

# United States Department of Agriculture Natural Resources Conservation Service

## Ecological Site Description

**Site Type:** Rangeland

**Site Name:** Sandy

**Site ID:** R058DY009SD

**Major Land Resource Area (MLRA):** 58D – Northern Rolling High Plains, Eastern Part



### Physiographic Features

This site occurs on nearly level to undulating slopes on uplands and river valleys.

**Landform:** fan, terrace, hillslope      **Aspect:** N/A

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	2,300	4,000
<b>Slope (percent):</b>	1	15
<b>Water Table Depth (inches):</b>	None	None
<b>Flooding:</b>		
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Ponding:</b>		
<b>Depth (inches):</b>	None	None
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Runoff Class:</b>	Low	High

### 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 to the east. Annual precipitation ranges from 14 to 16 inches. Most of the rainfall occurs as frontal storms early in the growing season. Some high-intensity, convective thunderstorms occur in the summer. Precipitation in winter occurs as snow. 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. Outbreaks of cold air from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring. The normal average annual temperature is about 44°F. January is the coldest month with average temperatures ranging from about 12°F (Marmarth, North Dakota (ND)), to about 20°F (Baker, Montana (MT)). July is the warmest month with temperatures averaging from about 70°F (Marmarth, ND), to about 76°F (Baker, MT). The range of normal average monthly temperatures between the coldest and warmest months is about 55°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 strong storms may bring 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 can 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>
<b>Frost-free period (days):</b>	110	123
<b>Freeze-free period (days):</b>	130	140
<b>Mean Annual Precipitation (inches):</b>	14	16

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

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.39	0.46	-0.8	31.0
February	0.34	0.54	5.7	34.4
March	0.73	0.82	15.7	43.8
April	1.23	1.73	29.1	60.4
May	2.29	2.71	39.6	67.7
June	2.79	3.00	49.3	76.7
July	1.91	2.10	54.5	90.7
August	1.35	1.46	50.2	88.2
September	1.16	1.25	40.1	76.5
October	0.85	1.07	28.9	59.5
November	0.43	0.57	15.9	44.6
December	0.31	0.50	6.1	33.7

Climate Stations		Period	
Station ID	Location or Name	From	To
MT0412	Baker	1948	2005
SD1294	Camp Crook	1896	2006
SD3560	Harding 3 SE	1951	2006
ND5575	Marmarth	1950	2006
SD7062	Redig 11 NE	1948	2006

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

## Influencing Water Features

No significant water features influence this site.

## Representative Soil Features

The features common to soils in this site are the fine sandy loam textured surface layers and slopes of 1 to 15 percent. The soils in this site are well to somewhat excessively drained and formed in eolian deposits, alluvium, or residuum from sandstone. The surface layer is 4 to 15 inches thick. The texture of the subsurface generally ranges from loamy fine sand to sandy clay loam. This site should show slight to no evidence of rills, wind scoured areas or pedestalled plants. If present, water flow paths are broken, irregular in appearance or discontinuous. The soil surface is stable and intact. Subsurface soil layers are not restrictive to water movement and root penetration.

These soils are susceptible to wind and water erosion. The hazard of water erosion increases on slopes greater than about 12 percent. 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.

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

**Parent Material Kind:** eolian deposits, residuum, alluvium

**Parent Material Origin:** sandstone

**Surface Texture:** fine sandy loam

**Surface Texture Modifier:** none

**Subsurface Texture Group:** sandy

**Surface Fragments ≤ 3" (% Cover):** 0

**Surface Fragments > 3" (%Cover):** 0

**Subsurface Fragments ≤ 3" (% Volume):** 0

**Subsurface Fragments > 3" (% Volume):** 0

	<u>Minimum</u>	<u>Maximum</u>
<b>Drainage Class:</b>	well	somewhat excessively
<b>Permeability Class:</b>	moderately slow	moderately rapid
<b>Depth to Bedrock (inches):</b>	20	80
<b>Electrical Conductivity (mmhos/cm)*:</b>	0	2
<b>Sodium Absorption Ratio*:</b>	0	0
<b>Soil Reaction (1:1 Water)*:</b>	6.1	8.4
<b>Soil Reaction (0.1M CaCl<sub>2</sub>)*:</b>	NA	NA
<b>Available Water Capacity (inches)*:</b>	3	6
<b>Calcium Carbonate Equivalent (percent)*:</b>	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, natural influences of large herbivores, occasional fire, 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 between communities that will occur, severe disturbances, such as periods of well below average precipitation, can cause significant shifts in plant communities and/or species composition.

