Ecological site NX118A01Y003
Rarely Flooded Terrace

Last updated: 9/22/2023
Accessed: 05/13/2025

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): 118A–Arkansas Valley and Ridges, Eastern Part

Major Land Resource Area 118A, Arkansas Valley and Ridges Eastern Part, is in Arkansas and Oklahoma. This MLRA is about 6,755 square miles (17,495 square kilometers). The Ozark National Forest and the northern portion of the Ouachita National Forest occur in this MLRA.

This area is mostly in the Arkansas Valley Section of the Ouachita Province of the Interior Highlands. Small areas in the southeast corner and the south-central part of the MLRA are in the Ouachita Mountains. This MLRA consists of long, narrow ridges and high flat-topped mountains capped with sandstone that trend northeastward. Crests are narrow and rolling on ridges, while broad and flat on mountaintops. The intervening valleys are broad and smooth. Elevations generally range from 310 feet (90 meters) to 760 feet (230 meters) with higher and lower elevations on the valleys and ridgetops.

The ridgetops and valleys in this MLRA are underlain by slightly folded to level beds of sandstone and shale of the Pennsylvanian age. The terrace deposits along the Arkansas River include a complex sequence of unconsolidated gravel, sandy gravel, sands, silty sands, silts, clayey silts, and clays. The individual deposits are commonly lenticular and discontinuous. At least three terrace levels are recognized with the lowest being the youngest.

The dominant soil orders in this MLRA are Ultisols. The soils in the area have a thermic soil temperature regime, a udic soil moisture regime, and mixed or siliceous mineralogy.

Ecological site concept

The Rarely Flooded Terrace Ecological Site is in river valleys along stream terraces. This site has slopes between 0 and 3 percent with elevations ranging from 40 to 1,000 feet (12 to 300 meters). The soils associated with this site are very deep and formed in alluvium derived from sandstone and shale. Defining characteristics associated with this site are rare flooding events for brief periods and a layer of clay accumulation within 20 inches (50 cm) of the soil surface.

Associated sites

NX118A01Y008	**Fluventic Flood Plain** Found on river valleys along flood plains. This ecological site is differentiated from the Rarely Flooded Terrace Ecological Site by landscape position and the absence of a layer of clay accumulation.

Similar sites

NX118A01Y007	**Seasonally Wet Terraces and Footslopes** Found on hills and valleys along hillslopes, flood plains, and paleoterraces. This ecological site is differentiated from the Rarely Flooded Terrace Ecological Site by a clay content of greater than 18 percent in the particle size control section.

Table 1. Dominant plant species

Tree	(1) *Quercus* (2) *Carya*
Shrub	Not specified
Herbaceous	(1) *Panicum virgatum* (2) *Schizachyrium scoparium*

Legacy ID

F118AY003AR

Physiographic features

This ecological site is on river valleys along stream terraces. This site has slopes between 0 and 3 percent. Elevations range from 40 to 1,000 feet (12 to 300 meters). Runoff class varies from low to medium, with no ponding and very rare flooding for brief durations.

Table 2. Representative physiographic features

Landforms	(1) River valley > Stream terrace
Runoff class	Low to medium
Flooding duration	Extremely brief (0.1 to 4 hours) to brief (2 to 7 days)
Flooding frequency	Very rare to rare
Ponding frequency	None
Elevation	12–305 m
Slope	0–3%
Aspect	Aspect is not a significant factor

Climatic features

This ecological site is characterized by hot summers, cool winters, and mild spring and fall temperatures. Mean annual precipitation is 49 inches. The average frost-free period is 193 days, and the average freeze-free period is 212 days. The highest precipitation occurs in May (6 inches), and the lowest occurs in January (2.8 inches). The warmest month of the year is August (94°F average high), and the coolest is January (26°F average low).

Thunderstorms and heat waves are common and occur frequently during summer months. Catastrophic storm events, such as tornados, ice-storms, floods, and hail-storms are also known to occasionally occur within this ecological site. According to the Oklahoma Water Resource Board, drought occurs on 5 to 10 year cycles. The EPA predicts that droughts will become more severe throughout Arkansas due to longer periods without rain and an increase in very hot days (EPA, 2016).

