USDA Natural Resources
Conservation Service

Ecological site R062XY016SD
Very Shallow

Last updated: 7/31/2024
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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

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): 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 Very Shallow ecological site is located on upland landscapes throughout the Black Hills but is most prominent in the northern and southern Land Resource Units (LRUs) (A and C). Soils on this site are very shallow, less than 10 inches in depth, with a surface layer ranging from 1 to 3 inches in depth. Most soils on this site are channery loam with carbonates to the surface. Flat limestone slabs and fragments of limestone typically are exposed on the surface of the ground. The soils are excessively drained with a restrictive bedrock layer of limestone, which impedes water movement and rooting depth. The typical slope ranges from 2 to 30 percent. Vegetation in the Reference State consists primarily of warm -season grass species, and cool-season species are subdominant. Common warm-season grasses include little bluestem, sideoats grama, plains muhly, and hairy grama. Common cool-season grass are needleandthread, prairie Junegrass, slender wheatgrass, bottlebrush squirreltail, and bluebunch wheatgrass. Forbs are very diverse but never dominant. Shrubs such as common juniper and creeping juniper almost always are present in plant community. Ponderosa pine usually is present on this site, but typically makes up less than 2 percent of the plant community. The site can be susceptible to pine encroachment, although tree canopy rarely becomes closed or significantly impacts herbaceous production.

Associated sites

R062XA010SD	**Loamy - North** The Loamy (North) site can be located adjacent to the Very Shallow site. Loamy sites have deep soils are more productive.
R062XA024SD	**Shallow Loamy - North** The Shallow Loamy (North) site is commonly associated with the Very Shallow site but has deeper soils.
R062XB010SD	**Loamy - High Central** The Loamy (South) site can be located adjacent to the Very Shallow site. Loamy sites have deep soils are more productive.
R062XB024SD	**Shallow Loamy - High Central** The Shallow Loamy (South) site is commonly associated with the Very Shallow site but has deeper soils.

Similar sites

R062XA024SD	**Shallow Loamy - North** The Shallow Loamy (North) has deeper soils. The plant community can look very similar but will have higher production and very little ground juniper.
R062XB024SD	**Shallow Loamy - High Central** The Shallow Loamy (South) has deeper soils. The plant community can look very similar but will have higher production and very little ground juniper

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Juniperus communis*
Herbaceous	(1) *Schizachyrium scoparium* (2) *Bouteloua curtipendula*

Physiographic features

This site occurs on gently sloping to very steep summits, shoulders, and backslopes in the Black Hills.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope (2) Structural bench
Runoff class	Low to very high
Flooding frequency	None
Ponding frequency	None
Elevation	1,158–2,134 m
Slope	2–30%
Water table depth	203 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 temperature, 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 MLRA 62 is 17 to 35 inches; LRU-A (North) is 22 to 30 inches, LRU-B (Central High Country) is 25 to 35 inches, and LRU-C (South) is 17 to 21 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. It 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 upon soil moisture availability.

Table 3. Representative climatic features

Frost-free period (characteristic range)	69-98 days
Freeze-free period (characteristic range)	102-121 days
Precipitation total (characteristic range)	508-584 mm
Frost-free period (actual range)	30-107 days
Freeze-free period (actual range)	66-125 days
Precipitation total (actual range)	483-737 mm
Frost-free period (average)	80 days
Freeze-free period (average)	107 days
Precipitation total (average)	559 mm

Climate stations used

- (1) DEERFIELD 3 SE [USC00392231], Hill City, SD
- (2) LEAD [USC00394834], Lead, SD

- (3) SUNDANCE [USC00488705], Sundance, WY
- (4) CUSTER [USC00392087], Custer, SD
- (5) WIND CAVE [USC00399347], Buffalo Gap, SD

Influencing water features

The Very Shallow ecological site does not receive additional moisture from streams or wetlands; however, additional moisture may be received as runoff, but the majority does not stay on-site.