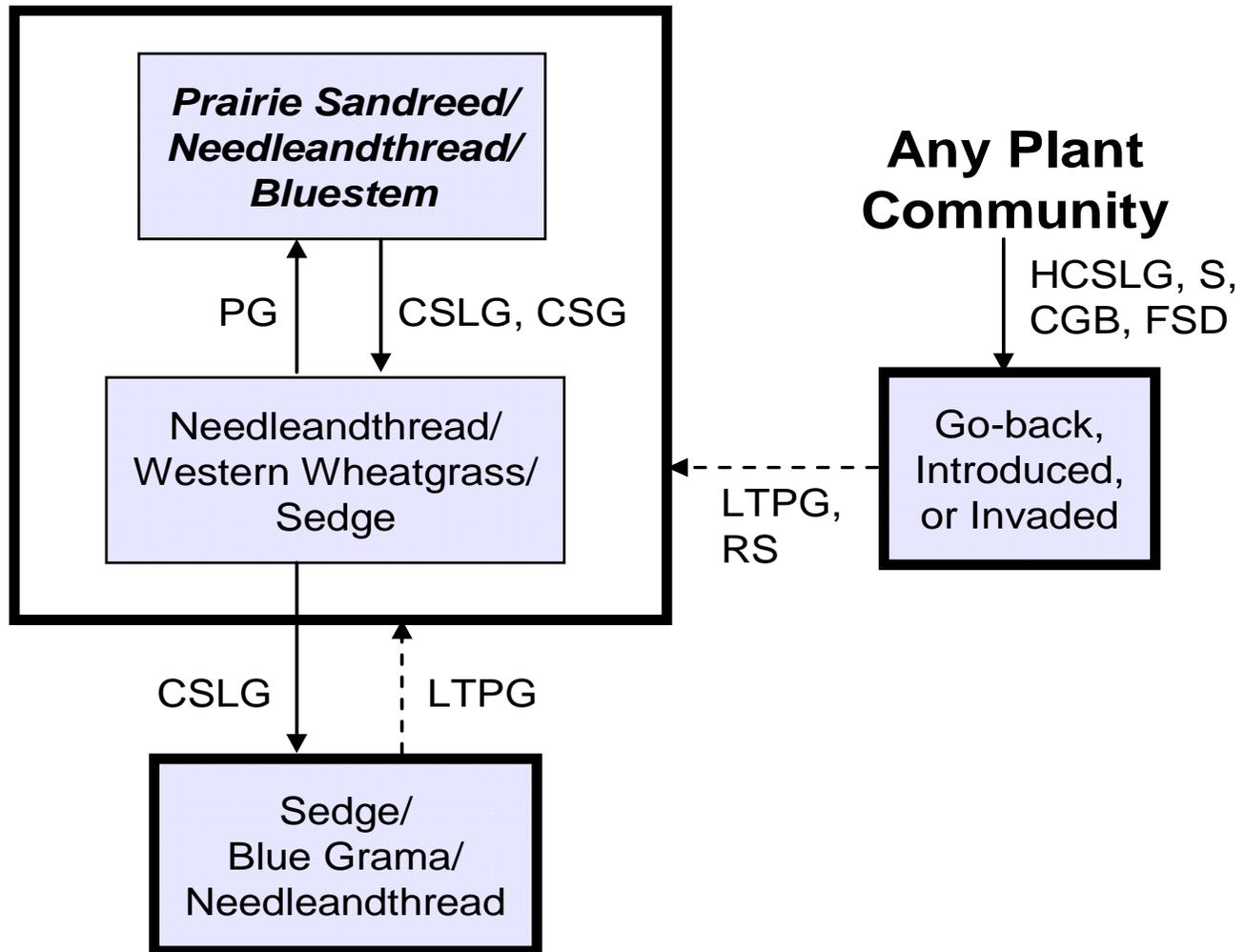
Continuous season-long grazing (during the typical growing season of May through October) and/or repeated seasonal grazing (e.g., every spring, every summer) without adequate recovery periods following each grazing occurrence causes this site to depart from the Prairie Sandreed/Needleandthread/Bluestem Plant Community. Species such as needleandthread, blue grama, and sedge will increase. Continued deterioration results in a community dominated by sedge, sand dropseed, and western ragweed. Warm-season grasses such as sand bluestem, big bluestem, little bluestem, and eventually prairie sandreed will decrease in frequency and production.

The plant community upon which interpretations are primarily based is the Prairie Sandreed/Needleandthread/Bluestem Plant Community. This plant community has been determined by studying 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 communities, states, transitional pathways, and thresholds have been determined through similar studies and experience.

The following is a diagram that illustrates the common plant communities that can occur on the site and the transitions between communities. The ecological processes are discussed in more detail in the plant community narratives following the diagram.

### Plant Communities and Transitional Pathways



**CGB** – Cropped go-back; **CSG** – Continuous seasonal grazing; **CSLG** – Continuous season-long grazing; **FSD** – Frequent and severe defoliation; **HCSLG** – Heavy, continuous season-long grazing; **LTPG** – Long-term prescribed grazing; **PG** – Prescribed grazing; **RS** – Range seeding; **S** – Seeding.

