

United States Department of Agriculture Natural Resources Conservation Service

Ecological Site Description

Site Type: Rangeland

Site Name: Loamy Terrace

Site ID: R061XY022SD

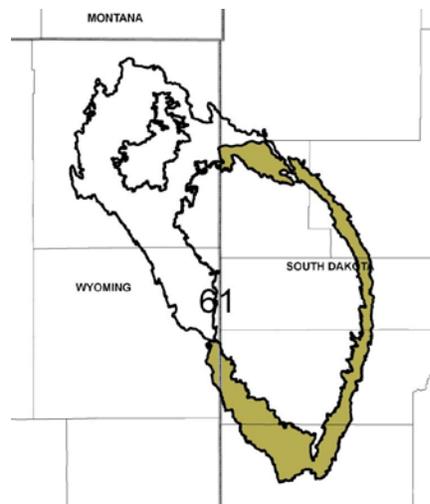
Major Land Resource Area (MLRA): 61 – Black Hills Foot Slopes

Physiographic Features

This site occurs on nearly level stream terraces.

Landform: floodplain, terrace

Aspect: N/A



	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	2,900	4,000
Slope (percent):	0	4
Water Table Depth (inches):	80	80
Flooding:		
Frequency:	None	Rare
Duration:	None	Very brief
Ponding:		
Depth (inches):	None	None
Frequency:	None	None
Duration:	None	None
Runoff Class:	Low	Medium

Climatic Features

The climate in this MLRA is typical of the drier portions of the Northern Great Plains where sagebrush steppes to the west yield to grassland steppes to the east. Annual precipitation ranges from 14 to 21 inches per year, with most occurring during the growing season. Temperatures show a wide range between summer and winter and between daily maximums and minimums, due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air outbreaks from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Chinook winds may occur in winter and bring rapid rises in temperature. Extreme storms may occur during the winter but most severely affect ranch operations during late winter and spring.

The average annual temperature is about 46°F. January is the coldest month with average temperatures ranging from about 20°F (Sundance, Wyoming (WY)), to about 26°F (Fort Meade, South Dakota (SD)). July is the warmest month with temperatures averaging from about 69°F (Sundance, WY), to about 73°F (Hot Springs, SD). The range of average monthly temperatures between the coldest and warmest months is about 49°F. Hourly winds are estimated to average about 11 miles per hour (mph) annually, ranging from about 13 mph during the spring to about 10 mph during the summer. Daytime winds are generally stronger than nighttime and occasional storms may bring brief periods of high winds with gusts to more than 50 mph.

Growth of cool-season plants begins in early to mid-March, slowing or ceasing in late June. Warm-season plants begin growth about mid-May and continue to early or mid-September. Greenup of cool-season plants may occur in September and October when adequate soil moisture is present.

	<u>Minimum</u>	<u>Maximum</u>
Frost-free period (days):	116	148
Freeze-free period (days):	143	168
Mean Annual Precipitation (inches):	14	21

Average Monthly Precipitation (inches) and Temperature (°F):

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.32	0.74	8.6	37.9
February	0.36	0.72	12.6	41.9
March	0.77	1.33	18.9	49.9
April	1.77	2.38	29.0	61.0
May	2.73	4.15	38.9	70.7
June	3.20	3.47	47.7	80.9
July	2.00	2.69	54.6	89.3
August	1.43	2.21	52.8	88.0
September	1.25	1.45	43.0	78.4
October	0.98	1.68	32.6	65.5
November	0.42	0.87	20.9	49.6
December	0.33	0.74	12.3	39.9

Climate Stations		Period	
Station ID	Location or Name	From	To
SD3069	Fort Meade	1902	2008
SD3775	Hermosa 3 SSW	1906	2009
SD4007	Hot Springs	1894	2009
SD6947	Rapid City	1916	2009
SD7882	Spearfish	1893	2008
WY8705	Sundance	1915	2005
SD9347	Wind Cave	1948	2009

For local climate stations that may be more representative, refer to <http://www.wcc.nrcs.usda.gov>.

Riparian and Wetland Features

No riparian areas or wetland features are directly associated with this site.

Representative Soil Features

The soils in this site are well-drained and formed in alluvium. The silt loam to very fine sandy loam surface layer is 3 to 10 inches thick. The soils have a moderate to moderately slow infiltration rate. At one time, this site was in the active floodplain zone but downcutting of the channel has left this site out of reach of the water table and flooding. This site should show no evidence of rills, wind scoured areas, or pedestalled plants. If present, water flow paths are broken, irregular in appearance, or discontinuous with numerous debris dams or vegetative barriers. The soil surface is stable and intact.

These soils are mainly susceptible to water erosion. The hazard of water erosion increases where vegetative cover is not adequate. A drastic loss of the soil surface layer on this site can result in a shift in species composition and/or production.

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

Parent Material Kind: alluvium

Parent Material Origin:

Surface Texture: silt loam, very fine sandy loam, loam

Surface Texture Modifier: none

Subsurface Texture Group: loamy

Surface Fragments ≤3" (% Cover): 0-10

Surface Fragments >3" (%Cover): 0

Subsurface Fragments ≤3" (% Volume): 0-33

Subsurface Fragments >3" (% Volume): 0-2

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	well	well
Permeability Class:	moderately slow	moderate
Depth (inches):	80	80
Electrical Conductivity (mmhos/cm)*:	0	8
Sodium Absorption Ratio*:	0	5
Soil Reaction (1:1 Water)*:	6.6	9.0
Soil Reaction (0.1M CaCl₂)*:	NA	NA
Available Water Capacity (inches)*:	5	8
Calcium Carbonate Equivalent (percent)*:	0	15

*These attributes represent from 0-40 inches or to the first restrictive layer.

