

## Ecological site R081BY353TX Very Shallow 19-23 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.

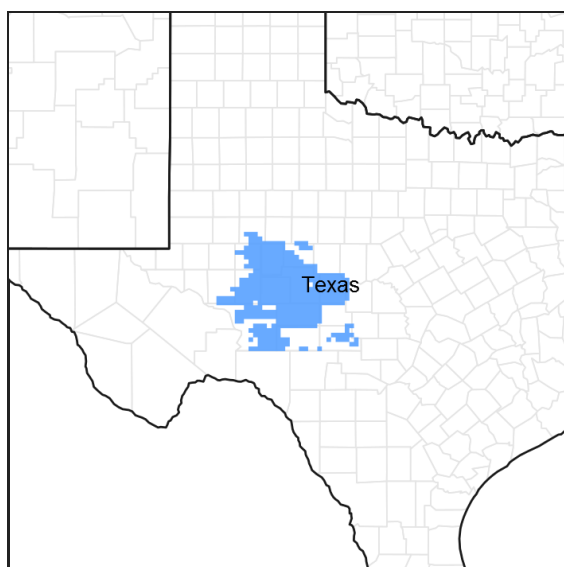


Figure 1. Mapped extent

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): 081B—Edwards Plateau, Central Part

This area is entirely in south-central Texas. It makes up about 11,125 square miles (28,825 square kilometers). The towns of Fredericksburg, Junction, Menard, Rocksprings, and Sonora are in this MLRA. Interstate 10 crosses the middle part of the area. A few State parks and State historic sites are in this MLRA.

### Classification relationships

USDA-Natural Resources Conservation Service, 2006.  
-Major Land Resource Area (MLRA) 81B

### Ecological site concept

The Very Shallow ecological site is located on uplands with soils less than 10 inches deep over a petrocalcic horizon.

### Associated sites

R081BY323TX	<b>Clay Flat 19-23 PZ</b> The Clay Flat site is found on similar sites but deeper soils in depressions.
R081BY333TX	<b>Loamy 19-23 PZ</b> The Loamy site is found on deeper soils.
R081BY325TX	<b>Clay Loam 19-23 PZ</b> The Clay Loam site can be found on adjacent slopes or slightly downslope on terraces.
R081BY593TX	<b>Limestone Hill 19-23 PZ</b> The Limestone Hill site may be encountered upslope.

## Similar sites

R081BY342TX	<b>Shallow 19-23 PZ</b> The Shallow Site is similar in that both sites are located on similar topography and parent material.
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**Table 1. Dominant plant species**

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Bouteloua curtipendula</i> (2) <i>Schizachyrium scoparium</i>

## Physiographic features

Sites are on nearly level to gently sloping uplands with a petrocalcic horizon. They are formed in calcareous loamy alluvium derived from limestone. This site is usually found on stream terraces, alluvial fans, hills, ridges, divides, and foot slopes. The elevation ranges from 1,200 feet to 2,700 feet above sea level. Slope ranges from 1 to 8 percent. The majority of the site is used for rangeland. Runoff is medium to very high.

**Table 2. Representative physiographic features**

Landforms	(1) Plateau > Stream terrace (2) Plateau > Ridge (3) Plateau > Plain
Runoff class	Medium to very high
Flooding frequency	None
Ponding frequency	None
Elevation	366–823 m
Slope	1–8%
Aspect	Aspect is not a significant factor

## Climatic features

The climate in the MLRA 81B is subtropical subhumid on the eastern portion and subtropical steppe on the western portion of the MLRA. Winters are dry, and the summers are hot and humid. The precipitation increases from west to east and the temperatures increase from north to south. The area usually receives 65 to 70 percent sunshine each year. The majority of the rainfall occurs during the warm months of April to October. Most precipitation comes from thunderstorms that vary in the amount of water received and the areas covered. Spring is characterized by fluctuating patterns, but mild temperatures prevail. July and August are relatively dry and hot with little weather variability day-to-day. As summer progresses through fall, an increase of precipitation usually occurs in the eastern portions while a decrease of precipitation occurs to the west. Winter temperatures are mild, but polar Canadian air masses bring rapid drops in temperature. These cold spells last 2 or 3 days. Prevailing winds are southerly with March and April the windiest months.

