

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 (MLRA): 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>
Elevation (feet):	2,500	4,300
Slope (percent):	2	60
Water Table Depth (inches):	None	None
Flooding:		
Frequency:	None	None
Duration:	None	None
Ponding:		
Depth (inches):	None	None
Frequency:	None	None
Duration:	None	None
Runoff Class:	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, Wyoming (WY)), to about 22°F (Belle Fourche, South Dakota (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 (mph) annually, ranging from about 13 mph during the spring to about 10 mph during the summer. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 mph.

Growth of cool-season plants begins in early to mid-March, slowing or ceasing in late June. Warm-season plants begin growth about mid-May and can continue to early or mid-September. Greenup of cool-season plants may occur in September and October when adequate soil moisture is present.

	<u>Minimum</u>	<u>Maximum</u>
Frost-free period (days):	122	129
Freeze-free period (days):	145	152
Mean Annual Precipitation (inches):	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 one to six 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 five 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 ≤3” (% Cover): 0-25
Surface Fragments >3” (%Cover): 0
Subsurface Fragments ≤3” (% Volume): 5-15
Subsurface Fragments >3” (% Volume): 0

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	well	well
Permeability Class:	very slow	moderately slow
Depth (inches):	10	20
Electrical Conductivity (mmhos/cm)*:	0	8
Sodium Absorption Ratio*:	0	13
Soil Reaction (1:1 Water)*:	6.1	9.0
Soil Reaction (0.1M CaCl2)*:	NA	NA
Available Water Capacity (inches)*:	2	3
Calcium Carbonate Equivalent (percent)*:	0	15

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

Plant Communities

Ecological Dynamics of the Site:

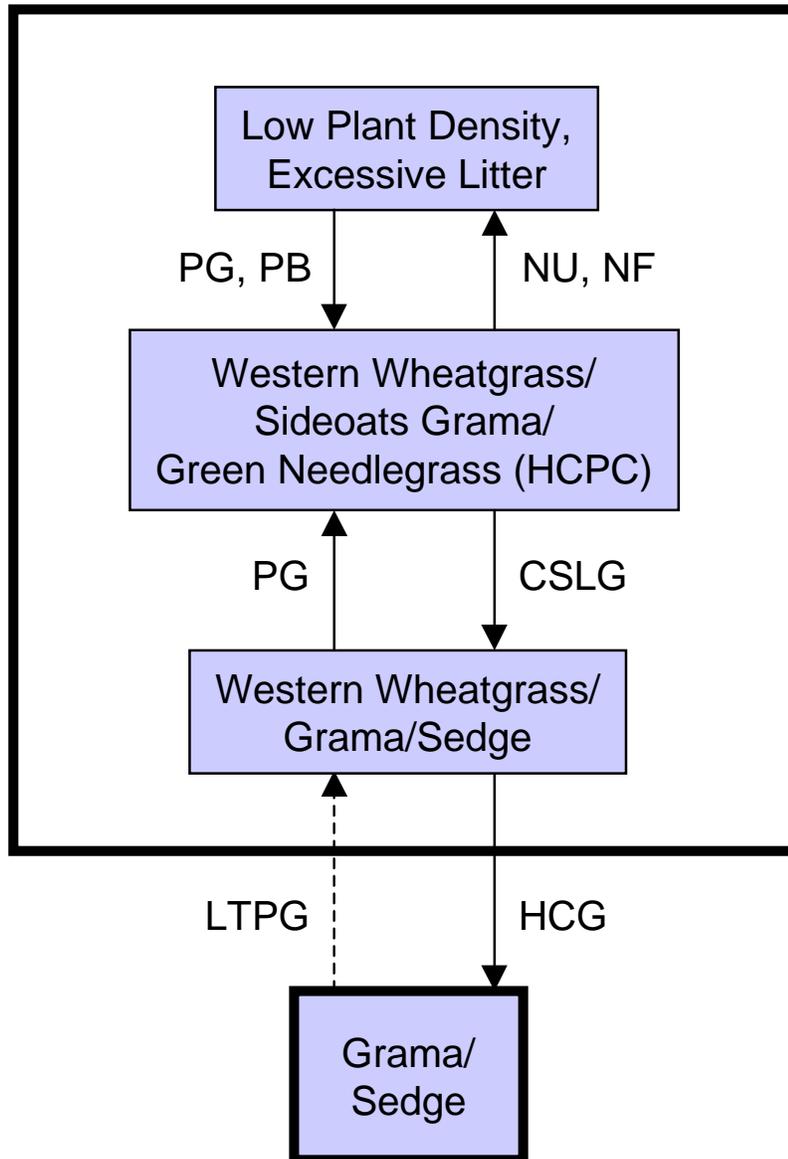
This site developed under Northern Great Plains climatic conditions, natural influences of large herbivores, occasional fire, and other biotic and abiotic factors that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts 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
GRASSES & GRASS-LIKES				1120 - 1260	80 - 90
RHIZOMATOUS WHEATGRASS			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
COOL-SEASON MID GRASSES			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
WARM-SEASON MID GRASSES			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
WARM-SEASON SHORT GRASSES			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
OTHER NATIVE GRASSES & GRASS-LIKES			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
FORBS			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	Psoraleum 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
SHRUBS			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
GRASSES & GRASS-LIKES	870 -	1190	- 1510
FORBS	65 -	105	- 145
SHRUBS	65 -	105	- 145
TOTAL	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 Grma/Green Needlegrass			Western Wheatgrass/ Grma/Sedge			Low Plant Density, Excessive Litter			Grma/Sedge		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
GRASSES & GRASS-LIKES			1120 - 1260	80 - 90		800 - 900	80 - 90		960 - 1080	80 - 90		510 - 570	85 - 95
RHIZOMATOUS WHEATGRASSES		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			
COOL-SEASON MID GRASSES		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	PBSP6	2	0 - 140	0 - 10	2	0 - 20	0 - 2	2	0 - 60	0 - 5			
WARM-SEASON MID GRASSES		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
WARM-SEASON SHORT GRASSES		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
NATIVE GRASSES/GRASS-LIKES		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
NON-NATIVE GRASSES		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
FORBS		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
SHRUBS		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
Annual Production lbs./acre			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH
GRASSES & GRASS-LIKES			870 - 1190 - 1510		610 - 850 - 1090		490 - 1020 - 1250		375 - 537 - 700				
FORBS			65 - 105 - 145		45 - 75 - 105		55 - 90 - 125		0 - 18 - 35				
SHRUBS			65 - 105 - 145		45 - 75 - 105		55 - 90 - 125		25 - 45 - 65				
TOTAL			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” (DPCs). According to the USDA Natural Resources Conservation Service (NRCS) National Range and Pasture Handbook, DPCs 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 HCPC. Potential vegetation is about 80-90 percent grasses or grass-like plants, 5-10 percent forbs, and 5-10 percent 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 offsite and natural plant mortality is very low. The diversity in plant species allows for high drought tolerance. Runoff 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 subdominant.

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

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	10	23	34	15	6	5	4	0	0

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

- Nonuse 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 percent grasses and grass-likes, 5-15 percent forbs, and 5-10 percent 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 threeawn. Forbs commonly occurring include yarrow, cudweed sagewort, goldenpea, prairie coneflower, and scurfpea. Shrubs commonly found include fringed sagewort and broom snakeweed.

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. Nonnative species such as cheatgrass, salsify, curlycup gumweed, thistle, and sweet clover 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 subdominant.

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

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	10	23	34	15	6	5	4	0	0

Transitional pathways leading to other plant communities are as follows:

- 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 nonuse 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 sweet clover 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*.

Gramma/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 percent grasses (primarily short, warm-season grasses), 1-5 percent forbs, and 5-10 percent 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 midgrasses 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. Onsite soil erosion is low. Infiltration is low and runoff is high. Typically, the runoff is very clean but offsite 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 subdominant.