Plant Communities

Ecological Dynamics of the Site

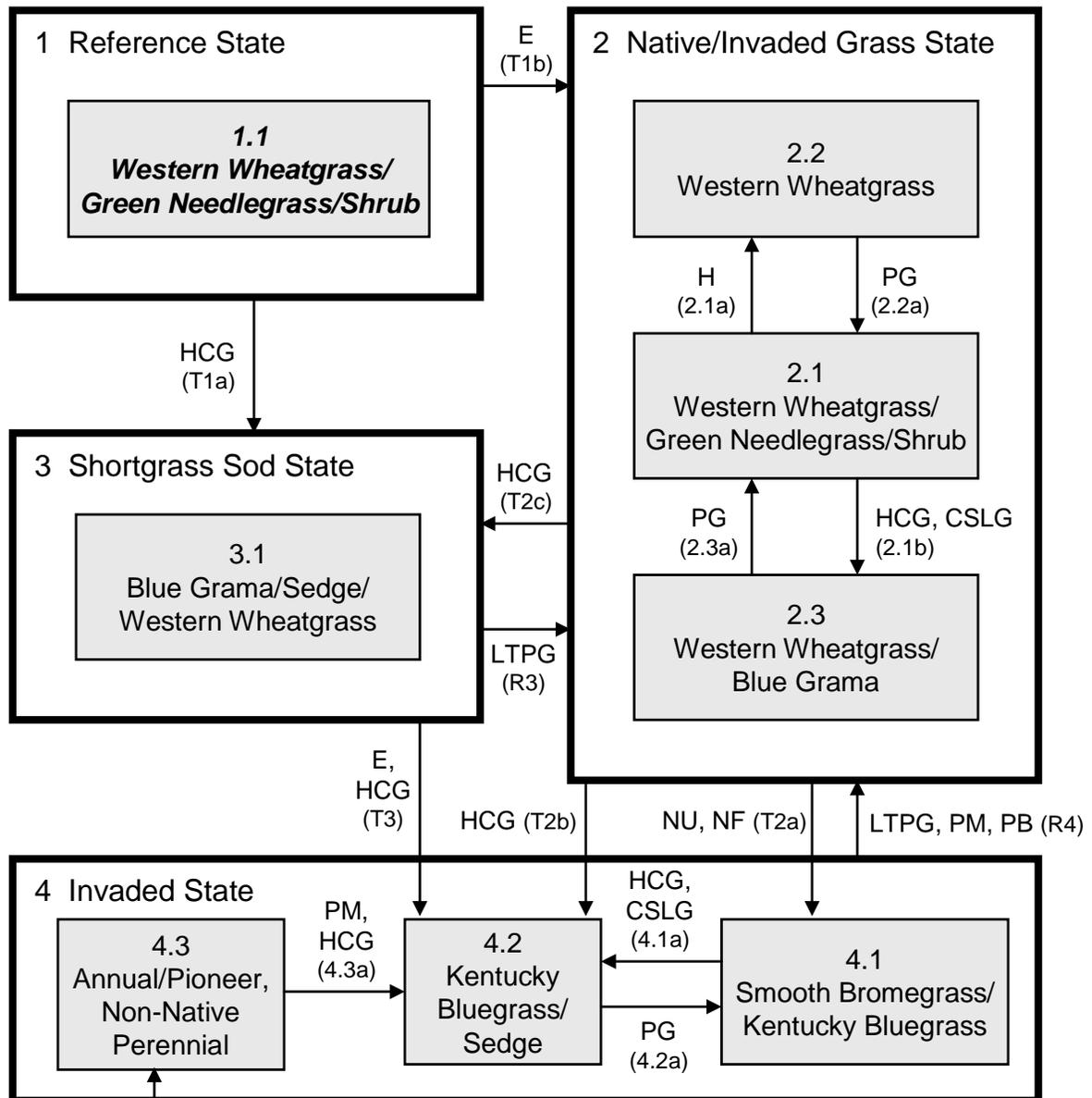
This site developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfire (often of light intensities), and other biotic and abiotic factors that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts of native and/or exotic plant and animal species, and management actions. While the following plant community descriptions describe more typical transitions that will occur, severe disturbances, such as periods of well below average precipitation, can cause significant shifts in plant communities and/or species composition.

Continuous season-long grazing (during the typical growing season of May through October) and/or heavy continuous grazing (e.g., every spring and/or every summer at moderate to heavy stocking levels) without adequate recovery periods following grazing events causes departure from the Western Wheatgrass/Green Needlegrass/Shrub Plant Community Phase. Short grass and grass-like species such as sedge, blue grama, and bluegrass will increase and eventually develop into a sod. Western wheatgrass will increase initially and then begin to decrease. Green needlegrass and big bluestem will decrease in frequency and production. Extended periods of nonuse and lack of fire will result in excessive litter and a plant community dominated by cool-season grasses such as green needlegrass, western wheatgrass, bluegrass, and smooth brome grass. Remnant mature trees are randomly present across this site but recruitment does not typically occur

Interpretations are primarily based on the Western Wheatgrass/Green Needlegrass/Shrub Plant Community Phase (1.1). It has been determined by study of rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts also have been used. Plant community phases, states, transitional pathways, and thresholds have been determined through similar studies and experience.

The following is a diagram that illustrates the common plant community phases that can occur on the site and the transition pathways between communities. These are the most common plant community phases based on current knowledge and experience, and changes may be made as more data is collected. Narratives following the diagram contain more detail pertaining to the ecological processes.

Plant Communities and Transitional Pathways



Refer to narrative for details on pathways: **C** – Cropped, abandoned; **CSLG** – Continuous season-long grazing; **E** – Encroachment of introduced species; **H** – Haying on a regular basis; **HCG** – Heavy continuous grazing; **LTPG** – Long-term prescribed grazing; **NU, NF** – Non-use, no fire; **PB** – Prescribed burning; **PG** – Prescribed grazing; **PM** – Pest management (herbicide); **S** – Seeding.

