

# United States Department of Agriculture Natural Resources Conservation Service

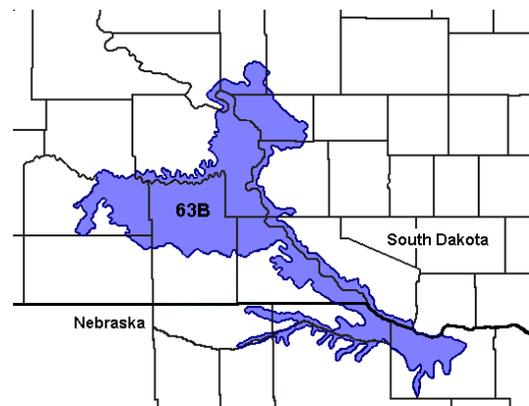
## Ecological Site Description

**Site Type:** Rangeland

**Site Name:** Very Shallow

**Site ID:** R063BY016SD

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



### Physiographic Features

This site occurs on moderately to steeply sloping uplands.

**Landform:** stream terrace

**Aspect:** N/A

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	1,300	2,000
<b>Slope (percent):</b>	9	35
<b>Water Table Depth (inches):</b>	80	80
<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	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 common features of soils in this site are the gravelly loam to very gravelly sand textured subsoil and slopes of 9 to 35 percent. The soils in this site are well to excessively well-drained and formed in outwash or gravelly alluvium. The loam surface layer is three to seven inches thick. The soils have a moderate to moderately rapid infiltration rate. This site should show no evidence of rills, wind scoured areas, or pedestalled plants. If present, water flow paths are broken, irregular in appearance, or discontinuous. The soil surface is very unstable but intact. Subsurface soil layers are restrictive to root 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 caused by the shallow rooting depth strongly influences the soil-water-plant relationship. Loss of the soil surface layer 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:** outwash or gravelly alluvium  
**Parent Material Origin:** igneous, metamorphic and sedimentary  
**Surface Texture:** loam  
**Surface Texture Modifier:** none  
**Subsurface Texture Group:** sandy  
**Surface Fragments ≤3” (% Cover):** 5-28  
**Surface Fragments >3” (%Cover):** 2-3  
**Subsurface Fragments ≤3” (% Volume):** 22-41  
**Subsurface Fragments >3” (% Volume):** 3-7

	<u>Minimum</u>	<u>Maximum</u>
<b>Drainage Class:</b>	well	excessively
<b>Permeability Class:</b>	moderate	moderately rapid
<b>Depth (inches):</b>	3	7
<b>Electrical Conductivity (mmhos/cm)*:</b>	0	2
<b>Sodium Absorption Ratio*:</b>	0	0
<b>Soil Reaction (1:1 Water)*:</b>	6.1	8.4
<b>Soil Reaction (0.1M CaCl<sub>2</sub>)*:</b>	NA	NA
<b>Available Water Capacity (inches)*:</b>	2	3
<b>Calcium Carbonate Equivalent (percent)*:</b>	5	25

\*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.

