

United States Department of Agriculture Natural Resources Conservation Service

Ecological Site Description

Site Type: Rangeland

Site Name: Clayey 16-18" P.Z.

Site ID: R060AY040SD

Major Land Resource Area (MLRA): 60A – Pierre Shale Plains



Physiographic Features

This site occurs on gently undulating to rolling uplands.

Landform: fan, plain, hill

Aspect: N/A

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	2,500	4,300
Slope (percent):	0	30
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:	Medium	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 16 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 47°F. January is the coldest month with average temperatures ranging from about 18°F (Newell, South Dakota (SD)), to about 23°F (Oelrichs, SD). July is the warmest month with average temperatures ranging from about 72°F (Newell, SD), to about 74°F (Oelrichs, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 53°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):	124	135
Freeze-free period (days):	143	154
Mean Annual Precipitation (inches):	16	18

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

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.37	0.43	6.0	34.6
February	0.45	0.57	11.4	40.9
March	0.85	0.94	19.5	48.8
April	1.66	1.78	31.4	60.9
May	2.74	3.19	42.6	71.1
June	3.05	3.38	52.2	81.5
July	1.87	2.78	57.8	90.3
August	1.37	1.76	55.9	89.7
September	1.26	1.50	44.8	79.2
October	1.07	1.32	32.9	65.5
November	0.57	0.61	20.3	47.9
December	0.48	0.49	10.0	37.5

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
SD6054	Newell	1948	1999
SD6212	Oelrichs	1948	1999
SD8911	Wasta	1949	1999

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, residuum from shale or alluvium. The surface layer is 3 to 11 inches thick. The texture of the profile ranges from silty clay loam to clay. The soils have a low to moderate 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. The soil surface is stable and intact. Subsurface soil layers are generally not restrictive to water movement and root penetration. These soils are susceptible to wind and water erosion. The hazard of water erosion increases on slopes greater than about six percent.

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: shale
Parent Material Origin: shale, clayey
Surface Texture: silt loam, silty clay 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): 0-13
Subsurface Fragments >3" (% Volume): 0-6

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	well	well
Permeability Class:	very slow	slow
Depth (inches):	20	80
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)*:	4	7
Calcium Carbonate Equivalent (percent)*:	0	15

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

Plant Communities

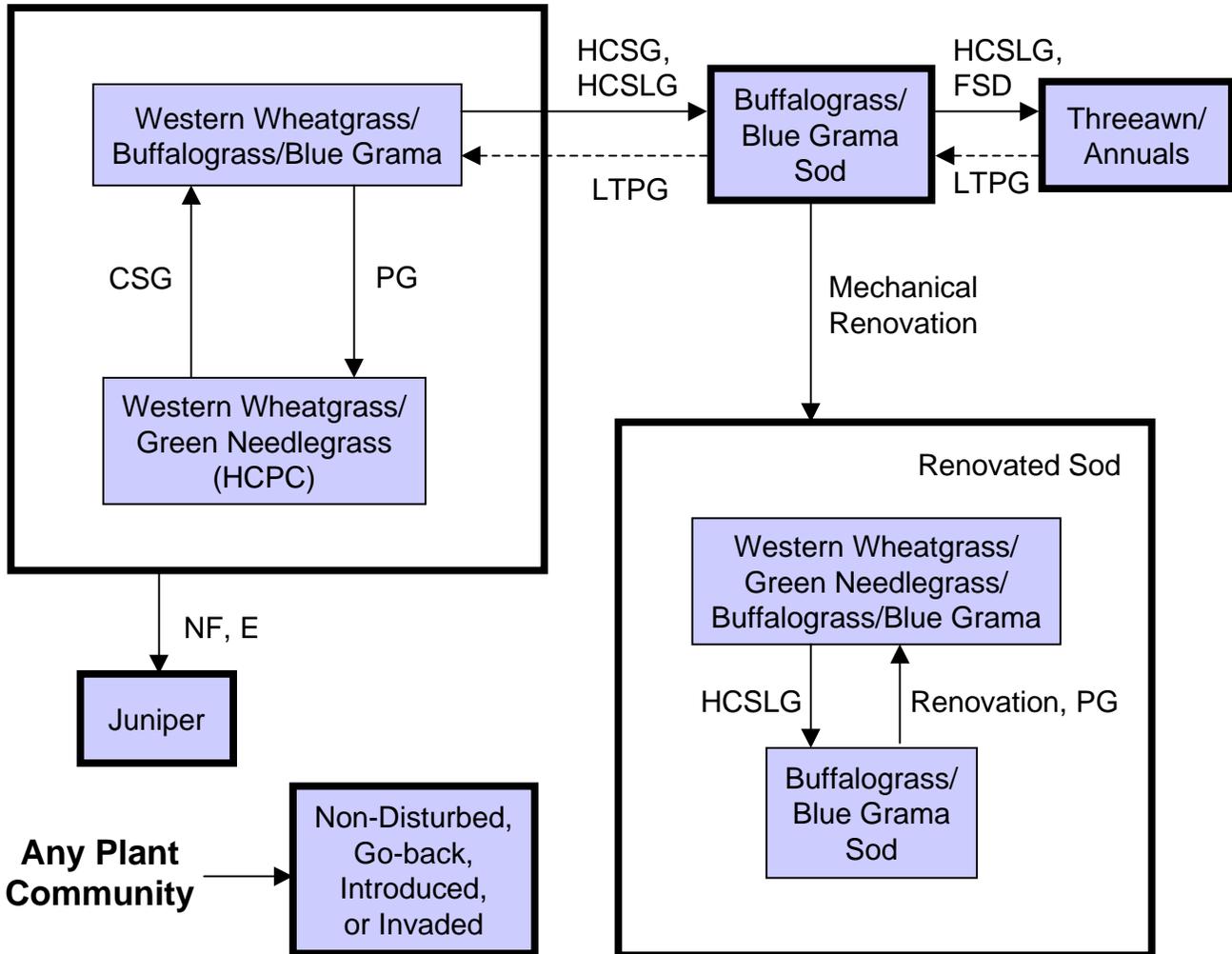
Ecological Dynamics of the Site:

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.

