

Ecological site R081BY593TX

Limestone Hill

19-23 PZ

Last updated: 9/19/2023
Accessed: 08/19/2026

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): 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 Limestone Hills are comprised of shallow soils with lithic contact. The sites are filled with gravels, cobbles, and flagstones and occur on undulating hills with less than 20 percent slopes.

Associated sites

R081BY336TX	Low Stony Hill 19-23 PZ The Low Stony Hill site are on adjacent slopes.
R081BY342TX	Shallow 19-23 PZ The Shallow site can be found downslope.
R081BY353TX	Very Shallow 19-23 PZ The Very Shallow site can be found downslope.
R081BY325TX	Clay Loam 19-23 PZ The Clay Loam site is on adjacent slopes lower in the landscape.

Similar sites

R081BY336TX	Low Stony Hill 19-23 PZ The Low Stony Hill site are very similar.
R081BY353TX	Very Shallow 19-23 PZ The Very Shallow site are less than 10 inches to petrocalcic horizon.

Table 1. Dominant plant species

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

Physiographic features

The Limestone Hill site is classified as upland. Soils occur on nearly level to steep, generally convex hills, plateaus, ridges or plains. Slopes range from 1 to 20 percent. Some rock outcrops occur on slopes greater than 15 percent. Elevation of the site ranges from 1,600 to 2,800 feet above mean sea level. In most locations little or no runoff is received from other sites. Due to the usual sloping nature and slow moisture intake, most water from heavier rainfall events runs off of the site, providing extra moisture to lower, adjacent sites, but also furnishing the potential for damaging erosion. Abundant herbaceous ground cover prevents, or at least minimizes, erosion damage while the problem is compounded as vegetative cover diminishes.

Table 2. Representative physiographic features

Landforms	(1) Plateau > Ridge (2) Plateau > Hill (3) Plateau > Plain
Runoff class	Medium to high
Flooding frequency	None
Ponding frequency	None
Elevation	490 – 850 m
Slope	0 – 20 %
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)	210-270 days
Freeze-free period (characteristic range)	240-290 days
Precipitation total (characteristic range)	480-610 mm
Frost-free period (actual range)	210-270 days
Freeze-free period (actual range)	240-290 days
Precipitation total (actual range)	480-640 mm
Frost-free period (average)	230 days
Freeze-free period (average)	260 days
Precipitation total (average)	560 mm

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

Influencing water features

This is an upland site and is not influenced by water from a wetland or a stream.

Wetland description

N/A

Soil features

The soils consist of very shallow or shallow, well drained, moderately permeable uplands. They are composed of grayish-brown to dark grayish-brown loams, clay loams, and silty clay loams formed in residuum from limestone and, lying over limestone bedrock, usually unfractured or with fractures sealed with calcium carbonate. Gravel, cobbles, and stones are found on the surface. Available water capacity is very low. Shrink-swell potential is low. Soil series correlated to this site include: Ector and Noelke.

Table 4. Representative soil features

Parent material	(1) Residuum – limestone
Surface texture	(1) Very gravelly loam (2) Very cobbly clay loam (3) Gravelly silty clay loam
Family particle size	(1) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	10 – 50 cm
Soil depth	10 – 50 cm
Surface fragment cover ≤3"	20 – 40 %
Surface fragment cover >3"	10 – 20 %
Available water capacity (0-50.8cm)	0.51 – 2.79 cm
Calcium carbonate equivalent (0-50.8cm)	30 – 90 %
Electrical conductivity (0-50.8cm)	Not specified
Sodium adsorption ratio (0-50.8cm)	Not specified
Soil reaction (1:1 water) (0-50.8cm)	7.4 – 8.4

Subsurface fragment volume <=3" (10.2-50.8cm)	20 – 40 %
Subsurface fragment volume >3" (10.2-50.8cm)	30 – 60 %

Ecological dynamics

The Limestone Hill site is a mid and short grassland with scattered small shrubs and numerous perennial forbs. Mid-size bunchgrasses, shortgrasses, and perennial forbs probably covered most of the surface. This plant community was greatly influenced by grazing, climate (including periodic extended periods of drought) and, to a lesser degree, fire.

Extensive herds of pronghorns as well as smaller populations of white-tailed deer were present and had an impact on the plant community. Bison grazing on most of this site was intermittent. Bison, a migratory herd animal, would come through an area, grazed on the move, and not come back for many months or even years. This long deferment period allowed the more palatable grasses and forbs to recover from the heavy grazing. Fire has a strong influence on plant community structure and was a factor in maintaining the original grassland vegetation. Species such as Ashe juniper (*Juniperus ashei*), redberry juniper (*Juniperus pinchotii*), and mesquite (*Prosopis glandulosa*) were very likely present on the site, but not at the level we see today. On the average, fires occurred every 7 to 12 years and helped keep woody species under control. Grazing patterns by native herbivores and climate were also significant factors in maintaining a well-balanced plant community.

