

# Ecological site R078CY038OK

## Gyp

Last updated: 9/15/2023  
Accessed: 05/02/2024

### General information

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

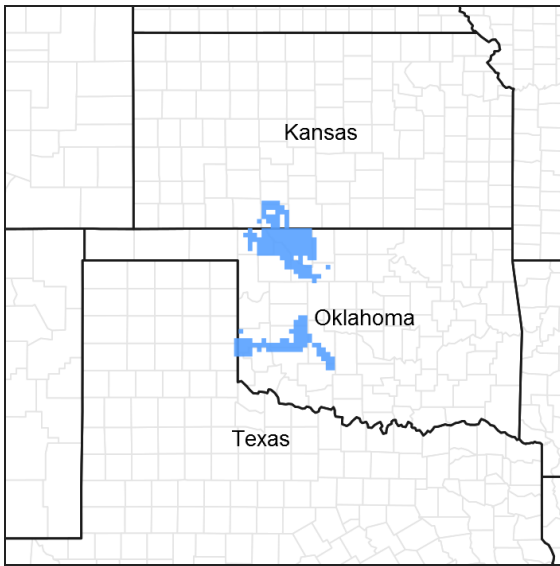


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

### MLRA notes

Major Land Resource Area (MLRA): 078C—Central Rolling Red Plains, Eastern Part

MLRA 78C is characterized by moderately dissected, rolling plains with prominent ridges and valleys and numerous terraces adjacent to dissecting streams. Loamy and clayey soils are generally deep, well drained, and developed in calcareous and gypsiferous sediments of Permian age.

### LRU notes

NA

### 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 shallow soils over gypsum. The vegetation can vary depending on gypsum content in the soils. Generally the reference vegetation will consist of midgrasses, shortgrasses, with smaller amounts of shrubs and

forbs. Major grasses include little bluestem and common shrubs are broom snakeweed and yucca. If these sites are subjected to abusive grazing, the plant community may shift to one dominated by less palatable species.

### Associated sites

R078CY006OK	<b>Clayey Breaks</b> Fine textured soils on Breaks from Gyp caps. >20% Slopes.
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### Similar sites

R078BY076TX	<b>Gyp 19-26" PZ</b> Gyp site in 78B
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Schizachyrium scoparium</i> (2) <i>Gutierrezia sarothrae</i>

### Physiographic features

This site occurs as ridges, knobs, hilltops, and benches within the redbed geologic formations of the western rolling plains. In general, these sites do not comprise large acreages and are found within larger associated sites. Slopes range from nearly level to moderately steep. Raw gypsum is visible on the surface.

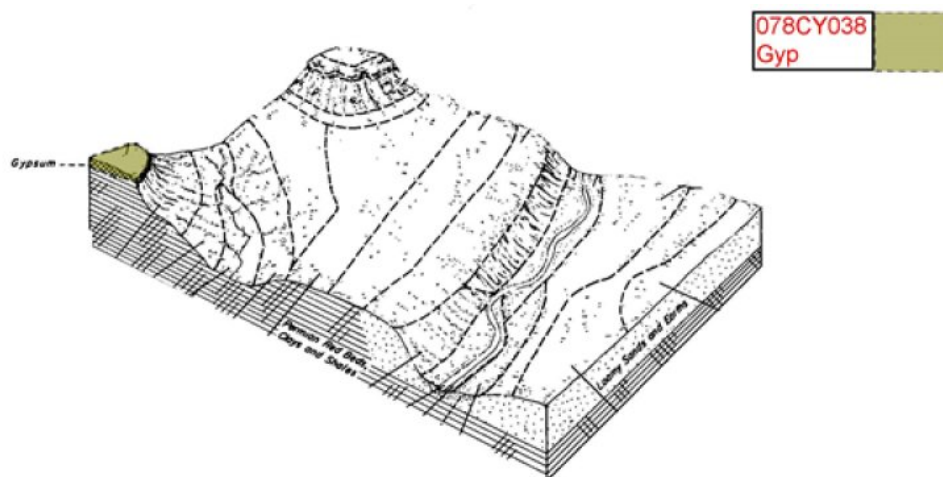


Figure 2. Gyp

Table 2. Representative physiographic features

Landforms	(1) Plains > Ridge (2) Plains > Hill (3) Plains > Knob
Runoff class	High to very high
Flooding frequency	None
Ponding frequency	None
Elevation	305–792 m
Slope	1–20%
Aspect	Aspect is not a significant factor

