

Ecological site R077EY052TX

Draw 16-24" PZ

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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): 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 aridic. 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

This site occurs on very deep loamy soils on drainageways. The reference vegetation consists of tall and midgrass species with forbs and few woody plants. In the absence of fire or alternative brush management, woody species may expand on the site. If proper grazing management is not followed, the plant community may shift towards a midgrass/shortgrass dominated community.

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.
R077EY062TX	Breaks 16-24" PZ Strongly sloping to very steep, shallow, loamy soils often intermixed with rock outcrops on higher positions. A mixture of grasses, forbs, shrubs, and a few trees with bare ground. Many rocks and cobbles on the surface.

Similar sites

R077EY058TX	Loamy Bottomland 16-24" PZ Loamy alluvial soils lower in the landscape on floodplains and possible water table below 60 inches.
R077AY002TX	Draw 16-22" PZ A similar site in MLRA 77A with soils formed in a slightly cooler mesic soil temperature regime.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Panicum obtusum</i> (2) <i>Pascopyrum smithii</i>

Physiographic features

This site occurs as valley floors and along stream flood plains and drainages that dissect the high plains. They flood frequently to rarely. Slopes are nearly level to very gently sloping. The site may or may not be channeled. Generally speaking, draws with large drainage areas have defined channels. This site is associated with drainage ways such as Palo Duro Creek, Coldwater Creek, Hannas Draw, Palo Duro Draw, Tierra Blanca Creek, upper Mulberry Creek and upper McClellan Creek. These are upper drainages of the Canadian and Red River Systems.

Table 2. Representative physiographic features

Landforms	(1) Plains > Draw (2) Plains > Flood plain (3) Plains > Drainageway
Runoff class	Negligible to low
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to frequent
Ponding frequency	None
Elevation	610 – 1,370 m
Slope	0 %
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Negligible to low
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to frequent
Ponding frequency	None
Elevation	610 – 1,370 m
Slope	0 – 10 %

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)	150-160 days
Freeze-free period (characteristic range)	180-190 days
Precipitation total (characteristic range)	510-610 mm
Frost-free period (actual range)	140-180 days
Freeze-free period (actual range)	180-200 days
Precipitation total (actual range)	480-660 mm
Frost-free period (average)	160 days

Freeze-free period (average)	190 days
Precipitation total (average)	560 mm

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

Influencing water features

This site receives runoff from surrounding areas. Overflows are usually over a broad area with large rainfall events and may be confined to channels during small events.

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.

The soils of this site are deep, well drained, and slightly alkaline to neutral alluvial soils on nearly level to very gently sloping terrain on valley floors and flood plains adjacent to drainages. They are frequently to rarely flooded when major rainfall events occur. They do not usually have high water tables. Surface horizons are dark colored loam or clay loam and may be calcareous to the surface. Permeability is moderate and available water holding capacity is high. Fertility is high and the root zone is easily penetrated by plant roots. Productive capacity is moderately high.

Representative soil components for this site include: Bippus and Sprone. Some older surveys may include Spur soils for this site.

Table 5. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Loam (2) Clay loam

Family particle size	(1) Fine-loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	10.67 – 20.32 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 10 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	6.6 – 8.4
Subsurface fragment volume <=3" (0-101.6cm)	Not specified
Subsurface fragment volume >3" (0-101.6cm)	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 consists of a mixture of tall and midgrasses with lesser amounts of shortgrass species along with a respectable amount of forbs and scattered woody plants.

The productivity is fairly high due to a deep soil and extra runoff from adjacent upland sites. The main grass species are western wheatgrass (*Pascopyrum smithii*), vine mesquite (*Panicum obtusum*), sideoats grama (*Bouteloua curtipendula*), along with smaller components of switchgrass (*Panicum virgatum*) and Indiangrass (*Sorghastrum nutans*). There is always a component of blue grama (*Bouteloua gracilis*) and buffalograss (*Bouteloua dactyloides*) present but it is relatively small in the reference community. Some sites will have some alkali sacaton (*Sporobolus airoides*) present.

More commonly found forbs are goldenrod (*Solidago* spp.), baldwin ironweed (*Vernonia baldwinii*), berlandiera (*Berlandiera* spp.), gaura (*Gaura* spp.), western ragweed (*Ambrosia psilostachya*), mallow (*Sphaeralcea* spp.), heath aster (*Chaetopappa ericoides*), sagewort (*Artemisia* spp.), Illinois bundleflower (*Desmanthus illinoensis*), Maximilian sunflower (*Helianthus maximiliani*) and numerous annuals. Scattered elm (*Ulmus* spp.), hackberry (*Celtis* spp.), western soapberry (*Sapindus saponaria*), and cottonwood (*Populus deltoides*) occur but these are not as prevalent as on loamy or wet bottomland sites.

