USDA Natural Resources
Conservation Service

Ecological site R078CY005OK
Loamy Breaks

Last updated: 9/15/2023
Accessed: 05/13/2025

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.

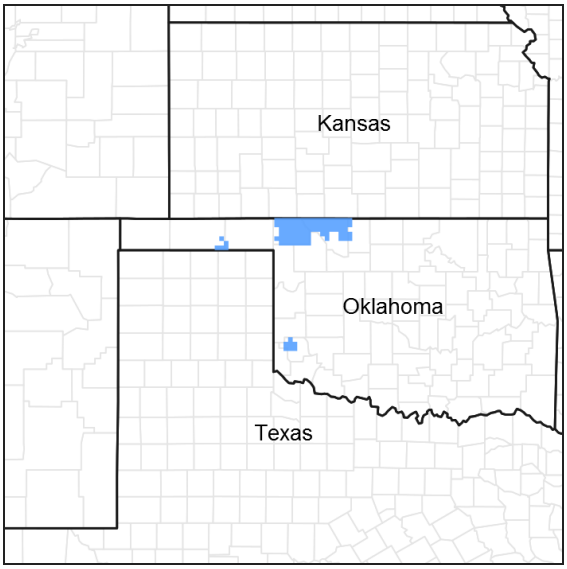


Figure 1. Mapped extent

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): 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 soft, calcareous sandstones, siltstones, and shales in red beds of Permian age. Characteristic red soils have formed in most of the area because of the underlying Permian red-bed sedimentary rocks.

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 loamy soils on steep slopes. These areas may support a grassland plant community that has evolved through periodic fires. If fire is removed from the system, woody plants may encroach. The reference plant community consists of a mixture of tallgrasses and midgrasses with forbs. Woody species canopy cover is less than 10 percent. These sites are usually not suitable for livestock grazing due to the slopes and topography.

Associated sites

R078CY056OK	**Loamy Upland** Similar soils <20% slopes. Higher productivity.
R078CY083OK	**Shallow Upland** Similar soils. Occurs on slopes less than 20%.

Similar sites

R078CY006OK	**Clayey Breaks** Fine textured soils. Shallow to bedrock. Less productivity.
R078CY083OK	**Shallow Upland** Similar soils. Occurs on slopes less than 20%.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Schizachyrium scoparium* (2) *Bouteloua curtipendula*

Physiographic features

This site occurs on hills and escarpments with slopes ranging from 3 to 45%.

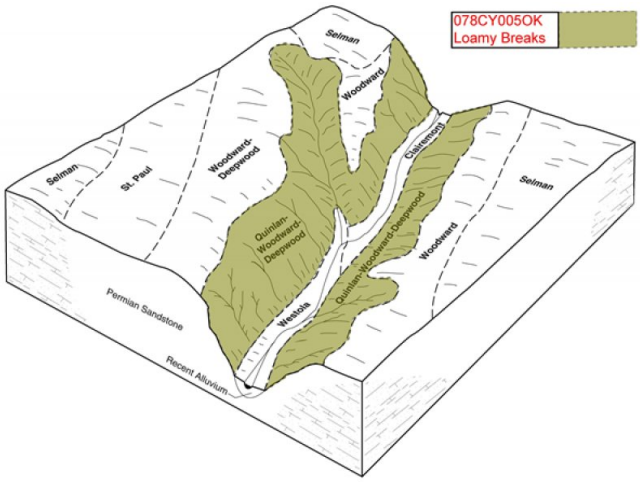


Figure 2. Loamy Breaks

Table 2. Representative physiographic features

Landforms	(1) Plains > Hill (2) Plains > Escarpment
Runoff class	Medium to very high
Flooding frequency	None
Ponding frequency	None
Elevation	1,000–3,000 ft
Slope	3–45%
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, and from east to west from Weatherford, Oklahoma to 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. Spring and summer prevailing winds are 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 precipitation occurs during the warm season with much of it coming from storms of high intensity and short duration in May and June. These rains can be particularly erosive to sites when 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)	162-199 days
Freeze-free period (characteristic range)	192-215 days
Precipitation total (characteristic range)	26-27 in
Frost-free period (actual range)	161-204 days
Freeze-free period (actual range)	190-229 days
Precipitation total (actual range)	26-27 in
Frost-free period (average)	181 days
Freeze-free period (average)	205 days
Precipitation total (average)	26 in

Climate stations used

- (1) ABILENE 2 [USC00410013], Abilene, TX
- (2) LAKE KEMP [USC00414982], Seymour, TX
- (3) CLINTON SHERMAN AP [USW00003932], Dill City, OK
- (4) MUTUAL [USC00346139], Mutual, OK
- (5) COLDWATER [USC00141704], Coldwater, KS

Influencing water features

These are steep, well drained sites with slopes in excess of 20 percent.

