USDA Natural Resources Conservation Service

Ecological site R080BY163TX
Steep Rocky 26-33" PZ

Last updated: 9/19/2023
Accessed: 05/04/2024

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.

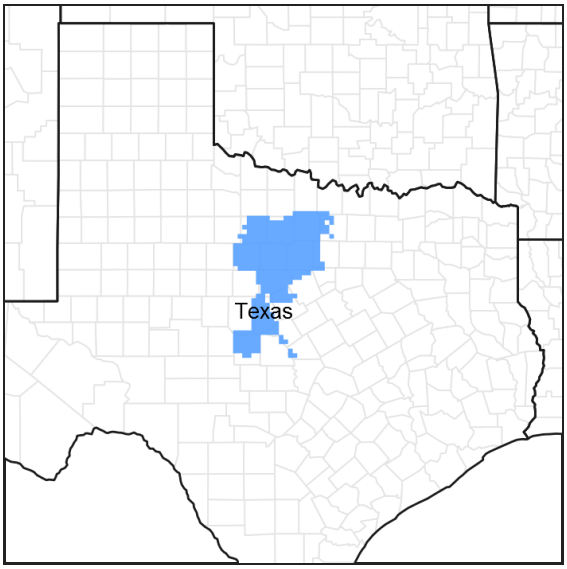


Figure 1. Mapped extent

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): 080B–Texas North-Central Prairies

MLRA 80B consists of gently rolling, dissected plains with very steep hillsides and sideslopes and narrow flood plains associated with small streams. Loamy and clayey soils range from very shallow to deep and developed in sandstones, shales, and limestones of Pennsylvanian age.

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 rocky soils on steep slopes. The reference vegetation consists of native perennial tallgrasses mixed with forbs and scattered trees. Without periodic fire or other brush management, woody species may increase on the site.

Associated sites

R080BY154TX	**Low Stony Hill 26-33" PZ** Low Stony Hill occurs adjacent to and generally downslope of the Steep Rocky site.

Similar sites

R080BY154TX	**Low Stony Hill 26-33" PZ** Low Stony Hill has similar species but higher production because soils are usually not as shallow and slopes are not as steep.

Table 1. Dominant plant species

Tree	(1) *Quercus fusiformis* (2) *Juniperus ashei*
Shrub	Not specified
Herbaceous	(1) *Schizachyrium scoparium* (2) *Andropogon gerardii*

Physiographic features

This site occurs on linear to convex side slopes and nose slopes of scarp slopes and on structural benches in the Texas North-Central Prairies. This site is characteristically a water distributing site. Slopes typically range from 20 to 30 percent.

Table 2. Representative physiographic features

Landforms	(1) Hills > Scarp slope (2) Hills > Ridge (3) Hills > Structural bench
Runoff class	High to very high
Elevation	229–732 m
Slope	20–30%
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Elevation	Not specified
Slope	5–40%

Climatic features

The climate is subtropical subhumid and is characterized by hot humid summers and relatively mild winters. Tropical maritime air controls the climate during spring, summer and fall. In winter and early spring, frequent surges of polar Canadian air cause sudden drops in temperatures and add considerable variety to the daily weather. The average first frost generally occurs about November 5 and the last freeze of the season usually occurs about March 19. The average frost free period ranges from 215 days in the northern counties, to 240 days in the south.

The average relative humidity in mid-afternoon is about 60 percent in the summer months. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 75 percent of the time possible during the summer and 50 percent in winter. The prevailing wind direction is from the southwest and highest windspeeds occur during the spring months.

Approximately 75% of annual rainfall occurs between April 1 and October 31. Rainfall during the months of April through September typically occurs during thunderstorms which tend to be intense and brief, resulting in large amounts of rain in a short time. The wettest months of the year are May, June, September, and October. The driest

months during the growing season are July and August. The winter months of November, December, January, and February are the driest months overall.

Average annual precipitation for the entire MLRA is approximately 28 inches. There is a noticeable difference in the average annual precipitation in the northern counties in comparison to the southern and western counties of this Major Land Resource Area. Jack, Clay, Young, and Palo Pinto Counties all have an average annual precipitation of more than 31 inches. Stephens, Eastland, McCulloch, and San Saba Counties all have an average annual precipitation of less than 28 inches.

Winters tend to be mild, with occasional periods of very cold temperatures which can be accompanied by strong northerly winds and freezing precipitation. Snow is infrequent and significant accumulations are rare. These periods of very cold weather are generally short-lived. Summers tend to be hot and dry. Drought conditions are common during most summers. Air temperatures of more than 95oF are common from mid-June through September. In the northern counties nearest to the Red River, temperatures are generally slightly cooler during winter months and slightly warmer during summer months than in the other counties in the North Central Prairie.

Table 4. Representative climatic features

Frost-free period (characteristic range)	184-200 days
Freeze-free period (characteristic range)	211-225 days
Precipitation total (characteristic range)	762-813 mm
Frost-free period (actual range)	183-204 days
Freeze-free period (actual range)	210-226 days
Precipitation total (actual range)	737-838 mm
Frost-free period (average)	193 days
Freeze-free period (average)	217 days
Precipitation total (average)	787 mm

Climate stations used

- (1) SAN SABA 7NW [USC00417994], Richland Springs, TX
- (2) BROWNWOOD 2ENE [USC00411138], Early, TX
- (3) EASTLAND [USC00412715], Eastland, TX
- (4) MINERAL WELLS AP [USW00093985], Millsap, TX
- (5) BRECKENRIDGE [USC00411042], Breckenridge, TX
- (6) GRAHAM [USC00413668], Graham, TX
- (7) JACKSBORO [USC00414517], Jacksboro, TX

Influencing water features

These site will shed some water via runoff to areas downslope. However, the presence of good ground cover and deep rooted grasses can help facilitate water infiltration into the soil. These sites are not associated with wetlands.

