

# United States Department of Agriculture Natural Resources Conservation Service

## Ecological Site Description

**Site Type:** Rangeland

**Site Name:** Sands

**Site ID:** R060AXY008SD

**Major Land Resource Area (MLRA):** 60A – Pierre Shale Plains



### Physiographic Features

This site occurs on dune fields or river valleys.

**Landform:** dune, stream terrace, flood plain

**Aspect:** N/A

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	2,500	4,300
<b>Slope (percent):</b>	0	24
<b>Water Table Depth (inches):</b>	None	None
<b>Flooding:</b>		
<b>Frequency:</b>	None	Rare
<b>Duration:</b>	None	Brief
<b>Ponding:</b>		
<b>Depth (inches):</b>	None	None
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Runoff Class:</b>	Negligible	Very low

### 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 13 to 18 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 normal average annual temperature is about 46°F. January is the coldest month with average temperatures ranging from about 19°F (Moorcroft CAA, Wyoming (WY)), to about 22°F (Belle Fourche, South Dakota (SD)). July is the warmest month with temperatures averaging from about 70°F (Moorcroft CAA, WY), to about 72°F (Belle Fourche, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 51°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 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 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>	122	129
<b>Freeze-free period (days):</b>	145	152
<b>Mean Annual Precipitation (inches):</b>	13	18

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

	<b>Precip. Min.</b>	<b>Precip. Max</b>	<b>Temp. Min.</b>	<b>Temp. Max.</b>
January	0.32	0.43	7.1	34.1
February	0.44	0.57	12.6	40.1
March	0.65	0.94	19.7	46.5
April	1.43	1.72	29.4	60.2
May	2.45	3.19	39.7	70.6
June	2.34	3.38	48.5	80.1
July	1.60	2.78	54.8	88.0
August	1.24	1.76	53.1	87.7
September	1.01	1.50	42.3	77.0
October	0.90	1.11	31.4	64.9
November	0.40	0.61	19.8	47.5
December	0.40	0.48	10.2	38.0

<b>Climate Stations</b>		<b>Period</b>	
<b>Station ID</b>	<b>Location or Name</b>	<b>From</b>	<b>To</b>
SD0236	Ardmore 2 N	1948	1999
SD0559	Belle Fourche	1948	1999
SD1124	Buffalo Gap	1951	1999
WY6395	Moorcroft CAA	1948	1998
WY9207	Upton 13 SW	1949	1998

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 soils in this site are excessively drained and formed in eolian sand or sandy alluvium. The surface layer is 3 to 10 inches thick. The texture of the profile ranges from loamy fine sand to fine sand. This site should show slight to no evidence of rills, wind scoured areas, or pedestalled plants. Water flow paths are broken, irregular in appearance, or discontinuous with numerous vegetative barriers. The soil surface is stable and intact.

More information can be found in the various soil survey reports. Contact the local USDA Service Center for soil survey reports that include more detail specific to your location.

**Parent Material Kind:** eolian deposits  
**Parent Material Origin:** mixed  
**Surface Texture:** fine sand  
**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>	somewhat excessively	excessively
<b>Permeability Class:</b>	moderately rapid	moderately rapid
<b>Depth (inches):</b>	80	80
<b>Electrical Conductivity (mmhos/cm)*:</b>	0	2
<b>Sodium Absorption Ratio*:</b>	0	0
<b>Soil Reaction (1:1 Water)*:</b>	5.6	8.4
<b>Soil Reaction (0.1M CaCl<sub>2</sub>)*:</b>	NA	NA
<b>Available Water Capacity (inches)*:</b>	2	4.4
<b>Calcium Carbonate Equivalent (percent)*:</b>	0	6