Wetland description

NA

Soil features

This site is formed by erosion cutting down through sandstone. Loamy alluvium is found in the valley bottoms and loamy colluvium along the steep slopes. These sites are highly variable in soil depth and topography.

Representative Soils: Burson, Deepwood, Quinlan, Spikebox, and Woodward.

Table 4. Representative soil features

Parent material	(1) Residuum–calcareous sandstone
Surface texture	(1) Very fine sandy loam (2) Loam (3) Fine sandy loam
Drainage class	Well drained

Permeability class	Moderately slow to moderate
Depth to restrictive layer	2–40 in
Soil depth	18–40 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	0.4–6.8 in
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–5%
Subsurface fragment volume >3" (Depth not specified)	0–1%

Ecological dynamics

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

On Loamy Breaks sites, aspect, climate, soil depth, percent slope, and disturbance factors are all important determinants in the overall expression of the plant community species. Tallgrasses and midgrasses do fairly well in the deeper soils, or "pockets", while midgrasses and shortgrasses usually dominate most of the site on the shallower soils. The species present on this site will be the same indigenous species found in the parent area where the breaks occur. For example: A Loamy Breaks will essentially have the same vegetation species as the Loamy Upland wherein the site might occur. However, production will be much less when compared to the parent because of aspect, slope and a general "shallowing up" of the soils. This site, depending on all physical and climatic factors mentioned herein, can be highly variable in production, but usually averages about one-third to one-half the of the parent site production. Important plants are sand bluestem and little bluestem. Disturbances (i.e. domestic livestock grazing), coupled with lack of fire, will foster increases in sideoats grama, blue grama and hairy grama. Over time, with persistent lack of fire (common to most Breaks sites), various woody species and encroaching species such as mesquite (predominantly in the southern portions of the MLRA, but spreading north) or Juniperus spp. (anywhere in the MLRA) usually encroach into this site. Because of usual unfavorable topography, Breaks sites are usually not cultivated. Since the site is not normally heavily grazed by domestic animals due to its inherently rough terrain, the overall ecological condition tends to be less affected than more accessible sites. There are places on the most accessible parts of the site where there can be evidence of grazing by cattle. The grazing tends to be somewhat seasonal and of shorter duration than more productive, less sloping, terrain. If this site were grazed by goats instead of cattle, then overgrazing or over-browsing could be a potential problem. This can be observed in other areas of the country where cattle are not the principal grazers. Deer utilize this site readily, but in most places, the deer population is not dense enough to place a lot of pressure on primary browse. In most cases, this site is more important for wildlife habitat than for livestock grazing. A diverse plant community benefits species utilizing the site and promotes natural ecological processes.

Natural fire played a role in the ecology of the site as is true for practically all High Plains sites. The general effects of fire were to promote a grassland and keep woody shrubs suppressed. However, the rocky soils and steep terrain of this site have much more influence on the plant community than does any external ecological influence. The sparse vegetation and lower production probably affected fire continuity, and the heat generated by natural fire may have limited the degree of damage to woody plants. In general, when burned periodically the tallgrasses tend to benefit and shrubs are suppressed for a few years time. Juniper, of non-sprouting types, are especially suppressed

by fire. There are some of the steeper slopes and canyon walls that escape fire altogether. It does take this site longer to recover from a burn than most associated sites due to sparse plant density and dry soils.

State and Transition Diagram:
A State and Transition Diagram for the Loamy Breaks (R078CY005OK) 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.

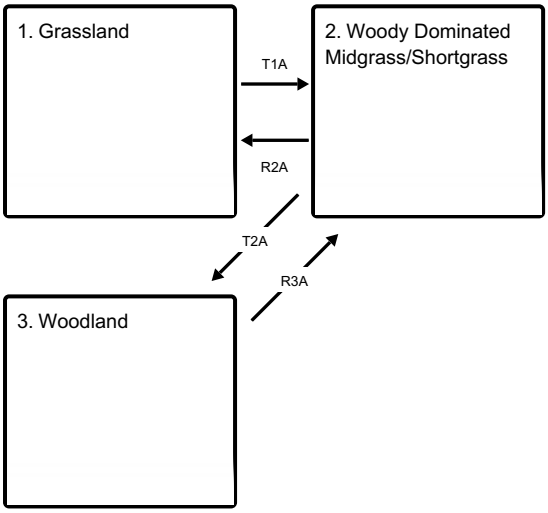
The biological processes on this site are complex. Therefore, representative values are presented in a land management context. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every 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

