

Ecological site R052XN169MT

Subirrigated (Sb)

10-14" p.z.

Last updated: 4/14/2025
Accessed: 10/01/2026

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): 052X–Brown Glaciated Plains

The Brown Glaciated Plains, MLRA 52, is an expansive and agriculturally and ecologically significant area. It consists of approximately 14.5 million acres and stretches across 350 miles from east to west, encompassing portions of 15 counties in north-central Montana. This region represents the southwestern limit of the Laurentide Ice Sheet and is considered to be the driest and westernmost area within the vast network of glacially derived prairie pothole landforms of the northern Great Plains. Elevation ranges from 2,000 feet (610 meters) to 4,600 feet (1,400 meters). Soils are primarily Mollisols, but Entisols, Inceptisols, Alfisols, and Vertisols are also common. Till from continental glaciation is the predominant parent material, but alluvium and bedrock are also common. Till deposits are typically less than 50 feet thick, and in some areas glacially deformed bedrock occurs at or near the soil surface (Soller, 2001). Underlying the till is sedimentary bedrock largely consisting of Cretaceous shale, sandstone, and mudstone (Vuke et al., 2007). The bedrock is commonly exposed on hillslopes, particularly along drainageways. Significant alluvial deposits occur along glacial outwash channels and major drainages, including portions of the Missouri, Teton, Marias, Milk, and Frenchman Rivers. Large glacial lakes, particularly in the western half of the MLRA, deposited clayey and silty lacustrine sediments (Fullerton et al., 2013). Much of the western portion of this MLRA was glaciated towards the end of the Wisconsin age, and the maximum glacial extent occurred approximately 20,000 years ago (Fullerton et al., 2004). The result is a geologically young landscape that is predominantly a level till plain interspersed with lake plains and dominated by soils in the Mollisol and Vertisol orders. These soils are very productive and generally are well suited to dryland farming. Much of this area is aridic-ustic. Crop-fallow dryland wheat farming is the predominant land use. Areas of rangeland typically are on steep hillslopes along drainages. The rangeland, much of which is native mixedgrass prairie, increases in abundance in the eastern half of the MLRA. The Wisconsin-age till in the north-central part of this area typically formed large disintegration moraines with steep slopes and numerous poorly drained potholes. A large portion of Wisconsin-age till occurring on the type of level terrain that would typically be optimal for farming has large amounts of less-suitable sodium-affected Natrustalfs. Significant portions of Blaine, Phillips, and Valley Counties were glaciated approximately 150,000 years ago during the Illinoian age. Due to erosion and dissection of the landscape, many of these areas have steeper slopes and more exposed bedrock than areas glaciated during the Wisconsin age (Fullerton and Colton, 1986). While much of the rangeland in the aridic-ustic portion of MLRA 52 is classified as belonging to the "dry grassland" climatic zone, sites in portions of southern MLRA 52 may belong to the "dry shrubland" climatic zone. The Dry Shrubland climatic zone represents the northernmost extent of the big sagebrush (*Artemisia tridentata*) steppe on the Great Plains. Because similar soils occur in both southern and northern portions of the MLRA, it is currently hypothesized that climate is the primary driving factor affecting big sagebrush distribution in this area. However the precise factors are not fully understood at this time. Sizeable tracts of largely unbroken rangeland in the eastern half of the MLRA and adjacent southern Saskatchewan are home to the Northern Montana population of greater sage grouse (*Centrocercus urophasianus*), and large portions of this area are considered to be a Priority Area for Conservation (PAC) by the U.S. Fish and Wildlife Service (U.S. Fish and Wildlife Service, 2013). This population is unique among sage grouse populations because many individuals overwinter in the big sagebrush steppe (dry shrubland) in the southern portion of the MLRA and then migrate to the northern portion of the MLRA, which lacks big sagebrush (dry grassland), to live the rest of the year (Smith, 2013). Areas of the till plain near the Bearpaw and Highwood Mountains as well as the Sweetgrass Hills and Rocky Mountain foothills are at higher elevations, receive higher amounts of precipitation, and have a typic-ustic moisture regime. These areas have significantly more rangeland production than the drier aridic-ustic portions of the MLRA and have enough moisture to produce crops annually rather than just bi-annually, as in the drier areas. Ecological sites in this higher precipitation area are classified as the Moist Grassland climatic zone.