**Table 3. Representative climatic features**

Frost-free period (characteristic range)	210-240 days
Freeze-free period (characteristic range)	240-280 days
Precipitation total (characteristic range)	483-610 mm
Frost-free period (actual range)	210-240 days
Freeze-free period (actual range)	240-280 days
Precipitation total (actual range)	483-635 mm
Frost-free period (average)	225 days
Freeze-free period (average)	260 days
Precipitation total (average)	559 mm

## Climate stations used

- (1) OZONA [USC00416734], Ozona, TX
- (2) CARTA VALLEY [USC00411492], Rocksprings, TX
- (3) ELDORADO [USC00412809], Eldorado, TX
- (4) SONORA [USC00418449], Sonora, TX
- (5) BIG LAKE 2 [USC00410779], Big Lake, TX

## Influencing water features

There are no wetlands on this site.

## Wetland description

N/A

## Soil features

The soils are well drained and permeability is moderate. The parent material is loamy alluvium, derived from limestone and/or sandstone. The surface layer is dark grayish-brown, calcareous loam about 6 to 9 inches thick. Depth to the petrocalcic horizon is generally less than 10 inches. Cemented caliche fragments occur throughout the soil profile. Gravel and/or cobble occupy up 40 percent on the surface and as much as 50 percent in the subsoil. The available water capacity is low the soil profile can contain as much as 70 percent calcium carbonate. Soil series correlated to this site include: Cho and Mailtrail.

**Table 4. Representative soil features**

Parent material	(1) Alluvium–limestone and sandstone
Surface texture	(1) Gravelly loam (2) Very gravelly clay loam
Family particle size	(1) Loamy (2) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	10–25 cm
Soil depth	10–25 cm
Surface fragment cover <=3"	20–40%
Surface fragment cover >3"	0–5%

Available water capacity (0-25.4cm)	1.52–2.79 cm
Calcium carbonate equivalent (0-25.4cm)	40–85%
Electrical conductivity (0-25.4cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-25.4cm)	0–1
Soil reaction (1:1 water) (0-25.4cm)	7.4–8.4
Subsurface fragment volume <=3" (10.2-25.4cm)	15–30%
Subsurface fragment volume >3" (10.2-25.4cm)	0–5%

## Ecological dynamics

The Very Shallow Ecological Site is a midgrass dominated prairie with widely scattered trees and understory shrubs. Historically, the site evolved under the influences of grazing and browsing by endemic pronghorn antelope, deer, and migratory bison, severe droughts, and frequent fires. Fires are estimated to have occurred at 7 to 12 year-intervals maintaining brushy and woody species at about five percent canopy. The frequent fires and droughts were postulated to be the major influences on developing the plant communities.

Midgrasses such as sideoats grama (*Bouteloua curtipendula*) and little bluestem (*Schizachyrium scoparium*) are the co-dominants, with sideoats grama becoming more prominent to the west. Other midgrasses, including several feathery bluestems (*Bothriochloa* spp.) and green sprangletop (*Leptochloa dubia*), make significant contributions to production. Blue grama (*Bouteloua gracilis*), black grama (*Bouteloua eriopoda*), buffalograss (*Bouteloua dactyloides*), and curlmesquite (*Hilaria belangeri*) are characteristic shortgrasses. Frequent fires favor grasses over woody plants and forbs, but a wide variety of both are present. Trees, primarily live oak (*Quercus virginiana*), occupied deeper soil pockets underlain by marl on areas protected from fires, covering less than two percent of the ground area. Shrubs occupy two to four percent canopy.

The Midgrass Prairie Community (1.1) was relatively stable and resilient within the climate, soil, grazing, and fire regime until settlement and the advent of fencing and animal husbandry in the late 1800's. Not understanding the limits of rangeland productivity, European settlers overstocked livestock almost universally. As overgrazing by livestock and wildlife occurred, there was a reduction of palatable plants, a decline in plant cover, mulch, soil organic matter, and a reduction in intensity and frequency of fires. The shift in plant cover and decline in soil properties favored woody plant encroachment. The woody and herbaceous increasers were generally endemic species released from the effects of fire or from competition. The resultant plant community was a Mid/Shortgrass Savannah Community (1.2). In this phase, the more palatable midgrasses transition to less palatable, or more grazing resistant, shortgrasses and midgrasses like feathery bluestems and plains lovegrass (*Eragrostis intermedia*). The grassland component still dominated primary production, but the proportion of encroaching woody species, mainly shrubs, was increasing.

