

**United States Department of Agriculture  
Natural Resources Conservation Service**

**Ecological Site Description**

**Site Type:** Rangeland

**Site Name:** Shallow Clayey

**Site ID:** R060AY017SD

**Major Land Resource Area:** 60A – Pierre Shale Plains



**Physiographic Features**

This site typically occurs on gently to steeply sloping uplands.

**Landform:** plain, hill, ridge

**Aspect:** N/A

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	2500	4300
<b>Slope (percent):</b>	2	60
<b>Water Table Depth (inches):</b>	None	None
<b>Flooding:</b>		
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Ponding:</b>		
<b>Depth (inches):</b>	None	None
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Runoff Class:</b>	High	Very high

**Climatic Features**

The climate in this MLRA is typical of the drier portions of the Northern Great Plains where sagebrush steppes to the west yield to grassland steppes to the east. Annual precipitation ranges from 13 to 18 inches per year, with most occurring during the growing season. Temperatures show a wide range between summer and winter and between daily maximums and minimums, due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air masses from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Chinook winds may occur in winter and bring rapid rises in temperature. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring. The normal average annual temperature is about 46° F. January is the coldest month with average temperatures ranging from about 19° F (Moorcroft CAA, WY) to about 22° F (Belle Fourche, SD). July is the warmest month with temperatures averaging from about 70° F (Moorcroft CAA, WY) to about 72° F (Belle Fourche, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 51° F. Hourly winds are estimated to average about 11 miles per hour 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 can 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>	122	129
<b>Freeze-free period (days):</b>	145	152
<b>Mean Annual Precipitation (inches):</b>	13	18

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

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.32	0.43	7.1	34.1
February	0.44	0.57	12.6	40.1
March	0.65	0.94	19.7	46.5
April	1.43	1.72	29.4	60.2
May	2.45	3.19	39.7	70.6
June	2.34	3.38	48.5	80.1
July	1.60	2.78	54.8	88.0
August	1.24	1.76	53.1	87.7
September	1.01	1.50	42.3	77.0
October	0.90	1.11	31.4	64.9
November	0.40	0.61	19.8	47.5
December	0.40	0.48	10.2	38.0

Climate Stations		Period	
Station ID	Location or Name	From	To
SD0236	Ardmore 2 N	1948	1999
SD0559	Belle Fourche	1948	1999
SD1124	Buffalo Gap	1951	1999
WY6395	Moorcroft CAA	1948	1998
WY9207	Upton 13 SW	1949	1998

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

### Influencing Water Features

No significant water features influence this site.

### Representative Soil Features

The soils in this site are well drained and formed in shale. The surface layer is 1 to 6 inches thick. The bedrock which occurs at 10 to 20 inches is impervious shale which is virtually impenetrable to plant roots. The soils have a slow to very slow infiltration rate. This site should show slight to no evidence of rills, wind scoured areas or pedestalled plants. Water flow paths are broken, irregular in appearance or discontinuous with numerous debris dams or vegetative barriers.

These soils are mainly susceptible to water erosion. The hazard of water erosion increases on slopes greater than about 5 percent. Low available water capacity and very slow permeability strongly influences the soil-water-plant relationship. More information can be found in the various soil survey reports. Contact the local USDA Service Center for soil survey reports that include more detail specific to your location.

**Parent Material Kind:** residuum, shale  
**Parent Material Origin:** shale, unspecified  
**Surface Texture:** clay, silty clay loam, silty clay  
**Surface Texture Modifier:** none  
**Subsurface Texture Group:** clayey  
**Surface Fragments  $\leq$  3" (% Cover):** 0-25  
**Surface Fragments  $>$  3" (%Cover):** 0  
**Subsurface Fragments  $\leq$  3" (% Volume):** 5-15  
**Subsurface Fragments  $>$  3" (% Volume):** 0

	<u>Minimum</u>	<u>Maximum</u>
<b>Drainage Class:</b>	well	well
<b>Permeability Class:</b>	very slow	moderately slow
<b>Depth (inches):</b>	10	20
<b>Electrical Conductivity (mmhos/cm)*:</b>	0	8
<b>Sodium Absorption Ratio*:</b>	0	13
<b>Soil Reaction (1:1 Water)*:</b>	6.1	9.0
<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>	0	15