Data was provided by the Blue Mountain Dam, Clarksville, Greers Ferry Dam, Poteau, Sallisaw, and Subiaco climate stations. Site specific data should be obtained by accessing the database provided by the National Centers for Environmental Information (https://www.ncdc.noaa.gov/cdo-web/search).

Table 3. Representative climatic features

Frost-free period (characteristic range)	191-194 days

Freeze-free period (characteristic range)	210-216 days
Precipitation total (characteristic range)	1,219-1,295 mm
Frost-free period (actual range)	189-195 days
Freeze-free period (actual range)	202-219 days
Precipitation total (actual range)	1,194-1,295 mm
Frost-free period (average)	193 days
Freeze-free period (average)	212 days
Precipitation total (average)	1,245 mm

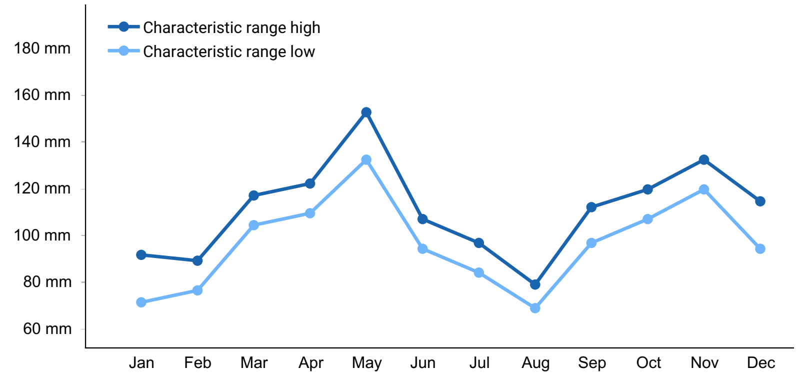


Figure 1. Monthly precipitation range

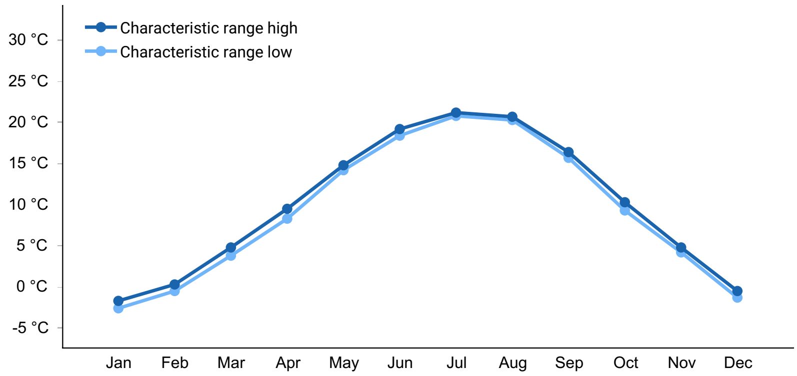


Figure 2. Monthly minimum temperature range

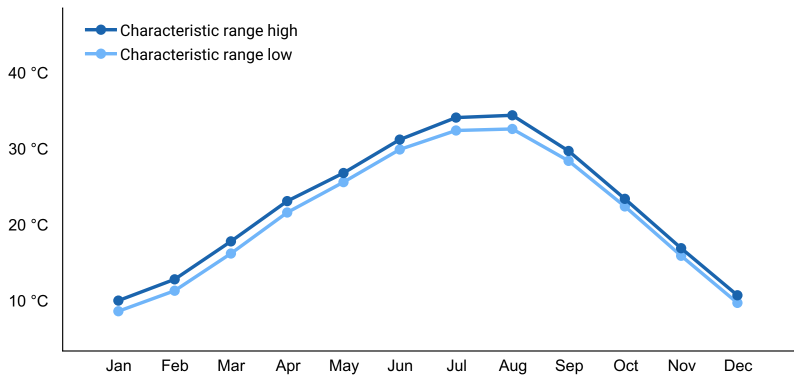


Figure 3. Monthly maximum temperature range

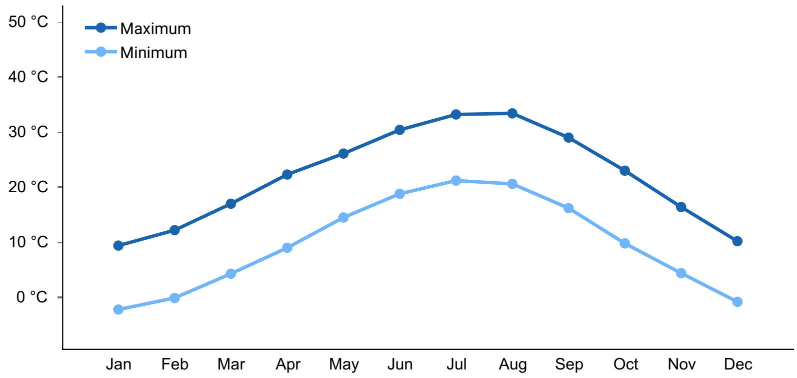


Figure 4. Monthly average minimum and maximum temperature

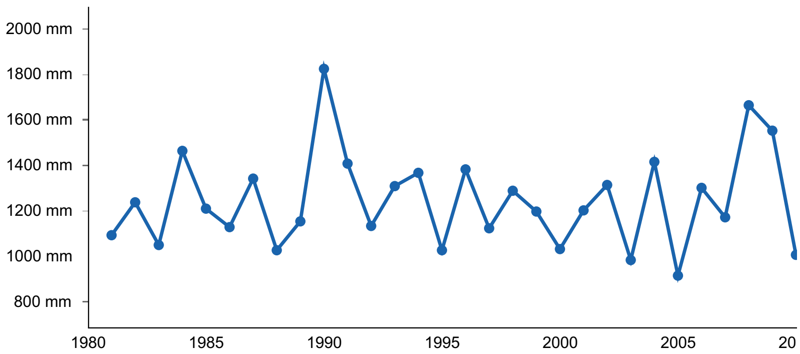


Figure 5. Annual precipitation pattern