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

## Plant Communities

### Ecological Dynamics of the Site:

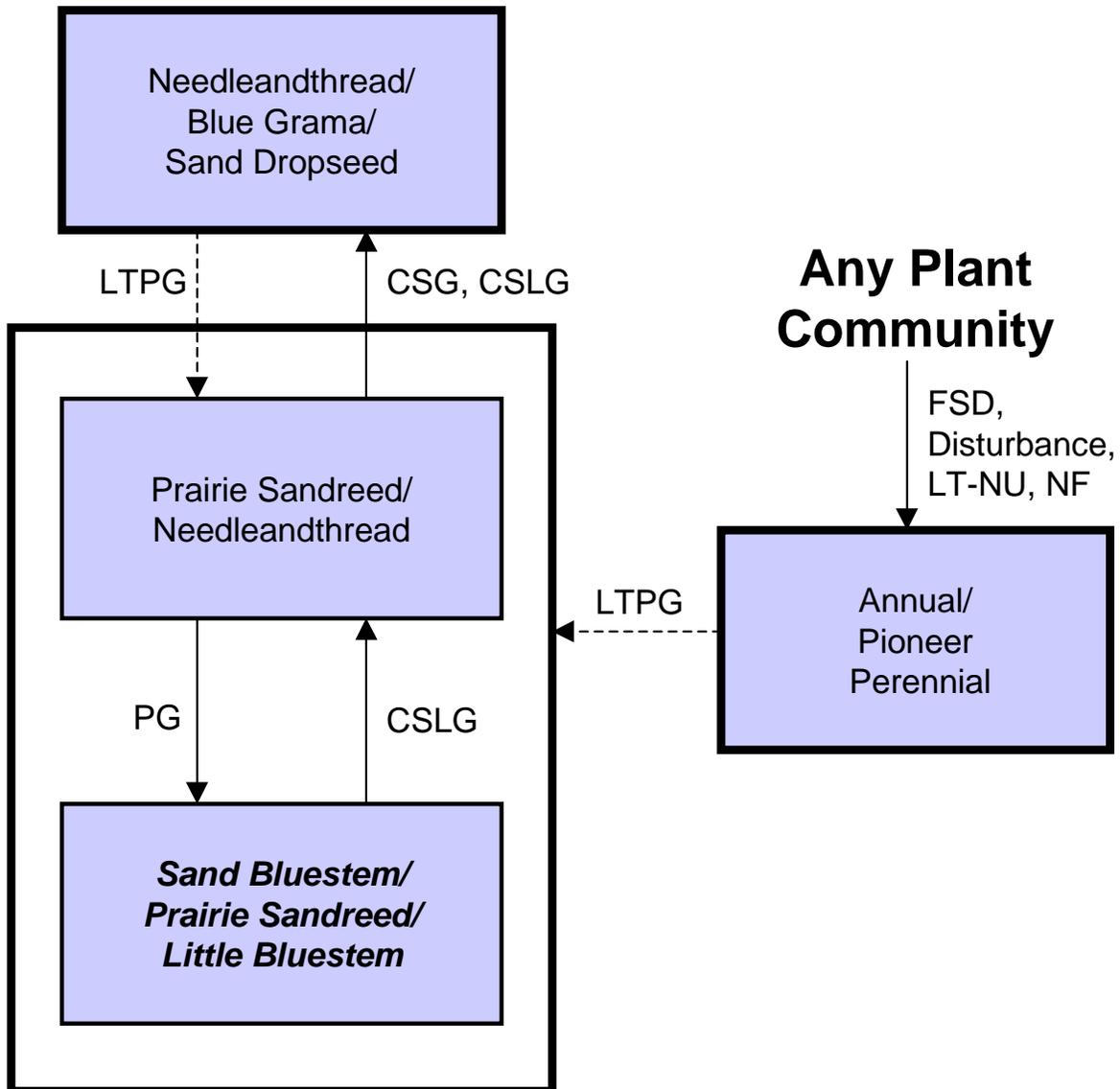
This site developed under Northern Great Plains climatic conditions, natural influences of large herbivores, occasional fire, and other biotic and abiotic factors that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts 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.

Blue grama, needleandthread, and sand dropseed increase as this site deteriorates from improper management. Species such as sand bluestem, little bluestem, and prairie sandreed will decrease in frequency and production.

The plant community upon which interpretations are primarily based is the Sand Bluestem/Prairie Sandreed/Little 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 transition pathways between communities. The ecological processes are discussed in more detail in the plant community descriptions following the diagram.

## Plant Communities and Transitional Pathways



**CSG** - continuous seasonal grazing; **CSLG** - continuous season-long grazing; **FSD** - frequent and severe defoliation; **LT-NU, NF** - long-term, non-use and no fire; **LTPG** - long-term prescribed grazing; **PG** - prescribed grazing with adequate recovery opportunity.