While grazing is a natural component of this ecosystem, overstocking and thus overgrazing by domesticated animals has had a tremendous impact on the site. Early settlers, accustomed to farming and ranching in more temperate zones of the eastern United States or even Europe, misjudged the capacity of the site for sustainable production and expected more of the site than it could deliver. Moreover, there was a gap of time between the extirpation of bison and the introduction of domestic livestock which resulted in an accumulation of plant material. This may have given the illusion of higher production than was actually being produced. Overgrazing and fire suppression disrupted ecological processes that took hundreds or thousands of years to develop. Instead of grazing and moving on, domestic livestock were present on the site most of the time, particularly after the practice of fencing arrived. Another influence on grazing patterns was the advent of wells and windmills. They opened up large areas that were previously unused by livestock due to lack of natural surface water.

The more palatable plants such as little bluestem (*Schizachyrium scoparium*), cane bluestem (*Bothriochloa barbinodis*), and awnless bushsunflower (*Simsia calva*) were selected repeatedly and eventually began to disappear from the ecosystem being replaced by lower successional, less palatable species such as curlymesquite (*Hilaria belangeri*), hairy grama (*Bouteloua hirsuta*), Hall's panicum (*Panicum hallii* var. *hallii*), and annual forbs. As overgrazing continued, overall production of grasses and forbs declined, more bare ground appeared, soil erosion increased, and woody and succulent increasers such as algerita (*Mahonia trifoliolata*), condalia (*Condalia* spp.) species and prickly pear (*Opuntia* spp.) species began to multiply. The elimination of fire due to the lack of fine fuel or by human interference assisted the rapid encroachment by herbaceous and woody increasers/invasers with a concurrent reduction of usable forage and growing danger from toxic plants.

Extremes in climate exerted tremendous influence on the site long before European man arrived. Geologic formations, archeological findings, and rainfall records since the mid-1900's show wide variations in precipitation with cycles of long, dry periods going back thousands of years with corresponding variations in kind and amount of flora and fauna species. Although the limestone hill site has shallow soils with low moisture holding capacity, it can make good use of small rainfall events. The mineral content and reaction of the soils enable the site to produce diverse, highly nutritious forage. Loss of cover and soil robs the site the site of this capability and promotes rapid water shed, erosion and crusting. Pedestalling, terracetes, and water flow patterns are range health indicators that will be present if the site begins to deteriorate.

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			224-404	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	224-404	–

	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	224-404	–
2	Midgrasses			325-504	
	cane bluestem	BOBA3	<i>Bothriochloa barbinodis</i>	325-504	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	325-504	–
	black grama	BOER4	<i>Bouteloua eriopoda</i>	325-504	–
	silver beardgrass	BOLAT	<i>Bothriochloa laguroides</i> ssp. <i>torreyana</i>	325-504	–
3	Midgrasses			112-202	
	green sprangletop	LEDU	<i>Leptochloa dubia</i>	112-202	–
	vine mesquite	PAOB	<i>Panicum obtusum</i>	112-202	–
	plains bristlegrass	SEVU2	<i>Setaria vulpiseta</i>	112-202	–
4	Midgrasses			112-202	
	Wright's threeawn	ARPUW	<i>Aristida purpurea</i> var. <i>wrightii</i>	112-202	–
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	112-202	–
	Reverchon's bristlegrass	SERE3	<i>Setaria reverchonii</i>	112-202	–
	slim tridens	TRMU	<i>Tridens muticus</i>	112-202	–
	slim tridens	TRMUE	<i>Tridens muticus</i> var. <i>elongatus</i>	112-202	–
5	Shortgrasses			112-202	
	buffalograss	BODA2	<i>Bouteloua dactyloides</i>	112-202	–
	fall witchgrass	DICO6	<i>Digitaria cognata</i>	112-202	–
	curly-mesquite	HIBE	<i>Hilaria belangeri</i>	112-202	–
	Hall's panicgrass	PAHA	<i>Panicum hallii</i>	112-202	–
6	Cool Season Grasses			22-101	
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	22-101	–
	threeflower melicgrass	MENI	<i>Melica nitens</i>	22-101	–
	Texas wintergrass	NALE3	<i>Nassella leucotricha</i>	22-101	–
7	Shortgrasses			22-101	
	Grass, annual	2GA	<i>Grass, annual</i>	22-101	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	22-101	–
	red grama	BOTR2	<i>Bouteloua trifida</i>	22-101	–
	hairy woollygrass	ERPI5	<i>Erioneuron pilosum</i>	22-101	–
Forb					
8	Forbs			123-202	
	Indian mallow	ABUT1	<i>Abutilon</i>	123-202	–
	white sagebrush	ARLUM2	<i>Artemisia ludoviciana</i> ssp. <i>mexicana</i>	123-202	–
	croton	CROTO	<i>Croton</i>	123-202	–
	bundleflower	DESMA	<i>Desmanthus</i>	123-202	–
	Engelmann's daisy	ENGEL	<i>Engelmannia</i>	123-202	–
	beeblossom	GAURA	<i>Gaura</i>	123-202	–
	Chalk Hill hymenopappus	HYTE2	<i>Hymenopappus tenuifolius</i>	123-202	–
	trailing krameria	KRLA	<i>Krameria lanceolata</i>	123-202	–
	menodora	MENOD	<i>Menodora</i>	123-202	–
	Nuttall's sensitive-briar	MINU6	<i>Mimosa nuttallii</i>	123-202	–
	Texas sage	SATE3	<i>Salvia texana</i>	123-202	–
	awnless bushsunflower	SICA7	<i>Simsia calva</i>	123-202	–
	greenthread	THELE	<i>Thelesperma</i>	123-202	–
	vervain	VERBE	<i>Verbena</i>	123-202	–