When the Mid/Shortgrass Savannah Community (1.2) was continually overgrazed and fire is excluded, the process of regression proceeded toward woody plant dominance and replacement of the midgrasses with more grazing resistant shortgrasses and less palatable forbs. As grass 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 (*Prosopis glandulosa*) and Ashe juniper (*Juniperus ashei*). Redberry juniper (*Juniperus pinchotii*) often invades from the west and north. Rest from grazing will generally not restore the grassland community when the woody plant community exceeds 15 percent canopy and/or the woody invaders become dense and large enough to resist fire (about three feet in height). When this plant composition and structure is reached, not enough fine fuel exists for fires to effectively control woody species and forbs. When this threshold is crossed, the site changes into the Mixed Brush/Shortgrass Community (2.1). This transition also marks the beginning of the Shrubland state. The transition is not reversible without considerable input of energy and expense in the form of brush control.

With overgrazing being persistent, mesquite, juniper and other shrubs continue to increase forming thickets in the Mixed Brush/Shortgrass Community (2.1). Buffalograss, curlymesquite, three-awns (*Aristida* spp.), and broomweed (*Gutierrezia* spp.) are the typical shortgrass vegetation. With continued overgrazing, the more palatable grasses will be replaced by less palatable shortgrasses and forbs. Cool-season grasses such as Texas wintergrass (*Nassella leucotricha*) and annual bromes (*Bromus* spp.) also increase.

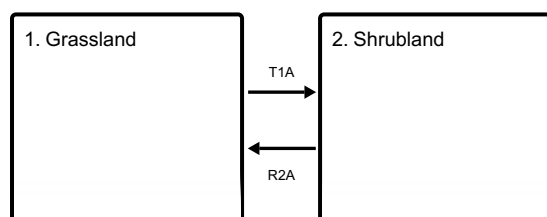
In the Mixed-Brush/Shortgrass Community (2.1), the process of retrogression can be reversed with moderately intensive brush control and good grazing management that allows the application of prescribed burning. If these conservation practices are not applied, the woody canopy will continue to increase in dominance and ground cover, even without livestock grazing or deer browsing. Once brush cover exceeds 25 to 30 percent, understory herbage production is very limited and generally composed of unpalatable shrubs, grasses, and forbs in the woody interspaces. The resultant woody plant dominated community is the Mixed-Brush/Shrubland Community (2.2). Mesquite and/or juniper dominate the overstory, although occasionally oaks are present. Brushy species such as agarito (*Mahonia trifoliata*), prickly pear (*Opuntia* spp.), and javelinabush (*Condalia ericoides*) often form thickets. The remaining shortgrasses, cool-season grasses, and forbs are in weakened condition. Primary production is from lower successional trees, shrubs, forbs, and grasses.

The microclimate becomes drier as interception losses increase with brush canopy cover and more runoff occurs during rainfall. Litter amounts are greatly reduced exposing bare soil. The exposed soil crusts readily, creating opportunities for rill erosion to occur. Considerable litter and soil movement occur during heavy rainfall events. Until maximum ground cover by woody species is approached, desertification and erosion continue in the interspaces. Once shrub canopy cover is maximized, however, the hydrologic processes, energy flow, and nutrient cycling stabilize under the woodland/shrubland environment. This process may take many years to become stable.

Major expense and energy are required to restore the Mixed-Brush/Shrubland Community (2.2) back to the productive grassland community. Generally, expensive mechanical or herbicidal treatments (IPT) range planting, grazing deferment, and prescribed burning are required for restoration. Erosion and fertility losses during the retrogression process may preclude the plant community's ability to be restored. Very little of the Very Shallow site has been plowed because the lack of soil depth is not well suited for cultivation. The site is highly erodible when exposed by overgrazing, cultivation, or crop production. There are, however, some areas of the site planted to pasture grasses, small grains, or wildlife food plots. Many of these are inclusions with adjacent Shallow or Clay Loam sites. Generally, most fields in the Very Shallow Site previously cultivated for crops have been returned to native grasses and managed as rangeland.

## State and transition model

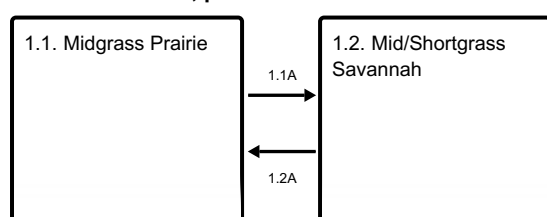
### Ecosystem states



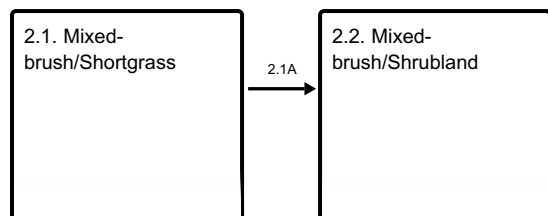
**T1A** - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