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Sand Bluestem/Prairie Sandreed/ Little Bluestem		
			Group	lbs./acre	% Comp
<b>GRASSES &amp; GRASS-LIKES</b>				1425 - 1615	75 - 85
sand bluestem	Andropogon hallii	ANHA	1	380 - 760	20 - 40
prairie sandreed	Calamovilfa longifolia	CALO	2	380 - 570	20 - 30
little bluestem	Schizachyrium scoparium	SCSC	3	95 - 380	5 - 20
<b>MID COOL-SEASON GRASSES</b>			<b>4</b>	<b>95 - 285</b>	<b>5 - 15</b>
needleandthread	Hesperostipa comata ssp. comata	HECOC8	4	95 - 190	5 - 10
western wheatgrass	Pascopyrum smithii	PASM	4	0 - 190	0 - 10
<b>SHORT WARM-SEASON GRASSES</b>			<b>5</b>	<b>38 - 190</b>	<b>2 - 10</b>
blue grama	Bouteloua gracilis	BOGR2	5	19 - 190	1 - 10
hairy grama	Bouteloua hirsuta	BOHI2	5	19 - 95	1 - 5
<b>NATIVE GRASSES AND GRASS-LIKES</b>			<b>6</b>	<b>95 - 190</b>	<b>5 - 10</b>
switchgrass	Panicum virgatum	PAVI2	6	0 - 95	0 - 5
sand dropseed	Sporobolus cryptandrus	SPCR	6	0 - 57	0 - 3
Indian ricegrass	Achnatherum hymenoides	ACHY	6	0 - 38	0 - 2
prairie junegrass	Koeleria macrantha	KOMA	6	0 - 57	0 - 3
sand paspalum	Paspalum setaceum	PASE5	6	0 - 19	0 - 1
sand lovegrass	Eragrostis trichodes	ERTR3	6	0 - 38	0 - 2
sedge	Carex spp.	CAREX	6	38 - 95	2 - 5
other perennial grasses		2GP	6	0 - 57	0 - 3
<b>FORBS</b>			<b>8</b>	<b>95 - 285</b>	<b>5 - 15</b>
annual eriogonum	Eriogonum annuum	ERAN4	8	19 - 38	1 - 2
bush morningglory	Ipomoea leptophylla	IPLE	8	0 - 57	0 - 3
false boneset	Brickellia eupatorioides	BREU	8	0 - 38	0 - 2
false gromwell	Onosmodium molle	ONMO	8	0 - 38	0 - 2
gayfeather	Liatris spp.	LIATR	8	0 - 57	0 - 3
goldenrod	Solidago spp.	SOLID	8	0 - 57	0 - 3
green sawwort	Artemisia dracunculus	ARDR4	8	0 - 38	0 - 2
heath aster	Symphotrichum ericoides	SYER	8	0 - 57	0 - 3
hoary puccoon	Lithospermum canescens	LICA12	8	0 - 38	0 - 2
penstemon	Penstemon spp.	PENST	8	0 - 38	0 - 2
prairie clover	Dalea spp.	DALEA	8	0 - 57	0 - 3
prairie coneflower	Ratibida columnifera	RACO3	8	0 - 57	0 - 3
pricklypoppy	Argemone polyanthemus	ARPO2	8	0 - 19	0 - 1
rush skeletonweed	Lygodesmia juncea	LYJU	8	0 - 19	0 - 1
scurfpea	Psoralidium spp.	PSORA2	8	0 - 57	0 - 3
spiderwort	Tradescantia spp.	TRADE	8	0 - 38	0 - 2
stiff sunflower	Helianthus pauciflorus	HEPA19	8	0 - 38	0 - 2
tenpetal mentzelia	Mentzelia decapetala	MEDE2	8	19 - 38	1 - 2
western ragweed	Ambrosia psilostachya	AMPS	8	0 - 57	0 - 3
other perennial forbs		2FP	8	0 - 57	0 - 3
<b>SHRUBS</b>			<b>9</b>	<b>38 - 190</b>	<b>2 - 10</b>
American plum	Prunus americana	PRAM	9	0 - 95	0 - 5
cactus	Opuntia spp.	OPUNT	9	0 - 38	0 - 2
chokecherry	Prunus virginiana	PRVI	9	0 - 95	0 - 5
fringed sawwort	Artemisia frigida	ARFR4	9	0 - 38	0 - 2
leadplant	Amorpha canescens	AMCA6	9	19 - 95	1 - 5
rose	Rosa spp.	ROSA5	9	19 - 95	1 - 5
sand sagebrush	Artemisia filifolia	ARFI2	9	0 - 95	0 - 5
western sandcherry	Prunus pumila var. besseyi	PRPUB	9	0 - 57	0 - 3
yucca	Yucca glauca	YUGL	9	0 - 57	0 - 3
other shrubs		2SHRUB	9	0 - 38	0 - 2
<b>Annual Production lbs./acre</b>			<b>LOW</b>	<b>RV</b>	<b>HIGH</b>
<b>GRASSES &amp; GRASS-LIKES</b>			1175 -	1596	-2005
<b>FORBS</b>			90 -	190	-300
<b>SHRUBS</b>			35 -	114	-195
<b>TOTAL</b>			1300 -	1900	-2500