	creepingoxeye	WEDEL	<i>Wedelia</i>	123-202	–
9	Annual Forbs			17-34	
	Forb, annual	2FA	<i>Forb, annual</i>	17-34	–
Shrub/Vine					
10	Shrubs/Vines			62-101	
	catclaw acacia	ACGR	<i>Acacia greggii</i>	62-101	–
	roundflower catclaw	ACRO	<i>Acacia roemeriana</i>	62-101	–
	snakewood	CONDA	<i>Condalia</i>	62-101	–
	featherplume	DAFO	<i>Dalea formosa</i>	62-101	–
	jointfir	EPHED	<i>Ephedra</i>	62-101	–
	Texas kidneywood	EYTE	<i>Eysenhardtia texana</i>	62-101	–
	stretchberry	FOPU2	<i>Forestiera pubescens</i>	62-101	–
	Texas barometer bush	LEFR3	<i>Leucophyllum frutescens</i>	62-101	–
	algerita	MATR3	<i>Mahonia trifoliolata</i>	62-101	–
	Texas sacahuista	NOTE	<i>Nolina texana</i>	62-101	–
	littleleaf sumac	RHMI3	<i>Rhus microphylla</i>	62-101	–
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	62-101	–
	evergreen sumac	RHVI3	<i>Rhus virens</i>	62-101	–

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 3.1 plant community composition

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

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 well drained with low water-holding capacity but is able to make use of small rainfall events. It does not lend itself to aquifer recharge. The site is located at higher elevations with steeper slopes, so the potential for rapid runoff is high, particularly when in a denuded state during heavy rainfall. Erosion can be quite high on this site, and as the erosion process continues the hydrologic characteristics worsen.

Recreational uses

This site has the appeal of the wide-open spaces and a wide variety of plant and animal life. When winter and early spring moisture is available, colorful annual and perennial forbs create scenic beauty. The area is also used for hunting, birding, and other eco-tourism related enterprises.

Inventory data references

Information presented here is derived from literature, limited NRCS clipping data (417s), field observations, and personal contacts with range-trained personnel.

Other references

Archer, S. 1994. Woody plant encroachment into southwestern grasslands and savannas: Rates, patterns, and proximate causes. *Ecological implications of livestock herbivory in the West*, 13-68.

Archer, S. and F. E. Smeins. 1991. Ecosystem-level processes. *Grazing Management: An Ecological Perspective*. Edited by R.K. Heischmidt and J.W. Stuth. Timber Press, Portland, OR.

Bestelmeyer, B. T., J. R. Brown, K. M. Havstad, R. Alexander, G. Chavez, and J. E. Herrick. 2003. Development and use of state-and-transition models for rangelands. *Journal of Range Management*, 56(2):114-126.

Bracht, V. 1931. Texas in 1848. German-Texan Heritage Society, Department of Modern Languages, Southwest Texas State University, San Marcos, TX.

Bray, W. L. 1904. The timber of the Edwards Plateau of Texas: Its relations to climate, water supply, and soil. No. 49. US Department of Agriculture, Bureau of Forestry.