Ecosystem states



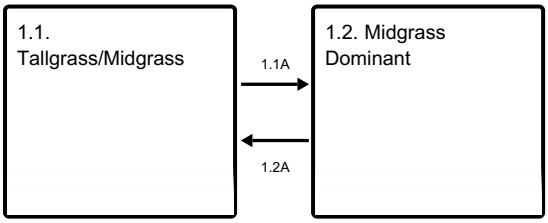
T1A - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

R2A - Adequate rest from defoliation, followed by reintroduction of historic disturbance regimes

T2A - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

R3A - Removal of woody canopy and adequate rest from defoliation

State 1 submodel, plant communities



State 2 submodel, plant communities

2.1. Woody

State 3 submodel, plant communities

3.1. Invaded

State 1
Grassland

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

Dominant plant species

- little bluestem (*Schizachyrium scoparium*), grass
- sideoats grama (*Bouteloua curtipendula*), grass

Community 1.1
Tallgrass/Midgrass

Figure 9. Loamy Breaks

The reference plant community for this site varies from tallgrasses on the deeper soils to midgrasses on the shallow and very shallow soils. Tallgrasses include sand bluestem, little bluestem, Indiangrass, switchgrass, Canada wildrye, Virginia wildrye and eastern gamagrass. Midgrasses and shortgrasses are blue grama, hairy grama, western wheatgrass, dropseed and sideoats grama. The taller grasses, big bluestem, little bluestem and Indiangrass usually make up 40 to 50% of the total herbaceous production while the shorter grasses contribute 20 to 30%. Woody species canopy cover will usually be in the 5% range. Eastern redcedar may encroach upon this site at any time. It is usually not invaded by mesquite.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	700	1100	1500
Forb	150	225	300
Tree	50	75	100
Shrub/Vine	50	75	100
Total	**950**	**1475**	**2000**

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 Dominant

A quick reduction of tallgrasses will result from overgrazing by cattle. Midgrasses and shortgrasses increase. Trees and shrubs increase from 5% to somewhere around 45%. Woody species will usually be more prolific on north and northeast slopes. This site is not conducive to cattle grazing, so overgrazing usually occurs when surrounding areas are lacking desirable vegetation.

Pathway 1.1A
Community 1.1 to 1.2

If abusive grazing practices persist without adequate rest, the plant community may shift towards community phase 2.2. Lack of prescribed fire will also contribute to the brush encroachment.

Pathway 1.2A
Community 1.2 to 1.1

With adequate rest from grazing and use of prescribed fire, the plant community may shift back towards community phase 1.1.

State 2
Woody Dominated Midgrass/Shortgrass

Dominant plant species

- honey mesquite (*Prosopis glandulosa*), shrub
- eastern redcedar (*Juniperus virginiana*), shrub
- buffalograss (*Bouteloua dactyloides*), grass

Community 2.1
Woody

Continued overgrazing, drought, or some other adverse happening has driven the site to less ground cover and fewer midgrasses and shortgrasses than state #1. Remnant tallgrass seedstock is still present. Trees and shrubs have increased to 50% or greater canopy cover. As this site moves away from the HPC, more bare ground and surface rock becomes visible.

State 3

Woodland

Dominant plant species

- eastern redcedar (*Juniperus virginiana*), tree
- honey mesquite (*Prosopis glandulosa*), tree

Community 3.1
Invaded

This site can be invaded by eastern redcedar or mesquite at any time. When this happens, because of the inherent lack of fire on these sites, tree canopy cover closes more rapidly causing a quicker loss of more favorable understory growing conditions for gramanoids and forbs. The site accelerates towards a closed canopy tree and shrub area with very little understory growth. A few shade tolerant species will be found in the understory..

Transition T1A
State 1 to 2

Without periodic fire or brush management, the site may transition to State 2. Grazing management is also an important factor in fuel management for prescribed fire.

Restoration pathway R2A
State 2 to 1

Through a program of prescribed fire, prescribed grazing, and possibly alternative brush management, the site may be restored to state 1.

Transition T2A
State 2 to 3

Invasive woody species can dominate the site in short amounts of time. This causes a transition to state 3.

Restoration pathway R3A
State 3 to 2

Brush management may be implemented to eradicate invasive species, however, without proper grazing management and continued prescribed fire, the site may transition to State 2.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Tallgrasses**			350–750	
	little bluestem	SCSC	*Schizachyrium scoparium*	0–480	–
	sand bluestem	ANHA	*Andropogon hallii*	0–160	–
	switchgrass	PAVI2	*Panicum virgatum*	0–80	–
	Indiangrass	SONU2	*Sorghastrum nutans*	0–80	–
2	**Shortgrasses**			275–550	
	sideoats grama	BOCU	*Bouteloua curtipendula*	0–320	–
	buffalograss	BODA2	*Bouteloua dactyloides*	0–80	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–80	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	0–80	–
	rough dropseed	SPCL	*Sporobolus clandestinus*	0–80	–

