Ecological site R080BY160TX
Shallow
26-33" PZ

Last updated: 9/19/2023
Accessed: 07/03/2026

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): 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 shallow clay and clay loam soils on uplands. The reference vegetation consists native perennial midgrasses with numerous forbs and few scattered shrubs and trees. Without periodic fire or other brush management, woody species may increase and dominate the site.

Associated sites

R080BY146TX	**Clay Loam 26-33" PZ** Often adjacent downhill with deeper soils.
R080BY154TX	**Low Stony Hill 26-33" PZ** Often adjacent uphill with shallower soils.

Similar sites

R085AY185TX	**Shallow 30-38" PZ** Shallow site in MLRA 85.

Table 1. Dominant plant species

Tree	Not specified

Shrub	Not specified
Herbaceous	(1) *Bouteloua curtipendula* (2) *Schizachyrium scoparium*

Physiographic features

This site occurs on linear to convex dip slopes in the Texas North-Central Prairies. This site is characteristically a water distributing site. Slopes are typically less than 5 percent.

Table 2. Representative physiographic features

Landforms	(1) Hills > Ridge (2) Hills > Dip slope
Runoff class	Low to medium
Elevation	230 – 730 m
Slope	0 – 10 %
Aspect	Aspect is not a significant factor

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 3 Representative climatic features

Frost-free period (characteristic range)	180-200 days
Freeze-free period (characteristic range)	210-230 days
Precipitation total (characteristic range)	760-810 mm
Frost-free period (actual range)	180-200 days
Freeze-free period (actual range)	210-230 days
Precipitation total (actual range)	740-840 mm
Frost-free period (average)	190 days
Freeze-free period (average)	220 days
Precipitation total (average)	790 mm

- (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 sites often shed some rainfall water to areas lower on the landscape. 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

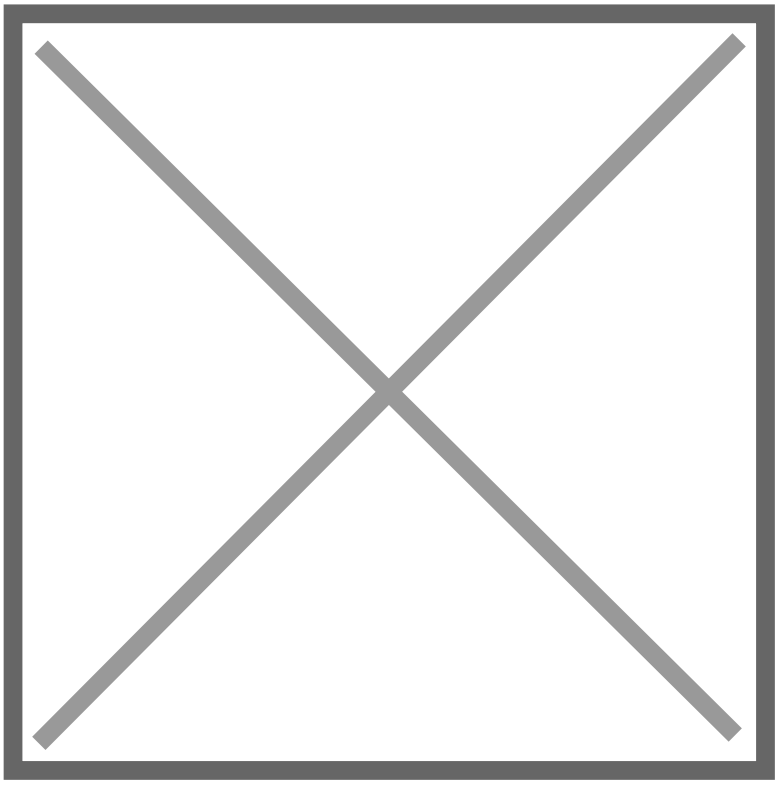

Figure 7.

Soil features

Representative soil components for this ecological site include: Aledo, Cho, Mereta

The site is characterized by shallow, calcareous, well drained soils.

