USDA Natural Resources Conservation Service

Ecological site R150AY542TX
Sandy Loam

Last updated: 9/20/2019
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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 150A–Gulf Coast Prairies

MLRA 150A is in the West Gulf Coastal Plain Section of the Coastal Plain Province of the Atlantic Plain in Texas (83 percent) and Louisiana (17 percent). It makes up about 16,365 square miles (42,410 square kilometers). It is characterized by nearly level plains that have low local relief and are dissected by rivers and streams that flow toward the Gulf of Mexico. Elevation ranges from sea level to about 165 feet (0 to 50 meters) along the interior margin. It includes the towns of Crowley, Eunice, and Lake Charles, Louisiana, and Beaumont, Houston, Bay City, Victoria, Corpus Christi, Robstown, and Kingsville, Texas. Interstates 10 and 45 are in the northeastern part of the area, and Interstate 37 is in the southwestern part. U.S. Highways 90 and 190 are in the eastern part, in Louisiana. U.S. Highway 77 passes through Kingsville, Texas. The Attwater Prairie Chicken National Wildlife Refuge and the Fannin Battleground State Historic Site are in the part of the area in Texas.

Classification relationships

USDA-Natural Resources Conservation Service, 2006.
-Major Land Resource Area (MLRA) 150A

Ecological site concept

The Sandy Loam ecological site typically has a fine sandy loam or very fine sandy loam surface. Sandy clay loam subsoil horizons are generally present 15 to 18 inches below the surface.

Associated sites

R150AY526TX	**Southern Blackland** Surface textures are heavier (clay and clay loam).
R150AY535TX	**Southern Loamy Prairie** Adjacent to site.

Similar sites

R150AY543TX	**Sandy Prairie** Slightly higher production than Sandy Loam.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

The Sandy Loam site was formed in loamy fluviomarine deposits of Pleistocene age. This nearly level to gently sloping site occurs on linear or convex stream terraces on the Coastal Plains. Runoff ranges from low to high depending upon the slope. Elevation of this site ranges from 50 to 250 feet.

Table 2. Representative physiographic features

Landforms	(1) Stream terrace
Flooding frequency	None
Ponding frequency	None
Elevation	50–250 ft
Slope	0–5%
Water table depth	60 in
Aspect	Aspect is not a significant factor

Climatic features

The climate of MLRA 150A is humid subtropical with mild winters. The average annual precipitation in the northern two-thirds of this area is 45 to 63 inches. It is 28 inches at the extreme southern tip of the area and 30 to 45 inches in the southwestern third of the area. The precipitation is fairly evenly distributed, but it is slightly higher in late summer and midsummer in the western part of the area and slightly higher in winter in the eastern part. Rainfall typically occurs as moderate intensity, tropical storms that produce large amounts of rain during the winter. The average annual temperature is 66 to 72 degrees F. The freeze-free period averages 325 days and ranges from 290 to 365 days, increasing in length to the southwest.

Table 3. Representative climatic features

Frost-free period (characteristic range)	231-265 days
Freeze-free period (characteristic range)	365 days
Precipitation total (characteristic range)	34-48 in
Frost-free period (actual range)	221-320 days

Freeze-free period (actual range)	308-365 days
Precipitation total (actual range)	32-52 in
Frost-free period (average)	257 days
Freeze-free period (average)	355 days
Precipitation total (average)	42 in

Climate stations used

- (1) THOMPSONS 3 WSW [USC00418996], Richmond, TX
- (2) SEALY [USC00418160], Sealy, TX
- (3) COLUMBUS [USC00411911], Columbus, TX
- (4) NEW GULF [USC00416286], Boling, TX
- (5) ANGLETON 2 W [USC00410257], Angleton, TX
- (6) BAY CITY WTR WKS [USC00410569], Bay City, TX
- (7) DANEVANG 1 W [USC00412266], El Campo, TX
- (8) POINT COMFORT [USC00417140], Port Lavaca, TX
- (9) VICTORIA FIRE DEPT #5 [USC00419361], Victoria, TX
- (10) REFUGIO 2 NW [USC00417533], Refugio, TX
- (11) BEEVILLE CHASE NAAS [USW00012925], Beeville, TX
- (12) SINTON [USC00418354], Sinton, TX
- (13) C C BOTANICAL GARDENS [USC00412013], Corpus Christi, TX
- (14) ROBSTOWN [USC00417677], Robstown, TX