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	1.1 Western Wheatgrass/ Green Needlegrass/Shrub		
			Group	lbs./acre	% Comp
GRASSES & GRASS-LIKES				1960 - 2380	70 - 85
WHEATGRASSES			1	560 - 980	20 - 35
western wheatgrass	Pascopyrum smithii	PASM	1	560 - 980	20 - 35
slender wheatgrass	Elymus trachycaulus	ELTR7	1	0 - 140	0 - 5
COOL-SEASON BUNCHGRASSES			2	420 - 700	15 - 25
green needlegrass	Nassella viridula	NAVI4	2	280 - 700	10 - 25
needleandthread	Hesperostipa comata ssp. comata	HECOC8	2	56 - 280	2 - 10
Canada wildrye	Elymus canadensis	ELCA4	2	0 - 140	0 - 5
MID & TALL WARM-SEASON GRASSES			3	140 - 560	5 - 20
prairie sandreed	Calamovilfa longifolia	CALO	3	56 - 420	2 - 15
big bluestem	Andropogon gerardii	ANGE	3	28 - 224	1 - 8
sideoats grama	Bouteloua curtipendula	BOCU	3	28 - 140	1 - 5
little bluestem	Schizachyrium scoparium	SCSC	3	0 - 140	0 - 5
tall dropseed	Sporobolus compositus var. compositus	SPCOC2	3	0 - 84	0 - 3
SHORT WARM-SEASON GRASSES			4	28 - 140	1 - 5
blue grama	Bouteloua gracilis	BOGR2	4	28 - 140	1 - 5
buffalograss	Bouteloua dactyloides	BODA2	4	0 - 84	0 - 3
sand dropseed	Sporobolus cryptandrus	SPCR	4	0 - 56	0 - 2
OTHER NATIVE GRASSES			5	28 - 140	1 - 5
prairie junegrass	Koeleria macrantha	KOMA	5	28 - 84	1 - 3
Cusick's bluegrass	Poa cusickii	POCU3	5	0 - 56	0 - 2
other grasses		2GRAM	5	0 - 140	0 - 5
GRASS-LIKES			6	28 - 196	1 - 7
sedge	Carex spp.	CAREX	6	28 - 196	1 - 7
other grass-likes		2GL	6	0 - 84	0 - 3
FORBS			8	140 - 280	5 - 10
American licorice	Glycyrrhiza lepidota	GLLE3	8	28 - 84	1 - 3
American vetch	Vicia americana	VIAM	8	28 - 56	1 - 2
cudweed sagewort	Artemisia ludoviciana	ARLU	8	28 - 84	1 - 3
dotted gayfeather	Liatris punctata	LIPU	8	0 - 28	0 - 1
false boneset	Brickellia eupatorioides	BREU	8	0 - 28	0 - 1
goldenrod	Solidago spp.	SOLID	8	28 - 84	1 - 3
green sagewort	Artemisia campestris	ARCA12	8	0 - 56	0 - 2
Maximilian sunflower	Helianthus maximiliani	HEMA2	8	28 - 84	1 - 3
prairie clover	Dalea spp.	DALEA	8	28 - 56	1 - 2
prairie coneflower	Ratibida columnifera	RACO3	8	28 - 56	1 - 2
scarlet gaura	Gaura coccinea	GACO5	8	0 - 28	0 - 1
scurfpea	Psoraleidium spp.	PSORA2	8	28 - 56	1 - 2
stiff sunflower	Helianthus pauciflorus	HEPA19	8	0 - 28	0 - 1
wavyleaf thistle	Cirsium undulatum	CIUN	8	28 - 56	1 - 2
western ragweed	Ambrosia psilostachya	AMPS	8	0 - 28	0 - 1
western yarrow	Achillea millefolium var. occidentalis	ACMIO	8	28 - 56	1 - 2
white prairie aster	Symphotrichum falcatum	SYFA	8	28 - 56	1 - 2
wood lily	Lilium philadelphicum	LIPH	8	0 - 28	0 - 1
woolly verbena	Verbena stricta	VEST	8	28 - 56	1 - 2
native forbs		2FN	8	28 - 140	1 - 5
SHRUBS			9	280 - 560	10 - 20
American plum	Prunus americana	PRAM	9	0 - 112	0 - 4
big sagebrush	Artemisia tridentata	ARTR2	9	0 - 112	0 - 4
chokecherry	Prunus virginiana	PRVI	9	0 - 84	0 - 3
leadplant	Amorpha canescens	AMCA6	9	28 - 140	1 - 5
rose	Rosa spp.	ROSA5	9	28 - 84	1 - 3
silver buffaloberry	Shepherdia argentea	SHAR	9	28 - 224	1 - 8
silver sagebrush	Artemisia cana	ARCA13	9	56 - 224	2 - 8
western snowberry	Symphoricarpos occidentalis	SYOC	9	56 - 280	2 - 10
other shrubs		2SHRUB	9	0 - 224	0 - 8
TREES			10	0 - 84	0 - 3
American elm	Ulmus americana	ULAM	10	0 - 84	0 - 3
boxelder	Acer negundo	ACNE2	10	0 - 84	0 - 3
green ash	Fraxinus pennsylvanica	FRPE	10	0 - 84	0 - 3
plains cottonwood	Populus deltoides ssp. monilifera	PODEM	10	0 - 84	0 - 3
other trees		2TREE	10	0 - 84	0 - 3

Annual Production lbs./acre		LOW	RV	HIGH
GRASSES & GRASS-LIKES		1635	2128	2525
FORBS		125	210	320
SHRUBS		240	420	670
TREES		0	42	85
TOTAL		2000	2800	3600

This list of plants and their relative proportions are based on near normal years. Fluctuations in species composition and relative production may change from year to year dependent upon precipitation or other climatic factors. RV = Representative value.