Classification relationships

NRCS Soil Geography Hierarchy • Land Resource Region: Northern Great Plains • Major Land Resource Area (MLRA): 052 Brown Glaciated Plains • Climate Zone: N/A National Hierarchical Framework of Ecological Units (Cleland et al., 1997; McNab et al., 2007) • Domain: Dry • Division: Temperate Steppe • Province: Great Plains-Palouse Dry Steppe Province 331 • Section: Northwestern Glaciated Plains 331D • Subsection: Montana Glaciated Plains 331Dh • Landtype association/Landtype phase: N/A National Vegetation Classification Standard (Federal Geographic Data Committee, 2008) • Class: Mesomorphic Shrub and Herb Vegetation Class (2) •

Subclass: Shrub and Herb Wetland Subclass (2.C) • Formation: Temperate to Polar Freshwater Marsh, Wet Meadow and Shrubland Formation (2.C.4) • Division: *Salix interior* / *Juncus* spp. - *Eupatorium perfoliatum* Wet Meadow and Shrubland Division (2.C.4.Nd) • Macrogroup: *Spartina pectinata* - *Typha* spp. - *Schoenoplectus* spp. Great Plains Marsh, Wet Meadow, Shrubland and Playa Macrogroup (2.C.4.Nd.5) • Group: *Spartina pectinata* - *Calamagrostis stricta* - *Carex* spp. Great Plains Wet Prairie, Wet Meadow and Seepage Fen Group (2.C.4.Nd.5.b) • Alliance: *Spartina pectinata* Great Plains Wet Meadow Alliance • Association: *Spartina pectinata* - *Carex* spp. Wet Meadow Herbaceous Vegetation EPA Ecoregions • Level 1: Great Plains (9) • Level 2: West-Central Semi-Arid Prairies (9.3) • Level 3: Northwestern Glaciated Plains (42) • Level 4: North Central Brown Glaciated Plains (42o) and Glaciated Northern Grasslands (42j) Montana Riparian and Wetland Sites (Hansen et. al, 1995) • *Spartina pectinata* Habitat Type and *Symphoricarpos occidentalis* Community Type

Ecological site concept

This provisional ecological site occurs as a minor component in floodplain map units. The map is approximate, is not intended to be definitive, and is subject to change. Subirrigated is an ecological site of limited extent occurring sporadically throughout MLRA 52. It occurs on floodplains and stream terraces where a seasonal water table is present at a depth of 24 to 40 inches below the soil surface, especially during peak runoff periods. In some cases, the site may also receive additional moisture from flooding and stream overflow. The distinguishing characteristics of this site are that it is located on floodplains and that it receives additional moisture from groundwater. Soils for this ecological site are typically very deep (more than 60 inches) and derived from alluvium. Soil textures in the upper 4 inches are typically loam, silt loam, or silty clay loam. The soils typically have a mollic epipedon and are commonly stratified (USDA-NRCS, 2016) due to deposition of sediment from multiple flood events. Characteristic vegetation is prairie cordgrass (*Spartina pectinata*), western wheatgrass (*Pascopyrum smithii*), and sedges (*Carex* spp.). Shrubs may include chokecherry (*Prunus virginiana*), snowberry (*Symphoricarpos* spp.), and Wood's rose (*Rosa woodsii*).

Associated sites

R052XN178MT	Shallow (Sw) 10-14" p.z. Soil depth 10-20 inches; 20 inches to a restrictive layer; less forage production, different landscape position.
R052XN162MT	Clayey (Cy) 10-14" p.z. Different landscape position; different species composition and soil texture.
R052XN163MT	Sandy (Sy) 10-14" p.z. Different landscape position, different species composition and soil texture.
R052XN168MT	Silty-Steep (SiStp) 10-14" p.z. Slopes >15%; less forage production; different species composition.
R052XN171MT	Saline Overflow (SOv) 10-14" p.z. Similar landscape position, receives additional run-in moisture from surrounding landscape; different species composition, saline or sodic affected, lower productivity.
R052XN166MT	Overflow (Ov) 10-14" p.z. Site receives extra moisture, but it is not in floodplain, no permanent water table at less than 42 inches