**R2A** - Reintroduction of historic disturbance return intervals

### State 1 submodel, plant communities



## State 2 submodel, plant communities



## State 1 Grassland

### Dominant plant species

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

## Community 1.1 Midgrass Prairie

The reference plant community is a fire-maintained prairie of midgrasses. Woody plants, mostly shrubs provided little canopy cover. Live oak, netleaf hackberry (*Celtis laevigata* var. *reticulata*), and other small trees are widely scattered in protected areas and along draws. Catclaw acacia (*Acacia greggii*), sumacs (*Rhus* spp.), Texas kidneywood (*Eysenhardtia texana*), elbowbush (*Forestiera pubescens*), ephedra (*Ephedra* spp.), and javelinabush are typical shrubs. Little bluestem occupies favorable micro-sites and is locally abundant. Sideoats grama is the dominant grass throughout. Also occurring in smaller amounts, are meadow dropseed (*Sporobolus compositus* var. *asper*), feathery bluestems (*Bothriochloa* spp.), Arizona cottontop (*Digitaria californica*), Canada wildrye (*Elymus canadensis*), Texas wintergrass (*Nassella leucotricha*), vine mesquite (*Panicum obtusum*), and a number of shortgrasses. Shortgrasses include blue grama, black grama, curly mesquite, buffalograss, tridens (*Tridens* spp.), and bristlegrass (*Setaria* spp.). Characteristic forbs are dotted gayfeather (*Liatris punctata*), trailing ratany (*Krameria lanceolata*), awnless bushsunflower (*Simsia calva*), Engelmann's daisy (*Engelmannia peristenia*), wooly-white (*Hymenopappus* spp.), half-shrub sundrop (*Calylophus serrulatus*), catclaw sensitivebriar (*Mimosa aculeaticarpa* var. *biuncifera*), and bundleflower (*Desmanthus* spp.). Texas redbud (*Cercis canadensis* var. *texensis*) and mesquite (*Prosopis glandulosa*) are widely scattered tree species. Productivity of the site is limited by the very shallow soils with restrictive layers of caliche and limestone, coarse surface fragments, and very low water availability. In reference condition, annual production ranges from 500 to 2,000 pounds per acre annually, depending upon the particular soil series and amount of precipitation. Production declines from east to west in response to average annual precipitation. Grasses make up to 90 to 95 percent of the total herbage. The grass cover and accumulated mulch aide in the infiltration of rainfall into the slowly permeable soil and reduces runoff. The Midgrass Prairie Plant Community (1.1) furnishes good habitat for grazing livestock and wildlife. But, with overgrazing, decreases in fires, and no brush management, this plant community will transition very quickly to the Mid/Shortgrass Savannah Community (1.2).

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	504	1513	2018
Shrub/Vine	22	67	90
Forb	22	67	90
Tree	11	34	45
<b>Total</b>	<b>559</b>	<b>1681</b>	<b>2243</b>

Figure 9. Plant community growth curve (percent production by month). TX3614, Midgrass & Shortgrass Savannah Community. Warm-season rangeland with peaks in production from April, May and June and in September and October..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	3	5	13	23	15	4	5	15	7	5	3

## Community 1.2

### Mid/Shortgrass Savannah

The Mid/Shortgrass Savannah Community is a grassland being invaded by indigenous or woody species that had been held at low densities by repeated fires or competition from a vigorous grass component. Numerous brushy species, plus juniper and mesquite, are increasing in density because overgrazing by livestock has reduced grass cover, increased soil exposure, and reduced fine fuel for fire. In this phase, the increasing woody species are generally less than three feet tall and still subject to control by fire and improved grazing management. The woody canopy varies between 10 and 15 percent depending on severity of grazing, time since last burned, and availability of invading species. Besides juniper and mesquite, other brushy species include sumacs (*Sumac* spp.), agarito, javelinabush, condalia, elbowbush, and feather dalea (*Dalea* spp.). The prairie is converting into a savannah by encroaching woody species. The more grazing-resistant grasses are replacing the preferred grasses. Grasses still occurring are sideoats grama, tall dropseed (*Sporobolus compositus* var. *drummondii*), meadow dropseed, vine mesquite, plains lovegrass, Texas wintergrass, and Canada wildrye (*Elymus canadensis*). All but the least grazing resistant climax perennial forbs persist. Annual primary production ranges from 500 to 2,000 pounds per acre depending on precipitation and the soil series. Forage production is still predominantly grass. There could be some mulch and litter movement during rainfall events but due to gentle slopes little soil movement would take place during this vegetation phase. The changes in composition are small initially, but unless proper grazing and prescribed burning are initiated at this stage, the woody species would continue to increase in stature and density. When the canopy of the woody plants becomes dense enough (15 to 20 percent) and tall enough (more than three feet) to suppress grass growth and resist fire damage, a threshold in ecological regression is reached. The Mid/Shortgrass Savannah Community (1.2) becomes the Mixed-Brush/Shortgrass Plant Community (2.1).