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

## Plant Communities

### Ecological Dynamics of the Site:

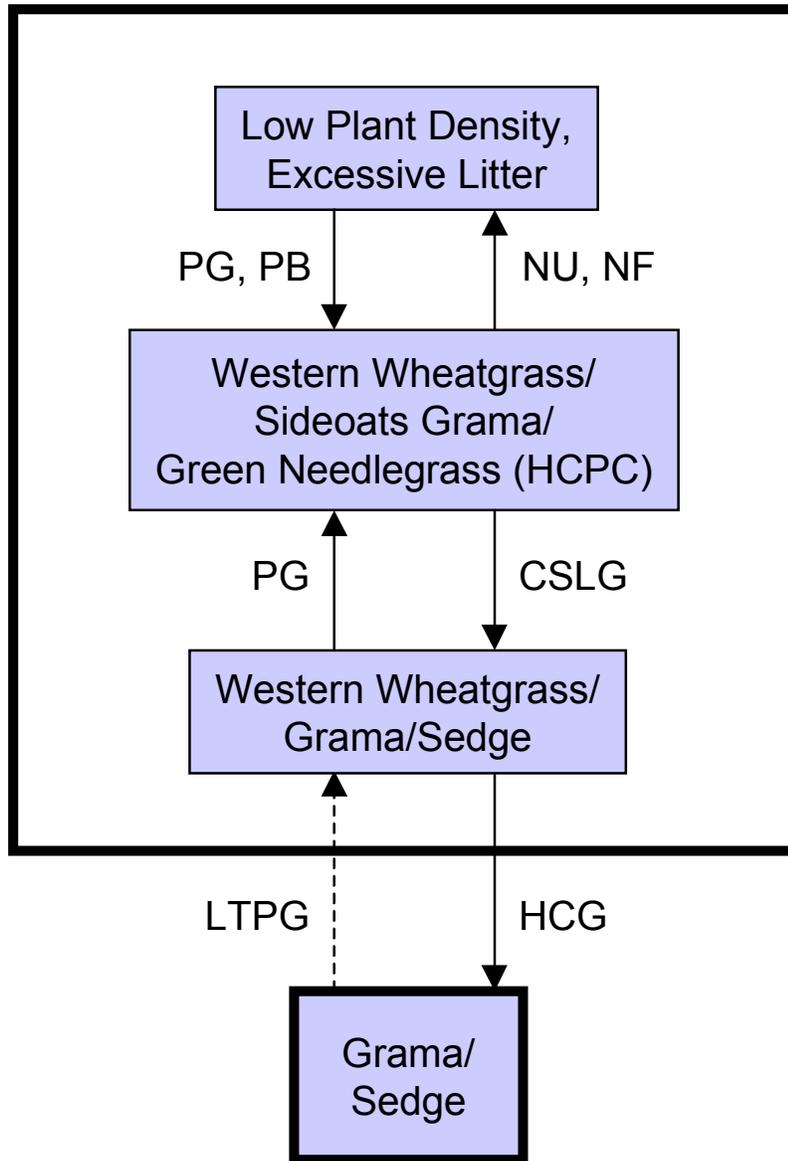
This site developed under Northern Great Plains climatic conditions, natural influences of large herbivores, occasional fire, and other biotic and abiotic factors that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts of native and/or exotic plant and animal species, and management actions. While the following plant community descriptions describe more typical transitions between communities that will occur, severe disturbances, such as periods of well-below average precipitation, can cause significant shifts in plant communities and/or species composition. Green needlegrass is more prevalent in the western portions of the MLRA, and partially replaces the wheatgrasses.

As this site deteriorates, species such as blue grama and big sagebrush will increase. Cool season grasses such as green needlegrass, little bluestem, bluebunch wheatgrass, and rhizomatous wheatgrasses will decrease in frequency and production.

The plant community upon which interpretations are primarily based is the Historic Climax Plant Community (HCPC). The HCPC has been determined by studying rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts also have been used. Plant communities, states, transitional pathways, and thresholds have been determined through similar studies and experience.

The following diagram illustrates the common plant communities and vegetation states commonly occurring on the site and the transition pathways between communities and states. The ecological processes are discussed in more detail in the plant community descriptions following the diagram.

### Plant Communities and Transitional Pathways



**CSLG** - Continuous season-long grazing; **HCG** - Heavy continuous grazing; **HCPC** - Historical Climax Plant Community; **LTPG** - Long-term prescribed grazing; **NU, NF** - Extended period of non-use & no fire; **PB** - Prescribed burning; **PG** - Prescribed grazing.