Wetland description

NA

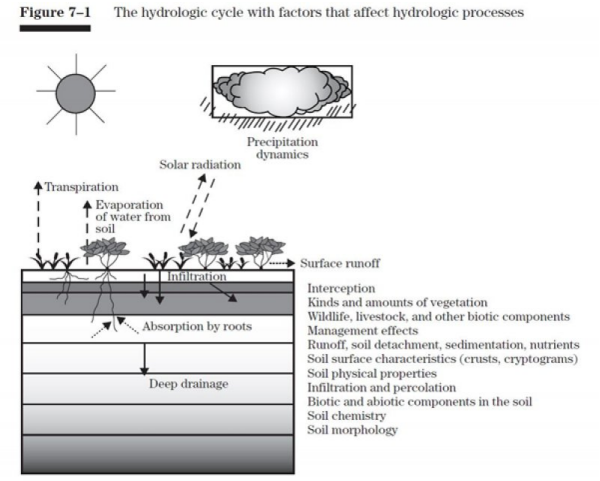


Figure 8.

Soil features

Representative soil components for this ecological site include: Palopinto, Set

The site is characterized by steep, extremely stony, well drained soils.

Table 5. Representative soil features

Parent material	(1) Residuum–limestone (2) Residuum–claystone
Surface texture	(1) Stony clay loam (2) Very stony clay (3) Very stony clay loam (4) Stony clay
Drainage class	Well drained
Permeability class	Very slow to moderately slow
Soil depth	15–152 cm
Surface fragment cover <=3"	0–2%
Surface fragment cover >3"	10–80%
Available water capacity (0-101.6cm)	2.54–17.78 cm
Calcium carbonate equivalent (0-101.6cm)	0–65%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–5%
Subsurface fragment volume >3" (Depth not specified)	0–80%

Ecological dynamics

The reference plant community for the Steep Rocky ecological site is a bluestem/oak/juniper savanna with a variety of forbs and a significant presence of trees and shrubs. Oaks, elms, hackberry, junipers, and several other tree and

shrub species are distributed throughout the site to create a diverse mosaic of grasses, forbs, shrubs, and trees. Evidence of the historic vegetation can be found in the journals and records of explorers, military expeditions, and boundary survey teams.

Climate is a major factor influencing vegetation on the site. Long-term droughts lasting multiple years or growing seasons are infrequent, but when they do occur, they can have a negative impact on the vegetation. Because of the shallow and stony characteristics of the soil, this site often shows signs of drought earlier than adjacent sites with deeper soils. Those same characteristics enable this site to respond quickly when rainfall does occur. The effects of erratic seasonal moisture and short-term dry spells lasting a few months are not as severe as those caused by long-term droughts. However, the lower the ecological status of the site, the greater the negative impact will be during drought periods regardless of duration.

Abusive grazing during or immediately following the drought period can have disastrous consequences. The extended drought of the 1950's was especially devastating to the Steep Rocky site. Herbaceous production on this and other sites was significantly reduced for five to seven consecutive years, but livestock numbers were not reduced accordingly. The result was severe overgrazing that caused long-term, and often permanent, adverse changes to the plant community on this site. Grazing and browsing by goats was especially damaging to this site. Many of these areas have not recovered, and may never recover, from the impacts of that drought.

Fire was an important part of the ecosystem. Most ecosystems in the North Central Prairie developed in a 4 to 6 year regime of recurring fires. This site, like other steep, shallow sites probably had a longer recurring fire cycle of 7 to 12 years according to some historians. Many of these fires resulted from lightning strikes during thunderstorms. Native Americans frequently set fires to manipulate the movement of bison and other animals as well as using fire as a defensive or offensive technique when dealing with their enemies. These historic fires were usually severe because of the amount and volatility of fuel available to carry the fire. The intensity of fires kept shrubs and sapling trees suppressed and allowed grasses and forbs to flourish along with the established trees and naturally occurring dense mottes of shrubs. Tallgrass species are fire tolerant and are enhanced by periodic burning. Forbs usually increase for a year or two following these fires before the grasses become dominant again. These periodic fires perpetuated the diverse mosaic pattern of vegetation on the site.

Lack of fire allows herbaceous vegetation to become senescent and may eventually lead to the loss of the most desirable species. Seedlings of non-native brush species and invasive weeds may encroach on the site from adjacent sites, as well as allowing native shrubs and trees to increase in density and canopy cover.

Prior to settlement, this site was subject to periodic grazing and browsing by vast herds of bison, wild cattle, wild horses, and deer. Because of the steep, rugged terrain, the Steep Rocky site was probably not grazed as frequently or as severely as other sites in the vicinity. However, at times the site was grazed heavily along with adjacent sites. These grazing and browsing episodes were intense and severe, but periods of heavy use were followed by long periods of non-use as the herds migrated to fresh grazing areas before returning to previously grazed areas. The grazed areas had an opportunity to rest, regrow, regain vigor, and reproduce prior to the next grazing event. Intervals between grazing periods were frequently influenced by the amount of time that had elapsed since the last fire on the area.

