

Ecological site R077EY051TX Clay Loam 16-24" PZ

Last updated: 9/12/2023
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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.



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): 077E–Southern High Plains, Breaks

MLRA 77E occurs along moderately sloping breaks and steep escarpments associated with dissecting river systems and erosional margins of the Southern High Plains. Soil temperature regime is thermic and soil moisture regime is ustic bordering on arid. Loamy and sandy soils are generally well drained, range from shallow to deep, and developed in Ogallala Formation sediments.

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 very deep clay loam soils on uplands. The reference vegetation consists of short grasses and midgrasses with scattered forbs and few shrubs. In the absence of fire or alternative brush management, woody species may increase across the site. Abusive grazing practices may also have an impact on the plant community causing a decrease in the more palatable species.

Associated sites

R077EY055TX	Hardland Slopes 16-24" PZ Nearly level to moderately steep fine-loamy calcareous soils on higher side slope positions. Dominantly shortgrass community with some midgrasses, forbs, and few woody species.
R077EY057TX	Limy Upland 16-24" PZ Gently sloping to moderately sloping loamy soils with highly calcareous subsoils on similar positions or slightly lower side slopes. Short and mid-grass dominate and with few tall grasses, perennial and annual forbs, and few woody species present.
R077EY061TX	Mixedland Slopes 16-24" PZ Very gently to moderately steeply sloping, very deep coarse-loamy soils on higher hillslopes. Tallgrasses and midgrasses dominate with forbs, and few shrub species.

Similar sites

R077EY056OK	Loamy Upland 16-24" PZ Similar soils in the cooler and wetter northeastern portions of the MLRA, with dominantly mid- and tallgrass species of switchgrass and little bluestem.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Bouteloua gracilis</i> (2) <i>Bouteloua dactyloides</i>

Physiographic features

This site occurs on nearly level to gently sloping plains, divides, side slopes and upland terraces within the Canadian River breaks. Surfaces vary from slightly concave to slightly convex. Slopes are typically from 0 to 5 %. This areas occupied by this site usually vary from twenty to as much as 200 acres in size.

Table 2. Representative physiographic features

Landforms	(1) Plains > Terrace (2) Plains > Plain (3) Plains > Divide
Runoff class	Negligible to medium
Flooding frequency	None
Ponding frequency	None
Elevation	2,000–4,500 ft
Slope	0–5%
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Negligible to high
Flooding frequency	None
Ponding frequency	None
Elevation	2,000–4,500 ft
Slope	0–12%

Climatic features

Climate is a cold semi-arid steppe (Koppen-Geiger classification BSk). Summers are hot and winters are cold. Temperature extremes are common. Humidity is generally low, evaporation is high, and short-term droughts are common. Average annual wind speed is 12 mph with highest winds in early spring. The prevailing wind direction is south. Summertime brings strong high pressure systems that build into heat domes with highs in the upper 90 to mid-100 degree F range. Evaporation in summer is high and open pan evaporation exceeds 6 feet per year. Early autumn temperatures are mild, with Canadian and Pacific cold fronts bringing cold air in mid-autumn throughout winter. Arctic air can settle in and dominate for several weeks during winter with very cold air in place for 2 to 3 weeks at a time.

Most of the precipitation comes in the form of rain from May through September. Rainfall events often occur as intense showers of relatively short duration. Snowfall average is about 17 inches but is also variable from 8 to 36 inches annually. Long term droughts are likely to occur every 15 to 20 years and may last 4 to 5 years. Mean precipitation is around 21 inches but varies significantly from year to year. Rainfall amounts over the last 100 years have varied from as little as 9 inches to as much as 37 inches. The probability is about 70% that precipitation will fall between 14 to 24 inches. Growing season averages 190 days. Average first frost is around October 22, and the last freeze of the season occurs around April 15.