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SYMBOL	1.1 Western Wheatgrass/ Green Needlegrass/Shrub			2.2 Western Wheatgrass			2.3 Western Wheatgrass/ Blue Grama			3.1 Blue Grama/Sedge/ Western Wheatgrass		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
GRASSES & GRASS-LIKES			1960 - 2380	70 - 85		1800 - 1900	90 - 95		1500 - 1700	75 - 85		1050 - 1190	75 - 85
WHEATGRASSES		1	560 - 980	20 - 35	1	1000 - 1400	50 - 70	1	300 - 600	15 - 30	1	70 - 210	5 - 15
western wheatgrass	PASM	1	560 - 980	20 - 35	1	1000 - 1400	50 - 70	1	300 - 600	15 - 30	1	70 - 210	5 - 15
slender wheatgrass	ELTR7	1	0 - 140	0 - 5									
COOL-SEASON BUNCHGRASSES		2	420 - 700	15 - 25	2	0 - 100	0 - 5	2	100 - 300	5 - 15	2	0 - 70	0 - 5
green needlegrass	NAV14	2	280 - 700	10 - 25	2	0 - 60	0 - 3	2	100 - 300	5 - 15	2	0 - 56	0 - 4
needleandthread	HECOC8	2	56 - 280	2 - 10	2	0 - 60	0 - 3	2	20 - 160	1 - 8	2	0 - 70	0 - 5
Canada wildrye	ELCA4	2	0 - 140	0 - 5				2	0 - 20	0 - 1			
MID & TALL WARM-SEASON		3	140 - 560	5 - 20	3	0 - 100	0 - 5	3	40 - 140	2 - 7	3	14 - 70	1 - 5
prairie sandreed	CALO	3	56 - 420	2 - 15				3	20 - 140	1 - 7	3	0 - 42	0 - 3
big bluestem	ANGE	3	28 - 224	1 - 8	3	0 - 60	0 - 3	3	0 - 60	0 - 3			
sideoats grama	BOCU	3	28 - 140	1 - 5	3	0 - 80	0 - 4	3	0 - 60	0 - 3	3	0 - 28	0 - 2
little bluestem	SCSC	3	0 - 140	0 - 5				3	0 - 40	0 - 2			
tall dropseed	SPCOC2	3	0 - 84	0 - 3	3	0 - 40	0 - 2	3	20 - 100	1 - 5	3	14 - 56	1 - 4
SHORT WARM-SEASON GRASSES		4	28 - 140	1 - 5	4	40 - 200	2 - 10	4	100 - 300	5 - 15	4	280 - 560	20 - 40
blue grama	BOGR2	4	28 - 140	1 - 5	4	40 - 200	2 - 10	4	100 - 300	5 - 15	4	210 - 490	15 - 35
buffalograss	BODA2	4	0 - 84	0 - 3	4	0 - 120	0 - 6	4	20 - 100	1 - 5	4	28 - 112	2 - 8
sand dropseed	SPCR	4	0 - 56	0 - 2	4	0 - 60	0 - 3	4	0 - 60	0 - 3	4	0 - 70	0 - 5
OTHER NATIVE GRASSES		5	28 - 140	1 - 5	5	0 - 60	0 - 3	5	20 - 100	1 - 5	5	0 - 70	0 - 5
prairie junegrass	KOMA	5	28 - 84	1 - 3	5	0 - 20	0 - 1	5	20 - 60	1 - 3	5	0 - 28	0 - 2
Cusick's bluegrass	POCU3	5	0 - 56	0 - 2				5	0 - 20	0 - 1			
other grasses	2GRAM	5	0 - 140	0 - 5	5	0 - 60	0 - 3	5	0 - 100	0 - 5	5	0 - 56	0 - 4
GRASS-LIKES		6	28 - 196	1 - 7	6	20 - 200	1 - 10	6	100 - 300	5 - 15	6	140 - 280	10 - 20
sedge	CAREX	6	28 - 196	1 - 7		20 - 200	1 - 10	6	100 - 300	5 - 15	6	140 - 280	10 - 20
other grass-likes	2GL	6	0 - 84	0 - 3		0 - 60	0 - 3	6	0 - 60	0 - 3	6	0 - 42	0 - 3
NON-NATIVE GRASSES		7			7	20 - 200	1 - 10	7	100 - 300	5 - 15	7	0 - 140	0 - 10
annual bromegrass	BROMU				7	0 - 40	0 - 2	7	20 - 140	1 - 7	7	0 - 56	0 - 4
bluegrass	POA				7	20 - 200	1 - 10	7	40 - 200	2 - 10	7	0 - 140	0 - 10
smooth bromegrass	BRIN2				7	0 - 40	0 - 2	7	0 - 80	0 - 4	7	0 - 14	0 - 1
FORBS		8	140 - 280	5 - 10	8	20 - 100	1 - 5	8	100 - 200	5 - 10	8	70 - 210	5 - 15
American licorice	GLLE3	8	28 - 84	1 - 3				8	0 - 40	0 - 2			
American vetch	VIAM	8	28 - 56	1 - 2				8	0 - 20	0 - 1			
cudweed sagewort	ARLU	8	28 - 84	1 - 3	8	0 - 40	0 - 2	8	20 - 80	1 - 4	8	14 - 70	1 - 5
dotted gayfeather	LIPU	8	0 - 28	0 - 1									
false boneset	BREU	8	0 - 28	0 - 1									
goldenrod	SOLID	8	28 - 84	1 - 3	8	0 - 20	0 - 1	8	20 - 80	1 - 4	8	14 - 56	1 - 4
green sagewort	ARCA12	8	0 - 56	0 - 2				8	0 - 60	0 - 3	8	14 - 70	1 - 5
Maximilian sunflower	HEMA2	8	28 - 84	1 - 3				8	0 - 20	0 - 1			
prairie clover	DALEA	8	28 - 56	1 - 2									
prairie coneflower	RACO3	8	28 - 56	1 - 2				8	0 - 20	0 - 1			
scarlet gaura	GACO5	8	0 - 28	0 - 1									
scurpea	PSORA2	8	28 - 56	1 - 2				8	20 - 40	1 - 2	8	14 - 42	1 - 3
stiff sunflower	HEPA19	8	0 - 28	0 - 1									
wavyleaf thistle	CIUN	8	28 - 56	1 - 2	8	0 - 20	0 - 1	8	0 - 20	0 - 1			
western ragweed	AMPS	8	0 - 28	0 - 1	8	0 - 40	0 - 2	8	20 - 60	1 - 3	8	14 - 42	1 - 3
western yarrow	ACMIO	8	28 - 56	1 - 2	8	20 - 60	1 - 3	8	20 - 60	1 - 3	8	14 - 42	1 - 3
white prairie aster	SYFA	8	28 - 56	1 - 2				8	0 - 20	0 - 1			
wood lily	LIPH	8	0 - 28	0 - 1									
woolly verbena	VEST	8	28 - 56	1 - 2				8	20 - 60	1 - 3	8	14 - 70	1 - 5
native forbs	2FN	8	28 - 140	1 - 5	8	0 - 40	0 - 2	8	20 - 60	1 - 3	8	0 - 28	0 - 2
introduced forbs	2FI				8	20 - 60	1 - 3	8	20 - 60	1 - 3	8	14 - 98	1 - 7
SHRUBS		9	280 - 560	10 - 20	9	0 - 100	0 - 5	9	100 - 300	5 - 15	9	28 - 140	2 - 10
American plum	PRAM	9	0 - 112	0 - 4				9	0 - 40	0 - 2			
big sagebrush	ARTR2	9	0 - 112	0 - 4				9	0 - 40	0 - 2			
chokecherry	PRV1	9	0 - 84	0 - 3				9	0 - 20	0 - 1			
leadplant	AMCA6	9	28 - 140	1 - 5				9	0 - 40	0 - 2			
rose	ROSA5	9	28 - 84	1 - 3	9	0 - 40	0 - 2	9	20 - 40	1 - 2	9	0 - 28	0 - 2
silver buffaloberry	SHAR	9	28 - 224	1 - 8	9	0 - 60	0 - 3	9	0 - 100	0 - 5	9	0 - 42	0 - 3
silver sagebrush	ARCA13	9	56 - 224	2 - 8				9	20 - 100	1 - 5	9	14 - 42	1 - 3
western snowberry	SYOC	9	56 - 280	2 - 10				9	20 - 140	1 - 7	9	0 - 56	0 - 4
other shrubs	2SHRUB	9	0 - 224	0 - 8	9	0 - 100	0 - 5	9	0 - 100	0 - 5	9	0 - 98	0 - 7
TREES		10	0 - 84	0 - 3	10	0 - 60	0 - 3	10	0 - 60	0 - 3	10	0 - 42	0 - 3
American elm	ULAM	10	0 - 84	0 - 3	10	0 - 60	0 - 3	10	0 - 60	0 - 3	10	0 - 42	0 - 3
boxelder	ACNE2	10	0 - 84	0 - 3	10	0 - 60	0 - 3	10	0 - 60	0 - 3	10	0 - 42	0 - 3
green ash	FRPE	10	0 - 84	0 - 3	10	0 - 60	0 - 3	10	0 - 60	0 - 3	10	0 - 42	0 - 3
plains cottonwood	PODEM	10	0 - 84	0 - 3	10	0 - 60	0 - 3	10	0 - 60	0 - 3	10	0 - 42	0 - 3
other trees	2TREE	10	0 - 84	0 - 3	10	0 - 60	0 - 3	10	0 - 60	0 - 3	10	0 - 42	0 - 3
Annual Production lbs./acre			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH
GRASSES & GRASS-LIKES			1635 - 2128 - 2525		1385 - 1860 - 2315		1210 - 1620 - 1965		810 - 1155 - 1460				
FORBS			125 - 210 - 320		15 - 60 - 110		95 - 150 - 225		65 - 140 - 240				
SHRUBS			240 - 420 - 670		0 - 50 - 110		95 - 200 - 345		25 - 84 - 155				
TREES			0 - 42 - 85		0 - 30 - 65		0 - 30 - 65		0 - 21 - 45				
TOTAL			2000 - 2800 - 3600		1400 - 2000 - 2600		1400 - 2000 - 2600		900 - 1400 - 1900				