As the region was settled, fire was reduced or eliminated and grasslands were fenced off to control movement and facilitate grazing by domestic livestock. As a result of abusive grazing or lack of grazing and/or the elimination of fire, in association with extreme climatic events, the tallgrass and midgrass plant community has been severely altered on most Steep Rocky sites.

Further deterioration leads to the loss of the perennial warm-season midgrass and forb plant community and an increase in short grasses, annuals, exposed limestone, and bare ground. This provides the opportunity for less desirable woody species, especially juniper, to increase dramatically.

Selective individual removal of unwanted trees and shrubs is relatively easy and more practical when brush plants initially appear on the site. The increase of brush can be fairly rapid and the plants per acre will soon become too numerous for individual control to be feasible. Once woody plants become mature or develop into dense stands, control is expensive, uneconomical, impractical, and difficult to achieve. Brush management is most successful using a systems approach. Initial treatment by hand cutting can be followed by using approved herbicides, and using prescribed fire as a maintenance technique. Prescribed grazing with a reasonable stocking rate and periodic

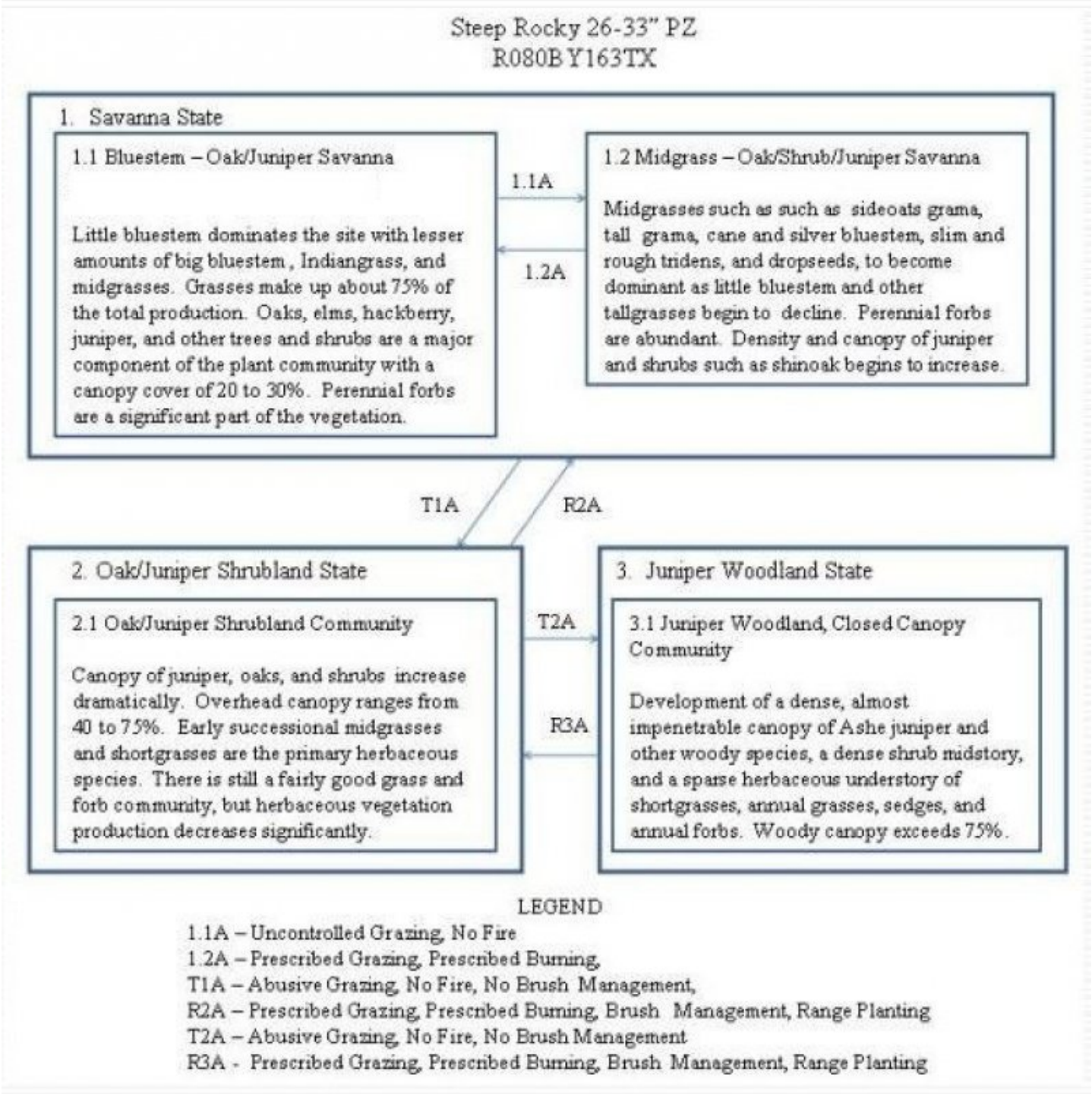
prescribed fire can sustain the species composition and production at a near reference level.

Changes in plant communities and vegetation states on the Steep Rocky site are the result of the combined influences of natural events (rainfall, temperature, droughts, etc.) and the accompanying management systems implemented on the area (prescribed fire, grazing management, and brush management).

Rangeland Health Reference Worksheets have been posted for this site on the Texas NRCS website (www.tx.nrcs.usda.gov) in Section II of the eFOTG under (F) Ecological Site Descriptions.

