

United States Department of Agriculture Natural Resources Conservation Service

Ecological Site Description

Site Type: Rangeland

Site Name: Shallow Sandy

Site ID: R060AY044SD

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

Physiographic Features

This site occurs on gently sloping to very steep uplands.

Landform: hill, ridge, escarpment

Aspect: N/A



	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	2,500	4,300
Slope (percent):	3	45
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:	Medium	Very high

Climatic Features

The climate in this MLRA is typical of the drier portions of the Northern Great Plains where sagebrush steppes to the west yield to grassland 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 of this site are shallow (less than 20" to bedrock) well-drained soils formed in eolian deposits or alluvium over residuum or residuum. These soils have moderately rapid to very rapid permeability and may occur on all slopes. The bedrock may be of any kind except igneous or volcanic and is virtually impenetrable to plant roots. The surface soil will be one or more of the following textures: fine sandy loam, sandy loam, loamy fine sand, loamy sand, or sand.

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: residuum, alluvium, eolian deposits
Parent Material Origin: sandstone, unspecified
Surface Texture: loamy fine sand, fine sandy loam, sandy loam, loamy sand, sand
Surface Texture Modifier: none
Subsurface Texture Group: sandy
Surface Fragments ≤3” (% Cover): 0
Surface Fragments >3” (%Cover): 0
Subsurface Fragments ≤3” (% Volume): 0-10
Subsurface Fragments >3” (% Volume): 0

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	well	excessive
Permeability Class:	moderately rapid	very rapid
Depth (inches):	10	20
Electrical Conductivity (mmhos/cm)*:	0	2
Sodium Absorption Ratio*:	0	0
Soil Reaction (1:1 Water)*:	6.6	7.8
Soil Reaction (0.1M CaCl₂)*:	NA	NA
Available Water Capacity (inches)*:	1	2
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:

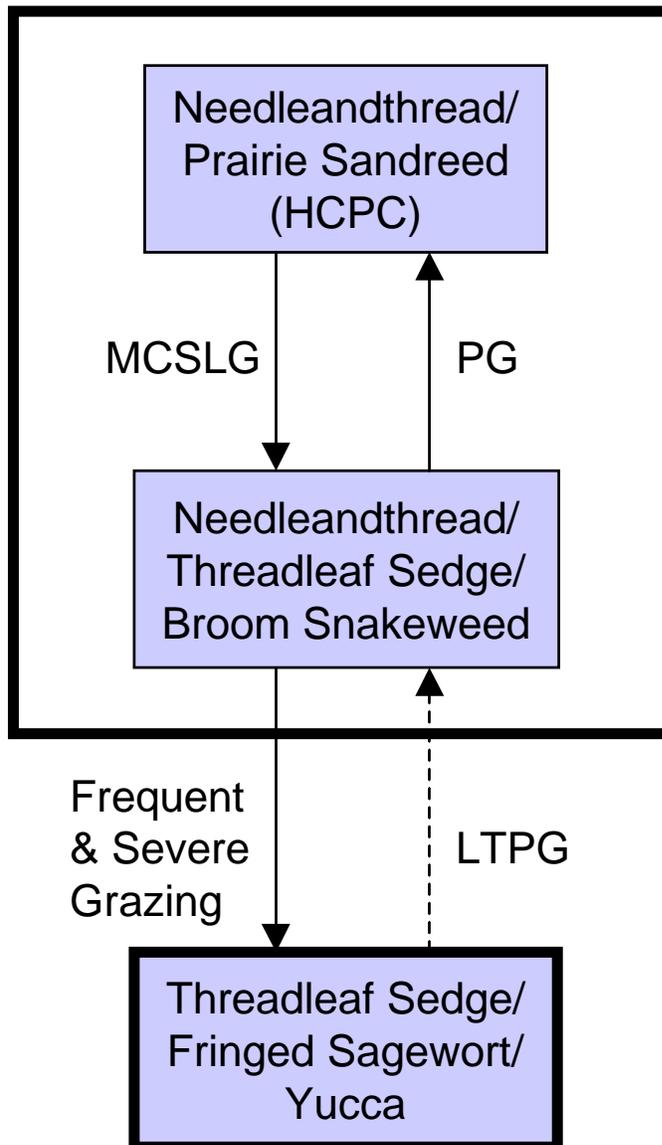
This site developed under Northern Great Plains climatic conditions, natural influences of large herbivores, occasional fire, and other biotic and abiotic factors that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts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

