Ecological site R078CY096TX
Clay Loam
23-30" PZ

Last updated: 9/15/2023
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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.

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 deep clay loam soils. The reference vegetation consists of midgrasses and forbs with few woody species. Without brush management or prescribed fire, woody species may encroach on the site and begin to dominate the ecological functions. Under prolonged abusive grazing, the midgrass species will be reduced and shortgrass and annual forbs may increase substantially.

Associated sites

R078CY110TX	**Sandy Loam 23-31" PZ** Adjacent to site.
R078CY099TX	**Draw 23-30" PZ** Often runs through the clay loam site and serves as a drainage down slope.

Similar sites

R078BY072TX	**Clay Loam 19-26" PZ** Clay Loam site in 78B

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Bouteloua curtipendula* (2) *Panicum obtusum*

Physiographic features

These soils are located on nearly level to gently sloping soils on alluvial plains, Paleo terraces and broad flat plains. Slopes range from 0 to 12 percent but mainly less than 3 percent. Elevation ranges from 1,000 to 2,500 feet.

Table 2. Representative physiographic features

Landforms	(1) Plains > Plain (2) Plains > Paleoterrace
Runoff class	Low to very high
Flooding frequency	None
Ponding frequency	None
Elevation	310 – 760 m
Slope	0 – 10 %
Water table depth	100 – 200 cm
Aspect	Aspect is not a significant factor

Climatic features

MLRA 78C lies within the subtropical sub-humid climate regime, which typically has dry winters with hot and not as humid summers. This regime is characterized by rapid changes in temperature; marked extremes, both daily and annual; and rather erratic rainfall.

This region lies in the path of polar air masses that move down from the north during the winter. With the passage of cold fronts during the fall and winter, abrupt temperature drops sometimes occur. While the area is subject to a wide range of temperature, winters are generally mild. Low humidity and good wind movements characterize the summers.

Wind speeds average more than eleven miles an hour with prevailing southern winds. Rather strong winds can occur in all months of the year. While strong gusty winds occur, severe dust storms are rare.

Normal rainfall averages 23 to 30 inches a year but distribution of rainfall patterns are so erratic short dry periods are common. The majority of the rainfall occurs as showers, rather than general rain events between March and November. Dry periods of three to four weeks can be expected during this time as well. Even if these dry conditions occur, complete crop failures seldom results. May is the wettest month and December is the driest. Effective precipitation is low due to high temperatures, amounts received and intensity.

Table 3 Representative climatic features

Frost-free period (characteristic range)	160-200 days
Freeze-free period (characteristic range)	190-220 days
Precipitation total (characteristic range)	660-710 mm
Frost-free period (actual range)	150-200 days
Freeze-free period (actual range)	180-230 days
Precipitation total (actual range)	640-760 mm
Frost-free period (average)	180 days
Freeze-free period (average)	210 days
Precipitation total (average)	690 mm

- (1) WILMORE 16SE [USC00148914], Coldwater, KS
- (2) ANSON 3ESE [USC00410268], Anson, TX
- (3) LAKE KEMP [USC00414982], Seymour, TX
- (4) HAMMON 3 SSW [USC00343871], Elk City, OK
- (5) MUTUAL [USC00346139], Mutual, OK
- (6) ABILENE RGNL AP [USW00013962], Abilene, TX
- (7) HOBART MUNI AP [USW00093986], Hobart, OK
- (8) FREDERICK [USC00343353], Frederick, OK
- (9) MUNDAY [USC00416146], Munday, TX
- (10) VERNON [USC00419346], Vernon, TX

Influencing water features

None.

Wetland description

NA

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:
Abilene, Aspermont, Frankirk, Hollister, Rotan, Rowena, Sagerton, and Tillman.

The soils found in the Clay Loam 23-30" PZ ecological site consists of deep to very deep, well drained, loam, silty clay loam, or clay loam surface layers. They are moderately to slowly permeable soils. Solum thickness exceeds 40 inches. Runoff is negligible to medium on slopes less than 1 percent, very low to high on 1 to 3 percent slopes, and medium to high on 3 to 5 percent slopes. Drainage is slow. Natural fertility and organic matter content ranges from medium to high. The plant zone is normally deeper than 60 inches for most soils. As grass cover deteriorates and surface is exposed there is a distinct tendency for a thick crust to form, causing susceptibility to increased erosion during heavy storms.