**Plant Community Composition and Group Annual Production**

COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Prairie Sandreed/Needleandthread/ Bluestem			
			Group	lbs./acre	% Comp	
<b>GRASSES &amp; GRASS-LIKES</b>				1600 - 1800	80 - 90	
<b>TALL WARM-SEASON GRASSES</b>			<b>1</b>	<b>300 - 600</b>	<b>15 - 30</b>	
prairie sandreed	Calamovilfa longifolia	CALO	1	200 - 500	10 - 25	
big bluestem	Andropogon gerardii	ANGE	1	40 - 200	2 - 10	
sand bluestem	Andropogon hallii	ANHA	1	40 - 200	2 - 10	
<b>NEEDLEGRASS</b>			<b>2</b>	<b>200 - 500</b>	<b>10 - 25</b>	
needleandthread	Hesperostipa comata ssp. comata	HECOC8	2	200 - 500	10 - 25	
porcupine grass	Hesperostipa spartea	HESP11	2	0 - 100	0 - 5	
<b>MID WARM-SEASON GRASSES</b>			<b>3</b>	<b>40 - 300</b>	<b>2 - 15</b>	
little bluestem	Schizachyrium scoparium	SCSC	3	40 - 300	2 - 15	
plains muhly	Muhlenbergia cuspidata	MUCU3	3	0 - 100	0 - 5	
<b>COOL-SEASON GRASSES</b>			<b>4</b>	<b>100 - 200</b>	<b>5 - 10</b>	
western wheatgrass	Pascopyrum smithii	PASM	4	40 - 160	2 - 8	
slender wheatgrass	Elymus trachycaulus	ELTR7	4	0 - 100	0 - 5	
prairie junegrass	Koeleria macrantha	KOMA	4	20 - 60	1 - 3	
bottlebrush squirreltail	Elymus elymoides	ELEL5	4	0 - 60	0 - 3	
other grasses		2GRAM	4	0 - 100	0 - 5	
<b>SHORT WARM-SEASON GRASSES</b>			<b>5</b>	<b>40 - 100</b>	<b>2 - 5</b>	
blue grama	Bouteloua gracilis	BOGR2	5	20 - 100	1 - 5	
sand dropseed	Sporobolus cryptandrus	SPCR	5	20 - 100	1 - 5	
<b>GRASS-LIKES</b>			<b>6</b>	<b>100 - 300</b>	<b>5 - 15</b>	
threadleaf sedge	Carex filifolia	CAFI	6	40 - 200	2 - 10	
needleleaf sedge	Carex duriuscula	CADU6	6	40 - 200	2 - 10	
sun sedge	Carex inops ssp. heliophila	CAINH2	6	20 - 100	1 - 5	
other grass-likes		2GL	6	0 - 100	0 - 5	
<b>FORBS</b>			<b>8</b>	<b>100 - 200</b>	<b>5 - 10</b>	
American vetch	Vicia americana	VIAM	8	0 - 40	0 - 2	
bracted spiderwort	Tradescantia bracteata	TRBR	8	20 - 40	1 - 2	
cudweed sagewort	Artemisia ludoviciana	ARLU	8	20 - 40	1 - 2	
dotted gayfeather	Liatris punctata	LIPU	8	20 - 40	1 - 2	
false boneset	Brickellia eupatorioides	BREU	8	20 - 40	1 - 2	
false gromwell	Onosmodium molle	ONMO	8	0 - 40	0 - 2	
green sagewort	Artemisia campestris	ARCA12	8	0 - 60	0 - 3	
hairy goldaster	Heterotheca villosa	HEVI4	8	20 - 40	1 - 2	
Missouri goldenrod	Solidago missouriensis	SOMI2	8	0 - 40	0 - 2	
penstemon	Penstemon spp.	PENST	8	20 - 40	1 - 2	
prairie clover	Dalea spp.	DALEA	8	20 - 60	1 - 3	
prairie coneflower	Ratibida columnifera	RACO3	8	0 - 20	0 - 1	
rush skeletonweed	Lygodesmia juncea	LYJU	8	0 - 20	0 - 1	
scarlet gaura	Gaura coccinea	GACO5	8	20 - 40	1 - 2	
scarlet globemallow	Sphaeralcea coccinea	SPCO	8	0 - 40	0 - 2	
scurfpea	Psoraleidium spp.	PSORA2	8	20 - 60	1 - 3	
stiff sunflower	Helianthus pauciflorus	HEPA19	8	20 - 60	1 - 3	
tenpetal mentzelia	Mentzelia decapetala	MEDE2	8	0 - 20	0 - 1	
wavyleaf thistle	Cirsium undulatum	CIUN	8	0 - 40	0 - 2	
western ragweed	Ambrosia psilostachya	AMPS	8	0 - 20	0 - 1	
white prairie aster	Symphyotrichum falcatum	SYFA	8	20 - 40	1 - 2	
native forbs		2FN	8	20 - 100	1 - 5	
<b>SHRUBS</b>			<b>9</b>	<b>100 - 200</b>	<b>5 - 10</b>	
big sagebrush	Artemisia tridentata	ARTR2	9	0 - 60	0 - 3	
cactus	Opuntia spp.	OPUNT	9	0 - 80	0 - 4	
fringed sagewort	Artemisia frigida	ARFR4	9	20 - 100	1 - 5	
leadplant	Amorpha canescens	AMCA6	9	20 - 160	1 - 8	
prairie rose	Rosa arkansana	ROAR3	9	20 - 40	1 - 2	
silver sagebrush	Artemisia cana	ARCA13	9	0 - 60	0 - 3	
western snowberry	Symphoricarpos occidentalis	SYOC	9	0 - 60	0 - 3	
yucca	Yucca glauca	YUGL	9	0 - 60	0 - 3	
other shrubs		2SHRUB	9	0 - 100	0 - 5	
<b>CRYPTOGAMS</b>			<b>10</b>	<b>0 - 20</b>	<b>0 - 1</b>	
clubmoss	Selaginella densa	SEDE2	10	0 - 20	0 - 1	
<b>Annual Production lbs./acre</b>				<b>LOW</b>	<b>RV</b>	<b>HIGH</b>
<b>GRASSES &amp; GRASS-LIKES</b>				1210 -	1690	·2325
<b>FORBS</b>				95 -	150	·225
<b>SHRUBS</b>				95 -	150	·225
<b>CRYPTOGAMS</b>				0 -	10	·25
<b>TOTAL</b>				1400 -	2000	·2800

