

# United States Department of Agriculture Natural Resources Conservation Service

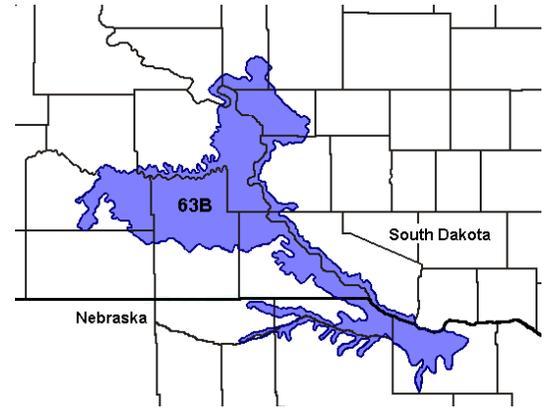
## Ecological Site Description

**Site Type:** Rangeland

**Site Name:** Thin Upland

**Site ID:** R063BY012SD

**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, valley

**Aspect:** N/A

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	1,300	2,000
<b>Slope (percent):</b>	4	33
<b>Water Table Depth (inches):</b>	None	None
<b>Flooding:</b>		
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Ponding:</b>		
<b>Depth (inches):</b>	None	None
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Runoff Class:</b>	Low	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>
<b>Frost-free period (days):</b>	130	162
<b>Freeze-free period (days):</b>	148	180
<b>Mean Annual Precipitation (inches):</b>	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 features common to soils in this site are the clay to loam textured surface layers and slopes of 4 to 33 percent. The soils in this site are well-drained and formed in residuum from shale, or from glacial till, alluvium, or loess. The surface layer is three to eight inches thick. The texture of the subsurface layers ranges from clay to very fine sandy loam. The soils have a moderate to very slow infiltration rate. These soils are typically calcareous at or near the surface; however, carbonates are not always distinguishable in the upper layers. The soil profile should show evidence of weak development (i.e., thin A horizon, pale colors, lack of argillic horizon). 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.

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:** residuum, glacial till, alluvium, or loess

**Parent Material Origin:** sedimentary, unspecified

**Surface Texture:** loam, silt loam, silty clay

**Surface Texture Modifier:** none

**Subsurface Texture Group:** loamy

**Surface Fragments ≤3" (% Cover):** 0-9

**Surface Fragments >3" (%Cover):** 0-3

**Subsurface Fragments ≤3" (% Volume):** 0-11

**Subsurface Fragments >3" (% Volume):** 0-3

	<u>Minimum</u>	<u>Maximum</u>
<b>Drainage Class:</b>	well	well
<b>Permeability Class:</b>	very slow	moderate
<b>Depth (inches):</b>	24	80
<b>Electrical Conductivity (mmhos/cm)*:</b>	0	2
<b>Sodium Absorption Ratio*:</b>	0	3
<b>Soil Reaction (1:1 Water)*:</b>	6.6	9.0
<b>Soil Reaction (0.1M CaCl<sub>2</sub>)*:</b>	NA	NA
<b>Available Water Capacity (inches)*:</b>	4	8
<b>Calcium Carbonate Equivalent (percent)*:</b>	10	40

\*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.