State and Transitional Pathways:
The State and Transition Diagram which follows provides information on some of the most typical pathways that the vegetation on this site can follow as the result of natural events, management inputs, and application of conservation treatments. There may be other plant communities that can exist on this site under certain conditions. Consultation with local experts and professionals is recommended prior to application of practices or management strategies in order to ensure that specific objectives will be met.

State and transition model



State 1
Savanna State - Reference

The reference plant community for the Steep Rocky ecological site is a Bluestem/Oak/Juniper Savanna Community. In pristine conditions, the site is dominated by little bluestem with lesser amounts of tallgrasses and midgrasses. Trees such as live oak, other oaks, elms, hackberry, and Ashe juniper are native to the site and make up a significant portion of the original plant community. Shrubs and a variety of perennial forbs are also commonly found on the site. Annual production ranges from 1000 to 3000 pounds per acre. The Midgrass/Oak/Juniper/Shrub Savanna Community occurs as little bluestem and other tallgrasses gradually begin to retreat and fade out of the plant community, they are replaced by midgrasses and shortgrasses. Lower successional forbs begin to replace some of the original perennial forbs. Density of shinoak and juniper increases significantly, and the canopy of shrubs and trees increases noticeablyAnnual production ranges from 800 to 2600 pounds per acre.

Dominant plant species

- Texas live oak (*Quercus fusiformis*), tree

- little bluestem (*Schizachyrium scoparium*), grass

Community 1.1
Bluestem/Oak/Juniper Savanna Community

Figure 9. 1.1 Bluestem/Oak/Juniper Savanna Community

The reference plant community for the Steep Rocky ecological site is a bluestem/oak/juniper savanna. In pristine conditions, the site is dominated by little bluestem with lesser amounts of big bluestem, Indiangrass, and midgrasses such as sideoats grama, cane bluestem, tall grama, plains lovegrass, green sprangletop and Texas cupgrass. Trees such as live oak, other oaks, elms, hackberry, and Ashe juniper are native to the site and make up a significant portion of the original plant community. Shrubs such as kidneywood, elbowbush, bumelia, agarito, sumacs, and yucca are also prevalent A variety of perennial forbs such as bushsunflower, Engelmann daisy, orange zexmenia, bundleflowers, and sensitivebriar are also commonly found on the site. Annual production ranges from 1000 to 3000 pounds per acre.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	785	1681	2522
Tree	168	280	392
Forb	112	168	280
Shrub/Vine	56	112	168
Total	**1121**	**2241**	**3362**

Figure 11. Plant community growth curve (percent production by month). TX3041, Bluestem-Oak/Juniper Savanna, <30% canopy. Little bluestem, big bluestem, Indiangrass grassland intermingled with significant population of oaks, elms, hackberry, and juniper. .

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	3	6	14	22	18	5	5	10	7	5	3

Community 1.2
Midgrass/Oak/Shrub/Juniper/Shrub Savanna Community

Figure 12. 1.2 Midgrass - Oak/Shrub/Juniper Savanna Communit

This site is fragile because of steep slopes and shallow soils. It can decline rapidly as the result of uncontrolled grazing, lack of fire, and/or extended drought. As little bluestem and other tallgrasses gradually begin to retreat and fade out of the plant community, they are replaced by midgrasses such as sideoats grama, tall grama, cane and silver bluestem, slim and rough tridens, dropseeds, and threeawns. Lower successional forbs begin to replace some of the original perennial forbs. Density of shinoak and juniper increases significantly, and the canopy of shrubs and trees increases noticeably. There is still a sufficient population of little bluestem and tallgrasses remaining to enable this site to recover to near its reference potential through proper grazing management and prescribed burning. Annual production ranges from 800 to 2600 pounds per acre.

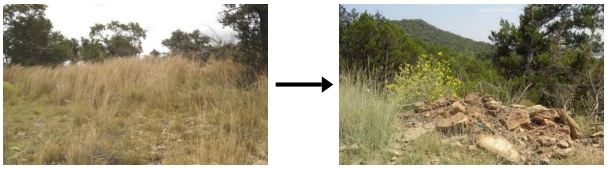
Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	560	1233	1905
Tree	112	280	448
Forb	56	168	280
Shrub/Vine	56	168	280
Total	**784**	**1849**	**2913**

Figure 14. Plant community growth curve (percent production by month). TX3042, Midgrasses/Shrubs/Juniper, 30% Canopy. Midgrass community with significant increase in overstory and midstory canopy, predominantly oak and juniper species..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	2	5	15	20	20	5	5	14	7	3	2

Pathway 1.1A
Community 1.1 to 1.2



Bluestem/Oak/Juniper Savanna Community

Midgrass/Oak/Shrub/Juniper/Shrub Savanna Community

The shift from the Bluestem/Oak/Juniper Savanna Community to the Midgrass/Oak/Juniper/Shrub Savanna Community occurs when there is uncontrolled grazing and no fires to maintain the tall and midgrass functional groups.

Pathway 4.2A
Community 1.2 to 1.1

Midgrass/Oak/Shrub/Juniper/Shrub Savanna Community

Bluestem/Oak/Juniper Savanna Community

With Prescribed Grazing and Prescribed Burning conservation practices, the Midgrass/Oak/Juniper/Shrub Savanna Community can revert back to the Bluestem/Oak/Juniper Savanna Community.

