Ecological site R062XB010SD
Loamy - High Central

Last updated: 8/19/2024
Accessed: 08/24/2026

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): 062X–Black Hills

The Black Hills (MLRA 62) is a unique, low lying mountain range situated in the midst of a mixed short and mid-grass prairie. It is a true Island in the Plains, as it has geophysical and biological attributes that are unlike the surrounding area. The Black Hills have strong floristic ties to four of the North American biomes: Cordilleran (Rocky Mountain) Forest, Northern Coniferous Forest, Eastern Deciduous Forest, and Grasslands. MLRA 62 is approximately 3,040 square miles in size; 74 percent is located in South Dakota, and 26 percent is in Wyoming. The towns of Lead, Deadwood, Hill City, and Custer, South Dakota, are in this area. U.S. Highways 16 and 385 cross the MLRA. The Black Hills National Forest, Custer State Park, Mt. Rushmore National Monument, Jewel Cave National Monument, and Wind Cave National Park are located in this MLRA. This area forms the core of the Black Hills and the Bear Lodge Mountains where the elevation ranges between 3,600 to 6,565 feet, however, Black Elk Peak (Harney Peak) rises to 7,242 feet. Slopes range from moderately sloping on some of the high plateaus to very steeply sloping along drainageways and on peaks and ridges. Narrow valleys generally are gently sloping to strongly sloping. The Black Hills uplift is the product of the Laramide mountain-building episodes that produced most of the ranges in the Rocky Mountains. Uplift began near the end of the Cretaceous period, 65 million years ago and ended by 35 million years ago (Froiland 1999). The core of the Black Hills is a plutonic mass of granite with steeply dipping metamorphic rocks, primarily slate and schist, which directly surrounds the granite core. A plateau of Mississippian limestone surrounds the igneous and metamorphic rock core. The Madison limestone is broken around the outer edges of the uplifted area. The Permian Minnekahta limestone forms the outermost boundary of the area. Many other tilted sandstone, shale, and limestone units are exposed like a bathtub ring inside the steeply dipping Madison limestone. The dominant soil orders in this MLRA are Alfisols (forest soils) and Mollisols (grassland soils). The soils in the area have a frigid or cryic soil temperature regime, a udic or ustic soil moisture regime, and mixed, micaceous, or smectitic mineralogy. They are shallow to very deep, generally well drained, and loamy in texture. The Black Hills MLRA supports open to dense forest vegetation. Ponderosa pine is the dominant species across the Black Hills. White spruce grows at the higher elevations and along the major drainageways. Bur oak is found intermixed with pine in the northern and eastern fringes of the Black Hills, and Rocky Mountain Juniper is most common in the southern portion of the Black Hills. Aspen is of minor extent throughout the Black Hills area. Roughleaf ricegrass, slender wheatgrass, bearded wheatgrass, poverty oatgrass, Richardson’s needlegrass, and mountain ricegrass are the most common native grasses under open forest stands. The most common native shrubs are common snowberry, bearberry, common juniper, Oregon grape, and Saskatoon serviceberry. MLRA 62 land ownership is approximately 47 percent private and 53 percent federal. Rangeland and forestland are split almost equally between private and federal ownership (47 percent each). Minor areas of land are privately owned cropland and urban development. The forestland in this area is used mainly for timber production, recreation, and grazing. The major resource concerns are soil erosion and surface compaction caused by logging, mining, wildfires, grazing, and urban expansion. The quality of ground and surface water is another concern, especially in the northern part of the Black Hills. The primary cause is contamination from mine waste and septic systems in areas of rural development and urban expansion (USDA-NRCS, 2006: Ag Handbook 296).

LRU notes

For development of ecological sites, MLRA 62 is divided into three Land Resource Units (LRU’s) or physiographic zones (A, B, C, and Y). Each LRU has a set of ecological sites that represents these zones. The LRU is identified in the Ecological Site ID: R062XY000SD; “062X” identifies the MLRA, the next letter “Y” identifies the LRU. Note: The organization of Ecological Site ID’s will likely change in the future. LRU-A includes the northern Black Hills and Bear Lodge Mountains (22-30” PZ); LRU-B includes the high elevation central core of the Black Hills (25-35” PZ); and LRU-C includes the southern portion of the Black Hills (17-21” PZ). The Forest ecological sites are representative of sites in the Black Hills, Bear Lodge Mountains (MLRA-62), and the surrounding Dakota Hogback (MLRA-61). These sites are separated by elevation, soil temperature regimes, and slope. The Low Mountain area includes all of the Black Hills, Bear Lodge Mountains, and Dakota Hogback below 6,200 feet in elevation (LRU’s A and C). The soils in this area have a frigid soil temperature regime. The High Mountain area includes all of the Black Hills above 6,200 feet elevation (LRU-B). The soils in this area have a cryic soil temperature regime.