Soil features

The soils on this site are very shallow and excessively drained. The surface layer ranges from 1 to 3 inches thick. Encroachment of ponderosa pine occurs on this site in some areas. If pine encroachment is moderate to severe, the surface of the mineral soil may be covered with up to 1 inch of pine needles and duff. Surface textures are variable and are listed below. Flat limestone fragments are exposed on the surface of the ground in most areas. The soils on this site are calcareous to the surface. The slopes range from 2 to 30 percent.

This site typically should show slight to no evidence of rills, wind-scoured areas, or pedestalled plants. If present, water flow paths could include long, continuous, shallow gullies, or they could be broken, irregular in appearance, or discontinuous. The soil surface usually is fairly stable due to the high number of exposed rocks. There is a restrictive layer of bedrock (typically limestone) at 4 to 10 inches in depth, which impedes water movement and root penetration. These soils mainly are susceptible to water erosion. The hazard of water erosion is low on slopes of less than about 10 percent due to the volume of rock fragments. The hazard increases on slopes greater than about 10 percent. Loss of 50 percent or more of the surface layer of the soils on this site can result in a shift to a non-site (rock outcrop).

The commonly-occurring soil on this site is Rockerville, very shallow.

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

Figure 8. Very Shallow Soil Profile

Table 4. Representative soil features

Parent material	(1) Residuum–limestone and sandstone
Surface texture	(1) Very channery fine sandy loam (2) Very channery silt loam
Family particle size	(1) Loamy
Drainage class	Excessively drained
Permeability class	Moderate to moderately rapid
Soil depth	10–25 cm

Surface fragment cover <=3"	15–50%
Surface fragment cover >3"	5–40%
Available water capacity (0-101.6cm)	0.64–2.54 cm
Calcium carbonate equivalent (0-101.6cm)	10–30%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–3
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	35–80%
Subsurface fragment volume >3" (Depth not specified)	15–35%

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 infestations of mountain pine beetles 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. This site developed under Black Hills climatic conditions with short-term weather variations, light to severe grazing by bison, elk, 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.

Fire, or the lack of fire, and grazing are major drivers that shape this site as well as adjacent ecological sites. The Very Shallow site is susceptible to conifer encroachment from adjacent forest sites.

The historic native vegetation on this site consisted of mixed prairie grasses occurring on ridges and uplands. The vegetation predominately consists of warm-season grasses mixed with cool-season grasses, portraying a mixed grass prairie characteristic. Little bluestem and sideoats grama are the dominant species, along with plains muhly. Subdominant cool-season grasses include needlegrasses and wheatgrasses. Other species include blue grama, hairy grama, threeawn, bottlebrush squirreltail, and threadleaf sedge. Kentucky bluegrass and smooth brome may be present, but typically do not dominate the plant community. A diverse community of forbs make up a significant proportion in the mixture. Common forbs include stemless hymenoxys, cudweed sagewort, scurfpea, prairie coneflowers, purple coneflower, gayfeather, and asters, along with hood phlox and pussytoes in the understory. Shrubs include common juniper, creeping juniper, fringed sagewort, broom snakeweed, green sagewort, prairie rose, and scattered yucca. A few ponderosa pine and Rocky Mountain juniper often are scattered across this site.

Rocks, and rock fragments are very noticeable and bare ground can be present, but is not common.

