

United States Department of Agriculture Natural Resources Conservation Service

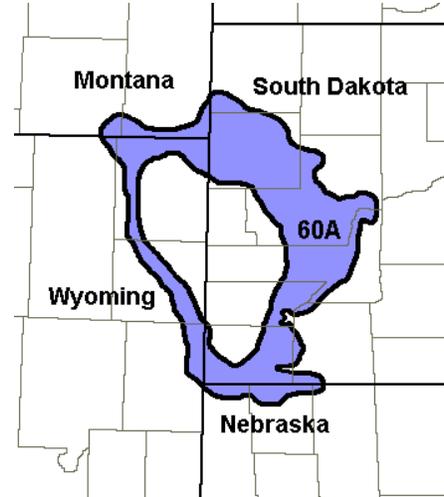
Ecological Site Description

Site Type: Rangeland

Site Name: Sandy

Site ID: R060AY009SD

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



Physiographic Features

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

Landform: valley, interdune, terrace **Aspect:** N/A

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	2,500	4,300
Slope (percent):	0	15
Water Table Depth (inches):	None	None
Flooding:		
Frequency:	None	None
Duration:	None	None
Ponding:		
Depth (inches):	None	None
Frequency:	None	None
Duration:	None	None
Runoff Class:	Very 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 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>
Frost-free period (days):	122	129
Freeze-free period (days):	145	152
Mean Annual Precipitation (inches):	13	18

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

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
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

Climate Stations		Period	
Station ID	Location or Name	From	To