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	Prairie Sandreed/ Needleandthread/Bluestem			Needleandthread/Western Wheatgrass/Sedge			Sedge/Blue Grama/ Needleandthread		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
<b>GRASSES &amp; GRASS-LIKES</b>										
			1600 - 1800	80 - 90		1120 - 1390	80 - 95		750 - 850	75 - 85
<b>TALL WARM-SEASON GRASSES</b>										
prairie sandreed	CALO	1	300 - 600	15 - 30	1	14 - 70	1 - 5	1		
big bluestem	ANGE	1	40 - 200	2 - 10	1	0 - 28	0 - 2			
sand bluestem	ANHA	1	40 - 200	2 - 10	1	0 - 28	0 - 2			
<b>NEEDLEGRASS</b>										
needleandthread	HECOC8	2	200 - 500	10 - 25	2	210 - 490	15 - 35	2	50 - 150	5 - 15
porcupine grass	HESP11	2	0 - 100	0 - 5						
<b>MID WARM-SEASON GRASSES</b>										
little bluestem	SCSC	3	40 - 300	2 - 15	3	0 - 70	0 - 5			
plains muhly	MUCU3	3	0 - 100	0 - 5	3	0 - 28	0 - 2			
<b>MID WARM-SEASON GRASSES</b>										
western wheatgrass	PASM	4	100 - 200	5 - 10	4	140 - 350	10 - 25	4	20 - 100	2 - 10
slender wheatgrass	ELTR7	4	40 - 160	2 - 8	4	140 - 350	10 - 25	4	10 - 100	1 - 10
prairie junegrass	KOMA	4	0 - 100	0 - 5						
bottlebrush squirreltail	ELEL5	4	20 - 60	1 - 3	4	14 - 56	1 - 4	4	10 - 30	1 - 3
other grasses	2GRAM	4	0 - 60	0 - 3	4	0 - 70	0 - 5	4	0 - 50	0 - 5
<b>SHORT WARM-SEASON GRASSES</b>										
blue grama	BOGR2	5	40 - 100	2 - 5	5	70 - 140	5 - 10	5	100 - 200	10 - 20
sand dropseed	SPCR	5	20 - 100	1 - 5	5	28 - 140	2 - 10	5	50 - 150	5 - 15
<b>GRASS-LIKES</b>										
threadleaf sedge	CAFI	6	20 - 100	1 - 5	6	14 - 112	1 - 8	6	20 - 100	2 - 10
needleleaf sedge	CADU6	6	100 - 300	5 - 15	6	140 - 350	10 - 25	6	200 - 400	20 - 40
sun sedge	CAINH2	6	40 - 200	2 - 10	6	70 - 210	5 - 15	6	100 - 250	10 - 25
other grass-likes	2GL	6	20 - 100	1 - 5	6	28 - 112	2 - 8	6	20 - 150	2 - 15
<b>NON-NATIVE GRASSES</b>										
bluegrass	POA	7	0 - 100	0 - 5	7	0 - 70	0 - 5	7	0 - 50	0 - 5
other grasses	2GRAM	7	0 - 100	0 - 5	7	0 - 70	0 - 5	7	0 - 50	0 - 5
<b>FORBS</b>										
American vetch	VIAM	8	100 - 200	5 - 10	8	14 - 98	1 - 7	8	10 - 50	1 - 5
bracted spiderwort	TRBR	8	0 - 40	0 - 2						
cutweed sagewort	ARLU	8	20 - 40	1 - 2	8	0 - 14	0 - 1			
dotted gayfeather	LIPU	8	20 - 40	1 - 2	8	14 - 42	1 - 3	8	10 - 30	1 - 3
false boneset	BREU	8	20 - 40	1 - 2						
false gromwell	ONMO	8	20 - 40	1 - 2						
green sagewort	ARCA12	8	0 - 40	0 - 2	8	0 - 56	0 - 4	8	0 - 30	0 - 3
hairy goldaster	HEVI4	8	0 - 60	0 - 3	8	0 - 56	0 - 4			
Missouri goldenrod	SOMI2	8	20 - 40	1 - 2	8	0 - 14	0 - 1			
penstemon	PENST	8	0 - 40	0 - 2	8	0 - 14	0 - 1			
prairie clover	DALEA	8	20 - 40	1 - 2	8	0 - 14	0 - 1			
prairie coneflower	RACO3	8	20 - 60	1 - 3	8	0 - 28	0 - 2			
rush skeletonweed	LYJU	8	0 - 20	0 - 1	8	0 - 14	0 - 1	8	0 - 10	0 - 1
scarlet gaura	GACO5	8	0 - 20	0 - 1						
scarlet globemallow	SPCO	8	20 - 40	1 - 2	8	0 - 14	0 - 1			
scurfpea	PSORA2	8	0 - 40	0 - 2	8	0 - 28	0 - 2	8	0 - 10	0 - 1
stiff sunflower	HEPA19	8	20 - 60	1 - 3	8	14 - 42	1 - 3	8	0 - 20	0 - 2
tenpetal mentzelia	MEDE2	8	20 - 60	1 - 3	8	14 - 42	1 - 3			
wayleaf thistle	CIUN	8	0 - 20	0 - 1	8	0 - 14	0 - 1	8	0 - 10	0 - 1
western ragweed	AMPS	8	0 - 40	0 - 2	8	0 - 28	0 - 2	8	0 - 30	0 - 3
white prairie aster	SYFA	8	0 - 20	0 - 1	8	0 - 14	0 - 1			
native forbs	2FN	8	20 - 40	1 - 2	8	0 - 14	0 - 1			
introduced forbs	2FI	8	20 - 100	1 - 5	8	0 - 42	0 - 3	8	0 - 20	0 - 2
<b>SHRUBS</b>										
big sagebrush	ARTR2	9	0 - 20	0 - 1	9	0 - 42	0 - 3	9	0 - 30	0 - 3
cactus	OPUNT	9	100 - 200	5 - 10	9	70 - 140	5 - 10	9	50 - 150	5 - 15
fringed sagewort	ARFR4	9	0 - 60	0 - 3	9	0 - 70	0 - 5	9	0 - 50	0 - 5
leadplant	AMCA6	9	0 - 80	0 - 4	9	14 - 84	1 - 6	9	10 - 80	1 - 8
prairie rose	ROAR3	9	20 - 100	1 - 5	9	14 - 98	1 - 7	9	20 - 100	2 - 10
silver sagebrush	ARCA13	9	20 - 160	1 - 8	9	0 - 42	0 - 3			
western snowberry	SYOC	9	20 - 40	1 - 2	9	14 - 28	1 - 2	9	0 - 10	0 - 1
yucca	YUGL	9	0 - 60	0 - 3	9	0 - 70	0 - 5	9	0 - 50	0 - 5
other shrubs	2SHRUB	9	0 - 60	0 - 3	9	0 - 70	0 - 5	9	10 - 50	1 - 5
<b>CRYPTOGAMS</b>										
clubmoss	SEDE2	10	0 - 100	0 - 5	10	0 - 42	0 - 3	10	0 - 20	0 - 2
<b>Annual Production lbs./acre</b>										
		LOW	RV	HIGH	LOW	RV	HIGH	LOW	RV	HIGH
<b>GRASSES &amp; GRASS-LIKES</b>		1210	1690	2325	725	1218	1695	445	840	1225
<b>FORBS</b>		95	150	225	10	56	105	5	30	55
<b>SHRUBS</b>		95	150	225	85	105	155	45	100	165
<b>CRYPTOGAMS</b>		0	10	25	0	21	45	5	30	55
<b>TOTAL</b>		1400	2000	2800	800	1400	2000	500	1000	1500