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 is a diagram that illustrates the common plant communities that can occur on the site and the transitions between communities. The ecological processes are discussed in more detail in the plant community narratives following the diagram.

Plant Communities and Transitional Pathways



CSG - Continuous seasonal grazing; **CSLG** - Continuous season-long grazing; **E** - Encroachment; **HCPC** - Historical Climax Plant Community; **HCSG** - Heavy continuous seasonal grazing; **HCSLG** - Heavy continuous season-long grazing; **LTPG** - Long-term prescribed grazing; **NF** - No fire; **PG** - Prescribed Grazing; Dashed lines signify transitions returning across a threshold, which typically require significant inputs or long periods of time.

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Western Wheatgrass/ Green Needlegrass (HCPC)		
			Group	lbs./acre	% Comp
GRASSES & GRASS-LIKES				1700 - 1900	85 - 95
COOL-SEASON MID GRASSES			1	1400 - 1700	70 - 85
western wheatgrass	Pascopyrum smithii	PASM	1	700 - 1100	35 - 55
green needlegrass	Nassella viridula	NAVI4	1	500 - 700	25 - 35
porcupine grass	Hesperostipa spartea	HESP11	1	0 - 100	0 - 5
needleandthread	Hesperostipa comata ssp. comata	HECOC8	1	0 - 100	0 - 5
SHORT GRASSES & GRASS-LIKES			2	100 - 300	5 - 15
blue grama	Bouteloua gracilis	BOGR2	2	40 - 200	2 - 10
buffalograss	Buchloe dactyloides	BUDA	2	0 - 100	0 - 5
prairie junegrass	Koeleria macrantha	KOMA	2	20 - 100	1 - 5
Sandberg bluegrass	Poa secunda	POSE	2	0 - 100	0 - 5
sedge	Carex spp.	CAREX	2	20 - 100	1 - 5
WARM-SEASON TALL/MID GRASSES			3	200 - 400	10 - 20
sideoats grama	Bouteloua curtipendula	BOCU	3	200 - 400	10 - 20
big bluestem	Andropogon gerardii	ANGE	3	0 - 200	0 - 10
little bluestem	Schizachyrium scoparium	SCSC	3	0 - 100	0 - 5
WARM-SEASON TALL/MID GRASSES			4	0 - 100	0 - 5
other perennial grasses		2GP	4	0 - 100	0 - 5
other annual grasses		2GA	4	0 - 100	0 - 5
FORBS			6	100 - 200	5 - 10
American vetch	Vicia americana	VIAM	6	0 - 40	0 - 2
aster	Aster spp.	ASTER	6	0 - 40	0 - 2
biscuitroot	Lomatium spp.	LOMAT	6	0 - 40	0 - 2
bluebells	Mertensia spp.	MERTE	6	0 - 40	0 - 2
cudweed sagewort	Artemisia ludoviciana	ARLU	6	0 - 40	0 - 2
cutleaf ironplant	Machaeranthera pinnatifida	MAPI	6	0 - 40	0 - 2
deathcamas	Zigadenus spp.	ZIGAD	6	0 - 40	0 - 2
deervetch	Lotus unifoliolatus var. unifoliolatus	LOUNU	6	0 - 40	0 - 2
dotted gayfeather	Liatris punctata	LIPU	6	0 - 40	0 - 2
false boneset	Brickellia eupatorioides	BREU	6	0 - 40	0 - 2
goldenrod	Solidago spp.	SOLID	6	0 - 40	0 - 2
milkvetch	Astragalus spp.	ASTRA	6	0 - 40	0 - 2
penstemon	Penstemon spp.	PENST	6	0 - 40	0 - 2
prairie coneflower	Ratibida columnifera	RACO3	6	0 - 40	0 - 2
pussytoes	Antennaria spp.	ANTEN	6	0 - 40	0 - 2
scarlet gaura	Gaura coccinea	GACO5	6	0 - 40	0 - 2
scarlet globemallow	Sphaeralcea coccinea	SPCO	6	0 - 40	0 - 2
scurfpea	Psoralegium spp.	PSORA2	6	0 - 40	0 - 2
spiny phlox	Phlox hoodii	PHHO	6	0 - 40	0 - 2
thistle	Cirsium spp.	CIRSI	6	0 - 40	0 - 2
western ragweed	Ambrosia psilostachya	AMPS	6	0 - 40	0 - 2
wild onion	Allium spp.	ALLIU	6	0 - 40	0 - 2
wild parsley	Musineon divaricatum	MUDI	6	0 - 40	0 - 2
yarrow	Achillea spp.	ACHIL	6	0 - 40	0 - 2
other perennial forbs		2FP	6	0 - 40	0 - 2
SHRUBS			7	40 - 100	2 - 5
cactus	Opuntia spp.	OPUNT	7	0 - 20	0 - 1
rose	Rosa spp.	ROSA5	7	0 - 40	0 - 2
fringed sagewort	Artemisia frigida	ARFR4	7	0 - 20	0 - 1
snowberry	Symphoricarpos spp.	SYMPH	7	0 - 40	0 - 2
other shrubs		2SHRUB	7	0 - 40	0 - 2

Annual Production lbs./acre	LOW	RV	HIGH
GRASSES & GRASS-LIKES	1070 -	1780	-2490
FORBS	95 -	150	-205
SHRUBS	35 -	70	-105
TOTAL	1200 -	2000	-2800