As this site deteriorates, species such as threadleaf sedge and fringed sagewort will increase. Midgrasses such as 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 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



Frequent and Severe Grazing - Frequent and severe utilization of the cool-season mid-grasses during the growing season; **HCPC** - Historical Climax Plant Community; **LTPG** - Long-term prescribed grazing; **MCSLG** - Moderate, continuous season-long grazing.

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Needleandthread/ Prairie Sandreed (HCPC)			
			Group	lbs./acre	% Comp	
GRASSES & GRASS-LIKES				845 - 975	65 - 75	
RHIZOMATOUS WHEATGRASSES			1	65 - 130	5 - 10	
western wheatgrass	Pascopyrum smithii	PASM	1	65 - 130	5 - 10	
thickspike wheatgrass	Elymus lanceolatus ssp. lanceolatus	ELLAL	1	65 - 130	5 - 10	
bluebunch wheatgrass	Pseudoroegneria spicata	PSSP6	2	65 - 130	5 - 10	
little bluestem	Schizachyrium scoparium	SCSC	3	65 - 195	5 - 15	
needleandthread	Hesperostipa comata ssp. comata	HECOC8	4	195 - 325	15 - 25	
prairie sandreed	Calamovilfa longifolia	CALO	5	130 - 260	10 - 20	
sideoats grama	Bouteloua curtipendula	BOCU	6	65 - 130	5 - 10	
NATIVE GRASSES & GRASS-LIKES			7	65 - 195	5 - 15	
blue grama	Bouteloua gracilis	BOGR2	7	0 - 65	0 - 5	
Indian ricegrass	Achnatherum hymenoides	ACHY	7	0 - 65	0 - 5	
prairie junegrass	Koeleria macrantha	KOMA	7	0 - 65	0 - 5	
Sandberg bluegrass	Poa secunda	POSE	7	0 - 65	0 - 5	
sand bluestem	Andropogon hallii	ANHA	7	0 - 65	0 - 5	
sand dropseed	Sporobolus cryptandrus	SPCR	7	0 - 65	0 - 5	
plains muhly	Muhlenbergia cuspidata	MUCU3	7	0 - 65	0 - 5	
threadleaf sedge	Carex filifolia	CAFI	7	0 - 65	0 - 5	
other perennial grasses		2GP	7	0 - 65	0 - 5	
FORBS			9	65 - 195	5 - 15	
American vetch	Vicia americana	VIAM	9	0 - 65	0 - 5	
aster	Aster spp.	ASTER	9	0 - 65	0 - 5	
biscuitroot	Lomatium spp.	LOMAT	9	0 - 65	0 - 5	
bluebells	Mertensia spp.	MERTE	9	0 - 65	0 - 5	
Indian breadroot	Pediomelum esculentum	PEES	9	0 - 65	0 - 5	
milkvetch	Astragalus spp.	ASTRA	9	0 - 65	0 - 5	
prairie coneflower	Ratibida columnifera	RACO3	9	0 - 65	0 - 5	
purple prairie clover	Dalea purpurea	DAPU5	9	0 - 65	0 - 5	
rose pussytoes	Antennaria rosea	ANRO2	9	0 - 65	0 - 5	
scarlet gaura	Gaura coccinea	GACO5	9	0 - 65	0 - 5	
stemless hymenoxys	Tetaneuris acaulis	TEAC	9	0 - 65	0 - 5	
sulphur-flower buckwheat	Eriogonum umbellatum	ERUM	9	0 - 65	0 - 5	
tapertip hawksbeard	Crepis acuminata	CRAC2	9	0 - 65	0 - 5	
western yarrow	Achillea millefolium	ACMI2	9	0 - 65	0 - 5	
white prairie clover	Dalea candida	DACA7	9	0 - 65	0 - 5	
wild onion	Allium spp.	ALLIU	9	0 - 65	0 - 5	
other perennial forbs		2FP	9	0 - 65	0 - 5	
SHRUBS				130 - 260	10 - 20	
fourwing saltbush	Atriplex canescens	ATCA2	10	65 - 130	5 - 10	
OTHER SHRUBS			11	65 - 195	5 - 15	
big sagebrush	Artemisia tridentata	ARTR2	11	0 - 65	0 - 5	
Douglas rabbitbrush	Chrysothamnus viscidiflorus	CHVI8	11	0 - 65	0 - 5	
skunkbush sumac	Rhus trilobata	RHTR	11	0 - 65	0 - 5	
small soapweed	Yucca glauca	YUGL	11	0 - 65	0 - 5	
winterfat	Krascheninnikovia lanata	KRLA2	11	0 - 65	0 - 5	
Annual Production lbs./acre				LOW	RV	HIGH
GRASSES & GRASS-LIKES				815 -	975	-1125
FORBS				60 -	130	-200
SHRUBS				125 -	195	-275
TOTAL				1000 -	1300	-1600