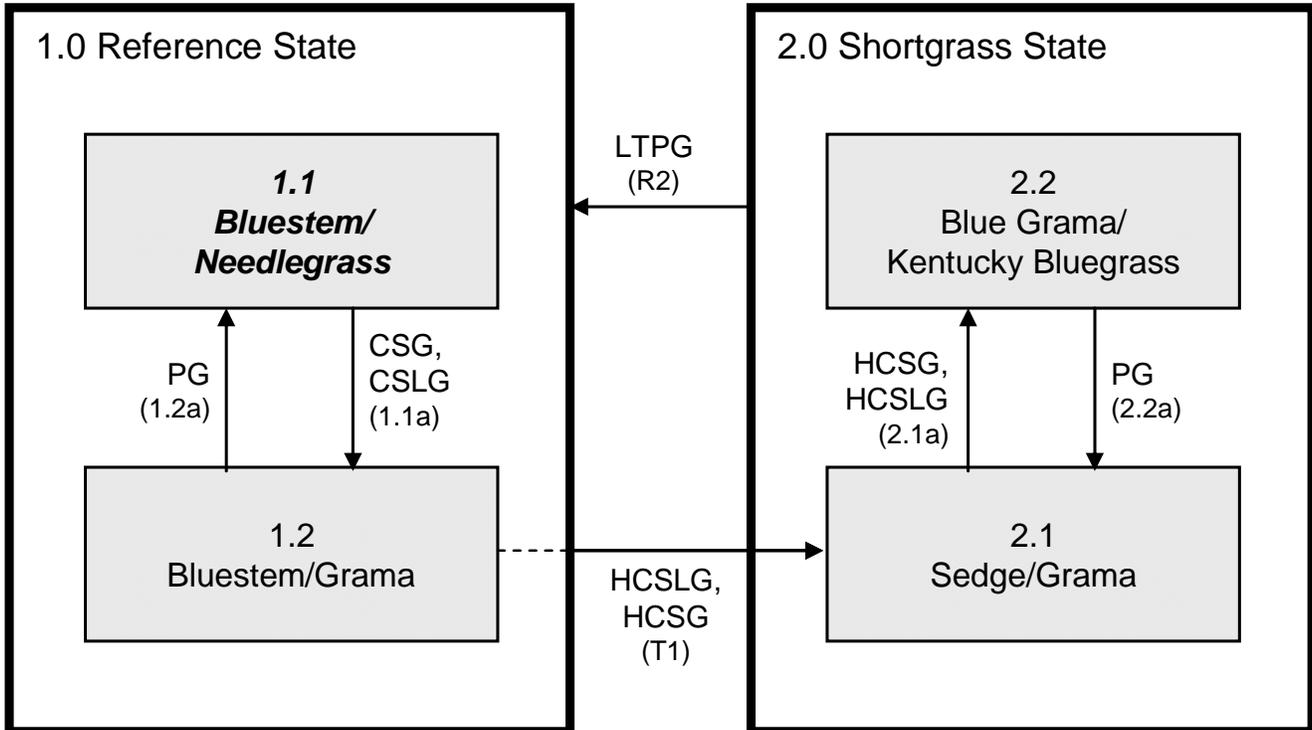
This ecological site (ES) is naturally resilient, and quite resistant to change. Also, due to the relatively steep slopes and naturally low fertility of the soils, this site generally avoids more intensive disturbances such as farming. However, continuous season-long grazing (during the typical growing 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, switchgrass, 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
<b>GRASSES &amp; GRASS-LIKES</b>				2040 - 2280	85 - 95
<b>TALL WARM-SEASON GRASSES</b>			1	480 - 960	20 - 40
big bluestem	Andropogon gerardii	ANGE	1	360 - 840	15 - 35
switchgrass	Panicum virgatum	PAVI2	1	48 - 240	2 - 10
Indiangrass	Sorghastrum nutans	SONU2	1	0 - 120	0 - 5
prairie sandreed	Calamovilfa longifolia	CALO	1	0 - 120	0 - 5
tall dropseed	Sporobolus compositus var. compositus	SPCOC2	1	0 - 72	0 - 3
<b>MID WARM-SEASON GRASSES</b>			2	360 - 720	15 - 30
little bluestem	Schizachyrium scoparium	SCSC	2	240 - 600	10 - 25
sideoats grama	Bouteloua curtipendula	BOCU	2	120 - 360	5 - 15
prairie dropseed	Sporobolus heterolepis	SPHE	2	0 - 120	0 - 5
<b>COOL-SEASON BUNCHGRASSES</b>			3	240 - 360	10 - 15
needleandthread	Hesperostipa comata ssp. comata	HECOC8	3	48 - 240	2 - 10
green needlegrass	Nassella viridula	NAVI4	3	48 - 240	2 - 10
porcupine grass	Hesperostipa spartea	HESP11	3	48 - 240	2 - 10
Canada wildrye	Elymus canadensis	ELCA4	3	0 - 120	0 - 5
<b>WHEATGRASS</b>			4	120 - 240	5 - 10
western wheatgrass	Pascopyrum smithii	PASM	4	120 - 240	5 - 10
<b>SHORT WARM-SEASON GRASSES</b>			5	48 - 240	2 - 10
blue grama	Bouteloua gracilis	BOGR2	5	48 - 192	2 - 8
buffalograss	Bouteloua dactyloides	BODA2	5	0 - 120	0 - 5
sand dropseed	Sporobolus cryptandrus	SPCR	5	0 - 120	0 - 5
<b>OTHER NATIVE GRASSES</b>			6	24 - 120	1 - 5
prairie junegrass	Koeleria macrantha	KOMA	6	24 - 72	1 - 3