### Pathway 1.1A

#### Community 1.1 to 1.2

Overgrazing, lack of fire, and allowing woody species to proliferate will shift the reference community into a Mid/Shortgrass Savannah Community (1.2).

### Pathway 1.2A

#### Community 1.2 to 1.1

Prescribed grazing, return of fire, and brush management can return the Mid/Shortgrass Savannah Community (1.2) to reference conditions.

## State 2

### Shrubland

#### Dominant plant species

- mesquite (*Prosopis*), shrub
- Pinchot's juniper (*Juniperus pinchotii*), shrub

## Community 2.1

### Mixed-brush/Shortgrass

The Mixed Brush/Shortgrass Community (2.1) is shrub invaded grassland with a 15 to 25 percent woody plant canopy of mixed-brush, mainly mesquite and juniper. It is the result of selective overgrazing and browsing resulting in a differential response of plants to defoliation. With continued overgrazing, the diversity of the grassland species declines, while woody species and unpalatable forbs increase. All but the most palatable woody species increase in density and size. Mesquite is an early increaser throughout the MLRA, while redberry juniper (*Juniperus pinchotii*) is found in the western section. Many of the reference shrubs are present and javelinabush, agarito, pricklypear, prickly ash (*Zanthoxylum* spp.), condalia (*Condalia* spp.), and sumac often form thickets. Remnants of reference

grasses, forbs, and unpalatable invaders occupy the interspaces between trees and shrubs. Cool-season grasses such as Texas wintergrass, plus other grazing-resistant species, can be found under and around woody plants where they find protection from grazing. Because of pressure and competition for nutrients and water, the grassland component shows a lack of vigor and productivity. Characteristic herbaceous species are three-awns (*Aristida* spp.), hairy tridens (*Erioneuron pilosum*), hairy grama (*Bouteloua hirsuta*), sedges (*Carex* spp.), Queen's delight (*Stillingia sylvatica*), prairie coneflower (*Ratibida columnifera*), Texas grama (*Bouteloua rigidiseta* var. *rigidiseta*), and red grama (*Bouteloua trifida*). Buffalograss (*Buchloe dactyloides*), curlymesquite (*Hilaria belangeri*), and tobosa (*Phleuraphis muticus*) are persistent increasers until shrub density reaches the maximum. As the grassland vegetation declines, more soil is exposed to crusting and erosion. During this phase, sheet and rill erosion can be high. Higher interception losses by the increasing woody canopy combined with evaporation and runoff can reduce the effectiveness of rainfall. Primary plant production has decreased due to the decline in soil structure and organic matter. Annual primary production is approximately 400 to 1,500 pounds per acre and is balanced between woody and herbaceous species. Browsing animals, such as goats and deer, find fair food value if browsing has not been excessive, but forage quality for cattle is low. Good grazing management alone cannot reverse the succession towards dense shrubland. Unless brush management practices are applied at this stage, the transition will continue. The trend can be reversed with intensive brush management such as individual plant treatments combined with prescribed grazing and burning.