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/ Green Needlegrass (HCPC)			Western Wheatgrass/ Buffalograss/Blue Grama			Buffalograss/Blue Grama Sod		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
GRASSES & GRASS-LIKES										
<i>COOL-SEASON MID GRASSES</i>										
western wheatgrass	PASM	1	700 - 1100	35 - 55	1	360 - 630	20 - 35	1	70 - 105	10 - 15
green needlegrass	NAV14	1	500 - 700	25 - 35	1	90 - 180	5 - 10	1	0 - 35	0 - 5
porcupine grass	HESP11	1	0 - 100	0 - 5	1	0 - 90	0 - 5	1	0 - 14	0 - 2
needleandthread	HECOC8	1	0 - 100	0 - 5	1	0 - 90	0 - 5	1	35 - 70	5 - 10
<i>SHORT GRASSES & GRASS-LIKES</i>										
blue grama	BOGR2	2	40 - 200	2 - 10	2	180 - 450	10 - 25	2	140 - 210	20 - 30
buffalograss	BUDA	2	0 - 100	0 - 5	2	90 - 360	5 - 20	2	140 - 245	20 - 35
prairie junegrass	KOMA	2	20 - 100	1 - 5	2	18 - 90	1 - 5	2	7 - 35	1 - 5
Sandberg bluegrass	POSE	2	0 - 100	0 - 5	2	0 - 90	0 - 5	2	0 - 35	0 - 5
sedge	CAREX	2	20 - 100	1 - 5	2	90 - 180	5 - 10	2	35 - 105	5 - 15
<i>WARM-SEASON TALL/MID GRASS</i>										
sideoats grama	BOCU	3	200 - 400	10 - 20	3	90 - 180	5 - 10	3	0 - 35	0 - 5
big bluestem	ANGE	3	0 - 200	0 - 10	3	0 - 90	0 - 5			
little bluestem	SCSC	3	0 - 100	0 - 5	3	0 - 54	0 - 3			
<i>OTHER NATIVE GRASSES</i>										
threeawn	ARIST	4	0 - 100	0 - 5	4	0 - 90	0 - 5	4	0 - 35	0 - 5
other perennial grasses	2GP	4	0 - 100	0 - 5	4	0 - 90	0 - 5	4	0 - 35	0 - 5
other annual grasses	2GA	4	0 - 100	0 - 5	4	0 - 90	0 - 5	4	0 - 35	0 - 5
<i>NON-NATIVE GRASSES</i>										
cheatgrass	BRTE				5	0 - 126	0 - 7	5	0 - 35	0 - 5
Kentucky bluegrass	POPR				5	0 - 126	0 - 7	5	0 - 35	0 - 5
<i>FORBS/CRYPTOGAMS</i>										
American vetch	VIAM	6	0 - 40	0 - 2	6	0 - 36	0 - 2	6	0 - 14	0 - 2
aster	ASTER	6	0 - 40	0 - 2	6	0 - 54	0 - 3	6	0 - 21	0 - 3
biscuitroot	LOMAT	6	0 - 40	0 - 2	6	0 - 54	0 - 3	6	0 - 21	0 - 3
bluebells	MERTE	6	0 - 40	0 - 2	6	0 - 18	0 - 1			
cutweed sagewort	ARLU	6	0 - 40	0 - 2	6	0 - 36	0 - 2	6	0 - 14	0 - 2
curlycup gumweed	GRSQ				6	0 - 36	0 - 2	6	0 - 14	0 - 2
cutleaf ironplant	MAPI	6	0 - 40	0 - 2	6	0 - 36	0 - 2	6	0 - 14	0 - 2
deathcamas	ZIGAD	6	0 - 40	0 - 2	6	0 - 36	0 - 2	6	0 - 14	0 - 2
deervetch	LOUNU	6	0 - 40	0 - 2	6	0 - 54	0 - 3	6	0 - 21	0 - 3
dotted gayfeather	LIPU	6	0 - 40	0 - 2	6	0 - 36	0 - 2	6	0 - 14	0 - 2
false boneset	BRFU	6	0 - 40	0 - 2	6	0 - 18	0 - 1			
fetid marigold	DYPA							6	0 - 7	0 - 1
goldenpea	THRH				6	0 - 36	0 - 2	6	0 - 14	0 - 2
goldenrod	SOLID	6	0 - 40	0 - 2	6	0 - 36	0 - 2	6	0 - 14	0 - 2
milkvetch	ASTRA	6	0 - 40	0 - 2	6	0 - 36	0 - 2	6	0 - 14	0 - 2
penstemon	PENST	6	0 - 40	0 - 2	6	0 - 36	0 - 2	6	0 - 14	0 - 2
prairie coneflower	RACO3	6	0 - 40	0 - 2	6	0 - 36	0 - 2	6	0 - 14	0 - 2
pussytoes	ANTEN	6	0 - 40	0 - 2	6	0 - 36	0 - 2	6	0 - 14	0 - 2
scarlet gaura	GACO5	6	0 - 40	0 - 2	6	0 - 18	0 - 1			
scarlet globemallow	SPCO	6	0 - 40	0 - 2	6	0 - 54	0 - 3	6	0 - 21	0 - 3
scurfpea	PSORA2	6	0 - 40	0 - 2	6	0 - 36	0 - 2	6	0 - 14	0 - 2
spiny phlox	PHHO	6	0 - 40	0 - 2	6	0 - 36	0 - 2	6	0 - 14	0 - 2
sweetclover	MELIL				6	0 - 90	0 - 5	6	0 - 70	0 - 10
thistle	CIRSI	6	0 - 40	0 - 2	6	0 - 36	0 - 2	6	0 - 14	0 - 2
verbena	VERBE				6	0 - 18	0 - 1	6	0 - 14	0 - 2
western ragweed	AMPS	6	0 - 40	0 - 2	6	0 - 36	0 - 2	6	0 - 14	0 - 2
wild onion	ALLIU	6	0 - 40	0 - 2	6	0 - 36	0 - 2	6	0 - 14	0 - 2
wild parsley	MUDI	6	0 - 40	0 - 2	6	0 - 54	0 - 3	6	0 - 21	0 - 3
yarrow	ACHIL	6	0 - 40	0 - 2	6	0 - 36	0 - 2	6	0 - 14	0 - 2
other perennial forbs	2FP	6	0 - 40	0 - 2	6	0 - 36	0 - 2	6	0 - 14	0 - 2
clubmoss	SEDE2				6	0 - 18	0 - 1	6	0 - 28	0 - 4
<i>SHRUBS</i>										
broom snakeweed	GUSA2	7	40 - 100	2 - 5	7	90 - 180	5 - 10	7	35 - 70	5 - 10
cactus	OPUNT	7	0 - 20	0 - 1	7	0 - 90	0 - 5	7	14 - 56	2 - 8
rose	ROSA5	7	0 - 40	0 - 2	7	0 - 54	0 - 3	7	0 - 14	0 - 2
fringed sagewort	ARFR4	7	0 - 20	0 - 1	7	0 - 90	0 - 5	7	0 - 35	0 - 5
snowberry	SYMPH	7	0 - 40	0 - 2	7	0 - 36	0 - 2	7	0 - 14	0 - 2
other shrubs	2SHRUB	7	0 - 40	0 - 2	7	0 - 36	0 - 2	7	0 - 14	0 - 2
<i>TREES</i>										
eastern redcedar	JUM	8			8			8		
Rocky Mountain juniper	JUSC2									
Annual Production lbs./acre										
		LOW	RV	HIGH	LOW	RV	HIGH	LOW	RV	HIGH
GRASSES & GRASS-LIKES		1070 - 1780 - 2490			630 - 1530 - 2030			340 - 595 - 750		
FORBS/CRYPTOGAMS		95 - 150 - 205			85 - 135 - 185			30 - 53 - 75		
SHRUBS		35 - 70 - 105			85 - 135 - 185			30 - 53 - 75		
TREES										
TOTAL		1200 - 2000 - 2800			800 - 1800 - 2400			400 - 700 - 900		