Table 4. Representative soil features

Parent material	(1) Alluvium – limestone and shale
Surface texture	(1) Gravelly loam (2) Gravelly clay loam
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	10 – 50 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	0 – 10 %

Available water capacity (0-101.6cm)	2.54 – 7.62 cm
Calcium carbonate equivalent (0-101.6cm)	10 – 70 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	7.9 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	0 – 30 %
Subsurface fragment volume >3" (Depth not specified)	0 – 10 %

Ecological dynamics

The reference plant community of the Shallow Ecological Site in the PZ 26-33 zone of the 80B MLRA is a fire induced Midgrass Prairie (1.1) with scattered live oak motts or trees. Before European settlement in the mid 1800s brought fencing and animal husbandry, frequent wildfires maintained woody species at about 5 percent canopy. The soils of the site are shallow with pockets of deeper soils. Productivity of the site varies with these fluctuations and decreases with precipitation from north to south in the MLRA. Moisture holding capacity is relatively limited and often limits productivity. Long term droughts, occurring three to four times per century, may cause shifts in vegetation affecting woody plant die-off such as the one that occurred in the 1930s (Dyksterhuis 1948).

There was a large component of midgrasses including sideoats grama, Texas cupgrass, vine-mesquite, Texas wintergrass, cane and silver bluestems. Little bluestem, big bluestem and Indiangrass were in scattered stands on favorable moisture areas and deeper soils throughout the site. Frequent fires favored grasses over woody plants and forbs. There was a wide variety of forbs, however. Trees, primarily live oak and hackberry, covered about 5 percent of the site occupying rock crevices and deeper soil pockets on areas protected from wildfires.

The Midgrass Prairie Community (1.1) was relatively stable and resilient within the climate, soil and fire regime until European settlement (Archer, 1994). As overgrazing occurred, there was a reduction of tallgrasses and palatable forbs, decline in mulch and 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. Climate change, including increased atmospheric carbon dioxide, is also thought to be a factor. The woody and grassland vegetation invaders were generally endemic species released from competition. Continued overgrazing results in a Mixed-grass Prairie Community (1.2) being invaded by woody plants. In this phase, midgrasses such as sideoats grama, feathery bluestems, plains lovegrass, buffalograss and low palatability forbs began replacing the more preferred tallgrasses and forbs. Grasses still dominate primary production, but the encroaching woody species contribute an increasing amount.

If the Mixed-grass Prairie Community (1.2) is continually overgrazed and fire is excluded, the plant community continues its transition toward a woody plant dominated community. The more preferred tall and midgrasses begin to be replaced by less palatable grasses and

forbs. Less preferred woody plants and weedy grasses and forbs invade. As grass cover declines, litter 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 and juniper, although live oak and other understory shrubs may increase also. When the woody plant community exceeds 20 to 25 percent canopy and they become fire resistant, rest from grazing alone generally will not restore the grassland community. When this threshold is crossed, the plant community transitions into the Shortgrass/Mixed-brush Community (2.1). This plant community also marks the beginning of the Woodland State.

Live oak, mesquite and juniper dominate the Shortgrass/Mixed-brush Community (2.1). Condalia, elbowbush, skunkbush sumac and pricklypear are also common. The grass component is a mixture of midgrasses, shortgrasses and low quality forbs initially. Little bluestem often persists, especially in the northern parts of the MLRA. Texas wintergrass and buffalograss are also persistent increasers. During this phase, the process of deterioration can be reversed with moderately intensive brush control, prescribed burning and prescribed grazing management. If these conservation practices are not applied, the woody canopy will continue to increase in size and density and a Mixed-brush/ Shortgrass/Annuals Plant Community (2.2) develops.

The Mixed-brush/Shortgrass/Annuals Community (2.2) is a mosaic, open woodland dominated by live oak, juniper, mesquite and underbrush to the exclusion of most herbaceous species except within the small interspaces. Once woody plant cover exceeds 40 to 50 percent overstory, forage production becomes very limited, being generally made up of unpalatable shrubs, grasses and forbs. Due to shading and competition from the woody plants, the herbaceous layer, mostly shortgrasses, cool-season grasses and annuals, is of low vigor. Desertification, including erosion, continues in the interspaces until maximum ground cover by woody species is approached. Once canopy cover reaches equilibrium, however, the hydrologic processes, energy flow and nutrient cycling stabilize under the woodland environment (Thurow, 1991).