## Climatic features

MLRA 78C extends north and south from Coldwater, Kansas to just northeast of San Angelo, Texas (Ballinger, Texas), and east to west from Weatherford, Oklahoma to west of Shamrock, Texas. The weather is alternately influenced by cold dry air from the Arctic Circle, and warm moist air from the Gulf of Mexico. Seasonal changes are gradual. Spring is a season of variable weather and relatively high precipitation with prevailing winds from the southwest. Summers are generally hot with low humidity. Fall has long periods of pleasant weather interspersed with moderate to heavy rains. Winter is open and moderate to cold with winds from the north and infrequent snows. Approximately 75 percent of the rainfall occurs during the warm season, and much of it comes in storms of high intensity and short duration in May and June. These rains can be particularly erosive on sites where vegetation is sparse. Occasional droughts are to be expected. Lack of rainfall and hot, dry winds often curtail forage production during July and August.

Table 3. Representative climatic features

Frost-free period (characteristic range)	157-201 days
Freeze-free period (characteristic range)	191-223 days
Precipitation total (characteristic range)	660-686 mm
Frost-free period (actual range)	150-205 days
Freeze-free period (actual range)	186-230 days
Precipitation total (actual range)	660-711 mm
Frost-free period (average)	181 days
Freeze-free period (average)	207 days
Precipitation total (average)	686 mm

## Climate stations used

- (1) COLDWATER [USC00141704], Coldwater, KS
- (2) TALOGA [USC00348708], Taloga, OK
- (3) CLINTON SHERMAN AP [USW00003932], Dill City, OK
- (4) LAKE KEMP [USC00414982], Seymour, TX
- (5) ANSON 3ESE [USC00410268], Anson, TX

## Influencing water features

Gypsum is highly water soluble and numerous cavities can occur in these concentrated gyp deposits.

## Wetland description

NA

## Soil features

Soils of this site consist of shallow or very shallow, well drained, moderately permeable soils that formed in loamy residuum over gypsum bedrock of Permian age. These soils are on nearly level to strongly sloping hills and ridges. They occur on summits and side slopes of hills and on ridges and benches. The gypsum content varies and is the limiting factor to the kind and amount of vegetation present.

Representative Soils: Cornick, Cottonwood

Table 4. Representative soil features

Parent material	(1) Residuum-rock gypsum
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Surface texture	(1) Silt loam (2) Loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	13–25 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	2.29–6.1 cm
Calcium carbonate equivalent (0-101.6cm)	5–30%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–4
Soil reaction (1:1 water) (0-101.6cm)	7.9–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–3%
Subsurface fragment volume >3" (Depth not specified)	0%

## Ecological dynamics

The plant community on this site is influenced by the gypsum content more than by any other factor. Where the gyp content is very high, the vegetation is sparse and plant species very limited. Where there has been some significant soil formation over the gypsum beds, the vegetation is denser and there are a wider range of species present. At best, the production for the site is low and the plants are not very palatable to livestock. It is not a site that is attractive for livestock grazing. It generally occurs as fairly small areas occurring within an associated site of considerably more acres. The gypsum can occur as bedded strata, or as a platy crystalline form on the soil surface. Any sort of mechanical activity on this site (including heavy animal traffic) results in making the gypsum more concentrated. Livestock will sometimes graze the site but in general, overuse of the site is rare. It is a fragile site due to lack of plant growth to protect the soil surface. Since gypsum is highly water soluble, cavities can develop beneath the soil surface. Sometimes in walking over the site a hollow sound is produced and instances of "cave-ins" have occurred. Large "gyp sinks" sometimes occur in areas underlain by gypsum that has dissolved over the years.