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/ Green Needlegrass (HCPC)			Threeawn/Annuals			Juniper		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
GRASSES & GRASS-LIKES			1700 - 1900	85 - 95		350 - 595	50 - 85		750 - 1050	50 - 70
COOL-SEASON MID GRASSES		1	1400 - 1700	70 - 85	1	7 - 70	1 - 10	1	450 - 750	30 - 50
western wheatgrass	PASM	1	700 - 1100	35 - 55	1	7 - 70	1 - 10	1	300 - 600	20 - 40
green needlegrass	NAV14	1	500 - 700	25 - 35	1	0 - 7	0 - 1	1	300 - 600	20 - 40
porcupine grass	HESP11	1	0 - 100	0 - 5				1	0 - 150	0 - 10
needleandthread	HECOC8	1	0 - 100	0 - 5	1	0 - 14	0 - 2	1	75 - 225	5 - 15
SHORT GRASSES & GRASS-LIKES		2	100 - 300	5 - 15	2	35 - 245	5 - 35	2	75 - 225	5 - 15
blue grama	BOGR2	2	40 - 200	2 - 10	2	7 - 105	1 - 15	2	30 - 150	2 - 10
buffalograss	BUDA	2	0 - 100	0 - 5	2	7 - 105	1 - 15	2	0 - 75	0 - 5
prairie junegrass	KOMA	2	20 - 100	1 - 5	2	0 - 21	0 - 3	2	15 - 75	1 - 5
Sandberg bluegrass	POSE	2	0 - 100	0 - 5	2	0 - 7	0 - 1	2	0 - 75	0 - 5
sedge	CAREX	2	20 - 100	1 - 5	2	7 - 35	1 - 5	2	30 - 120	2 - 8
WARM-SEASON TALL/MID GRASS		3	200 - 400	10 - 20	3	0 - 21	0 - 3	3	75 - 225	5 - 15
sideoats grama	BOCU	3	200 - 400	10 - 20	3	0 - 14	0 - 2	3	75 - 150	5 - 10
big bluestem	ANGE	3	0 - 200	0 - 10				3	0 - 75	0 - 5
little bluestem	SCSC	3	0 - 100	0 - 5	3	0 - 7	0 - 1	3	0 - 75	0 - 5
OTHER NATIVE GRASSES		4	0 - 100	0 - 5	4	70 - 245	10 - 35	4	0 - 75	0 - 5
threeawn	ARIST				4	70 - 245	10 - 35	4	0 - 45	0 - 3
other perennial grasses	2GP	4	0 - 100	0 - 5	4	0 - 14	0 - 2	4	0 - 75	0 - 5
other annual grasses	2GA	4	0 - 100	0 - 5	4	0 - 35	0 - 5	4	0 - 75	0 - 5
NON-NATIVE GRASSES		5			5	7 - 70	1 - 10	5	75 - 150	5 - 10
cheatgrass	BRTE				5	7 - 70	1 - 10	5	30 - 120	2 - 8
Kentucky bluegrass	POPR				5	0 - 14	0 - 2	5	0 - 105	0 - 7
FORBS/CRYPTOGAMS		6	100 - 200	5 - 10	6	70 - 175	10 - 25	6	75 - 150	5 - 10
American vetch	VIAM	6	0 - 40	0 - 2						
aster	ASTER	6	0 - 40	0 - 2	6	0 - 14	0 - 2	6	0 - 45	0 - 3
biscuitroot	LOMAT	6	0 - 40	0 - 2				6	0 - 30	0 - 2
bluebells	MERTE	6	0 - 40	0 - 2						
cutweed sagewort	ARLU	6	0 - 40	0 - 2	6	14 - 35	2 - 5	6	0 - 60	0 - 4
curlycup gumweed	GRSQ				6	0 - 35	0 - 5			
cutleaf ironplant	MAPI	6	0 - 40	0 - 2	6	0 - 7	0 - 1	6	0 - 30	0 - 2
deathcamas	ZIGAD	6	0 - 40	0 - 2				6	0 - 30	0 - 2
deervetch	LOUNU	6	0 - 40	0 - 2				6	0 - 30	0 - 2
dotted gayfeather	LIPU	6	0 - 40	0 - 2	6	0 - 7	0 - 1	6	0 - 45	0 - 3
false boneset	BREU	6	0 - 40	0 - 2						
fetid marigold	DYPA				6	14 - 70	2 - 10			
goldenpea	THRH							6	0 - 30	0 - 2
goldenrod	SOLID	6	0 - 40	0 - 2				6	0 - 45	0 - 3
milkvetch	ASTRA	6	0 - 40	0 - 2				6	0 - 30	0 - 2
penstemon	PENST	6	0 - 40	0 - 2				6	0 - 30	0 - 2
prairie coneflower	RACO3	6	0 - 40	0 - 2	6	0 - 7	0 - 1	6	0 - 30	0 - 2
pussytoes	ANTEN	6	0 - 40	0 - 2	6	0 - 35	0 - 5	6	0 - 30	0 - 2
scarlet gaura	GACO5	6	0 - 40	0 - 2						
scarlet globemallow	SPCO	6	0 - 40	0 - 2	6	0 - 7	0 - 1	6	0 - 30	0 - 2
scurfpea	PSORA2	6	0 - 40	0 - 2				6	0 - 45	0 - 3
spiny phlox	PHHO	6	0 - 40	0 - 2	6	0 - 7	0 - 1	6	0 - 30	0 - 2
sweetclover	MELIL				6	0 - 70	0 - 10	6	0 - 75	0 - 5
thistle	CIRSI	6	0 - 40	0 - 2				6	0 - 30	0 - 2
verbena	VERBE				6	7 - 35	1 - 5	6	0 - 15	0 - 1
western ragweed	AMPS		0 - 40	0 - 2	6	7 - 35	1 - 5	6	0 - 30	0 - 2
wild onion	ALLIU	6	0 - 40	0 - 2				6	0 - 30	0 - 2
wild parsley	MUDI	6	0 - 40	0 - 2				6	0 - 30	0 - 2
yarrow	ACHIL	6	0 - 40	0 - 2	6	0 - 14	0 - 2	6	0 - 45	0 - 3
other perennial forbs	2FP	6	0 - 40	0 - 2	6	0 - 14	0 - 2	6	0 - 45	0 - 3
clubmoss	SEDE2				6	0 - 7	0 - 1			
SHRUBS		7	40 - 100	2 - 5	7	35 - 175	5 - 25	7	75 - 150	5 - 10
broom snakeweed	GUSA2				7	7 - 70	1 - 10			
cactus	OPUNT	7	0 - 20	0 - 1	7	7 - 70	1 - 10	7	0 - 30	0 - 2
rose	ROSA5	7	0 - 40	0 - 2				7	0 - 60	0 - 4
fringed sagewort	ARFR4	7	0 - 20	0 - 1	7	14 - 105	2 - 15	7	0 - 75	0 - 5
snowberry	SYMPH	7	0 - 40	0 - 2				7	0 - 75	0 - 5
other shrubs	2SHRUB	7	0 - 40	0 - 2	7	0 - 7	0 - 1	7	0 - 60	0 - 4
TREES		8			8			8	75 - 450	5 - 30
eastern redcedar	JUVI							8	75 - 450	5 - 30
Rocky Mountain juniper	JUSC2							8	75 - 450	5 - 30
Annual Production lbs./acre			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH	
GRASSES & GRASS-LIKES			1070 - 1780 - 2490		305 - 473 - 640		490 - 1013 - 1190			
FORBS/CRYPTOGAMS			95 - 150 - 205		65 - 123 - 180		70 - 113 - 155			
SHRUBS			35 - 70 - 105		30 - 105 - 180		70 - 113 - 155			
TREES							70 - 263 - 500			
TOTAL			1200 - 2000 - 2800		400 - 700 - 1000		700 - 1500 - 2000			