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Western Wheatgrass/Sideoats Grama/ Green Needlegrass (HCPC)		
			Group	lbs./acre	% Comp
<b>GRASSES &amp; GRASS-LIKES</b>				1120 - 1260	80 - 90
<b>RHIZOMATOUS WHEATGRASS</b>			1	280 - 560	20 - 40
western wheatgrass	Pascopyrum smithii	PASM	1	280 - 560	20 - 40
thickspike wheatgrass	Elymus lanceolatus ssp. lanceolatus	ELLAL	1	14 - 140	1 - 10
<b>COOL-SEASON MID GRASSES</b>			2	140 - 350	10 - 25
green needlegrass	Nassella viridula	NAVI4	2	140 - 350	10 - 25
bluebunch wheatgrass	Pseudoroegneria spicata	PSSP6	2	0 - 140	0 - 10
<b>WARM-SEASON MID GRASSES</b>			3	140 - 350	10 - 25
sideoats grama	Bouteloua curtipendula	BOCU	3	140 - 350	10 - 25
little bluestem	Schizachyrium scoparium	SCSC	3	28 - 140	2 - 10
<b>WARM-SEASON SHORT GRASSES</b>			4	70 - 210	5 - 15
blue grama	Bouteloua gracilis	BOGR2	4	70 - 140	5 - 10
buffalograss	Buchloe dactyloides	BUDA	4	0 - 70	0 - 5
hairy grama	Bouteloua hirsuta	BOHI2	4	0 - 70	0 - 5
<b>OTHER NATIVE GRASSES &amp; GRASS-LIKES</b>			5	70 - 210	5 - 15
big bluestem	Andropogon gerardii	ANGE	5	28 - 112	2 - 8
prairie sandreed	Calamovilfa longifolia	CALO	5	0 - 42	0 - 3
needleandthread	Hesperostipa comata ssp. comata	HECOC8	5	0 - 42	0 - 3
prairie junegrass	Koeleria macrantha	KOMA	5	14 - 42	1 - 3
sedge	Carex spp.	CAREX	5	14 - 70	1 - 5
plains muhly	Muhlenbergia cuspidata	MUCU3	5	0 - 42	0 - 3
bottlebrush squirreltail	Elymus elymoides	ELEL5	5	0 - 28	0 - 2
Sandberg bluegrass	Poa secunda	POSE	5	0 - 28	0 - 2
other perennial grasses		2GP	5	0 - 42	0 - 3
<b>FORBS</b>			7	70 - 140	5 - 10
biscuitroot	Lomatium spp.	LOMAT	7	0 - 42	0 - 3
cudweed sagewort	Artemisia ludoviciana	ARLU	7	0 - 42	0 - 3
dotted gayfeather	Liatris punctata	LIPU	7	0 - 42	0 - 3
false boneset	Brickellia eupatorioides	BREU	7	0 - 42	0 - 3
goldenpea	Thermopsis rhombifolia	THRH	7	0 - 42	0 - 3
hairy goldaster	Heterotheca villosa	HEVI4	7	0 - 42	0 - 3
heath aster	Symphyotrichum ericoides	SYER	7	0 - 42	0 - 3
Indian breadroot	Pediomelum esculentum	PEES	7	0 - 42	0 - 3
milkvetch	Astragalus spp.	ASTRA	7	0 - 42	0 - 3
Missouri goldenrod	Solidago missouriensis	SOMI2	7	0 - 42	0 - 3
prairie coneflower	Ratibida columnifera	RACO3	7	0 - 42	0 - 3
purple coneflower	Echinacea angustifolia	ECAN2	7	0 - 42	0 - 3
purple prairie clover	Dalea purpurea	DAPU5	7	0 - 42	0 - 3
pussytoes	Antennaria spp.	ANTEN	7	0 - 42	0 - 3
scarlet gaura	Gaura coccinea	GACO5	7	0 - 42	0 - 3
scarlet globemallow	Sphaeralcea coccinea	SPCO	7	0 - 42	0 - 3
scurfpea	Psoraleidum spp.	PSORA2	7	0 - 42	0 - 3
tapertip hawksbeard	Crepis acuminata	CRAC2	7	0 - 42	0 - 3
thistle	Cirsium spp.	CIRSI	7	0 - 28	0 - 2
wild onion	Allium spp.	ALLIU	7	0 - 42	0 - 3
wild parsley	Musineon divaricatum	MUDI	7	0 - 42	0 - 3
yarrow	Achillea spp.	ACHIL	7	0 - 42	0 - 3
yellow wild buckwheat	Eriogonum flavum var. flavum	ERFLF	7	0 - 42	0 - 3
other perennial forbs		2FP	7	0 - 42	0 - 3
<b>SHRUBS</b>			8	70 - 140	5 - 10
big sagebrush	Artemisia tridentata	ARTR2	8	0 - 70	0 - 5
broom snakeweed	Gutierrezia sarothrae	GUSA2	8	0 - 42	0 - 3
fringed sagewort	Artemisia frigida	ARFR4	8	0 - 42	0 - 3
leadplant	Amorpha canescens	AMCA6	8	14 - 42	1 - 3
rose	Rosa spp.	ROSA5	8	14 - 42	1 - 3
silver sagebrush	Artemisia cana	ARCA13	8	0 - 42	0 - 3
skunkbush sumac	Rhus trilobata	RHTR	8	0 - 42	0 - 3
winterfat	Krascheninnikovia lanata	KRLA2	8	0 - 42	0 - 3
yucca	Yucca glauca	YUGL	8	0 - 42	0 - 3
other shrubs		2SHRUB	8	0 - 42	0 - 3

Annual Production lbs./acre	LOW	RV	HIGH
<b>GRASSES &amp; GRASS-LIKES</b>	870 -	1190	- 1510
<b>FORBS</b>	65 -	105	- 145
<b>SHRUBS</b>	65 -	105	- 145
<b>TOTAL</b>	1000 -	1400	- 1800