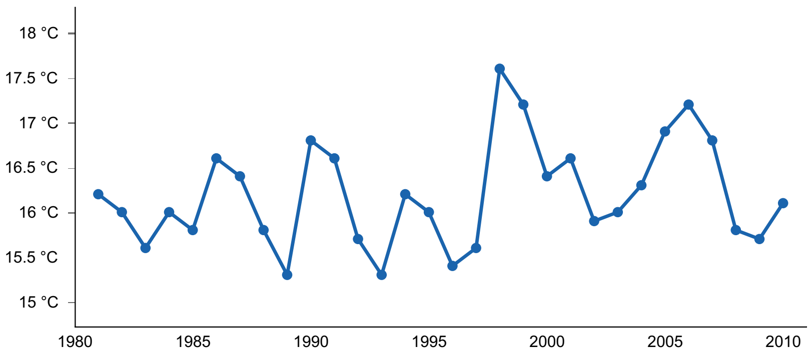


Figure 6. Annual average temperature pattern

Climate stations used

- (1) CLARKSVILLE 6 NE [USC00031457], Clarksville, AR
- (2) SUBIACO [USC00036928], Paris, AR
- (3) POTEAU WTR WKS [USC00347254], Poteau, OK
- (4) SALLISAW 2 NW [USC00347862], Sallisaw, OK
- (5) BLUE MTN DAM [USC00030798], Havana, AR
- (6) GREERS FERRY DAM [USC00032978], Tumbling Shoals, AR

Influencing water features

This ecological site may be subject to very rare to rare flooding events (1 time in 100 years to 1 to 5 times per 100 years) for extremely brief to brief durations (less than 4 hours to 2 to 7 days).

Wetland description

This ecological site is not significantly influenced by wetlands.

Soil features

The soils associated with this ecological site are formed in alluvium derived from sandstone and shale. These soils are very deep, well drained, and have a moderate permeability class. A silt loam or fine sandy loam surface texture is common. Important abiotic characteristics associated with this site are a layer of clay accumulation within 20 inches (50 cm) of the soil surface, and potential redox reactions in the Bt horizon.