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/Green Needlegrass Plant Community

The plant community upon which interpretations are primarily based is the Western Wheatgrass/Green Needlegrass Plant Community. This is also considered the HCPC. This plant community can be found on areas that are properly managed with grazing and/or prescribed burning and sometimes on areas receiving occasional short periods of deferment. The potential vegetation is about 85-95 percent grasses or grass-like plants, 5-10 percent forbs, and 2-5 percent shrubs. Cool-season grasses dominate this plant community. Major grasses include western wheatgrass and green needlegrass. Other grasses occurring on the site include sideoats grama, blue grama, buffalograss, prairie Junegrass, and sedge. Significant forbs include scarlet globemallow, wild parsley, biscuitroot, deer vetch, American vetch, and milkvetch. The significant shrubs that occur include cactus and rose.

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). The diversity in plant species allows for high drought tolerance. Moderate or high available water capacity provides a favorable soil-water-plant relationship.

Overall, the interpretive plant community has the appearance of being extremely stable, diverse, and productive. Litter normally falls in place and does not occur in excess amounts. Most plant species have a wide range of age classes represented and reproduction is not limited. Plant roots occupy most of the soil profile, which provides for soil stability and promotes infiltration.

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

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

- Continuous seasonal grazing during the active growing period of cool-season plants will lead to the *Western Wheatgrass/Buffalograss/Blue Grama Plant Community*.
- No fire and encroachment from adjacent plant communities containing juniper will move this plant community towards the *Juniper Plant Community*.

Western Wheatgrass/Buffalograss/Blue Grama Plant Community

This plant community develops under continuous seasonal grazing (i.e., grazing an area during the same season every year) or from over utilization during extended drought periods. The potential vegetation is made up of approximately 80-90 percent grasses and grass-like species, 5-10 percent forbs, and 5-10 percent shrubs. The dominant grasses include blue grama, buffalograss, and western and/or thickspike wheatgrass. Other grasses may include green needlegrass, prairie Junegrass, and Kentucky bluegrass. Significant forbs include scarlet globemallow, wild parsley, biscuitroot, phlox, golden pea, deer vetch, asters, and milkvetch. The significant shrubs that occur include cactus, broom snakeweed, and rose.

Compared to the HCPC, the shortgrass species including blue grama and buffalograss have increased. The cool-season species including western wheatgrass and green needlegrass have decreased in composition. Annual bromes, curlycup gumweed, sweet clover, and other annual grasses and forbs can invade the site. While plant diversity is relatively high, the structure of the community is dominated by short grasses. This plant community is resistant to change. The dominant herbaceous species are very adapted to grazing; however, the midgrass species and the more palatable forbs will decrease in the community through continuous seasonal grazing. If the herbaceous component is intact, it tends to be resilient if disturbance is not long-term. Because of the sod forming habit of the dominant shortgrass species, water infiltration is low and runoff is moderate to high. Typically, the runoff is very clean because of the low potential for onsite soil erosion. However, offsite areas may be affected by 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: SD6003

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

Growth curve description: Cool-season, warm-season codominant.

