

United States Department of Agriculture Natural Resources Conservation Service

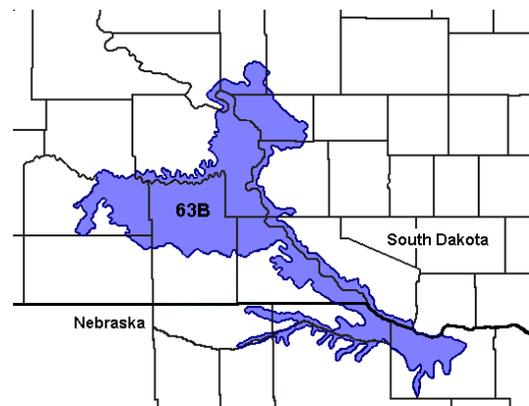
Ecological Site Description

Site Type: Rangeland

Site Name: Shallow

Site ID: R063BY024SD

Major Land Resource Area (MLRA): 63B – Southern Rolling Pierre Shale Plains



Physiographic Features

This site occurs on moderately to steeply sloping uplands.

Landform: hill, ridge

Aspect: N/A

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	1,300	2,000
Slope (percent):	9	45
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:	Medium	Very high

Climatic Features

MLRA 63B is considered to have a continental climate – cold winters and hot summers, low humidity, light rainfall, and much sunshine. Extremes in temperature may also abound. The climate is the result of this MLRA's location near the geographic center of North America. There are few natural barriers on the Northern Great Plains and air masses move freely across the plains and account for rapid changes in temperature.

Annual precipitation typically ranges from 19 to 24 inches per year. The average annual temperature is about 48°F. January is the coldest month with average temperatures ranging from about 15°F (Stephan, South Dakota (SD)), to about 22°F (Winner, SD). July is the warmest month with temperatures averaging from about 73°F (Stephan, SD), to about 76°F (Winner, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 56°F. This large annual range attests to the continental nature of this area's climate. 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 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):	130	162
Freeze-free period (days):	148	180
Mean Annual Precipitation (inches):	19	24

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

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.39	0.45	3.1	33.0
February	0.54	0.71	8.9	38.7
March	1.11	1.59	18.7	47.5
April	1.90	2.72	31.4	62.0
May	2.80	3.40	42.7	73.1
June	3.05	3.60	53.0	82.6
July	2.70	3.16	58.5	89.9
August	2.03	2.69	56.2	88.4
September	1.76	2.51	45.8	78.9
October	1.47	1.55	33.2	65.7
November	0.59	0.94	19.2	47.8
December	0.35	0.62	8.1	36.5

Climate Stations		Period	
Station ID	Location or Name	From	To
NE5040	Lynch	1948	2007
NE5960	Niobrara	1948	2005
SD7992	Stephan	1948	2007
SD9367	Winner	1948	2007

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

Riparian and Wetland Features

No riparian areas or wetland features are directly associated with this site.

Representative Soil Features

The soils in this site are well-drained and formed in residuum. The loam surface layer is four to seven inches thick. The bedrock which occurs at 10 to 20 inches is typically made up of siltstone. This forms a restrictive layer which inhibits plant roots. The soils have a moderately slow infiltration rate. 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. Subsurface soil layers are restrictive to water movement and penetration.

These soils are mainly susceptible to water erosion. The hazard of water erosion increases on slopes greater than about 15 percent. Low available water capacity and very slow permeability strongly influences the soil-water-plant relationship.

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

Parent Material Kind: residuum
Parent Material Origin: siltstone, unspecified
Surface Texture: loam
Surface Texture Modifier: none
Subsurface Texture Group: loamy
Surface Fragments ≤3” (% Cover): 0-4
Surface Fragments >3” (%Cover): 0
Subsurface Fragments ≤3” (% Volume): 0-4
Subsurface Fragments >3” (% Volume): 0

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	well	well
Permeability Class:	moderately slow	moderately slow
Depth (inches):	16	18
Electrical Conductivity (mmhos/cm)*:	0	2
Sodium Absorption Ratio*:	0	0
Soil Reaction (1:1 Water)*:	7.4	8.4
Soil Reaction (0.1M CaCl₂)*:	NA	NA
Available Water Capacity (inches)*:	3	3
Calcium Carbonate Equivalent (percent)*:	3	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, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfire (often of light intensities), 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 that will occur, severe disturbances, such as periods of well below average precipitation, can cause significant shifts in plant communities and/or species composition.