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	Needleandthread/ Prairie Sandreed (HCPC)			Needleandthread/Threadleaf Sedge/Broom Snakeweed			Threadleaf Sedge/Fringed Sagewort/Yucca		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
GRASSES & GRASS-LIKES			845 - 975	65 - 75		510 - 680	60 - 80		275 - 413	50 - 75
RHIZOMATOUS WHEATGRASSES		1	65 - 130	5 - 10	1	43 - 85	5 - 10	1	0 - 28	0 - 5
western wheatgrass	PASM	1	65 - 130	5 - 10	1	43 - 85	5 - 10	1	0 - 28	0 - 5
thickspike wheatgrass	ELLAL	1	65 - 130	5 - 10	1	43 - 85	5 - 10	1	0 - 28	0 - 5
bluebunch wheatgrass	PSSP6	2	65 - 130	5 - 10	2	0 - 43	0 - 5	2		
little bluestem	SCSC	3	65 - 195	5 - 15	3	0 - 43	0 - 5	3	0 - 28	0 - 5
needleandthread	HECOC8	4	195 - 325	15 - 25	4	170 - 255	20 - 30	4	28 - 83	5 - 15
prairie sandreed	CALO	5	130 - 260	10 - 20	5	0 - 85	0 - 10	5	0 - 28	0 - 5
sideoats grama	BOCU	6	65 - 130	5 - 10	6	0 - 43	0 - 5	6	0 - 28	0 - 5
NATIVE GRASSES & GRASS-LIKES		7	65 - 195	5 - 15	7	43 - 255	5 - 30	7	83 - 248	15 - 45
blue grama	BOGR2	7	0 - 65	0 - 5	7	43 - 128	5 - 15	7	11 - 55	2 - 10
Indian ricegrass	ACHY	7	0 - 65	0 - 5	7	0 - 17	0 - 2			
prairie junegrass	KOMA	7	0 - 65	0 - 5	7	0 - 43	0 - 5	7	0 - 28	0 - 5
Sandberg bluegrass	POSE	7	0 - 65	0 - 5	7	0 - 43	0 - 5	7	0 - 28	0 - 5
sand bluestem	ANHA	7	0 - 65	0 - 5						
sand dropseed	SPCR	7	0 - 65	0 - 5	7	17 - 85	2 - 10	7	11 - 55	2 - 10
plains muhly	MUCU3	7	0 - 65	0 - 5	7	0 - 26	0 - 3			
threadleaf sedge	CAFI	7	0 - 65	0 - 5	7	43 - 128	5 - 15	7	55 - 138	10 - 25
threawn	ARIST				7	0 - 43	0 - 5	7	0 - 55	0 - 10
sixweeks fescue	VUOC				7	0 - 43	0 - 5	7	0 - 28	0 - 5
other perennial grasses	2GP	7	0 - 65	0 - 5	7	0 - 43	0 - 5	7	0 - 28	0 - 5
NON-NATIVE GRASSES		8			8	0 - 85	0 - 10	8	11 - 83	2 - 15
cheatgrass	BRTE				8	0 - 85	0 - 10	8	11 - 83	2 - 15
FORBS		9	65 - 195	5 - 15	9	43 - 128	5 - 15	9	28 - 110	5 - 20
American vetch	VIAM	9	0 - 65	0 - 5	9	0 - 17	0 - 2			
aster	ASTER	9	0 - 65	0 - 5	9	0 - 43	0 - 5	9	0 - 28	0 - 5
biscuitroot	LOMAT	9	0 - 65	0 - 5	9	0 - 26	0 - 3	9	0 - 11	0 - 2
bluebells	MERTE	9	0 - 65	0 - 5	9	0 - 17	0 - 2			