The soil series associated with this site are Kamie, Muldraw, Porum, and Rexor.

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone and shale
Surface texture	(1) Silt loam (2) Fine sandy loam
Drainage class	Well drained
Permeability class	Moderate
Soil depth	152–203 cm
Surface fragment cover <=3"	0–1%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	11.43–20.07 cm
Soil reaction (1:1 water) (Depth not specified)	4.5–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–1%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The Rarely Flooded Terrace reference state consists of a bottomland hardwood forest. The common trees species for this state are oaks, hickories, loblolly pine, and sweet gum (Eldredge, 1937).

Fire has a significant influence on this ecological site. The historical average fire-return interval was likely between 3 and 25 years (Guyette and Spetich, 2003; Hallgren, DeSantic, and Burton, 2012). These fires would occur naturally through lightning strikes, but the majority were probably ignited by anthropogenic sources (DeSantis, Hallgren, and Stahle, 2010). Native species evolved with and responded well to fires (Spetich and Hong He, 2008; Engle and Bidwell, 2001). Fires on upland ecological sites are likely moderate to low severity, due to forested conditions and lower amounts of ground vegetation (Carey, 1992).

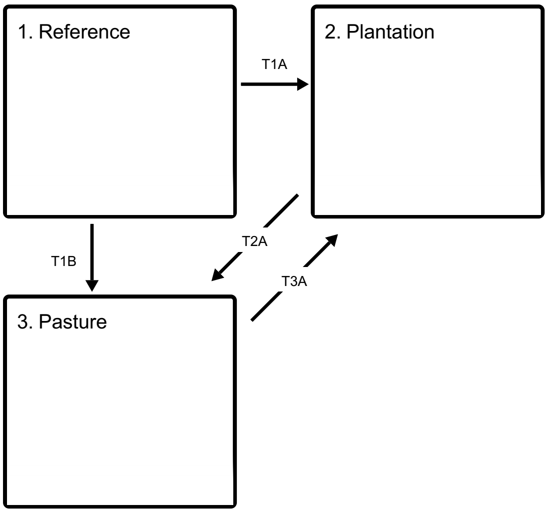
Grazing and farming can occur on this ecological site. Changes to the ecological dynamics are proportional to the intensity of livestock grazing and can be accelerated by overgrazing (Angerer, Fox, and Wolfe, 2013; Kohl, 2016). For example, desirable grasses and forbs are repeatedly grazed by livestock, weakening, and potentially killing or replacing these species with less desirable species (Smith, 1940).

Climate related events, such as hail-storms, tornados, thunderstorms, and extreme precipitation, occur on these sites. Hail-storms can reduce canopy size, increase litter deposition, and increase tree bark removal. When paired with other disturbances, such as fire, the effects on tree species were much greater than in areas not affected by hail-storms (Gower et al., 2015). Tornados have been shown to change plant community compositions in savanna ecosystems, favoring hardwoods and eliminating softwoods (Liu et al., 1997). Thunderstorms greatly effect ecosystem dynamics. Thunderstorms generally occur during summer months but can occur during every season. If a fire is started by a lightning strike, there will be different effects in the ecosystem depending on the season (Hiers, Wyatt, and Mitchell, 2000).

A state and transition model has been created to explain this Ecological Site. However, sparse data availability only allowed basic principles to be explored and a small number of species to be recorded. More data will be collected to provide a greater understanding of the ecological dynamics, as well as the resources consumption and distribution.

State and transition model

Ecosystem states



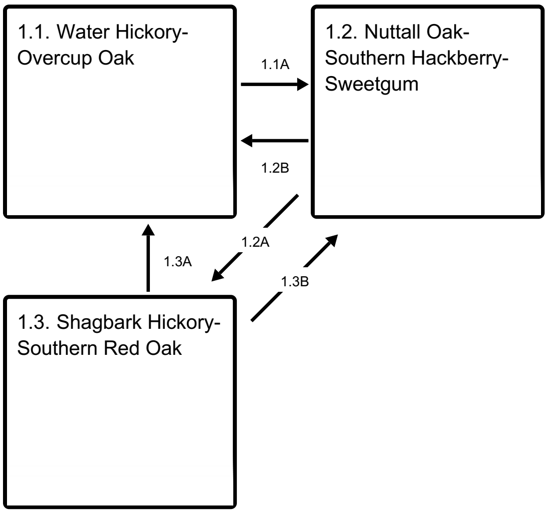
T1A - Tree removal, brush management, plantation tree establishment and management.