Similar sites

R052XC218MT	Subirrigated (Sb) 10-14" p.z. More switchgrass and big bluestem present in HCPC
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R053AE070MT	Subirrigated (Sb) (Legacy) RRU 53AE Switchgrass and big bluestem are dominant species in HCPC.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Shepherdia argentea</i> (2) <i>Salix</i>
Herbaceous	(1) <i>Spartina pectinata</i> (2) <i>Elymus trachycaulus</i>

Physiographic features

This site usually occurs on terraces and floodplain steppes, near springs or seeps, or other areas having a seasonal water table close enough to the surface to influence plant composition and production. These areas are rarely flooded or non-flooded. "Rare" indicates there is a 0- 5% chance of flooding in any year. The site has a seasonal water table at 24" – 42". Slopes vary from 0-2% and occur on all exposures. Elevations generally range from 2,000 to 3,100 feet.

Table 2. Representative physiographic features

Landforms	(1) Terrace (2) Hillslope (3) Flood plain
Runoff class	Negligible to low
Flooding frequency	None
Ponding frequency	None
Elevation	610 – 950 m
Slope	0 %
Water table depth	60 – 110 cm
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
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Flooding frequency	Not specified
Ponding frequency	Not specified
Elevation	570 – 1,070 m
Slope	Not specified
Water table depth	Not specified

Climatic features

A semi-arid, temperate climate characterizes the Glaciated Plains. The predominance of cool season species has evolved to take advantage of the precipitation regime that peaks in late spring-early summer (June). Seventy-five percent of the annual precipitation usually falls as steady, soaking, frontal system rains. Summer rains usually come with thunderstorms. Precipitation is the most important factor influencing production (Heitschmidt et al 2005). Severe drought occurs on average in two out of every ten years (Cooper, et al., 2001).

Table 4 Representative climatic features

Frost-free period (characteristic range)	90-120 days
Freeze-free period (characteristic range)	120-140 days
Precipitation total (characteristic range)	250-360 mm
Frost-free period (average)	90 days
Freeze-free period (average)	130 days
Precipitation total (average)	310 mm

- (1) CHESTER [USC00241692], Chester, MT
- (2) GLASGOW [USW00094008], Glasgow, MT
- (3) HAVRE CITY CO AP [USW00094012], Havre, MT
- (4) SHELBY [USC00247500], Shelby, MT

Influencing water features

This site is not influenced by water from streams.

Wetland description

This site is not influenced by water from wetlands.

Soil features

Soils are deep to very deep with a seasonal water table within about three feet of the surface. These soils are non-hydric. Soils are somewhat poorly drained, and more than 72 inches deep. Permeability varies from moderately slow to slow. The surface layer of these soils vary from 3-12 inches in depth and are typically a loam, silt loam, clay loam, or sandy loam. Textures of underlying layers also vary since these are alluvial soils, having been deposited by flowing water. Soil ph varies from 6.6-8.4. The following soil components characterize this site: Bearlake, Gallatin and Novary.

Table 5. Representative soil features

Parent material	(1) Alluvium – igneous, metamorphic and sedimentary rock
Surface texture	(1) Loam (2) Sandy loam (3) Clay loam
Family particle size	(1) Fine-loamy
Drainage class	Somewhat poorly drained
Permeability class	Very slow to moderately slow
Soil depth	100 – 200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (Depth not specified)	12.7 – 17.78 cm
Calcium carbonate equivalent (Depth not specified)	0 – 10 %
Electrical conductivity (Depth not specified)	Not specified
Sodium adsorption ratio (Depth not specified)	0 – 10

Soil reaction (1:1 water) (Depth not specified)	6.6 – 8.4
Subsurface fragment volume ≤3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

This ecological site developed under Northern Great Plains climatic conditions. At the time that North America was settled by Europeans, the Glaciated Plains was the home of nomadic tribes and large numbers of bison, prairie dogs, elk, pronghorn, bighorn sheep and deer. These herbivores have been present on the plains since the retreat of the Pleistocene glaciers and greatly influenced the mixed grass prairie ecosystem. Much of the landscape burned at intervals of 5-7 years, either as a result of lightning or environmental manipulations by the Native Americans (Frost 1998).