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	Western Wheatgrass/Sideoats Grama/Green Needlegrass			Western Wheatgrass/ Grama/Sedge			Low Plant Density, Excessive Litter			Grama/Sedge		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
<b>GRASSES &amp; GRASS-LIKES</b>			1120 - 1260	80 - 90		800 - 900	80 - 90		960 - 1080	80 - 90		510 - 570	85 - 95
<b>RHIZOMATOUS WHEATGRASSES</b>		1	280 - 560	20 - 40	1	150 - 300	15 - 30	1	180 - 420	15 - 35	1	6 - 60	1 - 10
western wheatgrass	PASM	1	280 - 560	20 - 40	1	150 - 300	15 - 30	1	180 - 420	15 - 35	1	6 - 60	1 - 10
thickspike wheatgrass	ELLAL	1	14 - 140	1 - 10	1	0 - 50	0 - 5	1	0 - 120	0 - 10			
<b>COOL-SEASON MID GRASSES</b>		2	140 - 350	10 - 25	2	0 - 150	0 - 15	2	120 - 240	10 - 20	2		
green needlegrass	NAVI4	2	140 - 350	10 - 25	2	0 - 150	0 - 15	2	120 - 240	10 - 20			
bluebunch wheatgrass	PSSP6	2	0 - 140	0 - 10	2	0 - 20	0 - 2	2	0 - 60	0 - 5			
<b>WARM-SEASON MID GRASSES</b>		3	140 - 350	10 - 25	3	100 - 250	10 - 25	3	60 - 180	5 - 15	3	30 - 120	5 - 20
sideoats grama	BOCU	3	140 - 350	10 - 25	3	50 - 150	5 - 15	3	60 - 120	5 - 10	3	0 - 60	0 - 10
little bluestem	SCSC	3	28 - 140	2 - 10	3	20 - 150	2 - 15	3	12 - 96	1 - 8	3	0 - 90	0 - 15
<b>WARM-SEASON SHORT GRASSES</b>		4	70 - 210	5 - 15	4	100 - 300	10 - 30	4	60 - 120	5 - 10	4	150 - 330	25 - 55
blue grama	BOGR2	4	70 - 140	5 - 10	4	100 - 250	10 - 25	4	60 - 120	5 - 10	4	150 - 300	25 - 50
buffalograss	BUDA	4	0 - 70	0 - 5	4	0 - 100	0 - 10	4	0 - 60	0 - 5	4	30 - 90	5 - 15
hairy grama	BOHI2	4	0 - 70	0 - 5	4	0 - 50	0 - 5	4	0 - 36	0 - 3	4	0 - 90	0 - 15
<b>NATIVE GRASSES/GRASS-LIKES</b>		5	70 - 210	5 - 15	5	50 - 250	5 - 25	5	60 - 180	5 - 15	5	60 - 150	10 - 25
big bluestem	ANGE	5	28 - 112	2 - 8				5	0 - 60	0 - 5			
prairie sandreed	CALO	5	0 - 42	0 - 3				5	0 - 24	0 - 2			
needleandthread	HECOC8	5	0 - 42	0 - 3	5	0 - 50	0 - 5	5	0 - 60	0 - 5	5	0 - 30	0 - 5
prairie junegrass	KOMA	5	14 - 42	1 - 3	5	10 - 30	1 - 3	5	12 - 36	1 - 3	5	6 - 18	1 - 3
sedge	CAREX	5	14 - 70	1 - 5	5	50 - 150	5 - 15	5	12 - 60	1 - 5	5	60 - 120	10 - 20
plains muhly	MUCU3	5	0 - 42	0 - 3				5	0 - 12	0 - 1			
bottlebrush squirreltail	ELEL5	5	0 - 28	0 - 2	5	0 - 50	0 - 5	5	0 - 36	0 - 3	5	0 - 30	0 - 5
Sandberg bluegrass	POSE	5	0 - 28	0 - 2	5	0 - 30	0 - 3	5	0 - 24	0 - 2	5	0 - 18	0 - 3
threeawn	ARIST				5	0 - 50	0 - 5	5	0 - 60	0 - 5	5	6 - 48	1 - 8
other perennial grasses	ZGP	5	0 - 42	0 - 3	5	0 - 30	0 - 3	5	0 - 36	0 - 3	5	0 - 18	0 - 3
<b>NON-NATIVE GRASSES</b>		6			6	0 - 50	0 - 5	6	36 - 120	3 - 10	6	6 - 60	1 - 10
Kentucky bluegrass	POPR				6	0 - 50	0 - 5	6	24 - 96	2 - 8	6	0 - 48	0 - 8
cheatgrass	BRTE				6	0 - 50	0 - 5	6	12 - 60	1 - 5	6	6 - 30	1 - 5
<b>FORBS</b>		7	70 - 140	5 - 10	7	50 - 100	5 - 10	7	60 - 120	5 - 10	7	6 - 30	1 - 5
biscuitroot	LOMAT	7	0 - 42	0 - 3	7	0 - 20	0 - 2	7	0 - 36	0 - 3			
cudweed sagewort	ARLU	7	0 - 42	0 - 3	7	10 - 40	1 - 4	7	12 - 48	1 - 4	7	6 - 18	1 - 3
curlycup gumweed	GRSQ				7	0 - 30	0 - 3	7	0 - 24	0 - 2	7	0 - 30	0 - 5
dotted gayfeather	LIPU	7	0 - 42	0 - 3	7	0 - 20	0 - 2	7	0 - 24	0 - 2	7	0 - 6	0 - 1