The reference vegetation for the site consists of relatively few species compared to other sites. It is primarily a grassland community with a few forbs and very few shrubs. The grasses are mainly tall and mid grass species. Little bluestem (*Schizachyrium scoparium*) is typically the most predominant species. Other grass species included sideoats grama (*Bouteloua curtipendula*), wright threeawn (*Aristida wrightii*), sand dropseed (*Sporobolus cryptandrus*), hairy grama (*Bouteloua hirsuta*), blue grama (*Bouteloua gracilis*) and hairy tridens (*Erioneuron pilosum*). Occasionally tobosa (*Hilaria mutica*) was found on sites in the far southern parts of the MLRA. On sites where more soil material exists, big bluestem (*Andropogon gerardii*) and Indiangrass (*Sorghastrum nutans*) could be found in small quantities. When the site is covered with gyp outcrop, a variety of shortgrasses and forbs could be found.

The main forb species found include brom snakeweed (*Gutierrezia sarothrae*), gyp bluecurls (*Phacelia integrifolia*), halfshrub sundrop (*Mentzelia strictissima*), Missouri primrose (*Oenothera missouriensis*), bushy primrose (*Oenothera drummondii*), false broomweed (*Haploesthes greggii*) and annual broomweed (*Gutierrezia dracunculoides*). The main shrubs and trees found on the site are: feather dalea (*Dalea formosa*), Yucca (*Yucca glauca*), catclaw mimosa (*Mimosa biuncifera*), and occasionally skunkbush sumac (*Rhus trilobata*). Occasionally,

eastern redcedar (*Juniperus virginiana*) and prickly pear cactus (*Opuntia polyacantha*) can be found in small amount also.

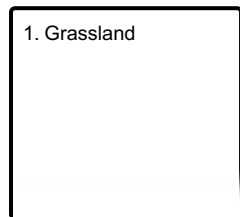
Natural fire may not have been important on this site due to sparse cover which limited fuel for fire. Many of these sites do not produce enough continuity of fuels to allow a complete burn. There is limited use of the site by wildlife. Cover is sparse and woody plants few, thereby limiting it for habitat. Deer will sometimes graze the forbs and browse the short shrubs.

Plant Communities and Transitional Pathways (diagram):

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

### Ecosystem states



### State 1 submodel, plant communities



## State 1 Grassland

### Community 1.1 Tallgrass/Midgrass Community



Figure 9. Tallgrass, Midgrasses, Shortgrasses

The reference plant community consisted of mainly Little bluestem. A few scattered yucca and a few forbs are present. Distance between plants will vary depending on amount of gyp outcrop.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	729	1020	1311
Forb	336	471	605
Shrub/Vine	34	47	61
Tree	22	31	40
<b>Total</b>	<b>1121</b>	<b>1569</b>	<b>2017</b>

Figure 11. 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/Shortgrass Community



Figure 12. Midgrass, Tallgrass, Shortgrass

Sparse community of midgrass and shortgrasses with forbs and cacti. Halfshrub sundrop, wright three-awn, and scattered grama species are dominant species in this community. Large bare areas are developing as plant density on the site decreases. Lower annual production due to higher gyp content.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	84	135	168
Forb	28	34	45
Shrub/Vine	–	6	11
Tree	–	–	–
Microbiotic Crusts	–	–	–
<b>Total</b>	<b>112</b>	<b>175</b>	<b>224</b>