Table 4. Representative soil features

Parent material	(1) Alluvium – claystone
Surface texture	(1) Clay loam (2) Silty clay loam (3) Loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	100 – 200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	8.38 – 20.07 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 20 %
Electrical conductivity (0-101.6cm)	Not specified

Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	6.6 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	0 – 10 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

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.

The reference plant community of the Clay Loam Ecological Site in MLRA (Major Land Resource Area) 78C is a Midgrass Prairie Community (1.1) with an occasional woody plant and a good variety of forbs. Pre-settlement disturbances included grazing or browsing by endemic pronghorn antelope, deer and migratory bison, severe droughts and frequent fires. Wildfires are thought to have occurred at 4 to 6 years intervals in this region (Frost 1998). The frequent fires, weather patterns and relatively frequent droughts favored grasses over woody plants. There were also a wide variety of forbs present. Sideoats grama and vine-mesquite were the dominant species throughout the MLRA contributing as much as 40 percent of the annual herbaceous production. Other characteristic grasses in the historic climax community include Arizona cottontop, tobosa, Texas wintergrass and western wheatgrass. Buffalograss was the most common shortgrass making up as much as 25 percent of plant composition. Tobosa was often important in the western and drier portion of the MLRA. Occasionally, wet winters and springs cause an abundance of cool-season annuals. See the Plant Composition and Annual Production Table below for estimated composition of the assumed historic climax species.

The Midgrass Prairie Community (1.1) is relatively stable and resilient within the climate, grazing and fire regimes until settlement in the late 1800’s brought animal husbandry and fencing. Following this settlement, overstocking with domesticated livestock was almost universal. As overgrazing occurred on the Clay Loam site, there was a reduction of palatable midgrasses, a reduction in intensity and frequency of fires and, consequently, a decline in mulch and soil organic matter. The frequency and intensity of fires was reduced because of less fire fuel and fire suppression. As regression occurred due to continued overgrazing, the midgrasses gave way to blue grama, buffalograss and Texas wintergrass.

The shift in plant cover and decline in soil properties favored woody plant encroachment. The woody and herbaceous invaders were generally endemic species released from competition and fire suppression. These woody species were endemic to the region, but not necessarily native to this site. In the resulting Mixed-grass Prairie Community (1.2), the more palatable midgrasses gave way to less palatable or more grazing resistant, midgrasses and shortgrasses. Midgrasses, especially sideoats grama and vine-mesquite, still dominated annual herbage production, but the encroaching woody species increased in the proportion of production compared to the Midgrass Prairie Community (1.1).

When the Mixed-grass Prairie Community (1.2) is continually overgrazed and fire is excluded, ecological succession transitions the plant community into one that is dominated by woody plants. This process is amplified by droughts that occur at approximately 20-year intervals in the region. More grazing resistant grasses such as buffalograss, tobosa, blue grama and Texas wintergrass and less palatable forbs begin replacing the midgrasses. As the midgrass cover declines, litter, mulch and soil organic matter decline and bare ground, erosion and other desertification processes increase. The microclimate in the grassland areas becomes more arid. Increasing woody dominants are primarily mesquite, pricklypear and lotebush. Proper stocking or rest from grazing and prescribed burning will generally not restore the grassland community when the woody plant community exceeds 10 to 15 percent canopy on this site and/or the plants reach fire resistant age (two years) and/or size (about four feet in height). The plant community transitions into the Shortgrass/Mixed-brush Community (2.1). This threshold also marks the beginning of a new state; the Shrubland State (2), in which woody species dominate the site.

Mesquite generally dominates the Shortgrass/Mixed-brush Community (2.1). Mesquite is sometimes limited by high calcareous soil conditions. Redberry juniper often invades on the western side of the MLRA. The grass component is a mixture of low palatability midgrasses, shortgrasses and low quality forbs. With continued livestock overgrazing, the palatable midgrasses are replaced by grazing resistant shortgrasses, such as buffalograss, white tridens, meadow dropseed, western ragweed and alkali sacaton. Cool-season grasses such as Texas wintergrass and annual brome also increase, especially during wet cycles. Exposed soil in open spaces crusts readily, subjecting the site to erosion.

