USDA Natural Resources Conservation Service

Ecological site R108XD904IA
Wet Floodplain Prairie

Last updated: 10/17/2024
Accessed: 05/12/2025

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.

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): 108X–Illinois and Iowa Deep Loess and Drift

The Illinois and Iowa Deep Loess and Drift, Western Part MLRA covers parts of both Iowa and Missouri and is known locally as part of the Southern Iowa Drift Plain. A silty loess deposit of varying thickness (5 to 20 feet) covers a series of glacial advances known collectively as pre-Illinoisan till. This till, deposited more than half a million years ago, was subjected to multiple instances of extreme erosion as well as periods of subdued erosion and intense weathering. The loess is thickest in the western part of the MLRA and generally thins eastward. In some areas, the loess has been removed and the older weathered till, called a “paleosol,” entirely exposed. These highly weathered soils, or paleosols, have a high content of clay, which slows the downward movement of water through the profile and causes water to move laterally instead of vertically. Wet areas, or “side-hill seeps,” commonly form where these paleosols become exposed along hillsides (Prior, 1991).

The dominant soil orders in this MLRA are Mollisols and Alfisols and, to a lesser extent, Entisols and Inceptisols. Most of the soils are Udolls or Udalfs. Aquolls are on the flatter interfluves. The soils in the area dominantly have a mesic soil temperature regime, an aquic or udic soil moisture regime, and mixed mineralogy. They generally are very deep, well drained to poorly drained, and silty, loamy, or clayey. These soils on uplands include somewhat poorly drained, nearly level Argiudolls (Macksburg series); moderately well drained, gently sloping to strongly sloping Argiudolls (Sharpsburg series); poorly drained, nearly level Argiaquolls (Winterset series); and well drained strongly, sloping to steep Hapludalfs (Gara, Lindley, Ladoga, and Armstrong series) (USDA-NRCS, 2006). The western part of the Illinois and Iowa Deep Loess and Drift is a segment of three other MLRAs within the Central Feed Grains and Livestock Region. The other areas are: the West-Central part (108C), the East-Central part (108B) and the Eastern part (108A).

Classification relationships

Major Land Resource Area (MLRA): Illinois and Iowa Deep Loess and Drift, Western Part (108D)

USFS Subregions: Central Dissected Till Plains Section (251C); Loess Hills (251Cb) and Central Dissected Till and Loess Plain (251Cc) Subsections (Cleland et al, 2007)

Relationship to Other Established Classifications:
NatureServe Classification: Ecological System: North-Central Interior Floodplain (9338); Ecological Association: Black Willow Riparian Forest (NatureServe, 2013)

Landfire Biophysical Setting: Central Interior and Appalachian Floodplain Systems (4314710) (Landfire, 2009)

Associated sites

F108XD902IA	**Sandy/Loamy Floodplain Forest** Sandy/ Loamy Floodplain Forest. Sandy soils including Alluvial land and the Perks series.
F108XD901IA	**Loamy Floodplain Forest** Loamy Floodplain Forest. Fine-silty and coarse-loamy textured soils including Nodaway, Landes, Kennebec and Huntsville series.

Similar sites

F108XD901IA	**Loamy Floodplain Forest** Loamy Floodplain Forest. Fine-silty and coarse-loamy textured soils including Nodaway, Landes, Kennebec and Huntsville series.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Carex atherodes* (2) *Carex lacustris*

Physiographic features

Wet Floodplains are of large extent, and can be found on floodplains in river valleys throughout MLRA 108D. These sites are within a dissected till plain landscape. Slopes are generally less than 5 percent. These sites typically occur along streams and rivers and are subjected to flooding and ponding.