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

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

Transitions or 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

Animal Community – Wildlife Interpretations shallow clayey

Major Land Resource Area (MLRA) 60A lies within the drier portion of Northern mixed-grass prairie ecosystem where sagebrush steppes to the west yield to grassland steppes to the east. Prior to European settlement, this area consisted of diverse grass/shrub land habitats interspersed with varying densities of depressional, in-stream wetlands, and woody riparian corridors. These habitats provided critical life cycle components for many of its users. Many species of grassland birds, small mammals, reptiles, amphibians, and herds of roaming bison, elk, and pronghorn were among the inhabitants adapted to this semi-arid region. Roaming herbivores, as well as several small mammal and insect species, were the primary consumers linking the grassland resources to predators such as the wolf, mountain lion, and grizzly bear as well as smaller carnivores such as the coyote, bobcat, fox, and raptors. The prairie dog was once abundant; however, the species remains a keystone species within its range. The black-footed ferret, burrowing owl, ferruginous hawk, mountain plover, and swift fox were associated with prairie dog complexes.

Historically, the Northern mixed-grass prairie was a disturbance-driven ecosystem with fire, herbivory and climate functioning as the primary disturbance factors either singly or in combination. Following European settlement, livestock grazing, cropland conversion, elimination of fire, energy development and other anthropogenic factors influenced species composition and abundance. Introduced and invasive species further impacted plant and animal communities. Bison were historically a keystone species but have been extirpated as a free-ranging herbivore. The loss of the bison and prairie dog, and fire as ecological drivers greatly influenced the character of the remaining native plant communities and altered wildlife habitats. Human development has reduced habitat quality for area-sensitive species.

Within MLRA 60A, the Shallow Clayey Ecological Site provides upland grassland cover with an associated forb and shrub component. It was typically part of an expansive grassland landscape that included combinations of Shallow Loamy, Clayey, Thin Upland, Claypan, Sandy, Saline Upland and Lowland, Loamy, and Thin Claypan Ecological Sites. This site provided habitat for species requiring unfragmented grassland. Important habitat features and components found commonly or exclusively on this site may include greater sage-grouse and sharp-tailed grouse leks; upland nesting habitat for grassland birds, forbs and insects for brood habitat; and a forage source for small and large herbivores. Many grassland and shrub steppe nesting bird populations are declining. Extirpated species include free-ranging American bison, grizzly bear, gray wolf, black-footed ferret, mountain plover, Rocky Mountain locust, and swift fox.

The majority of the Shallow Clayey Ecological Site remains intact and provides increasingly important habitat for grassland and shrub steppe nesting birds, small rodents, coyote, and a variety of reptiles, amphibians, and insects. Invasive species such as annual bromegrasses and crested wheat have impacted the biological integrity of the site for some grassland birds such as greater sage-grouse. Changes in historic fire regime and domestic grazing have impacted the forb/shrub/grass percentages. Greater sage-grouse and Brewer's sparrow benefit when big sagebrush increases.

Western Wheatgrass/Sideoats Grama/Green Needlegrass (HCPC): The predominance of grasses plus high diversity of forbs and shrubs in this community favors grazers and mixed-feeders, such as deer, and pronghorn. Insects, such as pollinators, play a large role in maintaining the forb community and provide a forage base for grassland birds and other species. The complex plant structural

diversity provides habitat for a wide array of migratory and resident birds. Brewer's and grasshopper sparrow, lark bunting, western meadowlark, greater sage-grouse, and sharp-tailed grouse are common and benefit from the structure and composition this plant community provides. This site provides important breeding habitat for the loggerhead shrike. This site provides excellent nesting and brood rearing habitat for greater sage-grouse and sharp-tailed grouse. Diverse prey populations are available for grassland raptors such as ferruginous hawk, Swainson's hawk, golden eagle, and prairie falcon.