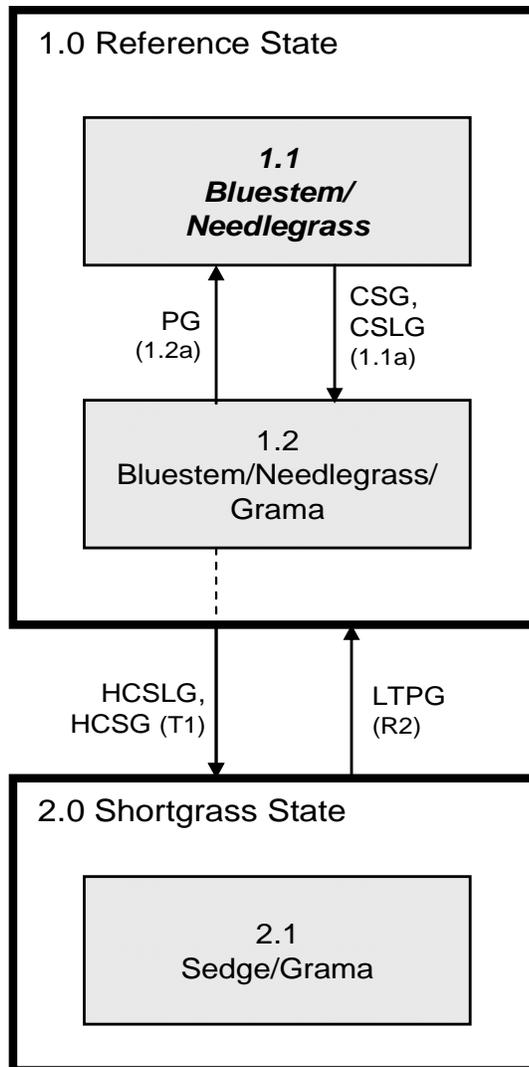
This ecological site (ES) is naturally resilient and quite resistant to change. Also, due to the relatively steep slopes and naturally low fertility of the soils, this site generally avoids more intensive disturbances such as farming. However, continuous season-long grazing (during the typical growing season of May through October) and/or repeated seasonal grazing (e.g., every spring, every summer) without adequate recovery periods following each grazing occurrence can cause this site to depart from the Bluestem/Needlegrass Plant Community. Sedges and grammas can increase and eventually develop into a sod, while many of the tall and mid-statured grasses will decrease (e.g., big bluestem, little bluestem, green needlegrass, needleandthread, porcupine grass, and western wheatgrass). Even with these disturbances, many of the tall and mid-statured grasses will remain in the community at reduced levels, allowing recovery to occur once the disturbances are removed.

Interpretations are primarily based on the Bluestem/Needlegrass Plant Community. It has been determined by study of 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 community phases, states, transitional pathways, and thresholds have been determined through similar studies and experience.

The following is a diagram that illustrates the common plant community phases that can occur on the site and the transition pathways between communities. These are the most common plant community phases based on current knowledge and experience, and changes may be made as more data is collected. Narratives following the diagram contain more detail pertaining to the ecological processes.