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	Sand Bluestem/Prairie Sandreed/ Little Bluestem (HCPC)			Prairie Sandreed/ Needleandthread			Needleandthread/Blue Grama/ Sand Dropseed			
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	
<b>GRASSES &amp; GRASS-LIKES</b>											
			1425 - 1615	75 - 85		975 - 1105	75 - 85		585 - 720	65 - 80	
sand bluestem	ANHA	1	380 - 760	20 - 40	1	65 - 195	5 - 15	1			
prairie sandreed	CALO	2	380 - 570	20 - 30	2	325 - 520	25 - 40	2	45 - 135	5 - 15	
little bluestem	SCSC	3	95 - 380	5 - 20	3	0 - 130	0 - 10	3	0 - 27	0 - 3	
<b>MID COOL-SEASON GRASSES</b>											
		4	95 - 285	5 - 15	4	195 - 325	15 - 25	4	135 - 225	15 - 25	
needleandthread	HECOC8	4	95 - 190	5 - 10	4	195 - 325	15 - 25	4	135 - 225	15 - 25	
western wheatgrass	PASM	4	0 - 190	0 - 10	4	0 - 195	0 - 15	4	0 - 90	0 - 10	
<b>SHORT WARM-SEASON GRASSES</b>											
		5	38 - 190	2 - 10	5	91 - 260	7 - 20	5	225 - 270	25 - 30	
blue grama	BOGR2	5	19 - 190	1 - 10	5	65 - 195	5 - 15	5	180 - 270	20 - 30	
hairy grama	BOHI2	5	19 - 95	1 - 5	5	26 - 104	2 - 8	5	45 - 90	5 - 10	
<b>NATIVE GRASSES &amp; GRASS-LIKES</b>											
		6	95 - 190	5 - 10	6	91 - 260	7 - 20	6	162 - 360	18 - 40	
switchgrass	PAVI2	6	0 - 95	0 - 5	6	0 - 13	0 - 1				
sand dropseed	SPCR	6	0 - 57	0 - 3	6	26 - 130	2 - 10	6	90 - 180	10 - 20	
Indian ricegrass	ACHY	6	0 - 38	0 - 2	6	0 - 13	0 - 1				
prairie junegrass	KOMA	6	0 - 57	0 - 3	6	0 - 39	0 - 3	6	0 - 27	0 - 3	
sand paspalum	PASE5	6	0 - 19	0 - 1	6	0 - 26	0 - 2	6	0 - 45	0 - 5	
sand lovegrass	ERTR3	6	0 - 38	0 - 2	6	0 - 13	0 - 1				
sedge	CAREX	6	38 - 95	2 - 5	6	65 - 104	5 - 8	6	45 - 135	5 - 15	
other perennial grasses	2GP	6	0 - 57	0 - 3	6	0 - 39	0 - 3	6	0 - 27	0 - 3	
<b>NON-NATIVE GRASSES</b>											
		7			7	13 - 26	1 - 2	7	9 - 45	1 - 5	
cheatgrass	BRTE					13 - 26	1 - 2		9 - 45	1 - 5	
<b>FORBS</b>											
		8	95 - 285	5 - 15	8	65 - 195	5 - 15	8	90 - 135	10 - 15	
annual eriogonum	ERAN4	8	19 - 38	1 - 2	8	13 - 39	1 - 3	8	18 - 45	2 - 5	
bush morningglory	IPLA	8	0 - 57	0 - 3	8	0 - 39	0 - 3	8	0 - 27	0 - 3	
false boneset	BREU	8	0 - 38	0 - 2	8	0 - 26	0 - 2	8	0 - 18	0 - 2	