A few shrubs such as baccharis (*Baccharis* spp.), and occasional yucca (*Yucca* spp.) are present. The significant presence of western wheatgrass makes this site preferred in the cool season as well as in the summer. At times there may be small holes of water present in the drainage channels. These provide a good source of water for wildlife and occasionally some plants such as curly dock (*Rumex* spp.) and smartweed (*Polygonum* spp.) may be found growing in wetter years. Since the site occupies a location lower on the landscape, animals prefer to take shelter from wind during the colder part of the year.

Grazing by large herbivores played a major role in shaping the site vegetatively. It is well documented that large herds of bison often grazed the site and domestic livestock prefer it as well. As bison migrated with the seasons, these sites received heavy grazing pressure from time to time but had long recovery periods. There is considerable evidence of haying of these sites by early day settlers. The increased productivity was recognized and the quality of the forage was good.

Natural fire also played a major role in grassland ecology. The general role of fire seems to have been to perpetuate grasslands and keep any encroaching woody vegetation at bay. Woody plants were scattered along the channels where they could often escape fires, but there is little doubt that fire kept the number of woody plants controlled. Fires may have occurred as often as every 5 to 7 years on the average and this site usually had an above average fuel load compared to other plains sites.

Grazing pressure began to be severe in the 1890's and the diversity and productivity of the site has generally declined except where excellent management has been practiced for long periods. The taller warm-season grasses such as Indiangrass and switchgrass have declined in most instances.

Western wheatgrass acts as a strong increaser as grazing pressure initially increases. If abusive grazing is practiced for many years, the western wheatgrass and other midgrasses will give way to increasing buffalograss and blue grama. These shortgrasses can adapt better to grazing pressure. The more desirable forbs decrease rapidly with abuse and western ragweed increases with a host of annual forbs. In some cases, annual grasses such as Japanese brome (*Bromus* spp.) and little barley (*Hordeum pusillum*) have become excessive and are competing strongly with perennials. If good plant cover is not maintained on this site, erosion from water can become a problem. Gullies may appear and the channels, which are usually grass-covered, become deeper and are sometimes devoid of cover.

Good grass cover and a variety of species make this site desirable for deer, turkey, and many ground nesting birds. Small mammals and predators such as coyotes and bobcats find the site attractive as well.

Poor cover and decreased plant diversity brought about by poor grazing management disrupt the natural processes such as the water cycle and nutrient cycle. Since the site receives runoff water from surrounding areas, good cover is essential to prevent gully and sheet erosion. The site has the capacity to store a good deal of water in the soil profile but poor vegetative cover inhibits this process. If little water enters the soil, then the taller grass species tend to do poorly. Opportunistic plants such as weedy forbs and annual grasses decrease the long term stability of the site.

State and Transition Diagram:

A State and Transition Diagram for the Draw (R077EY052TX) 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 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Cool-season Grasses			1653-2645	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	1345-2242	–
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	168-308	–
	Texas bluegrass	POAR	<i>Poa arachnifera</i>	56-140	–
2	Tallgrasses			757-1211	
	vine mesquite	PAOB	<i>Panicum obtusum</i>	560-925	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	84-168	–
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	84-140	–
	eastern gamagrass	TRDA3	<i>Tripsacum dactyloides</i>	11-28	–
3	Midgrasses			420-673	
	alkali sacaton	SPAI	<i>Sporobolus airoides</i>	168-308	–
	composite dropseed	SPCOC2	<i>Sporobolus compositus var. compositus</i>	84-168	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	84-168	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	39-84	–
4	Mid/Shortgrasses			28-56	
	buffalograss	BODA2	<i>Bouteloua dactyloides</i>	28-56	–
	silver beardgrass	BOLAT	<i>Bothriochloa laguroides ssp. torreyana</i>	22-56	–
	saltgrass	DISP	<i>Distichlis spicata</i>	28-56	–
	creeping muhly	MURE	<i>Muhlenbergia repens</i>	28-56	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	22-56	–
5	Annuals			34-84	
	brome	BROMU	<i>Bromus</i>	34-84	–
Forb					
6	Forbs			224-448	
	Forb, annual	2FA	<i>Forb, annual</i>	0-224	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	0-112	–
	desert milkweed	ASER2	<i>Asclepias erosa</i>	0-112	–
	aster	ASTER	<i>Aster</i>	0-112	–
	bundleflower	DESMA	<i>Desmanthus</i>	0-112	–
	Engelmann's daisy	ENGEL	<i>Engelmannia</i>	0-112	–
	scarlet beeblossom	GACO5	<i>Gaura coccinea</i>	0-112	–
	American licorice	GLLE3	<i>Glycyrrhiza lepidota</i>	0-112	–
	curlycup gumweed	GRSQ	<i>Grindelia squarrosa</i>	0-112	–
	common sunflower	HEAN3	<i>Helianthus annuus</i>	0-112	–
	Maximilian sunflower	HEMA2	<i>Helianthus maximiliani</i>	0-112	–
	slimflower scurfpea	PSTE5	<i>Psoraleidum tenuiflorum</i>	0-112	–