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

Following are the narratives for each of the described plant communities. These plant communities may not represent every possibility, but they are the most prevalent and repeatable plant communities. The plant composition tables shown above have been developed from the best available knowledge at the time of this revision. As more information is collected, some of these plant community descriptions may be revised or removed, and new ones added. None of these plant communities should necessarily be thought of as “Desired Plant Communities” (DPC). According to the USDA Natural Resources Conservation Service (NRCS) National Range and Pasture Handbook, DPCs will be determined by the decision makers and will meet minimum quality criteria established by the NRCS. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

### Prairie Sandreed/Needleandthread/Bluestem Plant Community

The interpretive plant community for this site is the Prairie Sandreed/Needleandthread/Bluestem Plant Community. This is also considered to be climax. This plant community can be found on areas that are properly managed with grazing and/or prescribed burning, and sometimes on areas receiving occasional short periods of deferment.

The potential vegetation is about 80-90 percent grasses or grass-like plants, 5-10 percent forbs, 5-10 percent shrubs, and 0-1 percent cryptogams. Cool-season and warm-season grasses codominate this plant community. The major grasses include needleandthread, prairie sandreed, and little bluestem. Other grasses or grass-likes occurring on the site include blue grama, big bluestem, western wheatgrass, plains muhly, slender wheatgrass, prairie Junegrass, and sedge. Significant forbs include cudweed sagewort, dotted gayfeather, and prairie clover. The significant shrubs that occur include fringed sagewort, leadplant, big sagebrush, and silver sagebrush.

This plant community is well adapted to the Northern Great Plains climatic conditions. Individual species can vary greatly in production depending on growing conditions (timing and amount of precipitation and temperature). The diversity in plant species allows for high drought tolerance. This is a healthy and sustainable plant community. Moderate or high available water capacity provides a favorable soil-water-plant relationship. Overall, the interpretive plant community has the appearance of being stable, diverse, and productive. Plant litter is properly distributed with very little movement offsite and natural plant mortality is very low.

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: SD5803

Growth curve name: Northern Rolling High Plains, 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 community pathways leading to other plant communities are as follows:

- Continuous season-long grazing or continuous seasonal grazing (grazing at the same time of year each year without adequate recovery periods) will lead to the *Needleandthread/Western Wheatgrass/Sedge Plant Community*. This occurs with exposure to herbivory during the entire growing season at light to moderate stocking rates or with a lack of adequate recovery periods for extended periods.

### Needleandthread/Western Wheatgrass/Sedge Plant Community

This plant community develops under continuous season-long grazing or continuous seasonal grazing (i.e., grazing an area during the same season every year) or from over utilization during extended drought periods. The potential vegetation is made up of approximately 80-95 percent grasses and grass-like species, 1-7 percent forbs, and 5-10 percent shrubs. The dominant grass or grass-like species include needleandthread, western wheatgrass, and sedge. Other grasses include blue grama, little bluestem, sand dropseed, and prairie Junegrass. Significant forbs include cudweed sagewort, green sagewort, scarlet globemallow, and scurfpea. The dominant shrubs that occur include cactus, fringed sagewort, big sagebrush, and silver sagebrush.