false gromwell	ONMO	8	0 - 38	0 - 2	8	0 - 26	0 - 2	8	0 - 18	0 - 2	
gayfeather	LIATR	8	0 - 57	0 - 3	8	0 - 26	0 - 2	8	0 - 18	0 - 2	
goldenrod	SOLID	8	0 - 57	0 - 3	8	0 - 65	0 - 5	8	9 - 72	1 - 8	
green sagewort	ARDR4	8	0 - 38	0 - 2	8	13 - 65	1 - 5	8	9 - 90	1 - 10	
heath aster	SYER	8	0 - 57	0 - 3	8	0 - 65	0 - 5	8	9 - 72	1 - 8	
hoary puccoon	LICA12	8	0 - 38	0 - 2	8	0 - 26	0 - 2	8	0 - 18	0 - 2	
penstemon	PENST	8	0 - 38	0 - 2	8	0 - 26	0 - 2	8	0 - 18	0 - 2	
prairie clover	DALEA	8	0 - 57	0 - 3	8	0 - 39	0 - 3	8	0 - 18	0 - 2	
prairie coneflower	RACO3	8	0 - 57	0 - 3	8	0 - 52	0 - 4	8	0 - 45	0 - 5	
pricklypoppy	ARPO2	8	0 - 19	0 - 1	8	0 - 13	0 - 1	8	0 - 9	0 - 1	
rush skeletonweed	LYJU	8	0 - 19	0 - 1	8	0 - 26	0 - 2	8	0 - 45	0 - 5	
scurfpea	PSORA2	8	0 - 57	0 - 3	8	0 - 39	0 - 3	8	0 - 72	0 - 8	
spiderwort	TRADE	8	0 - 38	0 - 2	8	0 - 13	0 - 1	8	0 - 9	0 - 1	
stiff sunflower	HEPA19	8	0 - 38	0 - 2	8	0 - 13	0 - 1				
tenpetal mentzelia	MEDE2	8	19 - 38	1 - 2	8	13 - 39	1 - 3	8	9 - 45	1 - 5	
western ragweed	AMPS	8	0 - 57	0 - 3	8	26 - 104	2 - 8	8	45 - 90	5 - 10	
other perennial forbs	2FP	8	0 - 57	0 - 3	8	0 - 39	0 - 3	8	0 - 18	0 - 2	
<b>SHRUBS</b>											
		9	38 - 190	2 - 10	9	26 - 195	2 - 15	9	45 - 225	5 - 25	
American plum	PRAM	9	0 - 95	0 - 5	9	0 - 52	0 - 4	9	0 - 27	0 - 3	
cactus	OPUNT	9	0 - 38	0 - 2	9	13 - 65	1 - 5	9	9 - 72	1 - 8	
chokecherry	PRVI	9	0 - 95	0 - 5	9	0 - 52	0 - 4	9	0 - 27	0 - 3	
fringed sagewort	ARFR4	9	0 - 38	0 - 2	9	13 - 65	1 - 5	9	9 - 72	1 - 8	
leadplant	AMCA6	9	19 - 95	1 - 5	9	13 - 65	1 - 5	9	0 - 27	0 - 3	
rose	ROSA5	9	19 - 95	1 - 5	9	26 - 78	2 - 6	9	18 - 45	2 - 5	
sand sagebrush	ARFI2	9	0 - 95	0 - 5	9	13 - 130	1 - 10	9	45 - 135	5 - 15	
western sandcherry	PRPUB	9	0 - 57	0 - 3	9	0 - 39	0 - 3	9	0 - 18	0 - 2	
yucca	YUGL	9	0 - 57	0 - 3	9	0 - 65	0 - 5	9	9 - 90	1 - 10	
other shrubs	2SHRUB		0 - 38	0 - 2	9	0 - 26	0 - 2	9	0 - 18	0 - 2	
<b>Annual Production lbs./acre</b>			LOW	RV	HIGH	LOW	RV	HIGH	LOW	RV	HIGH
<b>GRASSES &amp; GRASS-LIKES</b>			1175	1596	2005	815	1060	1300	475	653	830
<b>FORBS</b>			90	190	300	60	130	200	85	113	140
<b>SHRUBS</b>			35	114	195	25	111	200	40	135	230
<b>TOTAL</b>			1300	1900	2500	900	1300	1700	600	900	1200