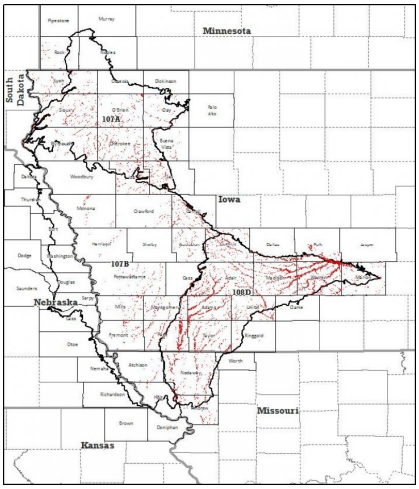


Figure 2. Distribution of Wet Floodplain Prairies within MLRA 108D

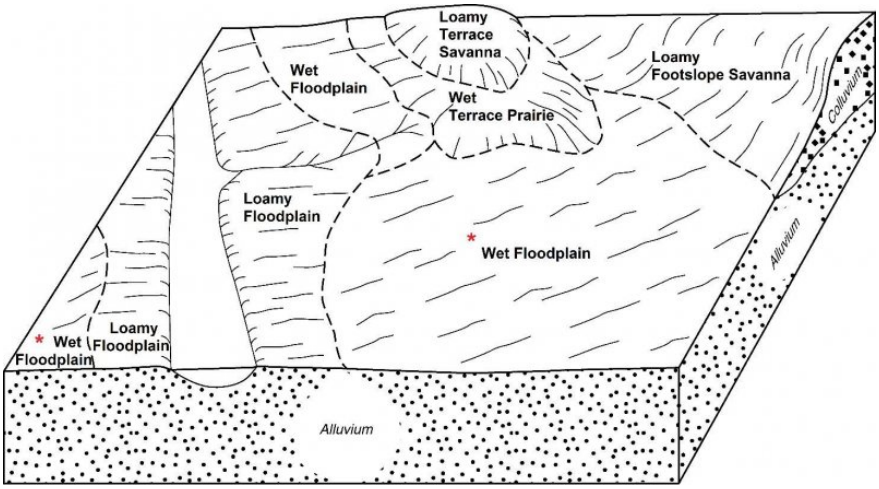


Figure 3. Block diagrams representing typical soil-landform sequences in

Loess Ridges, Glacial Till Side/Footslopes. Red asterisks identify soil components correlated to Wet Floodplain Prairie.

Table 2. Representative physiographic features

Landforms	(1) River valley > Flood plain
Runoff class	Negligible to low
Flooding frequency	None to frequent
Ponding frequency	None to frequent
Elevation	400–1,570 ft
Slope	0–5%
Water table depth	0–72 in
Aspect	Aspect is not a significant factor

Climatic features

The soil temperature regime of MLRA 108D is classified as “mesic” where the mean annual soil temperature is between 46 and 59°F (Soil Survey Staff, 2014). The average freeze-free period of this ecological site is about 166 days, while the frost-free period is about 144 days.

Average annual precipitation is 31 inches, which includes rainfall plus the water equivalent from snowfall.. The average annual low and high temperatures are 38 and 60°F, respectively.

Table 3. Representative climatic features

Frost-free period (characteristic range)	135-146 days
Freeze-free period (characteristic range)	157-174 days
Precipitation total (characteristic range)	35-37 in
Frost-free period (actual range)	130-152 days
Freeze-free period (actual range)	152-181 days
Precipitation total (actual range)	35-38 in
Frost-free period (average)	141 days
Freeze-free period (average)	166 days
Precipitation total (average)	36 in

Climate stations used

- (1) WINTERSET 1N [USC00139132], Winterset, IA
- (2) MARYVILLE 2E [USC00235340], Maryville, MO
- (3) CLARINDA [USC00131533], Clarinda, IA
- (4) CORNING [USC00131833], Corning, IA
- (5) CRESTON 2 SW [USC00131962], Creston, IA
- (6) BEDFORD [USC00130576], Bedford, IA
- (7) GUTHRIE CTR [USC00133509], Guthrie Center, IA
- (8) INDIANOLA 2W [USC00134063], Indianola, IA
- (9) GREENFIELD [USC00133438], Greenfield, IA
- (10) KNOXVILLE [USC00134502], Knoxville, IA
- (11) DES MOINES INTL AP [USW00014933], Des Moines, IA

Influencing water features

This ecological site is in floodplains of perennial streams, primarily in backswamp positions, and are not typically

adjacent to the current stream channel. They are influenced by a seasonal high water table, due to high groundwater levels in these topographically low positions. Most soils also have slow hydraulic conductivity, which impedes throughflow from precipitation and flood events. The water table is typically near the surface in late fall through spring, receding in the summer.

Stream levels typically respond quickly to storm events, especially in watersheds where surface runoff is dominant. Medium- to long-duration flooding is common in many areas, particularly during spring and early summer storm events. Constructed levees, often accompanied by stream channelization, have altered the hydrology and flooding dynamics in many places.

This site is in the RIVERINE wetlands class of the Hydrogeomorphic (HGM) classification system (Brinson, 1993), and are Emergent Palustrine wetlands (Cowardin et al., 1979).

Soil features

These soils have no major rooting restriction. The soils were formed under prairie vegetation, and have dark, organic-rich surface horizons. Parent material is glacial till. Some soils are underlain by shale residuum. The soils have loam, silt loam, silty clay and silty clay loam surface horizons (Table 5). Soil series associated with this site include Ackmore, Amana, Carlow, Colo, Lawson, Mt. Sterling, Spillville, Vesser, Wabash, Zook and Coland.