T1B - Tree removal, mechanical and chemical woody vegetation suppression, tillage, introduce annual or perennial forage species.

T2A - Woody species removal, prescribed fire, seeding, and grazing.

T3A - Forage species suppression, brush management, plantation tree establishment and management.

State 1 submodel, plant communities



1.1A - Less water during vegetation establishment.

1.2B - More water during vegetation establishment.

1.2A - Less water during vegetation establishment.

1.3A - More water during vegetation establishment.

1.3B - More water during vegetation establishment.

State 2 submodel, plant communities

2.1. Loblolly Pine

State 3 submodel, plant communities

3.1. Bermudagrass

State 1
Reference

The reference state is considered to be representative of the natural range of variability without major anthropogenic influences. Drivers- Climate (decadal scale), insect and disease presence or establishment, wildlife grazing or browsing, and wildfire frequency and intensity. Feedbacks- Water tolerant tree species dominate this ecological site, rare flooding events limit what species can grow and survive inundation.

Characteristics and indicators. The reference state consists of a bottomland hardwood forest. The common trees species for this state are oak, hickory, and hackberry.

Dominant plant species

- oak (*Quercus*), tree
- hybrid hickory (*Carya*), tree
- hackberry (*Celtis*), tree
- sycamore (*Platanus*), tree
- pine (*Pinus*), tree
- sweetgum (*Liquidambar*), tree

Community 1.1
Water Hickory-Overcup Oak

Community 1.2
Nuttall Oak- Southern Hackberry- Sweetgum

Community 1.3
Shagbark Hickory- Southern Red Oak

Pathway 1.1A
Community 1.1 to 1.2

This pathway consists of less water during vegetation establishment.

Pathway 1.2B
Community 1.2 to 1.1

This pathway consists of more water during vegetation establishment.

Pathway 1.2A

Community 1.2 to 1.3

This pathway consists of less water during vegetation establishment.

Pathway 1.3A
Community 1.3 to 1.1

This pathway consists of more water during vegetation establishment.

Pathway 1.3B
Community 1.3 to 1.2

This pathway consists of more water during vegetation establishment.

State 2
Plantation

The plantation state is characterized by the planting of merchantable trees species. The most common species for a plantation is loblolly pine. Community phases differ by tree type (softwood or hardwood) and the harvesting process. Drivers: Prescribed fires, pest management, vegetation management, canopy density. Feedbacks: Timber harvesting. Planted tree species dominate this ecological site, shading out other vegetation. Anthropogenic management decreases competition with other species and assists in growth.

Characteristics and indicators. A plantation state consists of tree species that are planted and managed to maximize the production of merchantable timber. The most common plantation species is loblolly pine, followed by hardwood trees. Community phases differ by tree type (softwood or hardwood), timber harvest method, management, and reforesting practices.

Dominant plant species

- loblolly pine (*Pinus taeda*), tree
- oak (*Quercus*), tree

Community 2.1
Loblolly Pine

Loblolly pine is planted to maximize timber production.

State 3
Pasture

The Pasture State is characterized by the dominance of improved forage species. The quality and quantity of forb, grass, and legume species within this state will depend on the level of management inputs including seeding, weed management, and land uses. Species of both warm-season and cool-season grasses are feasible for these sites. Drivers: Mechanical soil disturbance and seed planting, climate (decadal scale), seed dispersal, and wildlife or livestock grazing or browsing. Feedbacks: Land managers use mechanical and chemical equipment to increase forage. Inputs of fertilizer and brush management are required to maintain high productivity. Wildlife and livestock grazing and browsing decrease the amount of available forage.