Plant Communities and Transitional Pathways



Refer to narrative for details on pathways: **CSG** – Continuous seasonal grazing; **CSLG** – Continuous season-long grazing; **HCSG** – Heavy continuous seasonal grazing; **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	1.1 Bluestem/Needlegrass		
			Group	lbs./acre	% Comp
GRASSES & GRASS-LIKES				1760 - 1980	80 - 90
TALL WARM-SEASON GRASSES			1	440 - 660	20 - 30
big bluestem	Andropogon gerardii	ANGE	1	330 - 660	15 - 30
prairie sandreed	Calamovilfa longifolia	CALO	1	44 - 220	2 - 10
Indiangrass	Sorghastrum nutans	SONU2	1	0 - 110	0 - 5
switchgrass	Panicum virgatum	PAVI2	1	0 - 110	0 - 5
MID WARM-SEASON GRASSES			2	330 - 660	15 - 30
little bluestem	Schizachyrium scoparium	SCSC	2	220 - 550	10 - 25
sideoats grama	Bouteloua curtipendula	BOCU	2	110 - 330	5 - 15
plains muhly	Muhlenbergia cuspidata	MUCU3	2	22 - 110	1 - 5
prairie dropseed	Sporobolus heterolepis	SPHE	2	0 - 110	0 - 5
COOL-SEASON BUNCHGRASSES			3	220 - 660	10 - 30
porcupine grass	Hesperostipa spartea	HESP11	3	0 - 550	0 - 25
green needlegrass	Nassella viridula	NAVI4	3	0 - 550	0 - 25
needleandthread	Hesperostipa comata ssp. comata	HECOC8	3	0 - 550	0 - 25
Canada wildrye	Elymus canadensis	ELCA4	3	0 - 110	0 - 5
WHEATGRASS			4	110 - 220	5 - 10
western wheatgrass	Pascopyrum smithii	PASM	4	110 - 220	5 - 10
slender wheatgrass	Elymus trachycaulus	ELTR7	4	0 - 110	0 - 5
SHORT WARM-SEASON GRASSES			5	22 - 110	1 - 5
blue grama	Bouteloua gracilis	BOGR2	5	22 - 110	1 - 5
buffalograss	Bouteloua dactyloides	BODA2	5	0 - 110	0 - 5
hairy grama	Bouteloua hirsuta	BOHI2	5	0 - 110	0 - 5
threeawn	Aristida spp.	ARIST	5	0 - 44	0 - 2
OTHER NATIVE GRASSES			6	22 - 110	1 - 5
prairie junegrass	Koeleria macrantha	KOMA	6	22 - 66	1 - 3
Scribner panicum	Dichanthelium oligosanthes var. scribnerianum	DIOLS	6	0 - 44	0 - 2
other grasses		2GRAM	6	0 - 110	0 - 5
GRASS-LIKES			7	22 - 110	1 - 5
threadleaf sedge	Carex filifolia	CAFI	7	22 - 110	1 - 5
other grass-likes		2GL	7	0 - 66	0 - 3
FORBS			8	110 - 220	5 - 10
catclaw sensitive briar	Mimosa nuttallii	MINU6	8	22 - 44	1 - 2
compassplant	Silphium laciniatum	SILA3	8	0 - 44	0 - 2
cudweed sagewort	Artemisia ludoviciana	ARLU	8	22 - 44	1 - 2
cutleaf ironplant	Machaeranthera pinnatifida	MAPI	8	0 - 22	0 - 1
dotted gayfeather	Liatris punctata	LIPU	8	22 - 44	1 - 2
goldenrod	Solidago spp.	SOLID	8	22 - 44	1 - 2
green sagewort	Artemisia campestris	ARCA12	8	0 - 44	0 - 2
heath aster	Symphotrichum ericoides	SYER	8	22 - 44	1 - 2
Indian breadroot	Pediomelum esculentum	PEES	8	0 - 44	0 - 2
Lambert crazyweed	Oxytropis lambertii	OXLA3	8	0 - 22	0 - 1
penstemon	Penstemon spp.	PENST	8	0 - 44	0 - 2
prairie coneflower	Ratibida columnifera	RACO3	8	22 - 44	1 - 2
purple coneflower	Echinacea angustifolia	ECAN2	8	22 - 44	1 - 2
purple prairie clover	Dalea purpurea	DAPU5	8	22 - 44	1 - 2
scurfpea	Psoraleidum spp.	PSORA2	8	22 - 44	1 - 2
serrateleaf eveningprimrose	Calylophus serrulatus	CASE12	8	0 - 22	0 - 1
stiff sunflower	Helianthus pauciflorus	HEPA19	8	22 - 44	1 - 2
western ragweed	Ambrosia psilostachya	AMPS	8	0 - 22	0 - 1
native forbs		2FN	8	22 - 88	1 - 4
SHRUBS			9	22 - 110	1 - 5
fringed sagewort	Artemisia frigida	ARFR4	9	0 - 44	0 - 2
leadplant	Amorpha canescens	AMCA6	9	22 - 66	1 - 3
plains pricklypear	Opuntia polyacantha	OPPO	9	0 - 22	0 - 1
rose	Rosa spp.	ROSA5	9	22 - 44	1 - 2
skunkbush sumac	Rhus trilobata	RHTR	9	0 - 22	0 - 1
smooth sumac	Rhus glabra	RHGL	9	0 - 22	0 - 1
snowberry	Symphoricarpos spp.	SYMPH	9	22 - 44	1 - 2
yucca	Yucca glauca	YUGL	9	0 - 44	0 - 2
other shrubs		2SHRUB	9	0 - 44	0 - 2