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 well to somewhat excessively drained and formed in eolian sand or alluvium. The surface layer is 4 to 14 inches thick. The texture of the subsurface ranges from sand to very fine sandy loam. Slopes range from 0 to 15 percent. 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 debris dams or 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, alluvium

Parent Material Origin: mixed
Surface Texture: sandy loam, fine sandy loam, loamy 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>
Drainage Class:	well	somewhat excessively
Permeability Class:	moderate	moderately rapid
Depth (inches):	20	80
Electrical Conductivity (mmhos/cm)*:	0	4
Sodium Absorption Ratio*:	0	0
Soil Reaction (1:1 Water)*:	5.6	8.4
Soil Reaction (0.1M CaCl₂)*:	NA	NA
Available Water Capacity (inches)*:	4	5
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:

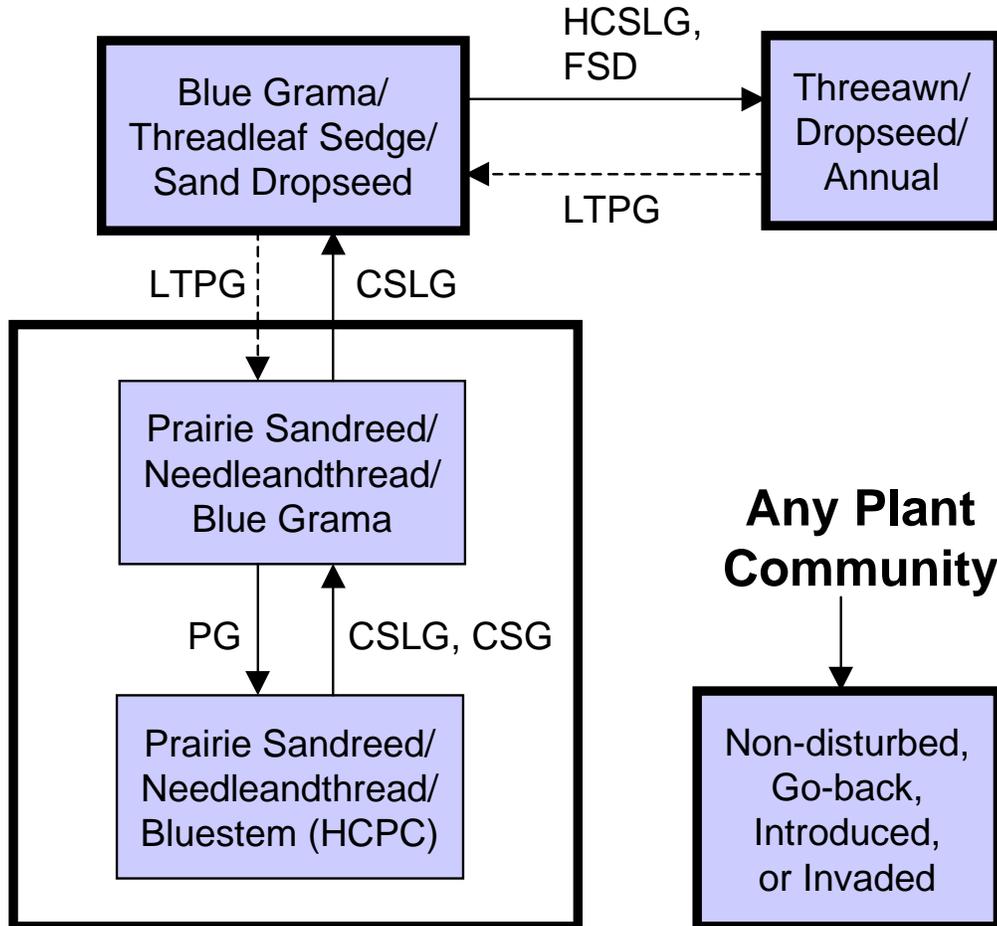
This site developed under Northern Great Plains climatic conditions, natural influences of large herbivores, occasional fire, and other biotic and abiotic factors that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts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

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

The plant community upon which interpretations are primarily based is the Historic Climax Plant Community (HCPC). The HCPC 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



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.

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Prairie Sandreed/Needleandthread/ Bluestem (HCPC)			
			Group	lbs./acre	% Comp	
GRASSES & GRASS-LIKES				1530 - 1710	85 - 95	
prairie sandreed	Calamovilfa longifolia	CALO	1	270 - 630	15 - 35	
sand bluestem	Andropogon hallii	ANHA	2	180 - 270	10 - 15	
little bluestem	Schizachyrium scoparium	SCSC	3	180 - 270	10 - 15	
needleandthread	Hesperostipa comata ssp. comata	HECOC8	4	180 - 360	10 - 20	
NATIVE GRASSES & GRASS-LIKES			5	180 - 450	10 - 25	
blue grama	Bouteloua gracilis	BOGR2	5	90 - 270	5 - 15	
western wheatgrass	Pascopyrum smithii	PASM	5	18 - 90	1 - 5	
sand dropseed	Sporobolus cryptandrus	SPCR	5	0 - 90	0 - 5	
sand lovegrass	Eragrostis trichodes	ERTR3	5	0 - 90	0 - 5	
switchgrass	Panicum virgatum	PAVI2	5	0 - 90	0 - 5	
Indian ricegrass	Achnatherum hymenoides	ACHY	5	0 - 36	0 - 2	
prairie junegrass	Koeleria macrantha	KOMA	5	0 - 36	0 - 2	
sand paspalum	Paspalum setaceum	PASE5	5	0 - 18	0 - 1	
Scribner panicum	Dichanthelium oligosanthes var. scribnerianum	DIOLS	5	0 - 18	0 - 1	
threadleaf sedge	Carex filifolia	CAFI	5	18 - 180	1 - 10	
Sandberg bluegrass	Poa secunda	POSE	5	0 - 18	0 - 1	
sedge	Carex spp.	CAREX	5	0 - 90	0 - 5	
bottlebrush squirreltail	Elymus elymoides	ELEL5	5	0 - 18	0 - 1	
other perennial grasses		2GP	5	0 - 54	0 - 3	
FORBS			7	90 - 180	5 - 10	
annual eriogonum	Eriogonum annuum	ERAN4	7	0 - 54	0 - 3	
bush morningglory	Ipomoea leptophylla	IPLE	7	0 - 36	0 - 2	
cudweed sagewort	Artemisia ludoviciana	ARLU	7	0 - 18	0 - 1	
cutleaf ironplant	Machaeranthera pinnatifida	MAPI	7	0 - 36	0 - 2	
dotted gayfeather	Liatris punctata	LIPU	7	0 - 36	0 - 2	
false boneset	Brickellia eupatorioides	BREU	7	0 - 36	0 - 2	
green sagewort	Artemisia dracunculul	ARDR4	7	0 - 18	0 - 1	
hairy goldaster	Heterotheca villosa	HEVI4	7	0 - 36	0 - 2	
heath aster	Symphyotrichum ericoides	SYER	7	0 - 36	0 - 2	
larkspur	Delphinium spp.	DELPH	7	0 - 36	0 - 2	
Missouri goldenrod	Solidago missouriensis	SOMI2	7	0 - 36	0 - 2	
penstemon	Penstemon spp.	PENST	7	0 - 36	0 - 2	
prairie coneflower	Ratibida columnifera	RACO3	7	0 - 36	0 - 2	
rush skeletonweed	Lygodesmia juncea	LYJU	7	0 - 36	0 - 2	
scarlet gaura	Gaura coccinea	GACO5	7	0 - 36	0 - 2	
scarlet globemallow	Sphaeralcea coccinea	SPCO	7	0 - 36	0 - 2	
scurfpea	Psoraleidum spp.	PSORA2	7	0 - 36	0 - 2	
serrate eveningprimrose	Calylophus serrulatus	CASE12	7	0 - 36	0 - 2	
spiderwort	Tradescantia spp.	TRADE	7	0 - 36	0 - 2	
tenpetal mentzelia	Mentzelia decapetala	MEDE2	7	0 - 18	0 - 1	
verbena	Verbena spp.	VERBE	7	0 - 18	0 - 1	
western ragweed	Ambrosia psilostachya	AMPS	7	0 - 36	0 - 2	
SHRUBS			8	0 - 90	0 - 5	
broom snakeweed	Gutierrezia sarothrae	GUSA2	8	0 - 18	0 - 1	
cactus	Opuntia spp.	OPUNT	8	0 - 18	0 - 1	
fringed sagewort	Artemisia frigida	ARFR4	8	0 - 18	0 - 1	
leadplant	Amorpha canescens	AMCA6	8	0 - 54	0 - 3	
rose	Rosa spp.	ROSA5	8	0 - 90	0 - 5	
sand sagebrush	Artemisia filifolia	ARFI2	8	0 - 18	0 - 1	
small soapweed	Yucca glauca	YUGL	8	0 - 18	0 - 1	
western sandcherry	Prunus pumila var. besseyi	PRPUB	8	0 - 36	0 - 2	
Annual Production lbs./acre				LOW	RV	HIGH
GRASSES & GRASS-LIKES				1115 -	1620	-2120
FORBS				85 -	135	-185
SHRUBS				0 -	45	-95
TOTAL				1200 -	1800	-2400

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/Needleand-thread/Bluestem (HCPC)			Prairie Sandreed/Needleand-thread/Blue Grama			Blue Grama/Threadleaf Sedge/Sand Dropseed			Threawn/Dropseed/Annual		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
GRASSES & GRASS-LIKES													
prairie sandreed	CALO	1	270 - 630	15 - 35	1	180 - 360	15 - 30	1	9 - 45	1 - 5	1	0 - 5	0 - 1
sand bluestem	ANHA	2	180 - 270	10 - 15	2	12 - 120	1 - 10	2	0 - 18	0 - 2	2		
little bluestem	SCSC	3	180 - 270	10 - 15	3	60 - 120	5 - 10	3	0 - 45	0 - 5	3	0 - 10	0 - 2
needleandthread	HECOC8	4	180 - 360	10 - 20	4	180 - 300	15 - 25	4	45 - 90	5 - 10	4	0 - 25	0 - 5
NATIVE GRASSES & GRASS-LIKES													
blue grama	BOGR2	5	90 - 270	5 - 15	5	120 - 240	10 - 20	5	135 - 270	15 - 30	5	25 - 75	5 - 15
western wheatgrass	PASM	5	18 - 90	1 - 5	5	12 - 96	1 - 8	5	9 - 90	1 - 10	5	0 - 25	0 - 5
sand dropseed	SPCR	5	0 - 90	0 - 5	5	12 - 60	1 - 5	5	45 - 180	5 - 20	5	25 - 100	5 - 20
sand lovegrass	ERTR3	5	0 - 90	0 - 5	5	0 - 36	0 - 3	5	0 - 9	0 - 1			
switchgrass	PAV12	5	0 - 90	0 - 5	5	0 - 36	0 - 3	5	0 - 9	0 - 1			
Indian ricegrass	ACHY	5	0 - 36	0 - 2	5	0 - 24	0 - 2	5	0 - 9	0 - 1			
prairie junegrass	KOMA	5	0 - 36	0 - 2	5	0 - 60	0 - 5	5	0 - 45	0 - 5	5	0 - 5	0 - 1
sand paspalum	PASE5	5	0 - 18	0 - 1	5	0 - 12	0 - 1	5	0 - 27	0 - 3			
Scribner panicum	DIOLS	5	0 - 18	0 - 1	5	12 - 24	1 - 2	5	18 - 45	2 - 5	5	0 - 25	0 - 5
threadleaf sedge	CAFI	5	18 - 180	1 - 10	5	60 - 180	5 - 15	5	90 - 180	10 - 20	5	25 - 50	5 - 10
threawn	ARIST				5	0 - 24	0 - 2	5	0 - 90	0 - 10	5	100 - 150	20 - 30
Sandberg bluegrass	POSE	5	0 - 18	0 - 1	5	0 - 12	0 - 1	5	0 - 9	0 - 1	5	0 - 5	0 - 1
sedge	CAREX	5	0 - 90	0 - 5	5	0 - 60	0 - 5	5	0 - 45	0 - 5	5	0 - 25	0 - 5
bottlebrush squirreltail	ELEL5	5	0 - 18	0 - 1	5	0 - 12	0 - 1	5	0 - 27	0 - 3	5	0 - 5	0 - 1
other perennial grasses	ZGP	5	0 - 54	0 - 3	5	0 - 36	0 - 3	5	0 - 18	0 - 2	5	0 - 10	0 - 2
NON-NATIVE GRASSES													
cheatgrass	BRTE				6	0 - 60	0 - 5	6	9 - 135	1 - 15	6	10 - 50	2 - 10
Kentucky bluegrass	POPR				6	12 - 36	1 - 3	6	9 - 18	1 - 2	6	0 - 25	0 - 5
FORBS													
annual eriogonum	ERAN4	7	0 - 54	0 - 3	7	60 - 120	5 - 10	7	45 - 135	5 - 15	7	50 - 150	10 - 30
bush morningglory	IPLE	7	0 - 36	0 - 2	7	0 - 24	0 - 2	7	0 - 9	0 - 1			
cudweed sagewort	ARLU	7	0 - 18	0 - 1	7	0 - 24	0 - 2	7	9 - 45	1 - 5	7	0 - 15	0 - 3
curlycup gumweed	GRSQ	7			7	0 - 24	0 - 2	7	9 - 27	1 - 3	7	5 - 50	1 - 10
cutleaf ironplant	MAPI	7	0 - 36	0 - 2	7	0 - 36	0 - 3	7	0 - 45	0 - 5			
dotted gayfeather	LIPU	7	0 - 36	0 - 2	7	0 - 24	0 - 2	7	0 - 18	0 - 2	7	0 - 5	0 - 1
false boneset	BREU	7	0 - 36	0 - 2	7	0 - 24	0 - 2						
fetid marigold	DYPA				7	0 - 12	0 - 1	7	0 - 9	0 - 1	7	10 - 50	2 - 10
green sagewort	ARDR4	7	0 - 18	0 - 1	7	0 - 60	0 - 5	7	0 - 45	0 - 5	7	5 - 25	1 - 5
hairy goldaster	HEVI4	7	0 - 36	0 - 2	7	0 - 24	0 - 2	7	0 - 18	0 - 2			
heath aster	SYER	7	0 - 36	0 - 2	7	12 - 24	1 - 2	7	9 - 27	1 - 3	7	0 - 5	0 - 1
larkspur	DELPH	7	0 - 36	0 - 2	7	0 - 36	0 - 3	7	0 - 18	0 - 2			
Missouri goldenrod	SOMI2	7	0 - 36	0 - 2	7	0 - 36	0 - 3	7	0 - 18	0 - 2			
penstemon	PENST	7	0 - 36	0 - 2	7	0 - 36	0 - 3	7	0 - 9	0 - 1			
prairie coneflower	RACO3	7	0 - 36	0 - 2	7	12 - 24	1 - 2	7	9 - 18	1 - 2			
Rocky Mountain beeplant	CLSE	7						7	0 - 9	0 - 1	7	0 - 10	0 - 2
rush skeletonweed	LYJU	7	0 - 36	0 - 2	7	12 - 24	1 - 2	7	9 - 27	1 - 3	7	0 - 5	0 - 1
scarlet gaura	GACO5	7	0 - 36	0 - 2	7	0 - 24	0 - 2	7	0 - 9	0 - 1			
scarlet globemallow	SPCO	7	0 - 36	0 - 2	7	12 - 24	1 - 2	7	9 - 18	1 - 2	7	0 - 5	0 - 1
scurfpea	PSORA2	7	0 - 36	0 - 2	7	0 - 36	0 - 3	7	9 - 27	1 - 3	7	0 - 5	0 - 1
serrate eveningprimrose	CASE12	7	0 - 36	0 - 2	7	0 - 24	0 - 2	7	0 - 18	0 - 2			
spiderwort	TRADE	7	0 - 36	0 - 2	7	0 - 24	0 - 2	7	0 - 9	0 - 1			
tenpetal mentzelia	MEDE2	7	0 - 18	0 - 1	7	0 - 24	0 - 2	7	0 - 27	0 - 3			
verbena	VERBE	7	0 - 18	0 - 1	7	0 - 36	0 - 3	7	0 - 45	0 - 5	7	5 - 25	1 - 5
western ragweed	AMPS	7	0 - 36	0 - 2	7	12 - 36	1 - 3	7	9 - 45	1 - 5	7	5 - 25	1 - 5
other annual forbs	ZFA				7	0 - 36	0 - 3	7	0 - 45	0 - 5	7	10 - 75	2 - 15
SHRUBS													
broom snakeweed	GUSA2	8	0 - 18	0 - 1	8	0 - 24	0 - 2	8	0 - 45	0 - 5	8	5 - 40	1 - 8
cactus	OPUNT	8	0 - 18	0 - 1	8	0 - 36	0 - 3	8	0 - 72	0 - 8	8	0 - 10	0 - 2
fringed sagewort	ARFR4	8	0 - 18	0 - 1	8	0 - 36	0 - 3	8	0 - 45	0 - 5	8	5 - 25	1 - 5
leadplant	AMCA6	8	0 - 54	0 - 3	8	0 - 24	0 - 2	8	0 - 9	0 - 1			
rose	ROSA5	8	0 - 90	0 - 5	8	0 - 60	0 - 5	8	0 - 18	0 - 2	8	0 - 5	0 - 1
sand sagebrush	ARFI2	8	0 - 18	0 - 1	8	0 - 60	0 - 5	8	0 - 45	0 - 5	8	0 - 10	0 - 2
small soapweed	YUGL	8	0 - 18	0 - 1	8	0 - 24	0 - 2	8	0 - 36	0 - 4	8	0 - 10	0 - 2
western sandcherry	PRPUB	8	0 - 36	0 - 2	8	0 - 12	0 - 1						
Annual Production lbs./acre													
GRASSES & GRASS-LIKES													
1115 · 1620 · 2120													
FORBS													
85 · 135 · 185													
SHRUBS													
0 · 45 · 95													
TOTAL													
1200 · 1800 · 2400													
635 · 1044 · 1550													
470 · 720 · 920													
55 · 90 · 125													
40 · 90 · 140													
200 · 358 · 565													
5 · 43 · 80													
250 · 500 · 800													

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.

Prairie Sandreed/Needleandthread/Bluestem Plant Community

The plant community upon which interpretations are primarily based is the Prairie Sandreed/Needleandthread/Bluestem Plant Community. This is also considered the HCPC. 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 85-95 percent grasses or grass-like plants, 5-10 percent forbs, and 0-5 percent shrubs. The site is dominated by mid- and tall grasses. Major grasses are prairie sandreed, needleandthread, and little bluestem. Other grass and grass-like species occurring on the site is sand bluestem, blue grama, western wheatgrass, and threadleaf sedge. Significant forbs include dotted gayfeather, penstemon, and prairie coneflower. Shrubs in this community are rose, sand sagebrush, and fringed sagewort.

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). Community dynamics, nutrient cycle, water cycle, and energy flow are functioning properly. Plant litter is properly distributed with little movement offsite and natural plant mortality is very low. The diversity in species allows for high drought tolerance. Runoff from adjacent sites and moderate or high available water capacity provides a favorable soil-water-plant relationship.

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

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

- Continuous season-long grazing or continuous seasonal grazing will convert this plant community to the *Prairie Sandreed/Needleandthread/Blue Grama Plant Community*.

Prairie Sandreed/Needleandthread/Blue Grama Plant Community

This plant community developed under continuous season-long grazing. The plant community's mid-grass component is reduced and an understory of short sod-forming grasses is increasing. This plant community also develops under continuous seasonal grazing. This occurs when grazed at the same time of the growing season, every year. If grazed early, needleandthread will be reduced; whereas, if grazed later, little bluestem and sand bluestem will be reduced.

Dominant grasses include needleandthread, blue grama, and prairie sandreed. Other grasses and grass-likes include western wheatgrass, sand dropseed, and threadleaf sedge. Forbs commonly found in this plant community include gayfeather, penstemon, prairie coneflower, cudweed sagewort, western ragweed, and spiderwort. Shrubs in this community include rose, sand sagebrush, fringed sagewort, and broom snakeweed. When compared to the HCPC, sand bluestem and little bluestem have decreased. Prairie sandreed is beginning to decline. Needleandthread, blue grama, and sand dropseed are increasing. Plant diversity is high but on a downward trend.

This plant community is not resistant to change. Management changes can easily shift this plant community. Soil erosion is low. The water cycle is functioning, infiltration is high, and 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: 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

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

- Prescribed grazing will move this plant community to the *Prairie Sandreed/Needleandthread/Bluestem Plant Community*.
- Continuous season-long grazing will move this plant community to the *Blue Grama/Threadleaf Sedge/Sand Dropseed Plant Community*.

Blue Grama/Threadleaf Sedge/Sand Dropseed Plant Community

This plant community typically develops under continuous season-long grazing over a period of several years. It is made up of short, grazing tolerant species. The dominant species are blue grama, sand dropseed, threadleaf sedge, and needleandthread. Dominant forbs include western ragweed, scurfpea, cutleaf ironplant, annual eriogonum, and cudweed sagewort. Dominant shrubs are broom snakeweed, cactus, and fringed sagewort. Compared to the HCPC, blue grama and sand dropseed have increased creating sod bound conditions. Little bluestem and sand bluestem are absent. Prairie sandreed is limited to a few sparse colonies. Fringed sagewort and broom snakeweed may also be increasing.

This plant community is fairly resistant to change. Soil erosion is low. The water cycle is reduced because of the lack of surface litter. Infiltration is moderate due to soil texture, which can help to reduce runoff, but offsite gully erosion can be a concern. Forage production, species diversity, and ground cover are declining. Total annual production (air-dry weight) is about 850 pound per acre during an average year, but it can range from about 550 pounds per acre in unfavorable years to about 1,100 pounds in above average years.

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

- Long-term prescribed grazing will move this plant community to the *Prairie Sandreed/Needleandthread/ Blue Grama Plant Community*. This may take many years depending on the degree to which the sod is formed and the amount of mid-grasses and palatable forbs remaining.
- Heavy, continuous season-long grazing or frequent and severe defoliation will move this plant community to the *Threeawn/Dropseed/Annual Plant Community*.

Threeawn/Dropseed/Annual Plant Community

This plant community develops where the rangeland is grazed year-round, at high stock densities, and/or occupation by prairie dogs. The plant composition is made up of annuals with a few species of perennial forbs and grasses that are tolerant to frequent and severe defoliation. Dominant species are threeawn, sand dropseed, blue grama, and threadleaf sedge. Most of the midgrasses have been eliminated. Cheatgrass is invading the site. Dominant forbs include curlycup gumweed, fetid marigold, verbena, annual eriogonum, green sagewort, and western ragweed. Broom snakeweed, fringed sagewort, and cactus can be abundant.

This plant community is resistant to positive change due to the lack of perennial species present and the amount of annuals and invaders occupying the site. Soil erosion is high compared to the potential plant community for the site due to the increased bare ground. Infiltration is low and runoff is high from the lack of litter and viable plant population.

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

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

- Long-term prescribed grazing will move this plant community back towards the *Blue Grama/Threadleaf Sedge/Sand Dropseed Plant Community*. The rate of this transition can be extremely variable depending on the species present on the site and the availability of a seed source. Typically, this transition will take a long period of time. Range or pasture planting and/or brush management (chemical) may be the only option to return this site to a productive condition in a realistic timeframe.