Major expense and energy are necessary to restore the Mixed-brush/Shortgrass/Annuals Community (2.2) to a Grassland State. Generally, broadcast mechanical or herbicidal treatments, such as dozing, range planting followed by grazing deferment, prescribed grazing and prescribed burning, are essential for the site to return to State 1. Erosion may preclude a return to the reference state (1).

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

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Tallgrasses**			336-785	
	little bluestem	SCSC	*Schizachyrium scoparium*	168-392	–
	Indiangrass	SONU2	*Sorghastrum nutans*	84-196	–
	big bluestem	ANGE	*Andropogon gerardii*	84-196	–
	switchgrass	PAVI2	*Panicum virgatum*	0-11	–
2	**Midgrasses**			757-1765	
	sideoats grama	BOCU	*Bouteloua curtipendula*	420-981	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	34-78	–
	Arizona cottontop	DICA8	*Digitaria californica*	34-78	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	34-78	–
	Texas cupgrass	ERSE5	*Eriochloa sericea*	34-78	–
	green sprangletop	LEDU	*Leptochloa dubia*	34-78	–
	vine mesquite	PAOB	*Panicum obtusum*	34-78	–
	large-spike bristlegrass	SEMA5	*Setaria macrostachya*	34-78	–
	Reverchon's bristlegrass	SERE3	*Setaria reverchonii*	34-78	–
	Drummond's dropseed	SPCOD3	*Sporobolus compositus var. drummondii*	34-78	–
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	34-78	–

3	**Shortgrasses**			168-392	
	curly-mesquite	HIBE	*Hilaria belangeri*	34-78	–
	buffalograss	BODA2	*Bouteloua dactyloides*	34-78	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	17-39	–
	fall witchgrass	DICO6	*Digitaria cognata*	17-39	–
	white tridens	TRAL2	*Tridens albescens*	17-39	–
	slim tridens	TRMUE	*Tridens muticus var. elongatus*	17-39	–
	slim tridens	TRMUM	*Tridens muticus var. muticus*	17-39	–
	threeawn	ARIST	*Aristida*	17-39	–
4	**Cool-season grasses**			168-392	
	Texas wintergrass	NALE3	*Nassella leucotricha*	112-280	–
	Canada wildrye	ELCA4	*Elymus canadensis*	56-112	–
	cedar sedge	CAPL3	*Carex planostachys*	0-6	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	0-6	–
Forb					
5	**Forbs**			168-392	
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	8-22	–
	white sagebrush	ARLUA	*Artemisia ludoviciana ssp. albula*	8-22	–
	white sagebrush	ARLUM2	*Artemisia ludoviciana ssp. mexicana*	8-22	–
	milkvetch	ASTRA	*Astragalus*	8-22	–
	croton	CROTO	*Croton*	8-22	–
	purple prairie clover	DAPU5	*Dalea purpurea*	8-22	–
	bundleflower	DESMA	*Desmanthus*	8-22	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	8-22	–
	beeblossom	GAURA	*Gaura*	8-22	–
	hoary false goldenaster	HECA8	*Heterotheca canescens*	8-22	–
	trailing krameria	KRLA	*Krameria lanceolata*	8-22	–
	dotted blazing star	LIPU	*Liatris punctata*	8-22	–
	Florida mimosa	MIQUF	*Mimosa quadrivalvis var. floridana*	8-22	–
	leafflower	PHYLL	*Phyllanthus*	8-22	–
	groundcherry	PHYSA	*Physalis*	8-22	–
	skullcap	SCUTE	*Scutellaria*	8-22	–
	awnless bushsunflower	SICA7	*Simsia calva*	8-22	–
	fanpetals	SIDA	*Sida*	8-22	–
	vervain	VERBE	*Verbena*	8-22	–
Shrub/Vine					
6	**Shrubs/Vines**			34-78	
	acacia	ACACI	*Acacia*	3-11	–
	snakewood	CONDA	*Condalia*	3-11	–
	featherplume	DAFO	*Dalea formosa*	3-11	–
	jointfir	EPHED	*Ephedra*	3-11	–
	stretchberry	FOPU2	*Forestiera pubescens*	3-11	–
	algerita	MATR3	*Mahonia trifoliolata*	3-11	–
	fragrant sumac	RHAR4	*Rhus aromatica*	3-11	–
	littleleaf sumac	RHMI3	*Rhus microphylla*	3-11	–
	bully	SIDER2	*Sideroxylon*	3-11	–