Table 4. Representative climatic features

Frost-free period (characteristic range)	146-164 days
Freeze-free period (characteristic range)	184-194 days
Precipitation total (characteristic range)	20-24 in
Frost-free period (actual range)	144-176 days
Freeze-free period (actual range)	180-198 days
Precipitation total (actual range)	19-26 in
Frost-free period (average)	156 days
Freeze-free period (average)	189 days
Precipitation total (average)	22 in

Climate stations used

- (1) GATE [USC00343489], Gate, OK
- (2) FOLLETT [USC00413225], Follett, TX
- (3) CANADIAN [USC00411412], Canadian, TX
- (4) SANFORD DAM [USC00418040], Fritch, TX
- (5) GUYMON MUNI AP [USW00003030], Guymon, OK
- (6) BEAVER [USC00340593], Beaver, OK
- (7) MEADE [USC00145171], Meade, KS
- (8) BOYS RANCH [USC00411000], Vega, TX
- (9) CLARENDON [USW00023072], Clarendon, TX
- (10) LIPSCOMB [USC00415247], Booker, TX
- (11) CHANNING 2 [USC00411649], Channing, TX
- (12) MIAMI [USC00415875], Miami, TX
- (13) COLDWATER [USC00141704], Coldwater, KS
- (14) REYDON 2SSE [USC00347579], Reydon, OK

Influencing water features

Well drained soils with negligible to high runoff. No influencing water features.

Wetland description

Soils in this ecological site are not part of wetland ecosystems.

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 inclusions of areas of additional Ecological Sites which are correlated to the minor components of that particular soil Mapunit.

These are deep to very deep well drained, fine-loamy, neutral to mildly alkaline, moderately to moderately slowly permeable soils that have high fertility and high water holding capacity. Slopes vary from 0 to 5 percent. They have dark brown loam, clay loam, or silty clay loam surface horizons and significant clay accumulation in the subsoils. Productivity is moderate. These soils are easily penetrated by plant roots.

Representative soil components for this site include: Alibates, Darrouzett, Texroy, and Woods (some older surveys will include Acuff and Olton series).

Table 5. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Loam (2) Clay loam (3) Silty clay loam
Family particle size	(1) Fine-loamy (2) Fine
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	4.3–8.9 in
Calcium carbonate equivalent (0-40in)	0–20%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–3
Soil reaction (1:1 water) (0-40in)	6.6–8.4
Subsurface fragment volume <=3" (0-40in)	0%
Subsurface fragment volume >3" (0-40in)	0%

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 for this site consists of mainly shortgrass species with a few perennial forbs and a few woody shrubs. The principal grass species are blue grama (*Bouteloua gracilis*) and buffalograss (*Bouteloua dactyloides*) with smaller amounts of vine mesquite (*Panicum obtusum*) and western wheatgrass (*Pascopyrum smithii*). The most frequently encountered forbs are scarlet globemallow (*Sphaeralcea coccinea*), slimleaf scurfpea (*Psoralidium tenuiflorum*), chocolate daisy (*Berlandiera lyrata*), plains greenthread (*Thelesperma filifolium*), western ragweed (*Ambrosia psilostachya*) and nightshades (*Solanum* spp.). Annual forbs are infrequent except in wet springs. The main woody species are plains prickly pear (*Opuntia polyacantha*), occasional cholla (*Cylindropuntia imbricata*) and occasional mesquite (*Prosopis glandulosa*).

Under reference conditions, the blue grama exhibits a semi-bunch grass appearance and the production is moderate. Ground cover is good and some plant residues are present. The vine mesquite and western wheatgrass occupies small depressional areas. According to historical accounts, there were only small amounts of mesquite present in this ecoregion in pre-settlement times. With grazing pressure over time, the major effect on the vegetation is for the blue grama to take on a more sod-bound appearance and the midgrasses tend to decrease. With abusive grazing for long periods, the buffalograss will sometimes increase and litter disappears. Bare spots will open up and weedy species will begin to invade. Sometimes perennial woody plants such as prickly pear and mesquite can become quite thick. The blue grama is very resistant to grazing pressure and will usually remain even if abuse is severe. However, the vigor and production of the site will be low and the hydrologic characteristics negatively affected. For this site to actually cross a threshold, abuse either has to have been so severe that turf has been lost and sufficient bare ground exists so invasive weedy species dominate or form a dense canopy. These communities do exist but are not common in this MLRA. The site is perhaps one of the more resistant sites as to plant community change, and is also quite resilient provided good management can be applied before a threshold is crossed. This site is preferred by livestock and often receives more grazing pressure than surrounding sites which makes good management more difficult.

Natural fire played a major part in the ecology of all plains grassland sites. The major effect of fire was to suppress woody shrubs and promote a grassland community. Many species such as prickly pear, cholla and small mesquite are suppressed by fire and this effect was probably important in keeping the grassland an open community. Fire promotes diversity in the community and for a couple of years following a fire the forb population tends to be favored. The main obstacle to prescribed fire today is liability and unpredictable environmental conditions. Fire can be a valuable tool to manage vegetation when used by trained people who understand its effects.