false boneset	BREU	7	0 - 42	0 - 3				7	0 - 24	0 - 2			
goldenpea	THRH	7	0 - 42	0 - 3	7	0 - 40	0 - 4	7	0 - 36	0 - 3	7	0 - 18	0 - 3
hairy goldaster	HEVI4	7	0 - 42	0 - 3	7	0 - 20	0 - 2	7	0 - 24	0 - 2			
heath aster	SYER	7	0 - 42	0 - 3	7	0 - 40	0 - 4	7	0 - 36	0 - 3	7	0 - 30	0 - 5
Indian breadroot	PEES	7	0 - 42	0 - 3				7	0 - 24	0 - 2			
milkvetch	ASTRA	7	0 - 42	0 - 3	7	0 - 30	0 - 3	7	0 - 24	0 - 2	7	0 - 18	0 - 3
Missouri goldenrod	SOMI2	7	0 - 42	0 - 3	7	0 - 20	0 - 2	7	0 - 36	0 - 3	7	0 - 6	0 - 1
prairie coneflower	RACO3	7	0 - 42	0 - 3	7	0 - 30	0 - 3	7	0 - 36	0 - 3	7	0 - 18	0 - 3
purple coneflower	ECAN2	7	0 - 42	0 - 3	7	0 - 20	0 - 2	7	0 - 24	0 - 2			
purple prairie clover	DAPU5	7	0 - 42	0 - 3	7	0 - 20	0 - 2	7	0 - 36	0 - 3	7	0 - 12	0 - 2
pussytoes	ANTEN	7	0 - 42	0 - 3	7	0 - 30	0 - 3	7	0 - 12	0 - 1	7	0 - 18	0 - 3
salsify	TRAGO				7	0 - 30	0 - 3	7	0 - 36	0 - 3	7	0 - 18	0 - 3
scarlet gaura	GACO5	7	0 - 42	0 - 3				7	0 - 24	0 - 2			
scarlet globemallow	SPCO	7	0 - 42	0 - 3	7	0 - 30	0 - 3	7	0 - 24	0 - 2	7	0 - 12	0 - 2
scurfpea	PSORA2	7	0 - 42	0 - 3	7	0 - 30	0 - 3	7	0 - 36	0 - 3	7	0 - 30	0 - 5
sweetclover	MELIL				7	0 - 50	0 - 5	7	0 - 60	0 - 5	7	0 - 30	0 - 5
tapertip hawksbeard	CRAC2	7	0 - 42	0 - 3				7	0 - 24	0 - 2			
thistle	CIRSI	7	0 - 28	0 - 2	7	0 - 30	0 - 3	7	0 - 36	0 - 3	7	0 - 18	0 - 3
wild onion	ALLIU	7	0 - 42	0 - 3	7	0 - 30	0 - 3	7	0 - 24	0 - 2	7	0 - 18	0 - 3
wild parsley	MUDI	7	0 - 42	0 - 3	7	0 - 20	0 - 2	7	0 - 36	0 - 3			
yarrow	ACHIL	7	0 - 42	0 - 3	7	0 - 40	0 - 4	7	0 - 36	0 - 3	7	0 - 18	0 - 3
yellow wild buckwheat	ERFLF	7	0 - 42	0 - 3	7	0 - 30	0 - 3	7	0 - 24	0 - 2	7	0 - 12	0 - 2
other perennial forbs	ZFP	7	0 - 42	0 - 3	7	0 - 30	0 - 3	7	0 - 36	0 - 3	7	0 - 18	0 - 3
<b>SHRUBS</b>		8	70 - 140	5 - 10	8	50 - 100	5 - 10	8	60 - 120	5 - 10	8	30 - 60	5 - 10
big sagebrush	ARTR2	8	0 - 70	0 - 5	8	0 - 80	0 - 8	8	0 - 60	0 - 5	8	0 - 60	0 - 10
broom snakeweed	GUSA2	8	0 - 42	0 - 3	8	10 - 50	1 - 5	8	0 - 36	0 - 3	8	6 - 30	1 - 5
fringed sagewort	ARFR4	8	0 - 42	0 - 3	8	10 - 50	1 - 5	8	12 - 48	1 - 4	8	6 - 30	1 - 5
leadplant	AMCA6	8	14 - 42	1 - 3				8	0 - 36	0 - 3			
rose	ROSA5	8	14 - 42	1 - 3	8	10 - 30	1 - 3	8	12 - 36	1 - 3	8	6 - 18	1 - 3
silver sagebrush	ARCA13	8	0 - 42	0 - 3	8	0 - 50	0 - 5	8	0 - 24	0 - 2			
skunkbush sumac	RHTR	8	0 - 42	0 - 3	8	0 - 30	0 - 3	8	0 - 36	0 - 3	8	0 - 30	0 - 5
winterfat	KRLA2	8	0 - 42	0 - 3				8	0 - 36	0 - 3			
yucca	YUGL	8	0 - 42	0 - 3	8	0 - 30	0 - 3	8	0 - 48	0 - 4	8	0 - 30	0 - 5
other shrubs	ZSHRUB	8	0 - 42	0 - 3	8	0 - 30	0 - 3	8	0 - 36	0 - 3	8	0 - 12	0 - 2
<b>Annual Production lbs./acre</b>			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH
<b>GRASSES &amp; GRASS-LIKES</b>			870 - 1190 - 1510		610 - 850 - 1090		490 - 1020 - 1250		375 - 537 - 700				
<b>FORBS</b>			65 - 105 - 145		45 - 75 - 105		55 - 90 - 125		0 - 18 - 35				
<b>SHRUBS</b>			65 - 105 - 145		45 - 75 - 105		55 - 90 - 125		25 - 45 - 65				
<b>TOTAL</b>			1000 - 1400 - 1800		700 - 1000 - 1300		600 - 1200 - 1500		400 - 600 - 800				