Plant community interpretations are based on the Historic Climax Plant Community (HCPC). The HCPC is the plant community that is best adapted to the unique combination of factors associated with this ecological site. It was in a natural dynamic equilibrium with the historic biotic, abiotic, and climatic factors at the time of European immigration and settlement. This site is highly resilient to disturbance. Changes in the HCPC are brought about by frequency, timing and intensity of past grazing use, series of dry or wet years, or disturbances by fire, insect infestations, prairie dogs, noxious weed invasions, etc. Continual adverse impacts to the site over a period of years results in a departure from the HCPC. As the HCPC regresses to lower seral stages, the deep-rooted perennial grasses are replaced by the introduced bluegrasses (Kentucky and Canada) and lower successional species (Baltic rush, sedges, foxtail barley, curlydock, and annual forbs). The dominance of these short grasses, low successional warm season forbs and half-shrubs, and invasive species in the plant community disrupts ecological processes, impairs the biotic integrity of the site, and adversely affects resiliency. The system's ability to recover to higher seral states is restricted or impeded.

State and Transition Diagram

Traditional theories of plant succession leading to a single climax community are inadequate for understanding the complex successional pathways of Subirrigated 10-14" p.z. ecological sites in the northern Glaciated Plains. The ecological site is more aptly described using state-and-transition vegetation dynamics in a non-linear framework. A "state" is an alternative, persistent vegetation community that is not simply reversible in the linear successional framework (Stringham 2003). States are depicted as seral stages, while pathways between states are "transitions." The latter can be transient or persisting (crosses a threshold). Transitions are triggered by climatic events, fire, grazing, farming, burning, etc.

Three important plant communities and associated successional pathways for the Reference state (State 1) are illustrated below for the Subirrigated 10-14" p.z. ecological site in the Glaciated Plains. The diagram also depicts a transition from Plant Community B to State 2 (Community C) and a possible transition from the Reference State to State 3 (Community D).

State and transition model

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Warm-season Grasses			448-2018	
	prairie cordgrass	SPPE	<i>Spartina pectinata</i>	448-1345	–
	mat muhly	MURI	<i>Muhlenbergia richardsonis</i>	0-448	–
	rough bentgrass	AGSC5	<i>Agrostis scabra</i>	0-448	–
2	Rhizomatous Wheatgrasses			673-1569	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	448-897	–

	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	224-673	–
3	Cool-season Grasses			897-2018	
	tufted hairgrass	DECE	<i>Deschampsia cespitosa</i>	673-1345	–
	slimstem reedgrass	CAST36	<i>Calamagrostis stricta</i>	224-673	–
4	Miscellaneous Grasslikes			224-1345	
	sedge	CAREX	<i>Carex</i>	224-448	–
	bulrush	SCIRP	<i>Scirpus</i>	224-448	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	224-448	–
	Grass, native	2GN	<i>Grass, native</i>	224-448	–
Forb					
5	Forbs			45-560	
	dotted blazing star	LIPU	<i>Liatris punctata</i>	45-224	–
	Maximilian sunflower	HEMA2	<i>Helianthus maximiliani</i>	45-224	–
	lanceleaf goldenweed	PYLA	<i>Pyrrocoma lanceolata</i>	0-224	–
	fiddleleaf hawksbeard	CRRU3	<i>Crepis runcinata</i>	0-224	–
	prairie thermopsis	THRH	<i>Thermopsis rhombifolia</i>	0-224	–
	arrowgrass	TRIGL	<i>Triglochin</i>	0-224	–
	Forb, native	2FN	<i>Forb, native</i>	0-224	–
Shrub/Vine					
6	Shrubs			45-280	
	chokecherry	PRVI	<i>Prunus virginiana</i>	45-224	–
	willow	SALIX	<i>Salix</i>	45-224	–
	shrubby cinquefoil	DAFR6	<i>Dasiphora fruticosa</i>	0-224	–
	snowberry	SYMPH	<i>Symphoricarpos</i>	0-224	–
	rose	ROSA5	<i>Rosa</i>	0-224	–
	buffaloberry	SHEPH	<i>Shepherdia</i>	0-224	–
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0-224	–