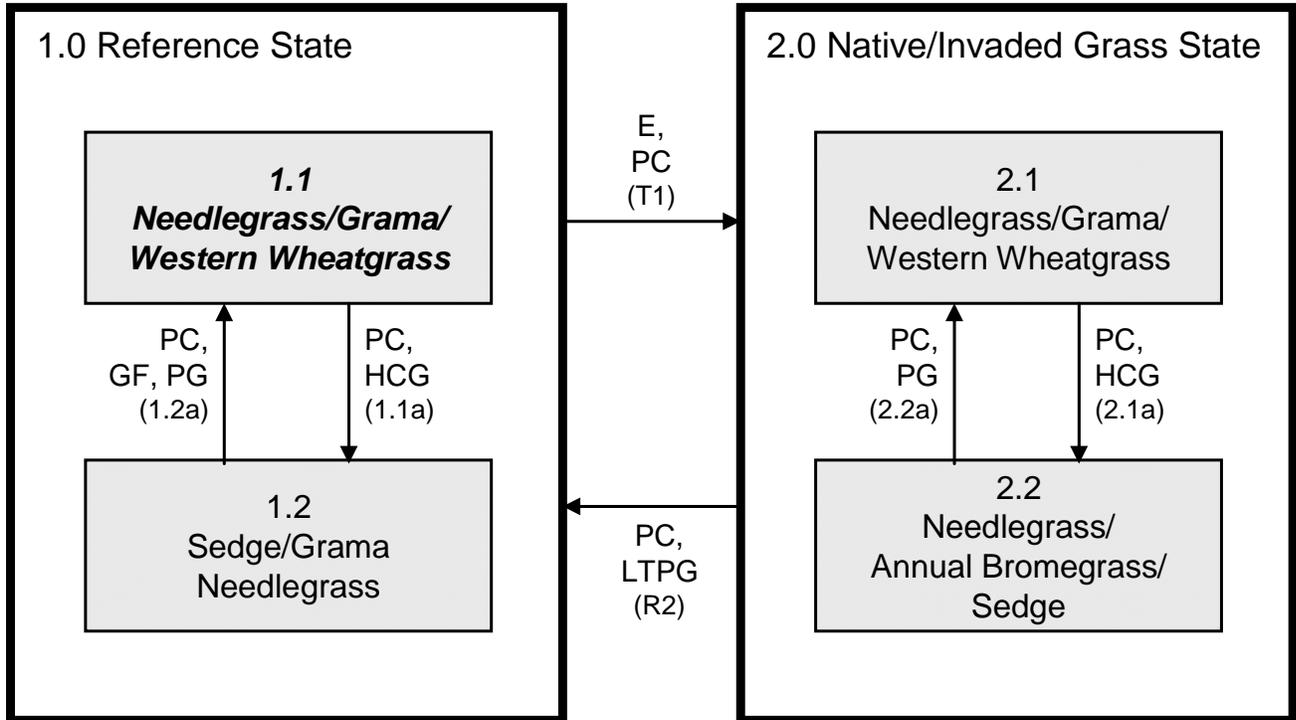
This ecological site (ES) is naturally resilient and quite resistant to change. Also, due to the relatively steep slopes and naturally low fertility of the soils, this site generally avoids more intensive disturbances such as farming. However, continuous season-long grazing (during the typical growing 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 Needlegrass/Grama/Western Wheatgrass Plant Community Phase. Sedges and gramas can increase and eventually develop into a sod, while many of the tall and mid-statured grasses will decrease (e.g., 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 Needlegrass/Grama/Western Wheatgrass Plant Community Phase. 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: **E** – Encroachment of non-native species; **GF** – Grazing and fire returned to normal disturbance regime levels and frequencies; **HCG** – Heavy continuous grazing (repeated grazing during the growing season without adequate recovery periods; **LTPG** – Long-term prescribed grazing; **PC** – Precipitation cycles; **PG** – Prescribed grazing.