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

### Plant Community and Vegetation State Narratives

Following are the narratives for each of the described plant communities. These plant communities may not represent every possibility, but they are the most prevalent and repeatable plant communities. The plant composition tables shown above have been developed from the best available knowledge at the time of this revision. As more information is collected, some of these plant community descriptions may be revised or removed, and new ones added. None of these plant communities should necessarily be thought of as "Desired Plant Communities". According to the USDA NRCS National Range and Pasture Handbook, Desired Plant Communities (DPC's) will be determined by the decision makers and will meet minimum quality criteria established by the NRCS. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

### Western Wheatgrass/Sideoats Grama/Green Needlegrass Plant Community

Interpretations are primarily based on the Western Wheatgrass/Sideoats Grama/Green Needlegrass Plant Community. This is also considered the Historic Climax Plant Community (HCPC). Potential vegetation is about 80-90% grasses or grass-like plants, 5-10% forbs and 5-10% shrubs. Major grasses include western wheatgrass, green needlegrass and sideoats grama. Other grasses and grass-likes occurring on this plant community include little bluestem, blue grama, sedge and big bluestem. Forbs commonly occurring include purple coneflower, goldenpea, prairie coneflower and scurfpea. Shrubs commonly occurring include leadplant, big sagebrush and rose. Big sagebrush is more likely to occur in the western portions of the MLRA, and can make up from 5 to 10 percent of the annual production.

This plant community is well adapted to the Northern Great Plains climatic conditions. Individual species can vary greatly in production depending on growing conditions (timing and amount of precipitation and temperature). Community dynamics, nutrient cycle, water cycle and energy flow are functioning properly. Plant litter is properly distributed with very little movement off-site and natural plant mortality is very low. The diversity in plant species allows for high drought tolerance. Run-off from adjacent sites and moderate or high available water capacity provides a favorable soil-water-plant relationship.

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: SD6002

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:

- Non-use and no fire will convert this plant community to the *Low Plant Density, Excessive Litter Plant Community*.
- Continuous season-long grazing will convert the plant community to the *Western Wheatgrass/Grama/Sedge Plant Community*.

### Western Wheatgrass/Grama/Sedge Plant Community

This plant community develops under continuous season-long grazing by large herbivores. The potential vegetation is about 80-90% grasses and grass-likes, 5-15% forbs and 5-10% shrubs. The major grasses and grass-likes include western wheatgrass, blue grama and sedge. Other grasses occurring on this plant community include sideoats grama, little bluestem, needleandthread and threawn. Forbs commonly occurring include yarrow, cudweed sagewort, goldenpea, prairie coneflower and scurfpea. Shrubs commonly found include fringed sagewort and broom snakeweed.

## RANGELAND INTERPRETATIONS

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When compared to the HCPC, blue grama and sedges have increased. Green needlegrass, little bluestem and sideoats grama have decreased. Production of cool-season grasses has also been reduced. Non-native species such as cheatgrass, salsify, curlycup gumweed, thistle and sweetclover will likely invade this plant community.

This plant community is stable and protected from excessive erosion. The dominant herbaceous species are very adapted to grazing; however, the mid grass species and the more palatable forbs will decrease in the community through continuous seasonal grazing. This plant community tends to be resilient if disturbance is not long-term.

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: SD6002

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

Transitional pathways leading to other plant communities are as follows:

- Prescribed grazing will move this plant community to the *Western Wheatgrass/Sideoats Grama/Green Needlegrass Plant Community*.
- Heavy continuous grazing will shift this plant community to the *Grama/Sedge Plant Community*.