Classification relationships

USDA Land Resource Region G—Western Great Plains Range and Irrigated Region: Major Land Resource Area (MLRA) 62—Black Hills US Environmental Protection Agency (EPA) Level IV Ecoregions of the Conterminous United States: Black Hills Plateau—17b Black Hills Core Highlands—17c USDA Forest Service Ecological Subregions: Sections and Subsections of Conterminous United States: Black Hills Coniferous Forest Province—M334: Black Hills Section—334A Black Hills Limestone Plateau-Core Highlands Subsection—M334Ab

Ecological site concept

The site is located on hillslopes within high mountain valley landscapes in the Black Hills (LRU-B). The soils are loamy with a surface layer thickness less than 15 inches in depth. It does not receive additional water from runoff or overflow. The typical slope range is 0 to 25 percent, but averages around 10 percent. Vegetation in reference site consists primarily of cool-season needlegrasses and rhizomatous wheatgrasses; forbs are common and diverse but never dominant; and shrubs such as shrubby cinquefoil and western snowberry are often present in the plant community.

Associated sites

R062XB039SD	**Stony Overflow - High Central** The Stony Overflow site can be located adjacent to the Loamy site, however, the overflow site is directly influenced by addition water.
R062XB024SD	**Shallow Loamy - High Central** The Shallow Loamy site is commonly associated with the Loamy site but is located on steeper slopes with shallow soil depths.
R062XY043SD	**Valley Loam** The Valley Loam site can be adjacent to the loamy site but typically will be in lower landscape positions and will have deeper, darker soil profiles (> 16

Similar sites

R062XY043SD	**Valley Loam** The Valley Loam site typically has a deeper and darker soil profile, (> 16” soil surface layer) and is located in a flat “V” or “U” shaped valley. The plant community has more big bluestem and higher production.
R062XC024SD	**Shallow Loamy - South** The Shallow Loamy site will have shallow soil depths and less production.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Dasiphora fruticosa ssp. floribunda*
Herbaceous	(1) *Achnatherum nelsonii* (2) *Elymus trachycaulus*

Physiographic features

This site occurs on nearly level to sloping hillslopes, foot slopes, and backslopes within mountain valley landscapes in the Black Hills.

Table 2. Representative physiographic features

Landforms	(1) Mountain valley (2) Hill (3) Mountain slope
Runoff class	Low to high
Flooding frequency	None
Ponding frequency	None
Elevation	1,890 – 2,130 m
Slope	0 – 30 %
Water table depth	200 cm
Aspect	Aspect is not a significant factor

Climatic features

MLRA 62 is in a microclimate caused by the influence of increased elevation, which leads to increased precipitation, moderate air temperatures, and lower wind velocities as compared to the surrounding Great Plains. In general, the Black Hills climate is a continental type, cold in the winter and hot in the summer. Annual precipitation in MLRA 62 typically increases with elevation and decreases from west to east and north to south. The average annual precipitation range for LRU-B (Central High Country) is 25 to 35 inches. Most of the rainfall occurs as frontal storms early in the growing season, in May and June. Some high-intensity, convective thunderstorms occur in July and August. Precipitation in the winter occurs mostly as snow. The annual average snowfall ranges from 23 inches at the lower elevations in the south to 54 inches at the higher elevations in the central part of MLRA 62. Average annual temperature ranges from 36 to 48 degrees F. January is the coldest month, with an average temperature of 22°F in the central part and 25°F in the southern part of MLRA 62. July is the warmest month, with an average daily temperature of 67°F in the central part and 73°F in the southern part of this MLRA. The frost-free period ranges from 129 to 168 days; the period is shortest at higher elevations and in the northwestern part of the MLRA. Hourly winds are estimated to average about 11 miles per hour (mph) annually. Growth of cool-season plants begins in April, slowing or ceasing growth by mid-August. Warm-season plants begin growth in May, and continue to mid-September. Regrowth of cool-season plants may occur in September and October, depending on the availability of soil moisture. *

Deerfield 3 SE (USC00392231) climate station is not located within LRU-B, but is adjacent to it in LRU-A. The mean annual precipitation at this station is less than what LRU-B actually receives.