green sagewort	ARDR4				9	0 - 43	0 - 5	9	0 - 55	0 - 10
Indian breadroot	PEES	9	0 - 65	0 - 5	9	0 - 17	0 - 2			
milkvetch	ASTRA	9	0 - 65	0 - 5	9	0 - 43	0 - 5	9	0 - 28	0 - 5
prairie coneflower	RACO3	9	0 - 65	0 - 5	9	0 - 43	0 - 5	9	0 - 28	0 - 5
purple prairie clover	DAPU5	9	0 - 65	0 - 5	9	0 - 43	0 - 5	9	0 - 28	0 - 5
rose pussytoes	ANRO2	9	0 - 65	0 - 5	9	0 - 26	0 - 3	9	0 - 17	0 - 3
scarlet gaura	GACO5	9	0 - 65	0 - 5	9	0 - 17	0 - 2			
stemless hymenoxys	TEAC	9	0 - 65	0 - 5	9	0 - 43	0 - 5	9	0 - 28	0 - 5
sulphur-flower buckwheat	ERUM	9	0 - 65	0 - 5	9	0 - 43	0 - 5	9	0 - 28	0 - 5
sweetclover	MELIL				9	0 - 43	0 - 5	9	0 - 55	0 - 10
tapertip hawksbeard	CRAC2	9	0 - 65	0 - 5	9	0 - 17	0 - 2			
thistle	CIRSI				9	0 - 43	0 - 5	9	0 - 55	0 - 10
western yarrow	ACMI2	9	0 - 65	0 - 5	9	0 - 43	0 - 5	9	0 - 28	0 - 5
white prairie clover	DACA7	9	0 - 65	0 - 5	9	0 - 26	0 - 3			
wild onion	ALLIU	9	0 - 65	0 - 5	9	0 - 26	0 - 3	9	0 - 17	0 - 3
other perennial forbs	2FP	9	0 - 65	0 - 5	9	0 - 43	0 - 5	9	0 - 28	0 - 5
other annual forbs	2FA				9	0 - 43	0 - 5	9	0 - 28	0 - 5
SHRUBS			130 - 260	10 - 20		85 - 213	10 - 25		55 - 165	10 - 30
fourwing saltbush	ATCA2	10	65 - 130	5 - 10	10	0 - 43	0 - 5	10		
OTHER SHRUBS		11	65 - 195	5 - 15	11	85 - 170	10 - 20	11	55 - 165	10 - 30
big sagebrush	ARTR2	11	0 - 65	0 - 5	11	0 - 43	0 - 5	11	0 - 28	0 - 5
broom snakeweed	GUSA2				11	0 - 43	0 - 5	11	28 - 55	5 - 10
Douglas rabbitbrush	CHVI8	11	0 - 65	0 - 5	11	0 - 43	0 - 5	11	0 - 28	0 - 5
fringed sagewort	ARFR4				11	0 - 43	0 - 5	11	28 - 55	5 - 10
skunkbush sumac	RHTR	11	0 - 65	0 - 5	11	0 - 43	0 - 5	11	0 - 28	0 - 5
small soapweed	YUGL	11	0 - 65	0 - 5	11	17 - 68	2 - 8	11	28 - 55	5 - 10
winterfat	KRLA2	11	0 - 65	0 - 5						
other shrubs	2SHRUB				11	0 - 43	0 - 5	11	0 - 28	0 - 5
Annual Production lbs./acre			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH	
GRASSES & GRASS-LIKES			815 - 975 - 1125		580 - 616 - 655		325 - 371 - 415			
FORBS			60 - 130 - 200		40 - 85 - 130		25 - 69 - 115			
SHRUBS			125 - 195 - 275		80 - 149 - 215		50 - 110 - 170			
TOTAL			1000 - 1300 - 1600		700 - 850 - 1000		400 - 550 - 700			