Annual Production lbs./acre	LOW	RV	HIGH
GRASSES & GRASS-LIKES	1280 -	1969	-2430
FORBS	100 -	165	-250
SHRUBS	20 -	66	-120
TOTAL	1400 -	2200	-2800

This list of plants and their relative proportions are based on near normal years. Fluctuations in species composition and relative production may change from year to year dependent upon precipitation or other climatic factors. RV = Representative value.

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SYMBOL	1.1 Bluestem/Needlegrass			1.2 Bluestem/Needleandthread/Grama			2.1 Sedge/Grama		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
GRASSES & GRASS-LIKES			1760 - 1980	80 - 90		1125 - 1350	75 - 90		675 - 765	75 - 85
TALL WARM-SEASON GRASSES		1	440 - 660	20 - 30	1	75 - 225	5 - 15	1	9 - 45	1 - 5
big bluestem	ANGE	1	330 - 660	15 - 30	1	75 - 225	5 - 15	1	9 - 45	1 - 5
prairie sandreed	CALO	1	44 - 220	2 - 10	1	0 - 75	0 - 5	1	0 - 18	0 - 2
Indiangrass	SONU2	1	0 - 110	0 - 5	1	0 - 30	0 - 2			
switchgrass	PAVI2	1	0 - 110	0 - 5	1	0 - 30	0 - 2			
MID WARM-SEASON GRASSES		2	330 - 660	15 - 30	2	225 - 375	15 - 25	2	18 - 90	2 - 10
little bluestem	SCSC	2	220 - 550	10 - 25	2	150 - 300	10 - 20	2	0 - 72	0 - 8
sideoats grama	BOCU	2	110 - 330	5 - 15	2	75 - 225	5 - 15	2	18 - 90	2 - 10
plains muhly	MUCU3	2	22 - 110	1 - 5	2	0 - 30	0 - 2			
prairie dropseed	SPHE	2	0 - 110	0 - 5						
COOL-SEASON BUNCHGRASSES		3	220 - 660	10 - 30	3	75 - 300	5 - 20	3	0 - 45	0 - 5
porcupine grass	HESP11	3	0 - 550	0 - 25	3	0 - 75	0 - 5			
green needlegrass	NAVI4	3	0 - 550	0 - 25	3	0 - 75	0 - 5			
needleandthread	HECOC8	3	0 - 550	0 - 25	3	75 - 300	5 - 20	3	0 - 45	0 - 5
Canada wildrye	ELCA4	3	0 - 110	0 - 5						
WHEATGRASS		4	110 - 220	5 - 10	4	0 - 75	0 - 5	4	0 - 45	0 - 5
western wheatgrass	PASM	4	110 - 220	5 - 10	4	0 - 75	0 - 5	4	0 - 45	0 - 5
slender wheatgrass	ELTR7	4	0 - 110	0 - 5						
SHORT WARM-SEASON GRASSES		5	22 - 110	1 - 5	5	150 - 300	10 - 20	5	180 - 315	20 - 35
blue grama	BOGR2	5	22 - 110	1 - 5	5	75 - 225	5 - 15	5	135 - 270	15 - 30
buffalograss	BODA2	5	0 - 110	0 - 5	5	0 - 120	0 - 8	5	9 - 90	1 - 10
hairy grama	BOHI2	5	0 - 110	0 - 5	5	0 - 150	0 - 10	5	0 - 45	0 - 5
threawn	ARIST	5	0 - 44	0 - 2	5	15 - 75	1 - 5	5	18 - 90	2 - 10
OTHER NATIVE GRASSES		6	22 - 110	1 - 5	6	15 - 75	1 - 5	6	9 - 45	1 - 5
prairie junegrass	KOMA	6	22 - 66	1 - 3	6	15 - 45	1 - 3	6	9 - 18	1 - 2
Scribner panicum	DIOLS	6	0 - 44	0 - 2	6	0 - 30	0 - 2	6	0 - 18	0 - 2
other grasses	2GRAM	6	0 - 110	0 - 5	6	0 - 75	0 - 5	6	0 - 45	0 - 5