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 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” (DPCs). 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.

### Sand Bluestem/Prairie Sandreed/Little Bluestem Plant Community

The plant community upon which interpretations are primarily based is the Sand Bluestem/Prairie Sandreed/Little Bluestem Plant Community (this is also considered climax). This plant community occurs on areas that are properly managed with grazing and/or prescribed burning, and on areas receiving occasional short periods of deferment.

This plant community consists chiefly of tall and mid-warm-season grasses. Principle dominants are sand bluestem, prairie sandreed, little bluestem, and needleandthread. Grasses and grass-likes of secondary importance are sand dropseed, blue and/or hairy grama, and sedge. Forbs and shrubs such as penstemon, gayfeather, leadplant, rose, and sand sagebrush are significant. This plant community is about 75-85 percent grasses, 5-15 percent forbs, and 2-10 percent shrubs by weight.

This plant community is well adapted to the Northern Great Plains climatic conditions. Community dynamics, nutrient cycle, water cycle, and energy flow are functioning at the sites potential. Plant litter is properly distributed with some movement offsite and natural plant mortality is low. The diversity in plant species allows for high drought tolerance.

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

Growth curve number: SD6005

Growth curve name: Pierre Shale Plains, warm-season dominant.

Growth curve description: Warm-season dominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	2	5	15	25	30	15	7	1	0	0

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Continuous season-long grazing will convert this plant community to the *Prairie Sandreed/Needleandthread Plant Community*. Continuous heavy grazing tends to accelerate this movement.
- Frequent and severe defoliation, excessive disturbance, or long-term nonuse and no fire will convert this plant community to the *Annual/Pioneer Perennial Plant Community*.

### Prairie Sandreed/Needleandthread Plant Community

This plant community developed under continuous season-long grazing. It is made up of a mixture of warm- and cool-season grasses. The dominant grasses include prairie sandreed and needleandthread. Other grasses may include blue grama, western wheatgrass, sand dropseed, and sedges. Forbs commonly found include dotted gayfeather, cudweed sagewort, green sagewort,

western ragweed, annual eriogonum, scurfpea, and spiderwort. Dominant shrubs in this community include rose, cactus, yucca, leadplant, and sand sagebrush.

Compared to the Sand Bluestem/Prairie Sandreed/Little Bluestem Plant Community, blue grama, sand dropseed, and annual forbs increase. Sand bluestem and little bluestem have decreased. Annual forbs invade the site. Plant diversity is high. This plant community is about 75-85 percent grasses, 5-15 percent forbs, and 2-15 percent shrubs by weight.

This plant community is not resistant to change. Changes in climate, fire patterns, and/or grazing management can result in a shift to another plant community. This community is fairly resilient under normal disturbances because of the high diversity of plant species and the high amount of litter. Soil erosion is low. The water cycle is functioning because of the plant and litter cover on the soil surface. Infiltration is high because of soil texture and surface litter. Runoff is low.

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

Growth curve number: SD6003

Growth curve name: Pierre Shale 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

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Prescribed grazing will convert this plant community to the *Sand Bluestem/Prairie Sandreed/Little Bluestem Plant Community*. The probability of this occurring is high.
- Continuous season-long grazing, and/or continuous seasonal grazing (grazing at moderate rates at the same time every year) will move this plant community to the *Needleandthread/Blue Grama/Sand Dropseed Plant Community*.
- Frequent and severe defoliation, excessive disturbance, or long-term nonuse and no fire will convert this plant community to the *Annual/Pioneer Perennial Plant Community*.

### **Needleandthread/Blue Grama/Sand Dropseed Plant Community**

This plant community typically developed over a period of several years under long-term season-long grazing with inadequate deferment during the growing season. Short, drought tolerant grasses dominate, and in the western portions of the MLRA, sand sagebrush is also prevalent. Occasional midgrasses may be found within the canopy of the shrubs where it is protected from grazing. The dominant grasses are sand dropseed, blue, and/or hairy grama and needleandthread. Other grasses and grass-likes present include western wheatgrass, prairie Junegrass, prairie sandreed, and sedge. The dominant forbs include western ragweed, tenpetal mentzelia, green sagewort, annual eriogonum, and annual sunflower. The dominant shrubs include sand sagebrush, cactus, and yucca.

Compared to the Sand Bluestem/Prairie Sandreed/Little Bluestem Plant Community, sand dropseed, blue grama, and hairy grama have increased. Needleandthread and prairie sandreed are limited to areas in the sagebrush. Sand bluestem and little bluestem are absent. Annual forbs will begin to invade the site. The plant diversity and production has decreased compared to the Sand Bluestem/Prairie Sandreed/Little Bluestem Plant Community. This plant community is made up of about 65-80 percent grasses and grass-likes, 10-15 percent forbs, and 5-25 percent shrubs.