### **Low Plant Density, Excessive Litter Plant Community**

This plant community develops after an extended periods of non-use by herbivores and exclusion of fire. This plant community can sometimes be found in small patches dispersed throughout the pasture, encircling spot grazed areas, and areas distant from water sources. This is a typical pattern found in properly stocked pastures grazed season-long. Plant litter may accumulate as this plant community first develops. Due to a lack of tiller stimulation and sunlight, native bunchgrasses typically develop dead centers and native rhizomatous grasses are limited to colonies. Standing decadent plants and moderate litter covers shorter understory species (i.e. short grasses and sedges), restricting their ability to capture adequate sunlight for photosynthesis. Vigor and diversity of native plants are reduced. Annual and/or biennial forbs, annual grasses, and cryptogams commonly fill interspaces once occupied by desirable species.

Kentucky bluegrass, cheatgrass and sweetclover tend to invade and can sometimes dominate this plant community. Other grasses present include western wheatgrass, needleandthread, green needlegrass, prairie junegrass, Sandberg bluegrass and sedges with lesser amounts of plains muhly, little bluestem, blue grama, and sideoats grama. The common forbs include dotted gayfeather, Missouri goldenrod, prairie coneflower, silverleaf scurfpea, western yarrow, and heath aster. Shrubs occurring on this plant community include fringed sagewort, silver sagebrush, broom snakeweed and winterfat.

This plant community is resistant to change without prescribed grazing or fire. The combination of both grazing and fire is most effective in moving this plant community towards the HCPC. Soil erosion is low. Compared to the HCPC, infiltration is reduced to the lower root zone. This plant community tends to favor early cool season plant species. Once this plant community is reached, any of the preferred treatments can readily return the diversity and production of the site.

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: SD6001

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

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- With prescribed grazing or prescribed burning and prescribed grazing, this plant community will move toward the *Western Wheatgrass/Sideoats Grama/Green Needlegrass Plant Community*.

### **Grama/Sedge Plant Community**

This plant community develops under heavy continuous grazing, or with continuous seasonal grazing with concentrated use in the early part of the growing season (as in calving/lambing pastures). It is made up of approximately 85-95% grasses (primarily short, warm season grasses), 1-5% forbs, and 5-10% shrubs. The dominant grasses or grass-likes include blue grama, buffalograss and sedge. Other grasses may include western wheatgrass, prairie junegrass, threeawn, and annual brome. The dominant forbs include slimflower scurfpea, pussytoes, curlycup gumweed and scarlet globemallow. The dominant shrubs are fringed sagewort and plains pricklypear.

Compared to the HCPC, short grasses have increased, and the cool season mid grasses have diminished greatly. Some forbs and cactus have either increased and/or invaded the site. Plant diversity is low. This plant community is very stable. Generally, this plant community will require significant management inputs and time to move it away from this plant community. On-site soil erosion is low. Infiltration is low, and runoff is high. Typically the runoff is very clean, but off-site areas can be significantly impacted due to the increased runoff.

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: SD6004

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

Growth curve description: Warm-season dominant, cool-season sub-dominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	7	18	25	25	15	7	1	0	0

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

- Long term prescribed grazing and favorable climatic conditions, which allows for adequate plant recovery periods, will move this plant community towards the *Western Wheatgrass/Grama/Sedge Plant Community*.