	vine mesquite	PAOB	*Panicum obtusum*	0–50	–
	purple threeawn	ARPU9	*Aristida purpurea*	0–50	–
3	**Cool-Season**			75–150	
	Heller's rosette grass	DIOL	*Dichanthelium oligosanthes*	0–50	–
	western wheatgrass	PASM	*Pascopyrum smithii*	0–50	–
	Texas bluegrass	POAR	*Poa arachnifera*	0–50	–
	Canada wildrye	ELCA4	*Elymus canadensis*	0–40	–
Forb					
4	**Forb**			100–200	
	white wild indigo	BAAL	*Baptisia alba*	0–33	–
	Illinois bundleflower	DEIL	*Desmanthus illinoensis*	0–33	–
	littleleaf sensitive-briar	MIMI22	*Mimosa microphylla*	0–33	–
5	**Forb**			50–100	
	common yarrow	ACMI2	*Achillea millefolium*	0–91	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–91	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–91	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	0–91	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	0–91	–
	ashy sunflower	HEMO2	*Helianthus mollis*	0–91	–
	whitest evening primrose	OEAL	*Oenothera albicaulis*	0–91	–
	azure blue sage	SAAZ	*Salvia azurea*	0–91	–
	white heath aster	SYER	*Symphyotrichum ericoides*	0–91	–
Shrub/Vine					
6	**Shrub/Vine**			50–100	
	pricklypear	OPUNT	*Opuntia*	0–62	–
	Chickasaw plum	PRAN3	*Prunus angustifolia*	0–62	–
	smooth sumac	RHGL	*Rhus glabra*	0–62	–
	coralberry	SYOR	*Symphoricarpos orbiculatus*	0–62	–
	soapweed yucca	YUGL	*Yucca glauca*	0–62	–
	leadplant	AMCA6	*Amorpha canescens*	0–33	–
Tree					
7	**Tree**			50–100	
	eastern redcedar	JUVI	*Juniperus virginiana*	0–65	–
	honey mesquite	PRGL2	*Prosopis glandulosa*	0–65	–

Animal community

This site's plant community has good value for grazing by domestic animals, but travel is difficult. It also has good value as food and cover for numerous species of wildlife. It provides excellent habitat for bobwhite quail. Whitetail deer and turkey often frequent this site. A great variety of song birds and woodpeckers utilize this site for summer habitat. For more specific guidance, refer to Wildlife Habitat Appraisal Guides that are species specific.

Recreational uses

Camping, Fishing, Hunting, Hiking, Bird Watching, and many other outdoor recreational practices.

Wood products

There are no significant wood products from this site other than firewood and fence posts.

Other products

None

Other references

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

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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)	Mark Moseley, Steve Glasgow
Contact for lead author	
Date	07/01/2004
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** There could some rills where water flows and concentrates down the steep slopes. Usually these are no more than 4” deep and 10” wide.

2. **Presence of water flow patterns:** Flow patterns will exist where water flows down the slopes. Usually these will be distinct.

3. **Number and height of erosional pedestals or terracettes:** Pedestalled plants or rocks can occur but are usually < 1 inch tall depending upon slope. Terracettes can be common.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Should not exceed 50 %.

5. **Number of gullies and erosion associated with gullies:** No serious head cutting, drainages generally have stable channels: vegetation common in the bottom of the channels, there can be some geologic erosion. In most cases the south exposure will be more prone to geologic erosion than the north slope.

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

7. **Amount of litter movement (describe size and distance expected to travel):** Litter will move, especially after heavy rainfall events. It would not be uncommon for litter to move 2 – 3 feet.

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 by organic matter decomposition products and/or a biological crust under vegetation, Stability score 5 – 6. On geologic erosion parts of the site, the Stability Score will be below 4.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A: 0 to 8 inches; reddish brown loam, weak medium granular structure. Bw: 8 to 13 inches; red loam, weak medium granular structure.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant community dominated by deep, fibrous rooted perennial grasses with some shrubs. Any changes in infiltration and runoff can be attributed to other factors such as compaction or trailing.

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.

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: Little Bluestem

Sub-dominant: Other Midgrasses, Shortgrasses, Forbs

Other: Shrubs

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Some decadence with perennial grasses in the absence of fire and herbivory but usually < 10%.

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14. **Average percent litter cover (%) and depth (in):** Litter will be scattered because of slope, and not well distributed. Litter cover is < 50% at depths not exceeding ½ inch.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1200 – 1800 pounds per acre.

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** None.

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17. **Perennial plant reproductive capability:** Capability to produce seed or vegetative tillers is not reduced relative to recent climatic conditions. All plants should reproduce every 2 – 3 years.