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 community pathways leading to other plant communities are as follows:

- Prescribed grazing, which allows for adequate plant recovery periods, will move this plant community to the *Western Wheatgrass/Green Needlegrass Plant Community*. Periods of nonuse or deferment may be a management option to reach the HCPC.
- With heavy continuous seasonal grazing this site will move towards the *Buffalograss/Blue Grama Sod Plant Community*. This would be typical of calving/lambing pastures where the unit is continuously utilized during the late winter through spring. This transition will result in decreased forage production and plant species diversity. In addition, with heavy continuous season-long grazing, this plant community will move to the *Buffalograss/Blue Grama Sod Plant Community*. During this transition, the plant community can have the appearance of a mosaic, with sod and mixed grass communities intermingled.
- No fire and encroachment from adjacent plant communities containing juniper will move this plant community towards the *Juniper Plant Community*.

Buffalograss/Blue Grama Sod Plant Community

This plant community develops under heavy continuous season-long grazing, and 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 80-90 percent grasses (primarily short, warm-season grasses), 5-10 percent forbs, and 5-10 percent shrubs.

The dominant grasses include blue grama and buffalograss. 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 shrub is 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 (i.e., high animal impact, long-term prescribed grazing, favorable climatic conditions, etc.) and time to move it towards the Western Wheatgrass/Buffalograss/Blue Grama Plant Community. Onsite soil erosion is low. Infiltration is low and runoff is high. Typically, the runoff is very clean because of the low potential for onsite soil erosion. However, 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: SD6005

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 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/Buffalograss/Blue Grama Plant Community*. Periods of nonuse or deferment may be a management option to facilitate this movement.
- Mechanical renovation (specifically contour furrowing) will move this plant community to the renovated *Western Wheatgrass/Green Needlegrass/Buffalograss/Blue Grama Plant Community*. Proper grazing management must be included in order to derive the benefits of renovation.
- Heavy, continuous season-long grazing or frequent and severe defoliation will move this plant community to the *Threeawn/Annuals Plant Community*.

Juniper Plant Community

Historically, juniper (eastern redcedar and Rocky Mountain juniper) was confined to ridges and steep shallow slopes located adjacent to this ecological site. Currently, juniper is expanding on to this site due to the suppression of fire. Juniper canopy is greater than 30 percent of mature trees. The understory production is made up of about 50-70 percent grasses and grass-like species, 5-10 percent forbs, and 10-40 percent shrubs or trees. Dominant grasses include bluegrass, annual brome, and threeawn. Other grasses that occur include western wheatgrass, green needlegrass, and prairie Junegrass. Forbs commonly found in this community include western ragweed, verbena, cudweed sagewort, and pussytoes.

When compared to the HCPC, juniper increases significantly. The grass component decreases dramatically. Total annual production of the understory also decreases significantly. While the juniper canopy provides excellent protection from the weather for both livestock and wildlife, it is not capable

of supporting large numbers of wildlife and livestock due to decreased forage production. This vegetation state is resistant to change. A significant reduction of juniper can only be accomplished through harvesting or crown fire. The vegetation in the understory is capable of enduring fire; however, very hot crown fires will have a detrimental effect to the plant community. Reclamation of juniper dominated areas can be costly and prove to be temporary without proper management (i.e., prescribed burning and prescribed grazing). If the juniper canopy becomes high enough, bare ground and soil erosion will likely increase.

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: SD6011

Growth curve name: Pierre Shale Plains, heavy conifer canopy.

Growth curve description: Mature ponderosa pine/juniper overstory.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	3	7	11	24	27	12	5	4	3	2	1

The direction this plant community will move is dependent on the canopy cover of the juniper. If the canopy cover is high enough, and the plant community is subjected to a hot, crown fire, the resulting plant community will likely be dominated by early successional species, or by introduced species. If the canopy cover is not closed, proper management, including removal of trees, may return the plant community to near the HCPC or the Western Wheatgrass/Bufalograss/Blue Grama Plant Community.

Threeawn/Annuals Plant Community

This plant community develops where the rangeland is grazed year-round, at high stock densities and/or occupation by prairie dogs. The potential plant community is made up of approximately 50-85 percent grasses and grass-like species, 10-25 percent forbs, and 5-25 percent shrubs. The dominant grasses include threeawn and annual brome grasses. Other grasses may include blue grama, buffalograss, sedges, western wheatgrass, and sixweeks fescue. The dominant forbs include fringed sagewort, fetid marigold, western ragweed, pussytoes, prostrate verbena, and other annual invader-like species. 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 nonnative species because of the relatively high percent of bare ground. Compared to the Western Wheatgrass/Needleandthread Plant Community, red threeawn, annual brome grasses, and percent of bare ground has increased. Western wheatgrass, needlegrasses, and other cool-season grasses and grass-like species have decreased as have the warm-season species including big bluestem, sideoats grama, blue grama, and buffalograss. Many annual and perennial forbs, including native and nonnative species have invaded the site. Plant diversity is low.

This plant community is resistant to change back to a higher successional plant community because of the loss of plant diversity and overall soil disturbance. It is very susceptible to invasion of nonnative plant species. 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.

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: NE6403

Growth curve name: Pine Ridge/Badlands, cool-season/warm-season codominant.

Growth curve description: Cool-season, warm-season codominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	5	10	20	25	20	10	5	5	0	0

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

- Under long-term prescribed grazing, including adequate recovery periods, this plant community will move to the *Buffalograss/Blue Grama Sod Plant Community*.

Renovated Sod Vegetation State

An altered vegetation community can be achieved through mechanical renovation. Renovation creates microrelief that alters the water cycle by increasing infiltration and decreasing runoff. The renovation reduces the sod-bound conditions, increasing the vegetative production potential. These factors favor cool-season species such as western wheatgrass, green needlegrass, and a variety of forbs.