### Community 1.3 Scattered tall and midgrass community



Figure 14. Shortgrasses, Midgrasses, few if any Tallgrasses

Few perennial grasses and a few forbs are left in this plant community. Very sparse vegetation due to increase of bare ground and high gyp content in the soil. There is an increase of shrubs and cacti on the site. Dominant plant species in this community include little bluestem, sand lily and yucca.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	90	146	224
Forb	11	17	22
Shrub/Vine	11	17	22
Tree	–	–	–
Microbiotic Crusts	–	–	–
<b>Total</b>	<b>112</b>	<b>180</b>	<b>268</b>

### Pathway 1.1A Community 1.1 to 1.2



Tallgrass/Midgrass  
Community



Midgrass/Shortgrass  
Community

Long term abusive grazing practices or mechanical soil disturbance may push the plant community towards 1.2.

### Pathway 1.2A Community 1.2 to 1.3



Midgrass/Shortgrass  
Community



Scattered tall and midgrass  
community

Long term abusive grazing practices or mechanical soil disturbance may push the plant community towards 1.2.

### Pathway 1.3A Community 1.3 to 1.2



Scattered tall and midgrass  
community



Midgrass/Shortgrass  
Community

With rest from grazing and soil disturbing activity, the site may be shifted back toward community phase 1.2. This may take a period of years.

## Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Tall Grasses</b>			280–504	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	224–404	–
	Indianagrass	SONU2	<i>Sorghastrum nutans</i>	0–101	–



	sand bluestem	ANHA	<i>Andropogon hallii</i>	56–101	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	0–101	–
2	<b>Mid-grasses</b>			336–605	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	224–404	–
	silver beardgrass	BOLAT	<i>Bothriochloa laguroides</i> ssp. <i>torreyana</i>	0–101	–
	tumble windmill grass	CHVE2	<i>Chloris verticillata</i>	0–101	–
	marsh bristlegrass	SEPA10	<i>Setaria parviflora</i>	0–101	–
	composite dropseed	SPCOC2	<i>Sporobolus compositus</i> var. <i>compositus</i>	0–101	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	56–101	–
	slim tridens	TRMUE	<i>Tridens muticus</i> var. <i>elongatus</i>	0–101	–
	longspike tridens	TRST2	<i>Tridens strictus</i>	0–101	–
	purple threeawn	ARPU9	<i>Aristida purpurea</i>	56–101	–
3	<b>Shortgrasses</b>			112–202	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	56–101	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	0–101	–
	vine mesquite	PAOB	<i>Panicum obtusum</i>	0–101	–
<b>Forb</b>					
4	<b>Forbs</b>			336–605	
	prairie broomweed	AMDR	<i>Amphiachyris dracunculoides</i>	56–101	–
	Indian paintbrush	CASTI2	<i>Castilleja</i>	0–101	–
	prairie clover	DALEA	<i>Dalea</i>	0–101	–
	purple prairie clover	DAPU5	<i>Dalea purpurea</i>	0–101	–
	Illinois bundleflower	DEIL	<i>Desmanthus illinoensis</i>	0–101	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	56–101	–
	Maximilian sunflower	HEMA2	<i>Helianthus maximiliani</i>	56–101	–
	stiffleaf false goldenaster	HESTS	<i>Heterotheca stenophylla</i> var. <i>stenophylla</i>	0–101	–
	hairy false goldenaster	HEVI4	<i>Heterotheca villosa</i>	56–101	–
	bluet	HOUST	<i>Houstonia</i>	0–101	–
	indigo	INDIG	<i>Indigofera</i>	0–101	–
	slender lespedeza	LEVI7	<i>Lespedeza virginica</i>	0–101	–
	dotted blazing star	LIPU	<i>Liatris punctata</i>	56–101	–
	grassland blazingstar	MEST3	<i>Mentzelia strictissima</i>	0–101	–
	evening primrose	OENOT	<i>Oenothera</i>	56–101	–
	nailwort	PARON	<i>Paronychia</i>	0–101	–
	slimflower scurfpea	PSTE5	<i>Psoralidium tenuiflorum</i>	0–101	–
	pitcher sage	SAAZG	<i>Salvia azurea</i> var. <i>grandiflora</i>	0–101	–
	skullcap	SCUTE	<i>Scutellaria</i>	0–101	–
	greenthread	THELE	<i>Thelesperma</i>	0–101	–
	bluecurls	TRICH9	<i>Trichostema</i>	0–101	–
	Rocky Mountain zinnia	ZIGR	<i>Zinnia grandiflora</i>	0–101	–
<b>Shrub/Vine</b>					