Table 3 Representative climatic features

Frost-free period (characteristic range)	20 days
Freeze-free period (characteristic range)	50 days

Precipitation total (characteristic range)	530 mm
Frost-free period (actual range)	20 days
Freeze-free period (actual range)	50 days
Precipitation total (actual range)	530 mm
Frost-free period (average)	20 days
Freeze-free period (average)	50 days
Precipitation total (average)	530 mm

- (1) DEERFIELD 3 SE [USC00392231], Hill City, SD

Influencing water features

The Loamy LRU-B (Central High Country) does not receive additional moisture from streams or wetlands.

Soil features

The soils on this site are moderately deep to very deep and well drained. The surface layer ranges from 5 to 10 inches but can reach 20 inches in thickness. Surface textures are loamy (specific textures are listed below.) Most of the soils have calcium carbonate in the profile, but they are leached to depths typically greater than 12 inches. The slopes range from 0 to 25 percent.

Water erosion is the primary hazard on this site. Erosion normally is minimal on slopes of less than 6 percent, and primarily occurs in the form of sheet erosion when present. Sheet and rill erosion can occur on linear surfaces where the slopes range from 6 to about 10 percent. On non-linear (undulating) surfaces, rill erosion is dominant. On slopes greater than about 10 percent, rill erosion can be present on all types of surfaces. Rill erosion can often morph into gully erosion on disturbed sites, in areas where flow paths concentrate into one. Loss of 50 percent or more of the surface layer of the soils on this site can result in a shift in species composition and/or production. The soils on this site normally are not susceptible to significant wind erosion.

The commonly-occurring soils for this site include Gillum and Jenksdraw.

Access Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/) for specific local soils information.

Table 4. Representative soil features

Parent material	(1) Alluvium – limestone and sandstone
Surface texture	(1) Silt loam
Family particle size	(1) Clayey

Drainage class	Well drained
Permeability class	Moderately slow to slow
Soil depth	50 – 100 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	15.24 – 22.86 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)	5.6 – 7.8
Subsurface fragment volume <=3" (Depth not specified)	0 – 30 %
Subsurface fragment volume >3" (Depth not specified)	0 – 10 %

Ecological dynamics

Black Hills vegetation types consist of a mixture of forest and grasslands resulting from the varied topography, geology, soils, climate and natural disturbances. Frequent fires, periodic drought, and episodic mountain pine beetle infestations all contribute to the maintenance of large open grasslands scattered throughout the Black Hills. Ponderosa pine is the dominant tree species in the Black Hills. It is a fire adapted species that coexists with frequent, low-intensity fires that consume small seedlings, prune lower branches from larger trees, and reduce fuel loads on the forest floor.

Fire, or the lack of fire, introduced non-native cool-season grasses, and defoliation (grazing and haying), are major drivers that shape this

site and the adjacent ecological sites. This Loamy site does not appear to be as susceptible to conifer encroachment as other Loamy sites in MLRA 62, however it can occur on the margins. Aspen may also occur on the margins between forest sites and the Loamy site in LRU-B. Kentucky bluegrass, timothy and smooth brome are common cool-season grass species throughout MLRA 62. Because the Black Hills have higher precipitation amounts and cooler spring and fall periods than the surrounding MLRA 61, these non-native cool-season grasses can easily invade and become established on this site. Improper grazing management, and non-use and/or no fire can cause these species to become the dominant species in the plant communities.

Changes will occur in plant communities due to short-term weather variations, impacts of native and/or exotic plant and animal species. Management actions, severe disturbances, such as periods of well-below average precipitation, severe defoliation, excessive haying or no fire and no use can also cause significant shifts in plant communities and/or species composition.