Large herbivores, mainly bison, roamed the plains region, grazed heavily, but moved on quickly allowing for long recovery periods. Good grass cover was maintained under this type of natural grazing. Grazing of domestic livestock, mostly cattle, began in this region in the 1870's. Since that time, grazing has often been heavy and more or less continuous. This site is resistant to change but is often grazed so hard that low vigor sod bound plants occur and community functions are not efficiently taking place. Diversity decreases and woody plant cover often increases with abusive grazing.

Hydrologically speaking, the site is generally nearly level to moderately sloping and does not yield large amounts of runoff compared to some other sites. With poor plant cover, infiltration is reduced and evaporation increased resulting in a dryer site and plants with shortened root systems. This renders the water cycle inefficient.

State and Transition Diagram:

A State and Transition Diagram for the Clay Loam (R077EY051TX) 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.

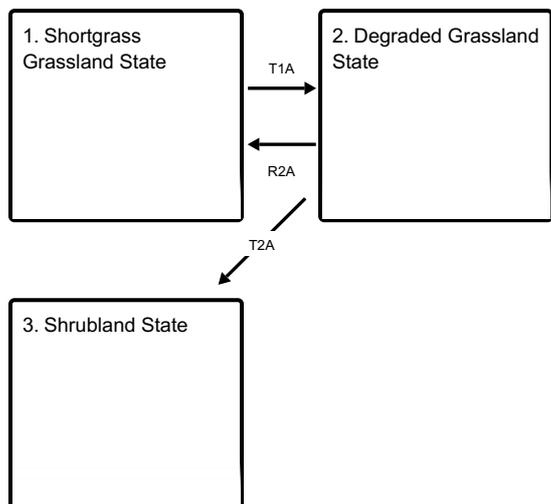
The biological processes on this site are complex. Therefore, representative values are presented in a land management context. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every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

Ecosystem states

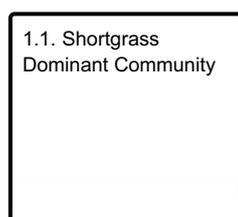


T1A - Absence of disturbance and natural regeneration over time coupled with excessive grazing pressure

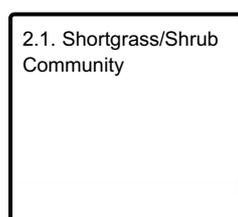
R2A - Reintroduction of historic disturbances, maybe be coupled with rangeland seeding

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

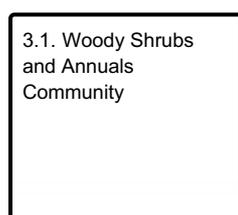
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1

Shortgrass Grassland State

Blue grama is dominant along with a few midgrasses present. There are scattered mesquite trees throughout the site. Few forbs are visible due to a dryer than usual summer.

Dominant plant species

- blue grama (*Bouteloua gracilis*), grass
- buffalograss (*Bouteloua dactyloides*), grass

Community 1.1

Shortgrass Dominant Community



Figure 8. 1.1 Shortgrass Dominant Community

This is the interpretive plant community for this site. Blue grama is dominant along with a few midgrasses present. There are scattered mesquite trees throughout the site. Good vigor and average production for the site. Few forbs are visible due to a dryer than usual summer. Mesquite has increased on practically all Clay Loam sites in MLRA 77E. The presence of mesquite is the major difference between the present community and historic community.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	750	1335	1950
Forb	50	100	150
Shrub/Vine	25	65	70
Tree	0	0	1
Total	825	1500	2171

Figure 10. Plant community growth curve (percent production by month). TX1506, Shortgrass dominant. Warm season native perennial grasses with shortgrasses as being dominant..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	2	3	8	25	30	12	4	8	4	3	1

State 2

Degraded Grassland State

Shortgrasses such as blue grama and buffalograss are in low vigor. Plant litter rarely exists. Mesquite and cholla woody canopy is increasing to fifteen percent canopy. There is also a dramatic increase of annuals and bare ground.