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

State and transition model

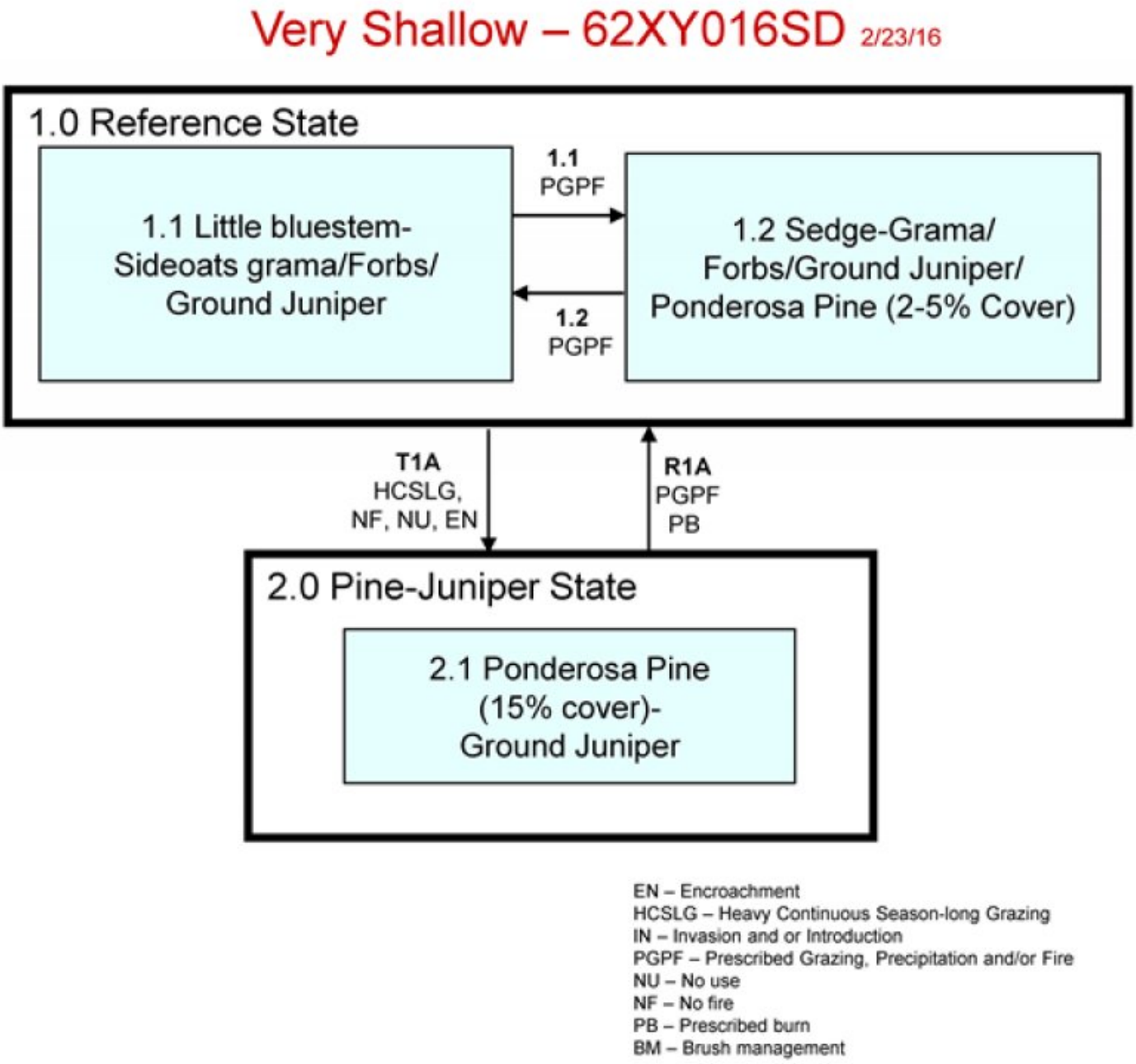

Figure 9. Very Shallow - 062XY016SD

Diagram Legend - Very Shallow - 062XC016SD

T1A		Heavy continuous season long grazing, no use, no fire, encroachment of conifers
R1A		Favorable precipitation pattern, fire or prescribed burn, followed by prescribed grazing
CP 1.1A	1.1 - 1.2	Below normal precipitation, continuous season long grazing, or heavy continuous grazing and lack of fire will decrease little bluestem, sideoats grama and mid stature cool season grasses and increase short-statured cool season grasses and sedges. Pine and ground juniper will also increase
CP 1.2A	1.2 - 1.1	Long-term prescribed grazing that provided adequate recovery and change in season of use, along with a normal precipitation patterns and normal fire regime can restore the plant community