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	1.1 Needlegrass/Grama/ Western Wheatgrass		
			Group	lbs./acre	% Comp
<b>GRASSES &amp; GRASS-LIKES</b>				1125 - 1275	75 - 85
<b>NEEDLEGRASS</b>			1	300 - 525	20 - 35
needleandthread	Hesperostipa comata ssp. comata	HECOC8	1	150 - 375	10 - 25
green needlegrass	Nassella viridula	NAV14	1	75 - 300	5 - 20
porcupine grass	Hesperostipa spartea	HESP11	1	75 - 300	5 - 20
<b>SHORT WARM-SEASON GRASSES</b>			2	150 - 300	10 - 20
blue grama	Bouteloua gracilis	BOGR2	2	75 - 225	5 - 15
hairy grama	Bouteloua hirsuta	BOH12	2	30 - 150	2 - 10
threeawn	Aristida spp.	ARIST	2	15 - 45	1 - 3
<b>WHEATGRASS</b>			3	75 - 225	5 - 15
western wheatgrass	Pascopyrum smithii	PASM	3	75 - 225	5 - 15
<b>MID WARM-SEASON GRASSES</b>			4	45 - 150	3 - 10
plains muhly	Muhlenbergia cuspidata	MUCU3	4	30 - 105	2 - 7
little bluestem	Schizachyrium scoparium	SCSC	4	0 - 75	0 - 5
<b>OTHER NATIVE GRASSES</b>			5	15 - 75	1 - 5
prairie junegrass	Koeleria macrantha	KOMA	5	15 - 45	1 - 3
Scribner panicum	Dichanthelium oligosanthes var. scribnerianum	DIOLS	5	0 - 30	0 - 2
Wilcox panicum	Dichanthelium wilcoxianum	DIW15	5	0 - 30	0 - 2
other grasses		2GRAM	5	0 - 60	0 - 4
<b>GRASS-LIKES</b>			6	75 - 150	5 - 10
threadleaf sedge	Carex filifolia	CAFI	6	30 - 120	2 - 8
needleleaf sedge	Carex duriuscula	CADU6	6	15 - 75	1 - 5
sun sedge	Carex inops ssp. heliophila	CAINH2	6	0 - 60	0 - 4
<b>FORBS</b>			8	75 - 225	5 - 15
American vetch	Vicia americana	VIAM	8	15 - 30	1 - 2
bush morningglory	Ipomoea leptophylla	IPL	8	0 - 30	0 - 2
cudweed sagewort	Artemisia ludoviciana	ARLU	8	15 - 45	1 - 3
cutleaf ironplant	Machaeranthera pinnatifida	MAPI	8	0 - 15	0 - 1
dotted gayfeather	Liatris punctata	LIPU	8	15 - 30	1 - 2
erigonum	Eriogonum spp.	ERIOG	8	0 - 15	0 - 1
false boneset	Brickellia eupatorioides	BREU	8	0 - 30	0 - 2
green sagewort	Artemisia campestris	ARCA12	8	15 - 30	1 - 2
hairy goldaster	Heterotheca villosa	HEV14	8	15 - 45	1 - 3
heath aster	Symphotrichum ericoides	SYER	8	15 - 30	1 - 2
milkvetch	Astragalus spp.	ASTRA	8	0 - 15	0 - 1
prairie coneflower	Ratibida columnifera	RACO3	8	0 - 15	0 - 1
prairie spiderwort	Tradescantia occidentalis	TROC	8	15 - 30	1 - 2
purple coneflower	Echinacea angustifolia	ECAN2	8	15 - 45	1 - 3
purple prairie clover	Dalea purpurea	DAPU5	8	15 - 30	1 - 2
pussytoes	Antennaria spp.	ANTEN	8	0 - 15	0 - 1
scarlet gaura	Gaura coccinea	GACO5	8	0 - 15	0 - 1
scarlet globemallow	Sphaeralcea coccinea	SPCO	8	0 - 15	0 - 1
silverleaf scurfpea	Pediomelum argophyllum	PEAR6	8	15 - 30	1 - 2
slimflower scurfpea	Psoraleidum tenuiflorum	PSTE5	8	0 - 15	0 - 1
stemless hymenoxys	Tetraneuris acaulis var. acaulis	TEACA2	8	15 - 30	1 - 2
white prairie clover	Dalea candida	DACA7	8	0 - 15	0 - 1
woolly Indianwheat	Plantago patagonica	PLPA2	8	0 - 15	0 - 1
native forbs		2FN	8	15 - 45	1 - 3
<b>SHRUBS</b>			9	75 - 150	5 - 10
fringed sagewort	Artemisia frigida	ARFR4	9	15 - 45	1 - 3
leadplant	Amorpha canescens	AMCA6	9	15 - 45	1 - 3
plains pricklypear	Opuntia polyacantha	OPPO	9	0 - 15	0 - 1
rose	Rosa spp.	ROSA5	9	15 - 30	1 - 2
skunkbush sumac	Rhus trilobata	RHTR	9	0 - 15	0 - 1
snowberry	Symphoricarpos spp.	SYMPH	9	15 - 30	1 - 2
yucca	Yucca glauca	YUGL	9	15 - 30	1 - 2
other shrubs		2SHRUB	9	0 - 30	0 - 2