GRASS-LIKES		7	22 - 110	1 - 5	7	75 - 225	5 - 15	7	135 - 315	15 - 35
threadleaf sedge	CAFI	7	22 - 110	1 - 5	7	75 - 225	5 - 15	7	135 - 315	15 - 35
other grass-likes	2GL	7	0 - 66	0 - 3	7	0 - 75	0 - 5	7	0 - 90	0 - 10
FORBS		8	110 - 220	5 - 10	8	75 - 225	5 - 15	8	45 - 90	5 - 10
catclaw sensitive briar	MINU6	8	22 - 44	1 - 2	8	0 - 15	0 - 1			
compassplant	SILA3	8	0 - 44	0 - 2						
cutweed sagewort	ARLU	8	22 - 44	1 - 2	8	15 - 60	1 - 4	8	9 - 27	1 - 3
cutleaf ironplant	MAPI	8	0 - 22	0 - 1	8	0 - 15	0 - 1			
dotted gayfeather	LIPU	8	22 - 44	1 - 2	8	15 - 30	1 - 2	8	0 - 9	0 - 1
goldenrod	SOLID	8	22 - 44	1 - 2	8	15 - 45	1 - 3	8	9 - 18	1 - 2
green sagewort	ARCA12	8	0 - 44	0 - 2	8	15 - 45	1 - 3	8	9 - 36	1 - 4
heath aster	SYER	8	22 - 44	1 - 2	8	15 - 45	1 - 3	8	9 - 18	1 - 2
Indian breadroot	PEES	8	0 - 44	0 - 2	8	0 - 15	0 - 1			
Lambert crazyweed	OXLA3	8	0 - 22	0 - 1	8	0 - 15	0 - 1			
penstemon	PENST	8	0 - 44	0 - 2	8	0 - 15	0 - 1			
prairie coneflower	RACO3	8	22 - 44	1 - 2	8	15 - 30	1 - 2	8	0 - 9	0 - 1
purple coneflower	ECAN2	8	22 - 44	1 - 2	8	0 - 15	0 - 1			
purple prairie clover	DAPU5	8	22 - 44	1 - 2	8	0 - 15	0 - 1			
scurfpea	PSORA2	8	22 - 44	1 - 2	8	15 - 45	1 - 3	8	0 - 9	0 - 1
serrateleaf eveningprimrose	CASE12	8	0 - 22	0 - 1						
stiff sunflower	HEPA19	8	22 - 44	1 - 2	8	0 - 15	0 - 1			
western ragweed	AMPS	8	0 - 22	0 - 1	8	0 - 45	0 - 3	8	9 - 27	1 - 3
native forbs	2FN	8	22 - 88	1 - 4	8	15 - 75	1 - 5	8	9 - 45	1 - 5
introduced forbs	2FI				8	0 - 45	0 - 3	8	0 - 36	0 - 4
SHRUBS		9	22 - 110	1 - 5	9	75 - 150	5 - 10	9	45 - 135	5 - 15
fringed sagewort	ARFR4	9	0 - 44	0 - 2	9	15 - 60	1 - 4	9	18 - 54	2 - 6
leadplant	AMCA6	9	22 - 66	1 - 3	9	0 - 15	0 - 1			
plains pricklypear	OPPO	9	0 - 22	0 - 1	9	0 - 30	0 - 2	9	9 - 36	1 - 4
rose	ROSA5	9	22 - 44	1 - 2	9	15 - 30	1 - 2	9	9 - 18	1 - 2
skunkbush sumac	RHTR	9	0 - 22	0 - 1	9	0 - 15	0 - 1	9	0 - 9	0 - 1
smooth sumac	RHGL	9	0 - 22	0 - 1	9	0 - 45	0 - 3	9	0 - 36	0 - 4
snowberry	SYMPH	9	22 - 44	1 - 2	9	15 - 45	1 - 3	9	9 - 45	1 - 5
yucca	YUGL	9	0 - 44	0 - 2	9	15 - 45	1 - 3	9	9 - 45	1 - 5
other shrubs	2SHRUB	9	0 - 44	0 - 2	9	0 - 30	0 - 2	9	0 - 45	0 - 5
Annual Production lbs./acre			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH	
GRASSES & GRASS-LIKES			1280 - 1969 - 2430		860 - 1238 - 1680		520 - 743 - 1155			
FORBS			100 - 165 - 250		70 - 150 - 255		40 - 68 - 95			
SHRUBS			20 - 66 - 120		70 - 113 - 165		40 - 90 - 150			
TOTAL			1400 - 2200 - 2800		1000 - 1500 - 2100		600 - 900 - 1400			