Table 7. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 1.3 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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Animal community

Livestock Management This site evolved with trampling, defoliation (ungulates, grasshoppers and jackrabbits, and other herbivores), fire and drought. In comparison to upland ecological sites, water is relatively more accessible to grazing animals on this site. Therefore, it is theorized that this site evolved with more animal impact than did the normal upland ecological sites. This site has the potential to produce an abundance of high quality forage. Total annual production varies from 3500 – 5000 lbs/ac. The Subirrigated 10-14" p.z. site is normally highly resistant to disturbances which may alter its ecological processes. However, grazing early in the season when the upper part of the soil is wet can cause compaction and hummocks. Proper stocking rates, along with adequate recovery periods following grazing events, are needed to ensure that this site remains in a high seral or HCPC state. Following perturbations such as drought or poor grazing management, which allows mat muhly and other low successional species to increase at the expense of the mid and tall grasses,

succession occurs with subsequent rainfall and prescribed grazing. Forage production is greatly reduced in Plant communities C and D. Once these communities occupy this site, the presence of non-native grasses and undesirable plants significantly impede succession. Species such as Kentucky bluegrass, leafy spurge and Canada thistle are difficult to remove from the site. Arrowgrass, death camas, and horsetail are poisonous plants that often occur on this site. However, livestock losses are unusual unless the range is overstocked and livestock are forced to consume the poisonous plants. This site is suitable for livestock grazing from May through October. Because of topographic position, proximity to water, and species composition (grasses comprise about 85% of the production) the site is better-suited for cattle, rather than sheep grazing. Wildlife Interpretations The Subirrigated 10-14" p.z. ecological site has high biodiversity in the northern Glaciated Plains. High forage yields and the diversity of shrubs, grasses and forbs provide food and cover for resident and migratory wildlife species. The narrow irregular, meandering drainage patterns serve as a corridor allowing big game and other species to move between upland habitats. State 1 supports the highest abundance of insects, invertebrates, amphibians, reptiles, upland game birds and small mammals. It also provides forage for mule deer and antelope during most of the year. States 2 and 3 are much less suitable for big game, upland birds and most species of small mammals. The simplification of the plant community reduces the number of wildlife habitat niches. Because of less plant growth and litter, soil surface temperatures rise and soil moisture decreases. As the site becomes more xeric the insect and invertebrate population becomes less diverse, and there are less cover and food resources for upland birds, and mammals. Plant Preferences by Animal Kind Refer to NRCS Field Office Technical Guide, Section IIE, General Information, for tables displaying plant preferences by livestock and wildlife.

Hydrological functions

Soils associated with this ecological site are in Hydrologic Soil Groups B and C. Infiltration rates are generally moderate. The runoff potential is negligible to low, varying with landscape and ground cover. Good hydrologic conditions exist on overflow sites that are either in a high seral state or are at HCPC (State 1). Canopy cover (grasses, forbs and shrubs) is greater than 100% in these communities, which is conducive to high infiltration rates and minimal runoff and erosion. Communities in the early seral state (Communities B & C) are generally considered to be in poor hydrologic condition. Concerns are valid, not because of the amount of bare ground, but because the short grasses have replaced the tall high yielding species. Thus, there is much less opportunity for the plant community to effectively utilize available moisture.

Recreational uses

Hunters are probably the most common recreational user of this ecological site. The site is also used by hikers and photographers and birdwatchers.

Wood products

This site has no significant value for wood products.

Other information

At high seral states, the Subirrigated 10-14" p.z. site in the northern Glaciated Plains is resistant to perturbations. However, the site loses its resiliency when the plant community regresses from State 1 to State 2. Reproductive capability of desirable plants declines and annual production decreases as the site moves toward the threshold separating State 1 from State 2. Production in the latter state is less than 50% of the potential at HCPC. Thus, litter and the number of structural/functional groups are adversely affected.