Table 4. Representative soil features

Parent material	(1) Residuum–shale
Surface texture	(1) Loam (2) Silt loam (3) Silty clay (4) Silty clay loam
Drainage class	Very poorly drained to moderately well drained
Permeability class	Very slow to moderately rapid
Soil depth	80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	5–8.8 in
Calcium carbonate equivalent (Depth not specified)	0%
Soil reaction (1:1 water) (Depth not specified)	5.6–6.9
Subsurface fragment volume <=3" (Depth not specified)	2–22%
Subsurface fragment volume >3" (Depth not specified)	3–20%

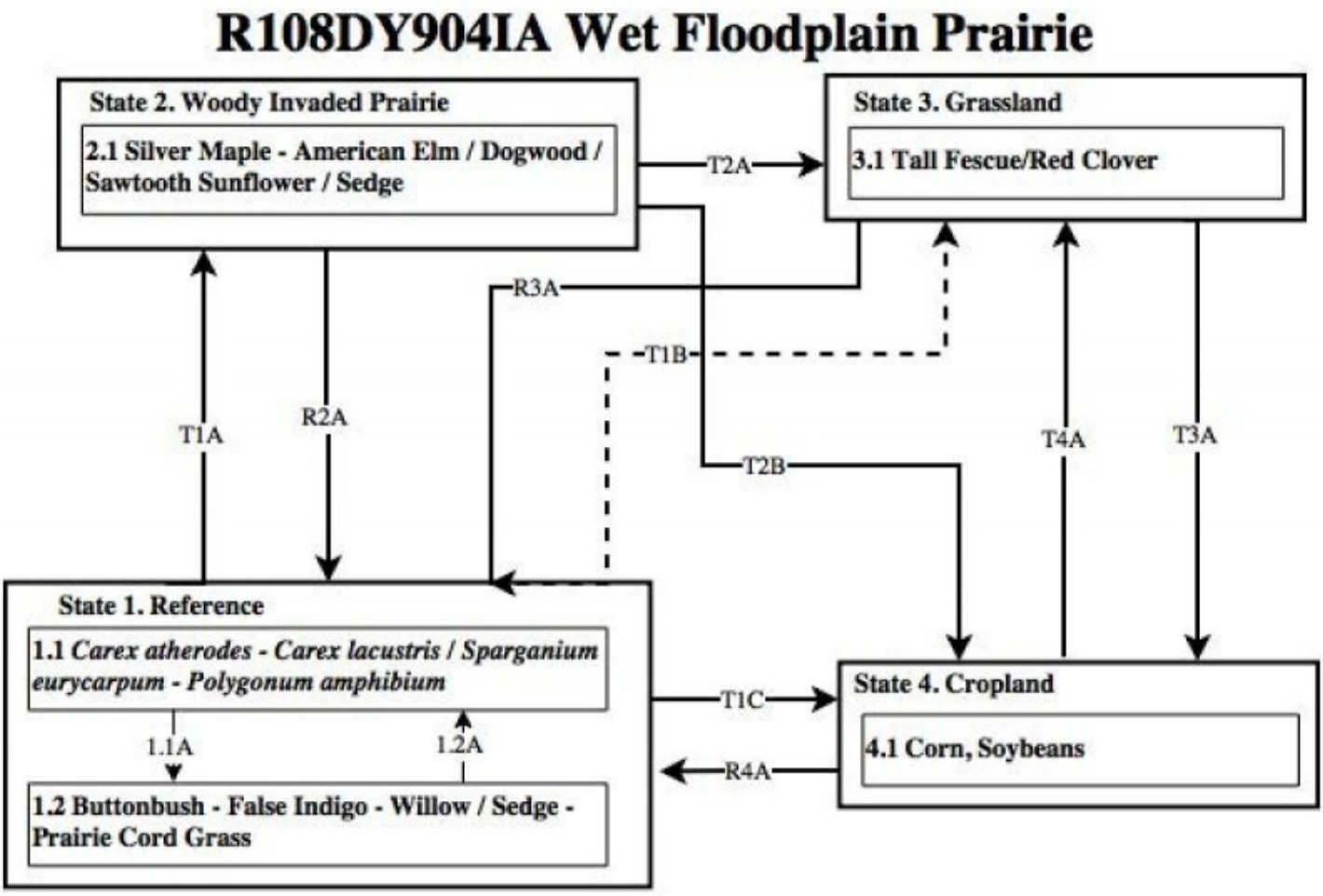
Ecological dynamics

Reference plant community is categorized as an emergent sedge wetland and includes grasses and sedges, forbs, and shrubs. Species composition typically includes *Carex atherodes*, *Carex lacustris*, *Polygonum amphibium*, *Sparganium eurycarpum*, *Polygonum punctatum*, *Ludwigia palustris*, *Ludwigia polycarpa*, *Penthorum sedoides*, *Polygonum hydropiper*, and *Sagittaria latifolia* (Rosburg, 2014).