## **Community 2.2**

### **Mixed-brush/Shrubland**

Juniper and/or mesquite dominate the Mixed-Brush/Shrubland Community (2.2). Common shrubs are pricklypear, agarita, sumacs, condalia, yucca, elbowbush, prickly ash (*Zanthoxylum* spp.), croton (*Croton* spp.) and tasajillo (*Opuntia leptocaulis*). The brushy shrubs can approach 50 percent ground cover with heavy abusive grazing. Shortgrasses and low-quality annual and perennial forbs occupy the woody interspaces. Characteristic grasses are Texas wintergrass, sedges (*Carex* spp.), hooded windmillgrass (*Chloris cucullata*), Hall's panicum (*Panicum hallii* var. *hallii*), rough tridens (*Tridens muticus* var. *muticus*), slim tridens (*Tridens muticus*), and fall witchgrass (*Digitaria cognata*). Characteristic forbs include dotted gayfeather (*Liatris punctata* var. *punctata*), orange zexmania (*Wedelia hispida*), croton (*Croton* spp.), Western ragweed (*Ambrosia psilostachya*), prairie coneflower (*Ratibida columnifera*), and broomweed (*Gutierrezia* spp.). The shrub canopy acts to intercept rainfall and increase evapotranspiration losses, creating a more xeric microclimate. Soil organic matter and mulch are reduced, exposing more soil surface. The exposed soil crusts readily and becomes susceptible to wind and water erosion. Rill erosion, terracettes, and pedestaling are common under extreme conditions. Unless brush control and proper stocking are applied, the brush community will continue to thicken until it stabilizes with the climate and soil. Good cover for wildlife can still be found, but only limited preferred forage and browse are available for livestock or wildlife. Alternatives for restoration include brush control and range planting to return vegetation back to the desired plant community and then prescribed grazing and prescribed burning to maintain the desired plant community. Without major management inputs, this state cannot be reversed.

## **Pathway 2.1A**

### **Community 2.1 to 2.2**

Continued heavy grazing, lack of fire, and absence of brush management will transition the site into a Mixed-brush/Shrubland Community.

## **Transition T1A**

### **State 1 to 2**

Heavy abusive grazing, absence of fire, and lack of brush management transition this site to a Shrubland State (2).

## **Restoration pathway R2A**

### **State 2 to 1**

Prescribed grazing, prescribed burning, brush management, and possibly range planting are required to restore the Shrubland State (2) back to the reference state. Depending on previous land history, erosion and soil fertility may be so low that a full restoration is unattainable.



## Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Tallgrass</b>			28–112	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	28–112	–
2	<b>Midgrasses</b>			168–673	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	168–673	–
	beardgrass	BOTHR	<i>Bothriochloa</i>	168–673	–
3	<b>Midgrasses</b>			84–336	
	green sprangletop	LEDU	<i>Leptochloa dubia</i>	84–336	–
	vine mesquite	PAOB	<i>Panicum obtusum</i>	84–336	–
	plains bristlegrass	SEVU2	<i>Setaria vulpiseta</i>	84–336	–
4	<b>Shortgrasses</b>			56–224	
	black grama	BOER4	<i>Bouteloua eriopoda</i>	56–224	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	56–224	–
5	<b>Midgrasses</b>			56–224	
	plains lovegrass	ERIN	<i>Eragrostis intermedia</i>	56–224	–
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	56–224	–
	composite dropseed	SPCOC2	<i>Sporobolus compositus</i> var. <i>compositus</i>	56–224	–
	Drummond's dropseed	SPCOD3	<i>Sporobolus compositus</i> var. <i>drummondii</i>	56–224	–
	white tridens	TRAL2	<i>Tridens albescens</i>	56–224	–
6	<b>Shortgrasses</b>			56–224	
	buffalograss	BODA2	<i>Bouteloua dactyloides</i>	56–224	–
	curly-mesquite	HIBE	<i>Hilaria belangeri</i>	56–224	–
7	<b>Shortgrasses</b>			28–112	
	threeawn	ARIST	<i>Aristida</i>	28–112	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	28–112	–
	fall witchgrass	DICO6	<i>Digitaria cognata</i>	28–112	–
	tobosagrass	PLMU3	<i>Pleuraphis mutica</i>	28–112	–
	Reverchon's bristlegrass	SERE3	<i>Setaria reverchonii</i>	28–112	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	28–112	–
	slim tridens	TRMU	<i>Tridens muticus</i>	28–112	–
	slim tridens	TRMUE	<i>Tridens muticus</i> var. <i>elongatus</i>	28–112	–
8	<b>Cool-season grasses</b>			28–112	
	cedar sedge	CAPL3	<i>Carex planostachys</i>	28–112	–
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	28–112	–
	Texas wintergrass	NALE3	<i>Nassella leucotricha</i>	28–112	–
<b>Forb</b>					
9	<b>Forbs</b>			22–90	
	Indian mallow	ABUTI	<i>Abutilon</i>	22–90	–