This site developed under Black Hills climatic conditions with short-term weather variations, light to severe grazing by bison, elk, insects and small mammals, sporadic natural or man-caused wildfire (often of light intensities), and other biotic and abiotic factors that typically influence soil/site development. The natural fire regime maintained this site as a grassland and the plant communities were free of non-native cool season grasses.

The Reference State illustrates what is thought to have existed prior to European settlement. It is very difficult to locate a Reference plant community with the introduction and spread of non-native cool-season grasses. Plant community phase 2.1 is most similar to the Reference State but because of the persistence of non-native cool-season grasses a restoration pathway to the Reference State is not believed to be achievable.

State and transition model

Figure 7. Loamy LRU-B - 062XB010SD

Figure 8. Loamy - LRU-B - 062XB010SD

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Cool-Season Bunchgrass**			1009-1681	
	slender wheatgrass	ELTRS	*Elymus trachycaulus ssp. subsecundus*	504-1009	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	504-1009	–
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	336-841	–
	green needlegrass	NAVI4	*Nassella viridula*	336-841	–
	mountain brome	BRMA4	*Bromus marginatus*	0-336	–
	nodding brome	BRAN	*Bromus anomalus*	0-336	–
	Pumpelly's brome	BRINP	*Bromus inermis ssp. pumpellianus*	0-336	–
	Richardson's needlegrass	ACRI8	*Achnatherum richardsonii*	0-336	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0-168	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0-168	–
	timber oatgrass	DAIN	*Danthonia intermedia*	0-168	–
2	**Cool-Season Rhizomatous Grass**			504-1177	
	western wheatgrass	PASM	*Pascopyrum smithii*	504-1177	–
3	**Tall and Mid- Warm-Season Bunchgrasses**			168-336	
	prairie dropseed	SPHE	*Sporobolus heterolepis*	168-336	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	0-168	–
4	**Mid- Warm-Season Rhizomatous Grasses**			0-336	
	marsh muhly	MURA	*Muhlenbergia racemosa*	0-168	–
	plains muhly	MUCU3	*Muhlenbergia cuspidata*	0-168	–
5	**Other Native Grasses**			0-168	
	Grass, perennial	2GP	*Grass, perennial*	0-168	–

6	**Grass-Likes**			168-336	
	sedge	CAREX	*Carex*	168-336	–
	needleleaf sedge	CADU6	*Carex duriuscula*	0-168	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0-168	–
7	**Non-Native Cool-Season Grasses**			0	
Forb					
8	**Forbs**			168-504	
	white sagebrush	ARLU	*Artemisia ludoviciana*	34-168	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	34-168	–
	old man's whiskers	GETR	*Geum triflorum*	34-168	–
	blacksamson echinacea	ECAN2	*Echinacea angustifolia*	34-168	–
	scurfpea	PSORA2	*Psoralidium*	34-168	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	34-168	–
	white prairie aster	SYFA	*Symphyotrichum falcatum*	34-168	–
	wild bergamot	MOFI	*Monarda fistulosa*	34-67	–
	Forb, perennial	2FP	*Forb, perennial*	34-67	–
	mariposa lily	CALOC	*Calochortus*	0-67	–
	beardtongue	PENST	*Penstemon*	0-67	–
	prairie clover	DALEA	*Dalea*	0-67	–
	dotted blazing star	LIPU	*Liatris punctata*	34-67	–
	fleabane	ERIGE2	*Erigeron*	0-67	–
	goldenrod	SOLID	*Solidago*	34-67	–
	American vetch	VIAM	*Vicia americana*	0-67	–
	blanketflower	GAAR	*Gaillardia aristata*	0-67	–
	Lewis flax	LILE3	*Linum lewisii*	0-67	–
	bluebell bellflower	CARO2	*Campanula rotundifolia*	0-67	–
	cinquefoil	POTEN	*Potentilla*	0-67	–
	deathcamas	ZIGAD	*Zigadenus*	0-34	–
	spiny phlox	PHHO	*Phlox hoodii*	0-34	–
	common starlily	LEMO4	*Leucocrinum montanum*	0-34	–
Shrub/Vine					
9	**Shrubs**			34-336	
	shrubby cinquefoil	DAFRF	*Dasiphora fruticosa ssp. floribunda*	34-336	–
	prairie sagewort	ARFR4	*Artemisia frigida*	34-168	–
	field sagewort	ARCA12	*Artemisia campestris*	0-67	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0-67	–
	common snowberry	SYAL	*Symphoricarpos albus*	0-67	–
	western snowberry	SYOC	*Symphoricarpos occidentalis*	0-67	–
Tree					
10	**Trees**			0-34	
	quaking aspen	POTR5	*Populus tremuloides*	0-34	–
	ponderosa pine	PIPO	*Pinus ponderosa*	0-34	–
	white spruce	PIGL	*Picea glauca*	0-34	–
	Tree	2TREE	*Tree*	0-34	–