Influencing water features

Water perches on top of the argillic horizon for some time following extended heavy rainfall. Runoff ranges from low to high depending upon the slope.

Soil features

The soils are very deep, moderately well or well drained, with very slow or slow permeability. Other features consist of moderately acid to neutral soil reaction. The dominant surface texture is fine sandy loam with some inclusions of loamy fine sand. Diagnostic features and horizons include an ochric epipedon and argillic horizon. A representative ochric epipedon ranges from 5 to 10 inches thick. Some pedons exhibit vertic properties in the argillic horizon. Soils correlated to this site include: Blanconia, Copano, Fulshear, Inez, and Morales.

Table 4. Representative soil features

Surface texture	(1) Fine sandy loam (2) Loamy fine sand
Family particle size	(1) Fine (2) Fine-loamy
Drainage class	Moderately well drained to well drained
Permeability class	Very slow to slow
Soil depth	80 in
Available water capacity (0-40in)	6–9 in
Calcium carbonate equivalent (0-40in)	0–2%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0

Soil reaction (1:1 water) (0-40in)	5.6–7.3

Ecological dynamics

Historically, the site developed under grazing by buffalo and wildfires. Many fires were set by the Native Americans to assist in their hunting activities. Grazing was often heavy while the buffalo were in the area, but long deferments from grazing allowed the forage species to fully recover and regain their vigor. Live oak (*Quercus virginiana*) and post oak (*Quercus stellata*) are the dominant woody trees in the small mottes that are scattered throughout the tallgrass areas. Hackberry (Celtis spp.) and an occasional American elm (*Ulmus americana*) may also occur in the woody mottes. The mottes of trees also produced some woody shrubs such as yaupon (*Ilex vomitoria*) and American beautyberry (*Callicarpa americana*).

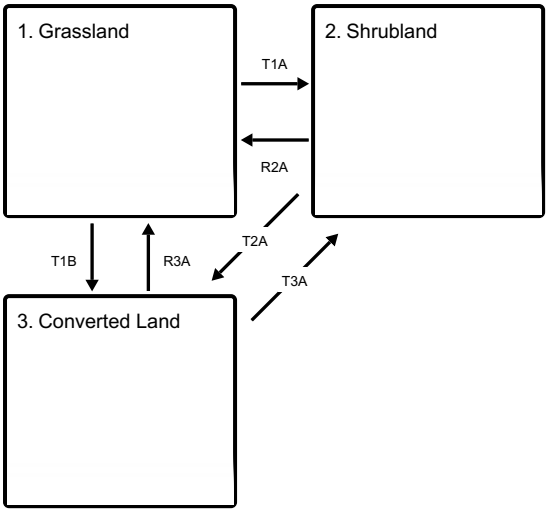
Little bluestem (*Schizachyrium scoparium*) is the dominant grass found in the reference plant community. Big bluestem (*Andropogon gerardii*), yellow Indiangrass (*Sorghastrum nutans*), crinkleawn (Trachypogon spp.), switchgrass (*Panicum virgatum*), and brownseed paspalum (*Paspalum plicatulum*) are also major contributors to the composition. Florida paspalum (*Paspalum floridanum*), tall dropseed (Sporobolus asper), Sideoats grama (*Bouteloua curtipendula*), and Texas wintergrass (Stipa leucotricha) are also common. The reference plant community is very productive and with the scattered mottes of woody vegetation providing cover, the site was readily used by wildlife. Periodic natural summer and winter fires kept the woody mottes of vegetation from increasing in abundance and kept the individual established mottes from getting larger.

