USDA Natural Resources Conservation Service

Ecological site R046XP801MT
Bottomland Group

Last updated: 9/07/2023
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.

MLRA notes

Major Land Resource Area (MLRA): 046X–Northern and Central Rocky Mountain Foothills

The Provisional ESD Initiative was established to expedite the development of ecological site descriptions through the development of provisional ESDs. While Provisional ESDs are not complete, the intent is to produce an ESD complete enough for land managers to use while approved ESDs are being developed. This project area has mixed ownership falling primarily under private ownership or lands managed by the Blackfeet Nation. This PES project is contained within MLRA 46.
Major Land Resource Area (MLRA) 46, Rocky Mountain Foothills, is approximately 11.6 million acres. MLRA 46's extent has changed over recent years and is now primarily located in Montana and Wyoming with limited acres in Utah and Colorado. It spans from the Canadian border south to the Uinta Mountains of Northwest Colorado. MLRA 46 is a transitional MLRA between the plains and mountains of primarily non-forested rangeland. In Montana, 3 LRUs exist based on differences in geology, landscape, soils, water resources, and plant communities. Elevations for this MLRA in Montana vary from a low of 3200 to 6500 feet (975 to 1981m) however the elevations on the fringes of this MLRA may fall outside of that range in extremely small isolated areas where the boundaries between LRU C and MLRA 43B LRU G are not easily defined. Annual precipitation ranges from 8 inches (254mm) to, in very isolated areas, 42 inches (1083mm). In general precipitation rarely exceeds 24 inches (610mm). Frost-free days are variable from 50 days near the Crazy and Beartooth Mountains to 130 days in the foothills south of the Bear's Paw Mountains of Central Montana. The geology of MLRA 46 is generally Cretaceous and Jurassic marine sediments. MLRA 46's plant communities are dominated by cool-season bunchgrasses with mixed shrubs. This MLRA is rarely forested; however, ponderosa and limber pine do occupy areas. Portions of this MRLA may have a sub dominance of warm-season mid-statured bunchgrasses like little bluestem, however the general concept of the MLRA does not have a large component of warm-season species. Wyoming big sagebrush, mountain big sagebrush, silver sagebrush, and shrubby cinquefoil tend to be the dominant shrub component. The kind and presences of shrubs tends to be driven by a combination of soils and climate. Due to the variable nature of the Land Resources Units, climatic subsets will be necessary to describe the ecological sites and the variation of plant communities for this MLRA.
The Rocky Mountain Front Foothills LRU is the northernmost LRU of MLRA 46. The boundaries are the Canadian border to the north, the Rocky Mountain Front LRU of MLRA 43B and the western extent of Continental Glaciation (MLRA 52).
The Rocky Mountain Front Foothills LRU's geology is generally sedimentary in nature. Primary geological units include Two Medicine Limestone & Sandstone, Colorado Shale, Glacial Drift (alluvium), Terrace deposits (alluvium) and St Mary River formation (mudstone). Landforms include outwash terraces, escarpments, fan remnants, valleys, hillslopes, and drainage ways. Elevations of this landscape is from 3221 feet (982 m) to 6954 feet (2120 m).
Well drained soils are dominate in this LRU. Most areas have 0 to 15 percent slope, while some are 15 to 30 percent mostly on the 43B boundary. Soils are slight to moderate alkaline, except for small area next to mountains. Mean clay percentages are mostly above 23 percent. Primarily very deep soils 70 percent, moderately-deep and deep soils 30 percent.
The climate of this LRU is the most variable of MLRA 46's LRUs however the average of 16.9 inches (429mm) follows the typical MLRA concept. The major difference between this LRU and the others of MLRA 46 is the Chinook wind. These winds create massive temperature swings in the winter which can melt snow cover and initiate

bud growth on shrubs. These changes may dry soil affecting plant production and species composition. The Rocky Mountain Front Foothills receives 10 inches (247 mm) to 42 inches (1083 mm) annually. The average air temperature ranges from 36 degrees F (2.39 degrees C) to 46 degrees F (8.02 degrees C). The soil temperature regime is frigid with a soil moisture regime dominated by ustic with areas of udic. Frost-free days is from 70 to 100 days.