During this stage, the process of retrogression can be reversed. Relatively inexpensive brush control practices and prescribed grazing management that sets up the application of prescribed burning is needed. If these practices are not applied and overgrazing continues, the woody canopy will continue to increase in dominance and ground cover and a woody-plant dominated community; the Mixed–brush/Shortgrasses/Annuals Community (2.2) occurs. Once the brush canopy exceeds 30 to 35 percent, annual production for the understory becomes limited and is generally made up of unpalatable shrubs, grasses and forbs within tree/shrub interspaces. Brushy species such as mesquite, prickly pear, and lotebush dominate production. Shortgrasses, cool-season grasses and annuals persist, but in weakened condition.

Until maximum canopy cover by woody species is reached, erosion continues in the interspaces. Considerable litter and soil movement occurs from exposed soil during heavy rains. The exposed soil crusts readily, creating opportunity for further soil and wind erosion. Interception losses increase with canopy cover and reduce the amount of soil moisture available for herbaceous production. Once canopy cover reaches potential however, the hydrologic processes, energy flow and nutrient cycling stabilize.

Major high cost and high energy accelerated management practices are required to restore the Mixed–brush/Shortgrasses/Annuals Community (2.2) back to the Grassland State. Generally, mechanical or herbicidal brush management practices such as aerial spraying, dozing and/or individual plant treatments (IPT) along with other conservation practices such as range planting, grazing deferment, prescribed grazing and prescribed burning are necessary for the ecological site to return to a grassland state. Regular maintenance practices will be required to maintain the grassland state.

The soils of the Clay Loam Ecological Site were formed from calcareous materials and are generally deep clay loams that are calcareous to the surface. The soils have favorable plant-soil-moisture relationships and high calcium content enables the site to produce quality forage plants. The site responds to good grazing management and is moderately resilient.

The Clay Loam site is suited primarily for range, but many acres have been put under cultivation. The soils on the flatter areas are arable. Many acres previously cultivated for crops have been returned to native or introduced grass species and are managed as pasture or range.

State and Transition Diagram:
A State and Transition Diagram for the Clay Loam (R078CY096TX) site is depicted below. Thorough descriptions of each state, transition, and pathway follow the model. Experts base this model on available experimental research, field observations, professional consensus, and interpretations. It is likely to change as knowledge increases.
Plant communities will differ across the MLRA because of the natural variability in weather, soils, and aspect. The Reference Plant Community is not necessarily the management goal; other vegetative states may be desired plant communities as long as the Range Health assessments are in the moderate and above category.

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

Composition by dry weight and percent canopy cover are provided to describing the functional groups. Most observers find it easier to visualize or estimate percent canopy for woody species (trees and shrubs).

The following diagram suggests some pathways that the vegetation on this site might take. There may be other states not shown on the diagram. This information is intended to show what might happen in a given set of circumstances. It does not mean that this would happen the same way in every instance. Local professional guidance should always be sought before pursuing a treatment scenario.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Midgrasses**			785-1569	
	vine mesquite	PAOB	*Panicum obtusum*	336-673	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	336-673	–

