

Ecological site F115XB022MO

Loess High Terrace Forest

Last updated: 12/30/2024
Accessed: 09/30/2026

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): 115X—Central Mississippi Valley Wooded Slopes

This MLRA is characterized by deeply dissected, loess-covered hills bordering well defined valleys of the Illinois, Mississippi, Missouri, Ohio, and Wabash Rivers and their tributaries. It is used to produce cash crops and livestock. About one-third of the area is forested, mostly on the steeper slopes. This area is in Illinois (50 percent), Missouri (36 percent), Indiana (13 percent), and Iowa (1 percent) in two separate areas. It makes up about 25,084 square miles (64,967 square kilometers). Most of this area is in the Till Plains section and the Dissected Till Plains section of the Central Lowland province of the Interior Plains. The Springfield-Salem plateaus section of the Ozarks Plateaus province of the Interior Highlands occurs along the Missouri River and the Mississippi River south of the confluence with the Missouri River. The nearly level to very steep uplands are dissected by both large and small tributaries of the Illinois, Mississippi, Missouri, Ohio, and Wabash Rivers. The Ohio River flows along the southernmost boundary of this area in Indiana. Well defined valleys with broad flood plains and numerous stream terraces are along the major streams and rivers. The flood plains along the smaller streams are narrow. Broad summits are nearly level to undulating. Karst topography is common in some parts along the Missouri and Mississippi Rivers and their tributaries. Well-developed karst areas have hundreds of sinkholes, caves, springs, and losing streams. In the St. Louis area, many of the karst features have been obliterated by urban development. Elevation ranges from 90 feet (20 meters) on the southernmost flood plains to 1,030 feet (320 meters) on the highest ridges. Local relief is mainly 10 to 50 feet (3 to 15 meters) but can be 50 to 150 feet (15 to 45 meters) in the steep, deeply dissected hills bordering rivers and streams. The bluffs along the major rivers are generally 200 to 350 feet (60 to 105 meters) above the valley floor. The uplands in this MLRA are covered almost entirely with Peoria Loess. The loess can be more than 7 feet (2 meters) thick on stable summits. On the steeper slopes, it is thin or does not occur. In Illinois, the loess is underlain mostly by Illinoian-age till that commonly contains a paleosol. Pre-Illinoian-age till is in parts of this MLRA in Iowa and Missouri and to a minor extent in the western part of Illinois. Wisconsin-age outwash, alluvial deposits, and sandy eolian material are on some of the stream terraces and on dunes along the major tributaries. The loess and glacial deposits are underlain by several bedrock systems. Pennsylvanian and Mississippian bedrock are the most extensive. To a lesser extent are Silurian, Devonian, Cretaceous, and Ordovician bedrock. Karst areas have formed where limestone is near the surface, mostly in the southern part of the MLRA along the Mississippi River and some of its major tributaries. Bedrock outcrops are common on the bluffs along the Mississippi, Ohio, and Wabash Rivers and their major tributaries and at the base of some steep slopes along minor streams and drainageways. The annual precipitation ranges from 35 to 49 inches (880 to 1,250 millimeters) with a mean of 41 inches (1,050 millimeters). The annual temperature ranges from 48 to 58 degrees F (8.6 to 14.3 degrees C) with a mean of 54 degrees F (12.3 degrees C). The freeze-free period ranges from 150 to 220 days with a mean of 195 days. Soils The dominant soil orders are Alfisols and, to a lesser extent, Entisols and Mollisols. The soils in the area have a mesic soil temperature regime, an aquic or udic soil moisture regime, and mixed or smectitic mineralogy. They are shallow to very deep, excessively drained to poorly drained, and loamy, silty, or clayey. The soils on uplands in this area support natural hardwoods. Oak, hickory, and sugar maple are the dominant species. Big bluestem, little bluestem, and scattered oak and eastern redcedar grow on some sites. The soils on flood plains support mixed forest vegetation, mainly American elm, eastern cottonwood, river birch, green ash, silver maple, sweetgum, American sycamore, pin oak, pecan, and willow. Sedge and grass meadows and scattered trees are on some low-lying sites. (United States Department of Agriculture, Natural Resources Conservation Service, 2022)