The vegetation potential for the Rocky Mountain Front Foothills LRU can be variable but is dominated by rangeland. Forested extents are typically minimal and consist primarily of limber pine, ponderosa pine, and Rocky Mountain juniper with mixed grassland. The rangeland of this LRU follows the general concept of the MLRA. The dryer sites are dominated by bluebunch wheatgrass and as the precipitation increases and temperatures decrease rough fescue increase. In areas that receive the highest precipitation, Richardson's needlegrass may exist. Shrub cover is limited in this area and is generally silver sagebrush and shrubby cinquefoil with areas of chokecherry and buffaloberry (both russet and silver). The glacial drift areas will often have wetland associated vegetation as well as large areas of quaking aspen.

Ecological site concept

• This site occurs in flood plains of perennial and intermittent streams, near springs and seeps, or other areas having a permanent or perched water table with riparian area
• Dominant Cover: mixed vegetation
• Site receives additional water
• Moisture Regime: ustic
• Temperature Regime: frigid to cry
• Elevation Range: 3800-5800
• Soils are
o Not saline or saline-sodic
o Moderately deep, deep, or very deep
o Typically less than 5% stone and boulder cover (<10% max)
• Seasonal high water table within 40" (approx. 100cm) of soil surface.
• Transitional area of foothills separating plains and mountains
• Parent material is recent alluvium
• Slope: 0-5%

Associated sites

R046XN256MT	**Subirrigated (Sb) RRU 46-N 13-19 PZ** Subirrigated sites are often adjacent to the Bottomland site and share plant communities
R046XS108MT	**Subirrigated (Sb) RRU 46-S 15-19 PZ** Subirrigated sites are often adjacent to the Bottomland site and share plant communities
R046XC512MT	**Subirrigated (Sb) RRU 46-C 13-19 PZ** Subirrigated sites are often adjacent to the Bottomland site and share plant communities

Similar sites

R046XC512MT	**Subirrigated (Sb) RRU 46-C 13-19 PZ** Subirrigated sites are often adjacent to the Bottomland site and share plant communities
R046XN256MT	**Subirrigated (Sb) RRU 46-N 13-19 PZ** Subirrigated sites are often adjacent to the Bottomland site and share plant communities
R046XS108MT	**Subirrigated (Sb) RRU 46-S 15-19 PZ** Subirrigated sites are often adjacent to the Bottomland site and share plant communities

Table 1. Dominant plant species

Tree	(1) *Populus* (2) *Betula*
Shrub	(1) *Salix exigua* (2) *Cornus sericea*

Herbaceous	(1) *Spartina pectinata* (2) *Carex nebrascensis*

Physiographic features

The Bottomland ecological site occurs on terraces and high floodplain steppes, near springs or seeps, or other areas having a permanent water table close enough to the surface (typically within 3 feet) to influence plant composition and production. Slope is 0–2%, except can be greater when this site occurs on hillslope near a spring/seep. These areas are rarely or non-flooded. Rare flooding indicates that flooding is unlikely, but possible under unusual weather conditions (0–5% chance in any year). These are also considered to be “lentic” (standing water) riparian/wetland areas.

Table 2. Representative physiographic features

Landforms	(1) Foothills > Stream terrace (2) Foothills > Stream (3) Foothills > Flood plain (4) Foothills > Alluvial fan
Elevation	1,158–1,768 m
Slope	0–5%
Water table depth	0–102 cm

Climatic features

Climate is highly variable as this site exists across a large portion of Montana. The average precipitation is 15 inches and averages 83 Frost Free Days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	77-99 days
Freeze-free period (characteristic range)	115-125 days
Precipitation total (characteristic range)	356-432 mm
Frost-free period (actual range)	32-111 days
Freeze-free period (actual range)	94-138 days
Precipitation total (actual range)	356-432 mm
Frost-free period (average)	83 days
Freeze-free period (average)	118 days
Precipitation total (average)	381 mm