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

Growth curve number: SD6004

Growth curve name: Pierre Shale Plains, warm-season dominant, cool-season subdominant.

Growth curve description: Warm-season dominant, cool-season subdominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	7	18	25	25	15	7	1	0	0

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- With long-term prescribed grazing, this plant community will be converted to the *Prairie Sandreed/Needleandthread Plant Community*. In areas with high amounts of sand sagebrush, brush control followed by prescribed grazing may be necessary.

### Annual/Pioneer Perennial Plant Community

This plant community develops through excessive disturbance such as frequent and severe defoliation, heavy use areas, and go-back cultivated land. This site is highly variable, sometimes being dominated by native or nonnative forbs. A number of species can occupy the plant community, including annual brome, sand dropseed, sedge, annual sunflower, green sagewort, western ragweed, annual erigonum, cactus, and sand sagebrush. Compared to the interpretive plant community, the later seral stage grasses such as the bluestems and prairie sandreed are absent, and the forb and shrub component has increased. Bare ground has significantly increased.

This plant community can also develop with long-term nonuse and no fire. Plant litter accumulates in large amounts when this community first develops. Eventually litter levels become high enough that plants are crowded out and bare ground areas develop. Annual forbs and grasses commonly fill these bare ground areas. Typically, bunchgrasses have developed dead centers and rhizomatous grasses form small colonies because of a lack of stimulation to tiller.

With the increase in bare ground and the increase in annual species, this site is susceptible to wind erosion, which could lead to blowing and shifting sand.

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

Growth curve number: SD6002

Growth curve name: Pierre Shale 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

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Under long-term prescribed grazing, including adequate recovery periods, this plant community may move through the successional stages eventually leading to a plant community similar to the *Sand Bluestem/Prairie Sandreed/Little Bluestem Plant Community*, if adjacent seed sources are available, and the climate is favorable.

## Ecological Site Interpretations

### Animal Community – Wildlife Interpretations

The MLRA 60A lies within the drier portion of the 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, in-stream 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 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 was a historical keystone species but have been extirpated as a free-ranging herbivore. The loss of the bison and prairie dog, and 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 60A, the Sands Ecological Site 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, Sandy Claypan, Clayey, and Thin Claypan Ecological Sites. This site provided habitat for species requiring unfragmented grassland. Important habitat features include 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 American bison, grizzly bear, gray wolf, black-footed ferret, mountain plover, Rocky Mountain locust, and swift fox.

The majority of the Sands Ecological Site remains intact and provides increasingly important habitat for grassland nesting birds, small rodents, coyotes, and a variety of reptiles, amphibians, and insects. Invasive species such as annual brome grasses and crested wheat have impacted the biological integrity of the site for some grassland birds.

#### **Sand Bluestem/Prairie Sandreed/Little Bluestem (HCPC) and Prairie Sandreed/**

**Needleandthread:** 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. 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 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.

Resulting from continuous season-long grazing, the shift to a needleandthread and prairie sandreed community occurs. The forb and shrub diversity has not substantially decreased. The shift from the HCPC to the needleandthread/prairie sandreed community does not result in a significant change to the wildlife community.

**Needleandthread/Blue Grama/Sand Dropseed:** Resulting from continuous season-long grazing or continuous seasonal grazing without adequate recovery periods between grazing events; needleandthread, and blue grama will dominate. Forb and shrub abundance increases. This increase along with the abundance of western ragweed and dropseed provide a substantial high quality seed source for small herbivores including voles, mice, and thirteen-lined ground squirrel.

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.

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.

**Annual/Pioneer Plant Community:** This plant community develops under severe disturbance and/or excessive defoliation. This can result from heavy livestock or prairie dog concentration or cropping abandonment (go-back land). The dominant vegetation includes pioneer annual grasses, forbs, invaders, and early successional biennial and perennial species. Plant species from adjacent ecological sites may become minor components of this plant community. The community is susceptible to invasion of annual brome grasses, crested wheatgrass, and other nonnative species due to severe soil disturbances and relatively high percent of bare ground.

Soil erosion is potentially high, impacting offsite aquatic habitats through increased runoff, nutrient, and sediment loads. Reduced surface cover, low plant density, low plant vigor, loss of root biomass, and soil compaction, all contribute to decreased wildlife abundance and diversity.

