Ecological site F116BY032MO
Chert Exposed Backslope Woodland

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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.

MLRA notes

Major Land Resource Area (MLRA): 116B–Springfield Plain

The Springfield Plain is in the western part of the Ozark Uplift. It is primarily a smooth plateau with some dissection along streams. Elevation is about 1,000 feet in the north to over 1,700 feet in the east along the Burlington Escarpment adjacent to the Ozark Highlands. The underlying bedrock is mainly Mississippian-aged limestone, with areas of shale on lower slopes and structural benches, and intermittent Pennsylvanian-aged sandstone deposits on the plateau surface.

Classification relationships

Terrestrial Natural Community Type in Missouri (Nelson, 2010): The reference state for this ecological site is most similar to a Dry-Mesic Chert Woodland. Missouri Department of Conservation Forest and Woodland Communities (Missouri Department of Conservation, 2006): The reference state for this ecological site is most similar to a Mixed Oak Woodland. National Vegetation Classification System Vegetation Association (NatureServe, 2010): The reference state for this ecological site is most similar to a Quercus alba - Quercus stellata - Quercus velutina / Schizachyrium scoparium Woodland (CEGL002150). Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002): This ecological site occurs primarily within the following Land Type Associations: Spring River Prairie/Savanna Dissected Plain Upper Sac River Oak Savanna/Woodland Low Hills Little Sac River oak Savanna/Woodland Low Hills James River Oak Savanna/Woodland Low Hills Finley River Oak Savanna/Woodland Low Hills

Ecological site concept

NOTE: This is a “provisional” Ecological Site Description (ESD) that is under development. It contains basic ecological information that can be used for conservation planning, application and land management. After additional information is collected, analyzed and reviewed, this ESD will be refined and published as “Approved”. Chert Exposed Backslope Woodlands occur on steep backslopes with southern and western aspects that are associated with the major stream valleys of the region, such as the Sac river valley and the upper reaches of the James River and Finley Creek. They also occur in valleys along the southern edge of the Springfield Plain, where soils are formed in the lower Mississippian limestones and into the Ordovician-aged Jefferson City Cotter formation. This site is mapped in complex with the Chert Protected Backslope Forest ecological site. Soils are typically very deep, with an abundance of chert fragments. The reference plant community is woodland with an overstory dominated by black oak and white oak and a ground flora of native grasses and forbs.

Associated sites

F116BY003MO	**Chert Upland Woodland** Chert Upland Woodlands are upslope, on upper backslopes.
F116BY004MO	**Low-Base Chert Upland Woodland** Low-base Chert Upland Woodlands are upslope, on convex summit crests, and often contain a fragipan in the subsoil.

F116BY008MO	**Interbedded Sedimentary Upland Woodland** In areas where the Mississippian-aged Compton Formation occurs, Shale Upland Woodlands are downslope.
F116BY009MO	**Chert Protected Backslope Forest** Chert Protected Backslope Woodlands are mapped in complex with this ecological site, on steep northern and eastern aspects.
F116BY013MO	**Loamy Footslope Woodland** Loamy Footslope Woodlands are downslope.
F116BY017MO	**Gravelly/Loamy Upland Drainageway Woodland** Gravelly/Loamy Upland Drainageway Woodlands are downslope.
F116BY001MO	**Fragipan Upland Woodland** Fragipan Upland Woodlands are upslope on convex summits where a thin layer of loess is present over a fragipan in the subsoil.
R116BY024MO	**Shallow Limestone Upland Glade/Woodland** Shallow Limestone Upland Glade/Woodlands are often downslope.

Similar sites

F116BY003MO	**Chert Upland Woodland** Chert Upland Woodlands are less sloping and generally include summit and shoulder positions. These sites are more productive.
F116BY009MO	**Chert Protected Backslope Forest** Chert Protected Backslope Woodlands are mapped in complex with this ecological site, on similar slope positions but on northern and eastern aspects. These sites are more productive.

Table 1. Dominant plant species

Tree	(1) *Quercus velutina* (2) *Quercus alba*
Shrub	(1) *Rhus aromatica*
Herbaceous	(1) *Carex* (2) *Schizachyrium scoparium*

Physiographic features

This site is on upland backslopes with slopes of 15 to 50 percent. It is on exposed aspects (south, southwest, and west), which receive significantly more solar radiation than the protected aspects. The site receives runoff from upslope summit and shoulder sites, and generates runoff to adjacent, downslope ecological sites. This site does not flood.

The following figure (adapted from Hughes, 1982) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites. Chert Exposed Backslope Woodland sites are within the area labeled “3”, on lower backslopes with southerly to westerly exposures. Chert Protected Backslope Forest sites are on the corresponding northerly to easterly exposures. Upper slopes and shoulders within the area are in the Chert Upland Woodland ecological site. Low-base Chert upland Woodland sites, labeled “2”, are often upslope on crests and shoulders.