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

Reference State (State 1)

This state represents the natural range of variability that dominates the dynamics of this ES. This state is dominated by warm-season grasses. In pre-European times, the primary disturbance mechanisms for this site in the reference condition included relatively frequent fire and grazing by large herding ungulates. Timing of fires and grazing coupled with weather events dictated the dynamics that occurred within the natural range of variability. Today, this state can be found on areas that are properly managed with grazing and/or prescribed burning, and sometimes on areas receiving occasional short periods of rest. The dominant tall and mid-grass species can decline and a corresponding increase in short statured species will occur.

1.1 Bluestem/Needlegrass Plant Community Phase

Interpretations are based primarily on the Bluestem/Needlegrass Plant Community Phase (this is also considered to be climax). The potential vegetation is about 80 percent grasses or grass-like plants, 10 percent forbs, and 10 percent shrubs. The community is dominated by tall and mid warm-season grasses, and needlegrasses. The major grasses include big bluestem, little bluestem, porcupine grass, needleandthread, green needlegrass, and sideoats grama. Other grass and grass-like species include prairie sandreed, western wheatgrass, blue grama, sedges, switchgrass, Indiangrass, Canada wildrye, and buffalograss. This plant community is resilient and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allows for high drought tolerance. This is a sustainable plant community in regards to site/soil stability, watershed function, and biologic integrity.

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: SD6304

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:

- 1.1a – Continuous seasonal grazing (grazing at moderate to heavy stocking levels at the same time of year each year), continuous season-long grazing (grazing at light to moderate stocking levels for the entire growing season), or a combination of disturbances such as extended periods of below average precipitation coupled with periodic heavy grazing will shift this community to the *1.2 Bluestem/Needlegrass/Grama Plant Community Phase*. In all cases, recovery periods are inadequate for health and vigor of dominant grass species.

1.2 Bluestem/Needlegrass/Grama Plant Community Phase

This plant community developed under continuous seasonal grazing, continuous season-long grazing, or from over utilization during extended drought periods. This community can also develop where this site occurs near to water sources. The potential plant community is made up of approximately 75 percent grasses and grass-like species, 15 percent forbs, and 10 percent shrubs. Dominant grass and grass-like species include little bluestem, needleandthread, big bluestem, sideoats grama, blue grama, and threadleaf sedge. Grasses of secondary importance include green needlegrass, porcupine grass, hairy grama, western wheatgrass, and buffalograss. Forbs commonly found in this plant community include cudweed sagewort, goldenrod, heath aster, scurfpea, and western ragweed.

When compared to the Bluestem/Needlegrass Plant Community Phase (1.1), blue grama, sideoats grama, sedge, and buffalograss have increased. Tall warm-season grasses have decreased and production has also been reduced. Needleandthread will persist in this phase. This plant community is moderately resistant to change. This is due in part to the shallow rooted nature of the shortgrass species which decreases infiltration especially to the deeper rooted tall and mid-grass species. The herbaceous species present are well adapted to grazing; however, species composition can be altered through continued overgrazing. If the herbaceous component is intact, it tends to be resilient if the disturbance is not long-term.

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: SD6304

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:

- T1 – Heavy continuous seasonal grazing (stocking levels well above carrying capacity for extended portions of the growing season, and at the same time of year each year, typically beginning early in the season) or heavy continuous season-long grazing will convert this plant community to the *2.1 Sedge/Grama Plant Community Phase* and the *Shortgrass State*.
- 1.2a – Prescribed grazing (alternating season of use and providing adequate recovery periods) or periodic light to moderate grazing possibly including periodic rest will convert this plant community to the *1.1 Bluestem/Needlegrass Plant Community Phase*.

2.1 Sedge/Grama Plant Community

This plant community evolved under heavy continuous seasonal grazing, heavy continuous season-long grazing, or from over utilization during extended drought periods. The potential plant community is made up of approximately 75 percent grasses and grass-like species, 10 percent forbs, and 15 percent shrubs. Dominant grass and grass-like species include threadleaf sedge, blue grama, sideoats grama, threeawn, and buffalograss. Grasses of secondary importance include big bluestem, little bluestem, western wheatgrass, and needleandthread. Forbs commonly found in this plant community include cudweed sagewort, green sagewort, and western ragweed. When compared to the Bluestem/Needlegrass Plant Community Phase (1.1), short-statured species are dominant on this plant community. Tall and mid-grasses have decreased significantly. This vegetation state is very resistant to change due to the increase in the root mat near the surface of the soil which further reduces infiltration. The herbaceous species present are well adapted to grazing; however, composition can be altered through long-term prescribed grazing.

This plant community is less productive than other plant community phases. The thick sod prevents other species from getting established. Lack of litter and reduced plant vigor causes higher soil temperatures, poor water infiltration rates, and high evapotranspiration which gives the short statured species a competitive advantage. Soil erosion will be minimal due to the sod forming habit of dominant species in this phase.

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: SD6304

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 recovery pathways leading to other plant communities are as follows:

- R2 – Long-term prescribed grazing (moderate stocking levels coupled with adequate recovery periods, or other grazing systems such as high-density, low-frequency intended to treat specific species dominance, or periodic light to moderate stocking levels possibly including periodic rest) may lead this plant community phase over a threshold to the *1.0 Reference State*. This will likely take a long period of time, possibly up to 10 years or more, and recovery may not be attainable. Under certain circumstances, the harsh conditions created by the shortgrass sod can lead to the elimination of invasive grass species such as Kentucky bluegrass.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

-- Under Development --

Bluestem/Needlegrass Plant Community Phase (1.1):

Bluestem/Needlegrass/Grama Plant Community Phase (1.2):

Sedge/Grama Plant Community Phase (2.1):

Animal Preferences (Quarterly – 1,2,3,4†)

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
Grasses and Grass-likes							
big bluestem	U D P D	U D U U	U D P D	U D U U	U D U U	U D P D	U D P D
blue grama	U D P U	D P P D	U D P U	D P P D	D P P D	U D P U	U D P U
buffalograss	U U D U	N U D U	U U D U	N U D U	N U D U	U U D U	U U D U
Canada wildrye	U D U U	N U N N	U D U U	N U N N	N U N N	U D U U	U D U U
green needlegrass	U P U D	N P N P	U P U D	N P N P	N P N P	U P U D	U P U D
hairy 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
Indiangrass	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
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
plains muhly	U U D U	U U D U	U U D U	N N N N	N N N N	U U D U	U U D U
porcupine grass	U P U D	N D N U	U P U D	N D N U	N D N U	U P U D	U P U D
prairie dropseed	N U P U	N U D U	N U P U	N U D U	N U D U	N U P U	N U P 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
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
sideoats grama	U D P U	U P D U	U D P U	U P D U	U P D U	U D P U	U D P U
slender wheatgrass	U P U U	N D U N	U P U U	N D U N	N D U N	U P U U	U P U U
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 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
threeawn	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
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							
catclaw sensitive briar	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
compassplant	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
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
goldenrod	U U D U	N U U N	U U D U	N U U N	N U U N	U U D U	N U U N
green sagewort	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U
heath aster	U U D U	U U P U	U U D U	U U P U	U U P U	U U D U	U U P U
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
Lambert crazyweed	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
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
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
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
serrateleaf eveningprimrose	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
stiff sunflower	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U
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
Shrubs							
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
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
skunkbush sumac	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 U D
smooth sumac	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
snowberry	U U U U	U U U U	U U U U	D U D D	U U U U	U U U U	D U U U
yucca	D N N D	D U U D	D N N D	D U U D	D U U D	D N N D	D U U D

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

† 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 ES 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)
Bluestem/Needlegrass (1.1)	2,200	0.60
Bluestem/Needlegrass/Grama (1.2)	1,500	0.41
Sedge/Grama (2.1)	900	0.25

*Based on 912 lbs./acre (air-dry weight) per Animal Unit Month (AUM), and on 25 percent harvest efficiency (refer to United States Department of Agriculture (USDA) Natural Resources Conservation Service (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 D. Infiltration is moderately slow and runoff potential for this site varies from high 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 higher infiltration and lower runoff. An example of an exception would be where shortgrasses form a strong sod and dominate the site. Dominance by blue grama, buffalograss, and/or sedge will result in reduced infiltration and increased runoff. 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, hiking, photography, bird watching, and other opportunities. The wide varieties of plants that 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 (R063BY010SD), Thin Upland (R063BY012SD), Clayey (R063BY011SD)

Similar Sites

(R063BY011SD) – Clayey [less big bluestem; higher production]
(R063BY010SD) – Loamy [less little bluestem, less big bluestem, higher production]
(R063BY012SD) – Thin Upland [more little bluestem, less needlegrass, 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 include: April Boltjes, Range Management Specialist (RMS), NRCS; Stan Boltz, RMS, NRCS; and Dana Larsen, RMS, NRCS.

<u>Data Source</u>	<u>Number of Records</u>	<u>Sample Period</u>	<u>State</u>	<u>County</u>
SCS-RANGE-417	5	1971 – 1982	NE, SD	Boyd, Knox, and Tripp

State Correlation

This site has been correlated with Nebraska (NE) and SD in MLRA 63B.

Field Offices/Counties

Ainsworth, NE	Keya Paha/Rock	Highmore, SD	Hyde	Pierre, SD	Hughes
Bloomfield, NE	Knox	Kennebec, SD	Lyman	Spencer, NE	Boyd
Burke, SD	Gregory	Lake Andes, SD	Charles Mix	White River, SD	Todd/Mellette
Chamberlain, SD	Brule/Buffalo	O'Neill, NE	Holt		

Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 42h - Southern River Breaks.

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://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.

Site Description Approval

SD, State Range Management Specialist

Date

NE, State Range Management Specialist

Date