Table 6. Community 2.1 plant community composition

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

Table 7. Community 3.1 plant community composition

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

Table 8. Community 4.1 plant community composition

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

Table 9. Community 5.1 plant community composition

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

Other information

Revision Notes: This PROVISIONAL ecological site concept has been QCd and QAd to ensure that the site meets the NESH standards for a provisional ecological site that provides basic compiled information in one location. This site should not be considered an Approved ESD, as it contains only the foundational site concepts and requires further data collection; specifically, high-intensity data characterizations and full 232 soil descriptions—and further site investigations and final STM reviews before it can be used as an Approved ESD meeting NESH standards. This site was previously known as High Country Silty Range Site 062XY033SD in the South Dakota FOTG. Site Development and Testing Plan: Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document.

Inventory data references

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range-trained personnel also were used. Those involved in developing this site include: Lakhdar Benkobi, ESI/SRIC, NRCS; Stan Boltz, Range Management Specialist, NRCS; Dan Brady, Soil Scientist, NRCS; Mitch Faulkner, Range Management Specialist, NRCS; Roger Gates, Associate Professor/Rangeland Management Specialist, West River Ag Center; Rick Peterson, Ecological Site Specialist, NRCS; Matthew Scott, Botanist, USFS Hell Canyon District Ranger; L. Michael Stirling, Range Management Specialist, NRCS; and Jim Westerman, Soil Scientist, NRCS. All inventory information and data records are compiled within the Rapid City, SD USDA-NRCS Shared “S” network drive.

Other references

High Plains Regional Climate Center, University of Nebraska,. (http://www.hprcc.unl.edu/)

Toledo, D., Sanderson, M., Spaeth, K., Hendrickson, J., Printz, J. 2014. Extent of Kentucky bluegrass and its effect on native plant species: diversity and ecosystem services in the northern great plains of the United States. Invasive Plant Science and Management. 7(4):543-522. Weed Science Society of America.

USDS, NRCS. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

USDA, NRCS. National Water and Climate Center. (http://wcc.nrcs.usda.gov) USDA, NRCS. National Range and Pasture Handbook, September, 1997.

USDA, NRCS. National Soil Information System, Information Technology Center. (http://nasis.nrcs.usda.gov)

USDA, NRCS. 2001. The PLANTS Database, Version 3.1 (http://plants.usda.gov).

USDA, NRCS. National Ecological Site Handbook, 1st Ed. January, 2014

Wrage, K. J. 1994. The effects of ponderosa pine on soil moisture, precipitation, and understory vegetation in the Black Hills of South Dakota. 158 p. Thesis.

Contributors

Peterson Rick L
Westerman James

Approval

Suzanne Mayne-Kinney, 8/19/2024

Acknowledgments

MLRA 62 sites were written to the Provisional Level by Rick L. Peterson, ESS, Rapid City, SSO in FY20. The ESDs were reviewed for quality control by Emily Helms, John Hartung, Mitch Faulkner, and Ryan Murray. All ecological sites were then reviewed and approved at the Provisional Level by David Kraft, Regional ESS, Salina, KS on 03/16/2021

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)	Stan Boltz, Mitch Faulkner, Emily Helms, Rick Peterson, Andrea Westlake, John Hartung, Ryan Murray, Jim Westerman.
Contact for lead author	Emily Helms, USDA-NRCS South Dakota State Rangeland Management Specialist Huron, SD 57350 emily.helms@usda.gov (605) 352-1241
Date	03/16/2021
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** **None.**

---

2. **Presence of water flow patterns:** **None, or barely visible and discontinuous.**

---

3. **Number and height of erosional pedestals or terracettes:** **None.**

---

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground less than 5 percent and patches less than 2 inches in diameter.