	Arizona cottontop	DICA8	*Digitaria californica*	112-224	–
2	**Midgrasses**			112-224	
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	112-224	–
	tobosagrass	PLMU3	*Pleuraphis mutica*	112-224	–
	large-spike bristlegrass	SEMA5	*Setaria macrostachya*	112-224	–
	alkali sacaton	SPAI	*Sporobolus airoides*	112-224	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	112-224	–
	white tridens	TRAL2	*Tridens albescens*	112-224	–
	slim tridens	TRMU	*Tridens muticus*	112-224	–
3	**Shortgrasses**			448-785	
	buffalograss	BODA2	*Bouteloua dactyloides*	336-560	–
	blue grama	BOGR2	*Bouteloua gracilis*	112-224	–
	fall witchgrass	DICO6	*Digitaria cognata*	112-224	–
	Hall's panicgrass	PAHA	*Panicum hallii*	112-224	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	112-224	–
	threeawn	ARIST	*Aristida*	112-224	–
4	**Cool-season grasses**			112-224	
	Texas wintergrass	NALE3	*Nassella leucotricha*	112-224	–
	western wheatgrass	PASM	*Pascopyrum smithii*	112-224	–
5	**Grasslike species**			0-1	
	sedge	CAREX	*Carex*	0-1	–
Forb					
6	**Forbs**			56-168	
	onion	ALLIU	*Allium*	56-168	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	56-168	–
	milkvetch	ASTRA	*Astragalus*	56-168	–
	rose heath	CHER2	*Chaetopappa ericoides*	56-168	–
	springparsley	CYMOP2	*Cymopterus*	56-168	–
	prairie clover	DALEA	*Dalea*	56-168	–
	larkspur	DELPH	*Delphinium*	56-168	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	56-168	–
	beeblossom	GAURA	*Gaura*	56-168	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	56-168	–
	hoary false goldenaster	HECA8	*Heterotheca canescens*	56-168	–
	Indian rushpea	HOGL2	*Hoffmannseggia glauca*	56-168	–
	trailing krameria	KRLA	*Krameria lanceolata*	56-168	–
	flax	LINUM	*Linum*	56-168	–
	dotted blazing star	LIPU	*Liatris punctata*	56-168	–
	rush skeletonplant	LYJU	*Lygodesmia juncea*	56-168	–
	globemallow	SPHAE	*Sphaeralcea*	56-168	–
	greenthread	THELE	*Thelesperma*	56-168	–
	spiderwort	TRADE	*Tradescantia*	56-168	–
	vervain	VERBE	*Verbena*	56-168	–
Shrub/Vine					
7	**Shrubs/Vines**			11-34	
	fourwing saltbush	ATCA2	*Atriplex canescens*	11-34	–

	jointfir	EPHED	*Ephedra*	11-34	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	11-34	–
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	11-34	–
	pricklypear	OPUNT	*Opuntia*	11-34	–
	honey mesquite	PRGL2	*Prosopis glandulosa*	11-34	–
	littleleaf sumac	RHMI3	*Rhus microphylla*	11-34	–
Tree					
8	**Trees**			0-1	
	hackberry	CELTI	*Celtis*	0-1	–
	elm	ULMUS	*Ulmus*	0-1	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Animal community

Many types of wildlife use the Clay Loam Ecological Site. Bison and pronghorn antelope utilized the site prior to European settlement. Grassland insects, reptiles, birds and mammals frequent the site, either as their base habitat or from the adjacent sites. Small mammals include many kinds of rodents, jackrabbit, cottontail rabbit, raccoon, skunk, opossum and armadillo. Predators include coyote, fox and bobcat. Game birds, songbirds, and birds of prey were indigenous or frequent users. Most are still plentiful. Bison and pronghorn antelope, however, are no longer present. White-tailed deer utilize the Clay Loam site in its various states. Deer, turkey and quail particularly favor the habitat provided by the Mixed-Grass (1.2) and Shortgrass/Mixed-Brush (2.1) plant communities. The site is well suitable for production of livestock, including cattle, sheep and goats. The site in reference condition is very suited to primary grass eaters such as cattle. As retrogression occurs and woody plants invade it becomes better habitat for a mixture of cattle, sheep, goats, deer and other wildlife because of the browse and cool season grasses. Although sheep and goats are seldom pastured in the MLRA anymore, any livestock should be stocked in proportion to the available grass, forb and browse forage, keeping deer competition for forbs and browse in mind. If the animal numbers are not kept in balance with herbage and browse production through grazing management and good wildlife population management, the late advanced 2.2 Mixed-brush/Shortgrasses/Annuals Community will have little to offer as habitat except cover. Cropland in grain crops, pasture or seeded to wildlife food plots can enhance the landscape as wildlife habitat.