Annual Production lbs./acre	LOW	RV	HIGH
<b>GRASSES &amp; GRASS-LIKES</b>	860 -	1238	- 1480
<b>FORBS</b>	70 -	150	- 255
<b>SHRUBS</b>	70 -	113	- 165
<b>TOTAL</b>	1000 -	1500	- 1900

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 Needlegrass/Grama/ Western Wheatgrass			1.2 Sedge/Grama/ Needlegrass			2.2 Needlegrass/Annual Bromegrass/Sedge		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
<b>GRASSES &amp; GRASS-LIKES</b>			1125 - 1275	75 - 85		750 - 850	75 - 85		525 - 595	75 - 85
<b>NEEDLEGRASS</b>		1	300 - 525	20 - 35	1	50 - 150	5 - 15	1	35 - 140	5 - 20
needleandthread	HECOC8	1	150 - 375	10 - 25	1	0 - 150	0 - 15	1	0 - 140	0 - 20
green needlegrass	NAVI4	1	75 - 300	5 - 20	1	0 - 150	0 - 15	1	0 - 140	0 - 20
porcupine grass	HESP11	1	75 - 300	5 - 20	1	0 - 150	0 - 15	1	0 - 140	0 - 20
<b>SHORT WARM-SEASON GRASSES</b>		2	150 - 300	10 - 20	2	150 - 300	15 - 30	2	35 - 105	5 - 15
blue grama	BOGR2	2	75 - 225	5 - 15	2	100 - 250	10 - 25	2	14 - 70	2 - 10
hairy grama	BOHI2	2	30 - 150	2 - 10	2	30 - 150	3 - 15	2	0 - 49	0 - 7
threeawn	ARIST	2	15 - 45	1 - 3	2	20 - 80	2 - 8	2	14 - 84	2 - 12
<b>WHEATGRASS</b>		3	75 - 225	5 - 15	3	10 - 100	1 - 10	3	0 - 21	0 - 3
western wheatgrass	PASM	3	75 - 225	5 - 15	3	10 - 100	1 - 10	3	0 - 21	0 - 3
<b>MID WARM-SEASON GRASSES</b>		4	45 - 150	3 - 10	4	0 - 50	0 - 5	4		
plains muhly	MUCU3	4	30 - 105	2 - 7	4	0 - 50	0 - 5			
little bluestem	SCSC	4	0 - 75	0 - 5	4	0 - 20	0 - 2			
<b>OTHER NATIVE GRASSES</b>		5	15 - 75	1 - 5	5	10 - 40	1 - 4	5	0 - 21	0 - 3
prairie junegrass	KOMA	5	15 - 45	1 - 3	5	10 - 20	1 - 2	5	0 - 14	0 - 2
Scribner panicum	DIOLS	5	0 - 30	0 - 2	5	0 - 10	0 - 1			
Wilcox panicum	DIW15	5	0 - 30	0 - 2	5	0 - 10	0 - 1			
other grasses	2GRAM	5	0 - 60	0 - 4	5	0 - 30	0 - 3	5	0 - 21	0 - 3
<b>GRASS-LIKES</b>		6	75 - 150	5 - 10	6	150 - 300	15 - 30	6	105 - 210	15 - 30
threadleaf sedge	CAFI	6	30 - 120	2 - 8	6	100 - 200	10 - 20	6	70 - 140	10 - 20
needleleaf sedge	CADU6	6	15 - 75	1 - 5	6	50 - 150	5 - 15	6	35 - 105	5 - 15
sun sedge	CAINH2	6	0 - 60	0 - 4	6	0 - 100	0 - 10	6	0 - 70	0 - 10
<b>NON-NATIVE GRASSES</b>		7			7	0 - 100	0 - 10	7	70 - 210	10 - 30
bluegrass	POA				7	0 - 30	0 - 3	7	0 - 35	0 - 5
cheatgrass	BRTE				7	0 - 100	0 - 10	7	35 - 140	5 - 20
Japanese bromegrass	BRJA				7	0 - 100	0 - 10	7	35 - 140	5 - 20
<b>FORBS</b>		8	75 - 225	5 - 15	8	50 - 150	5 - 15	8	35 - 105	5 - 15
American vetch	VIAM	8	15 - 30	1 - 2	8	0 - 10	0 - 1			
bush morningglory	IPLA	8	0 - 30	0 - 2	8	0 - 10	0 - 1			
cudweed sagewort	ARLU	8	15 - 45	1 - 3	8	10 - 50	1 - 5	8	7 - 49	1 - 7
cutleaf ironplant	MAPI	8	0 - 15	0 - 1	8	0 - 10	0 - 1			
dotted gayfeather	LIPU	8	15 - 30	1 - 2	8	0 - 10	0 - 1			
erigonum	ERIOG	8	0 - 15	0 - 1	8	0 - 10	0 - 1	8	0 - 7	0 - 1
false boneset	BREU	8	0 - 30	0 - 2						
green sagewort	ARCA12	8	15 - 30	1 - 2	8	10 - 40	1 - 4	8	7 - 42	1 - 6
hairy goldaster	HEVI4	8	15 - 45	1 - 3	8	0 - 20	0 - 2			
heath aster	SYER	8	15 - 30	1 - 2	8	10 - 30	1 - 3	8	7 - 28	1 - 4
milkvetch	ASTRA	8	0 - 15	0 - 1						
prairie coneflower	RACO3	8	0 - 15	0 - 1	8	0 - 10	0 - 1			
prairie spiderwort	TROC	8	15 - 30	1 - 2	8	0 - 10	0 - 1			
purple coneflower	ECAN2	8	15 - 45	1 - 3	8	10 - 40	1 - 4	8	7 - 14	1 - 2
purple prairie clover	DAPU5	8	15 - 30	1 - 2	8	0 - 10	0 - 1			
pussytoes	ANTEN	8	0 - 15	0 - 1	8	0 - 10	0 - 1	8	0 - 7	0 - 1
scarlet gaura	GACO5	8	0 - 15	0 - 1						
scarlet globemallow	SPCO	8	0 - 15	0 - 1	8	0 - 10	0 - 1	8	0 - 7	0 - 1
silverleaf scurfpea	PEAR6	8	15 - 30	1 - 2	8	10 - 20	1 - 2	8	0 - 7	0 - 1
slimflower scurfpea	PSTE5	8	0 - 15	0 - 1	8	0 - 10	0 - 1			
stemless hymenoxys	TEACA2	8	15 - 30	1 - 2	8	0 - 10	0 - 1			
white prairie clover	DACA7	8	0 - 15	0 - 1						
woolly Indianwheat	PLPA2	8	0 - 15	0 - 1	8	0 - 10	0 - 1	8	0 - 7	0 - 1
native forbs	2FN	8	15 - 45	1 - 3	8	10 - 30	1 - 3	8	0 - 14	0 - 2
introduced forbs	2FI				8	0 - 40	0 - 4	8	7 - 56	1 - 8
<b>SHRUBS</b>		9	75 - 150	5 - 10	9	50 - 100	5 - 10	9	35 - 70	5 - 10
fringed sagewort	ARFR4	9	15 - 45	1 - 3	9	10 - 50	1 - 5	9	14 - 56	2 - 8
leadplant	AMCA6	9	15 - 45	1 - 3	9	0 - 10	0 - 1			
plains pricklypear	OPPO	9	0 - 15	0 - 1	9	0 - 20	0 - 2	9	0 - 28	0 - 4
rose	ROSA5	9	15 - 30	1 - 2	9	0 - 10	0 - 1			
skunkbush sumac	RHTR	9	0 - 15	0 - 1						
snowberry	SYMPH	9	15 - 30	1 - 2	9	0 - 20	0 - 2	9	0 - 7	0 - 1
yucca	YUGL	9	15 - 30	1 - 2	9	10 - 30	1 - 3	9	7 - 35	1 - 5
other shrubs	2SHRUB	9	0 - 30	0 - 2	9	0 - 20	0 - 2	9	0 - 21	0 - 3
<b>Annual Production lbs./acre</b>			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH	
<b>GRASSES &amp; GRASS-LIKES</b>			860 - 1238 - 1480		510 - 825 - 1225		340 - 578 - 810			
<b>FORBS</b>			70 - 150 - 255		45 - 100 - 165		30 - 70 - 115			
<b>SHRUBS</b>			70 - 113 - 165		45 - 75 - 110		30 - 53 - 75			
<b>TOTAL</b>			1000 - 1500 - 1900		600 - 1000 - 1500		400 - 700 - 1000			

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 cool-season grasses, with warm-season grasses being subdominant. In pre-European times, the primary disturbance mechanisms for this site in the reference condition included grazing by large herding ungulates and fluctuations in levels of precipitation. 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 Needlegrass/Grama/Western Wheatgrass Plant Community Phase

The Needlegrass/Grama/Western Wheatgrass Plant Community Phase is the plant community upon which interpretations are primarily based. This is also considered to be climax. This plant community can be found on areas that are properly managed with prescribed grazing that allows for proper utilization, changes in season of use and adequate recovery periods following each grazing event. The potential vegetation is about 75 percent grasses or grass-like plants, 15 percent forbs, and 10 percent shrubs. Cool-season grass and grass-like species dominate this plant community, with warm-season grasses being subdominant. The major grass or grass-like species include needlegrasses (needleandthread, green needlegrass, and/or porcupine grass), blue and/or hairy grama, western wheatgrass, threadleaf sedge, and needleleaf sedge. Other grasses occurring on the site include threeawn, plains muhly, little bluestem, and prairie Junegrass. The significant forbs include dotted gayfeather, hairy goldaster, purple coneflower, prairie clover, and stemless hymenoxys. Significant shrubs are fringed sagewort, leadplant, rose, skunkbush sumac, and yucca.

This plant community is moderately resistant to change. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. If the herbaceous component is intact, it tends to be resilient if the disturbance is not long-term. This plant community is stable and protected from excessive erosion.

The following growth curve is an estimate of the monthly percentages of the annual growth of the dormant species expected during the normal 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 pathways leading to other plant communities are as follows:

- 1.1a – Heavy continuous grazing (grazing the same area for extended portions of the growing season well above recommended stocking rates and without adequate recovery periods), especially when coupled with extended periods of below average precipitation will convert the plant community to the *1.2 Sedge/Grama/Needlegrass Plant Community Phase*.

### 1.2 Sedge/Grama/Needlegrass Plant Community Phase

This plant community can develop from the adverse effects of heavy, continuous grazing in conjunction with extended periods of below-average precipitation. Short grass and grass-like species increase to dominate the site and annual production decreases.

Lack of litter and short plant heights result in higher soil temperatures, poor water infiltration rates, and higher evaporation, which gives blue grama and sedges a competitive advantage over cool- and warm-season mid-grasses. Blue grama and threadleaf sedge are the dominant grass/grass-like species. Other grasses may include western wheatgrass, needleandthread, prairie Junegrass, and threeawn. Significant forbs include green sagewort, cutleaf ironplant, scurfpeas, white prairie aster, and woolly Indianwheat. Common shrubs include cactus, yucca, and fringed sagewort. Nonnative species such as Kentucky bluegrass, cheatgrass, and Japanese brome grass may begin to invade this phase.

This plant community is relatively stable. The competitive advantage of blue grama and threadleaf sedge prevents other species from establishing. This plant community is less productive than the 1.1 Needlegrass/Grama/Western Wheatgrass Plant Community Phase. Runoff has increased and infiltration has decreased. Soil erosion does not increase substantially.

The following growth curve is an estimate of the monthly percentages of the annual growth of the dormant species expected during the normal 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

Transitional pathways leading to other plant communities are as follows:

- 1.2a – Grazing and fire returned to normal disturbance regime levels and frequencies or prescribed grazing (alternating season of use and providing adequate recovery periods) will convert this plant community to the *1.1 Needlegrass/Grama/Western Wheatgrass Plant Community Phase*.
- T1 – Encroachment of non-native species and fluctuations in precipitation cycles (typically extended periods of below-average precipitation) will cause a shift across a threshold from the *Reference State (State 1)* to the *Native/Invaded Grass State (State 2)*.

## 2.1 Needlegrass/Grama/Western Wheatgrass Plant Community Phase

This plant community is the result of encroachment of nonnative species, often as a result of fluctuations in precipitation cycles, typically extended periods of below-average precipitation followed by a mild winter and/or a cool, wet spring. The potential vegetation is about 75 percent grasses or grass-like plants, 15 percent forbs, and 10 percent shrubs. Cool-season grass and grass-like species dominate this plant community, with warm-season grasses being subdominant. The major grass or grass-like species include needlegrasses (needleandthread, green needlegrass, and/or porcupine grass), blue and/or hairy grama, western wheatgrass, threadleaf sedge, and needleleaf sedge. Other grasses occurring on the site include threeawn, plains muhly, little bluestem, prairie Junegrass, and nonnative species such as Kentucky bluegrass, cheatgrass, and/or Japanese brome grass. The significant forbs include dotted gayfeather, stemless hymenoxys, purple coneflower, prairie clover, and hairy goldaster. Significant shrubs are fringed sagewort, leadplant, rose, and yucca.

This plant community is very similar to the 1.1 Needlegrass/Grama/Western Wheatgrass Plant Community Phase (see plant composition tables for specific species composition). The main difference is that this plant community will have a minor amount on nonnative grasses, up to about 10 to 15 percent by weight.

This plant community is moderately resistant to change. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. If the herbaceous component is intact, it tends to be resilient if the disturbance is not long-term. This plant community is stable and protected from excessive erosion.

The following growth curve is an estimate of the monthly percentages of the annual growth of the dormant species expected during the normal 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 pathways leading to other plant communities are as follows:

- 1.1a – Heavy continuous grazing (grazing the same area for extended portions of the growing season well above recommended stocking rates and without adequate recovery periods), especially when coupled with extended periods of below average precipitation will convert the plant community to the *2.2 Needlegrass/Annual Bromegrass/Sedge Plant Community Phase*.

## 2.2 Needlegrass/Annual Bromegrass/Sedge Plant Community Phase

This plant community can develop from the adverse effects of heavy, continuous grazing in conjunction with extended periods of below-average precipitation. This plant community phase is further impacted by the invasion of nonnative species such as cheatgrass, Japanese bromegrass, and/or Kentucky bluegrass. Needlegrasses will be evident on the aspect of this phase but will be reduced in vigor and production. Annual bromegrass and sedge will make up a bulk of the composition on this plant community phase. The dominant grass and grass-like species will include threadleaf sedge and/or needleleaf sedge, needlegrass (needleandthread, green needlegrass, and/or porcupine grass), and cheatgrass and/or Japanese bromegrass. Other grasses present include western wheatgrass, blue grama, threeawn, Kentucky bluegrass, hairy grama, and prairie Junegrass. Significant forbs include green sagewort, cutleaf ironplant, scurfpeas, white prairie aster, and woolly Indianwheat. Common shrubs include cactus, yucca, and fringed sagewort.

Lack of litter and short plant heights result in higher soil temperatures, poor water infiltration rates, and higher evaporation, which gives sedges and annual bromegrass a competitive advantage over cool- and warm-season mid-grasses. This plant community is relatively stable. The competitive advantage of blue grama and threadleaf sedge prevents other species from establishing. This plant community is less productive than the 1.1 Needlegrass/Grama/Western Wheatgrass Plant Community Phase. Runoff has increased and infiltration has decreased. Soil erosion does not increase substantially.

The following growth curve is an estimate of the monthly percentages of the annual growth of the dormant species expected during the normal year.

Growth curve number: SD6301

Growth curve name: Pierre Shale Plains, cool-season dominant.

Growth curve description: Cool-season dominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	4	12	25	36	10	5	4	4	0	0

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

- 2.2a – Prescribed grazing (alternating season of use and providing adequate recovery periods) especially when coupled with a return to more normal precipitation cycles will convert this plant community to the *2.1 Needlegrass/Grama/Western Wheatgrass Plant Community Phase*.
- 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) coupled with a return to more normal precipitation cycles may lead this plant community phase over a threshold to the *Reference State (State 1)*. This will likely take a long period of time, possibly up to 10 years or more, and recovery may not be attainable.

## Ecological Site Interpretations

### Animal Community – Wildlife Interpretations

-- Under Development --

**Needlegrass/Grama/Western Wheatgrass Plant Community Phases (1.1 & 2.1):**

**Sedge/Grama/Needlegrass Plant Community Phase (1.2):**

**Needlegrass/Annual Bromegrass/Sedge 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>							
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
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
little bluestem	U D D U	N D N N	U D D U	N D N N	N D N N	U D D U	U D D U
needleandthread	U D U D	N D N U	U D U D	N D N U	N D N U	U D U D	U D U D
needleleaf sedge	U D U D	U P N D	U D U D	U D U D	U D U D	U D U D	U D U D
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 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
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
sun sedge	U D U D	U P N D	U D U D	U D U D	U D U D	U D U D	U D U D
threadleaf sedge	U D U D	U P N D	U D U D	U D U D	U D U D	U D U D	U D U D
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
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 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
bush morningglory	U D P U	U D D U	U D P U	U D D U	U D D U	U D P U	U D D U
cudweed sagewort	U U U U	U U D U	U U U U	U U D U	U U D U	U U U U	U U D U
cutleaf ironplant	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
dotted gayfeather	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
erigonum	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
false boneset	U U D U	N D U N	U U D U	N D U N	N D U N	U U D U	N D U N
green sagewort	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U
hairy goldaster	U U D U	N N N N	U U D U	N N N N	N N N N	U U D U	N N N N
heath aster	U U D U	U U P U	U U D U	U U P U	U U P U	U U D U	U U P U
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
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
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
scarlet globemallow	U U D U	U D D U	U U D U	U D D U	U D D U	U U D U	U D D U
silverleaf 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
slimflower 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
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
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
woolly Indianwheat	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
<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
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
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.

<b>Plant Community</b>	<b>Average Annual Production (lbs./acre, air-dry)</b>	<b>Stocking Rate* (AUM/acre)</b>
Needlegrass/Grama/Western Wheatgrass (1.1 & 2.1)	1,500	0.41
Sedge/Grama/Needlegrass (1.2)	1,000	0.27
Needlegrass/Annual Bromegrass/Sedge (2.2)	700	0.19

\*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 A. 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

Shallow (R063BY024SD), Thin Upland (R063BY012SD)

### Similar Sites

(R063BY024SD) – Shallow [more little bluestem and big bluestem, higher production]  
(R063BY012SD) – Thin Upland [more little bluestem and big bluestem, 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	2	2006	SD	Lyman

### 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