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.

Needleandthread/Prairie Sandreed Plant Community

The plant community upon which interpretations are primarily based is the Needleandthread/Prairie Sandreed Plant Community. This is also considered the HCPC. Potential vegetation is about 65-75 percent grasses or grass-like plants, 5-15 percent forbs, and 10-20 percent woody plants. The plant community is a mix of warm-season and cool-season midgrasses. Major grasses include needleandthread, prairie sandreed, little bluestem, and sideoats grama. Other grasses occurring include bluebunch wheatgrass, Sandberg bluegrass, blue grama, and threadleaf sedge. The plant community is stable and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allows for high drought resistance. This is a sustainable plant community (site/soil stability, watershed function, and biologic integrity).

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:

- Moderate, continuous season-long grazing will convert the plant community to the *Needleandthread/Threadleaf Sedge/Broom Snakeweed Plant Community*.

Needleandthread/Threadleaf Sedge/Broom Snakeweed Plant Community

This plant community is the result of moderate continuous season-long grazing. The understory of grass includes needleandthread, threadleaf sedge, and prairie Junegrass. When compared to the HCPC, prairie sandreed and little bluestem have decreased. Threadleaf sedge and needleandthread have increased. Broom snakeweed has invaded. This community is well suited to grazing by both domestic livestock and wildlife, during the spring summer and fall. The communities' soil, biotic integrity, and watershed are intact, although more than normal runoff may occur due to the sod forming vegetation.

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 leading to other plant communities are as follows:

- Prescribed grazing will return this plant community to the *Needleandthread/Prairie Sandreed Plant Community (HCPC)*.
- Frequent and severe grazing will convert this plant community to the *Threadleaf Sedge/Fringed Sagewort/Yucca Plant Community*.

Threadleaf Sedge/Fringed Sagewort/Yucca Plant Community

This plant community is the result of frequent and severe grazing. A sod of threadleaf sedge dominates it. Broom snakeweed and yucca have increased. When the HCPC is replaced by sod forming communities and woody shrubs, grass production is reduced.

The soil is generally well protected on this plant community. The biotic integrity may be reduced due to low vegetative production. The sod formed by these grasses is resistant to water infiltration. While this sod protects the site, offsite areas are affected by excessive runoff that may cause gully erosion. This sod is resistant to change and may require practices such as long-term prescribed grazing to return to a mid-grass community.

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 leading to other plant communities are as follows:

- Long-term prescribed grazing will eventually return this plant community to the *Needleandthread/Threadleaf Sedge/Broom Snakeweed Plant Community*.

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 Shallow 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, Sands, 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 Shallow Sandy 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.

Needleandthread/Prairie Sandreed (HCPC): 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, chestnut-collared longspur, Sprague's pipit, horned lark, lark bunting, and sharp-tailed grouse are common and benefit from the structure and composition this plant community provides. Brewer's sparrow and greater sage-grouse will use this site due to the presence 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. The higher stature of this plant community provides thermal, protective and escape cover for herbivores and grassland birds. Predators utilizing this plant community include coyote, American badger, red fox, and long-tailed weasel. This plant community provides habitat for herptiles such as the spade foot toad, bull snake, and western rattlesnake.

Needleandthread/Threadleaf Sedge/Broom Snakeweed: Resulting from moderate, continuous season-long grazing the warm-season grass component has been substantially reduced and a shift to a needleandthread and sedge community occurs. The forb and shrub diversity increases. The diversity of forbs and shrubs provide high nutrition levels for small and large herbivores including voles, mice, thirteen-lined ground squirrel, white-tailed jackrabbit, and deer. Brewer's sparrow and greater sage-grouse will continue to use this site where big sagebrush is present.