Scribner panicum	Dichantherium oligosanthes var. scribnerianum	DIOLS	6	0 - 48	0 - 2
Wilcox panicum	Dichantherium wilcoxianum	DIWI5	6	0 - 48	0 - 2
other grasses		2GRAM	6	0 - 120	0 - 5
<b>GRASS-LIKES</b>			7	24 - 120	1 - 5
sedge	Carex spp.	CAREX	7	24 - 120	1 - 5
other grass-likes		2GL	7	0 - 72	0 - 3
<b>FORBS</b>			9	120 - 240	5 - 10
American pasqueflower	Pulsatilla patens ssp. multifida	PUPAM	9	0 - 48	0 - 2
American vetch	Vicia americana	VIAM	9	0 - 24	0 - 1
catclaw sensitive briar	Mimosa nuttallii	MINU6	9	0 - 24	0 - 1
cutweed sagewort	Artemisia ludoviciana	ARLU	9	0 - 48	0 - 2
dotted gayfeather	Liatris punctata	LIPU	9	24 - 48	1 - 2
goldenrod	Solidago spp.	SOLID	9	24 - 48	1 - 2
heath aster	Symphotrichum ericoides	SYER	9	24 - 48	1 - 2
Indian breadroot	Pediomelum esculentum	PEES	9	0 - 24	0 - 1
Lambert crazyweed	Oxytropis lambertii	OXLA3	9	0 - 24	0 - 1
prairie coneflower	Ratibida columnifera	RACO3	9	24 - 48	1 - 2
prairie spiderwort	Tradescantia occidentalis	TROC	9	0 - 24	0 - 1
purple coneflower	Echinacea angustifolia	ECAN2	9	24 - 48	1 - 2
purple prairie clover	Dalea purpurea	DAPU5	9	0 - 48	0 - 2
scarlet gaura	Gaura coccinea	GACO5	9	0 - 24	0 - 1
scurfpea	Psoraleidum spp.	PSORA2	9	24 - 48	1 - 2
stiff sunflower	Helianthus pauciflorus	HEPA19	9	24 - 48	1 - 2
wavyleaf thistle	Cirsium undulatum	CIUN	9	0 - 48	0 - 2
western ragweed	Ambrosia psilostachya	AMPS	9	0 - 48	0 - 2
native forbs		2FN	9	24 - 72	1 - 3
<b>SHRUBS</b>			10	24 - 120	1 - 5
fringed sagewort	Artemisia frigida	ARFR4	10	0 - 24	0 - 1
leadplant	Amorpha canescens	AMCA6	10	24 - 72	1 - 3
plains pricklypear	Opuntia polyacantha	OPPO	10	0 - 24	0 - 1
rose	Rosa spp.	ROSA5	10	24 - 48	1 - 2
smooth sumac	Rhus glabra	RHGL	10	0 - 24	0 - 1
western snowberry	Symphoricarpos occidentalis	SYOC	10	24 - 48	1 - 2
yucca	Yucca glauca	YUGL	10	0 - 24	0 - 1
other shrubs		2SHRUB	10	0 - 48	0 - 2