When the site is overgrazed, big bluestem and Indiangrass disappear. If the overgrazing continues, little bluestem, Florida paspalum, switchgrass and many of the desirable forbs such as Engelmann daisy (*Engelmannia peristenia*), velvet bundleflower (*Desmanthus velutinus*), and awnless bush sunflower (*Simsia calva*) disappear. Pan American balsamscale (*Elionurus tripsacoides*) and many low-growing paspalums (Paspalum spp.) dramatically increase, as do many annual forbs. As the tallgrasses disappear, the site becomes a midgrass-dominated community. When midgrasses such as brownseed paspalum and knotroot bristlegrass (Setaria geniculata) dominate, they are susceptible to excessive grazing pressure and will deteriorate to a shortgrass prairie if the excessive continuous grazing continues. With grazing management and prescribed fire, restoration back to reference conditions are possible.

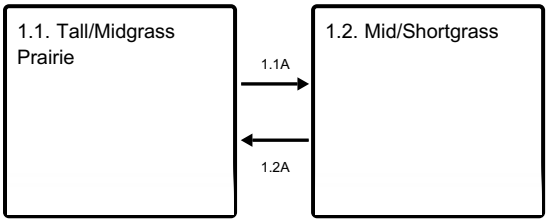
Overgrazing and the removal of fire causes susceptibility to increases in the sizes and number of mottes. Mesquite (*Prosopis glandulosa*) and huisache (Acacia smallii) seedlings will readily invade in an overgrazed condition. With the removal of fire, mesquite and huisache have little resistance. Cattle grazing mesquite beans from off-site areas dropping mesquite seeds with their manure also causes an increase in establishment. With the invasion of mesquite and huisache, the area can become a Shrubland State unless brush management arrests the encroachment. The Shrubland State starts when the woody invaders occupy about 15 percent canopy and reach approximately 6 feet tall. If this trend continues, mesquite and huisache will dominate in about 15 years. Prescribed fire, grazing management, and brush management must be used to restore reference conditions.

State and transition model

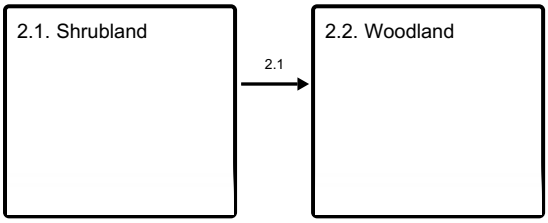
Ecosystem states



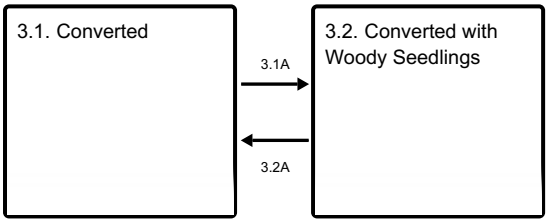
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Grassland

Community 1.1
Tall/Midgrass Prairie

This reference plant community is a fire-dependent grassland composed primarily of tallgrasses and midgrasses that make up to 70 percent of the composition. Forbs make up 5 percent of the composition and woody shrubs, mainly yaupon, American beautyberry, and dewberry (Rubus spp.), comprise 5 percent of the composition. Trees, consisting of either live oak or post oak, dominate the small mottes found on the site. An occasional American elm or hackberry may be found in the tree mix. Productivity is very high and litter accumulates covering approximately 60 to 75 percent. Crusting does not occur on the soil surface and bare ground is less than 10 percent. Native legumes occur in relatively high numbers. Continuous grazing with excessive livestock numbers has had a major impact on the vegetation. The reduction in grass volume also reduces the incidence of wildfires allowing woody seedlings to escape fire and grow large enough to become fire tolerant. Moreover, as overgrazing continues, the more palatable tallgrasses are replaced by less desirable grasses. Basal densities of grass species will decline as does ground litter. Bare ground increases, as does annual production of annual forbs. Soil erosion is not a problem due to the