Compared to the Prairie Sandreed/Needleandthread/Bluestem Plant Community, the shortgrass species including blue grama and threadleaf sedge have increased. The warm-season species such as prairie sandreed, little bluestem, big bluestem, and sand bluestem decreased in composition. Bluegrass, annual bromes, sweetclover, and other annual grasses and forbs can invade the site. This plant community can occur in a mosaic with patchy, slightly used areas occurring adjacent to and intermingled with this plant community.

This plant community is resistant to change. The dominant herbaceous species are very adapted to grazing; however, the mid-grass species and the more palatable forbs will decrease. If the herbaceous component is intact, it tends to be resilient if disturbance is not long-term. Because of the sod forming habit of the shortgrass species, water infiltration is low, and runoff is moderate to high. Typically, the runoff is very clean because of the low potential for onsite soil erosion. However, offsite areas may be affected by increased runoff.

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: SD5802

Growth curve name: Northern Rolling High Plains, 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 community pathways leading to other plant communities are as follows:

- Prescribed grazing, which allows for adequate plant recovery periods, will move this plant community to the *Prairie Sandreed/Needleandthread/Bluestem Plant Community*.
- With continuous seasonal grazing this plant community will move towards the *Sedge/Blue Grama/Needleandthread Plant Community*.

### Sedge/Blue Grama/Needleandthread Plant Community

This plant community develops under continuous season-long grazing, often with concentrated use in the early part of the growing season (as in calving/lambing pastures). It is made up of approximately 75-85 percent grasses (primarily short grass and grass-like species), 1-5 percent forbs, 5-15 percent shrubs, and 1-5 percent cryptogams (clubmoss). The dominant grass and grass-like species include sedge and blue grama. Other grasses may include western wheatgrass, prairie Junegrass, bluegrass, and cheatgrass. The dominant forbs include common pepperweed, curlycup gumweed, cudweed sagewort, green sagewort, sweetclover, and western yarrow. The dominant shrubs include fringed sagewort and cactus.

Compared to the Prairie Sandreed/Needleandthread/Bluestem Plant Community, blue grama, and sedge have increased, and the cool- and warm-season mid and tall grasses have diminished greatly. Nonpalatable forbs and cactus have increased and nonnative species have invaded the site. Plant diversity is low.

This plant community is very stable. Generally, this plant community will require significant management inputs (i.e., high animal impact, long-term prescribed grazing, favorable climatic conditions, etc.) and time to move it towards the Needleandthread/Western Wheatgrass/Sedge Plant Community. Onsite soil erosion is low. Infiltration is low and runoff is high. Typically, the runoff is very clean because of the low potential for onsite soil erosion. However, offsite areas can be significantly impacted due to the increased runoff.

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: SD5802

Growth curve name: Northern Rolling High Plains, 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 community pathways leading to other plant communities are as follows:

- Long-term prescribed grazing and favorable climatic conditions, which allow for adequate plant recovery periods, may cause a shift to the *Needleandthread/Western Wheatgrass/Sedge Plant Community*.
- Heavy, continuous season-long grazing, or frequent and severe defoliation (e.g., rodents) will move this plant community to the *Go-back or Invaded Plant Community*.

### **Go-back, Introduced, or Invaded**

This group includes three separate vegetation states that are highly variable in nature. They are derived through four distinct management scenarios and are not related successional. Infiltration, runoff, and soil erosion vary depending on the vegetation present on the site.

The **Go-back** state can be reached whenever severe mechanical disturbance (i.e., abandoned farmland) occurs. During the early successional stages, the species that mainly dominate are annual grasses and forbs, later being replaced by both native and introduced perennials. The vegetation on this site varies greatly, sometimes being dominated by needleandthread, blue grama, and sedge.

The **Introduced** state is normally those areas seeded to crested wheatgrass, pubescent or intermediate wheatgrass, and alfalfa. They require considerable investment to establish and have a variable life expectancy. They do produce up to 50 percent more than native range, but their value as forage is somewhat limited due to the single species usually seeded.

The **Invaded** state includes areas that have been invaded by species such as smooth brome grass, Kentucky bluegrass, crested wheatgrass, nonnative thistles, field bindweed, knapweeds, leafy spurge, hoary cress, and other introduced species.

## Ecological Site Interpretations

### Animal Community – Wildlife Interpretations

Major Land Resource Area 58D lies within the drier portion of Northern mixed-grass prairie ecosystem where sagebrush steppes to the west yield to grassland steppes to the east. Prior to European settlement, this area consisted of diverse grass/shrub land habitats interspersed with varying densities of depressional, instream wetlands, and woody riparian corridors. These habitats provided critical life cycle components for many of its users. Many species of grassland birds, small mammals, reptiles, amphibians, and herds of roaming bison, elk, and pronghorn were among the inhabitants adapted to this semi-arid region. Roaming herbivores, as well as, several small mammal and insect species, were the primary consumers linking the grassland resources to predators such as the wolf, mountain lion, and grizzly bear, as well as, smaller carnivores such as the coyote, bobcat, fox, and raptors. The black-tailed prairie dog was once abundant; however, the species remains a keystone species within its range. The black-footed ferret, burrowing owl, ferruginous hawk, mountain plover, and swift fox were associated with prairie dog complexes.