Figure 10. Very Shallow - 062XY016SD

State 1

Reference State

This state represents what is believed to represent the natural range of variability and plant community dynamics of this ecological site prior to European settlement. This site is dominated by warm-season grasses, a diverse forb component, and various low-growing shrubs. In pre- European times, the primary disturbances included fire and grazing by large ungulates and small mammals. Favorable growing conditions occurred during the spring, and the warm months of June and July. Routine and/or occasional fires and reduced tree cover contributed to the ecological processes that maintained the reference plant community.

Community 1.1
Little Bluestem-Grama-Wheatgrass/Ground Juniper

Interpretations are based primarily on the Little Bluestem-Grama-Wheatgrass/Ground Juniper plant community phase. This also is considered to be the Reference or historic plant community. The potential vegetation is about 70 percent grass and grass-like plants, 20 percent forbs, and 10 percent shrubs. Total annual production for a normal growing year is approximately 1,200 lbs./ac. The community is dominated by warm-season grasses including little bluestem, sideoats grama, plains muhly, blue grama, hairy grama, and three-awn. The dominant cool-season grasses are needle and thread, prairie Junegrass, slender wheatgrass, bottlebrush squirreltail, bluebunch wheatgrass, western wheatgrass, Canada bluegrass, and threadleaf sedge. Forbs include stemless hymenoxys, hairy goldaster, cudweed sagewort, scurfpea, prairie coneflowers, purple coneflower, and dotted gayfeather. The dominant shrubs are common and creeping juniper. Other shrubs include yucca, fringed sagewort, broom snakeweed, and pricklypear cactus. It is common to have a few ponderosa pines on this site (< 2 percent cover). This plant community is productive, and resilient to disturbances such as drought and fire. It was a sustainable plant community in regards to soil/site stability, watershed function, and biological integrity.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	824	1130	1429
Forb	62	135	207
Shrub/Vine	11	74	140
Tree	–	7	17
Total	**897**	**1346**	**1793**

Figure 12. Plant community growth curve (percent production by month). SD6204, Black Hills, warm-season dominant, cool-season sub-dominant. Warm-season dominant, cool-season sub-dominant.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	7	17	25	25	15	7	1	0	0

Community 1.2
Sedge-Grama/Forbs/Ground Juniper/Ponderosa Pine (2-5% Cover)

Figure 13. Very Shallow PCP-1.2

This plant community is a result of continuous season-long grazing or heavy, continuous grazing with no change in season of use between grazing years. Drought or extended periods of below normal precipitation also can be a driver. The potential plant community is made up of approximately 65 percent grasses and grass-like species, 15 percent forbs, and 20 percent shrubs and trees. Dominant grasses include blue grama, hairy grama, threadleaf sedge, and plains muhly. Little bluestem, sideoats grama, needleandthread, and some wheatgrass will be present, but in small amounts. Some non-native cool-season species such as Kentucky bluegrass and smooth brome may also be present. Forbs contribute substantially to the biomass production in this plant community, as do the low-growing shrubs. Ponderosa pine can be scattered throughout the site, but will not exceed 5 percent canopy cover. The herbaceous species within this plant community are well-adapted to grazing.

Pathway 1.1A
Community 1.1 to 1.2

Continuous season-long grazing or heavy, continuous grazing with stocking rates above the carrying capacity for the entire growing season will cause a decrease in little bluestem, sideoats grama, and the mid-stature cool-season grasses. Blue and hairy grama and threadleaf sedge will increase in the plant community, along with low-growing shrubs and possibly ponderosa pine. Drought or long periods of below normal precipitation can accelerate this shift in the plant community.

Pathway 1.2A
Community 1.2 to 1.1

Long-term prescribed grazing, which provides grazing deferment during the growing season, along with stocking rates not exceeding carrying capacities and periodic fire, prescribed burning, or brush management can restore this plant community phase to PCP 1.1. Normal or above-normal precipitation can help shift this plant community back to 1.1.