Figure 1. Landscape relationships for this ecological site.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Hillslope
Flooding frequency	None
Ponding frequency	None
Slope	20 – 50 %
Water table depth	150 cm
Aspect	W, SE, S, SW

Climatic features

The Springfield Plain 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 Springfield Plain experiences few regional differences in climates. The average annual precipitation in this area is 41 to 45 inches. Snow falls nearly every winter, but the snow cover lasts for only a few days. The average annual temperature is about 55 to 58 degrees F. The lower temperatures occur at the higher elevations. Mean July maximum temperatures have a range of only one or two degrees across the area.
Mean annual precipitation varies along a west to east gradient. 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.

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. Deep sinkholes often have a microclimate significantly cooler, moister, and shadier than surrounding surfaces, a

phenomenon that may result in a strikingly different ecology. 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; 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)	150-160 days
Freeze-free period (characteristic range)	190-200 days
Precipitation total (characteristic range)	1,140-1,170 mm
Frost-free period (actual range)	150-160 days
Freeze-free period (actual range)	180-200 days
Precipitation total (actual range)	1,140-1,170 mm
Frost-free period (average)	160 days
Freeze-free period (average)	190 days
Precipitation total (average)	1,170 mm

- (1) CARTHAGE [USC00231356], Carthage, MO
- (2) MT VERNON M U SW CTR [USC00235862], Mount Vernon, MO
- (3) SPRINGFIELD [USW00013995], Springfield, MO
- (4) STOCKTON DAM [USC00238082], Stockton, MO

Influencing water features

This ecological site is not influenced by wetland or riparian water features. This site generates runoff to adjacent, downslope ecological sites. This site does not flood.
The water features of this upland ecological site include evapotranspiration, surface runoff, and drainage. Each water balance component fluctuates to varying extents from year-to-year. Evapotranspiration remains the most constant. Precipitation and drainage are highly variable between years. Seasonal variability differs for each water component. Precipitation generally occurs as single day events. Evapotranspiration is lowest in the winter and peaks in the summer. Water stored as ice and snow decreases drainage and surface runoff rates throughout the winter and increases these fluxes in the spring. The surface runoff pulse is greatly influenced by extreme events. Conversion to cropland or other high intensities land uses tends to increase runoff, but also decreases evapotranspiration. Depending on the situation, this might increase groundwater discharge, and decrease baseflow in receiving streams.

Soil features

These soils have no rooting restriction, and subsoils are not low in bases. The soils were formed under woodland vegetation, and have thin, light-colored surface horizons. Parent material is slope alluvium over residuum weathered primarily from limestone. They have very gravelly or very cobbly silt loam surface horizons, and skeletal subsoils with high amounts of chert gravel and cobbles. They are not affected by seasonal wetness. Soil series associated with this site include Goss and Rueter.

The accompanying picture of the Goss series shows a thin, light-colored surface horizon underlain by very cobbly reddish clay. Scale is in inches. Picture from Henderson (2004).

Figure 8. Goss series

Table 4. Representative soil features

Parent material	(1) Residuum – cherty limestone
Surface texture	(1) Very gravelly silt loam (2) Very cobbly silt loam (3) Extremely gravelly silt loam
Family particle size	(1) Clayey
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderately slow
Soil depth	180 cm
Surface fragment cover <=3"	20 – 80 %
Surface fragment cover >3"	0 – 30 %
Available water capacity (0-101.6cm)	2.54 – 12.7 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)	30 – 70 %
Subsurface fragment volume >3" (Depth not specified)	20 – 30 %

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.

The reference plant community is well developed woodland dominated by an overstory of black oak and white oak. It is very similar to Chert Upland Woodlands, except that it may be slightly less dense with more afternoon sunlight cutting to the woodland floor. The canopy is moderately tall (60 to 75 feet) but more open (65 to 85 percent cover) than protected slopes and the understory is poorly developed with less structural diversity. Increased light from the open canopy causes a diversity of ground flora species to flourish. In addition, proximity to shallow soil glades and open woodlands provides additional opportunity for increased light and species diversity. Woodlands are distinguished from forest, by their relatively open understory, and the presence of sun-loving ground flora species. Characteristic plants in the ground flora can be used to gauge the restoration potential of a stand along with remnant open-grown old-age trees, and tree height growth.