	Hercules' club	ZACL	*Zanthoxylum clava-herculis*	3-11	–
Tree					
7	**Trees**			50-118	
	eastern redbud	CECA4	*Cercis canadensis*	10-28	–
	hackberry	CELTI	*Celtis*	10-28	–
	mesquite	PROSO	*Prosopis*	10-28	–
	Texas live oak	QUFU	*Quercus fusiformis*	10-28	–
	elm	ULMUS	*Ulmus*	10-28	–

Table 6. Community 1.2 plant community composition

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

Table 7. Community 2.1 plant community composition

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

Table 8. Community 2.2 plant community composition

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

Animal community

Many types of grassland insects, reptiles, birds and mammals used the plant community of the Shallow Ecological Site, either as their base habitat or from the adjacent sites. Small mammals include many kinds of rodents, jackrabbit, cottontail rabbit, raccoon, skunk, opossum and armadillo. Predators include coyote, fox and bobcat. Game birds, songbirds, and birds of prey were indigenous or frequent users. Bison and pronghorn antelope are no longer present, but white-tailed deer utilize the Shallow site in conjunction with adjacent sites. Deer, turkey and quail particularly favor the habitat provided by the Mixed-grass Community (1.2) and Shortgrass/ Mixed-brush (2.1) plant communities. The site in the Grassland State (1.0) is very suited to primary grass eaters such as cattle. As woody plants increase the site becomes better habitat for sheep, goats, deer and other wildlife because of the browse and cool season grasses. Cattle, sheep and goats should be stocked in proportion to the available grass, forb and browse forage, keeping deer competition for forbs and browse in mind. If the animal numbers are not kept in balance with herbage and browse production through prescribed grazing management and good wildlife population management, the late Mixed-brush/Shortgrass/Annuals (2.2) plant community will have little to offer as habitat except cover.

Hydrological functions

The Shallow Ecological Site is a well-drained, moderately permeable upland with nearly level to gentle slopes. The soils have a good plant-soil-moisture relationship, but shallowness to a hard limestone or caliche layer limits soil moisture holding capacity. Little or no water penetrates to a ground water table except through cracks and crevasses in the caliche layer. Runoff is slow due to gentle slopes if there is a good vegetative cover. However, soil crusting can cause erosion from bare ground on steeper slopes if plant cover is removed. The grassland vegetation intercepted and utilized much of the incoming rainfall in the soil solum. Only during extended rains or heavy thunderstorms was there much runoff. Litter and soil movement was slight. Standing plant cover, duff and organic matter decrease and surface runoff increases as the Midgrass Prairie Community (1.1) transitions to the Mixed-grass Community (1.2). These processes continue in the interstitial spaces in the Shortgrass/Mixed-brush Community (2.1) phase. Evaporation and interception losses are higher, resulting in less moisture reaching the soil. If, overgrazing continues the plant community deteriorates further and desertification processes continue. Biomass production is reduced and production has shifted from primarily grasses to primarily woody plants. The woody plants compete for moisture with the remaining grasses and forbs further reducing production and ground cover in openings. Decreased litter and more bare ground allow erosion from soils in openings between trees. Once the Mixed-brush/Shortgrass/Annuals Community (2.2) canopy surpasses 50 percent the hydrological and ecological processes, nutrient cycling and energy flow, stabilize within the woody plant community.