State 2
Pine-Juniper State

This state is dominated by ponderosa pine and ground juniper. This transition is a result of heavy, continuous grazing and lack of frequent fire or no use and no fire, resulting in encroachment of ponderosa pine. Areas of intermediate and dense ponderosa pine canopy were found to reduce precipitation reaching the forest floor by an average of 30 percent (Wrage, 1994). If pine encroachment is moderate to severe, the soil surface may be covered with up to 1 inch of pine needles and duff. Native warm-season grasses such as bluestems, sideoats grama and blue grama, and cool-season grasses such as wheatgrass and needlegrass decline as overstory canopy cover increases. Shade-tolerant grasses, such as slender wheatgrass, poverty oatgrass, bluegrasses, and rough-leaved ricegrass will increase, as well as common and creeping juniper. In the absence of fire, this plant community phase will be resistant to change. Ponderosa pine canopy can continue to increase over time, reducing herbaceous production and increasing bare ground. This state will have lower water infiltration rates, increased runoff, and a higher potential for soil erosion.

Community 2.1
Ponderosa pine (15% cover)-Ground Juniper

This plant community is characterized by the dominance of Ponderosa pine, common juniper and creeping juniper and is the result of heavy, continuous, season-long grazing and no fire, or no use and no fire. Ponderosa pine make up approximately 15 percent of the plant community and shrubs approximately 20 percent. Grasses and forbs make up approximately 65 percent of the plant community. Dominant grass and grass-like plants include bluegrass, slender wheatgrass, rough-leaved rice grass, poverty oatgrass, and upland sedge. Dominant forbs include cudweed sagewort, coneflower, and pussytoes. Prevalent shrubs include fringed sagewort, poison ivy, and broom snakeweed. Most of these shrubs rarely exceed one foot in height. Rocky Mountain juniper may be present, but does not dominate.

Transition 1A
State 1 to 2

Continuous season-long grazing with stocking rates above the carrying capacity for the entire growing season, combined with the absence of fire to control conifer seedling establishment, or no use, no fire and pine encroachment will lead toward a pine-juniper-dominated state, State 2. More shade-tolerant grasses will become dominant in this state.

Restoration pathway 2A
State 2 to 1

Prescribed burning or mechanical brush management plus long-term prescribed grazing may move the Pine-Juniper State back to the Reference State depending upon the plant community and climatic conditions. This could be a long-term process, and the results may not achieved or meet management goals.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Tall and Mid- Warm-Season Grasses**			269–673	
	little bluestem	SCSC	*Schizachyrium scoparium*	202–336	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	67–202	–
	plains muhly	MUCU3	*Muhlenbergia cuspidata*	13–67	–
	prairie dropseed	SPHE	*Sporobolus heterolepis*	13–67	–
	big bluestem	ANGE	*Andropogon gerardii*	0–27	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	0–27	–
2	**Cool-Season Bunchgrass**			67–269	
	slender wheatgrass	ELTRS	*Elymus trachycaulus ssp. subsecundus*	13–135	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	13–135	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	13–67	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	13–67	–
	Richardson's needlegrass	ACRI8	*Achnatherum richardsonii*	0–27	–
	Rocky Mountain fescue	FESA	*Festuca saximontana*	0–27	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	0–27	–
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	0–27	–
	green needlegrass	NAVI4	*Nassella viridula*	0–27	