Dominant plant species

- cholla (*Cylindropuntia*), shrub

Community 2.1 Shortgrass/Shrub Community



Figure 11. 2.1 Shortgrass/Shrub Community

Shortgrasses such as blue grama are in low vigor, few plant residues exist, and mesquite and cholla are on the increase to approximately >15% woody canopy. Increase in bare ground. Annuals are also increasing in this plant community.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	400	600	800
Shrub/Vine	90	100	130
Forb	30	40	50
Tree	0	1	1
Total	520	741	981

Figure 13. Plant community growth curve (percent production by month). TX1747, Shortgrass with shrubs. "Shortgrasses are in low vigor, few plant residues exist, and mesquite and cholla are on the increase.".

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	3	5	15	28	30	5	3	6	3	1	1

State 3 Shrubland State

Mesquite and annual grasses and forbs dominate. Few perennial grasses remain. A threshold has been crossed. The site is now unstable and the natural processes such the water and nutrient cycles have been compromised. This community is the result of years of grazing abuse.

Dominant plant species

- honey mesquite (*Prosopis glandulosa*), shrub

Community 3.1 Woody Shrubs and Annuals Community



Figure 14. 3.1 Woody Shrubs and Annuals Community

Mesquite and annual grasses and forbs dominate. Few perennial grasses remain. A threshold has been crossed. The site is now unstable and the natural processes such the water and nutrient cycles have been compromised. This community is the result of years of grazing abuse. This community will not be able to revert back to the Grassland State due to its degraded state.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Forb	250	300	500
Shrub/Vine	250	300	400
Grass/Grasslike	150	240	300
Tree	0	1	1
Total	650	841	1201

Figure 16. Plant community growth curve (percent production by month). TX1508, Annuals/Mesquite. Degraded shortgrass with annuals and mesquite dominating the site. .

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	4	8	26	30	20	2	2	4	3	1	0

Transition T1A State 1 to 2

With heavy continuous grazing, no fires, no brush management, and a brush invasion of mesquite and cholla, the Shortgrass Grassland State will transition to the Degraded Grassland State.

Restoration pathway R2A State 2 to 1

With the installation of beneficial conservation practices such as Prescribed Grazing and Brush Management, the Degraded Shortgrass State can be restored to the Shortgrass Grassland State.

Conservation practices

Brush Management
Prescribed Grazing

Transition T2A

State 2 to 3

With long-term heavy continuous grazing, no brush management, no pest management, and brush invasion of mesquite and cholla, the Degraded Grassland State will transition to the Shrubland State.

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	Shortgrasses			112–400	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	472–1050	–
	buffalograss	BODA2	<i>Bouteloua dactyloides</i>	112–400	–
2	Midgrasses			60–185	
	vine mesquite	PAOB	<i>Panicum obtusum</i>	35–105	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	25–105	–
3	Midgrasses			101–290	
	bristlegrass	SETAR	<i>Setaria</i>	11–34	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	11–32	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	11–32	–
	silver beardgrass	BOLAT	<i>Bothriochloa laguroides</i> ssp. <i>torreyana</i>	11–32	–
	tumble windmill grass	CHVE2	<i>Chloris verticillata</i>	11–32	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	11–32	–
	gummy lovegrass	ERCU	<i>Eragrostis curtipedicellata</i>	11–32	–
	little barley	HOPU	<i>Hordeum pusillum</i>	11–32	–
	sand muhly	MUAR2	<i>Muhlenbergia arenicola</i>	6–16	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	6–16	–
Forb					
4	Forbs			50–150	
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	4–11	–
	lyreleaf greeneyes	BELY	<i>Berlandiera lyrata</i>	4–11	–
	rose heath	CHER2	<i>Chaetopappa ericoides</i>	4–11	–
	Engelmann's daisy	ENPE4	<i>Engelmannia peristenia</i>	4–11	–
	scarlet beeblossom	GACO5	<i>Gaura coccinea</i>	4–11	–
	Indian blanket	GAPU	<i>Gaillardia pulchella</i>	4–11	–
	trailing krameria	KRLA	<i>Krameria lanceolata</i>	4–11	–
	dotted blazing star	LIPU	<i>Liatis punctata</i>	4–11	–
	slimflower scurfpea	PSTE5	<i>Psoraleidum tenuiflorum</i>	4–11	–
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	4–11	–
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	4–11	–
	stiff greenthread	THFI	<i>Thelesperma filifolium</i>	4–11	–
	Rocky Mountain zinnia	ZIGR	<i>Zinnia grandiflora</i>	4–11	–
Shrub/Vine					
5	Shrubs			15–20	