Fire played an important role in the maintenance of these systems. While the upland prairies and savannas had an estimated fire frequency of 1 to 3 years, Chert Exposed Backslope Woodlands burned less frequently (estimated 5 to 20 years) and with lower intensity. These periodic fires kept woodlands open, removed the litter, and stimulated the growth and flowering of the grasses and forbs. During fire free intervals, woody understory species increased and the herbaceous understory diminished. The return of fire would open the woodlands up again and stimulate the abundant ground flora.

Chert Exposed Backslope Woodlands were also subjected to occasional disturbances from wind and ice, as well as grazing by native large herbivores, such as bison, elk, and white-tailed deer. Wind and ice would have periodically opened the canopy up by knocking over trees or breaking substantial branches off canopy trees. Grazing by native herbivores would have effectively kept understory conditions more open, creating conditions more favorable to oak reproduction and sun-loving ground flora species.

Today, these ecological sites have been cleared and converted to pasture or have undergone repeated timber harvest and domestic grazing. Most existing forested ecological sites have a younger (50 to 80 years) canopy layer whose species composition and quality has been altered by timber harvesting practices. In the long term absence of fire, woody species, especially hickory, encroach into these woodlands. Once established, these woody plants can quickly fill the existing understory increasing shade levels with a greatly diminished ground flora. Removal of the younger understory and the application of prescribed fire have proven to be effective restoration means.

Uncontrolled domestic grazing has also impacted these communities, further diminishing the diversity of native plants and introducing species that are tolerant of grazing, such as buckbrush, gooseberry, and Virginia creeper. Grazed sites also have a more open understory. In addition, soil compaction and soil erosion from grazing can be a problem and lower site productivity.

These ecological sites are only moderately productive, especially when compared to adjacent protected slopes and deeper loess covered units. Oak regeneration is typically problematic. Sugar maple, red elm, and hickories are often dominant competitors in the understory.

Maintenance of the oak component will require disturbances that will encourage more sun adapted species and reduce shading effects.

Single tree selection timber harvests are common in this region and often results in removal of the most productive trees (high grading) in the stand leading to poorer quality timber and a shift in species composition away from more valuable oak species. Better planned single tree selection or the creation of group openings can help regenerate and maintain more desirable oak species and increase vigor on the residual trees.

Clearcutting also occurs and results in dense, even-aged stands dominated by oak. This may be most beneficial for existing stands whose composition has been highly altered by past management practices. However, without some thinning of the dense stands, and periodic fires, the ground flora diversity can be shaded out and diversity of the stand may suffer.

A state-and-transition model 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 Model 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 (%)

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	*Quercus alba*	Native	–	20-40	–	–
black oak	QUVE	*Quercus velutina*	Native	–	20-40	–	–
post oak	QUST	*Quercus stellata*	Native	–	10-20	–	–
mockernut hickory	CATO6	*Carya tomentosa*	Native	–	10-20	–	–
shagbark hickory	CAOV2	*Carya ovata*	Native	–	10-20	–	–
sassafras	SAAL5	*Sassafras albidum*	Native	–	10-20	–	–
common persimmon	DIVI5	*Diospyros virginiana*	Native	–	10-20	–	–

Table 7. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (m)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
poverty oatgrass	DASP2	*Danthonia spicata*	Native	–	5-20
slimleaf panicgrass	DILI2	*Dichanthelium linearifolium*	Native	–	5-20
rock muhly	MUSO	*Muhlenbergia sobolifera*	Native	–	5-20
black edge sedge	CANI3	*Carex nigromarginata*	Native	–	5-20
little bluestem	SCSC	*Schizachyrium scoparium*	Native	–	5-20
hairy woodland brome	BRPU6	*Bromus pubescens*	Native	–	5-20
Bosc's panicgrass	DIBO2	*Dichanthelium boscii*	Native	–	5-20
Pennsylvania sedge	CAPE6	*Carex pensylvanica*	Native	–	5-20
whitetinge sedge	CAAL25	*Carex albicans*	Native	–	5-20
eastern bottlebrush grass	ELHY	*Elymus hystrix*	Native	–	5-20
oval-leaf sedge	CACE	*Carex cephalophora*	Native	–	5-20
Muhlenberg's sedge	CAMU4	*Carex muehlenbergii*	Native	–	5-20
Forb/Herb					
elmleaf goldenrod	SOUL2	*Solidago ulmifolia*	Native	–	1-20