Characteristics and indicators. The Pasture State consists of species that are grown for specific management goals, mainly livestock grazing. Common pasture species include buffalograss, western wheatgrass, little bluestem, sideoats grama, Bermudagrass, and bahiagrass. Quality and quantity of forb, grass, and legume species within this state depend on the level of management inputs (seeding, weed management, and land uses). Species of both warm-season and cool-season grasses are feasible for these sites.

Dominant plant species

- Bermudagrass (*Cynodon dactylon*), grass
- red clover (*Trifolium pratense*), grass

Community 3.1
Bermudagrass

Herbaceous species have been planted to maximize forage production for grazing livestock.

Transition T1A
State 1 to 2

Trigger: Merchantable tree planting, targeted vegetation suppression, prescribed fire, and fertilization. Slow Variables: Increased production and management of merchantable trees. Tree thinning when appropriate. Thresholds: Vegetation is removed and timber species are planted.

Transition T1B
State 1 to 3

Trigger: Tree removal, mechanical and chemical woody vegetation suppression, tillage, introduce annual or perennial forage species. Slow Variables: Increase production and management of forage species. Thresholds: Changes in soil properties, such as structure, organic matter, and nutrient cycling, as well as changes in type and frequency of disturbance.

Transition T2A
State 2 to 3

Trigger: Tree removal, mechanical and chemical woody vegetation suppression, tillage, introduce annual or perennial forage species. Slow Variables: Increase production and management of forage species. Thresholds: Changes in soil properties such as structure, organic matter, and nutrient cycling as well as changes in type and frequency of disturbance.

Transition T3A
State 3 to 2

Trigger: Merchantable tree planting, targeted vegetation suppression, prescribed fire, and fertilization. Slow Variables: Increased production and management of merchantable trees. Tree thinning when appropriate. Thresholds: Introduced forage species are suppressed due to management strategies and shading.

Additional community tables

Animal community

Common wildlife species include whitetail deer, coyote, armadillo, beaver, raccoon, skunk, opossum, muskrat, cottontail, mourning dove, turkey, fox squirrel, and gray squirrel.

Hydrological functions

Following are the estimated withdrawals of freshwater by use in this MLRA:

Public supply—surface-water, 24.4%; ground-water, 5.1%
Livestock—surface-water, 8.1%; ground-water, 0.6%
Irrigation—surface-water, 0.0%; ground-water, 0.0%
Other—surface-water, 61.8%; ground-water, 0.0%

The total withdrawals average 95 million gallons per day (360 million liters per day). About 6 percent is from ground-water sources, and 94 percent is from surface-water sources. The moderately high precipitation is adequate for crops and pasture. Large reservoirs on a few of the major streams are sources of municipal water and provide flood control and opportunities for recreation. The surface water is generally of good quality and is suitable for most uses. Shallow wells are the principal sources of water for domestic use. Deep wells are needed to obtain moderate to large quantities of ground water. Water from the Ozark aquifer system in the northern half of this area is suitable for drinking.

Recreational uses

Mountain biking, camping, fishing, hiking, horseback riding, hunting, mineral prospecting, nature viewing, off-highway vehicle riding, and water activities can all be enjoyed throughout this MLRA on public land where permitted and on private land where allowed. The Ozark National Forest is throughout this MLRA.

Wood products

Public and private timberland comprise large areas throughout this MLRA. Loblolly pine is the most popular species to harvest and produces products such as lumber, pulpwood, posts, and poles. Hardwood species are also harvested and used to produce lumber, flooring, and pulpwood.

Other products

Poultry production is a major industry throughout the MLRA. Small grains, soybeans, and hay are major crops.

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NatureServe
Oklahoma Water Resource Board
National Centers For Environmental Information
University of Arkansas
Oklahoma State University
Arkansas Department of Forestry
Oklahoma Department of Forestry

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Approval

Bryan Christensen, 9/22/2023

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Rangeland health reference sheet

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

Author(s)/participant(s)	
Contact for lead author	
Date	05/13/2025
Approved by	Bryan Christensen
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):

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

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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

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

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

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

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17. **Perennial plant reproductive capability:**