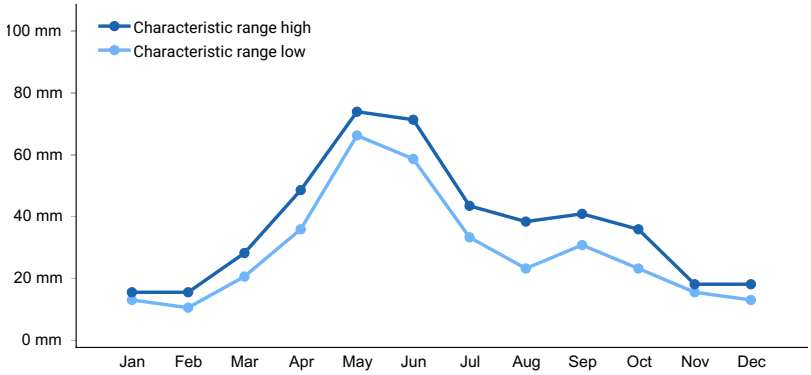


Figure 1. Monthly precipitation range

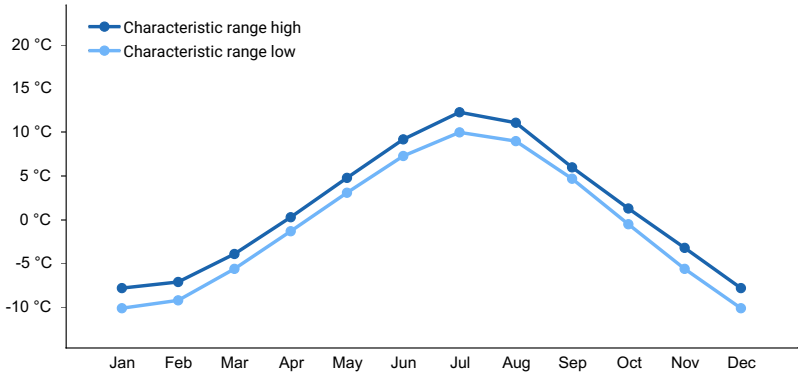


Figure 2. Monthly minimum temperature range

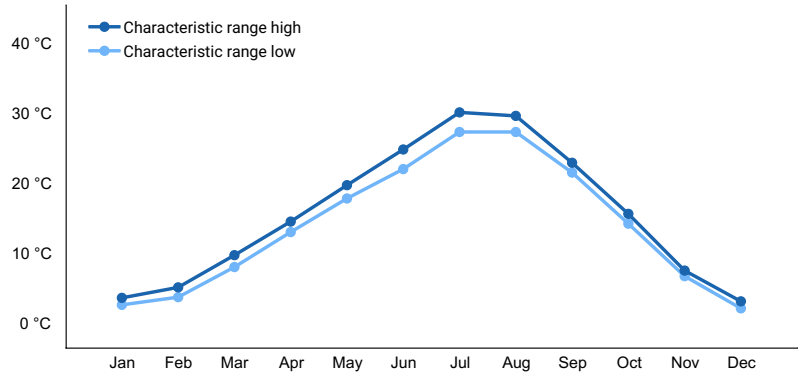


Figure 3. Monthly maximum temperature range

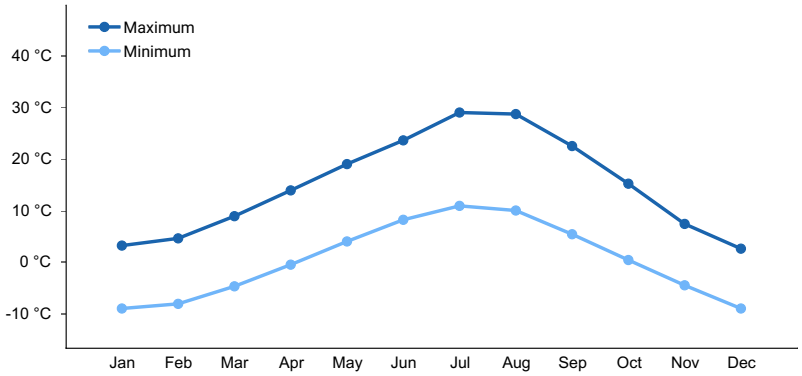


Figure 4. Monthly average minimum and maximum temperature

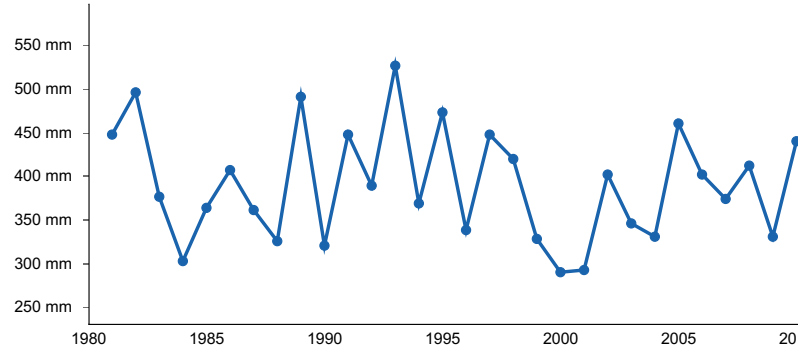


Figure 5. Annual precipitation pattern

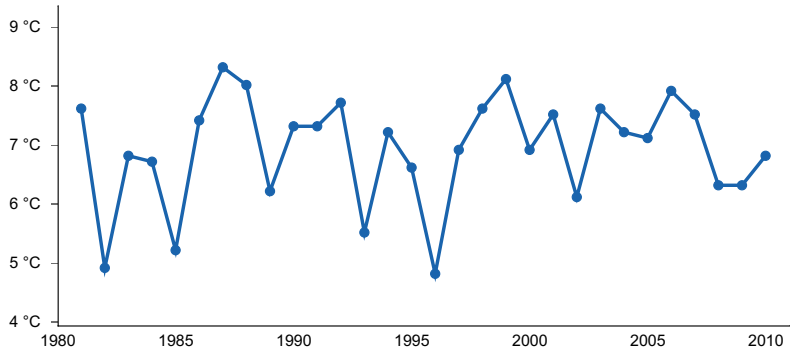


Figure 6. Annual average temperature pattern

Climate stations used

- (1) AUGUSTA [USC00240364], Augusta, MT
- (2) CASCADE 5 S [USC00241552], Cascade, MT
- (3) CASCADE 20 SSE [USC00241557], Cascade, MT
- (4) HOBSON [USC00244193], Hobson, MT
- (5) LEWISTOWN MUNI AP [USW00024036], Lewistown, MT
- (6) BIG TIMBER [USC00240780], Big Timber, MT
- (7) JOLIET [USC00244506], Joliet, MT
- (8) YELLOWTAIL DAM [USC00249240], Lodge Grass, MT

Influencing water features

This site occurs in the floodplains of perennial and intermittent streams, near springs, seeps, and other areas having a permanent or perched water table with a riparian area. Water table is variable based on stream dynamics and state of current plant community.

Soil features

Soils are recent alluvium of mixed geology. Soil may or may not express classic redox features based on age and amount of saturation.