This list of plants and their relative proportions are based on near normal years. Fluctuations in species composition and relative production may change from year to year dependent upon precipitation or other climatic factors. RV = Representative value. Refer to PLANTS database for scientific names and codes: <http://plants.usda.gov>

Plant Community and Vegetation State Narratives

Reference State (State 1)

This state description represents the natural range of variability that dominated the dynamics of this ecological site (ES). This state was typically dominated by cool-season grasses, with occasional shifts to a near co-dominance of cool- and warm-season grasses. In pre-European times, the primary disturbance mechanisms for this site in the reference condition included periods of below and/or above average precipitation, periodic fire, and herbivory by insects and large ungulates. Timing of fires and herbivory coupled with weather events dictated the dynamics that occurred within the natural range of variability. A combination of disturbances would likely have caused a shift to shorter statured grasses and grass-likes with a corresponding decrease in taller cool-season grasses. An increase in fire frequency or fire followed by occasional grazing would have caused an increase in warm-season grasses.

1.1 Western Wheatgrass/Green Needlegrass/Shrub Plant Community Phase

Interpretations are based primarily on the Western Wheatgrass/Green Needlegrass/Shrub Plant Community Phase (this is also considered to be climax). The potential vegetation was about 70 percent grasses or grass-like plants, 10 percent forbs, 20 percent shrubs, and scattered mature trees in some locations. The community was dominated by cool-season grasses. The major grasses included western wheatgrass and green needlegrass. Other grass or grass-like species included big bluestem, prairie sandreed, needleandthread, slender wheatgrass, Canada wildrye, little bluestem, sideoats grama, sedge, and blue grama. This plant community was resilient and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allowed for high drought tolerance. This was a sustainable plant community in regards to site/soil stability, watershed function, and biologic integrity.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during an average year:

Growth curve number: SD6102

Growth curve name: Black Hills Foot Slopes, cool-season dominant, warm-season subdominant.

Growth curve description: Cool-season dominant, warm-season subdominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	10	23	34	15	6	5	4	0	0

Transitions or pathways leading to other plant communities are as follows:

- T1a – Heavy continuous grazing which included herbivory at moderate to heavy levels at the same time of year each year without adequate recovery periods, or a combination of disturbances such as extended periods of below average precipitation coupled with periodic or chronic heavy grazing would shift this community to the *3.1 Blue Grama/Sedge/Western Wheatgrass Plant Community Phase* within the *Shortgrass Sod State (State 3)*. In pre-settlement times, this transition would have happened where concentrated grazing occurred such as near water sources. After the area began to be settled, and with the encroachment of nonnative species, the resulting plant community would also have minor amounts of species such as Kentucky bluegrass, cheatgrass, and smooth bromegrass.
- T1b – Encroachment of non-native grasses such as Kentucky bluegrass and smooth bromegrass, and disruption of natural disturbance regimes (typically as a result of fire suppression following settlement) led this state over a threshold to the *Native/Invaded Grass State (State 2)*.

Native/Invaded Grass State (State 2)

This state represents the more common range of variability that exists with higher levels of grazing management but in the absence of periodic fire due to fire suppression. This state is typically dominated by cool-season grasses. It can be found on areas that are properly managed with grazing and/or prescribed burning and sometimes on areas receiving occasional short periods of rest. Taller grass species can decline and a corresponding increase in short statured grass will occur.

2.1 Western Wheatgrass/Green Needlegrass/Shrub Plant Community Phase

This plant community phase is similar to the 1.1 Western Wheatgrass/Green Needlegrass/Shrub Plant Community Phase but it also contains minor amounts of nonnative invasive grass species such as Kentucky bluegrass and smooth brome grass (up to about 15 percent by air-dry weight). The potential vegetation is about 70 percent grasses or grass-like plants, 10 percent forbs, 20 percent shrubs, and scattered mature trees in some locations. The community is dominated by cool-season grasses. The major grasses include western wheatgrass and green needlegrass. Other grass or grass-like species include big bluestem, prairie sandreed, needleandthread, slender wheatgrass, Canada wildrye, little bluestem, sideoats grama, sedge, Kentucky bluegrass, smooth brome grass, and blue grama. This plant community is resilient and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allows for high drought tolerance. This is a sustainable plant community in regards to site/soil stability, watershed function, and biologic integrity.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during an average year:

Growth curve number: SD6102

Growth curve name: Black Hills Foot Slopes, cool-season dominant, warm-season subdominant.

Growth curve description: Cool-season dominant, warm-season subdominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	10	23	34	15	6	5	4	0	0

Transitions or pathways leading to other plant communities are as follows:

- 2.1a – Heavy continuous grazing (stocking levels well above carrying capacity for extended portions of the growing season, and often at the same time of year each year), or continuous season-long grazing, or a combination of disturbances such as extended periods of below average precipitation coupled with periodic heavy grazing will shift this community to the 2.3 *Western Wheatgrass/Blue Grama Plant Community Phase*.
- 2.1b – Haying on an annual or regular basis will shift this plant community to the 2.2 *Western Wheatgrass Plant Community Phase*.

2.2 Western Wheatgrass Plant Community Phase

This plant community occurs when the site is hayed on an annual or regular basis. This type of management tends to simplify the plant community, and species that can survive intermittent, severe defoliation will increase and dominate the site. The potential vegetation is about 90 percent grasses or grass-like plants, 5 percent forbs, 5 percent shrubs, and occasional scattered, mature trees. The community is dominated by western wheatgrass. This plant community is resistant to change as long as haying continues, but will readily shift back to the 1.1 Western Wheatgrass/Green Needlegrass/Shrub Plant Community Phase with a cessation of haying and implementation of prescribed grazing. If the trees and shrubs were largely removed during haying operations (instead of just avoided as is sometimes the case), the resulting plant community will resemble the 1.1 plant community phase, but will lack woody species.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during an average year:

Growth curve number: SD6101

Growth curve name: Black Hills Foot Slopes, cool-season dominant.

Growth curve description: Cool-season dominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	4	12	25	36	10	5	4	4	0	0

Transitions or pathways leading to other plant communities are as follows:

- 2.2a – Prescribed grazing (alternating season of use and providing adequate recovery periods) or periodic light to moderate grazing possibly including periodic rest will convert this plant community to the *1.1 Western Wheatgrass/Green Needlegrass/Shrub Plant Community Phase*.