	white sagebrush	ARLUM2	<i>Artemisia ludoviciana ssp. mexicana</i>	22–90	–
	aster	ASTER	<i>Aster</i>	22–90	–
	milkvetch	ASTRA	<i>Astragalus</i>	22–90	–
	Drummond's clematis	CLDR	<i>Clematis drummondii</i>	22–90	–
	croton	CROTO	<i>Croton</i>	22–90	–
	prairie clover	DALEA	<i>Dalea</i>	22–90	–
	purple prairie clover	DAPU5	<i>Dalea purpurea</i>	22–90	–
	bundleflower	DESMA	<i>Desmanthus</i>	22–90	–
	Engelmann's daisy	ENPE4	<i>Engelmannia peristenia</i>	22–90	–
	beeblossom	GAURA	<i>Gaura</i>	22–90	–
	hoary false goldenaster	HECA8	<i>Heterotheca canescens</i>	22–90	–
	trailing krameria	KRLA	<i>Krameria lanceolata</i>	22–90	–
	dotted blazing star	LIPU	<i>Liatris punctata</i>	22–90	–
	menodora	MENOD	<i>Menodora</i>	22–90	–
	Nuttall's sensitive-briar	MINU6	<i>Mimosa nuttallii</i>	22–90	–
	Texas sacahuista	NOTE	<i>Nolina texana</i>	22–90	–
	Texas sage	SATE3	<i>Salvia texana</i>	22–90	–
	awnless bushsunflower	SICA7	<i>Simsia calva</i>	22–90	–
	globemallow	SPHAE	<i>Sphaeralcea</i>	22–90	–
	queen's-delight	STSY	<i>Stillingia sylvatica</i>	22–90	–
	creepingoxeye	WEDEL	<i>Wedelia</i>	22–90	–

#### Shrub/Vine

10	<b>Shrubs/Vines</b>			22–90	
	acacia	ACACI	<i>Acacia</i>	22–90	–
	catclaw acacia	ACGR	<i>Acacia greggii</i>	22–90	–
	snakewood	CONDA	<i>Condalia</i>	22–90	–
	featherplume	DAFO	<i>Dalea formosa</i>	22–90	–
	jointfir	EPHED	<i>Ephedra</i>	22–90	–
	Texas kidneywood	EYTE	<i>Eysenhardtia texana</i>	22–90	–
	stretchberry	FOPU2	<i>Forestiera pubescens</i>	22–90	–
	snakeweed	GUTIE	<i>Gutierrezia</i>	22–90	–
	desert-thorn	LYCIU	<i>Lycium</i>	22–90	–
	algerita	MATR3	<i>Mahonia trifoliolata</i>	22–90	–
	pricklypear	OPUNT	<i>Opuntia</i>	22–90	–
	fragrant sumac	RHAR4	<i>Rhus aromatica</i>	22–90	–
	littleleaf sumac	RHMI3	<i>Rhus microphylla</i>	22–90	–
	evergreen sumac	RHVIV	<i>Rhus virens var. virens</i>	22–90	–
	yucca	YUCCA	<i>Yucca</i>	22–90	–
	Hercules' club	ZACL	<i>Zanthoxylum clava-herculis</i>	22–90	–

#### Tree

11	<b>Trees</b>			11–45	
	eastern redbud	CECA4	<i>Cercis canadensis</i>	11–45	–

	netleaf hackberry	CELAR	<i>Celtis laevigata var. reticulata</i>	11–45	–
	juniper	JUNIP	<i>Juniperus</i>	11–45	–
	mesquite	PROSO	<i>Prosopis</i>	11–45	–
	oak	QUERC	<i>Quercus</i>	11–45	–

## Animal community

This site is used to produce domestic livestock and to provide habitat for native wildlife. Cow-calf operations are the primary livestock enterprise, although stocker cattle are also grazed. Sheep, Angora goats, and Spanish goats were formerly raised in large numbers. Sheep are still present in reduced numbers, while meat goats are now present in fairly high numbers. Boer goats have been introduced, either purebred or crossed with Spanish goats, to obtain a larger meat animal. Reports indicate that Boers do not browse as heavily as earlier breeds.

Sustainable stocking rates have declined drastically over the past 100 years due to the deterioration of the reference plant community. An assessment of vegetation is needed to determine the site's current carrying capacity. Calculations used to determine livestock stocking rate should be based on forage production remaining after determining use by resident wildlife, then refined by frequent careful observation of the plant community's response to animal foraging.

A large diversity of wildlife is native to this site. In the reference plant community, migrating bison, grazing primarily during wetter periods, pronghorn, white-tailed deer and turkey were the more predominant herbivore species. With the subsequent transformation of the plant community, due primarily to the influence of man and climate change, the kind and proportion of wildlife species have been altered.