Historically, the Northern mixed-grass prairie was a disturbance-driven ecosystem with fire, herbivory, and climate functioning as the primary disturbance factors either singly or in combination. Following European settlement, livestock grazing, cropland conversion, elimination of fire, energy development, and other anthropogenic factors influenced species composition and abundance. Introduced and invasive species further impacted plant and animal communities. Bison were historically a keystone species but have been extirpated as a free-ranging herbivore. The loss of the bison, reduction of prairie dog colonies, and loss of fire as ecological drivers greatly influenced the character of the remaining native plant communities and altered wildlife habitats. Human development has reduced habitat quality for area-sensitive species.

Within MLRA 58D, the Sandy Ecological Site (ES) provides upland grassland cover with an associated forb and shrub component. It was typically part of an expansive grassland landscape that included combinations of Loamy, Shallow Loamy, Shallow Clayey, Thin Loamy, Claypan, Sandy Claypan, Clayey, and Thin Claypan ESs. This site provided habitat for species requiring unfragmented grassland. Important habitat features and components found commonly or exclusively on this site may include greater sage-grouse and sharp-tailed grouse leks; upland nesting habitat for grassland birds, forbs and insects for brood habitat; and a forage source for small and large herbivores. Many grassland and shrub steppe nesting bird populations are declining. Extirpated species include free-ranging bison, grizzly bear, gray wolf, black-footed ferret, mountain plover, Rocky Mountain locust, and swift fox.

The majority of Sandy ES remains intact and provides increasingly important habitat for grassland and shrub steppe nesting birds, small rodents, coyote, and a variety of reptiles, amphibians, and insects. Invasive species such as annual bromegrasses and crested wheat have impacted the biological integrity of the site for some grassland birds such as greater sage-grouse. Changes in historic fire regime and domestic grazing have impacted the forb/shrub/grass percentages. Greater sage-grouse and Brewer's sparrow benefit when big sagebrush increases.

**Prairie Sandreed/Needleandthread/Bluestem:** The predominance of grasses plus high diversity of forbs and shrubs in this community favors grazers and mixed-feeders, such as deer and pronghorn. Insects, such as pollinators, play a large role in maintaining the forb community and provide a forage base for grassland birds and other species. The complex plant structural diversity provides habitat for a wide array of migratory and resident birds. Grasshopper sparrow, lark bunting, western meadowlark, and sharp-tailed grouse are common and benefit from the structure and composition this

plant community provides.

Brewer's sparrow and greater sage-grouse may be present depending on the frequency and distribution of big sagebrush. Diverse prey populations are available for grassland raptors such as ferruginous hawk, Swainson's hawk, golden eagle, and prairie falcon.

The diversity of grasses, forbs, and shrubs provide high nutrition levels for small and large herbivores including voles, mice, thirteen-lined ground squirrel, white-tailed jackrabbit, and deer. This ES provides excellent wintering habitat for pronghorn. The higher stature of this plant community provides thermal, protective and escape cover for herbivores and grassland birds. Predators utilizing this plant community include coyote, American badger, red fox, and long-tailed weasel. This plant community provides habitat for herptiles such as the spade foot toad, bull snake, and western rattlesnake.

**Needleandthread/Western Wheatgrass/Sedge:** The predominance of grasses plus high diversity of forbs and shrubs in this community favors grazers and mixed-feeders, such as deer and pronghorn. Insects, such as pollinators, play a large role in maintaining the forb community and provide a forage base for grassland birds and other species. The plant structural diversity provides habitat for a wide array of migratory and resident birds. Grasshopper sparrow, lark bunting, western meadowlark, and sharp-tailed grouse are common and benefit from the mid to short structure and composition this plant community provides. This site provides limited nesting and brood rearing habitat for greater sage-grouse. Diverse prey populations are available for grassland raptors such as ferruginous hawk, Swainson's hawk, golden eagle, and prairie falcon.

The diversity of grasses, forbs, and shrubs provide high nutrition levels for small and large herbivores including voles, mice, thirteen-lined ground squirrel, white-tailed jackrabbit, and deer. The moderate stature of this plant community provides suitable thermal, protective, and escape cover for small herbivores and grassland birds. Predators utilizing this plant community include coyote, American badger, red fox, and long-tailed weasel. This plant community provides habitat for spade foot toad, Great Plains toad, bull snake, and western rattlesnake.

**Sedge/Blue Grama/Needleandthread:** Resulting from heavy continuous season-long grazing without adequate recovery periods between grazing events; sedges, and blue grama will dominate. The forb diversity has decreased. A shift to shorter plant structure will favor prairie dog expansion and associate species such as ferruginous hawk, burrowing owl, tiger salamander, and swift fox. Species such as horned lark, long-billed curlew, upland sandpiper, and white-tailed jackrabbit will increase due to the loss of the tall grass component. Density of species such as Brewer's sparrow, greater sage-grouse, as well as, desert cottontail will decline. However, this plant community may provide areas suitable for lek site development.

The short stature of this plant community limits thermal, protective, and escape cover. Predators utilizing this plant community include coyote, American badger, red fox, and long-tailed weasel.

### **Go Back, Introduced, and/or Invaded States**

This group includes separate vegetation states that are highly variable in nature. They are derived through distinct management scenarios. These plant communities have been or are highly susceptible to invasion of annual brome grasses, bluegrasses, crested wheatgrass, and other nonnative species.