2.3 Western Wheatgrass/Blue Grama Plant Community Phase

This plant community evolves under heavy continuous grazing, continuous season-long grazing, or from over utilization during extended drought periods. The potential plant community is made up of approximately 75 percent grasses and grass-like species, 10 percent forbs, 15 percent shrubs, and a minor amount of trees in some locations. Dominant grass and grass-like species include western wheatgrass, green needlegrass, blue grama, and sedge. Grasses of secondary importance include needleandthread, prairie sandreed, tall dropseed, buffalograss, and Kentucky bluegrass. Forbs commonly found in this plant community include cudweed sagewort, goldenrod, green sagewort, woolly verbena, and western yarrow. Dominant shrubs are western snowberry and silver sagebrush.

When compared to the Western Wheatgrass/Green Needlegrass/Shrub Plant Community Phase (1.1), western wheatgrass, blue grama, and sedges increase. Green needlegrass and big bluestem decrease and production of all tall and mid grasses are reduced. This plant community is moderately resistant to change. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. If the herbaceous component is intact, it tends to be resilient if the disturbance is not long-term.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during an average year:

Growth curve number: SD6102

Growth curve name: Black Hills Foot Slopes, cool-season dominant, warm-season subdominant.

Growth curve description: Cool-season dominant, warm-season subdominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	10	23	34	15	6	5	4	0	0

Transitions or pathways leading to other plant communities are as follows:

- 2.3a – Prescribed grazing (alternating season of use and providing adequate recovery periods) or periodic light to moderate grazing possibly including periodic rest will convert this plant community to the *1.1 Western Wheatgrass/Green Needlegrass/Shrub Plant Community Phase*.

Transitions from the Native/Invaded Grass State (State 2) to other States

- T2a – Non-use and no fire for extended periods of time (typically for 10 or more years) will likely lead this state over a threshold resulting in the *4.1 Smooth Bromegrass/Kentucky Bluegrass Plant Community Phase* within the *Invaded State (State 4)*.

- T2b & T2c – Heavy continuous grazing which included herbivory at moderate to heavy levels at the same time of year each year without adequate recovery periods, or a combination of disturbances such as extended periods of below average precipitation coupled with periodic or chronic heavy grazing would shift this community to one of two states/phases. If nonnative species such as Kentucky bluegrass are present in only minor amounts when this transition occurs, it will shift across a threshold to the *3.1 Blue Grama/Sedge/Western Wheatgrass Plant Community Phase* within the *Shortgrass Sod State (State 3)*. If, however, the nonnative species make up roughly 20 percent or more of the plant community when this transition occurs, it will shift across a threshold to the *4.2 Kentucky Bluegrass/Sedge Plant Community Phase* within the *Invaded State (State 4)*.

Shortgrass Sod State (State 2)

This state occurs as a result of heavy stocking levels, inadequate recovery periods between grazing events, or a combination of these disturbances. This state is dominated by warm-season grasses, with cool-season grasses being subdominant. The shallow, compact nature of the roots of the dominant species causes increased runoff and reduced infiltration. In addition, reduced shading due to a lesser amount of foliar cover causes increased soil temperatures and increased evaporation of the surface soil moisture. These conditions combine to cause the site to become more droughty and thus reduce the opportunity for recruitment and/or establishment of the taller statured grasses. This state is relatively stable and resistant to change.

2.1 Blue Grama/Sedge/Western Wheatgrass Plant Community

This plant community evolved under heavy continuous season grazing or from over utilization during extended drought periods. The potential plant community is made up of approximately 75 percent grasses and grass-like species, 15 percent forbs, 10 percent shrubs, and scattered mature trees. Dominant grass and grass-like species include blue grama, sedge and western wheatgrass. Grasses of secondary importance include needleandthread, sand dropseed, and sometimes Kentucky bluegrass. Forbs commonly found in this plant community included cudweed sagewort, goldenrod, green sagewort, scurfspea, western ragweed, and western yarrow. When compared to the Western Wheatgrass/Green Needlegrass/Shrub Plant Community Phase (1.1), blue grama, sedge and western wheatgrass dominate this plant community. This vegetation state is very resistant to change. The herbaceous species present are well adapted to grazing. This plant community is less productive than most other phases. The thick sod prevents other species from establishing.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during an average year:

Growth curve number: SD6103

Growth curve name: Black Hills Foot Slopes, cool-season/warm-season codominant.

Growth curve description: Cool-season, warm-season codominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	10	20	28	21	10	5	3	0	0

Transitions or restoration pathways leading to other plant communities are as follows:

- T3 – Encroachment of nonnative grasses such as Kentucky bluegrass, a continuation of heavy continuous grazing (moderate to heavy stocking levels at the same time of year each year without adequate recovery periods), and disruption of natural disturbance regimes (typically as a result of fire suppression following settlement) will lead this state over a threshold to the *4.2 Kentucky Bluegrass/Sedge Plant Community Phase* within the *Invaded State (State 4)*.

- R3 - Long-term prescribed grazing (moderate stocking levels coupled with adequate recovery periods, or other grazing systems such as high-density, low frequency intended to treat specific species dominance, or periodic light to moderate stocking levels possibly including periodic rest) may lead this plant community phase over a threshold to the *Native/Invaded Grass State (State 2)*. This will likely take a long period of time, possibly up to 10 years or more, and recovery may not be attainable. Success depends on whether native reproductive propagules remain intact on the site.

Invaded State (State 4)

This state is the result of invasion and dominance of introduced species. This state is characterized by the dominance of Kentucky bluegrass and smooth brome grass, and an increasing thatch layer that effectively blocks introduction of other plants into the system. Plant litter accumulation tends to favor the more shade tolerant introduced grass species. The nutrient cycle is also impaired and the result is typically a higher level of nitrogen which also favors the introduced species. Increasing plant litter decreases the amount of sunlight reaching plant crowns thereby shifting competitive advantage to shade tolerant introduced grass species. Studies indicate that soil biological activity is altered, and this shift apparently exploits the soil microclimate and encourages growth of the introduced grass species. Once the threshold is crossed, a change in grazing management alone cannot cause a reduction in the invasive grass dominance. Preliminary studies would tend to indicate this threshold may exist when Kentucky bluegrass exceeds 30 percent of the plant community and native grasses represent less than 40 percent of the plant community composition.

Once the state is well established, even drastic events such as a single high intensity fire driven by high fuel loads of litter and thatch may not result in more than a very short term reduction of Kentucky bluegrass. These events may reduce the dominance of Kentucky bluegrass, but due to the large amount of rhizomes in the soil, there may not be an opportunity for the native species to establish and dominate before Kentucky bluegrass rebounds and again dominates the system.

4.1 Smooth Brome grass/Kentucky Bluegrass Plant Community Phase

This plant community phase is a result of extended periods of nonuse and no fire. It is characterized by a dominance of smooth brome grass and Kentucky bluegrass. The dominance is at times so complete that other species are difficult to find on the site. A thick duff layer also accumulates at or above the soil surface. Nutrient cycling is greatly reduced and native plants have great difficulty becoming established. When dominated by smooth brome grass, infiltration is moderately reduced and runoff is moderate. Production can be equal to or higher than the interpretive plant community. However, when dominated by Kentucky bluegrass, infiltration is greatly reduced and runoff is high. Production in this case will likely be significantly less. In either case, the period that palatability is high is relatively short as these cool-season species mature rapidly. Energy capture is also reduced.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during an average year:

Growth curve number: SD6101

Growth curve name: Black Hills Foot Slopes, cool-season dominant.