Table 4. Representative soil features

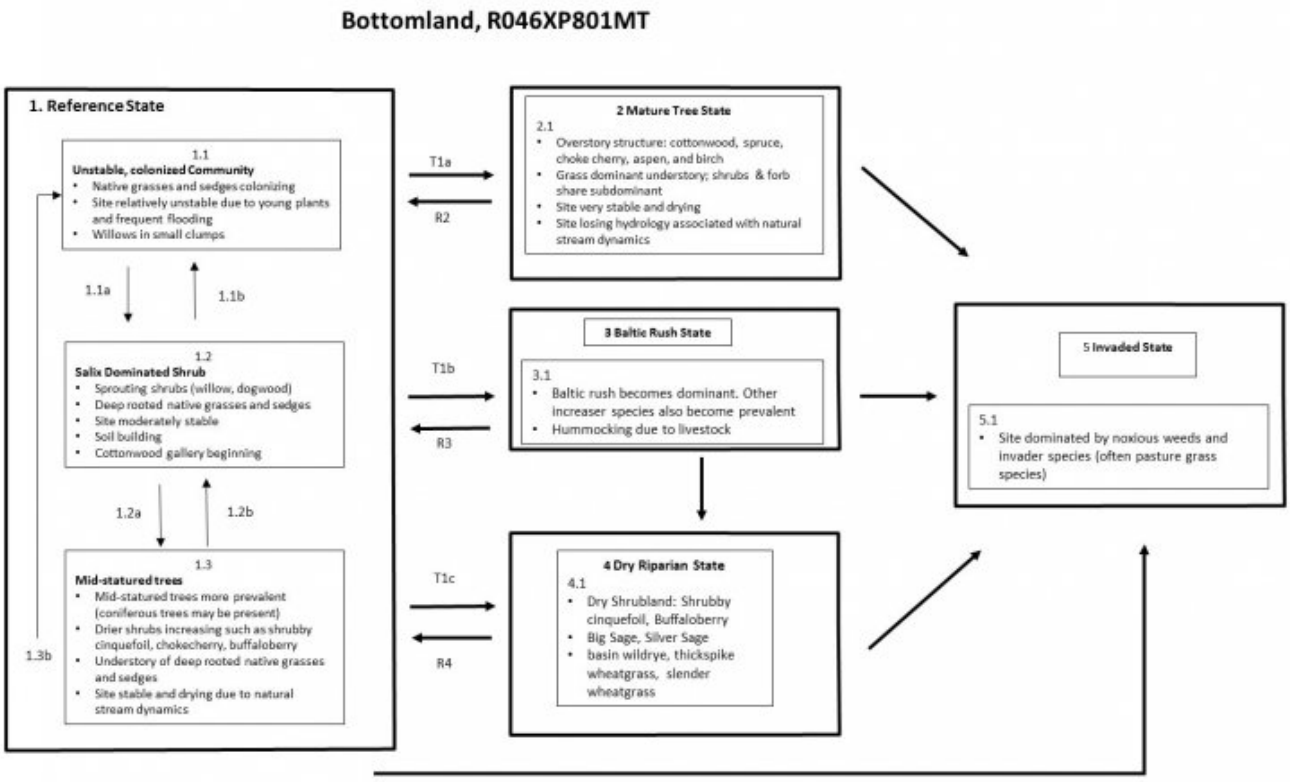
Parent material	(1) Alluvium–igneous, metamorphic and sedimentary rock
Permeability class	Slow to moderate
Soil depth	102–254 cm
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–2%
Available water capacity (0-101.6cm)	8.38–15.75 cm
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (25.4-50.8cm)	0–40%
Subsurface fragment volume >3" (25.4-50.8cm)	0–11%

Ecological dynamics

1 Reference State (as represented by active floodplain). Due to active stream dynamics, no one community can describe the reference state and it is common for multiple communities to exist in a relatively small area.