Annual Production lbs./acre	LOW	RV	HIGH
<b>GRASSES &amp; GRASS-LIKES</b>	1475 -	2148	- 2795
<b>FORBS</b>	105 -	180	- 275
<b>SHRUBS</b>	20 -	72	- 130
<b>TOTAL</b>	1600 -	2400	- 3200

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/Grama			2.1 Sedge/Grama			2.2 Blue Grama/ Kentucky Bluegrass		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
<b>GRASSES &amp; GRASS-LIKES</b>			2040 - 2280	85 - 95		1520 - 1710	80 - 90		1020 - 1140	85 - 95		680 - 760	85 - 95
<b>TALL WARM-SEASON GRASSES</b>		1	480 - 960	20 - 40	1	95 - 285	5 - 15	1	12 - 120	1 - 10	1	0 - 40	0 - 5
big bluestem	ANGE	1	360 - 960	15 - 40	1	38 - 285	2 - 15	1	12 - 84	1 - 7	1	0 - 40	0 - 5
switchgrass	PAV12	1	48 - 240	2 - 10	1	0 - 95	0 - 5						
Indiangrass	SONU2	1	0 - 120	0 - 5									
prairie sandreed	CALO	1	0 - 120	0 - 5	1	0 - 38	0 - 2						
tall dropseed	SPCOC2	1	0 - 72	0 - 3	1	0 - 95	0 - 5	1	0 - 60	0 - 5			
<b>MID WARM-SEASON GRASSES</b>		2	360 - 720	15 - 30	2	285 - 570	15 - 30	2	60 - 240	5 - 20	2	0 - 80	0 - 10
little bluestem	SCSC	2	240 - 600	10 - 25	2	38 - 190	2 - 10	2	0 - 60	0 - 5			
sideoats grama	BOCU	2	120 - 360	5 - 15	2	190 - 475	10 - 25	2	60 - 240	5 - 20	2	0 - 80	0 - 10
prairie dropseed	SPHE	2	0 - 120	0 - 5	2	0 - 19	0 - 1						
<b>COOL-SEASON BUNCHGRASSES</b>		3	240 - 360	10 - 15	3	0 - 190	0 - 10	3	0 - 60	0 - 5	3		
green needlegrass	NAV14	3	0 - 360	0 - 15	3	0 - 95	0 - 5	3	0 - 36	0 - 3			
needleandthread	HECOC8	3	0 - 360	0 - 15	3	0 - 95	0 - 5	3	0 - 36	0 - 3			
porcupine grass	HEBP11	3	0 - 360	0 - 15	3	0 - 95	0 - 5						
Canada wildrye	ELCA4	3	0 - 120	0 - 5									
<b>WHEATGRASS</b>		4	120 - 240	5 - 10	4	19 - 133	1 - 7	4	0 - 60	0 - 5	4	0 - 160	0 - 20
western wheatgrass	PASM	4	120 - 240	5 - 10	4	19 - 133	1 - 7	4	0 - 60	0 - 5	4	0 - 160	0 - 20
<b>SHORT WARM-SEASON GRASSES</b>		5	48 - 240	2 - 10	5	95 - 380	5 - 20	5	240 - 360	20 - 30	5	120 - 200	15 - 25
blue grama	BOGR2	5	48 - 192	2 - 8	5	95 - 285	5 - 15	5	180 - 300	15 - 25	5	80 - 200	10 - 25
buffalograss	BODA2	5	0 - 120	0 - 5	5	0 - 133	0 - 7	5	0 - 120	0 - 10	5	0 - 80	0 - 10
sand dropseed	SPCR	5	0 - 120	0 - 5	5	0 - 95	0 - 5	5	12 - 120	1 - 10	5	16 - 80	2 - 10
<b>OTHER NATIVE GRASSES</b>		6	24 - 120	1 - 5	6	19 - 95	1 - 5	6	12 - 60	1 - 5	6	8 - 40	1 - 5
prairie junegrass	KOMA	6	24 - 72	1 - 3	6	19 - 57	1 - 3	6	12 - 24	1 - 2	6	8 - 24	1 - 3
Scribner panicum	DIOLS	6	0 - 48	0 - 2	6	0 - 57	0 - 3	6	0 - 24	0 - 2	6	0 - 16	0 - 2
Wilcox panicum	DIWI5	6	0 - 48	0 - 2	6	0 - 57	0 - 3	6	0 - 24	0 - 2	6	0 - 16	0 - 2
other grasses	ZGRAM	6	0 - 120	0 - 5	6	0 - 95	0 - 5	6	0 - 60	0 - 5	6	0 - 40	0 - 5
<b>GRASS-LIKES</b>		7	24 - 120	1 - 5	7	95 - 228	5 - 12	7	120 - 360	10 - 30	7	80 - 200	10 - 25
sedge	CAREX	7	24 - 120	1 - 5	7	95 - 228	5 - 12	7	120 - 360	10 - 30	7	80 - 200	10 - 25
other grass-likes	ZGL	7	0 - 72	0 - 3	7	0 - 57	0 - 3	7	0 - 60	0 - 5	7	0 - 24	0 - 3
<b>NON-NATIVE GRASSES</b>		8			8	0 - 19	0 - 1	8	24 - 120	2 - 10	8	40 - 200	5 - 25
annual bromegrass	BROMU	8			8	0 - 19	0 - 1	8	12 - 120	1 - 10	8	16 - 120	2 - 15
bluegrass	POA				8	0 - 19	0 - 1	8	12 - 120	1 - 10	8	24 - 160	3 - 20
<b>FORBS</b>		9	120 - 240	5 - 10	9	95 - 285	5 - 15	9	60 - 120	5 - 10	9	40 - 80	5 - 10
American pasqueflower	PUPAM	9	0 - 48	0 - 2									
American vetch	VIAM	9	0 - 24	0 - 1									
catclaw sensitive briar	MINU6	9	0 - 24	0 - 1									
cudweed sagewort	ARLU	9	0 - 48	0 - 2	9	19 - 57	1 - 3	9	12 - 36	1 - 3	9	0 - 16	0 - 2
dotted gayfeather	LIPU	9	24 - 48	1 - 2	9	0 - 38	0 - 2						
field pennycress	THAR5				9	0 - 19	0 - 1	9	0 - 24	0 - 2	9	0 - 24	0 - 3
goldenrod	SOLID	9	24 - 48	1 - 2	9	19 - 57	1 - 3	9	12 - 36	1 - 3	9	8 - 24	1 - 3
heath aster	SYER	9	24 - 48	1 - 2	9	19 - 57	1 - 3	9	12 - 24	1 - 2	9	0 - 16	0 - 2
Indian breadroot	PEES	9	0 - 24	0 - 1									
koaia	KOSC				9	0 - 38	0 - 2	9	0 - 36	0 - 3	9	0 - 40	0 - 5
Lambert crazyweed	OXLA3	9	0 - 24	0 - 1									
prairie coneflower	RACO3	9	24 - 48	1 - 2	9	19 - 38	1 - 2	9	0 - 12	0 - 1			
prairie spiderwort	TROC	9	0 - 24	0 - 1									
purple coneflower	ECAN2	9	24 - 48	1 - 2	9	0 - 19	0 - 1						
purple prairie clover	DAPU5	9	0 - 48	0 - 2	9	0 - 19	0 - 1						
scarlet gaura	GACO5	9	0 - 24	0 - 1									
scurphea	PSORA2	9	24 - 48	1 - 2	9	19 - 57	1 - 3	9	12 - 24	1 - 2	9	0 - 16	0 - 2
stiff sunflower	HEPA19	9	24 - 48	1 - 2	9	0 - 19	0 - 1						
sweetclover	MELIL				9	0 - 95	0 - 5	9	0 - 96	0 - 8	9	0 - 64	0 - 8
wavyleaf thistle	CIJUN	9	0 - 48	0 - 2	9	0 - 19	0 - 1						
western ragweed	AMPS	9	0 - 48	0 - 2	9	19 - 57	1 - 3	9	12 - 24	1 - 2	9	0 - 8	0 - 1
native forbs	2FN	9	24 - 72	1 - 3	9	19 - 76	1 - 4	9	12 - 36	1 - 3	9	0 - 16	0 - 2
introduced forbs	2FI				9	0 - 95	0 - 5	9	12 - 72	1 - 6	9	8 - 40	1 - 5
<b>SHRUBS</b>		10	24 - 120	1 - 5	10	19 - 95	1 - 5	10	12 - 60	1 - 5	10	0 - 40	0 - 5
fringed sagewort	ARFR4	10	0 - 24	0 - 1	10	0 - 38	0 - 2	10	12 - 48	1 - 4	10	0 - 24	0 - 3
leadplant	AMCA6	10	24 - 72	1 - 3	10	0 - 19	0 - 1						
plains pricklypear	OPPO	10	0 - 24	0 - 1	10	0 - 38	0 - 2	10	0 - 36	0 - 3	10	0 - 32	0 - 4
rose	ROSA5	10	24 - 48	1 - 2	10	19 - 38	1 - 2	10	0 - 12	0 - 1			
smooth sumac	RHGL	10	0 - 24	0 - 1	10	0 - 57	0 - 3	10	0 - 36	0 - 3	10	0 - 16	0 - 2
western snowberry	SYOC	10	24 - 48	1 - 2	10	19 - 57	1 - 3	10	0 - 24	0 - 2	10	0 - 8	0 - 1
yucca	YUGL	10	0 - 24	0 - 1	10	0 - 57	0 - 3	10	0 - 36	0 - 3	10	0 - 16	0 - 2
other shrubs	ZSHRUB	10	0 - 48	0 - 2	10	0 - 57	0 - 3	10	0 - 24	0 - 2	10	0 - 8	0 - 1
<b>Annual Production lbs./acre</b>			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH
<b>GRASSES &amp; GRASS-LIKES</b>			1475 - 2148 - 2795		1095 - 1853 - 2070		635 - 1074 - 1605		465 - 720 - 1070				
<b>FORBS</b>			105 - 180 - 275		90 - 190 - 330		55 - 90 - 130		35 - 60 - 85				
<b>SHRUBS</b>			20 - 72 - 130		15 - 57 - 100		10 - 36 - 65		0 - 20 - 45				
<b>TOTAL</b>			1600 - 2400 - 3200		1200 - 1900 - 2500		700 - 1200 - 1800		500 - 800 - 1200				

This list of plants and their relative proportions are based on near normal years. Fluctuations in species composition and relative production may change from year to year dependent upon precipitation or other climatic factors. RV = Representative value. 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 85 percent grasses or grass-like plants, 10 percent forbs, and 5 percent shrubs. The community is dominated by tall and mid warm-season grasses. The major grasses include big bluestem, little bluestem, green needlegrass, sideoats grama, switchgrass, and needleandthread or porcupine grass. Other grass and grass-like species include western wheatgrass, blue grama, sedges, Indiangrass, prairie sandreed, 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/Grama Plant Community Phase*. In all cases, recovery periods are inadequate for health and vigor of dominant grass species.

### 1.2 Bluestem/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 80 percent grasses and grass-like species, 15 percent forbs, and 5 percent shrubs. Dominant grass and grass-like species include big bluestem, sideoats grama, little bluestem, blue grama, and sedges. Grasses of secondary importance include green needlegrass, needleandthread, porcupine grass, 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. Needlegrasses and tall warm-season grasses have decreased and production has also been reduced. 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 85 percent grasses and grass-like species, 10 percent forbs, and 5 percent shrubs. Dominant grass and grass-like species include sedge, blue grama, sideoats grama, buffalograss, sand dropseed, annual bromegrass, and Kentucky bluegrass. Grasses of secondary importance include big bluestem, little bluestem, western wheatgrass, green needlegrass, and needleandthread. Forbs commonly found in this plant community include cudweed sagewort, goldenrod, and sweetclover. 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 most 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.
- 2.1a – 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 *2.2 Blue Grama/Kentucky Bluegrass Plant Community Phase*.

## 2.2 Blue Grama/Kentucky Bluegrass Plant Community Phase

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 85 percent grasses and grass-like species, 10 percent forbs, and 5 percent shrubs. The dominant species are variable in this phase, but often consist of blue grama, western wheatgrass, Kentucky bluegrass, annual bromegrass, sedge, sideoats grama, buffalograss, and sand dropseed. Other plant species, from adjacent ESs, can become minor components of this plant community. This plant community is susceptible to invasion of other nonnative species because of the relatively high percent of bare ground.

Compared to the Bluestem/Needlegrass Plant Community Phase (1.1), western wheatgrass, blue grama, sedge, and percent of bare ground have increased. Various nonnative species such as Kentucky bluegrass, annual bromegrass, field pennycress, kochia, and sweetclover have become established on the site. Many of the previously dominant tall and mid-grass species have been significantly reduced and may not be present. Plant diversity is low (plant richness may be high, but areas are often dominated by a few species). This plant community phase is typically the least productive phase. Soil erosion is potentially very high because of the bare ground and shallow rooted herbaceous plant community. Water runoff will increase and infiltration will decrease due to animal related soil compaction and loss of root mass due to low plant diversity and vigor.

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: SD6302

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

Transitions or restoration pathways leading to other states 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. Depending on the slope, aspect, and size, and if adequate perennial plants exist, this change can occur more rapidly.
- 2.2a – 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 *2.1 Sedge/Grama Plant Community Phase*.

## Ecological Site Interpretations

### Animal Community – Wildlife Interpretations

-- Under Development --

**Bluestem/Needlegrass Plant Community Phase (1.1):**

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

**Sedge/Grama Plant Community Phase (2.1):**

**Blue Grama/Kentucky Bluegrass Plant Community Phase (2.2):**

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

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
<b>Grasses and Grass-likes</b>							
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
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
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
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
Scribner panicum	U U D U	N U N N	U U D U	N U N N	N U N N	U U D U	U U D U
sedge	U 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
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
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
tall 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
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
Wilcox panicum	U U U U	N U N N	U U U U	N U N N	N U N N	U U U U	U U U U
<b>Forbs</b>							
American pasqueflower	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
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
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
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
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
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
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
prairie 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
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
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
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
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
<b>Shrubs</b>							
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
smooth 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
western 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)	2,400	0.66
Bluestem/Grama (1.2)	1,900	0.52
Sedge/Grama (2.1)	1,200	0.33
Blue Grama/Kentucky Bluegrass (2.2)	800	0.22

\*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 groups B and D. Infiltration is moderate to slow 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 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 bluegrass 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), Shallow (R063BY024SD), Clayey (R063BY011SD)

### Similar Sites

(R063BY011SD) – Clayey [less big bluestem; higher production]

(R063BY010SD) – Loamy [less little bluestem, more needleandthread, higher production]

(R063BY024SD) – Shallow [less little bluestem, less needlegrass, lower production]

### Inventory Data References

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range-trained personnel were also used. Those involved in developing this site 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	10	1970 – 2006	NE, SD	Boyd, Brule, Buffalo, Charles Mix, Gregory, Knox, 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