	silverleaf nightshade	SOEL	<i>Solanum elaeagnifolium</i>	0-112	–
	Baldwin's ironweed	VEBA	<i>Vernonia baldwinii</i>	0-112	–
	hoary verbena	VEST	<i>Verbena stricta</i>	0-112	–
Shrub/Vine					
7	Shrubs			28-84	
	saltwater false willow	BAAN	<i>Baccharis angustifolia</i>	0-22	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0-22	–
	Oklahoma plum	PRGR	<i>Prunus gracilis</i>	0-22	–
	willow	SALIX	<i>Salix</i>	0-22	–
	soapweed yucca	YUGL	<i>Yucca glauca</i>	0-22	–
Tree					
8	Trees			6-28	
	hackberry	CELT1	<i>Celtis</i>	0-28	–
	eastern cottonwood	PODE3	<i>Populus deltoides</i>	0-28	–
	western soapberry	SASAD	<i>Sapindus saponaria</i> var. <i>drummondii</i>	0-28	–
	American elm	ULAM	<i>Ulmus americana</i>	0-28	–

Table 7. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 3.1 plant community composition

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

This site supports a variety of small mammals, grassland birds, and predators. It does not afford cover for deer and turkey unless trees and shrubs are more prevalent, which they are often not. Pronghorn use the site especially when forb growth is prolific. Dove and Quail will use the site for nesting and for escape cover. Dove and Quail use the tall and mid grasses for nesting cover. The main source of food for dove and quail comes from annual and perennial seed bearing forbs. Some of the desirable forbs are Texas croton, annual sunflower, pigweed, western ragweed, and Illinois bundleflower. These plants make seed in late spring through summer and then seeds are dropped on the ground. This site lacks shrubby cover for bobwhite quail, but if water holes are available, mourning doves frequent the site in late summer and early fall.

Hydrological functions

This site acts as a conduit for drainage from the high plains to the major creeks and rivers. With good cover, water quality from runoff is good. If cover is poor, then erosion on the site can be substantial and off site effects are negative. Poor vegetative cover can contribute to flooding over roads and highways in the event of heavy rains.

Recreational uses

Hunting, camping, hiking, horseback riding.

Wood products

None.

Other products

None.

Other information

long these draws throughout the plains significant archaeological sites exist. Early native Americans often camped along these draws and hunted game that grazed and watered there.

Inventory data references

The information in this document is based on long term observations of well managed ranges, several years of clipping data, NRCS FOTG Ecological Site Descriptions (both past and present), and numerous historical accounts of vegetation present at the time of settlement of the area. Inventory Data References: NRCS 417 production data collected over approximately eight years was reviewed.

Other references

USDA, Soil Survey Reports, Soil Series Official Narratives
Hatch, Gandi, and Brown, Checklist of the Vascular Plants of Texas (Texas A&M, 1990)

Technical Review:

Mark Moseley, Oklahoma State Range Conservation NRCS
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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.

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Approved by	

Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. Number and extent of rills: None.

2. Presence of water flow patterns: None.

3. Number and height of erosional pedestals or terracettes: None.

4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground): 20-25%.

5. Number of gullies and erosion associated with gullies: None.

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

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 soil erosion.

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 capacity is high.

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: Cool-season grasses >

Sub-dominant: Warm-season midgrasses > Warm-season tallgrasses > Warm-season shortgrasses >

Other: Forbs > Shrubs/Vines > Trees

Additional:

13. **Amount of plant mortality and decadence** (include which functional groups are expected to show mortality or decadence):
Mortality and decadence moderate due to high herbaceous vegetative canopy.

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):
2,750 - 4,500 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: Yucca and willow baccharis. 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.