Conservation practices

Prescribed Burning
Prescribed Grazing

State 2
Shrubland State

The Oak/Juniper Shrubland Community is composed of overhead canopy of juniper, oaks, and shrubs increase as grasses and forbs begin to decline. Overhead canopy at this stage ranges from 40 to 75%. Early successional midgrasses, shortgrasses, and annual grasses and forbs become the primary herbaceous species in the open areas. Annual Production ranges from 800 to 2300 pounds per acre.

Dominant plant species

- Texas live oak (*Quercus fusiformis*), tree
- Ashe's juniper (*Juniperus ashei*), tree
- sideoats grama (*Bouteloua curtipendula*), grass

Community 2.1
Oak/Juniper Shrubland Community

Figure 15. 2.1 Oak/Juniper Shrubland Community

Abusive grazing, lack of fire, no brush management, and extended drought conditions lead to a dramatic change in the plant community. The canopy of juniper, oaks, and shrubs increase as grasses and forbs begin to decline. Overhead canopy at this stage ranges from 40 to 75%. Early successional midgrasses, shortgrasses, and annual grasses and forbs become the primary herbaceous species in the open areas. There is still a significant grass and forb community, but herbaceous production decreases significantly. Annual Production ranges from 800 to 2300 pounds per acre.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Tree	336	673	1009
Grass/Grasslike	280	560	785
Shrub/Vine	224	448	673
Forb	56	112	112
Total	**896**	**1793**	**2579**

Figure 17. Plant community growth curve (percent production by month). TX3043, Juniper/Oak Shrubland, Canopy 40-75%. Increasing canopy of juniper, oaks, and other trees and shrubs. Midgrasses dominate the herbaceous plant community..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3	4	6	13	20	17	5	4	12	7	5	4

State 3
Woodland State

The Juniper Woodland Community is created by the development of a closed overhead canopy of juniper and other trees as well as a midstory canopy of shrubs. The understory vegetation consists of a few remnant grasses, forbs, and sedges. A large percentage of the soil surface beneath the woody canopy is covered with a dense mat of juniper needles and leaf litter. Annual production ranges from 600 to 1800 pounds per acre.

Dominant plant species

- Ashe's juniper (*Juniperus ashei*), tree
- Texas wintergrass (*Nassella leucotricha*), grass

Community 3.1
Juniper Woodland Community

Figure 18. 3.1 Juniper Woodland Community

Elimination of fire, lack of timely brush management, extended drought and abusive grazing will eventually result in the development of a closed overhead canopy of juniper and other trees as well as a midstory canopy of shrubs. The understory vegetation consists of a few remnant grasses, forbs, and sedges. There is an increase in bare ground, but a large percentage of the soil surface beneath the woody canopy is covered with a dense mat of juniper needles and leaf litter. Annual production ranges from 600 to 1800 pounds per acre.

Table 9. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Tree	392	729	1121
Grass/Grasslike	112	280	392
Shrub/Vine	112	280	392
Forb	56	56	112
Total	**672**	**1345**	**2017**

Figure 20. Plant community growth curve (percent production by month). TX3044, Oak/Juniper Complex, Closed Canopy. Closed Canopy of Juniper, oaks, and other trees and shrubs. Sedges and cool-season grasses and forbs along with early successional warm-season grasses and annual forbs are primary herbaceous species..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5	7	8	12	15	10	5	4	12	10	7	5

Transition T1A
State 1 to 2

With continued abusive grazing pressure, no fires, and no brush management, the Savanna State will transition into the Shrubland State.

Restoration pathway R2A
State 2 to 1

With the use of various conservation practices including Prescribed Grazing, Prescribed Burning, Brush Management, and Range Planting, the Shrubland State can be restored into the Savanna State.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

Transition T2A
State 2 to 3

The Shrubland State will transition into the Woodland State due to abusive grazing pressure, no fires, and no brush management practices.

Restoration pathway R3A
State 3 to 2

With the application of various conservation practices including Prescribed Grazing, Prescribed Burning, Brush Management, and Range Planting, the Woodland State may be restored into the Shrubland State.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

Additional community tables

Table 10. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Tallgrass**			504–1065	
	little bluestem	SCSC	*Schizachyrium scoparium*	504–1065	–
2	**Tallgrasses**			336–897	
	big bluestem	ANGE	*Andropogon gerardii*	0–897	–
	Indiangrass	SONU2	*Sorghastrum nutans*	0–897	–
3	**Midgrasses**			280–448	
	sideoats grama	BOCU	*Bouteloua curtipendula*	168–448	–
	green sprangletop	LEDU	*Leptochloa dubia*	0–336	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	0–168	–
	Texas cupgrass	ERSE5	*Eriochloa sericea*	0–168	–
	Drummond's dropseed	SPCOD3	*Sporobolus compositus var. drummondii*	0–168	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	0–168	–
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	0–168	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	0–112	–
	tall grama	BOHIP	*Bouteloua hirsuta var. pectinata*	0–112	–
	purple threeawn	ARPU9	*Aristida purpurea*	0–112	–
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	0–112	–
	seep muhly	MURE2	*Muhlenbergia reverchonii*	0–112	–
	vine mesquite	PAOB	*Panicum obtusum*	0–112	–
	Reverchon's bristlegrass	SERE3	*Setaria reverchonii*	0–112	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	0–112	–
	slim tridens	TRMUE	*Tridens muticus var. elongatus*	0–112	–
	slim tridens	TRMUM	*Tridens muticus var. muticus*	0–112	–
	white tridens	TRAL2	*Tridens albescens*	0–34	–
	sand lovegrass	ERTR3	*Eragrostis trichodes*	0–34	–
	tumble windmill grass	CHVE2	*Chloris verticillata*	0–34	–
4	**Cool-season grasses**			34–56	
	cedar sedge	CAPL3	*Carex planostachys*	0–56	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	0–56	–
	Canada wildrye	ELCA4	*Elymus canadensis*	0–56	–
	Virginia wildrye	ELVI3	*Elymus virginicus*	0–56	–
	Texas wintergrass	NALE3	*Nassella leucotricha*	0–56	–
5	**Shortgrasses**			0–56	
	buffalograss	BODA2	*Bouteloua dactyloides*	0–56	–
	fall witchgrass	DICO6	*Digitaria cognata*	0–56	–
	curly-mesquite	HIBE	*Hilaria belangeri*	0–56	–