LRU notes

The Central Mississippi Valley Wooded Slopes, Western Part consists of deeply dissected, loess-covered hills bordering the Missouri and Mississippi Rivers as well as floodplains and terraces of these rivers. The Northern boundary runs along the South Fabius River valley separating it from the broad rounded interfluvies of the northern till plain. A major physiographic feature within the LRU (Land Resource Unit) includes the Lincoln Hills region. The Lincoln Hills extend along the Mississippi River in Missouri, starting about 40 miles (64 kilometers) northwest of St. Louis and extending north to Hannibal. The Lincoln Hills partially escaped the most recent glaciation in the region during the Pleistocene. In geology and biology, they resemble the rugged and forested hills of the Ozark Highlands (MLRA 116A) more than the rolling plains of northern Missouri. The underlying limestone bedrock has formed bluffs, glades, caves, springs, and

sinkholes. Elevation ranges from about 420 feet (128 meters) along the Mississippi River near Cape Girardeau, Missouri to about 830 feet (253 meters) near Clarksville along the Mississippi River upstream from St. Louis. High ridges near Hillsboro, Missouri can reach over 1,000 feet (305 meters). Underlying bedrock is mainly Ordovician-aged dolomite and sandstone, with Mississippian-aged limestone north of the Missouri River. Loess caps both stream and glacial outwash terraces along the major rivers along with Pre-Illinoian till near the edges of the area.

Classification relationships

Major Land Resource Area (MLRA) (USDA-NRCS, 2022): 115X–Central Mississippi Valley Wooded Slopes Terrestrial Natural Community Type in Missouri (Nelson, 2010): The reference state for this ecological site is most similar to a Mesic Bottomland Forest. Missouri Department of Conservation Forest and Woodland Communities (MDC, 2006): The reference state for this ecological site is most similar to a Mixed Hardwood Mesic Bottomland Forest. National Vegetation Classification System Vegetation Association (NatureServe, 2010): The reference state for this ecological site is most similar to a *Quercus alba* - *Quercus rubra* - *Acer saccharum* - *Carya cordiformis* / *Lindera benzoin* Forest (CEGL002058). Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002): This ecological site occurs primarily in Land Type Associations of the following Subsections: Inner Ozark Border Outer Ozark Border Mississippi River Hills

Ecological site concept

Loess High Terrace Forests are scattered throughout the Missouri River watershed portion of the MLRA, and in adjacent areas to the north. Soils are very deep, with no rooting restrictions. The reference plant community is forest dominated by a variety of trees including white oak, sugar maple, northern red oak, bitternut hickory, bur oak, American elm, black walnut and Kentucky coffeetree, with a well-developed understory and a rich herbaceous ground flora.

Associated sites

F115XB014MO	Chert Limestone/Dolomite Protected Backslope Forest Chert Limestone/Dolomite Protected Backslope Forest are upslope on northerly and easterly aspects.
F115XB031MO	Loamy Floodplain Forest Loamy Floodplain Forests are below in the floodplain.
F115XB046MO	Chert Limestone/Dolomite Exposed Backslope Woodland Chert Limestone/Dolomite Exposed Backslope Woodland are upslope on westerly and southerly aspects.
F115XB004MO	Loess Upland Woodland Loess Upland Woodlands are on summit positions above these ecological sites.

Similar sites

F115XB024MO	Loamy Terrace Forest Loamy Terrace Forests are on lower terrace areas that do experience some periodic flooding. Overstory species composition is similar.
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Table 1. Dominant plant species

Tree	(1) <i>Quercus alba</i> (2) <i>Acer saccharum</i>
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Shrub	(1) <i>Lindera benzoin</i>
Herbaceous	(1) <i>Polemonium reptans</i> (2) <i>Asarum canadense</i>

Physiographic features

This site is on high stream terraces that are typically loess-covered, with slopes of 1 to 5 percent. The site receives runoff from adjacent upland sites. This site does not flood.

The following figure shows a likely landscape position of this ecological site, and landscape relationships among the major ecological sites of the stream terraces, floodplains, and adjacent uplands. The site is within the area labeled “2” on the figure and is typically associated with the Loamy Terrace Forest ecological site. Floodplain sites are downslope, and Loess Upland sites are upslope.

Figure 1. Typical landscape relationships for this ecological site.