1.1 This plant community is primarily composed of colonizing grasses and sedge and is relatively unstable due to shallow rooted plants and frequent flooding. Willows may exist on site but are typically in small clumps or as single plants
1.1a Site becomes more stable over time, deeper rooted plants increase
1.1b Site experiences flooding that exceeds rooting strength of plant community, heavy grazing reduces shrub component
1.2 This plant community contains a high diversity of willows, dogwood, sedges (beaked, Nebraska, and water), and grasses (tufted hairgrass, American and fowl mannagrass, reedgrass). There are several other grasses and grass-likes (bearded wheatgrass, meadow barley, American sloughgrass, and Baltic rush), along with a variety of forbs. Slight variations in climate and elevation may cause some minor shifting of the willow species. This site is moderately stable and typically can withstand occasional flooding
1.2a Site becomes more stable over time, stream dynamics change (possibly man made structure) causing floodplain to shift to a drier site
1.2b Site experiences catastrophic flooding often associated with extreme weather event or ice jam
1.3 Mid-statured trees become more prevalent with interspersed coniferous trees possible. Site is very stable but drying due to natural stream dynamics. Willows remain the primary shrub however chokecherry and buffaloberry are increasing. Grasses and sedges remain as the understory.
1.3b Site experiences catastrophic flooding often associated with extreme weather event or ice jam
2.1 Mature Tree Dominated state where large cottonwood, spruce, chokecherry, aspen, and birch trees comprise overstory. Grasses often control the understory with dry shrubs. Site is very stable, drying, and has lost nearly all of its stream dynamic (often associated with a down cutting of the stream or loss of stream meandering)
T1a Long term stability created by nearly complete lack of wild flooding (either natural or man created), Improper grazing promotes grass growth.
R2 Site experiences catastrophic flooding often associated with extreme weather events or ice jams; Brush management, grazing management will also be necessary
3.1 Wetland characteristics of site altered. Baltic rush and increaser species become prevalent. Site drying due to stream downcutting. Hummocking by livestock possible
T1b Improper grazing (overgrazing or repeated spring grazing), extended drought.
R3 Improved grazing practices (change of season of use, conservative stocking rates), tree/shrub establishment, water impoundments (beaver dams, log jams, or dam analogs)
4.1 Dry riparian state: Site is typically dominated by native grasses such as basin wildrye, thickspike wheatgrass, and slender wheatgrass. Shrubby cinquefoil, buffaloberry, big sagebrush, and silver sagebrush are dominant shrubs. Site loses hydrology due to downcutting of stream or stream meandering.
T1c Natural stream dynamics creates a dry site that was once wetter. Improper grazing creates accelerated stream downcutting
T3a Drying of system as a result of loss of hydrology and increase in drier shrub species encroaching.
R4 Grazing management (timing and amount to improve shrub and tree establishment), brush management to remove unwanted drier species
5.1 Invaded State: This includes many non-native species that have come to dominate riparian areas. Some species may include: orchard grass, timothy, Kentucky bluegrass, non-native thistles, Russian olive, leafy spurge, spotted knapweed, hounds toungue, foxtail barley, whitetop mustard. Often sites are a combination both pasture grasses and invading weeds. Site is often a terminal state; meaning these sites are likely to never return to Reference regardless of management
T1d, T2a, T3b, T4a Sites are invaded by noxious weeds or introduced pasture grasses. Pasture grasses may be planted or a result of invasion from neighboring sites. Improper grazing may be a trigger for invasion; however, flooding may transport seeds to freshly deposited alluvium

State and transition model



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1.2a Site becomes more stable over time, stream dynamics change (possibly man made structure) causing floodplain to shift to a drier site

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1.3b Site experiences catastrophic flooding often associated with extreme weather event and/or ice jam

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T1d, T2a, T3b, T4a Sites are invaded by noxious weeds or introduced pasture grasses. Pasture grasses may be planted or a result of invasion from neighboring sites. Improper grazing may be a trigger for invasion however flooding may transport seeds to freshly deposited alluvium.

Animal community

Wildlife readily use this site for all life stage. Site produces high amounts of livestock forage.

Recreational uses

Hunting, fishing, hiking, wildlife viewing, landscape/viewshed

Wood products

This site is typically not utilized for timber products however large cottonwood trees are often sourced for toilet paper and for use in shipping boxes or pallets.

Inventory data references

This provisional site is based on professional knowledge from public and private entities, National Range Inventory (NRI) data, and historic references.

Other references

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Contributors

Petersen, Grant

Approval

Kirt Walstad, 9/07/2023

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	05/12/2025
Approved by	Kirt Walstad
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:**