	Hall's panicgrass	PAHAH	*Panicum hallii var. hallii*	0–56	–
	hairy woollygrass	ERPI5	*Erioneuron pilosum*	0–34	–
	Texas grama	BORI	*Bouteloua rigidiseta*	0–34	–
	red grama	BOTR2	*Bouteloua trifida*	0–34	–
Forb					
6	**Forbs**			112–280	
	Texas Indian mallow	ABFR3	*Abutilon fruticosum*	0–168	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–168	–
	white sagebrush	ARLUM2	*Artemisia ludoviciana ssp. mexicana*	0–168	–
	Berlandier's sundrops	CABE6	*Calylophus berlandieri*	0–168	–
	American star-thistle	CEAM2	*Centaurea americana*	0–168	–
	purple prairie clover	DAPU5	*Dalea purpurea*	0–168	–
	bundleflower	DESMA	*Desmanthus*	0–168	–
	ticktrefoil	DESMO	*Desmodium*	0–168	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	0–168	–
	buckwheat	ERIOG	*Eriogonum*	0–168	–
	Leavenworth's eryngo	ERLE11	*Eryngium leavenworthii*	0–168	–
	Texas stork's bill	ERTE13	*Erodium texanum*	0–168	–
	milkpea	GALAC	*Galactia*	0–168	–
	Indian blanket	GAPU	*Gaillardia pulchella*	0–168	–
	beeblossom	GAURA	*Gaura*	0–168	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	0–168	–
	hoary false goldenaster	HECA8	*Heterotheca canescens*	0–168	–
	trailing krameria	KRLA	*Krameria lanceolata*	0–168	–
	Nuttall's sensitive-briar	MINU6	*Mimosa nuttallii*	0–168	–
	yellow puff	NELU2	*Neptunia lutea*	0–168	–
	beardtongue	PENST	*Penstemon*	0–168	–
	scurfpea	PSORA2	*Psoralidium*	0–168	–
	snoutbean	RHYNC2	*Rhynchosia*	0–168	–
	pitcher sage	SAAZG	*Salvia azurea var. grandiflora*	0–168	–
	mealycup sage	SAFA2	*Salvia farinacea*	0–168	–
	awnless bushsunflower	SICA7	*Simsia calva*	0–168	–
	amberique-bean	STHE9	*Strophostyles helvola*	0–168	–
	white heath aster	SYERE	*Symphyotrichum ericoides var. ericoides*	0–168	–
	Texas vervain	VEHA	*Verbena halei*	0–168	–
Shrub/Vine					
7	**Shrubs/Vines**			56–168	
	catclaw acacia	ACGRG3	*Acacia greggii var. greggii*	0–56	–
	snakewood	CONDA	*Condalia*	0–56	–
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	0–56	–
	clapweed	EPAN	*Ephedra antisyphilitica*	0–56	–

	Texas kidneywood	EYTE	*Eysenhardtia texana*	0–56	–
	stretchberry	FOPU2	*Forestiera pubescens*	0–56	–
	algerita	MATR3	*Mahonia trifoliolata*	0–56	–
	pricklypear	OPUNT	*Opuntia*	0–56	–
	plum	PRUNU	*Prunus*	0–56	–
	bastard oak	QUSIB	*Quercus sinuata var. breviloba*	0–56	–
	prairie sumac	RHLA3	*Rhus lanceolata*	0–56	–
	littleleaf sumac	RHMI3	*Rhus microphylla*	0–56	–
	skunkbush sumac	RHTR	*Rhus trilobata*	0–56	–
	gum bully	SILA20	*Sideroxylon lanuginosum*	0–56	–
	greenbrier	SMILA2	*Smilax*	0–56	–
	yucca	YUCCA	*Yucca*	0–56	–
	lotebush	ZIOB	*Ziziphus obtusifolia*	0–56	–
Tree					
8	**Trees**			168–392	
	Texas live oak	QUFU	*Quercus fusiformis*	0–504	–
	Ashe's juniper	JUAS	*Juniperus ashei*	67–336	–
	black walnut	JUNI	*Juglans nigra*	0–168	–
	Texas red oak	QUBU2	*Quercus buckleyi*	0–168	–
	Lacey oak	QULA	*Quercus laceyi*	0–168	–
	winged elm	ULAL	*Ulmus alata*	0–168	–
	American elm	ULAM	*Ulmus americana*	0–168	–
	slippery elm	ULRU	*Ulmus rubra*	0–168	–
	eastern redbud	CECA4	*Cercis canadensis*	0–168	–
	sugarberry	CELAL	*Celtis laevigata var. laevigata*	0–168	–
	netleaf hackberry	CELAR	*Celtis laevigata var. reticulata*	0–168	–
	ash	FRAXI	*Fraxinus*	0–168	–

Animal community

Historically, the Steep Rocky site was inhabited permanently and intermittently by a wide variety of mammals, reptiles, and birds. Several historical references and journals written in the 18th and 19th century by explorers, survey parties, and military expeditions refer to herds of bison, wild cattle, wild horses, deer, and other animals roaming freely across the North Central Prairie and adjacent regions.