5	<b>Shrub/vine</b>			34-61	
	pricklypear	OPUNT	<i>Opuntia</i>	0-61	-
	skunkbush sumac	RHTRT	<i>Rhus trilobata var. trilobata</i>	0-61	-
	yucca	YUCCA	<i>Yucca</i>	0-61	-
<b>Tree</b>					
6	<b>Trees</b>			22-40	
	eastern redcedar	JUVI	<i>Juniperus virginiana</i>	22-40	-
	Pinchot's juniper	JUPI	<i>Juniperus pinchotii</i>	0-6	-

## Animal community

Lack of cover and palatable food plants limit animal usage, particularly livestock. Small mammals, lizards, snakes, songbirds, bobwhite quail, muledeer.

## Hydrological functions

Contributes runoff to nearby drainages

## Recreational uses

Hunting, Camping, Hiking, Birdwatching, Photography, Horseback

## Wood products

None

## Other products

None

## Other information

None

## Inventory data references

NRCS - Section II FOTG - Range Site Descriptions.

Historical NRCS Clipping data

Field visits and evaluations

## Other references

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This "Approved" site was included in an update project during 2013. The State&Transition model was re-formatted and 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

## Contributors

Dr. Jack Eckroat, Grazing Lands Specialist, NRCS, Oklahoma  
PES Edits by Tyson Morley, MLRA Soil Scientist, Altus, Oklahoma

## Approval

Bryan Christensen, 9/15/2023

## 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)	Jack Eckroat
Contact for lead author	100 USDA Suite 206 Stillwater, OK 74074
Date	12/01/2008
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

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

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2. **Presence of water flow patterns:** Distinct, particularly on steeper slopes. Not usually more than 6 inches deep.

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3. **Number and height of erosional pedestals or terracettes:** Common around small rocks and bunchgrasses but usually not more than 1-2 inches deep.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 40-50% (Rock 2-25%)

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5. **Number of gullies and erosion associated with gullies:** Shallow soils limit the formation of anything but small gullies. Usually on steeper slopes and less than 2 feet deep and 3 feet wide. Some geological erosion may occur on this site.

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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):** Litter may move 1-3 feet after high intensity rainfall event. It is difficult to maintain litter on exposed soil, particularly on the areas of increased slopes.
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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):** Soil stability scores of 4+.
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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** See Official Soil Series Description for representative soils which include Cornick and Cottonwood.
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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Mid-grass (little bluestem, sideoats grama), short grass/shrub community randomly dispersed. Slopes and very slowly permeable soils result in high runoff.
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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):** No compaction layer but fine texture and hard structure can be mistaken for 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: Mid-grass (little bluestem, sideoats)> sod grasses
- Sub-dominant: warm-season perennial forbs > tallgrass> shrubs > cool season grasses and grasslikes
- Other:
- Additional:
- 
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Due to the droughty nature of this site, some mortality will occur, especially with three-awns, sideoats grama and little bluestem. Death loss could be around 10%, higher in extremely dry, hot years.
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14. **Average percent litter cover (%) and depth ( in):** Litter cover should average 5 - 30% and less than ½ inch depth. Basal cover approximately 5 - 10%.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Normal Production is from 1,000-1,800lbs/ac
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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: Main invasives are eastern redcedar.
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17. **Perennial plant reproductive capability:** All plants capable of reproducing at least every 2 – 3 years.
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