manyray aster	SYAN2	*Symphyotrichum anomalum*	Native	–	1-20
rue anemone	THTH2	*Thalictrum thalictroides*	Native	–	1-20
American ipecac	GIST5	*Gillenia stipulata*	Native	–	1-20
hairy sunflower	HEHI2	*Helianthus hirsutus*	Native	–	1-20
feathery false lily of the valley	MARA7	*Maianthemum racemosum*	Native	–	1-20
eastern beebalm	MOBR2	*Monarda bradburiana*	Native	–	1-20
bristly buttercup	RAHI	*Ranunculus hispidus*	Native	–	1-20
fire pink	SIVI4	*Silene virginica*	Native	–	1-20
fourleaf milkweed	ASQU	*Asclepias quadrifolia*	Native	–	1-20
pointedleaf ticktrefoil	DEGL5	*Desmodium glutinosum*	Native	–	1-20
creeping lespedeza	LERE2	*Lespedeza repens*	Native	–	1-20
Parlin's pussytoes	ANPA9	*Antennaria parlinii*	Native	–	1-20
Virginia tephrosia	TEVI	*Tephrosia virginiana*	Native	–	1-20
late purple aster	SYPA11	*Symphyotrichum patens*	Native	–	1-20
calico aster	SYLA4	*Symphyotrichum lateriflorum*	Native	–	1-20
smooth small-leaf ticktrefoil	DEMA2	*Desmodium marilandicum*	Native	–	1-20
nakedflower ticktrefoil	DENU4	*Desmodium nudiflorum*	Native	–	1-20
Arkansas bedstraw	GAAR4	*Galium arkansanum*	Native	–	1-20
spotted geranium	GEMA	*Geranium maculatum*	Native	–	1-20
Shrub/Subshrub					
fragrant sumac	RHAR4	*Rhus aromatica*	Native	–	5-20
Blue Ridge blueberry	VAPA4	*Vaccinium pallidum*	Native	–	5-20
leadplant	AMCA6	*Amorpha canescens*	Native	–	5-20
American hazelnut	COAM3	*Corylus americana*	Native	–	5-20
Tree					
flowering dogwood	COFL2	*Cornus florida*	Native	–	5-20
farkleberry	VAAR	*Vaccinium arboreum*	Native	–	5-20

Table 8. Community 1.2 plant community composition

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

Table 9. Community 2.1 plant community composition

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

Table 10. Community 3.1 plant community composition

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

Table 11. Community 4.1 plant community composition

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

Table 12. Community 4.2 plant community composition

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

Table 13. Community 5.1 plant community composition

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

Animal community

Wildlife (MDC 2006): Oaks provide hard mast for wildlife; scattered shrubs provide soft mast; occasional bedrock outcrops provide reptile habitat and a patchier ground flora. Sedges and native grasses provide green browse; native grasses on dry sites provide cover and nesting habitat and a diversity of forbs provides a diversity and abundance of insects. Post-burn areas can provide temporary bare-ground – herbaceous cover habitat important for turkey poults and quail chicks. Bird species associated with Chert Woodlands include Indigo Bunting, Red-headed Woodpecker, Eastern Bluebird, Northern Bobwhite, Summer Tanager, Eastern Wood-Pewee, Whip-poor-will, Chuck-will's Widow, and Red-eyed Vireo. Reptiles and amphibians associated with mature Chert Woodlands include: ornate box turtle, northern fence lizard, five-lined skink, coal skink, broad-headed skink, six-lined racerunner, western slender glass lizard, prairie ring-necked snake, flat-headed snake, rough earth snake, red milk snake, western pygmy rattlesnake, and timber rattlesnake.

Other information

Forestry (NRCS 2002; 2014) Management: Field measured site index values average 57 for shortleaf pine and 53 for black oak. Timber management opportunities are fair to good. 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 group selection cuttings of ½ to 1 acre are other options that can be used if clear cutting is not desired or warranted. Using prescribed fire as a management tool could have a negative impact on timber quality and should be used with caution on a site if timber management is the primary objective. Limitations: Large amounts of coarse fragments throughout profile; Surface stones and rocks are problems for efficient and safe equipment operation and will make equipment use somewhat difficult. Disturbing the surface excessively in harvesting operations and building roads increases soil losses, which leaves a greater amount of coarse fragments on the surface. Hand planting or direct seeding may be necessary. Seedling mortality due to low available water capacity may be high. Mulching or providing shade can improve seedling survival. Mechanical tree planting will be limited. Erosion is a hazard when slopes exceed 15 percent. On steep slopes greater than 35 percent, traction problems increase and equipment use is not recommended.

Inventory data references

Potential Reference Sites: Chert Exposed Backslope Woodland Plot BRCRCA02 – Rueter soil Located in Brush Creek CA, Polk County, MO Latitude: 37.809045 Longitude -93.625518 Plot TUCRPV02 – Rueter soil Located in Turkey Creek Forest PV, Newton County, MO Latitude: 37.114194 Longitude: -94.555916

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Contributors

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Approval

Nels Barrett, 10/07/2020

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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	09/30/2020
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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

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5. **Number of gullies and erosion associated with gullies:**

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

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

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

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

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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:

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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:**