	green needlegrass	NAVI4	*Nassella viridula*	0–27	–
	timber oatgrass	DAIN	*Danthonia intermedia*	0–27	–
3	**Short Warm-Season Grasses**			67–202	
	blue grama	BOGR2	*Bouteloua gracilis*	27–135	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	27–135	–
	threeawn	ARIST	*Aristida*	0–67	–
4	**Cool-Season Rhizomatous Grass**			0–67	
	western wheatgrass	PASM	*Pascopyrum smithii*	0–67	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	0–67	–
5	**Other Native Grasses**			0–67	
	Grass, perennial	2GP	*Grass, perennial*	0–67	–
6	**Grass-Likes**			28–135	
	needleleaf sedge	CADU6	*Carex duriuscula*	13–67	–
	threadleaf sedge	CAFI	*Carex filifolia*	13–67	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–67	–
	Richardson's sedge	CARI	*Carex richardsonii*	0–27	–
	sedge	CAREX	*Carex*	13–27	–
7	**Non-Native Cool-Season Grasses**			–	
Forb					
8	**Forbs**			67–202	
	pussytoes	ANTEN	*Antennaria*	13–67	–
	scurfpea	PSORA2	*Psoralidium*	13–27	–
	stemless four-nerve daisy	TEACA2	*Tetraneuris acaulis var. acaulis*	13–27	–
	stonecrop	HYLOT	*Hylotelephium*	13–27	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	0–27	–
	Forb, perennial	2FP	*Forb, perennial*	0–27	–
	Lewis flax	LILE3	*Linum lewisii*	0–27	–
	bluebell bellflower	CARO2	*Campanula rotundifolia*	0–27	–
	cinquefoil	POTEN	*Potentilla*	0–27	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–27	–
	blacksamson echinacea	ECAN2	*Echinacea angustifolia*	13–27	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–27	–
	dotted blazing star	LIPU	*Liatris punctata*	13–27	–
	downy paintedcup	CASE5	*Castilleja sessiliflora*	0–27	–
	goldenrod	SOLID	*Solidago*	13–27	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	13–27	–
	mariposa lily	CALOC	*Calochortus*	0–13	–
	beardtongue	PENST	*Penstemon*	0–13	–
	old man's whiskers	GETR	*Geum triflorum*	0–13	–
	deathcamas	ZIGAD	*Zigadenus*	0–13	–
	Brandegee's Jacob's-ladder	POBR8	*Polemonium brandegeei*	0–13	–

	blanketflower	GAAR	*Gaillardia aristata*	0–13	–
	white prairie aster	SYFA	*Symphyotrichum falcatum*	0–13	–
	lesser spikemoss	SEDE2	*Selaginella densa*	0–13	–
	spiny phlox	PHHO	*Phlox hoodii*	0–13	–
Shrub/Vine					
9	**Shrubs**			13–135	
	plains cottonwood	PODEM	*Populus deltoides ssp. monilifera*	0–67	–
	common juniper	JUCO6	*Juniperus communis*	13–67	–
	creeping juniper	JUHO2	*Juniperus horizontalis*	13–67	–
	prairie sagewort	ARFR4	*Artemisia frigida*	13–27	–
	western poison ivy	TORY	*Toxicodendron rydbergii*	13–27	–
	rose	ROSA5	*Rosa*	0–13	–
	soapweed yucca	YUGL	*Yucca glauca*	0–13	–
	field sagewort	ARCA12	*Artemisia campestris*	0–13	–
Tree					
10	**Trees**			0–13	
	ponderosa pine	PIPO	*Pinus ponderosa*	0–13	–
	Tree	2TREE	*Tree*	0–13	–

Other information

Revision Notes:
This PROVISIONAL ecological site concept has been QCd 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 is 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 not previously described in MLRA 62.

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.
Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

Inventory data references

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range-trained personnel were also used. Those involved in developing this site include Stan Boltz, Range Management Specialist, NRCS; Dan Brady, Soil Scientist, NRCS; Mitch Faulkner, Range Management Specialist, NRCS; Rick Peterson, Ecological Site Specialist, NRCS; 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

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Contributors

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Approval

Suzanne Mayne-Kinney, 7/31/2024

Acknowledgments

All ecological sites were then reviewed and approved at the Provisional Level by David Kraft, Regional ESS, Salina, KS.

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	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:

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):

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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:**