The Steep Rocky site provides excellent habitat for many species of wildlife due to the rough, steep terrain and the diversity of plant species, growth forms, distribution, and structure of the vegetation that occurs. The site provides shelter, escape cover, and nesting habitat, as well as a variety of browse, mast, seeds, and fruit that are important to the diets of various wildlife species. Currently, the site is utilized by deer, wild turkey, numerous species of birds, and a variety of small fur-bearing mammals. Animal species and populations fluctuate as the vegetation cycles through temporary phases and different ecological stages.

Because of the tree and shrub component and the topography, the Steep Rocky site is well suited for grazing and browsing by goats. Grazing by cattle is usually limited to the lower slopes and benches on this site. Most European breeds of cattle and small statured cattle are not well suited to this site. Some of the hardier breeds of cattle are better suited to the slopes, but are still not well adapted for the steep terrain and lack of water sources on the site. Livestock grazing and distribution can be improved by providing water sources, providing supplemental feed in strategic locations, and by implementing grazing management systems that incorporate frequent and timely deferment periods.

Hydrological functions

The Steep Rocky site has a very good soil-water-air-plant relationship because of the amount of rock on the soil surface and in the upper portions of the soil profile. Showers and light rains can be very effective on this site. Surface rocks retain moisture and release it slowly to the soil and vegetation following showers and light rainfall. Rocks and fragments in the soil provide pockets for oxygen, moisture, and plant roots.

When herbaceous vegetation and ground cover are maintained in a healthy and vigorous status, water infiltration into the soil profile is increased significantly, resulting in less runoff. A healthy grass cover results in improved water quality because it serves as a filter or trap to reduce sediments and pollutants before the water flows offsite. In many areas where this site occurs, the presence of honeycomb limestone or fractured limestone allows water to penetrate deeper into the soil profile than on some of the associated sites with deeper soils and less rock. Natural springs can occasionally be found on this site where the pastures have been well managed.

Surface runoff is rapid during heavy rainfall events due to the rough, steep topography, slowly permeable soils, and numerous limestone outcrops. As the canopy of juniper increases, more rainfall is intercepted before it can reach the soil surface or herbaceous vegetation below. Where dense canopies of junipers and other trees and shrubs occur on this site, the effectiveness of rainfall is severely reduced or eliminated because the moisture never reaches the understory vegetation.

Recreational uses

These scenic areas offer outdoor activities including photography, shaded picnic areas, bird watching, hiking, camping, horseback riding, and off-road vehicle use. The Steep Rocky site is a prime site for wildlife habitat. Where it is managed properly, it provides outstanding opportunities for hunting deer and turkey.

Wood products

Ashe juniper is often used for fence posts. Oaks and some of the other hardwood trees can be used for firewood. Some of the woody species may be used for specialty products and crafts.

Other products

Plums, agarito berries and pricklypear tunas can be eaten or used to make jelly.

Other information

None.

Inventory data references

Vegetation data for this site was obtained from existing Range Site Descriptions, SCS-RANGE -417 Production and Composition Records for Native Grazing Lands, and on-site inventories by the author and local experts including ranchers, natural resource specialists from federal and state agencies, and personnel from cooperating agencies and organizations. A total of 10 SCS-RANGE-417’s containing data collected from 2 counties during the period 12/30/1981 to 12/12/1986 were reviewed for this site.

References

. 2021 (Date accessed). USDA PLANTS Database. http://plants.usda.gov.

Other references

Ajilvsgi, Geyata. Wildflowers of Texas. Sharer Publishing, Bryan, TX. 1984.

Coffey, Chuck R., and Russell Stevens. Grasses of Southern Oklahoma and North Texas: A Pictorial Guide. The Samuel Roberts Noble Foundation, Ardmore, OK. 2004

Diggs, George M., Jr., Barney L. Lipscomb, and Robert J. O'Kennon. Illustrated Flora of North Central Texas. Botanical Research Institute of Texas. Fort Worth, TX 1999.

Egan, Dave and Evelyn A. Howell. The Historical Ecology Handbook…A Restorationist's Guide to Reference Ecosystems. Island Press, Washington, DC. 2001.

Enquist, Marshall. Wildflowers of the Texas Hill Country. Lone Star Botanical, Austin, TX. 1987.

Flores, Dan. "Indian Use of Range Resources" presented at 20th Annual Ranch Management Conference. Lubbock, TX, September 30, 1983.

Gould, Frank W., The Grasses of Texas. Texas A&M University Press, College Station, TX. 1975.

Hatch, Stephan L., Kancheepuram N. Gandhi, and Larry E. Brown. Checklist of the Vascular Plants of Texas. Texas Agricultural Experiment Station MP-1655. College Station, TX. 1990

Hatch, Stephan L., Jennifer Pluhar. Texas Range Plants. Texas A&M University Press, College Station, TX. 1993.

Johnson, Rhett. Personal communication. 9/18/2007.

Kelton, Elmer. "History of Rancher Use of Range Resources" presented at 20th Annual Ranch Management Conference. Lubbock, TX, September 30, 1983.