---

5. **Number of gullies and erosion associated with gullies:** None.

---

6. **Extent of wind scoured, blowouts and/or depositional areas:** None.

---

7. **Amount of litter movement (describe size and distance expected to travel):** Litter should fall in place. Slight amount of movement of fine litter from water is possible, but not normal. Litter movement from wind is not expected.

---

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil aggregate stability ratings should typically be 5 to 6, usually 6. Typically high root content, organic matter, and granular structure. Soil surface is very resistant to erosion. Soil surface fragments will typically retain structure indefinitely when dipped in distilled water.

---

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A-horizon should be 5 to 10 inches thick with dark brownish colors (values of 4 to 5 dry or 2 to 3 moist). Soil surface structure typically is moderate or strong fine to medium granular.

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Combination of shallow and deep rooted species (mid & tall rhizomatous and tufted perennial cool season grasses) with fine and coarse roots positively influences infiltration. Invasion of introduced cool-season grasses such as Kentucky bluegrass, smooth brome, timothy, and potentially redtop or encroachment of ponderosa pine may have an adverse impact on infiltration and runoff. Relative composition is 70% grasses and/or grass-like plants, 20% forbs, and 10% shrubs. The grass component is composed of C3, bunch grasses (30-50%), C3, rhizomatous grasses (15-35%), grass-likes (5-10%), C4, bunch grasses (5-10%), and C4, rhizomatous grasses (0-10%).

---

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None - when dry, B horizons can be hard and appear to be compacted, but no platy structure will be present.

---

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: 1. Co-Dominant F/S Group: C3, bunch grasses – 900-1500 #/ac (30-50%), 4 species minimum 2. Co-Dominant F/S Group: C3, rhizomatous grasses – 450-1050 #/ac (15-35%), 1 species minimum

    Sub-dominant: 3. Subdominant F/S Group: Native, perennial and annual forbs – 150-450 #/ac (5-15%), 5 species minimum

    Other: 4. Minor F/S Group: Grass-likes – 150-300 #/ac (5-10%), 1 species minimum 5. Minor F/S Group: C4, bunch grasses – 150-300 #/ac (5-10%), 1 species minimum 6. Minor F/S Group: Shrubs-cacti-vines – 30-300 #/ac (1-10%), 2 species minimum 7. Minor F/S Group:

C4, rhizomatous grasses – 0-300 #/ac (0-10%) 8. Trace F/S Group: Trees – 0-30 #/ac (0-1%)

Additional: 12a. Relative Dominance: Community 1.1: C3, bunch grasses > C3, rhizomatous grasses > Native perennial and annual forbs > Grass-likes = C4, bunch grasses > or = Shrubs-cacti-vines > or = C4, rhizomatous grasses > Trees 12b. F/S Groups not expected for the site: Introduced annual grasses, perennial introduced and naturalized grasses 12c. Number of F/S Groups: 8 12d. Species number in Dominant and Sub-dominant F/S Groups: 10

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** **Very little evidence of decadence or mortality. Bunch grasses have strong, healthy centers and shrubs have few dead stems.**

---

14. **Average percent litter cover (%) and depth (in):** **Plant litter cover is evenly distributed throughout the site and is expected to be 80 to 90 percent and at a depth of 0.5 inch (1.2 cm). Excessive timothy or smooth brome litter may negatively impact the functionality of this site.**

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** **Annual production is 3,000 pounds per acre in a year with normal precipitation and temperatures. Low and High production years should yield 2,200 and 3,800 pounds per acre respectively.**

---

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:** **Smooth brome, Kentucky bluegrass, timothy, redtop, red clover, ponderosa pine, white (Black Hills) spruce, and others as they become known. See: Wyoming Weed and Pest Council Website: https://wyoweed.org/ South Dakota Department of Agriculture State Noxious Weed and Pest List: https://sdda.sd.gov/ag-services/weed-and-pest-control/weed-pest-control/sd-state-noxious-weed-declared-pest-list-and-distribution-maps/**

---

17. **Perennial plant reproductive capability:** **All perennial species exhibit high vigor relative to recent weather conditions. Perennial grasses should have vigorous rhizomes or tillers; vegetative and reproductive structures are not stunted. All perennial species should be capable of reproducing annually.**