The diversity of grasses, forbs, and shrubs provide high nutrition levels for small and large herbivores including voles, mice, least chipmunk, thirteen lined ground squirrel, white-tailed jackrabbit, and deer. This ecological site provides excellent wintering habitat for pronghorn. The moderate stature of this plant community provides suitable thermal, protective, and escape cover for small herbivores and grassland birds. Predators utilizing this plant community include coyote, American badger, red fox, and long-tailed weasel. This plant community provides habitat for spade foot toad, Great Plains toad, bull snake, and western rattlesnake.

Western Wheatgrass/Grama/Sedge and Grama/Sedge: Resulting from continuous season-long grazing, grama species (e.g. blue and sideoats), and sedges will become dominate. The forb and shrub diversity decreased. Big sagebrush, where present, remains the dominate shrub component. Density of species such as Brewer's sparrow, greater sage-grouse, as well as, desert cottontail should remain unchanged. However, this plant community may provide areas suitable for lek site development. Species such as the horned lark, long-billed curlew, upland sandpiper, and white-tailed jackrabbit will increase in locations where big sagebrush declines.

The shorter stature of this plant community limits thermal, protective, and escape cover. Predators utilizing this plant community include the coyote, American badger, red fox, and long-tailed weasel. The shift to shorter plant structure will favor prairie dog expansion and associate species such as ferruginous hawk, burrowing owl, tiger salamander, and swift fox.

Resulting from heavy continuous grazing the plant community will become dominated by grama species and sedge. The shift to even shorter grassland does not substantially change the wildlife community. Elevated surface temperatures resulting from reduced cover and litter will greatly reduce habitat for most amphibian species, grassland birds, and mammals. However, short grass nesting bird use will increase.

Extreme impairment of the ecological processes impacts offsite aquatic habitats through excessive runoff and nutrient loads.

Low Plant Density/Excessive Litter: Resulting from nonuse or no fire the plant community develops excessive litter and exhibits a reduction in plant density. The shift to a lower plant density but excessive litter does not favor short grass nesting bird species. Species such as the horned lark, long-billed curlew, and upland sandpiper may not use this site. Big sagebrush, where present, remains the dominate shrub component. Density of species such as Brewer's sparrow, greater sage-grouse, as well as, desert cottontail should remain unchanged. However, this plant community may provide areas suitable for lek site development.

The shorter stature of this plant community limits thermal, protective, and escape cover. Predators utilizing this plant community include the coyote, American badger, red fox, and long-tailed weasel. The shift to shorter plant structure will favor prairie dog expansion and associate species such as ferruginous hawk, burrowing owl, tiger salamander, and swift fox.

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

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
Grasses & Grass-likes							
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 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
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 D U U	U D U 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
Forbs							
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
cutweed 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
Shrubs							
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.

Plant Community	Average Annual Production (lbs./acre, air-dry)	Stocking Rate* (AUM/acre)
Western Wheatgrass/Sideoats Grama/Green Needlegrass	1,400	0.35 – 0.45
Western Wheatgrass/Grama/Sedge	1,000	0.25 – 0.35
Low Plant Density, Excessive Litter Gramma/Sedge	1,200 600	0.30 – 0.40 0.15 – 0.25

*Based on 790 lbs./acre (air-dry weight) per Animal Unit Month (AUM), and on 25 percent 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 percent 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 percent 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 (RMS), NRCS; Stan Boltz, RMS, NRCS; Darrel DuVall, RMS, NRCS; Jill Epley, RMS, NRCS; Glen Mitchell, RMS, NRCS; Cheryl Nielsen, RMS, NRCS; Rick Peterson, RMS, NRCS; and Mike Stirling, RMS, 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 (MT), Nebraska (NE), SD, and WY 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 – Semi-arid 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://www.hprcc.unl.edu/>)

USDA, NRCS. National Water and Climate Center, 101 SW Main, Suite 1600, Portland, OR 97204-3224. (<http://www.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://soils.usda.gov/technical/nasis>)

USDA, NRCS, 2002. National Soil Survey Handbook, Title 430-VI. (<http://soils.usda.gov/technical/handbook/>)

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

SD, State Range Management Specialist Date

WY, State Range Management Specialist Date