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

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

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
<b>Grasses &amp; Grass-like</b>							
blue grama	U D P D	D P P D	U D P U	D P P D	D P P D	U D P U	U D P U
hairy grama	U D P D	D P P D	U D P U	D P P D	D P P D	U D P U	U D P U
Indian ricegrass	D P U D	N P N D	D P U D	N P N D	N P N D	D P U D	D P U D
little bluestem	U D D U	U U D U	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 bluestem	U D P D	U U D 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
sand lovegrass	U D D U	N N N N	U D D U	N N N N	N N N N	U D D U	U D D U
sand paspalum	N U U N	N U N N	N U U N	N U N N	N U N N	N U U N	N U U N
sedge	U P U D	U P U D	U D U D	U D U D	U D U D	U D U D	U D U D
switchgrass	U D D U	U D U U	U D D U	N N N N	N N N N	U D D U	U D D U
western wheatgrass	U P D D	U D U U	U P D U	N D N N	N D N N	U P D U	U P D U
<b>Forbs</b>							
annual eriogonum	U D U U	N U U N	U D U U	N U U N	N U U N	U D U U	N U U N
bush morningglory	U D P U	U D D U	U D P U	U D D U	U D D U	U D P U	U D D 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
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
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
heath aster	U U D U	U U P U	U U D U	U U P U	U U P U	U U D U	U U P U
hoary puccoon	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
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
pricklypoppy	T T T T	T T T T	T T T T	T T T T	T T T T	T T T T	T T T T
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
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
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
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
western ragweed	U U U U	U U U U	U U U U	N N N N	N N N N	U U U U	N N N N
<b>Shrubs</b>							
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
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
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
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
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
sand sagebrush	U N N U	U N N U	U N N U	U N N U	U N N U	U N N U	U N N U
western sandcherry	D P P D	D U U D	D P P D	P U D P	D U U D	D P P D	P U U P
Yucca	N U U U	N U U U	N U U U	N U U U	N U U U	N U U U	N U U U

N = not used; U = undesirable; ND = desirable; PD = 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 Ecological Site 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)
Sand Bluestem/Prairie Sandreed/Little Bluestem	1,900	0.60
Prairie Sandreed/Needleandthread	1,300	0.41
Needleandthread/Blue Grama/Sand Dropseed	900	0.28
Annual/Pioneer Perennial	400	0.13**

\*Based on 790 lbs./acre (air-dry weight) per Animal Unit Month (AUM), and on 25 percent harvest efficiency (refer to USDA NRCS, National Range and Pasture Handbook).

\*\*Highly variable; stocking rate needs to be determined onsite.

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 A. Infiltration ranges from high to very high. Runoff potential for this site varies from very low to low depending on 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 short grasses 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 varieties of plants which bloom from spring until fall have an esthetic value that appeals to visitors.

## Wood Products

## Other Products

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

## Supporting Information

### Associated Sites

(060AY009SD) – Sandy

### Similar Sites

(060AY009SD) – Sandy

[more western wheatgrass; less sand bluestem; less slope]

### 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 description include: Stan Boltz, Range Management Specialist (RMS), NRCS; Darrel DuVall, RMS, NRCS; Jill Epley, RMS, NRCS; Cheryl Nielsen, RMS, NRCS; Rick Peterson, RMS, NRCS; and Mike Stirling, RMS, NRCS.

<u>Data Source</u>	<u>Number of Records</u>	<u>Sample Period</u>	<u>State</u>	<u>County</u>
SCS-RANGE-417				

### State Correlation

This site has been correlated between Montana (MT), Nebraska (NE), SD, and WY in MLRA 60A.

### Field Offices

Belle Fourche, SD	Custer, SD	Hot Springs, SD	Pine Ridge, SD	Sundance, WY
Broadus, MT	Ekalaka, MT	Lusk, WY	Rapid City, SD	Wall, SD
Buffalo, SD	Faith, SD	Martin, SD	Rushville, NE	
Chadron, NE	Gillette, WY	Newcastle, WY	Sturgis, SD	

### Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 43e – Sagebrush Steppe, 43g – Semi-arid Pierre Shale Plains, and 43k – Dense Clay Prairie.

### 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://soils.usda.gov/technical/nasis>)

USDA, NRCS, 2002. National Soil Survey Handbook, Title 430-VI. (<http://soils.usda.gov/technical/handbook/>)

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

\_\_\_\_\_  
NE, State Range Management Specialist      Date

\_\_\_\_\_  
SD, State Range Management Specialist      Date

\_\_\_\_\_  
WY, State Range Management Specialist      Date