Growth curve description: Cool-season dominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	4	12	25	36	10	5	4	4	0	0

Transitions or pathways leading to other plant communities are as follows:

- 4.1a – Heavy continuous grazing (stocking levels well above carrying capacity for extended portions of the growing season, and at the same time of year each year) or continuous season-

long grazing will convert this plant community to the *4.2 Kentucky Bluegrass/Sedge Plant Community Phase*.

4.2 Kentucky Bluegrass/Sedge Plant Community Phase

This plant community phase is a result of heavy continuous grazing or continuous season-long grazing. It is characterized by a dominance of Kentucky bluegrass and sedge. The dominance is at times so complete that other species are difficult to find on the site. A relatively thick duff layer can sometimes accumulate at or above the soil surface. Nutrient cycling is greatly reduced and native plants have great difficulty becoming established. Infiltration is greatly reduced and runoff is high. Production will be significantly reduced when compared to the interpretive plant community. The period that palatability is high is relatively short, as Kentucky bluegrass matures rapidly. Energy capture is also reduced. Biological activity in the soil is likely reduced significantly in this phase.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during an average year:

Growth curve number: SD6101

Growth curve name: Black Hills Foot Slopes, cool-season dominant.

Growth curve description: Cool-season dominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	4	12	25	36	10	5	4	4	0	0

Transitions or pathways leading to other plant communities are as follows:

- 4.2a – Prescribed grazing (alternating season of use and providing adequate recovery periods) or periodic light to moderate grazing possibly including periodic rest may convert this plant community to the *4.1 Smooth Bromegrass/Kentucky Bluegrass Plant Community Phase*.

Transition Pathway from Any Plant Community to the 4.3 Annual/Pioneer, Non-Native Perennial Plant Community Phase within the Invaded State (State 4)

- T5 – Encroachment of non-native invasive/noxious species, abandonment of cropping, or seeding of introduced and/or native improved varieties of forage species may lead this plant community phase over a threshold to the *Invaded State (State 4)* and more specifically to the *4.3 Annual/Pioneer, Non-native Perennial Plant Community Phase*. In the case of a seeding, refer to the corresponding Forage Suitability Group (FSG) description for adapted species and expected production (production estimates in the FSG description may be unrealistically high due to the degraded condition of the site at this phase).

4.3 Annual/Pioneer, Non-Native Perennial Plant Community Phase

This plant community developed under continuous heavy grazing or other excessive disturbances (e.g., heavy use areas, defoliation by rodents, etc.). The potential plant community is made up of approximately 40 to 80 percent grasses and grass-like species, 20 to 60 percent forbs, and 0 to 5 percent shrubs. The species present in this phase are highly variable, but often include nonnative invasive and/or early seral species. Plant diversity is low (plant richness may be high, but areas are often dominated by a few species). The ecological processes are difficult to restore because of the loss of plant diversity and overall soil disturbance. Soil erosion is potentially very high because of the bare ground and shallow rooted herbaceous plant community.

Water runoff will increase and infiltration will decrease due to animal related soil compaction and loss of root mass due to low plant diversity and vigor. This plant community will require significant economic inputs and time to move towards another plant community. This movement is highly

variable in its succession. This is due to the loss of diversity (including the loss of the seed bank), within the existing plant community, and the plant communities on adjacent sites.

Transitions or pathways leading to other states are as follows:

- 4.3a – Pest management (herbicides) and often heavy continuous grazing will likely result in an eventual dominance by Kentucky bluegrass which will lead to the *4.2 Kentucky Bluegrass/Sedge Plant Community Phase*.

Restoration Pathway from the Invaded State (State 4) to the Native/Invaded Grass State (State 2)

- R4 - Long-term prescribed grazing (moderate stocking levels coupled with adequate recovery periods, or other grazing systems such as high-density, low-frequency intended to treat specific species dominance, or periodic light to moderate stocking levels possibly including periodic rest) may lead this plant community phase over a threshold to the *Native/Invaded Grass State (State 2)*. Pest management (i.e., herbicide) may also be needed to suppress cool-season invasive grasses. This will likely take a long period of time, possibly up to 10 years or more and recovery may not be attainable. Success depends on whether native reproductive propagules remain intact on the site.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

-- Under Development --

Western Wheatgrass/Green Needlegrass/Shrub Plant Community Phases (1.1 & 2.1):

Western Wheatgrass Plant Community Phases (2.2):

Western Wheatgrass/Blue Grama Plant Community Phase (2.3):

Blue Grama/Sedge/Western Wheatgrass Plant Community Phase (3.1):

Western Wheatgrass/Kentucky Bluegrass/Big Bluestem Plant Community Phase (3.2):

Smooth Bromegrass/Kentucky Bluegrass Plant Community Phase (4.1):

Kentucky Bluegrass/Sedge Plant Community Phase (4.2):

Annual/Pioneer, Non-native Perennial Plant Community Phase (4.3):

Animal Preferences (Quarterly – 1,2,3,4[†])