The shorter stature of this plant community provides less 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. Prey populations are available for grassland raptors such as ferruginous hawk, Swainson's hawk, golden eagle, and prairie falcon.

Threadleaf Sedge/Fringed Sagewort/Yucca: Resulting from frequent and severe grazing, threadleaf sedge, fringed sagewort, and yucca will dominate. The decrease in diversity of grasses, forbs and shrubs will result in less seed production or lower quality nutrition for small herbivores including voles, mice, and thirteen-lined ground squirrel. Species such as horned lark, upland sandpiper, and white-tailed jackrabbit will increase due to the loss of the taller grass component. Brewer's sparrow and greater sage-grouse will continue to use this site where big sagebrush occurs.

The short stature of this plant community limits suitable thermal, protective and escape cover. Prey populations are reduced and are more vulnerable to raptor and mammalian predation. Predators utilizing this plant community include the coyote, American badger, red fox, and long-tailed weasel.

Extreme impairment of the ecological processes impacts off-site aquatic habitats through excessive runoff and nutrient loads. Elevated surface temperatures resulting from reduced cover and litter will greatly reduce habitat for most amphibian species, grassland birds, and mammals.

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
bluebunch wheatgrass	U P D D	P P P P	U P D D	D D D D	D D D D	U P D D	U P D D
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
plains muhly	U U D U	U U D U	U U D U	N N N N	N N N N	U U D U	U U D U
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
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
sideoats grama	U D P D	U P D D	U D P U	U P D U	U P D U	U D P U	U D P U
thickspike wheatgrass	U D D U	U D U U	U D D U	N D N N	N D 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							
American vetch	U D P U	U P P U	U D P U	U P P U	U P P U	U D P U	U P P U
aster	U U D U	U U D U	U U D U	U U D U	U U D U	U U D U	U U D U
biscuitroot	U D U U	U D D U	U D U U	U D D U	U D D U	U D U U	U D D U
bluebells	U D U U	U P P U	U D U U	U P P U	U P P U	U D U U	U P P U
Indian breadroot	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 U
milkvetch	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 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
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
rose pussytoes	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
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
stemless hymenoxys	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
sulphur-flower buckwheat	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
tapertip hawksbeard	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
western yarrow	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
white prairie 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
wild onion	U D U U	U D D U	U D U U	U D D U	U D D U	U D U U	U D D U
Shrubs							
big sagebrush	U U U U	D U U D	U N U U	P U D P	P P P P	U N U U	D U U U
Douglas rabbitbrush	D U U D	D U U D	D U U D	P U D D	P U D D	D U U D	D U U D
fourwing saltbush	P D D P	P D D P	P D D P	P D D P	P D D P	P D D P	P D D P
skunkbush sumac	D U U D	D D D D	D U U D	D U U D	D U U D	D U U D	D U U D
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
winterfat	P P P P	P P P P	P P P P	P P P P	P P P P	P P P P	P P P 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)
Needleandthread/Prairie Sandreed	1,300	0.35
Needleandthread/Threadleaf Sedge/Broom Snakeweed	850	0.20
Threadleaf Sedge/Fringed Sagewort/Yucca	550	0.10

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 and C. Infiltration ranges from moderately rapid to rapid. Runoff potential for this site varies from medium to very high depending on soil hydrologic group, slope and ground cover. In many cases, areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where 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

(060AY010SD) – Loamy 13-16" P.Z. (060AY009SD) – Sandy
(060AY041SD) – Loamy 16-18" P.Z. (060AY024SD) – Shallow Loamy

Similar Sites

(060AY024SD) – Shallow Loamy [less needleandthread & prairie sandreed; slightly higher production]

Inventory Data References

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel were also used. Those involved in developing this site description include: Everet Bainter, Range Management Specialist (RMS), NRCS; Stan Boltz, RMS, NRCS; Glen Mitchell, RMS, NRCS; and Cheryl Nielsen, 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