Recreational uses

The Shallow site occurs in small narrow bands with Low Stony 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 Shallow site, along with adjacent sites, 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 and oak are use for firewood and charcoal.

Other products

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

Other information

None.

Inventory data references

Information presented here has been derived from the Shallow Range Site Descriptions Area 8 dated 3-30-79 and Area 9 dated 8-1-72, literature, limited NRCS clipping data (417s), field observations and personal contacts with range-trained personnel. Photos by J.L. Schuster. Special thanks to the following NRCS personnel for assistance and guidance with development of this ESD: Justin Clary, NRCS Temple, Texas and to Mark Moseley, NRCS Boerne, TX.

References

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

Other references

1. Archer S. 1994. Woody plant encroachment into southwestern grasslands and savannas: rates, patterns and proximate causes. In Ecological implications of livestock herbivory in the West, pp. 13-68. Edited by M. Vavra, W. Laycock and R. Peiper, Society for Range Management Publication, Denver, CO.
2. Brown, J.K. and J.K. Smith (Editors). 2000. Wildland fire in Ecosystems; effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden. UT: U.S.D.A., Forest Service, Rocky Mtn. Sta. 257p.
3. Dyksterhuis, E.J. 1948. The Vegetation of the Western Cross Timbers. Ecological Monographs 18 (3):325-376.
4. Frost, C. C. 1998. Pre-settlement fire frequency regions of the United States: A first approximation. Tall Timbers Fire Ecology Conference Proceedings No. 20
5. Milchunas, D.G. 2006. Responses of Plant Communities to grazing in the southwestern United States. USDA-Forest Service. Rocky Mtn. Sta. GTR. 169
6. Thurow T.L., 1991. Hydrology and Erosion. Chapter 6 in: Grazing Management: An Ecological Perspective Edited by: R.K. Heitschmidt and J.W. Stuth. Timber Press, Portland, Oregon.
7. USDA/NRCS Soil Survey Manuals for Brown, Eastland, McCulloch, Young, Jack Counties, Texas.
8. Plant symbols, common names and scientific names according to USDA/NRCS Texas Plant List (Unpublished)
9. Bestelmeyer, B. T., J.R. Brown, K. M. Havsted, R. Alexander, G. Chavez and J. E. Hedrick. 2003. Development and use of state-and-transition models for rangelands. J. Range Management. 56(2): 114-126.

Reviewers:
Lem Creswell, RMS, NRCS, Weatherford, Texas
Nathan Haile, RSS, NRCS, Weatherford, Texas
Justin Clary, RMS, NRCS, Temple, Texas
Mark Moseley, RMS, NRCS, Boerne, Texas

Contributors

Dr Joe Schuster, Range & Wildlife Habitat Consultants, LLC, Bryan, Texas
Joe McEntire, Area Conservationist, 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	04/20/2009
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:** **Water flow patterns are common and follow old stream meanders. Deposition or erosion is uncommon for normal rainfall but may occur during intense rainfall events.**

---

3. **Number and height of erosional pedestals or terracettes:** **Pedestals or terracettes would have been uncommon for this site.**

---

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

---

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

---

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

---

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

---

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface in HCPC is resistant to wind erosion but moderate to severe water hazards. Stability range is expected to be 5-6.

---

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Shallow clays & clay loam surface; weak fine granular structure; hard, friable; few fine roots; calcareous moderately alkaline; moderate permeability; well drained; good plant-soil-moisture; moderate SOM.

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Functional groups and slight slopes make site well drained; permeability is moderately slow; run-off negligible on 0-1% slopes, very low on 1-3% and low on 3-5% slopes. Infiltration moderate to caliche layer which is impermeable except at cracks.

---

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 midgrasses >

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

    Other: Cool-season grasses > Forbs > Shrubs/Vines > Trees

    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 primarily herbaceous.

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production): 1500 - 3500 pounds per acre.**

---

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site: Mesquite, pricklypear, lotebush, tasajillo.**

---

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.**