flatness of the landscape. Once the woody invaders to this site such as mesquite, huisache and/or McCartney Rose seedlings appear in small numbers, the window of opportunity to control these plants before they become a serious problem is only very few years. Once the threshold of 15 percent canopy cover is surpassed, control requires a significant amount of resources in time, energy and money to restore the grassland.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	2800	4900	5600
Tree	800	1400	1600
Forb	200	350	400
Shrub/Vine	200	350	400
Total	**4000**	**7000**	**8000**

Figure 9. Plant community growth curve (percent production by month). TX7606, Tall/Midgrass Prairie Community. Prairie Community composed of warm-season tall and midgrasses..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	4	12	24	23	8	5	12	4	3	2

Community 1.2
Mid/Shortgrass

This community emerges as heavy grazing without rest removes the tallgrass component of the reference plant community. As tallgrasses begin to disappear, midgrass and shortgrass such as little bluestem, brownseed paspalum, longspike tridens, sideoats grama and Pan American balsamscale correspondingly increase. Fire frequency and intensity is decreased due to a reduction in fine fuel loads. This site can easily be returned to the reference community through the use of prescribed grazing and prescribed burning.

Pathway 1.1A
Community 1.1 to 1.2

Heavy continuous grazing and lack of fire will transition the site to Community 1.2.

Pathway 1.2A
Community 1.2 to 1.1

Prescribed grazing and prescribed burning will return the site to Community 1.1.

State 2
Shrubland

Community 2.1
Shrubland

The exclusion of brush management will lead to the invasion of the Grassland State (1) by mesquite and huisache. In some locations, Macartney rose is a prolific invader. Overgrazing will speed up the process as the opportunity for suppressing fire is removed and the seedlings do not receive completion from grasses. In addition to these invader species, the oak mottes will increase in size and number. Thick post oak mottes are common where overgrazing and fire removal have been practiced for an extended period. Continued overgrazing with no rest will kill the dominant grass species. As woody seedlings become established, there is still an opportunity to use grazing management, prescribed burning, and brush control to restore the site back to the Grassland State (1). When the brush exceeds 15 percent canopy, the process to restore the tallgrass prairie becomes more difficult and begins transitioning to the Woodland Community (2.2).

Community 2.2
Woodland

The further exclusion of brush management will lead to the invasion of mesquites and huisache. Continued overgrazing exacerbates the process. At this point, brush management is needed to restore the community back to reference conditions. Brush management can be mechanical or chemical. Specific restoration efforts will depend on the land manager's goals. In some instances, this can be the desired community for land use goals.

Pathway 2.1
Community 2.1 to 2.2

Continued overgrazing, lack of fire, and lack of brush control transition the Shubland (2.1) into the Woodland Community (2.2).

State 3
Converted Land

Community 3.1
Converted

This site has been cleared of all native grasses, forbs, woody shrubs, and trees and planted to an introduced forage species such as bermudagrass, Old World bluestems, and occasionally kleingrass. This conversion requires annual fertility and periodic chemical weed control. A few live oak trees are usually left for livestock shade and aesthetics. If the chemical weed control and fertility applications are stopped and overgrazing occurs, mesquite and huisache will invade and will transition to Community 3.2.

Community 3.2
Converted with Woody Seedlings

When the site is continuously overgrazed for long periods of time and fire is removed, woody plants will invade. These woody plants are primarily mesquite and huisache seedlings. The threshold for this community is reached when seedlings grow to occupy about 15 to 20 percent canopy with a height of about 6 feet tall. At this point, the site will transition to State 2. Community 3.2 can possibly be restored back to the grassland state with the use of grazing management, prescribed fire, and chemical brush control if enough damage has not occurred to the soil health.