Hydrological functions

The Clay Loam Ecological Site is a moderately fine textured upland with nearly level to gentle slopes. Most soils are more than 20 inches deep. They are slow to take up water and droughty during the summer months. Runoff is slow due to gentle slopes. However, soil crusting can cause erosion from bare ground on steeper slopes. Under reference condition, the grassland vegetation intercepted and utilized much of the incoming rainfall in the soil solum. Only during extended rains or heavy thunderstorms was there much runoff. Litter and soil movement was slight. Standing plant cover, duff and organic matter decrease and surface runoff increases as the Midgrass Prairie Community (1.1) transitions to the Mixed-Grass Community (1.2). These processes continue in the interstitial spaces in the Shortgrass/Mixed-Brush Community (2.1) phase. Evaporation and interception losses are higher, however, resulting in less moisture reaching the soil. If overgrazing continues, the plant community deteriorates further and desertification processes continue. The deeper-rooted woody plants are able to extract water from greater depths than grasses, so less water will be available for down-slope movement. The woody plants compete for moisture with the remaining grasses and forbs further reducing ground cover in openings. Decreased litter and more bare ground allow erosion from soils in openings between trees. Once the Mixed-brush/Shortgrasses/Annuals Community (2.2) canopy surpasses 50 percent the hydrology and ecological processes, nutrient cycling and energy flow, stabilize within the woody plant canopy.

Recreational uses

The Clay Loam Site is well suited for many outdoor recreational uses including recreational hunting, hiking, camping, equestrian and bird watching. This site along with adjacent upland sites and Loamy Bottomland site also provide diverse scenic beauty and many opportunities for recreation and hunting.

Wood products

Posts and specialty wood products can be made from juniper, mesquite and many shrubs. Mesquite is used for firewood.

Other products

Seeds are harvested from many HCPC plants for commercial sale. Grasses and forbs are harvested by the dried-plant industry for sale in dried flower arrangements. Honeybees are utilized to harvest honey from the many flowering plants, such as mesquite.

Other information

None.

Inventory data references

Information presented has been derived from the revised Clay Loam Range Site PE 31-44, an undated NRCS draft Ecological Site Description for Clay Loam PE 31-44 78C, literature, personal experience, field observations and personal contacts with range-trained personnel. Photos by: J.L. Schuster. Special thanks to the following NRCS personnel for assistance and guidance with development of this ESD: Reggie Quiett NRCS, Vernon, Texas, Mark Moseley NRCS, San Antonio, Texas and Justin Clary NRCS Temple, Texas. Site Reviewers: Lem Creswell, RMS, NRCS, Weatherford, Texas Nathan Haile, RSS, NRCS, Weatherford, Texas

Other references

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Contributors

Joe Norris
Joseph Schuster, Range & Wildlife Habitat Consultants, Bryan, Tx
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)	Lem Creswell, Zone RMS, NRCS, Weatherford, Texas
Contact for lead author	817-596-2865
Date	10/22/2007
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

2. **Presence of water flow patterns:** **Water flow patterns are common and follow old stream meanders. Deposition or erosion is uncommon for normal rainfall but may occur during intense rainfall events.**

3. **Number and height of erosional pedestals or terracettes:** **None to slight. Uncommon for this site.**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** **Expect no more than 20% bare ground randomly distributed throughout.**

5. **Number of gullies and erosion associated with gullies:** **Some gullies may be present on side drains into perennial and intermittent streams. Gullies should be vegetated and stable.**

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

7. **Amount of litter movement (describe size and distance expected to travel):** Under normal rainfall, little litter movement should be expected, however, litter of all sizes may move long distances depending on obstructions under intense storm events.

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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 surface is resistant to erosion. Stability class range is expected to be 5 to 6.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** 0 to 8 inches thick dark grayish brown fine sandy loam with weak granular structure. SOM is approximately 1-6%. See soil survey for specific soils information.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** The grassland cover of mid and short grasses plus litter provided excellent soil protection and infiltration. Little runoff occurred except under heavy rainfall events.

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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 evidence of compaction under HCPC.

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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: Warm-season shortgrasses >>

    Sub-dominant: Warm-season midgrasses >> Cool-season grasses >

    Other: Forbs > Grass-likes > 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 should be little mortality or decadence for any functional group.

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14. **Average percent litter cover (%) and depth (in):** Litter is dominantly herbaceous.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1000 - 3000 lbs/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: Honey mesquite, prickly pear, bermudagrass, johnsongrass.

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17. **Perennial plant reproductive capability: All perennial plants should be capable of reproducing except during periods of prolonged drought conditions, heavy natural herbivory or wildfires.**