Ladd, Doug. Tallgrass Prairie Wildflowers. Falcon Press, Helena and Billings, MT. 1995.

Larrabee, Aimee and John Altman. Last Stand of the Tallgrass Prairie. Sterling Publishing Co., New York, NY. 2001.

Nelson, Paul W. The Terrestrial Natural Communities of Missouri. Missouri Department of Natural Resources. 1985.

Packard, Stephen and Cornelia F. Mutel. The Tallgrass Restoration Handbook for Prairies, Savannas, and Woodlands. Island Press, Washington, DC. 1997.

Parker, W.B. Through Unexplored Texas In The Summer and Fall of 1854. The Texas State Historical Commission. Austin, TX 1984

Smith, Jared G. Grazing Problems in the Southwest and How to Meet Them. United States Department of Agriculture Division of Agrostology. Washington, DC. 1899.

Texas Almanac Sesquicentennial Edition 1857-2007. Dallas Morning News. Dallas, TX. 2006.

Tyrl, Ronald J., Terrence G. Bidwell, and Ronald E. Masters. Field Guide to Oklahoma Plants. Oklahoma State University, Stillwater, OK. 2002.

United States Department of Agriculture Natural Resources Conservation Service, National Plant Data Center, Baton Rouge, LA. The PLANTS Database. http://plants.usda.gov 2007.

United States Department of Agriculture Natural Resources Conservation Service, Ag Handbook 296. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. 2006.

United States Department of Agriculture Natural Resources Conservation Service, Temple, TX. Steep Rocky Ecological Site Description R081BY350TX. 2006.

United States Department of Agriculture Soil Conservation Service, Temple, TX. Production and Composition Record for Native Grazing Lands. SCS-RANGE 417 data from Brown, Eastland, Jack, Stephens, and Young Counties. 1981-1986.

United States Department of Agriculture Soil Conservation Service, Washington, DC. Web Soil Survey http://websoilsurvey.nrcs.usda.gov/app/. 2007

United States Department of Agriculture Soil Conservation Service, Temple, TX. Published Soil Surveys: Brown and Mills, Jack, Palo Pinto, Stephens, and Young Counties. Various publication dates.

United States Department of Agriculture Soil Conservation Service, Temple, TX. Range Site Descriptions for the North Central Prairie counties. Various publication dates.

Vines, Robert A. Trees of North Texas. University of Texas Press, Austin, TX. 1982

Weniger, Del. The Explorers' Texas. Eakin Publications. Austin, TX. 1984.

Williams, Gerald W. References On The American Indian Use Of Fire in Ecosystems. United States Department of Agriculture – Forest Service, Washington, DC. 2005.

ACKNOWLEDGEMENTS: I would like to express my thanks and appreciation to the following for their cooperation, assistance, and support in the development of this Ecological Site Description:

Tony Baeza, NRCS – Breckenridge, TX
Fort Richardson State Park – Jacksboro, TX
Matt Gregory, NRCS – Jacksboro, TX
Rhett Johnson, ranch manager – Granbury, TX
Myron Merz, NRCS – Mineral Wells, TX
Rancho Hielo Brazos – Glen Rose, TX
Michael and Susannah Wisenbaker, ranchers – Dallas, TX
J. C. Link Ranch

Reviewers:
Lem Creswell, RMS, NRCS, Weatherford, Texas
Justin Clary, RMS, NRCS, Temple, Texas

Contributors

Dan Caudle, DMC Natural Resources, Weatherford Texas
Joe B. Norris, RMS, NRCS, Abilene, Texas
PES edits by Colin Walden, Stillwater Soil Survey Office

Approval

Bryan Christensen, 9/19/2023

Acknowledgments

Site Development and Testing Plan:

Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document. Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	Lem Creswell, Zone RMS, NRCS, Weatherford, Texas
Contact for lead author	817-596-2865
Date	10/22/2007
Approved by	Bryan Christensen
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:** Deposition or erosion is uncommon during normal rainfall events, but may occur in limited areas during intense rainfall events.

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):** Expect no more than 40% bare ground scattered randomly throughout the site.

5. **Number of gullies and erosion associated with gullies:** Some deep rills and gullies may occur as a result of intense rainfall events.

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

7. **Amount of litter movement (describe size and distance expected to travel):** Little or no litter movement or deposition during normal rainfall events.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface is susceptible to water erosion due to amount of bare ground and steep slopes.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** 0-6 inche

of brown flaggy silty clay loam. Soil surface contains 35-85% coarse fragments ranging in size from 0.5 to 36 inches. Limestone bedrock occurs at depths ranging from 6 to 20 inches. SOM is 1-4%. See soil survey for more information.

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** The tallgrass/midgrass savanna with abundant forbs, adequate litter, and little bare ground provides for maximum infiltration and negligible runoff in normal rainfall events.

---

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 tallgrasses > Warm-season midgrasses >

    Sub-dominant: Trees > Shrubs/Vines > Perennial forbs

    Other: Cool-season grasses > Warm-season shortgrasses

    Additional:

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Perennial grasses will naturally exhibit a minor amount (less than 5%) of senescence and some mortality every year.

---

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):** 1000 to 3000 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:** Ashe juniper, redberry juniper, pricklypear, yucca, tasajillo, pricklyash, lotebush, mesquite, King Ranch bluestem, annual broomweed.

---

17. **Perennial plant reproductive capability:** All perennial species should be capable of reproducing every year unless disrupted by extended drought, overgrazing, wildfire, insect damage, or other events occuring immediately prior to, or during the reproductive phase.