Pathway 3.1A
Community 3.1 to 3.2

Lack of brush control will result in woody seedlings invade the Converted Land Community.

Pathway 3.2A
Community 3.2 to 3.1

Brush control and weed management will restore the site back to the Converted Land Community (3.1).

Transition T1A
State 1 to 2

Continuous overgrazing, lack of fire, and lack of brush management will transition the site to State 2.

Transition T1B
State 1 to 3

Converting to crops or pastureland transitions the site to State 3.

Restoration pathway R2A
State 2 to 1

Brush management, prescribed grazing, and eventually prescribed fire will restore the Shrubland State back to reference conditions.

Transition T2A
State 2 to 3

Converting to crops or pastureland transitions the site to State 3.

Restoration pathway R3A
State 3 to 1

Restoration from the Converted State is very difficult as many introduced species are hard to control. Chemical control is usually necessary to try and rid unwanted species, while range seeding is needed to reestablish the reference community. If enough damage has occurred to the soil health, full restoration may be impractical.

Transition T3A
State 3 to 2

Lack of brush control will allow the woody seedling to form a canopy and transition the site to State 2.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Tallgrasses**			2240–4480	
	big bluestem	ANGE	*Andropogon gerardii*	2240–4480	–
	Florida paspalum	PAFL4	*Paspalum floridanum*	2240–4480	–
	switchgrass	PAVI2	*Panicum virgatum*	2240–4480	–
	little bluestem	SCSC	*Schizachyrium scoparium*	2240–4480	–
	Indiangrass	SONU2	*Sorghastrum nutans*	2240–4480	–
	spiked crinkleawn	TRSP12	*Trachypogon spicatus*	2240–4480	–
2	**Mid/Shortgrasses**			420–840	
	sideoats grama	BOCU	*Bouteloua curtipendula*	420–840	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	420–840	–
	sedge	CAREX	*Carex*	420–840	–
	Virginia wildrye	ELVI3	*Elymus virginicus*	420–840	–
	Texas wintergrass	NALE3	*Nassella leucotricha*	420–840	–
	panicgrass	PANIC	*Panicum*	420–840	–
	brownseed paspalum	PAPL3	*Paspalum plicatulum*	420–840	–
	crowngrass	PASPA2	*Paspalum*	420–840	–
	marsh bristlegrass	SEPA10	*Setaria parviflora*	420–840	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	420–840	–
	purpletop tridens	TRFL2	*Tridens flavus*	420–840	–
3	**Mid/Shortgrasses**			140–280	
	hairy grama	BOHI2	*Bouteloua hirsuta*	140–280	–

