affected more by the slope and the amount of vertical rock that is exposed or within inches of the surface (30-70%) than any changes in plant community composition and distribution. (Midgrass/Tallgrass 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 usually 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: Midgrasses, Tallgrasses

    Sub-dominant: Shortgrasses, Forbs

    Other: Shrubs, Annuals, 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 or following severe drought, but usually <10%.

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14. **Average percent litter cover (%) and depth (in):** Litter should cover >70% of the area between plants with accumulations of ~1/2 inch deep.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Normal production is 1400 – 2800 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:** Invasives might include: persimmon, prickly pear, eastern redcedar, annuals and non-natives.

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17. **Perennial plant reproductive capability:** All plants capable of reproducing at least every 2 years. Seed stalks, stalk length, and seedheads are numerous and what would be expected. Overall health of plants is what would be expected.