Fire during dry periods removed the dense mat of leaf litter creating opportunities for plants less aggressive than the grasses and sedges. Peak water levels were usually high and persistent enough to preclude tree establishment under normal hydrologic regimes. In the long term, siltation slowly filled these depressions, altering flood duration and causing a shift toward floodplain woodland communities (Mutel, 2008).

Today most of these ecological sites have been drained and farmed. Only a very few quality remnants exist. While their flood regime usually has been altered, because of their site conditions, during wet years, they still act as ephemeral farmed wetlands in the agricultural landscape. Their position and soil properties also still make them good candidates for wet prairie development management. Left unfarmed, these sites can quickly develop into naturally wet communities.

State and transition model



Code	Process
T1A	Fire suppression > 20 years; woody invasion; reduced flooding
T1B	Tillage; vegetative seeding; grassland management; drainage water management
T1C	Tillage; conservation cropping system; drainage water management
T3A	Tillage; conservation cropping system
T2A	Woody removal; tillage; vegetative seeding; grassland management
T2B	Woody removal; tillage; conservation cropping system
T4A	Vegetative seeding; grassland management
R2A	Woody removal; prescribed fire
1.1A	Fire-free interval 10+ years; reduced flooding
1.2A	Flooding; prescribed fire
R3A, R4A	Vegetative seeding; prescribed fire; restore natural hydrology

State 1
Reference

This state is typical of wet prairies or sedge meadows that are not connected to groundwater (not seepage communities or fens) and that experience full horizon saturation (endosaturation), at least briefly throughout the

growing season. Long duration flooding regimes are common during some years. Two phases can occur that will transition back and forth depending on fire and flooding frequencies. Longer fire and flooding free intervals will allow woody species to increase such prairie willow, dogwoods and false indigo. When fire and flooding intervals shorten these woody species will decrease or be eliminated. This state is very rare. Nearly all sites have been converted to intensive agriculture cropland along with some cool season grassland or have reverted to wet savannas/woodlands.

Dominant plant species

- wheat sedge (*Carex atherodes*), grass
- hairy sedge (*Carex lacustris*), grass
- broadfruit bur-reed (*Sparganium eurycarpum*), grass
- water knotweed (*Polygonum amphibium*), other herbaceous

Community 1.1
Carex atherodes - Carex lacustris / Sparganium eurycarpum - Polygonum amphibium

Native herbaceous site with numerous species.

Dominant plant species

- bur oak (*Quercus macrocarpa*), tree
- wheat sedge (*Carex atherodes*), grass
- hairy sedge (*Carex lacustris*), grass
- broadfruit bur-reed (*Sparganium eurycarpum*), grass
- water knotweed (*Polygonum amphibium*), other herbaceous

Community 1.2
Buttonbush - False Indigo - Willow / Sedge - Prairie Cord Grass

increase in woody species

Dominant plant species

- common buttonbush (*Cephalanthus occidentalis*), shrub
- false indigo bush (*Amorpha fruticosa*), shrub
- willow (*Salix*), shrub
- prairie cordgrass (*Spartina pectinata*), grass
- sedge (*Carex*), grass

Pathway P1.1A
Community 1.1 to 1.2

Fire free interval 10 plus years; reduced flooding.

Pathway P1.2A
Community 1.2 to 1.1

Flooding; prescribed fire.

State 2
Woody Invaded Prairie State

Degraded reference states that have experienced fire suppression and flooding reduction for 20 or more years will transition to this state. With fire suppression and reduced flooding, woody species such as silver maple, American elm and eastern cottonwood will begin to increase transitioning this state from a prairie to a Woody Invaded Prairie. Native ground cover will also decrease. Transition from this state to cool season grasslands (State 3) or intensive cropland (State 4) was very common (Woodland Health, 2004).