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
Grasses and Grass-likes							
big bluestem	U D P D	U D U U	U D P D	U D U U	U D U U	U D P D	U D P D
blue grama	U D P U	D P P D	U D P U	D P P D	D P P D	U D P U	U D P U
buffalograss	U U D U	N U D U	U U D U	N U D U	N U D U	U U D U	U U D U
Canada wildrye	U D U U	N U N N	U D U U	N U N N	N U N N	U D U U	U D U U
Cusick's bluegrass	U P U D	D P U D	U P U D	U P N D	U P N D	U P U D	U P U D
green needlegrass	U P U D	N P N P	U P U D	N P N P	N P N P	U P U D	U P U D
little bluestem	U D D U	N D N N	U D D U	N D N N	N D N N	U D D U	U D D U
needleandthread	U D U D	N D N U	U D U D	N D N U	N D N U	U D U D	U D U D
prairie junegrass	U D U D	N D N U	U D U D	N D N U	N D N U	U D U D	U D U D
prairie sandreed	U D D U	U D U U	U D D U	U U D U	U U D U	U D D U	U D D U
sand dropseed	N U N N	N U N N	N U N N	N U N N	N U N N	N U N N	N U N N
sedge	U D U D	U P N D	U D U D	U D U D	U D U D	U D U D	U D U D
sideoats grama	U D P U	U P D U	U D P U	U P D U	U P D U	U D P U	U D P U
slender wheatgrass	U P U U	N D U N	U P U U	N D U N	N D U N	U P U U	U P U U
tall dropseed	N U N N	N U N N	N U N N	N U N N	N U N N	N U N N	N U N N
western wheatgrass	U P D U	N D N N	U P D U	N D N N	N D N N	U P D U	U P D U
Forbs							
American licorice	U U D U	N U U N	U U D U	N U U N	N U U N	U U D U	N U U N
American vetch	U D P U	U P P U	U D P U	U P P U	U P P U	U D P U	U P P U
cudweed sagewort	U U U U	U U D U	U U U U	U U D U	U U D U	U U U U	U U D U
dotted gayfeather	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
false boneset	U U D U	N D U N	U U D U	N D U N	N D U N	U U D U	N D U N
goldenrod	U U D U	N U U N	U U D U	N U U N	N U U N	U U D U	N U U N
green sagewort	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U
Maximilian sunflower	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U
prairie clover	U D P U	U P P U	U D P U	U P P U	U P P U	U D P U	U P P U
prairie coneflower	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
scarlet gaura	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
scurfpea	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
stiff sunflower	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U
wavyleaf thistle	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
western ragweed	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
western yarrow	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
white prairie aster	U U D U	N N N N	U U D U	N N N N	N N N N	U U D U	N N N N
wood lily	N U U N	N U D U	N U U N	N U D U	N U D U	N U U N	N U U N
woolly verbena	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
Shrubs and Trees							
American elm	N N N N	N N N N	N N N N	N U D N	N N N N	N N N N	N N N N
American plum	D U U D	D U U D	D U U D	P U D D	D U U D	D U U D	D U U D
big sagebrush	U N U U	D U U D	U N U U	P U D P	P P P P	U N U U	D U U U
boxelder	N N N U	N N U U	N N N U	N N U U	N N U U	N N N U	N N U U
chokecherry	D T T D	D T T D	D T T D	P U D P	D U U D	D T T D	P U U P
green ash	N U D U	N D D U	N U D U	N D D U	N U D U	N U D U	N D D U
leadplant	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U
plains cottonwood	D U U D	D U U D	D U U D	D U D D	D U U D	D U U D	D U U D
rose	U D D U	U D D U	U D D U	U D D U	U D D U	U D D U	U D D U
silver buffaloberry	D U U U	D U U U	D U U U	P U D P	U U U U	D U U U	D U U U
silver sagebrush	D U U D	D U U D	D U U D	P D D P	P P P P	D U U D	D U U D
western snowberry	U U U U	U U U U	U U U U	D U D D	U U U U	U U U U	D U U U

N = not used; **U** = undesirable; **D** = desirable; **P** = preferred; **T** = toxic

[†] Quarters: 1 – Jan., Feb., Mar.; 2 – Apr., May, Jun.; 3 – Jul., Aug., Sep.; 4 – Oct., Nov., Dec.

Animal Community – Grazing Interpretations

The following table lists annual, suggested initial stocking rates with average growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of conservation planning. Often, the current plant composition does not entirely match any particular plant community (as described in this ES description). Because of this, a resource inventory is necessary to document plant composition and production. More accurate carrying capacity estimates should eventually be calculated using the following stocking rate information along with animal preference data and actual stocking records, particularly when grazers other than cattle are involved. With consultation of the land manager, more intensive grazing management may result in improved harvest efficiencies and increased carrying capacity.

Plant Community	Average Annual Production (lbs./acre, air-dry)	Stocking Rate* (AUM/acre)
Western Wheatgrass/Green Needlegrass/Shrub (1.1 & 2.1)	2,800	0.77
Western Wheatgrass (2.2)	2,000	0.55
Western Wheatgrass/Blue Grama (2.3)	2,000	0.55
Blue Grama/Sedge/Western Wheatgrass (3.1)	1,400	0.38
Smooth Bromegrass/Kentucky Bluegrass (4.1)	2,600	0.71
Kentucky Bluegrass/Sedge (4.2)	1,400	0.38
Annual/Pioneer, Non-Native Perennial (4.3)	800	0.22

*Based on 912 lbs./acre (air-dry weight) per Animal Unit Month (AUM), and on 25 percent harvest efficiency (refer to the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) National Range and Pasture Handbook).

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage. During the dormant period, the forage for livestock will likely be lacking protein to meet livestock requirements, and added protein will allow ruminants to better utilize the energy stored in grazed plant materials. A forage quality test (either directly or through fecal sampling) should be used to determine the level of supplementation needed.

Hydrology Functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group B. Infiltration and runoff potential for this site varies from moderate to high depending on soil hydrologic group, slope and ground cover. In many cases, areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where shortgrasses form a strong sod and dominate the site. Dominance by blue grama, buffalograss, bluegrass, and/or smooth bromegrass will result in reduced infiltration and increased runoff. Areas where ground cover is less than 50 percent have the greatest potential to have reduced infiltration and higher runoff (refer to Section 4, NRCS National Engineering Handbook for runoff quantities and hydrologic curves).

Recreational Uses

This site provides hunting, hiking, photography, bird watching, and other opportunities. The wide varieties of plants that bloom from spring until fall have an esthetic value that appeals to visitors.

Wood Products

No appreciable wood products are typically present on this site.

Other Products

Seed harvest of native plant species can provide additional income on this site.

Supporting Information

Associated Sites

Loamy (R061XN010SD), Loamy (R061XS010SD), Loamy Overflow (R061XY020SD)

Similar Sites

(R061XN010SD) & (R061XS010SD) – Loamy [less shrubs; lower production]
(R061XY020SD) – Loamy Overflow [more big bluestem, higher production]

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 (RMS), NRCS; Cynthia Englebert, RMS, Forest Service; George Gamblin, RMS, NRCS; Tate Lantz, RMS, NRCS; Ryan Murray, RMS, NRCS; Cheryl Nielsen, RMS, NRCS; L. Michael Stirling, RMS, NRCS; and Jim Westerman, Soil Scientist, NRCS.

State Correlation

This site has been correlated with SD and WY in MLRA 61.

Field Offices/Counties

Belle Fourche, SD Butte & Lawrence Sturgis, SD Meade Sundance, WY Crook
Hot Springs, SD Fall River Rapid City, SD Pennington

Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 17a – Black Hills Foothills.

Other References

High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-0728. (<http://hpccsun.unl.edu>).

USDA, NRCS. National Water and Climate Center, 101 SW Main, Suite 1600, Portland, OR 97204-3224. (<http://www.wcc.nrcs.usda.gov>).

USDA, NRCS. National Range and Pasture Handbook, September 1997.

USDA, NRCS. National Soil Information System, Information Technology Center, 2150 Centre Avenue, Building A, Fort Collins, CO 80526. (<http://nasis.nrcs.usda.gov>).

USDA, NRCS. 2001. The PLANTS Database, Version 3.1 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

USDA, NRCS, Various Published Soil Surveys.

Site Description Approval

SD, State Range Management Specialist

Date

WY, State Range Management Specialist

Date