Since secondary succession is highly variable plant and wildlife species will vary. This plant community provides habitat for generalist or early successional species. In addition, these

communities may contain prairie dog towns. Prairie dog towns are sites of high plant and wildlife diversity.

The **Go-back** state can be reached whenever severe mechanical disturbance (i.e., abandoned farmland) is eliminated. Early successional plant communities include annual and perennial weedy type species first to occupy the site. These sites provide diverse foraging, reproductive, and escape cover favoring multiple edge species. This pioneer plant community provides abundant opportunity for insect, bird, and small mammal foraging due to abundant flowers and seed sources.

The **Introduced** state provides increased forage and; therefore, a potential for increased herbivore populations such as deer, pronghorn, and various small mammals. These sites provide diverse foraging, reproductive, and escape cover favoring multiple edge species.

The **Invaded** state includes areas that have been invaded, and are dominated by species such as smooth brome, Kentucky bluegrass, crested wheatgrass, nonnative thistles, field bindweed, knapweeds, leafy spurge, hoary cress, and other introduced species. These sites greatly reduce foraging, reproductive, and escape cover for grassland nesting bird species.

## Animal Preferences (Quarterly – 1,2,3,4<sup>†</sup>)

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
<b>Grasses and Grass-likes</b>							
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
bottlebrush squirreltail	U D U U	N D U N	U D U U	N D U N	N D U N	U D U U	U D U U
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
needleleaf 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
plains muhly	U U D U	U U D U	U U D U	N N N N	N N N N	U U D U	U U D U
porcupine grass	U P U D	N D N U	U P U D	N D N U	N D N U	U P U D	U P 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 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
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
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
sun 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
threadleaf 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
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
<b>Forbs</b>							
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
bracted spiderwort	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
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
false gromwell	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
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
hairy goldaster	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
Missouri 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
penstemon	U U U U	U P P U	U U U U	U P P U	U P P U	U U U U	U P 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
rush skeletonweed	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
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
scarlet globemallow	U U D U	U D D U	U U D U	U D D U	U D D U	U U D U	U D D U
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
tenpetal mentzelia	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
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
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
<b>Shrubs and Cryptogams</b>							
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
cactus	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N
clubmoss	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N
fringed sagewort	U U U U	U U U U	U U U U	U D D U	U P P D	U U U U	U U U D
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
prairie 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 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
yucca	D N N D	D U U D	D N N D	D U U D	D U U D	D N N D	D U U D

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

<sup>†</sup> Quarters: 1 – Jan., Feb., Mar.; 2 – Apr., May, Jun.; 3 – Jul., Aug., Sep.; 4 – Oct., Nov., Dec.

## Animal Community – Grazing Interpretations

As this site improves in condition through proper management (from the more short grass dominated plant communities to the interpretive plant community), the advantage for livestock production includes: higher forage production from cool-season grasses, improved early spring forage production, and higher water infiltration. The disadvantage for livestock include: reduction in cool-/warm-season grass mix which would provides better management flexibility, less plant diversity, and a potential increase in soil erosion. The Annual, Pioneer Perennial Plant Community is of limited value for livestock production.

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 exception would be where shortgrasses form a strong sod and dominate the site. Normally 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 opportunities for upland game species. The wide variety of plants which 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

Sandy Claypan (R058DY027SD), Loamy (R058DY010SD), Sands (R058DY008SD), Thin Sandy (R058DY026SD), Thin Claypan (R058DY015SD).

### Similar Sites

- (R058DY013SD) – Claypan  
[more western wheatgrass; more green needlegrass; less productive]
- (R058DY010SD) – Loamy  
[more western wheatgrass; more big sagebrush; more productive ]
- (R058DY008SD) – Sands  
[more prairie sandreed and sand bluestem; less productive]

## Inventory Data References

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations and experience were also used. Those involved in developing this site description include: Ryan Beer, Range Management Specialist (RMS), NRCS; Chuck Berdan, Biologist (BIO), Bureau of Land Management (BLM); Stan Boltz, RMS, NRCS; Dave Dewald, Wildlife BIO, NRCS; Jody Forman, RMS, NRCS; Dennis Froemke, RMS, NRCS; Tom Juntti, BIO, USFS; Cheryl Nielsen, RMS, NRCS; Jeff Printz, RMS, NRCS; Mike Stirling, RMS, NRCS; Dan Svingen, BIO, USFS; Darrell Vanderbusch, Soil Scientist, NRCS; Cindy Zachmeier, BIO, NRCS; and Tim Zachmeier, BIO, BLM.

<u>Data Source</u>	<u>Number of Records</u>	<u>Sample Period</u>	<u>State</u>	<u>County</u>
SCS-RANGE-417	9	1985 – 2004	SD	Harding

## State Correlation

This site has been correlated between MT, ND, and South Dakota (SD) in MLRA 58D.

## Field Offices

Baker, MT (Fallon County)	Belle Fourche, SD (Butte County)
Bowman, ND (Bowman & Slope Counties)	Buffalo, SD (Harding County)
Ekalaka, MT (Carter County)	

## Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 43e – Sagebrush Steppe.

## Other References

High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-0728. (<http://www.hprcc.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

_____ MT, State Range Management Specialist	_____ Date	_____ ND, State Range Management Specialist	_____ Date
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_____ SD, State Range Management Specialist	_____ Date
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