Briske, D. D., S. D. Fuhlendorf, and F. E. Smeins. 2005. State-and-transition models, thresholds, and rangeland health: A synthesis of ecological concepts and perspectives. *Rangeland Ecology and Management*, 58(1):1-10.

Brothers, A., M. E. Ray Jr., and C. McTee. 1998. Producing quality whitetails, revised edition. Texas Wildlife Association, San Antonio, TX.

Brown, J. K. and J. K. Smith. 2000. Wildland fire in ecosystems, effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: US Department of Agriculture, Forest Service, Rocky Mountain Research Station, 257:42.

Davis, W. B. 1974. The Mammals of Texas. Texas Parks and Wildlife Department, 41.

Foster, J. H. 1917. The spread of timbered areas in central Texas. *Journal of Forestry* 15(4):442-445.

Frost, C. C. 1998. Presettlement fire frequency regimes of the United States: A first approximation. *Fire in ecosystem management: Shifting the paradigm from suppression to prescription*. Tall Timbers Fire Ecology Conference Proceedings, 20:70-81.

Gould, F. W. 1975. The grasses of Texas. The Texas Agricultural Experiment Station, Texas A&M University Press, College Station, TX.

Hatch, S. L. and J. Pluhar. 1993. Texas Range Plants. Texas A&M University Press, College Station, TX.

Hamilton, W. and D. Ueckert. 2005. Rangeland woody plant control--past, present, and future. Texas A&M University Press. College Station, TX.

- Hart, C. R., A. McGinty, and B. B. Carpenter. 1998. Toxic plants handbook: Integrated management strategies for West Texas. Texas Agricultural Extension Service, The Texas A&M University, College Station, TX.
- Heitschmidt, R. K. and J. W. Stuth. 1991. Grazing management: An ecological perspective. Timberline Press, Portland, OR.
- Loughmiller, C. and L. Loughmiller. 1984. Texas wildflowers. University of Texas Press, Austin, TX.
- Milchunas, D. G. 2006. Responses of plant communities to grazing in the southwestern United States. Gen. Tech. Rep RMRS-GTR-169. Fort Collins, CO: US Department of Agriculture, Forest Service, Rocky Mountain Research Station, 126:169.
- Niehaus, T. F. 1998. A field guide to Southwestern and Texas wildflowers (Vol. 31). Houghton Mifflin Harcourt, Boston, MA.
- Ramsey, C. W. 1970. Texotics. Texas Parks and Wildlife Department, Austin, TX.
- Roemer, F. translated by O. Mueller. 1995. Roemer's Texas, 1845 to 1847. Texas Wildlife Association, San Antonio, TX.
- Scifres, C. J. and W. T. Hamilton. 1993. Prescribed burning for brushland management: The South Texas example. Texas A&M Press, College Station, TX.
- Smeins, F. E., S. Fuhlendorf, and C. Taylor, Jr. 1997. Environmental and land use changes: A long term perspective. Juniper Symposium, 1-21.
- Taylor, C. A. and F. E. Smeins. 1994. A history of land use of the Edwards Plateau and its effect on the native vegetation. Juniper Symposium, 94:2.
- Thurow, T. L. 1991. Hydrology and erosion. Grazing Management: An Ecological Perspective. Edited by R.K. Heitschmidt and J.W. Stuth. Timber Press, Portland, OR.
- Tull, D. and G. O. Miller. 1991. A field guide to wildflowers, trees and shrubs of Texas. Texas Monthly Publishing, Houston, TX.
- USDA-NRCS. 1997. National range and pasture handbook. Washington, DC: United States Department of Agriculture. Natural Resources Conservation Service, Grazing Lands Technology Institute.
- Weniger, D. 1997. The explorers' Texas: The animals they found. Eakin Press, Austin, TX.
- Weniger, D. 1984. The explorers' Texas: The lands and waters. Eakin Press, Austin, TX.
- Vines, R. A. 1984. Trees of Central Texas. University of Texas Press, Austin, TX.
- Vines, R. A. 1960. Trees, shrubs and vines of the Southwest. University of Texas Press, Austin, TX.

Contributors

Bruce Deere

Edits by Travis Waiser, MLRA Leader, NRCS, Kerrville, TX

Approval

Bryan Christensen, 9/19/2023

Acknowledgments

QC/QA completed by: Bryan Christensen, SRESS, NRCS, Temple, TX Erin Hourihan, ESDQS, NRCS, Temple, TX

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	08/19/2026
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. Number and extent of rills:

2. Presence of water flow patterns:

3. Number and height of erosional pedestals or terracettes:

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

5. Number of gullies and erosion associated with gullies:

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

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

8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):

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

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

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

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:

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

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

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

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:

17. Perennial plant reproductive capability:
