

United States Department of Agriculture Natural Resources Conservation Service

Ecological Site Description

Site Type: Rangeland

Site Name: Sands

Site ID: R058DY008SD

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



Physiographic Features

This site occurs on nearly level to moderately steep uplands.

Landform: dune, hillslope

Aspect: N/A

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	2,300	4,000
Slope (percent):	2	24
Water Table Depth (inches):	80	80
Flooding:		
Frequency:	None	None
Duration:	None	None
Ponding:		
Depth (inches):	None	None
Frequency:	None	None
Duration:	None	None
Runoff Class:	Very low	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 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 brief periods of high winds with gusts to more

than 50 miles per hour.

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):	110	123
Freeze-free period (days):	130	140
Mean Annual Precipitation (inches):	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 loamy fine sand textured surface layers and slopes of 2 to 24 percent. The soils in this site are well to excessively drained and formed in eolian sand or residuum formed in sandstone. The surface layer is three to six inches thick. The texture of the subsurface layers range 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.

These soils are susceptible to wind and water erosion. The hazard of water erosion increases on slopes greater than about 15 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 sands, residuum
Parent Material Origin: sandstone
Surface Texture: 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	excessive
Permeability Class:	moderately rapid	moderately rapid
Depth to Bedrock (inches):	80	80
Electrical Conductivity (mmhos/cm)*:	0	2
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)*:	3	3
Calcium Carbonate Equivalent (percent)*:	0	5

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

Plant Communities

Ecological Dynamics of the Site

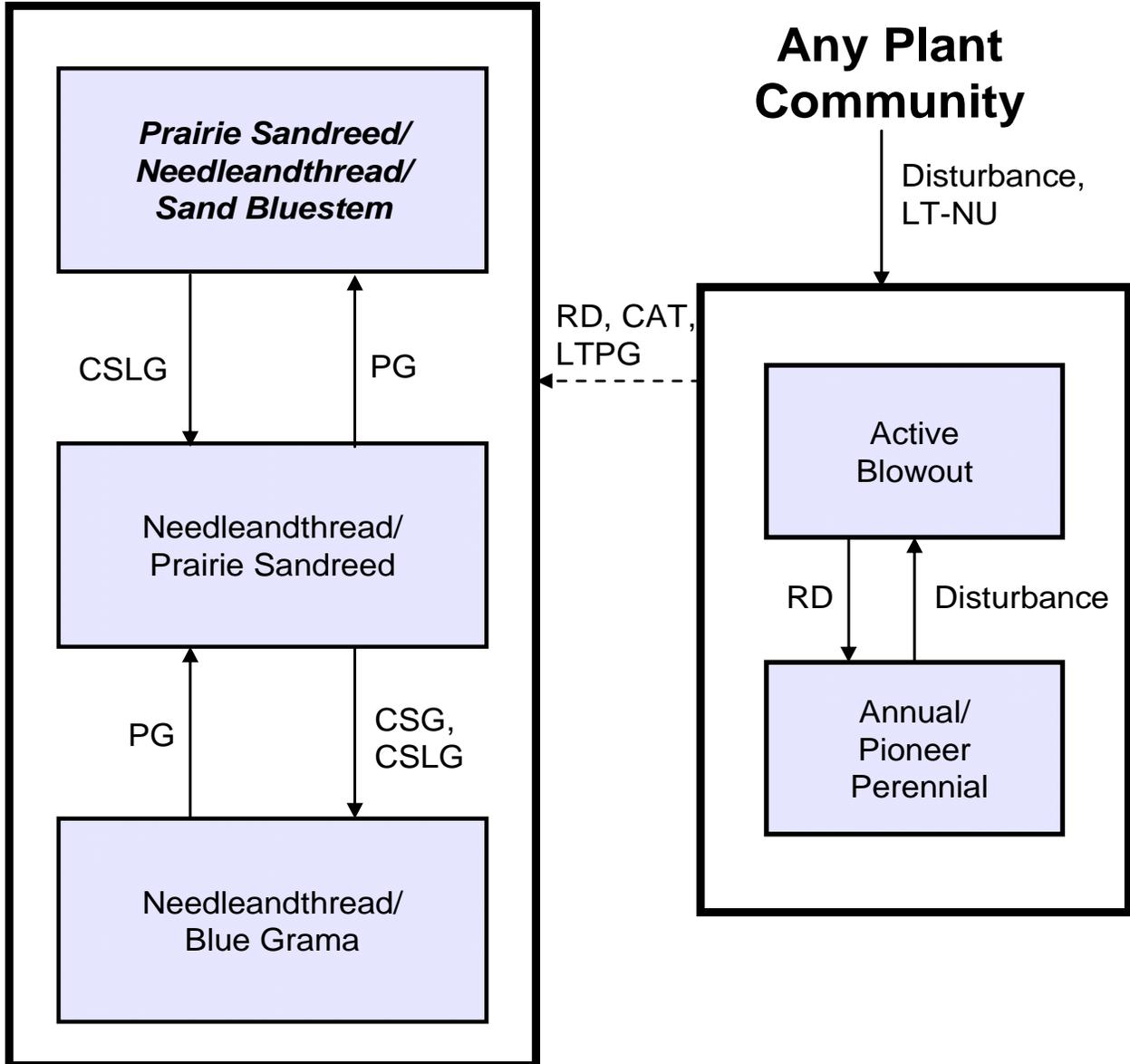
This site developed under Northern Great Plains climatic conditions, natural influences of large herbivores, occasional fire, and other biotic and abiotic factors that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts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



CAT – Critical area treatment; **CSG** – Continuous seasonal grazing; **CSLG** – Continuous season-long grazing; **FSD** – Frequent and severe defoliation; **LT-NU** – Long-term non-use; **LTPG** – Long-term prescribed grazing; **PG** – Prescribed grazing with adequate recovery opportunity; **RD** – Removal of disturbance; **RS** – Range seeding.

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Prairie Sandreed/Needleandthread/ Sand Bluestem		
			Group	lbs./acre	% Comp
GRASSES & GRASS-LIKES				1425 - 1615	75 - 85
TALL WARM-SEASON GRASSES			1	380 - 760	20 - 40
prairie sandreed	Calamoviifa longifolia	CALO	1	380 - 665	20 - 35
sand bluestem	Andropogon hallii	ANHA	1	95 - 285	5 - 15
MID COOL-SEASON BUNCHGRASSES			2	285 - 475	15 - 25
needleandthread	Hesperostipa comata ssp. comata	HECOC8	2	285 - 475	15 - 25
Indian ricegrass	Achnatherum hymenoides	ACHY	2	0 - 38	0 - 2
MID WARM-SEASON BUNCHGRASSES			3	38 - 152	2 - 8
little bluestem	Schizachyrium scoparium	SCSC	3	38 - 152	2 - 8
sand lovegrass	Eragrostis trichodes	ERTR3	3	0 - 38	0 - 2
SHORT WARM-SEASON GRASSES			4	19 - 95	1 - 5
blue grama	Bouteloua gracilis	BOGR2	4	19 - 95	1 - 5
sand paspalum	Paspalum setaceum	PASE5	4	0 - 19	0 - 1
sand dropseed	Sporobolus cryptandrus	SPCR	4	0 - 38	0 - 2
OTHER NATIVE GRASSES			5	38 - 152	2 - 8
prairie junegrass	Koeleria macrantha	KOMA	5	19 - 95	1 - 5
Scribner panicum	Dichanthelium oligosanthes var. scribnerianum	DIOLS	5	19 - 38	1 - 2
western wheatgrass	Pascopyrum smithii	PASM	5	0 - 57	0 - 3
sixweeks fescue	Vulpia octoflora	VUOC	5	0 - 19	0 - 1
other grasses		2GRAM	5	0 - 95	0 - 5
GRASS-LIKES			6	19 - 95	1 - 5
threadleaf sedge	Carex filifolia	CAFI	6	19 - 76	1 - 4
needleleaf sedge	Carex duriuscula	CADU6	6	0 - 38	0 - 2
sun sedge	Carex inops ssp. heliophila	CAINH2	6	19 - 57	1 - 3
other grass-likes		2GL	6	0 - 38	0 - 2
FORBS			8	95 - 285	5 - 15
annual eriogonum	Eriogonum annuum	ERAN4	8	0 - 38	0 - 2
bracted spiderwort	Tradescantia bracteata	TRBR	8	0 - 19	0 - 1
bush morningglory	Ipomoea leptophylla	IPLE	8	0 - 38	0 - 2
dotted gayfeather	Liatris punctata	LIPU	8	19 - 38	1 - 2
false gromwell	Onosmodium molle	ONMO	8	0 - 19	0 - 1
goldenrod	Solidago spp.	SOLID	8	19 - 57	1 - 3
green sagewort	Artemisia campestris	ARCA12	8	19 - 57	1 - 3
hairy goldaster	Heterotheca villosa	HEVI4	8	19 - 38	1 - 2
penstemon	Penstemon spp.	PENST	8	19 - 38	1 - 2
purple coneflower	Echinacea angustifolia	ECAN2	8	0 - 19	0 - 1
purple prairie clover	Dalea purpurea	DAPU5	8	19 - 38	1 - 2
rush skeletonweed	Lygodesmia juncea	LYJU	8	19 - 38	1 - 2
scurfpea	Psoraleum spp.	PSORA2	8	19 - 38	1 - 2
serrate eveningprimrose	Calylophus serrulatus	CASE12	8	0 - 19	0 - 1
stiff sunflower	Helianthus pauciflorus	HEPA19	8	0 - 19	0 - 1
wavyleaf thistle	Cirsium undulatum	CIUN	8	19 - 38	1 - 2
western ragweed	Ambrosia psilostachya	AMPS	8	19 - 38	1 - 2
western wallflower	Erysimum capitatum var. capitatum	ERCAC	8	0 - 19	0 - 1
western yarrow	Achillea millefolium var. occidentalis	ACMIO	8	19 - 38	1 - 2
whorled milkweed	Asclepias verticillata	ASVE	8	0 - 19	0 - 1
native forbs		2FN	8	19 - 57	1 - 3
SHRUBS			9	95 - 190	5 - 10
brittle cactus	Opuntia fragilis	OPFR	9	19 - 38	1 - 2
fringed sagewort	Artemisia frigida	ARFR4	9	19 - 57	1 - 3
plains pricklypear	Opuntia polyacantha	OPPO	9	19 - 38	1 - 2
rose	Rosa spp.	ROSA5	9	19 - 38	1 - 2
silver sagebrush	Artemisia cana	ARCA13	9	0 - 57	0 - 3
western sandcherry	Prunus pumila var. besseyi	PRPUB	9	0 - 38	0 - 2
yucca	Yucca glauca	YUGL	9	19 - 38	1 - 2
other shrubs		2SHRUB	9	0 - 57	0 - 3
CRYPTOGAMS			10	0 - 19	0 - 1
clubmoss	Selaginella densa	SEDE2	10	0 - 19	0 - 1

Annual Production lbs./acre	LOW	RV	HIGH
GRASSES & GRASS-LIKES	1020	1558	-2085
FORBS	90	190	-300
SHRUBS	90	143	-195
CRYPTOGAMS	0	10	-20
TOTAL	1200	1900	-2600

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/Sand Bluestem			Needleandthread/ Prairie Sandreed			Needleandthread/Blue Grama		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
GRASSES & GRASS-LIKES			1425 - 1615	75 - 85		910 - 1190	65 - 85		650 - 850	65 - 85
TALL WARM-SEASON GRASSES		1	380 - 760	20 - 40	1	140 - 280	10 - 20	1	0 - 50	0 - 5
prairie sandreed	CALO	1	380 - 665	20 - 35	1	140 - 280	10 - 20	1	0 - 50	0 - 5
sand bluestem	ANHA	1	95 - 285	5 - 15	1	0 - 70	0 - 5			
MID COOL-SEASON BUNCHGRASSES		2	285 - 475	15 - 25	2	210 - 420	15 - 30	2	100 - 300	10 - 30
needleandthread	HECOC8	2	285 - 475	15 - 25	2	210 - 420	15 - 30	2	100 - 300	10 - 30
Indian ricegrass	ACHY	2	0 - 38	0 - 2						
MID WARM-SEASON BUNCHGRASSES		3	38 - 152	2 - 8	3	0 - 70	0 - 5	3		
little bluestem	SCSC	3	38 - 152	2 - 8	3	0 - 70	0 - 5			
sand lovegrass	ERTR3	3	0 - 38	0 - 2						
SHORT WARM-SEASON GRASSES		4	19 - 95	1 - 5	4	42 - 210	3 - 15	4	150 - 300	15 - 30
blue grama	BOGR2	4	19 - 95	1 - 5	4	28 - 140	2 - 10	4	100 - 250	10 - 25
sand paspalum	PASE5	4	0 - 19	0 - 1						
sand dropseed	SPCR	4	0 - 38	0 - 2	4	14 - 112	1 - 8	4	20 - 150	2 - 15
OTHER NATIVE GRASSES		5	38 - 152	2 - 8	5	28 - 70	2 - 5	5	20 - 50	2 - 5
prairie junegrass	KOMA	5	19 - 95	1 - 5	5	14 - 42	1 - 3	5	10 - 30	1 - 3
Scribner panicum	DIOLS	5	19 - 38	1 - 2	5	14 - 28	1 - 2	5	10 - 20	1 - 2
western wheatgrass	PASM	5	0 - 57	0 - 3						
sixweeks fescue	VUOC	5	0 - 19	0 - 1	5	0 - 28	0 - 2	5	0 - 20	0 - 2
other grasses	2GRAM	5	0 - 95	0 - 5	5	0 - 70	0 - 5	5	0 - 50	0 - 5
GRASS-LIKES		6	19 - 95	1 - 5	6	70 - 210	5 - 15	6	100 - 200	10 - 20
threadleaf sedge	CAFI	6	19 - 76	1 - 4	6	28 - 140	2 - 10	6	50 - 150	5 - 15
needleleaf sedge	CADU6	6	0 - 38	0 - 2	6	14 - 56	1 - 4	6	10 - 50	1 - 5
sun sedge	CAINH2	6	19 - 57	1 - 3	6	14 - 56	1 - 4	6	10 - 50	1 - 5
other grass-like	2GL	6	0 - 38	0 - 2	6	0 - 28	0 - 2	6	0 - 20	0 - 2
NON-NATIVE GRASSES		7			7	14 - 70	1 - 5	7	10 - 50	1 - 5
bluegrass	POA				7	14 - 70	1 - 5	7	10 - 50	1 - 5
cheatgrass	BRTE				7	14 - 70	1 - 5	7	10 - 50	1 - 5
FORBS		8	95 - 285	5 - 15	8	70 - 210	5 - 15	8	50 - 150	5 - 15
annual eriogonum	ERAN4	8	0 - 38	0 - 2	8	0 - 42	0 - 3	8	0 - 30	0 - 3
bracted spiderwort	TRBR	8	0 - 19	0 - 1						
bush morninggory	IPLE	8	0 - 38	0 - 2	8	0 - 14	0 - 1			
dotted gayfeather	LIPU	8	19 - 38	1 - 2	8	14 - 28	1 - 2	8	0 - 10	0 - 1
false gromwell	ONMO	8	0 - 19	0 - 1						
goldenrod	SOLID	8	19 - 57	1 - 3	8	14 - 56	1 - 4	8	10 - 50	1 - 5
green sagewort	ARCA12	8	19 - 57	1 - 3	8	14 - 56	1 - 4	8	10 - 50	1 - 5
hairy goldaster	HEVI4	8	19 - 38	1 - 2	8	0 - 14	0 - 1			
penstemon	PENST	8	19 - 38	1 - 2	8	0 - 14	0 - 1			
purple coneflower	ECAN2	8	0 - 19	0 - 1						
purple prairie clover	DAPU5	8	19 - 38	1 - 2	8	0 - 14	0 - 1			
rush skeletonweed	LYJU	8	19 - 38	1 - 2	8	0 - 14	0 - 1	8	0 - 10	0 - 1
scurfpea	PSORA2	8	19 - 38	1 - 2	8	14 - 42	1 - 3	8	10 - 40	1 - 4
serrate eveningprimrose	CASE12	8	0 - 19	0 - 1	8	0 - 14	0 - 1			
stiff sunflower	HEPA19	8	0 - 19	0 - 1						
wavyleaf thistle	CIUN	8	19 - 38	1 - 2	8	0 - 28	0 - 2	8	0 - 10	0 - 1
western ragweed	AMPS	8	19 - 38	1 - 2	8	14 - 42	1 - 3	8	10 - 50	1 - 5
western wallflower	ERCAC	8	0 - 19	0 - 1						
western yarrow	ACMIO	8	19 - 38	1 - 2	8	14 - 28	1 - 2	8	10 - 30	1 - 3
whorled milkweed	ASVE	8	0 - 19	0 - 1	8	0 - 14	0 - 1			
native forbs	2FN	8	19 - 57	1 - 3	8	14 - 42	1 - 3	8	10 - 30	1 - 3
introduced forbs	2FI				8	14 - 42	1 - 3	8	10 - 50	1 - 5
SHRUBS		9	95 - 190	5 - 10	9	84 - 210	6 - 15	9	50 - 150	5 - 15
brittle cactus	OPFR	9	19 - 38	1 - 2	9	14 - 28	1 - 2	9	10 - 30	1 - 3
fringed sagewort	ARFR4	9	19 - 57	1 - 3	9	14 - 70	1 - 5	9	10 - 80	1 - 8
plains pricklypear	OPPO	9	19 - 38	1 - 2	9	14 - 28	1 - 2	9	10 - 30	1 - 3
rose	ROSA5	9	19 - 38	1 - 2	9	14 - 42	1 - 3	9	10 - 20	1 - 2
silver sagebrush	ARCA13	9	0 - 57	0 - 3	9	14 - 70	1 - 5	9	0 - 30	0 - 3
western sandcherry	PRPUB	9	0 - 38	0 - 2						
yucca	YUGL	9	19 - 38	1 - 2	9	14 - 56	1 - 4	9	10 - 70	1 - 7
other shrubs	2SHRUB	9	0 - 57	0 - 3	9	0 - 42	0 - 3	9	0 - 30	0 - 3
CRYPTOGAMS		10	0 - 19	0 - 1	10	0 - 42	0 - 3	10	10 - 50	1 - 5
clubmoss	SEDE2	10	0 - 19	0 - 1	10	42 - 42	3 - 3	10	10 - 50	1 - 5
Annual Production lbs./acre			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH	
GRASSES & GRASS-LIKES			1020 - 1558 - 2035		755 - 1092 - 1475		505 - 770 - 1115			
FORBS			90 - 190 - 330		65 - 140 - 240		45 - 100 - 165			
SHRUBS			90 - 143 - 215		80 - 147 - 240		45 - 100 - 165			
TREES			0 - 10 - 20		0 - 21 - 45		5 - 30 - 55			
TOTAL			1200 - 1900 - 2600		900 - 1400 - 2000		600 - 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 United States Department of Agriculture (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/Sand Bluestem Plant Community

The interpretive plant community for this site is the Prairie Sandreed/Needleandthread/Sand 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 75-85 percent grasses or grass-like plants, 5-15 percent forbs, 5-10 percent shrubs, and 0-1 percent cryptogams. Warm-season grasses dominate this plant community. The major grasses include prairie sandreed, sand bluestem, needleandthread, little bluestem, and sand lovegrass. Other grasses or grass-like species occurring on the site include prairie Junegrass, western wheatgrass, sixweeks fescue, and sedges. Significant forbs include dotted gayfeather, green sagewort, hairy goldaster, penstemon, and scurfpea. The significant shrubs that occur include western sandcherry, fringed sagewort, silver sagebrush, and yucca.

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: SD5805

Growth curve name: Northern Rolling High 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

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

- Continuous season-long grazing or grazing for extended periods during the actively growing period of the dominant grasses without adequate recovery periods will lead to the *Needleandthread/Prairie Sandreed Plant Community*. This occurs with exposure to herbivory during the entire or a major portion of the growing season at moderate stocking rates.

Needleandthread/Prairie Sandreed Plant Community

This plant community develops under continuous season-long grazing or from over utilization during extended drought periods. The potential vegetation is made up of approximately 65-85 percent grasses and grass-like species, 5-15 percent forbs, 6-15 percent shrubs, and 0-3 percent cryptogams. The dominant grasses include needleandthread and prairie sandreed. Other grasses or grass-like species may include blue grama, sedge, and little bluestem. Significant forbs include cudweed sagewort, green sagewort, scurfpea, and western ragweed. The dominant shrubs that occur include cactus, yucca, and fringed sagewort.

Compared to the Prairie Sandreed/Needleandthread/Sand Bluestem Plant Community, the shortgrass species including blue grama and threadleaf sedge have increased. The warm-season species including prairie sandreed, sand bluestem, and sand lovegrass have decreased in composition. Annual bromes, bluegrass, 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 not resistant to change. Changes in grazing management can result in a shift to another plant community. This community is fairly resilient following 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 due to the litter cover on the soil surface. Infiltration is high because of the soil texture and surface litter.

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:

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

Needleandthread/Blue Grama Plant Community

This plant community typically develops over a period of several years with continuous season-long grazing or continuous seasonal grazing (grazing at the same time of year every year for extended periods during the growing season). It is made up of approximately 65-85 percent grasses and grass-like species, 5-15 percent forbs, 5-15 percent shrubs, and 1-5 percent cryptogams. The dominant grasses are blue grama, needleandthread, and sand dropseed. Significant forbs include western ragweed, green sagewort, scurfpea, goldenrod, and annual eriogonum. Dominant shrubs in this community include fringed sagewort, yucca, and cactus.

Compared to the Prairie Sandreed/Needleandthread/Sand Bluestem Plant Community, sand dropseed and blue grama have greatly increased. Prairie sandreed is greatly diminished. Sand bluestem and little bluestem are essentially absent. Desirable plant species have decreased.

This plant community is not resistant to change due to the higher percentage of bare ground. The water cycle is impaired due to a reduction in litter and the potential for higher runoff and decreased infiltration. The risk for soil erosion increases.

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:

- With prescribed grazing and favorable climatic conditions, which allow for adequate plant recovery periods, this plant community can shift to the *Needleandthread/Prairie Sandreed Plant Community*.

Annual, Pioneer Perennial Plant Community

This plant community develops under frequent and severe defoliation and/or excessive disturbance. This can result from heavy livestock or wildlife concentration (i.e., water locations, bedding or loafing grounds, feeding areas, etc.) or cropping abandonment (Go-back land). The dominant vegetation includes pioneer annual grasses and forbs and early successional biennial and perennial species. Grasses may include blue grama, sand dropseed, sedge, sixweeks fescue, and cheatgrass. The dominant forbs may include green sagewort, western ragweed, annual sunflower, and annual eriogonum. Shrubs that may be present include cactus and small soapweed.

This plant community is resistant to change, as long as soil disturbance or severe vegetation defoliation persists, thus, holding back secondary plant succession. Soil erosion is potentially high in this plant community. The community also is susceptible to invasion of nonnative annual and perennial forbs due to severe soil disturbances and relatively high percent of bare ground. Reduced surface cover, low plant density, low plant vigor, and loss of root biomass, all contribute to decreased water infiltration, increased runoff, and accelerated erosion rates. If left without management, blowouts may occur.

Significant economic inputs and time would be required to move this plant community toward a higher successional stage and a more productive plant community. Secondary succession is highly variable, depending upon availability and diversity of a viable seed bank of higher successional species within the existing plant community and neighboring plant communities. This plant community can be renovated to improve the production capability, but management changes would be needed to maintain the new plant community.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

Major Land Resource Area (MLRA) 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 Sands 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, Sandy Claypan, Clayey, and Thin Claypan ESs. 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 bison, grizzly bear, gray wolf, black-footed ferret, mountain plover, Rocky Mountain locust, and swift fox.

The majority of Sands ES 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 bromegrasses and crested wheat have impacted the biological integrity of the site for some grassland birds.

Prairie Sandreed/Needleandthread/Sand Bluestem and Needleandthread/Prairie Sandreed:

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 seasonal grazing or from over utilization during extended drought periods, 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/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. 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 and Great Plains toad; and bull snake and western rattlesnake.

Needleandthread/Blue Grama: Resulting from continuous season-long grazing or continuous seasonal grazing without adequate recovery periods between grazing events; needleandthread and blue grama will dominate. The decrease in diversity of grasses, forbs, and shrubs may result in less seed production or lower quality nutrition 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†)

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
Grasses and Grass-likes							
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
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	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
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
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
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
sixweeks fescue	N N N N	N U N N	N N N N	N U N N	N U N N	N N N N	N N N N
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
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
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
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
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 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
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
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
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
purple 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
purple 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
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
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
stiff sunflower	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U
wavyleaf thistle	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
western ragweed	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
western wallflower	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
western yarrow	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
whorled milkweed	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
Shrubs and Cryptogams							
brittle 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
plains pricklypear	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
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 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	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
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

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

As this site improves in condition through proper management (from the more shortgrass 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 A. 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 varieties 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

Loamy (R058DY010SD), Sandy (R058DY009SD), Shallow Sandy (R058DY028SD)

Similar Sites

(R058DY010SD) – Loamy [more western wheatgrass; less needleandthread; more production]
(R058DY009SD) – Sandy [more western wheatgrass; more production]

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, United States Forest Service (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	1	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 and 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
_____ SD, State Range Management Specialist	_____ Date