The renovated **Western Wheatgrass/Green Needlegrass/Buffalograss/Blue Grama Plant Community** will have similar plant composition and growth curve characteristics as the Western Wheatgrass/Buffalograss/Blue Grama Plant Community. However, the production will likely be higher, depending on the degree of alteration. Proper grazing management must be implemented to maintain this plant community. Continuous season-long grazing will move this plant community to the renovated Blue Grama/Buffalograss Sod Plant Community.

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

- Heavy, continuous season-long grazing will shift this plant community to the renovated *Buffalograss/Blue Grama Sod Plant Community*. Proper grazing management must be included in order to derive the benefits of renovation.

The renovated **Buffalograss/Blue Grama Plant Community** is similar to the nonrenovated Buffalograss/Blue Grama Plant Community in most respects. The main difference is the microrelief created by the renovation.

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

- Mechanical renovation (specifically contour furrowing) or prescribed grazing will move this plant community to the renovated *Western Wheatgrass/Green Needlegrass/Buffalograss/Blue Grama Plant Community*. Proper grazing management must be included in order to derive the benefits of renovation.

Non-Disturbed, Go-back, Introduced, Invaded

This group includes four separate vegetation states that are highly variable in nature. They are derived through four distinct management scenarios, and are not related successional. Infiltration, runoff, and soil erosion varies depending on the vegetation present on the site.

The **Non-Disturbed** state develops from extended periods of exclusion by large herbivores, fire suppression, and lack of other surface disturbance. Plant litter accumulates in large amounts when this community first develops. Litter buildup reduces mature plant vigor and density, and seedling recruitment declines. Eventually litter levels become high enough that plant density decreases. Interspaces are commonly filled by annual forbs, annual grasses, and cryptogams. Typically, rhizomatous grasses form small colonies because of a lack of tiller stimulation. While many of the species present in the HCPC also occur here, other species tend to increase or invade such as

bluegrass, threeawn, cheatgrass, sweet clover, and crested wheatgrass. This plant community can return to a plant community similar to the HCPC with practices such as prescribed burning and/or prescribed grazing.

The **Go-back** state can be reached whenever severe mechanical disturbance (i.e., abandoned farmland) occurs. During the early successional stages, the species that mainly dominate are annual grasses and forbs, later being replaced by both native and introduced perennials. The vegetation on this site varies greatly, sometimes being dominated by threeawn, annual brome, crested wheatgrass, buffalograss, broom snakeweed, sweet clover, and nonnative thistles. Other plants that commonly occur on the site include western wheatgrass, prickly lettuce, maretail, kochia, squirreltail, foxtail, and annual sunflower. If remnant reproductive propagules are present, green needlegrass and western wheatgrass can rapidly occupy this state.

The **Introduced** state is normally those areas seeded to crested wheatgrass, pubescent or intermediate wheatgrass, and alfalfa. It requires considerable investment to establish and have a variable life expectancy. They do produce up to 50 percent more than native range, but their value as forage is somewhat limited due to the single species usually seeded.

The **Invaded** state includes areas that have been invaded by species such as smooth brome, Kentucky bluegrass, crested wheatgrass, nonnative thistles, field bindweed, knapweeds, leafy spurge, hoary cress, and other introduced species.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

The MLRA 60A lies within the drier portion of the 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 was a historical 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 Clayey 16-18 P.Z. 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, Shallow 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 Clayey 16-18 P.Z. Ecological Site remains intact and provides increasingly important habitat for grassland and shrub steppe nesting birds, small rodents, ungulates, 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 is present or increases.

Western Wheatgrass/Green Needlegrass (HCPC): The predominance of grasses plus high diversity of forbs and shrubs in this community favors grazers and mixed-feeders, such as mule 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. Grasshopper sparrow, lark bunting, western meadowlark, 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 sharp-tailed grouse. Due to the loss of big sagebrush, greater sage-grouse and Brewer's sparrow may rarely use the site. 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/Buffalograss /Blue Grama: Resulting from continuous seasonal grazing or from overutilization during extended drought periods, blue grama, and buffalograss will become dominate. The forb diversity increased while both shrub diversity and abundance increased. Due to the loss of big sagebrush, greater sage-grouse and Brewer's sparrow may rarely use the site. However, 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. However, this plant community may provide areas suitable for grouse lek site development. Species such as the horned lark, long-billed curlew, upland sandpiper, and white-tailed jackrabbit will increase in locations where shrub species decline.

The short 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.

Buffalograss/Blue Grama Sod: This plant community develops under heavy continuous season-long grazing, and with continuous seasonal grazing with concentrated use in the spring. The forb diversity and abundance has decreased. The shrub diversity has remained the same but the abundance of cactus is increased. A shift to short plant structure will favor prairie dog expansion with prairie dog town sites and associate species such as ferruginous hawk and burrowing owl. Species such as the horned lark, long-billed curlew, upland sandpiper, and white-tailed jackrabbit will continue to use this site. Species such as Brewer's sparrow, greater sage-grouse, as well as, desert cottontail will rarely use this site.

The short stature of this plant community limits thermal, protective, and escape cover. Prey populations are reduced but are more vulnerable to predation by raptors and mammalian predators. Predators utilizing this plant community include the coyote, American badger, red fox, and long-tailed weasel.

Extreme impairment of the ecological processes impacts offsite aquatic habitats through excessive runoff and nutrient loads. Elevated surface temperatures resulting from reduced cover and litter will greatly reduce habitat for most amphibian species, grassland birds and mammals.

Threeawn/Annuals: Resulting from heavy continuous season-long grazing over many years or frequent and severe defoliation, threeawn and annuals will dominate. The forb abundance has increased; however, forb diversity has substantially decreased and shrub abundance has increased. A shift to short plant structure and relatively high percent of bare ground will favor prairie dog expansion with prairie dog town sites and associate species such as ferruginous hawk and burrowing owl. Species such as horned lark, long-billed curlew, upland sandpiper, and white-tailed jackrabbit will increase. Species such as Brewer's sparrow, greater sage-grouse, and desert cottontail will rarely use this site.