Table 2. Representative physiographic features

Landforms	(1) Stream terrace
Runoff class	Medium to very high
Flooding frequency	None
Ponding frequency	None
Elevation	110 – 310 m
Slope	0 – 20 %
Water table depth	50 – 150 cm
Aspect	Aspect is not a significant factor

Climatic features

The Central Mississippi Valley Wooded Slopes, Western Part has a continental type of climate marked by strong seasonality. In winter, dry-cold air masses, unchallenged by any topographic barriers, periodically swing south from the northern plains and Canada. If they invade reasonably humid air, snowfall and rainfall result. In summer, moist, warm air masses, equally unchallenged by topographic barriers, swing north from the Gulf of Mexico and can produce abundant amounts of rain, either by fronts or by convectional processes. In some summers, high pressure stagnates over the region, creating extended droughty periods. Spring and fall are transitional seasons when abrupt changes in temperature and precipitation may occur due to successive, fast-moving fronts separating contrasting air masses.

The Central Mississippi Valley Wooded Slopes, Western Part experiences regional differences in climates, but these differences do not have obvious geographic boundaries. Regional climates grade inconspicuously into each other. The basic gradient for most climatic characteristics is along a line diagonally crossing the MLRA from northwest to southeast. Both mean annual temperature and precipitation exhibit gradients along this line.

The average annual precipitation in most of this area is 38 to 48 inches. The average annual temperature is 53 to 57 degrees F. Mean January minimum temperature follows the northwest-to-southeast gradient. However, mean July maximum temperature shows hardly any geographic variation in the MLRA. Mean July maximum temperatures have a range of only two or three degrees across the area.

Mean annual precipitation varies along the same gradient as temperature. Seasonal climatic variations are more complex. Seasonality in precipitation is very pronounced due to strong continental influences. June precipitation, for example, averages three to four times greater than January precipitation. Most of the rainfall occurs as high-intensity, convective thunderstorms in summer. Snowfall is common in winter.

During years when precipitation comes in a fairly normal manner, moisture is stored in the top layers of the soil during the winter and early spring, when evaporation and transpiration are low. During the summer months the loss of water by evaporation and transpiration is high, and if rainfall fails to occur at frequent intervals, drought will result. Drought directly affects plant and animal life by limiting water supplies, especially at times of high temperatures and high evaporation rates.

Superimposed upon the basic MLRA climatic patterns are local topographic influences that create topoclimatic, or microclimatic variations. In regions of appreciable relief, for example, air drainage at nighttime may produce temperatures several degrees lower in valley bottoms than on side slopes. At critical times during the year, this phenomenon may produce later spring or earlier fall freezes in valley bottoms. Higher daytime temperatures of bare rock surfaces and higher reflectivity of these unvegetated surfaces may create distinctive environmental niches such as glades and cliffs. Slope orientation is an important topographic influence on climate. Summits and south-and-west-facing slopes are regularly warmer and drier than adjacent north- and-east-facing slopes. Finally, the climate within a canopied forest is measurably different from the climate of a more open grassland or savanna areas.

Source: University of Missouri Climate Center - <http://climate.missouri.edu/climate.php>; accessed June 2012

Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin, United States Department of Agriculture Handbook 296 - <http://soils.usda.gov/survey/geography/mlra/>

Table 3 Representative climatic features

Frost-free period (characteristic range)	170-180 days
Freeze-free period (characteristic range)	190-210 days
Precipitation total (characteristic range)	1,090-1,190 mm
Frost-free period (actual range)	160-190 days
Freeze-free period (actual range)	190-210 days
Precipitation total (actual range)	1,070-1,250 mm
Frost-free period (average)	170 days
Freeze-free period (average)	200 days
Precipitation total (average)	1,140 mm

- (1) COLUMBIA U OF M [USC00231801], Columbia, MO
- (2) SPARTA 1 W [USC00118147], Sparta, IL
- (3) JACKSON [USC00234226], Jackson, MO

- (4) ALTON MELVIN PRICE L&D [USC00110137], West Alton, IL
- (5) JEFFERSON CITY WTP [USC00234271], Jefferson City, MO

Influencing water features

This ecological site is typically associated with, but not adjacent to, a perennial stream. This site is subject to rare to occasional flooding. Stream levels typically respond quickly to storm events, especially in watersheds where surface runoff is dominant. Constructed levees, often accompanied by stream channelization, have altered the hydrology and flooding dynamics in many places. The site receives runoff from adjacent upland sites. This site does not flood.

Soil features

These soils have no rooting restriction. The soils were formed under forest vegetation, and have thin, light-colored surface horizons. Parent material is loess, or loamy alluvium. Surface horizons are primarily silt loam. Subsurface horizons are loamy or clayey. Some soils are slightly affected by seasonal wetness. Soil series associated with this site include Iva, Geff, Kliever, Martinsville, Menfro, Weller, and Winfield.