	hairy grama	BOHI2	*Bouteloua hirsuta*	140–280	
	fall witchgrass	DICO6	*Digitaria cognata*	140–280	–
	Pan American balsamscale	ELTR4	*Elionurus tripsacoides*	140–280	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	140–280	–
	longspike tridens	TRST2	*Tridens strictus*	140–280	–
4	**Shortgrasses**			0–1	
	threeawn	ARIST	*Aristida*	0–1	–
	buffalograss	BODA2	*Bouteloua dactyloides*	0–1	–
	Texas grama	BORI	*Bouteloua rigidiseta*	0–1	–
	gulfhairawn muhly	MUFI3	*Muhlenbergia filipes*	0–1	–
	slim tridens	TRMU	*Tridens muticus*	0–1	–
Forb					
5	**Forbs**			200–400	
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	200–400	–
	partridge pea	CHFA2	*Chamaecrista fasciculata*	200–400	–
	Texas croton	CRTE4	*Croton texensis*	200–400	–
	purple dalea	DALA4	*Dalea lasiathera*	200–400	–
	velvet bundleflower	DEVE2	*Desmanthus velutinus*	200–400	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	200–400	–
	button eryngo	ERYU	*Eryngium yuccifolium*	200–400	–
	snow on the prairie	EUBI2	*Euphorbia bicolor*	200–400	–
	coastal indigo	INMI	*Indigofera miniata*	200–400	–
	dotted blazing star	LIPU	*Liatris punctata*	200–400	–
	Nuttall's sensitive-briar	MINU6	*Mimosa nuttallii*	200–400	–
	yellow puff	NELU2	*Neptunia lutea*	200–400	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	200–400	–
	least snoutbean	RHMI4	*Rhynchosia minima*	200–400	–
	awnless bushsunflower	SICA7	*Simsia calva*	200–400	–
	amberique-bean	STHE9	*Strophostyles helvola*	200–400	–
6	**Forbs**			0–1	
	prairie broomweed	AMDR	*Amphiachyris dracunculoides*	0–1	–
	eryngo	ERYNG	*Eryngium*	0–1	–
	sneezeweed	HEAM	*Helenium amarum*	0–1	–
	lemon beebalm	MOCI	*Monarda citriodora*	0–1	–
	phlox	PHLOX	*Phlox*	0–1	–
	snoutbean	RHYNC2	*Rhynchosia*	0–1	–
Shrub/Vine					
7	**Shrubs/Vines**			200–400	
	American beautyberry	CAAM2	*Callicarpa americana*	200–400	–
	yaupon	ILVO	*Ilex vomitoria*	200–400	–
	pricklypear	OPUNT	*Opuntia*	200–400	–
	Oklahoma blackberry	RUOK	*Rubus oklahomus*	200–400	–
	greenbrier	SMILA2	*Smilax*	200–400	–

	mustang grape	VIMU2	*Vitis mustangensis*	200–400	–
Tree					
8	**Trees**			800–1600	
	hackberry	CELTI	*Celtis*	800–1600	–
	Texas hawthorn	CRTE2	*Crataegus texana*	800–1600	–
	post oak	QUST	*Quercus stellata*	800–1600	–
	live oak	QUVI	*Quercus virginiana*	800–1600	–
	gum bully	SILAO	*Sideroxylon lanuginosum ssp. oblongifolium*	800–1600	–
	American elm	ULAM	*Ulmus americana*	800–1600	–
9	**Trees**			0–1	
	American plum	PRAM	*Prunus americana*	0–1	–
	blackjack oak	QUMA3	*Quercus marilandica*	0–1	–
	lime pricklyash	ZAFA	*Zanthoxylum fagara*	0–1	–

Animal community

The Coastal Prairie communities support a wide array of animals. Cattle and many species of wildlife make extensive use of the site. White-tailed deer may be found scattered across the prairie and are found in heavier concentrations where woody cover exists. Feral hogs are present and at times abundant. Coyotes are abundant and fill the mammalian predator niche. Rodent populations rise during drier periods and fall during periods of inundation. Attwater's pocket gophers are abundant and have an important impact on the ecology of the site. The badger is present but not abundant in locations at the southern extent of the site. Locally unique species alligators and bullfrogs.

The region is a major flyway for waterfowl and migrating birds. Hundreds of thousands of ducks, geese, and sandhill cranes abound during winter. Two important endangered species occur in the area, the whooping crane and Attwater's prairie chicken. Many other species of avian predators including northern harriers, ferruginous hawks, red-tailed hawks, white-tailed kites, kestrels, and, occasionally, swallow-tailed kites utilize the vast grasslands. Many species of grassland birds use the site, including blue grosbeaks, dickcissels, eastern meadowlarks, several sparrows, including, vesper sparrow, lark sparrow, savannah sparrow, grasshopper sparrow, and Le Conte's sparrow.

Inventory data references

Existing NRCS Range site descriptions and SCS-417 data were used to obtain vegetative information for this site. Three SCS-417's were available from one county for this site. Existing plant communities were ascertained through fieldwork on private ranches.

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Rangeland health reference sheet

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

Author(s)/participant(s)	
Contact for lead author	
Date	
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:

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

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

---

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

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

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

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

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17. **Perennial plant reproductive capability:**