The short stature of this plant community limits suitable thermal, protective, and escape cover. Prey populations are reduced and are more vulnerable to raptor and mammalian predation. Predators utilizing this plant community include the coyote, American badger, red fox, and long-tailed weasel.

Extreme impairment of the ecological processes impacts offsite aquatic habitats through excessive runoff, nutrient, and sediment loads. Elevated surface temperatures resulting from reduced cover and litter will greatly reduce habitat for most amphibian species, grassland birds, and mammals.

Juniper: Resulting from no fire and/or encroachment, juniper will expand from ridges and steep shallow slopes. Forb diversity has decreased while both shrub diversity and abundance has increased. Rocky Mountain juniper and eastern red cedar increase significantly. Grass species decline dramatically and species composition shifts to become dominated by invasive species and threeawn. Rocky mountain juniper stands provide nesting cover, escape cover, den sites for a variety of species. Species such as mule deer, white-footed mice, bushy-tailed woodrat, black-billed magpie, Townsend's solitaire, western meadowlark, Bohemian waxwing, dark-eyed junco, brown thrasher, lark sparrow, and white-crowned sparrow will increase. Species such as meadow voles, thirteen-lined ground squirrel, northern grasshopper mice, and western harvest mice will not utilize this site. Grassland nesting songbirds will be significantly reduced. Raptors such as the long-eared owl will increase. Predators utilizing this plant community include the coyote, American badger, and red fox.

If the juniper canopy is high enough then bare ground will likely increase and excessive runoff, nutrient, and sediment loads may impact offsite aquatic habitat.

Go-back, Introduced, and/or Invaded States

This group includes separate vegetation states that are highly variable in nature. They are derived through distinct management scenarios. These plant communities have been or are highly susceptible to invasion of annual brome grasses, bluegrasses, crested wheatgrass, and other nonnative species.

Since secondary succession is highly variable plant and wildlife species will vary. This plant community provides habitat for generalist or early successional species. In addition, these communities may contain prairie dog towns.

The **Go-back** state can be reached whenever severe mechanical disturbance (i.e., abandoned farmland) is eliminated. Early successional plant communities include annual and perennial weedy type species first to occupy the site. These sites provide diverse foraging, reproductive and escape cover favoring multiple edge species. This pioneer plant community provides abundant opportunity for insect, bird, and small mammal foraging due to abundant flowers and seed sources.

The **Introduced** state provides increased forage and, therefore, a potential for increased herbivore populations such as deer, pronghorn, and various small mammals. These sites provide diverse foraging, reproductive, and escape cover favoring multiple edge species.

The **Invaded** state includes areas that have been invaded and are dominated by species such as smooth brome, Kentucky bluegrass, crested wheatgrass, nonnative thistles, field bindweed, knapweeds, leafy spurge, hoary cress, and other introduced species. These sites greatly reduce foraging, reproductive, and escape cover for grassland nesting bird species.

Western Wheatgrass/Green Needlegrass/Buffalograss/Blue Grama Plant Community (Renovated): See the description for the Western Wheatgrass/Buffalograss/Blue Grama Plant Community.

Buffalograss/Blue Grama Sod Plant Community (Renovated): See the description for the Buffalograss/Blue Grama Sod Plant Community.

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

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
Grasses & Grass-like							
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
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
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
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
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
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							
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
aster	U U D U	U U D U	U U D U	U U D U	U U D U	U U D U	U U D U
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
bluebells	U D U U	U P P U	U D U U	U P P U	U P P U	U D U 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
cutleaf ironplant	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
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
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
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
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
penstemon	U U U U	U P P U	U U U U	U P P U	U P P U	U U U U	U P P 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
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
spiny phlox	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
thistle	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
western ragweed	U U U U	U U U U	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
Shrubs							
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
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
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
snowberry	U U U U	U U U U	U U U U	D U D D	U U U U	U U U U	D U U U

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/Green Needlegrass	2,000	0.55 – 0.65
Western Wheatgrass/Buffalograss/Blue Grama	1,800	0.50 – 0.60
Buffalograss/Blue Grama Sod	700	0.20 – 0.25
Threeawn/Annuals	700	0.20 – 0.25**
Renovated Western Wheatgrass/Green Needlegrass/ Buffalograss/Blue Grama	2500	0.80**
Renovated Buffalograss/Blue Grama	900	0.30**
Juniper	500	0.16**

*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).

**Highly variable; stocking rate needs to be determined onsite.

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

Hydrology Functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic groups C and D. Infiltration varies from very low to moderate, and runoff potential varies from moderate to very high depending on soil hydrologic group, slope, and ground cover. In many cases, areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be high runoff when short grasses form a strong 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 runoff quantities and hydrologic curves).

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

Seed harvest of native plant species can provide additional income on this site.

Supporting Information

Associated Sites

(060AY017SD) – Shallow Clayey (060AY012SD) – Thin Upland
(060AY021SD) – Clayey Overflow (060AY018SD) – Dense Clay
(060AY041SD) – Loamy 16-18" P.Z.

Similar Sites

(060AY021SD) – Clayey Overflow
[more big bluestem; higher production]
(060AY041SD) – Loamy 16-18" P.Z.
[less green needlegrass; more needleandthread]
(060AY018SD) – Dense Clay
[less green needlegrass; more western wheatgrass; less short grasses]

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 description include: Stan Boltz, Range Management Specialist (RMS), NRCS; Darrel DuVall, RMS, NRCS; Jill Epley, RMS, NRCS; Cheryl Nielsen, RMS, NRCS; Rick Peterson, RMS, NRCS; Maxine Rasmussen, 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	6	1971 – 1986	NE & SD	Dawes, Meade, Pennington

State Correlation

This site has been correlated between Nebraska (NE) and SD in MLRA 60A.

Field Offices

Belle Fourche, SD	Custer, SD	Martin, SD	Rapid City, SD	Sturgis, SD
Chadron, NE	Hot Springs, SD	Pine Ridge, SD	Rushville, NE	Wall, 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

NE, State Range Management Specialist Date

SD, State Range Management Specialist Date