The accompanying picture of the Weller series shows a thin, light-colored surface horizon overlying the brown silty clay loam subsoil. Roots can be seen throughout the soil profile. (photo credit: NRCS)

Figure 8. Weller series

Table 4. Representative soil features

Surface texture	(1) Silt loam (2) Loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Very slow to moderately slow
Soil depth	180 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	15.24 – 20.32 cm
Calcium carbonate equivalent (0-101.6cm)	Not specified

Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	4.5 – 7.3
Subsurface fragment volume <=3" (Depth not specified)	0 – 10 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

Information contained in this section was developed using historical data, professional experience, field reviews, and scientific studies. The information presented is representative of very complex vegetation communities. Key indicator plants, animals and ecological processes are described to help inform land management decisions. Plant communities will differ across the MLRA because of the naturally occurring variability in weather, soils, and aspect. The Reference Plant Community is not necessarily the management goal. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every situation or the full range of conditions, species, and responses for the site.

Loess High Terrace Forests in the Ozark Border are on relatively high stable former floodplain positions. The reference plant community is dominated by a wide variety of deciduous hardwood tree species including white oak, sugar maple, northern red oak, bitternut hickory, bur oak, American elm, black walnut and Kentucky coffeetree. Trees are generally large and tall forming a dense, closed canopy. Both historically and today, these forests are structurally and compositionally diverse, with occasional tree-fall gaps and natural mortality providing opportunities for regeneration of overstory species. The understory is also complex, with multiple layers of shade tolerant species such as pawpaw, northern spicebush, and Ohio buckeye. Grape vine, greenbriar, and Virginia creeper are also present along with a diverse array of ground flora species that carpets the forest floor.

Today, most of the rich, loamy Loess High Terrace Forests are largely converted to pasture and cropland. Where they still occur, these areas of forest play an important role as a source of food and shelter for migrating birds, and water quality. In addition, they are very important in stream bank stabilization. Uncontrolled grazing by domestic livestock in these remaining areas of forest damages and kills smaller trees and removes the ground cover. Carefully planned timber harvests can be tolerated on these sites, but high grading of the timber will ultimately degrade the sites. Re-establishment of these forests is important for stream quality and stream health, and as critical habitat for migratory birds. Planting of later successional species on the appropriate landscape position and soils has proven to be an effective means for restoration.

A State and Transition Diagram follows. Detailed descriptions of each state, transition, plant community, and pathway follow the model. This model is based on available experimental research, field observations, professional consensus, and interpretations. It is likely to change as knowledge increases.

State and transition model

Figure 9. State and transition diagram for this ecological site

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 6. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height M	Canopy Cover (%)	Diameter Cm	Basal Area (square M/hectare)
Tree							
white oak	QUAL	<i>Quercus alba</i>	Native	–	5-95	–	–
bitternut hickory	CACO15	<i>Carya cordiformis</i>	Native	–	10-25	–	–
shagbark hickory	CAOV2	<i>Carya ovata</i>	Native	–	2-25	–	–
mockernut hickory	CATO6	<i>Carya tomentosa</i>	Native	–	5-10	–	–
Shumard's oak	QUSH	<i>Quercus shumardii</i>	Native	–	5-10	–	–
northern red oak	QURU	<i>Quercus rubra</i>	Native	–	5-10	–	–
sugar maple	ACSA3	<i>Acer saccharum</i>	Native	–	2-5	–	–
Kentucky coffeetree	GYDI	<i>Gymnocladus dioicus</i>	Native	–	–	–	–
American elm	ULAM	<i>Ulmus americana</i>	Native	–	–	–	–
slippery elm	ULRU	<i>Ulmus rubra</i>	Native	–	–	–	–
green ash	FRPE	<i>Fraxinus pennsylvanica</i>	Native	–	–	–	–
American sycamore	PLOC	<i>Platanus occidentalis</i>	Native	–	–	–	–
bur oak	QUMA2	<i>Quercus macrocarpa</i>	Native	–	–	–	–
Tree Fern							
black walnut	JUNI	<i>Juglans nigra</i>	Native	–	–	–	–