Inventory data references

Data Source Number of Records Sample Period State County SCS-Range-417 ECS-1 Modified Double Sampling 1 2001 MT Valley
USDA-SCS-MT. 1981. Technical Range Site Description

Other references

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Heidel, B. S., V. Cooper, and C. Jean. Plant species of special concern and plant associations of Sheridan County, Montana. Report to the U.S. Fish and Wildlife Service. Montana Natural Heritage Program, Helena. 22pp. plus appendices.
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Contributors

Kirt Walstad

Approval

Kirt Walstad, 4/14/2025

Acknowledgments

Site Description Revisions The 2005 Subirrigated 10-14" p.z. ecological site description replaces earlier dated versions of Subirrigated 10-14" p.z. description in Rangeland Resource Unit 52XN. This 2005 revision incorporates the State and Transition Model theory, additional data on site productivity, and an improved understanding of many rangeland health indicators. Site Description Approval This ecological site description is approved with the understanding that it is no more than another step in our continual effort to update the NRCS technical guide. In order to facilitate the process, NRCS field personnel are encouraged to forward existing information and/or new data that can be used to improve the utility of this site description. Please forward the information and data to the State Rangeland Management Specialist. Authors Date Approval Date Dr. John Lacey 02/28/2005 Loretta J. Metz 03/19/2005 Maxine Rasmussen, Area RMS, Glasgow, MT Jon Siddoway, Area RMS, Great Falls, MT Rick Bandy, Area RSS, Great Falls, MT Greg Snell, Area RSS, Glasgow, MT

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)	Siddoway/Bandy
Contact for lead author	Great Falls Area Office, Great Falls, MT Reference site used? No
Date	04/19/2005
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Slopes on this site are between 0 – 2% and with 99 - 100% of the soil surface well-covered there are no rills even with the most extreme convection storms.

2. **Presence of water flow patterns:** Due to the soil surface being well covered and minimal slope there is no evidence of past or current soil deposition or erosion for this site.

3. Number and height of erosional pedestals or terracettes: Wind and water erosion will not be evident on this site, so pedestals and terracettes will not be present.

4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground): Bare ground should be less than 1% on this site.

5. Number of gullies and erosion associated with gullies: Gully erosion will not be evident on this site.

6. Extent of wind scoured, blowouts and/or depositional areas: Appearance or evidence of these erosional features on the landscape would not be present on this site.

7. Amount of litter movement (describe size and distance expected to travel): Because there is little bare ground, litter movement will be minimal at most. Because the site is dominated by taller bunchgrasses, rhizomatous grasses and sedges, litter size will reflect the height and diameter of the reproductive culms and leaves of these grasses as well as the lesser dominate mid-size grasses.

8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values): Resistance to erosion will be high with soil stability values of 6; rare areas of bare soil on this site may have values less than 6 if not under plant canopy.

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): Soil surface structure is granular; A horizon depth is 4 – 12”.

10. Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: Dominance of taller, deep rooted bunchgrasses and sedges will maximize infiltration and minimize runoff throughout the site.

11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site): Will not be present generally, but there may be areas that have “healed” from former bison trails and wallows as well as more current livestock trails and resting areas which could have a compaction layer below the soil surface.

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: Cool season rhizomatous grasses (Reedgrasses, Slender/Bearded wheatgrass) & cool season taller grasses (Tufted hairgrass) = warm season rhizomatous grasses (Prairie cordgrass) & cool season sedges/rushes (Nebraska sedge/Baltic rush) & perennial forbs & shrubs = warm season grass (Mat muhly). With less mineral soil and more coarse material in the profile, willows can dominate this site.

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

Will be low for all functional groups in a given year.

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): 3500 - 5000 #/acre. This would be the expected production for the reference state during adequate moisture years. 4000 pounds would be the expected production in a 12 inch precipitation zone.
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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: Kentucky and/or Canada bluegrass, redtop, timothy, smooth brome, a variety of annual or biennial weedy forbs, Rocky mountain iris, Potentilla spp., leafy spurge, houndstongue, various thistle spp.
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17. Perennial plant reproductive capability: During most years bunchgrasses and sedges will generally produce seeds, however the cool and warm season rhizomatous grasses may not necessarily produce seed even with the adequate moisture.
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