	honey mesquite	PRGLG	<i>Prosopis glandulosa var. glandulosa</i>	15–25	–
	soapweed yucca	YUGL	<i>Yucca glauca</i>	15–20	–
	tree cholla	CYIMI	<i>Cylindropuntia imbricata var. imbricata</i>	15–20	–
	plains pricklypear	OPPO	<i>Opuntia polyacantha</i>	15–20	–
Tree					
6	Trees			0–1	
	netleaf hackberry	CELAR	<i>Celtis laevigata var. reticulata</i>	0–1	–

Animal community

Native animals that occupy this site include scaled quail, mule and white-tailed deer, and various small mammals and grassland birds. The site lacks the shrubby cover that white-tailed deer need but whitetails do browse the site if cover is nearby. The shortgrasses and few forbs do not attract bob-white quail but scaled quail are at home in this environment. Mule deer are often seen and pronghorn prefer this site and other associated open sites. Many grassland songbirds utilize the site, especially in spring and early summer. Prairie dogs often choose this site for their towns. Predators such as coyote, skunks, and various raptors hunt small mammals on the site. In general, the site is not one of the more diverse sites as to number of species.

Hydrological functions

This site does not yield large amounts of runoff due to level to gently sloping terrain. If cover is poor, then infiltration is decreased and runoff increases along with evaporation. If infiltration is minimal, the plant community becomes droughty, plant residues are reduced, vigor is lowered and productive capability decreases. This becomes a self-perpetuating cycle of low soil moisture - low plant production that can be broken only by longer periods of rest, favorable moisture and careful grazing management.

Recreational uses

Hunting, Camping, Hiking, Birdwatching, Photography, Horseback Riding

Wood products

None

Other products

None

Other information

None

Inventory data references

Based on long-term observation of well-managed ranges, range inventory data, and numerous historical accounts of vegetation present at time of settlement.

Inventory Data References: Eight years of Range 417's were reviewed. Several years of clipping data and numerous old range inventories have been reviewed.

Other references

Natural Resources Conservation Service Range Site Descriptions
 USDA-Natural Resources Conservation Service Soil Surveys

Rathjen, Frederick W., The Texas Panhandle Frontier, Rev. 1998, Univ. of Texas Press
Hatch, Brown and Ghandi, Vascular Plants of Texas (An Ecological Checklist) Texas A&M Exp. Station, College Station, Texas
NRCS Official Soil Series Descriptions
Goulds Grasses of Texas

Technical Review:

Mark Moseley, Oklahoma State Range Conservation NRCS
Homer Sanchez, State Rangeland Management Specialist
Tony Garcia, Zone Rangeland Management Specialist
Clint Rollins, Rangeland Management Specialist
Dr. Jack Eckroat, Grazing Lands Specialist Oklahoma NRCS
Justin Clary, Rangeland Management Specialist

Contributors

J.R. Bell, RMS, NRCS, Amarillo, Texas
Steven McGowen, MLRA Office Leader, NRCS, Woodward, OK

Approval

Bryan Christensen, 9/12/2023

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)	Stan Bradbury, Zone RMS, NRCS, Lubbock, Texas
Contact for lead author	806-791-0581
Date	09/04/2007
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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2. **Presence of water flow patterns:** None to slight.
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3. **Number and height of erosional pedestals or terracettes:** None to slight.
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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 25-30%.
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5. **Number of gullies and erosion associated with gullies:** None to slight.
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6. **Extent of wind scoured, blowouts and/or depositional areas:** None to slight.
-
7. **Amount of litter movement (describe size and distance expected to travel):** None to slight.
-
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Very resistant to surface erosion.
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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Loam to clay loam, friable surface, high SOM.
-
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Basal cover and density with small interspaces should make rainfall impact minimal. This site has moderate permeability, runoff is slow to medium, and available water holding capacity is high.
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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):** None.
-
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: Warm-season tallgrasses > Forbs > Shrubs/Vines > Trees
- Additional:
-

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Grasses due to their growth habit will exhibit some mortality and decadence, though minimal.

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

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 850 to 2,200 pounds per acre.

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:** Mesquite, Pricklypear, Yucca and Cholla. Broom snakeweed can become invasive.

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