Dominant plant species

- silver maple (*Acer saccharinum*), tree
- American elm (*Ulmus americana*), tree
- dogwood (*Cornus*), shrub
- sedge (*Carex*), grass
- sawtooth sunflower (*Helianthus grosseserratus*), other herbaceous

Community 2.1
Silver maple - America Elm / dogwood / Sawtooth sunflower/ sedge

Fire suppression/ reduced flooding results in more tree and shrub species.

Dominant plant species

- silver maple (*Acer saccharinum*), tree
- American elm (*Ulmus americana*), tree
- dogwood (*Cornus*), shrub
- sedge (*Carex*), grass
- sawtooth sunflower (*Helianthus grosseserratus*), other herbaceous

State 3
Grassland

Conversion of other states to non-native cool season species such as tall fescue, white clover, and red top has been common in this area. Occasionally, these pastures will have scattered bur oaks or pecan. Transitioning to a Cropland State to help eliminate non-native grassland species and then restoring to a reference state is usually the easiest and most useful method of restoration from this state.

Dominant plant species

- tall fescue (*Schedonorus arundinaceus*), grass
- white clover (*Trifolium repens*), other herbaceous

Community 3.1
Tall Fescue - Red Clover

Seeded non-native grasses and forbs

Dominant plant species

- tall fescue (*Schedonorus arundinaceus*), grass
- red clover (*Trifolium pratense*), other herbaceous

State 4
Cropland

This is the dominant state that exists currently with intensive cropping of corn, soybeans, and wheat occurring. A return to the reference state may be difficult and costly, requiring a very long term series of management options. Many different crops can be grown on these sites depending on landowner objectives.

Community 4.1
Corn - soybean

Corn - soybean rotation is the most common crop.

Transition T1A
State 1 to 2

Fire suppression greater than 20 years; woody invasion; reduced flooding

Transition T1B
State 1 to 3

Tillage; vegetative seeding; grassland management; drainage water management.

Transition T1C
State 1 to 4

Tillage; conservation cropping system; drainage water management.

Restoration pathway R2A
State 2 to 1

Woody removal; prescribed fire.

Transition T2A
State 2 to 3

Woody removal; tillage; vegetative seeding; grassland management

Transition T2B
State 2 to 4

Woody removal; tillage; conservation cropping system.

Restoration pathway R3A
State 3 to 1

Vegetative seeding; prescribed fire; restore natural hydrology.

Transition T3A
State 3 to 4

Tillage; conservation cropping system.

Restoration pathway R4A
State 4 to 1

Vegetative seeding; prescribed fire; restore natural hydrology

Restoration pathway T4A
State 4 to 3

Vegetative seeding; grassland management

Additional community tables

Inventory data references

No field plots were available for this site. A review of the scientific literature and professional experience were used to approximate the plant communities for this provisional ecological site. Information for the state-and-transition model was obtained from the same sources. All community phases are considered provisional based on these plots and the sources identified in ecological site description.

Other references

Cleland, D.T., J.A. Freeouf, J.E. Keys, G.J. Nowacki, C. Carpenter, and W.H. McNab. 2007. Ecological Subregions:

Sections and Subsections of the Conterminous United States. USDA Forest Service, General Technical Report WO-76. Washington, DC.

Landfire. 2009. Biophysical Setting 4314210 Central Tallgrass Prairie. In: Landfire National Vegetation Dynamics Models. USDA For. Serv. and U.S. Department of Interior. Washington, DC.

Mutel, Cornelia F. 2008. The Emerald Horizon: The History of Nature in Iowa. University of Iowa Press.

NatureServe. 2013. Associations and alliances of Iowa. St. Paul, Minnesota.

Prior, Jean Cutler. 1991. Landforms of Iowa. University of Iowa Press. Iowa City, Iowa.

Soil Survey Staff. 2014. Keys to Soil Taxonomy, 12th ed. USDA-Natural Resources Conservation Service, Washington, DC.

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. USDA Handbook 296.

United States Department of Agriculture, Natural Resources Conservation Service. Hydrologic Soil Group. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_054223#39 accessed August 29, 2016.

United States Department of Agriculture, Natural Resources Conservation Service. Land Capability Classification. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_054226#02 accessed August 29, 2016.

Woodland Health: Stewardship Options for Iowa Woodland Owners. 2004. Iowa Natural Heritage Foundation. Des Moines, Iowa.

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Approval

Suzanne Mayne-Kinney, 10/17/2024

Acknowledgments

This ESD was originally approved prior to April 2021.

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)	John Hammerly, soil scientist Dan Pulido, SSOL
Contact for lead author	
Date	05/12/2025
Approved by	Suzanne Mayne-Kinney

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:

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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:**