## **Ecological Site Interpretations**

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

-- Under Development --

**Western Wheatgrass/Sideoats Grama/Green Needlegrass Plant Community:**

**Western Wheatgrass/Grama/Sedge Plant Community:**

**Low Plant Density, Excessive Litter Plant Community:**

**Grama/Sedge Plant Community:**

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

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
<b>Grasses &amp; Grass-likes</b>							
big bluestem	U D P D	U U D U	U D P D	U D U U	U D U U	U D P D	U D P D
blue grama	U D P D	D P P D	U D P U	D P P D	D P P D	U D P U	U D P U
bluebunch wheatgrass	U P D D	P P P P	U P D D	D D D D	D D D D	U P D D	U P D D
bottlebrush squirreltail	U D U U	N D U N	U D U U	N D U N	N D U N	U D U U	U D U U
buffalograss	U U P D	U U P D	U D U 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
hairy grama	U D P D	D P P D	U D P U	D P P D	D P P D	U D P U	U D P U
little bluestem	U D D U	U U D U	U D D U	N D N N	N D N N	U D D U	U D D U
needleandthread	U D U D	N D N U	U D U D	N D N U	N D N U	U D U D	U D U D
plains muhly	U U D U	U U D U	U U D U	N N N N	N N N N	U U D U	U U D U
prairie junegrass	U D U D	N D N U	U D U D	N D N U	N D N U	U D U D	U D U D
prairie sandreed	U D D U	U D U U	U D D U	U U D U	U U D U	U D D U	U D D U
Sandberg bluegrass	U U U U	U D U U	N U N N	N D N N	N D N N	N U N N	N U N N
sedge	U P U D	U P U D	U D U D	U D U D	U D U D	U D U D	U D U D
sideoats grama	U D P D	U P D D	U D P U	U P D U	U P D U	U D P U	U D P U
thickspike wheatgrass	U D D U	U D U U	U D D U	N D N N	N D N N	U D D U	U D D U
western wheatgrass	U P D D	U D U U	U P D U	N D N N	N D N N	U P D U	U P D U
<b>Forbs</b>							
biscuitroot	U D U U	U D D U	U D U U	U D D U	U D D U	U D U U	U D D U
cudweed sagewort	U U U U	U U D U	U U U U	U U D U	U U D U	U U U U	U U D U
dotted gayfeather	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
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
goldenpea	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
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
Indian breadroot	U U U U	U D U U	U U U U	U D U U	U D U U	U U U U	U D U U
milkvetch	U U U U	U D U U	U U U U	U D U U	U D U U	U U U U	U D U U
Missouri 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
prairie coneflower	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
purple coneflower	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
purple prairie clover	U D P U	U P P U	U D P U	U P P U	U P P U	U D P U	U P P U
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
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
tapertip hawksbeard	U U D U	N D U N	U U D U	N D U N	N D U N	U U D U	N D U N
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
wild onion	U D U U	U D D U	U D U U	U D D U	U D D U	U D U U	U D D U
wild parsley	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
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
yellow wild buckwheat	N N U N	N N U N	N N U N	N N U N	N N U N	N N U N	N N U N
<b>Shrubs</b>							
big sagebrush	U U U U	D U U D	U N U U	P U D P	P P P P	U N U U	D U U U
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
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
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
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
skunkbush sumac	D U U D	D D D D	D U U D	D U U D	D U U D	D U U D	D U U D
winterfat	P P P P	P P P P	P P P P	P P P P	P P P P	P P P P	P P P P
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 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/Sideoats Grama/Green Needlegrass	1400	0.35 – 0.45
Western Wheatgrass/Grama/Sedge	1000	0.25 – 0.35
Low Plant Density, Excessive Litter Grama/Sedge	1200 600	0.30 – 0.40 0.15 – 0.25

\* Based on 790 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 herbage production on this site. The site is dominated by soils in hydrologic group D. Infiltration varies from very slow to moderately slow and runoff varies from medium to very high depending on 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 exception would be where short grasses form a dense sod and dominate the site. Normally 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 further information).

## Recreational Uses

This site provides hunting opportunities for upland game species. The wide varieties of plants, which bloom from spring until fall, have an esthetic value that appeals to visitors.

## Wood Products

## Other Products

Selected seed harvest of certain unique native plant species can provide additional income.

## Supporting Information

### Associated Sites

(060AY011SD) – Clayey 13-16 P.Z.

(060AY030SD) – Porous Clay

(060AY040SD) – Clayey 16-18" P.Z.

(060AY043SD) – Shallow Porous Clay

## Similar Sites

- (060AY011SD & 060AY040SD) – Clayey 13-16" P.Z. & Clayey 16-18" P.Z.  
 [Less sideoats grama; higher production]  
 (060AY024SD) – Shallow Loamy  
 [More needleandthread, less green needlegrass]

## Inventory Data References

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel was also used. Those involved in developing this site description include: Everet Bainter, Range Management Specialist, NRCS; Stan Boltz, Range Management Specialist, NRCS; Darrel DuVall, Range Management Specialist, NRCS; Jill Epley, Range Management Specialist, NRCS; Glen Mitchell, Range Management Specialist, NRCS; Cheryl Nielsen, Range Management Specialist, NRCS; Rick Peterson, Range Management Specialist, NRCS; Mike Stirling, 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	11	1968 – 1990	NE & SD	Dawes, Meade, Pennington, Sioux

## State Correlation

This site has been correlated between Montana, Nebraska, South Dakota & Wyoming in MLRA 60A.

## Field Offices

Belle Fourche, SD	Custer, SD	Hot Springs, SD	Pine Ridge, SD	Sundance, WY
Broadus, MT	Ekalaka, MT	Lusk, WY	Rapid City, SD	Wall, SD
Buffalo, SD	Faith, SD	Martin, SD	Rushville, NE	
Chadron, NE	Gillette, WY	Newcastle, WY	Sturgis, SD	

## Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 43e – Sagebrush Steppe, 43g – Semiarid Pierre Shale Plains, and 43k – Dense Clay Prairie.

## Other References

High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-0728. (<http://hpccsun.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, 2002. National Soil Survey Handbook, title 430-VI. (<http://soils.usda.gov/procedures/handbook/main.htm>)

USDA, NRCS. 2001. The PLANTS Database, Version 3.1 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

USDA, NRCS, Various Published Soil Surveys.

## Site Description Approval

_____ MT, State Range Management Specialist	_____ Date	_____ NE, State Range Management Specialist	_____ Date
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_____ SD, State Range Management Specialist	_____ Date	_____ WY, State Range Management Specialist	_____ Date
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