Except for a few domestic herds, bison have been eliminated. With the eradication of the screwworm fly, increase in woody vegetation and man-suppressed natural predation, deer numbers have increased and are often in excess of carrying capacity. Where deer numbers are excessive, overbrowsing and overuse of preferred forbs causes deterioration of the plant community. Progressive management of deer populations through hunting can keep populations in balance and provide an economically important ranching enterprise. Achieving a balance between brushy cover and more open plant communities on this and adjacent sites is important to deer management. Competition among deer, sheep, and goats must be a consideration in livestock and wildlife management to prevent damage to the plant community.

Various species of exotic wildlife have been introduced on the site, including deer such as axis, sika, fallow, and red; antelope such as sable, oryx, blackbuck, and nilgai, and sheep such as barbados (mouflon) and aoudad with various degrees of success. Their numbers must be included along with livestock and native wildlife, primarily white-tailed deer, in any management plan. Feral hogs may feed on the site. They can be damaging to the plant community if their numbers are not managed. Smaller mammals include many kinds of rodents, jackrabbit, cottontail, raccoon, ringtail, skunk, and armadillo. Mammalian predators include coyote, red fox, gray fox, bobcat, and mountain lion. Wolves were common in earlier times, bears resided in some areas, and an occasional jaguar or ocelot was encountered. Many species of snakes and lizards are native to the site.

Many species of birds are found on this site including game birds, songbirds, and birds of prey. Major game birds that are economically important are turkey, bobwhite quail, scaled (blue) quail, and mourning dove. Turkeys prefer plant communities with substantial amounts of shrubs and trees interspersed with grassland. Quail prefer a combination of low shrubs, bunch grass (critical for nesting cover), bare ground, and low successional forbs. The different species of songbirds vary in their habitat preferences. Habitat on this site that provides a large diversity of grasses, forbs, and shrubs will support a good variety and abundance of songbirds. Birds of prey are important to keep the numbers of rodents, rabbits, and snakes in balance. Different species of raptors benefit from a diverse plant community as well.

## Hydrological functions

The site is a well-drained, very shallow upland with nearly level to gentle slopes. Most soils are six to nine inches deep with pockets of deeper soils included. The shallowness to a hard limestone or caliche layer limits water holding capacity. Runoff is slow due to gentle slopes if there is a good vegetative cover. Exposed soil crusts readily which allows the soil to become more susceptible to runoff and erosion. Under reference conditions, grassland

vegetation intercepts and utilizes much of the incoming rainfall. Only during extended rains or heavy thunderstorms does runoff occur. Litter and soil movement is slight.

Standing plant cover, duff and organic matter decrease and surface runoff increases as the Midgrass Prairie Community (1.1) transitions to the Mid/Shortgrass Savannah Community (1.2). These processes continue as the site transitions to the Mixed-Brush/Shortgrass Community (2.1), and finally the Mixed-Brush/Shrubland Community (2.2). As canopy surpasses 30 to 40 percent, the hydrological and ecological processes, nutrient cycling, and energy flow stabilize within the woody plant canopy. 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. Decreased mulch and more bare ground allow erosion from soils in openings between trees until a mature shrubland state is reached.

## **Recreational uses**

The Very Shallow site occurs in association with Limestone Hill and Clay Loam sites. Together these sites are well suited for many outdoor recreational uses including recreational hunting, hiking, camping, equestrian, and bird watching. The area provides diverse scenic beauty and many opportunities for recreation and hunting.

## **Wood products**

Posts and specialty wood products are made from juniper, mesquite, oak, and many shrubs. Mesquite, juniper, and oak are used for posts and firewood.

## **Other products**

Jams and jellies are made from many fruit-bearing species. Seeds are harvested from many plants for commercial sale. Grasses and forbs may be harvested by the dried-plant industry for sale in dried flower arrangements. Honeybees are utilized to harvest honey from the many flowering plants.

## **Inventory data references**

Eight records were used from Sterling and Taylor Counties. Information presented here has been derived from the revised Very Shallow Range Site, literature, limited NRCS clipping data (417s), field observations, and personal contacts with range-trained personnel. Photos by J. L. Schuster.

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## 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)	
Contact for lead author	
Date	05/18/2024
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

### 1. Number and extent of rills:

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### 2. Presence of water flow patterns:

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3. **Number and height of erosional pedestals or terracettes:**

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

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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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):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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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:

Sub-dominant:

Other:

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth ( in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**

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17. **Perennial plant reproductive capability:**

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