Table 7. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (m)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
Indian woodoats	CHLA5	<i>Chasmanthium latifolium</i>	Native	–	10-25
Bosc's panicgrass	DIBO2	<i>Dichanthelium boscii</i>	Native	–	2-5
eastern bottlebrush grass	ELHY	<i>Elymus hystrix</i>	Native	–	1-2
rock muhly	MUSO	<i>Muhlenbergia sobolifera</i>	Native	–	1-2
eastern star sedge	CARA8	<i>Carex radiata</i>	Native	–	–
sweet woodreed	CIAR2	<i>Cinna arundinacea</i>	Native	–	–
Virginia wildrye	ELVI3	<i>Elymus virginicus</i>	Native	–	–
Forb/Herb					
pointedleaf ticktrefoil	DEGL5	<i>Desmodium glutinosum</i>	Native	–	1-2
Greek valerian	PORE2	<i>Polemonium reptans</i>	Native	–	–
calico aster	SYLAL7	<i>Symphyotrichum lateriflorum</i> var. <i>lateriflorum</i>	Native	–	–
Canadian woodnettle	LACA3	<i>Laportea canadensis</i>	Native	–	–
nodding wakerobin	TRFL6	<i>Trillium flexipes</i>	Native	–	–
eastern waterleaf	HYVI	<i>Hydrophyllum virginianum</i>	Native	–	–
pale touch-me-not	IMPA	<i>Impatiens pallida</i>	Native	–	–
Canadian wildginger	ASCA	<i>Asarum canadense</i>	Native	–	–
green dragon	ARDR3	<i>Arisaema dracontium</i>	Native	–	–
white fawnlily	ERAL9	<i>Erythronium albidum</i>	Native	–	–
Virginia bluebells	MEVI3	<i>Mertensia virginica</i>	Native	–	–
Shrub/Subshrub					
northern spicebush	LIBE3	<i>Lindera benzoin</i>	Native	–	–
burningbush	EUAT5	<i>Euonymus atropurpureus</i>	Native	–	–

Tree					
American hornbeam	CACA18	<i>Carpinus caroliniana</i>	Native	–	5-10
pawpaw	ASTR	<i>Asimina triloba</i>	Native	–	–
Ohio buckeye	AEGL	<i>Aesculus glabra</i>	Native	–	–
Vine/Liana					
Virginia creeper	PAQU2	<i>Parthenocissus quinquefolia</i>	Native	–	–

Table 8. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 5.1 plant community composition

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

Wildlife (MDC 2006): Moist conditions with abundant coarse woody debris make this type of ecological site important for many herptiles. Ephemeral pools provide important amphibian breeding habitat. Tall emergent trees along with an uneven canopy structure and canopy gaps are important for heron colonies, eagle nesting, Mississippi kites, cerulean warblers and other bird species. Birds associated with late-successional to mature forests are Wood Duck, Hooded Merganser, Barred Owl, Cerulean Warbler, Yellow-throated Warbler, Prothonotary Warbler, Pileated Woodpecker, Yellow-throated Vireo, Brown Creeper, and Yellow-crowned Night Heron. Reptiles and amphibians associated with ecological site include small-mouthed salamander, central newt, midland brown snake, gray treefrog, northern spring peeper, Blanchard's cricket frog, southern leopard frog, western painted turtle, and red-eared slider.

Other information

Forestry (NRCS 2002, 2014): Management: Field measured site index values are 60 for white oak and 66 for black oak. Timber management opportunities are excellent. Create group openings of at least 2 acres. Large clearcuts should be minimized if possible to reduce impacts on wildlife and aesthetics. Uneven-aged management using single tree selection or small group selection cuttings of ½ to 1 acre are other options that can be used if clear cutting is not desired or warranted. Uneven-aged management will slowly cause an increase in more shade tolerant species such as sugar maple. Using prescribed fire as a management tool could have a negative impact on timber quality, may not be fitting, or should be used with caution on a particular site if timber management is the primary objective. Limitations: No major equipment restrictions or limitations exist.

Inventory data references

Potential Reference Sites: Loess High Terrace Forest Plot DIGGCA02 – Iva soil Located in Marshall Diggs CA, Audrain County, MO Latitude: 39.07988 Longitude: -91.6357 Plot ROBRSP02 – Menfro soil Located in Rockbridge State Park, Boone County, MO Latitude: 38.877288 Longitude: -92.305282 Plot ROBRSP01 – Menfro soil Located in Rockbridge State Park, Boone County, MO Latitude: 38.880634 Longitude: -92.300159

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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	09/30/2026
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:
