

## United States Department of Agriculture Natural Resources Conservation Service

### Ecological Site Description

**Site Type:** Rangeland

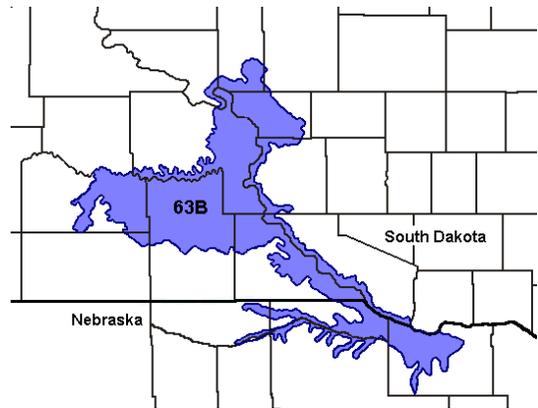
**Site Name:** Claypan

**Site ID:** R063BY013SD

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

#### Physiographic Features

This site occurs on nearly level to gently sloping uplands.



**Landform:** plain, stream terrace, flood plain

**Aspect:** N/A

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	1300	2000
<b>Slope (percent):</b>	1	4
<b>Water Table Depth (inches):</b>	48	80
<b>Flooding:</b>		
<b>Frequency:</b>	None	Rare
<b>Duration:</b>	None	Very Brief
<b>Ponding:</b>		
<b>Depth (inches):</b>	None	None
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Runoff Class:</b>	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, 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 annually, ranging from about 13 miles per hour during the spring to about 10 miles per hour during the summer. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 miles per hour.

Growth of cool season plants begins in early to mid March, slowing or ceasing in late June. Warm season plants begin growth about mid May and continue to early or mid September. Green up 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):**

	<b>Precip. Min.</b>	<b>Precip. Max</b>	<b>Temp. Min.</b>	<b>Temp. Max.</b>
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

<b>Climate Stations</b>		<b>Period</b>	
<b>Station ID</b>	<b>Location or Name</b>	<b>From</b>	<b>To</b>
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 clay loam to clay textured subsoils and slopes of 1 to 4 percent. The soils in this site are moderately well to well drained and formed in alluvium or residuum derived from soft siltstone and shale. The silt loam to silty clay loam surface layer is 4 to 12 inches thick. The extremely hard clayey Btn horizon has round-topped or “bun shaped” columnar structure. These Btn horizons are high in sodium. 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 mainly susceptible to water erosion. The hazard of water erosion increases where vegetation is diminished. 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/>) for specific local soils information.

**Parent Material Kind:** alluvium, residuum  
**Parent Material Origin:** sedimentary, unspecified  
**Surface Texture:** silt loam, silty clay loam  
**Surface Texture Modifier:** none  
**Subsurface Texture Group:** clayey  
**Surface Fragments ≤ 3” (% Cover):** 0  
**Surface Fragments > 3” (%Cover):** 0  
**Subsurface Fragments ≤ 3” (% Volume):** 0-12  
**Subsurface Fragments > 3” (% Volume):** 0

	<u>Minimum</u>	<u>Maximum</u>
<b>Drainage Class:</b>	moderately well	well
<b>Permeability Class:</b>	very slow	very slow
<b>Depth to Restrictive Layer (inches):</b>	10	20
<b>Electrical Conductivity (mmhos/cm)*:</b>	0	16
<b>Sodium Absorption Ratio*:</b>	5	20
<b>Soil Reaction (1:1 Water)*:</b>	5.6	9.0
<b>Soil Reaction (0.1M CaCl<sub>2</sub>)*:</b>	NA	NA
<b>Available Water Capacity (inches)*:</b>	3	5
<b>Calcium Carbonate Equivalent (percent)*:</b>	0	15

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

## Plant Communities

### Ecological Dynamics of the Site:

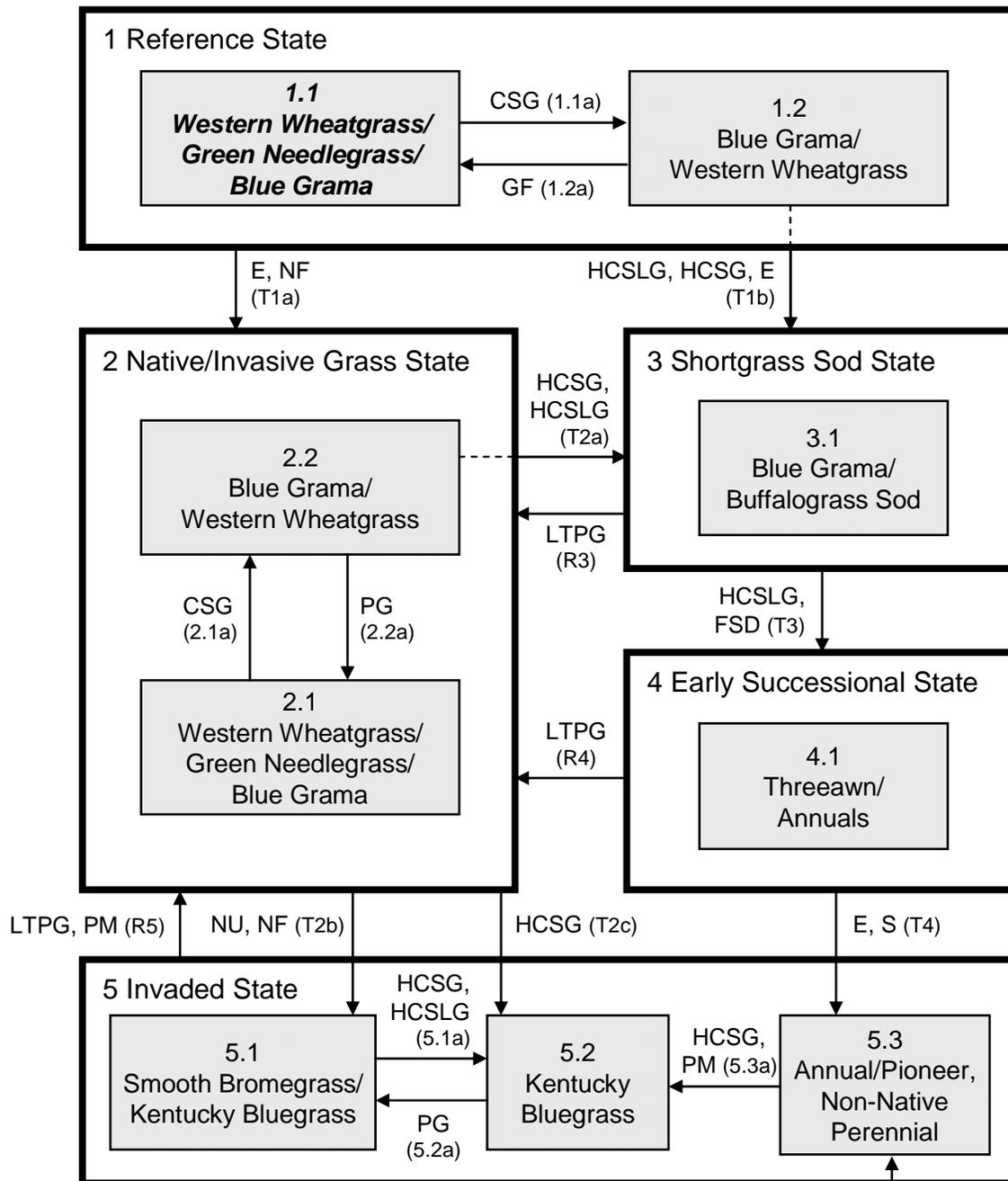
This site developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfire (often of light intensities), and other biotic and abiotic factors that typically influence soil/site development. Changes will occur 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.

The plant community upon which interpretations are primarily based is the 1.1 Western Wheatgrass/Green Needlegrass/Blue Grama 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.

Heavy 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 causes this site to depart from the 1.1 Western Wheatgrass/Green Needlegrass/Blue Grama Plant Community Phase. Blue grama and buffalograss will increase and eventually develop into a sod. Western wheatgrass will increase initially and then begin to decrease. Green needlegrass will decrease in frequency and production.

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: **C** – Cropped, abandoned; **CSG** – Continuous seasonal grazing; **CSLG** – Continuous season-long grazing; **E** – Encroachment introduced species; **FSD** – Frequent, severe defoliation; **GF** – Grazing and fire returned to normal disturbance levels; **HCSG** – Heavy continuous seasonal grazing; **HCSLG** – Heavy continuous season-long grazing; **LTPG** – Long-term prescribed grazing; **NF** – No fire; **NU** – Non-use; **PG** – Prescribed grazing; **PM** – Pest management (herbicide); **S** – Seeding.

**Any Plant Community**

**Plant Community Composition and Group Annual Production**

			1.1 Western Wheatgrass/Green Needlegrass/Blue Grama		
COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Group	lbs./acre	% Comp
<b>GRASSES &amp; GRASS-LIKES</b>				1500 - 1800	75 - 90
<b>WHEATGRASS</b>			<b>1</b>	<b>300 - 700</b>	<b>15 - 35</b>
western wheatgrass	Pascopyrum smithii	PASM	1	300 - 700	15 - 35
slender wheatgrass	Elymus trachycaulus	ELTR7	1	0 - 100	0 - 5
<b>COOL-SEASON BUNCHGRASSES</b>			<b>2</b>	<b>200 - 600</b>	<b>10 - 30</b>
green needlegrass	Nassella viridula	NAV14	2	200 - 500	10 - 25
needleandthread	Hesperostipa comata ssp. comata	HECOC8	2	40 - 200	2 - 10
porcupine grass	Hesperostipa spartea	HESP11	2	0 - 100	0 - 5
<b>SHORT WARM-SEASON GRASSES</b>			<b>3</b>	<b>100 - 300</b>	<b>5 - 15</b>
blue grama	Bouteloua gracilis	BOGR2	3	100 - 200	5 - 10
buffalograss	Bouteloua dactyloides	BODA2	3	20 - 100	1 - 5
inland saltgrass	Distichlis spicata	DISP	3	20 - 60	1 - 3
threeawn	Aristida spp.	ARIST	3	20 - 40	1 - 2
<b>TALL &amp; MID WARM-SEASON GRASSES</b>			<b>4</b>	<b>40 - 200</b>	<b>2 - 10</b>
prairie sandreed	Calamovilfa longifolia	CALO	4	0 - 200	0 - 10
sideoats grama	Bouteloua curtipendula	BOCU	4	0 - 200	0 - 10
<b>OTHER NATIVE GRASSES</b>			<b>5</b>	<b>20 - 100</b>	<b>1 - 5</b>
prairie junegrass	Koeleria macrantha	KOMA	5	20 - 60	1 - 3
Sandberg bluegrass	Poa secunda	POSE	5	0 - 40	0 - 2
Scribner panicum	Dichanthelium oligosanthes var. scribnerianum	DIOLS	5	0 - 40	0 - 2
other grasses		2GRAM	5	0 - 80	0 - 4
<b>GRASS-LIKES</b>			<b>6</b>	<b>60 - 200</b>	<b>3 - 10</b>
needleleaf sedge	Carex duriuscula	CADU6	6	40 - 160	2 - 8
threadleaf sedge	Carex filifolia	CAFI	6	20 - 100	1 - 5
other grass-likes		2GL	6	0 - 60	0 - 3
<b>FORBS</b>			<b>8</b>	<b>100 - 200</b>	<b>5 - 10</b>
American vetch	Vicia americana	VIAM	8	20 - 40	1 - 2
cudweed sagewort	Artemisia ludoviciana	ARLU	8	20 - 60	1 - 3
curlycup gumweed	Grindelia squarrosa	GRSQ	8	0 - 20	0 - 1
deathcamas	Zigadenus spp.	ZIGAD	8	0 - 20	0 - 1
deervetch	Lotus unifoliolatus var. unifoliolatus	LOUNU	8	0 - 20	0 - 1
goldenrod	Solidago spp.	SOLID	8	20 - 40	1 - 2
heath aster	Symphotrichum ericoides	SYER	8	20 - 40	1 - 2
milkvetch	Astragalus spp.	ASTRA	8	0 - 20	0 - 1
prairie coneflower	Ratibida columnifera	RACO3	8	20 - 40	1 - 2
pussytoes	Antennaria spp.	ANTEN	8	0 - 20	0 - 1
rush skeletonweed	Lygodesmia juncea	LYJU	8	0 - 20	0 - 1
scarlet gaura	Gaura coccinea	GACO5	8	20 - 40	1 - 2
scarlet globemallow	Sphaeralcea coccinea	SPCO	8	20 - 40	1 - 2
scurfpea	Psoraleum spp.	PSORA2	8	20 - 40	1 - 2
textile onion	Allium textile	ALTE	8	0 - 20	0 - 1
wavyleaf thistle	Cirsium undulatum	CIUN	8	0 - 40	0 - 2
western wallflower	Erysimum capitatum var. capitatum	ERCAC	8	0 - 20	0 - 1
western yarrow	Achillea millefolium var. occidentalis	ACMIO	8	20 - 40	1 - 2
woolly Indianwheat	Plantago patagonica	PLPA2	8	20 - 40	1 - 2
native forbs		2FN	8	20 - 60	1 - 3
<b>SHRUBS</b>			<b>9</b>	<b>100 - 300</b>	<b>5 - 15</b>
brittle cactus	Opuntia fragilis	OPFR	9	20 - 100	1 - 5
broom snakeweed	Gutierrezia sarothrae	GUSA2	9	0 - 60	0 - 3
fringed sagewort	Artemisia frigida	ARFR4	9	20 - 100	1 - 5
plains pricklypear	Opuntia polyacantha	OPPO	9	20 - 100	1 - 5
rubber rabbitbrush	Ericameria nauseosa	ERNA10	9	0 - 40	0 - 2
silver sagebrush	Artemisia cana	ARCA13	9	0 - 100	0 - 5
other shrubs		2SHRUB	9	0 - 100	0 - 5

Annual Production lbs./acre	LOW	RV	HIGH
<b>GRASSES &amp; GRASS-LIKES</b>	1310 -	1650	-1930
<b>FORBS</b>	95 -	150	-225
<b>SHRUBS</b>	95 -	200	-345
<b>TOTAL</b>	1500 -	2000	-2500

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 Western Wheatgrass/Green Needlegrass/Blue Grama			2.2 Blue Grama/ Western Wheatgrass			3.1 Blue Grama/ Buffalograss Sod			4.1 Threawn/Annuals			
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	
<b>GRASSES &amp; GRASS-LIKES</b>			1500 - 1800	75 - 90		1200 - 1440	75 - 90		840 - 1080	70 - 90		360 - 480	60 - 80	
<b>WHEATGRASS</b>		1	300 - 700	15 - 35	1	80 - 320	5 - 20	1	0 - 60	0 - 5	1	0 - 12	0 - 2	
western wheatgrass	PASM	1	300 - 700	15 - 35	1	80 - 320	5 - 20	1	0 - 60	0 - 5	1	0 - 12	0 - 2	
slender wheatgrass	ELTR7	1	0 - 100	0 - 5										
<b>COOL-SEASON BUNCHGRASSES</b>		2	200 - 600	10 - 30	2	16 - 160	1 - 10	2	0 - 36	0 - 3	2			
green needlegrass	NAV14	2	200 - 500	10 - 25	2	0 - 160	0 - 10	2	0 - 12	0 - 1				
needleandthread	HECOC8	2	40 - 200	2 - 10	2	16 - 160	1 - 10	2	0 - 24	0 - 2				
porcupine grass	HESP11	2	0 - 100	0 - 5										
<b>SHORT WARM-SEASON GRASSES</b>		3	100 - 300	5 - 15	3	240 - 560	15 - 35	3	300 - 660	25 - 55	3	150 - 300	25 - 50	
blue grama	BOGR2	3	100 - 200	5 - 10	3	160 - 400	10 - 25	3	240 - 480	20 - 40	3	6 - 60	1 - 10	
buffalograss	BODA2	3	20 - 100	1 - 5	3	32 - 160	2 - 10	3	24 - 240	2 - 20	3	0 - 18	0 - 3	
inland saltgrass	DISP	3	20 - 60	1 - 3	3	16 - 80	1 - 5	3	12 - 96	1 - 8	3	6 - 60	1 - 10	
threawn	ARIST	3	20 - 40	1 - 2	3	16 - 64	1 - 4	3	24 - 120	2 - 10	3	120 - 270	20 - 45	
<b>TALL &amp; MID WARM-SEASON</b>		4	40 - 200	2 - 10	4	0 - 80	0 - 5	4			4			
prairie sandreed	CALO	4	0 - 200	0 - 10	4	0 - 80	0 - 5							
sideoats grama	BOCU	4	0 - 200	0 - 10	4	0 - 80	0 - 5							
<b>OTHER NATIVE GRASSES</b>		5	20 - 100	1 - 5	5	16 - 80	1 - 5	5	12 - 60	1 - 5	5	0 - 30	0 - 5	
prairie junegrass	KOMA	5	20 - 60	1 - 3	5	16 - 48	1 - 3	5	12 - 24	1 - 2	5	0 - 6	0 - 1	
Sandberg bluegrass	POSE	5	0 - 40	0 - 2	5	0 - 32	0 - 2	5	0 - 36	0 - 3	5	0 - 6	0 - 1	
Scribner panicum	DIOLS	5	0 - 40	0 - 2	5	0 - 32	0 - 2	5	0 - 24	0 - 2				
other grasses	2GRAM	5	0 - 80	0 - 4	5	0 - 80	0 - 5	5	0 - 60	0 - 5	5	0 - 30	0 - 5	
<b>GRASS-LIKES</b>		6	60 - 200	3 - 10	6	80 - 240	5 - 15	6	120 - 240	10 - 20	6	12 - 60	2 - 10	
needleleaf sedge	CADU6	6	40 - 160	2 - 8	6	32 - 160	2 - 10	6	60 - 180	5 - 15	6	6 - 48	1 - 8	
threadleaf sedge	CAFI	6	20 - 100	1 - 5	6	16 - 112	1 - 7	6	24 - 120	2 - 10	6	6 - 30	1 - 5	
other grass-likes	2GL	6	0 - 60	0 - 3	6	0 - 48	0 - 3	6	0 - 60	0 - 5	6	0 - 12	0 - 2	
<b>NON-NATIVE GRASSES</b>		7			7	32 - 160	2 - 10	7	0 - 120	0 - 10	7	30 - 120	5 - 20	
annual bromegrass	BROMU				7	16 - 160	1 - 10	7	0 - 60	0 - 5	7	30 - 90	5 - 15	
Kentucky bluegrass	POPR				7	16 - 160	1 - 10	7	0 - 120	0 - 10	7	6 - 60	1 - 10	
smooth bromegrass	BRIN2				7	0 - 80	0 - 5							
<b>FORBS</b>		8	100 - 200	5 - 10	8	80 - 160	5 - 10	8	60 - 120	5 - 10	8	60 - 150	10 - 25	
American vetch	VIAM	8	20 - 40	1 - 2	8	0 - 16	0 - 1							
common dandelion	TAOF				8	0 - 16	0 - 1	8	0 - 24	0 - 2	8	0 - 30	0 - 5	
cudweed sagewort	ARLU	8	20 - 60	1 - 3	8	16 - 64	1 - 4	8	12 - 36	1 - 3	8	0 - 12	0 - 2	
curlycup gumweed	GRSQ	8	0 - 20	0 - 1	8	0 - 32	0 - 2	8	12 - 48	1 - 4	8	6 - 18	1 - 3	
deathcamas	ZIGAD	8	0 - 20	0 - 1	8	0 - 16	0 - 1							
deervetch	LOUNU	8	0 - 20	0 - 1	8	0 - 16	0 - 1							
goldenrod	SOLID	8	20 - 40	1 - 2	8	16 - 32	1 - 2	8	12 - 36	1 - 3	8	0 - 12	0 - 2	
heath aster	SYER	8	20 - 40	1 - 2	8	16 - 32	1 - 2	8	12 - 24	1 - 2	8	0 - 6	0 - 1	
milkvetch	ASTRA	8	0 - 20	0 - 1	8	0 - 16	0 - 1							
pepperweed	LEPID				8	0 - 16	0 - 1	8	0 - 36	0 - 3	8	0 - 42	0 - 7	
prairie coneflower	RACO3	8	20 - 40	1 - 2	8	0 - 16	0 - 1							
pussytoes	ANTEN	8	0 - 20	0 - 1	8	0 - 16	0 - 1	8	0 - 12	0 - 1				
rush skeletonweed	LYJU	8	0 - 20	0 - 1	8	0 - 16	0 - 1							
scarlet gaura	GACO5	8	20 - 40	1 - 2	8	0 - 16	0 - 1							
scarlet globemallow	SPCO	8	20 - 40	1 - 2	8	16 - 32	1 - 2	8	12 - 24	1 - 2	8	0 - 6	0 - 1	
scurfpea	PSORA2	8	20 - 40	1 - 2	8	16 - 32	1 - 2	8	12 - 24	1 - 2	8	0 - 6	0 - 1	
sweetclover	MELIL				8	0 - 64	0 - 4	8	0 - 72	0 - 6	8	0 - 48	0 - 8	
textile onion	ALTE	8	0 - 20	0 - 1	8	0 - 16	0 - 1							
wavyleaf thistle	CIUN	8	0 - 40	0 - 2	8	0 - 32	0 - 2	8	0 - 12	0 - 1				
western salsify	TRDU				8	0 - 32	0 - 2	8	0 - 36	0 - 3	8	0 - 12	0 - 2	
western wallflower	ERCAC	8	0 - 20	0 - 1	8	0 - 16	0 - 1							
western yarrow	ACMIO	8	20 - 40	1 - 2	8	16 - 48	1 - 3	8	12 - 36	1 - 3	8	6 - 12	1 - 2	
woolly Indianwheat	PLPA2	8	20 - 40	1 - 2	8	16 - 32	1 - 2	8	12 - 24	1 - 2	8	6 - 12	1 - 2	
native forbs	2FN	8	20 - 60	1 - 3	8	16 - 48	1 - 3	8	0 - 24	0 - 2	8	0 - 6	0 - 1	
introduced forbs	2FI				8	0 - 48	0 - 3	8	0 - 60	0 - 5	8	30 - 90	5 - 15	
<b>SHRUBS</b>		9	100 - 300	5 - 15	9	80 - 240	5 - 15	9	60 - 240	5 - 20	9	30 - 90	5 - 15	
brittle cactus	OPFR	9	20 - 100	1 - 5	9	16 - 112	1 - 7	9	12 - 96	1 - 8	9	12 - 60	2 - 10	
broom snakeweed	GUSA2	9	0 - 60	0 - 3	9	16 - 48	1 - 3	9	12 - 60	1 - 5	9	0 - 12	0 - 2	
fringed sagewort	ARFR4	9	20 - 100	1 - 5	9	16 - 112	1 - 7	9	12 - 108	1 - 9	9	6 - 30	1 - 5	
plains pricklypear	OPPO	9	20 - 100	1 - 5	9	16 - 80	1 - 5	9	12 - 84	1 - 7	9	6 - 48	1 - 8	
rubber rabbitbrush	ERNA10	9	0 - 40	0 - 2	9	0 - 32	0 - 2	9	0 - 36	0 - 3				
silver sagebrush	ARCA13	9	0 - 100	0 - 5	9	0 - 64	0 - 4	9	0 - 12	0 - 1				
other shrubs	2SHRUB	9	0 - 100	0 - 5	9	0 - 64	0 - 4	9	0 - 36	0 - 3	9	0 - 12	0 - 2	
<b>Annual Production lbs./acre</b>			LOW	RV	HIGH	LOW	RV	HIGH	LOW	RV	HIGH	LOW	RV	HIGH
<b>GRASSES &amp; GRASS-LIKES</b>			1310	1650	1930	950	1320	1545	590	960	1295	220	435	740
<b>FORBS</b>			95	150	225	75	120	180	55	90	130	55	105	165
<b>SHRUBS</b>			95	200	345	75	160	275	55	150	275	25	60	95
<b>TOTAL</b>			1500	2000	2500	1100	1600	2000	700	1200	1700	300	600	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 Composition and Group Annual Production**

COMMON/GROUP NAME	SYMBOL	1.1 Western Wheatgrass/Green Needlegrass/Blue Grama			5.1 Smooth Bromegrass/ Kentucky Bluegrass			5.2 Kentucky Bluegrass			
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	
<b>GRASSES &amp; GRASS-LIKES</b>											
<b>WHEATGRASS</b>											
western wheatgrass	PASM	1	300 - 700	15 - 35	1	0 - 60	0 - 3	1	0 - 39	0 - 3	
slender wheatgrass	ELTR7		0 - 100	0 - 5	1	0 - 20	0 - 1				
<b>COOL-SEASON BUNCHGRASSES</b>											
green needlegrass	NAV14	2	200 - 500	10 - 25	2	0 - 140	0 - 7				
needleandthread	HECOC8		40 - 200	2 - 10	2	0 - 40	0 - 2				
porcupine grass	HESP11		0 - 100	0 - 5	2	0 - 60	0 - 3				
<b>SHORT WARM-SEASON GRASSES</b>											
blue grama	BOGR2	3	100 - 200	5 - 10	3	0 - 60	0 - 3	3	26 - 130	2 - 10	
buffalograss	BODA2		20 - 100	1 - 5				3	0 - 26	0 - 2	
inland saltgrass	DISP		20 - 60	1 - 3	3	0 - 40	0 - 2	3	13 - 65	1 - 5	
threeawn	ARIST		20 - 40	1 - 2	3	0 - 100	0 - 5	3	13 - 78	1 - 6	
<b>TALL &amp; MID WARM-SEASON</b>											
prairie sandreed	CALO	4	0 - 200	0 - 10	4	0 - 40	0 - 2				
sideoats grama	BOCU		0 - 200	0 - 10	4	0 - 40	0 - 2				
<b>OTHER NATIVE GRASSES</b>											
prairie junegrass	KOMA	5	20 - 100	1 - 5	5	0 - 100	0 - 5	5	13 - 65	1 - 5	
Sandberg bluegrass	POSE		0 - 40	0 - 2				5	0 - 13	0 - 1	
Scribner panicum	DIOLS		0 - 40	0 - 2	5	0 - 20	0 - 1	5	0 - 26	0 - 2	
other grasses	2GRAM		0 - 80	0 - 4	5	0 - 100	0 - 5	5	0 - 52	0 - 4	
<b>GRASS-LIKES</b>											
needleleaf sedge	CADU6	6	40 - 160	2 - 8	6	0 - 40	0 - 2	6	13 - 104	1 - 8	
threadleaf sedge	CAFI		20 - 100	1 - 5	6	0 - 40	0 - 2	6	13 - 52	1 - 4	
other grass-likes	2GL		0 - 60	0 - 3	6	0 - 40	0 - 2	6	0 - 39	0 - 3	
<b>NON-NATIVE GRASSES</b>											
annual bromegrass	BROMU	7			7	800 - 1500	40 - 75	7	390 - 845	30 - 65	
Kentucky bluegrass	POPR				7	300 - 700	15 - 35	7	390 - 845	30 - 65	
smooth bromegrass	BRIN2				7	600 - 1400	30 - 70	7	0 - 195	0 - 15	
<b>FORBS</b>											
American vetch	VIAM	8	20 - 40	1 - 2							
common dandelion	TAOF				8	0 - 120	0 - 6	8	0 - 91	0 - 7	
cudweed sagewort	ARLU	8	20 - 60	1 - 3	8	20 - 40	1 - 2	8	13 - 26	1 - 2	
curlycup gumweed	GRSQ	8	0 - 20	0 - 1				8	13 - 65	1 - 5	
deathcamas	ZIGAD	8	0 - 20	0 - 1				8	0 - 13	0 - 1	
deervetch	LOUNU	8	0 - 20	0 - 1	8	0 - 20	0 - 1	8	0 - 13	0 - 1	
goldenrod	SOLID	8	20 - 40	1 - 2	8	20 - 40	1 - 2	8	13 - 39	1 - 3	
heath aster	SYER	8	20 - 40	1 - 2	8	0 - 20	0 - 1	8	13 - 26	1 - 2	
milkvetch	ASTRA	8	0 - 20	0 - 1							
pepperweed	LEPID				8	0 - 60	0 - 3	8	0 - 65	0 - 5	
prairie coneflower	RACO3	8	20 - 40	1 - 2	8	0 - 20	0 - 1				
pussytoes	ANTEN	8	0 - 20	0 - 1				8	0 - 13	0 - 1	
rush skeletonweed	LYJU	8	0 - 20	0 - 1							
scarlet gaura	GACO5	8	20 - 40	1 - 2	8	0 - 20	0 - 1				
scarlet globemallow	SPCO	8	20 - 40	1 - 2	8	0 - 20	0 - 1	8	13 - 39	1 - 3	
scurfspea	PSORA2	8	20 - 40	1 - 2	8	20 - 80	1 - 4	8	13 - 39	1 - 3	
sweetclover	MELIL				8	0 - 160	0 - 8	8	0 - 78	0 - 6	
textile onion	ALTE	8	0 - 20	0 - 1	8	0 - 20	0 - 1				
wavyleaf thistle	CIUN	8	0 - 40	0 - 2	8	0 - 20	0 - 1				
western salsify	TRDU				8	0 - 60	0 - 3	8	0 - 26	0 - 2	
western wallflower	ERCAC	8	0 - 20	0 - 1				8	0 - 13	0 - 1	
western yarrow	ACMIO	8	20 - 40	1 - 2	8	0 - 20	0 - 1	8	13 - 65	1 - 5	
woolly Indianwheat	PLPA2	8	20 - 40	1 - 2				8	0 - 13	0 - 1	
native forbs	2FN	8	20 - 60	1 - 3	8	0 - 40	0 - 2	8	13 - 39	1 - 3	
introduced forbs	2FI				8	0 - 100	0 - 5	8	0 - 91	0 - 7	
<b>SHRUBS</b>											
brittle cactus	OPFR	9	20 - 100	1 - 5	9	0 - 60	0 - 3	9	13 - 78	1 - 6	
broom snakeweed	GUSA2	9	0 - 60	0 - 3	9	0 - 40	0 - 2	9	0 - 39	0 - 3	
fringed sagewort	ARFR4	9	20 - 100	1 - 5	9	0 - 100	0 - 5	9	13 - 91	1 - 7	
plains pricklypear	OPPO	9	20 - 100	1 - 5	9	0 - 80	0 - 4	9	13 - 78	1 - 6	
rubber rabbitbrush	ERNA10	9	0 - 40	0 - 2	9	0 - 20	0 - 1	9	0 - 26	0 - 2	
silver sagebrush	ARCA13	9	0 - 100	0 - 5	9	0 - 80	0 - 4	9	0 - 39	0 - 3	
other shrubs	2SHRUB	9	0 - 100	0 - 5	9	0 - 80	0 - 4	9	0 - 65	0 - 5	
<b>Annual Production lbs./acre</b>			LOW	RV	HIGH	LOW	RV	HIGH	LOW	RV	HIGH
<b>GRASSES &amp; GRASS-LIKES</b>			1310	1650	1930	1130	1760	1950	680	1040	1260
<b>FORBS</b>			95	150	225	35	120	225	60	130	220
<b>SHRUBS</b>			95	200	345	35	120	225	60	130	220
<b>TOTAL</b>			1500	2000	2500	1200	2000	2400	800	1300	1700

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 dominated the dynamics of this ecological site. This state was dominated by cool-season grasses, and warm-season grasses were subdominant. In pre-European times, the primary disturbance mechanisms for this site in the reference condition included somewhat 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. Cool-season grasses could decline and a corresponding increase in short, warm-season grasses would have occurred.

### 1.1 Western Wheatgrass/Green Needlegrass/Blue Grama Plant Community Phase

Interpretations are based primarily on the Western Wheatgrass/Green Needlegrass/Blue Grama Plant Community Phase (this is also considered to be climax). The potential vegetation was about 75 percent grasses or grass-like plants, 10 percent forbs, and 15 percent shrubs. The community was dominated by cool-season grasses with warm-season grasses being subdominant. The major grasses included western wheatgrass, green needlegrass, blue grama, needleandthread, prairie sandreed, and sideoats grama. Other grass or grass-like species included slender wheatgrass, porcupine grass, buffalograss, and sedges. This plant community was resilient and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allowed for high drought tolerance. This was 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: SD6302

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

Growth curve description: Cool-season dominant, warm-season sub-dominant.

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 were as follows:

- 1.1a – Continuous seasonal grazing which includes grazing at moderate to heavy stocking levels at the same time of year each year, 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 Blue Grama/Western Wheatgrass Plant Community Phase*.

### 1.2 Blue Grama/Western Wheatgrass Plant Community Phase

This plant community evolved under continuous seasonal grazing or from over utilization during extended drought periods. The potential plant community was made up of approximately 75 percent grasses and grass-like species, 10 percent forbs, and 15 percent shrubs. Dominant grass and grass-like species included blue grama, western wheatgrass, sedges, and buffalograss. Grasses of secondary importance included green needlegrass, needleandthread, inland saltgrass, and sideoats grama. Forbs commonly found in this plant community included cudweed sagewort, goldenrod, heath aster, scurfpea, and western yarrow. Dominant shrubs included brittle cactus, plains pricklypear, broom snakeweed, and fringed sagewort. This plant community had similar plant composition to 2.2 Blue Grama/Western Wheatgrass Plant Community Phase (refer to the plant composition tables). The main difference is that this plant community phase did not have the presence of non-native invasive species such as Kentucky bluegrass and smooth bromegrass.

When compared to the Western Wheatgrass/Green Needlegrass/Blue Grama Plant Community Phase (1.1), blue grama and buffalograss increased. Western wheatgrass, green needlegrass, prairie sandreed, and sideoats grama decreased, and production was also reduced. This plant community was moderately resistant to change. The herbaceous species present were well adapted to grazing; however, species composition could be altered through long-term overgrazing. If the herbaceous component was intact, it tended to be resilient if the disturbance was 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: SD6303

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

Growth curve description: Cool-season, warm-season co-dominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	10	20	28	21	10	5	3	0	0

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

- T1b – 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 *3.1 Blue Grama/Buffalograss Sod Plant Community Phase* and the *Shortgrass Sod State*. In addition, encroachment of non-native grasses such as Kentucky bluegrass and smooth brome grass, and disruption of natural disturbance regimes such as periodic fire followed by short-term high intensity grazing will exacerbate this transition.
- 1.2a – Grazing and fire returned to normal disturbance regime levels and frequencies or periodic light to moderate grazing possibly including periodic rest will convert this plant community to the *1.1 Western Wheatgrass/Green Needlegrass/Blue Grama Plant Community Phase*.

### 3.1 Blue Grama/Buffalograss Sod Plant Community

This plant community evolved under heavy continuous season-long grazing or from over utilization during extended drought periods. The potential plant community is made up of approximately 70 percent grasses and grass-like species, 10 percent forbs, and 20 percent shrubs. Dominant grasses typically include blue grama and buffalograss. Kentucky bluegrass may also be present. Grass and grass-like species of secondary importance include sedge and western wheatgrass. Forbs commonly found in this plant community include cudweed sagewort, sweetclover, and western yarrow. Dominant shrubs include brittle cactus, fringed sagewort, plains pricklypear, and broom snakeweed.

When compared to the Western Wheatgrass/Green Needlegrass/Blue Grama Plant Community Phase (1.1), blue grama and buffalograss are dominant on this plant community. Cool-season grasses have decreased significantly. This vegetation state is very resistant to change. 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 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 blue grama and other short, warm-season grasses a competitive advantage over most other grasses. Soil erosion will be minimal due to the sod forming habit of blue grama and buffalograss.

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: SD6305

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

Growth curve description: Warm-season dominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	2	5	15	25	30	15	7	1	0	0

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

- R3 – 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 *2.0 Native/Invasive Grass State*. This will likely take a long period of time, possibly up to 10 years or more, and recovery may not be attainable.
- T3 – Heavy continuous season-long grazing and/or frequent severe defoliation as a result of rodent occupation will likely move this plant community to the *4.1 Threeawn/Annuals Plant Community Phase* and the *4.0 Early Successional State*.

#### **4.1 Threeawn/Annuals Plant Community Phase**

This plant community developed under continuous heavy grazing or other excessive disturbances (e.g., heavy use areas, defoliation by rodents, etc.). The potential plant community is made up of approximately 60 percent grasses and grass-like species, 25 percent forbs, and 15 percent shrubs. The dominant grass is threeawn. Other grasses may include annual brome (Japanese brome and downy brome), sedge, blue grama, Kentucky bluegrass, and western wheatgrass. The dominant forbs include sweetclover, western ragweed, cudweed sagewort, and other invader-like species. The dominant shrubs include fringed sagewort and cactus. Other plant species, from adjacent ecological sites, can become minor components of this plant community. This plant community is susceptible to invasion of Canada thistle and other non-native species because of the relatively high percent of bare ground.

Compared to the Western Wheatgrass/Green Needlegrass/Blue Grama Plant Community Phase (1.1), red threeawn, annual brome, and percent of bare ground has increased. Western wheatgrass, needlegrasses and other cool-season grasses have decreased as have the warm-season species including prairie sandreed and sideoats grama. Plant diversity is low (plant richness may be high, but areas are often dominated by a few species). The ecological processes are difficult to restore because of the loss of plant diversity and overall soil disturbance. 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.

This plant community will require significant economic inputs and time to move towards another plant community. This movement is highly variable in its succession. This is due to the loss of diversity (including the loss of the seed bank), within the existing plant community, and the plant communities on adjacent sites. This community can be renovated to improve the production capability, however if management changes are not made the vegetation could revert back to a threeawn/annual community.

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: SD6303

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

Growth curve description: Cool-season, warm-season co-dominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	10	20	28	21	10	5	3	0	0

Transitions or restoration pathways leading to other states are as follows:

- R4 - 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 *2.0 Native/Invasive Grass 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.
- T4 – Encroachment of non-native invasive/noxious species or seeding of introduced and/or native improved varieties of forage species may lead this plant community phase over a threshold to the *5.0 Invaded State* and more specifically to the *5.3 Annual/Pioneer, Non-native Perennial Plant Community Phase*. In the case of a seeding, refer to the corresponding Forage Suitability Group description for adapted species and expected production (production estimates in the Forage Suitability Group description may be unrealistically high due to the degraded condition of the site at this phase).

### **Transition from Reference State (State 1) to the Native/Invasive Grass State (State 2)**

- T1a – Encroachment of non-native grasses such as Kentucky bluegrass and smooth brome grass, and disruption of natural disturbance regimes such as periodic fire followed by short-term high intensity grazing will lead this plant community phase over a threshold to the *2.0 Native/Invasive Grass State*.

### **Native/Invasive Grass State (State 2)**

This state represents the more common range of variability that exists with higher levels of grazing management but in the absence of periodic fire followed by short-term intensive grazing. This state is dominated by cool- and warm-season grasses. It 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. Cool-season species can decline and a corresponding increase in short, warm-season grasses will occur.

### **2.1 Western Wheatgrass/Green Needlegrass/Blue Grama Plant Community Phase**

This plant community phase is similar to 1.1 Western Wheatgrass/Green Needlegrass/Blue Grama Plant Community Phase, but it also contains minor amounts of non-native invasive grass species such as Kentucky bluegrass and smooth brome grass (up to about 15 percent by air-dry weight). The potential vegetation is about 75 percent grasses or grass-like plants, 10 percent forbs, and 15 percent shrubs. The community is dominated by cool-season grasses with warm-season grasses being subdominant. The major grasses include western wheatgrass, green needlegrass, blue grama, needleandthread, prairie sandreed, and sideoats grama. Other grass or grass-like species include slender wheatgrass, porcupine grass, buffalograss, and sedges.

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: SD6302

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

Growth curve description: Cool-season dominant, warm-season sub-dominant.

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:

- 2.1a – Continuous seasonal grazing which includes grazing at moderate to heavy stocking levels at the same time of year each year, or a combination of disturbances such as extended periods of below average precipitation coupled with periodic heavy grazing will shift this community to the *2.2 Blue Grama/Western Wheatgrass Plant Community Phase*.

## **2.2 Blue Grama/Western Wheatgrass Plant Community Phase**

This plant community evolves under continuous seasonal 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 blue grama, western wheatgrass, sedges, and buffalograss. Grasses of secondary importance include green needlegrass, needleandthread, inland saltgrass, and sideoats grama. Forbs commonly found in this plant community include cudweed sagewort, goldenrod, heath aster, scurfpea, and western yarrow. Dominant shrubs include brittle cactus, plains pricklypear, broom snakeweed, and fringed sagewort.

When compared to the Western Wheatgrass/Green Needlegrass/Blue Grama Plant Community Phase (1.1), blue grama and buffalograss increase. Western wheatgrass, green needlegrass, prairie sandreed, and sideoats grama decrease, and production is also reduced. 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.

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: SD6303

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

Growth curve description: Cool-season, warm-season co-dominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	10	20	28	21	10	5	3	0	0

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

- 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 Western Wheatgrass/Needlegrass/Bluestem Plant Community Phase*.

- T2a – 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 *3.1 Blue Grama/Buffalograss Sod Plant Community Phase* and the *Shortgrass Sod State*.

### Transitions from Native/Invasive Grass State (State 2) to the Invaded State (State 5)

- T2b – Non-use and no fire for extended periods of time (typically for 10 or more years) will likely lead this state over a threshold resulting in the *5.1 Smooth Bromegrass/Kentucky Bluegrass Plant Community Phase* within the *5.0 Invaded State*.
- T2c – 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 after early cool-season grasses have reached boot stage) will likely lead this state over a threshold to the *5.2 Kentucky Bluegrass Plant Community Phase* within the *5.0 Invaded State*.

### 5.1 Smooth Bromegrass/Kentucky Bluegrass Plant Community Phase

This plant community phase is a result of extended periods of non-use and no fire. It is characterized by a dominance of smooth bromegrass and Kentucky bluegrass. The dominance is at times so complete that other species are difficult to find on the site. A thick duff layer also accumulates at or above the soil surface. Nutrient cycling is greatly reduced, and native plants have great difficulty becoming established. When dominated by smooth bromegrass, infiltration is moderately reduced and runoff is moderate. Production can be equal to or higher than the interpretive plant community. However, when dominated by Kentucky bluegrass, infiltration is greatly reduced and runoff is high. Production in this case will likely be significantly less. In either case, the period that palatability is high is relatively short, as these cool-season species mature rapidly. Energy capture is also reduced.

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: 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 pathways leading to other plant communities are as follows:

- 5.1a – 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) or heavy continuous season-long grazing will convert this plant community to the *5.2 Kentucky Bluegrass Plant Community Phase*.

### 5.2 Kentucky Bluegrass Plant Community Phase

This plant community phase is a result of heavy, continuous seasonal grazing or heavy, continuous season-long grazing. It is characterized by a dominance of Kentucky bluegrass. The dominance is at times so complete that other species are difficult to find on the site. A relatively thick duff layer can sometimes accumulate at or above the soil surface. Nutrient cycling is greatly reduced, and native plants have great difficulty becoming established. Infiltration is greatly reduced and runoff is high.

Production will be significantly reduced when compared to the interpretive plant community. The period that palatability is high is relatively short, as Kentucky bluegrass matures rapidly. Energy capture is also reduced. Biological activity in the soil is likely reduced significantly 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: 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 pathways leading to other plant communities are as follows:

- 5.2a – Prescribed grazing (alternating season of use and providing adequate recovery periods) or periodic light to moderate grazing possibly including periodic rest may convert this plant community to the *5.1 Smooth Bromegrass/Kentucky Bluegrass Plant Community Phase*.

### **Restoration Pathway from the Invaded State (State 5) to the Native/Invasive Grass State (State 2)**

- R5 - 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 *2.0 Native/Invasive Grass State*. Pest management (i.e., herbicide) may also be needed to suppress cool-season invasive grasses. This will likely take a long period of time, possibly up to 10 years or more, and recovery may not be attainable. Success depends on whether native reproductive propagules remain intact on the site.

## **Ecological Site Interpretations**

### **Animal Community – Wildlife Interpretations**

-- Under Development --

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

**Blue Grama/Western Wheatgrass Plant Community Phases (1.2 & 2.2):**

**Blue Grama/Buffalograss Sod Plant Community Phase (3.1):**

**Threeawn/Annuals Plant Community Phase (4.1):**

**Smooth Bromegrass/Kentucky Bluegrass Plant Community Phase (5.1):**

**Kentucky Bluegrass Plant Community Phase (5.2):**

**Annual/Pioneer, Non-native Perennial Plant Community Phase (5.3):**

## Animal Preferences (Quarterly – 1,2,3,4<sup>†</sup>)

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
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
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
inland saltgrass	N U U N	N N N N	N U U N	N N N N	N N N N	N U U N	N U U N
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
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
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
Sandberg bluegrass	N U N N	N D N N	N U N N	N D N N	N D 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
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
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
<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
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
curlycup gumweed	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
deathcamas	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
deervetch	U U U U	U D D U	U U U U	U D D U	U D D U	U U U U	U D D 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
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
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
rush skeletonweed	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
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
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
textile onion	U D U U	U D D U	U D U U	U D D U	U D D U	U D U U	U D D U
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 wallflower	U D U U	N U U N	U D U U	N U U N	N U U N	U D U U	N U U N
western yarrow	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
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>							
brittle cactus	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N
broom snakeweed	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
fringed sagewort	U U U U	U U U U	U U U U	U D D U	U P P D	U U U U	U U U D
plains pricklypear	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N
rubber rabbitbrush	N N N N	D U U D	N N N N	D U U D	U D D U	N N N N	D U U U
silver sagebrush	D U U D	D U U D	D U U D	P D D P	P P P P	D U U D	D U U D

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

<sup>†</sup> Quarters: 1 – Jan., Feb., Mar.; 2 – Apr., May, Jun.; 3 – Jul., Aug., Sep.; 4 – Oct., Nov., Dec.

## Animal Community – Grazing Interpretations

The following table lists annual, suggested initial stocking rates with average growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of conservation planning. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this a resource inventory is necessary to document plant composition and production. More accurate carrying capacity estimates should eventually be calculated using the following stocking rate information along with animal preference data and actual stocking records, particularly when grazers other than cattle are involved. With consultation of the land manager, more intensive grazing management may result in improved harvest efficiencies and increased carrying capacity.

<b>Plant Community</b>	<b>Average Annual Production (lbs./acre, air-dry)</b>	<b>Stocking Rate* (AUM/acre)</b>
Western Wheatgrass/Green Needlegrass/Blue Grama (1.1 & 2.1)	2000	0.55
Blue Grama/Western Wheatgrass (1.2 & 2.2)	1600	0.44
Smooth Bromegrass/Kentucky Bluegrass (5.1)	2000	0.55
Kentucky Bluegrass (5.2)	1300	0.36
Blue Grama/Buffalograss Sod (3.1)	1200	0.33
Threeawn/Annuals (4.1)	600	0.16

\* Based on 912 lbs./acre (air-dry weight) per Animal Unit Month (AUM), and on 25% harvest efficiency (refer to USDA NRCS, National Range and Pasture Handbook).

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage. During the dormant period, the forage for livestock will likely be lacking protein to meet livestock requirements, and added protein will allow ruminants to better utilize the energy stored in grazed plant materials. A forage quality test (either directly or through fecal sampling) should be used to determine the level of supplementation needed.

## Hydrology Functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group D. Infiltration and runoff potential for this site varies from moderate to high depending on soil hydrologic group, slope and ground cover. In many cases, areas with greater than 75% ground cover have the greatest potential for high 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, bluegrass, and/or smooth bromegrass will result in reduced infiltration and increased runoff. Areas where ground cover is less than 50% 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 variety 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

Clayey (R063BY011SD), Loamy (R063BY010SD), Clayey Overflow (R063BY021SD)

### Similar Sites

(R063BY010SD) – Loamy [more big bluestem; higher production]  
(R063BY011SD) – Clayey [more green 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, NRCS; Stan Boltz, Range Management Specialist, NRCS; Dana Larsen, Range Management Specialist, NRCS.

<u>Data Source</u>	<u>Number of Records</u>	<u>Sample Period</u>	<u>State</u>	<u>County</u>
SCS-RANGE-417	1	2003	SD	Buffalo

### State Correlation

This site has been correlated with Nebraska and South Dakota 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