Non-Disturbed, Go-back, Introduced, or Invaded

This group includes four 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 **Non-Disturbed** state develops from extended periods of exclusion by large herbivores, fire suppression, and lack of other surface disturbance. Plant litter accumulates in large amounts when this community first develops. Litter buildup reduces mature plant vigor and density, and seedling recruitment declines. Eventually, litter levels become high enough that plant density decreases.

Interspaces are commonly filled by annual forbs, annual grasses, and cryptogams. Typically, rhizomatous grasses form small colonies because of a lack of tiller stimulation.

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 sand dropseed, threeawn, annual brome, crested wheatgrass, broom snakeweed, sweet clover, and nonnative thistles. Other plants that commonly occur on the site include western wheatgrass, prickly lettuce, maretail, kochia, bottlebrush squirreltail, foxtail, and annual sunflower. If remnant populations are sufficient, western wheatgrass can sometimes rapidly occupy this state.

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, Kentucky bluegrass, crested wheatgrass, nonnative thistles, field bindweed, knapweeds, leafy spurge, hoary cress, and other introduced species.

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, 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 Sandy 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 Claypan, Clayey, and Thin Claypan Ecological Sites. 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 American bison, grizzly bear, gray wolf, black-footed ferret, mountain plover, Rocky Mountain locust, and swift fox.

The majority of the Sandy Ecological Site 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 (HCPC) and Prairie

Sandreed/Needleandthread/Blue Grama: 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 ecological site 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.

Resulting from continuous seasonal or season-long grazing, blue grama will dominate. The plant community changes do not result in a substantial change in the wildlife community from the HCPC.

Blue Grama/Threadleaf Sedge/Sand Dropseed and Threawn/Dropseed/Annual: Resulting from continuous season-long grazing over many years, threadleaf sedge, blue grama, and dropseed will dominate. Forb abundance has increased while for diversity has remained unchanged. Shrub abundance has increased significantly, especially cactus, broom snakeweed, sagewort, and sand sagebrush. The increase in these shrub species does not significantly benefit a specific wildlife group.

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. Species such as Brewer's sparrow, greater sage-grouse, as well as, desert cottontail will rarely use this site due to the absence of big sagebrush. 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.

Resulting from heavy continuous season-long grazing or frequent and severe defoliation, the threeawn and annuals will dominate. The change in plant community composition from the blue grama/sedge/dropseed community does not result in a significant change in the wildlife community. Short grass obligate species may increase as a result of prairie dog activity.

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†)

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
Grasses & Grass-likes							
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
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
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
Sandberg bluegrass	U U U U	U D U U	N U N N	N D N N	N D N N	N U N N	N U N N
Scribner panicum	U U D U	N U N N	U U D U	N U N N	N U N N	U U D U	U U D U
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
threadleaf 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
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
Forbs							
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
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
cutleaf ironplant	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
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
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
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
larkspur	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
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 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
serrate eveningprimrose	U U D U	U D P U	U U D U	U D P U	U D P U	U U D U	U D P U
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
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
verbena	U U D U	U U U U	U U D U	U U U U	U U U U	U U D U	U U U U
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
Shrubs							
broom snakeweed	N N N N	U U U U	N N N N	U U U U	U U U U	N N N N	U 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
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
small soapweed	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
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

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 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)
Prairie Sandreed/Needleandthread/Bluestem	1,800	0.57
Prairie Sandreed/Needleandthread/Blue Grama	1,200	0.38
Blue Grama/Threadleaf Sedge/Sand Dropseed	900	0.28
Threeawn/Dropseed/Annual	500	0.16

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).

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, with localized areas in group A. Infiltration ranges from high to very high. Runoff potential for this site varies from very low to low 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 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

(060AY008SD) – Sands (060AY012SD) – Thin Upland
(060AY044SD) – Shallow Sandy

Similar Sites

(060AY008SD) – Sands [more sand bluestem; less western wheatgrass; steeper slopes]
(060AY044SD) – Shallow Sandy [more sideoats grama; steeper slopes; lower 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 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	1	1981	SD	Meade

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 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