United States Department of Agriculture
Natural Resources Conservation Service

Ecological Site Description

Site Type: Rangeland

Site Name: Clayey

Site ID: R055CY011SD

Major Land Resource Area (MLRA): 55C – Southern Black Glaciated Plains

Physiographic Features

This site typically occurs on nearly level to gently sloping, undulating uplands.

Landform: plain, till plain, flood plain **Aspect:** N/A

	Minimum	Maximum
Elevation (feet):	1,300	2,000
Slope (percent):	1	8
Water Table Depth (inches):	51	80
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

MLRA 55C is considered to have a continental climate – cold winters and hot summers, low humidity, light rainfall, and much sunshine. Extremes in temperature may also abound. The climate is the result of this MLRA's location near the geographic center of North America. There are few natural barriers on the Northern Great Plains and air masses move freely across the plains and account for rapid changes in temperature.

Annual precipitation typically ranges from 19 to 25 inches per year. The average annual temperature is about 47°F. January is the coldest month with average temperatures ranging from about 15°F (Howard, South Dakota (SD)), to about 20°F (Wagner, SD). July is the warmest month with temperatures averaging from about 73°F (Howard, SD), to about 77°F (Wagner, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 58°F. This large annual range attests to the continental nature of this area's climate. Hourly winds are estimated to average about 12 miles per hour (mph) annually, ranging from about 13 mph during the spring to about 11 mph during the summer. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 mph.

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

	Minimum	Maximum
Frost-free period (days):	137	159
Freeze-free period (days):	156	180
Mean Annual Precipitation (inches):	19	25

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

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.42	0.54	3.4	31.0
February	0.51	0.81	8.1	36.3
March	1.00	1.61	20.5	47.7
April	2.05	2.50	33.6	62.7
May	2.85	3.47	44.8	74.6
June	3.35	4.15	54.9	84.1
July	2.38	2.97	59.9	91.1
August	2.23	2.87	57.7	88.8
September	1.61	2.71	48.2	79.4
October	1.39	1.76	36.1	65.9
November	0.62	1.09	21.7	47.4
December	0.42	0.65	9.4	34.8

Climate Stations		Period	
Station ID	**Location or Name**	**From**	**To**
SD4037	Howard	1893	2008
SD5228	Marion	1901	2008
SD5561	Miller	1902	2008
SD8767	Wagner	1916	2008

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

Riparian and Wetland Features

No riparian areas or wetland features are directly associated with this site.

Representative Soil Features

The common features of soils in this site are the clay loam to clay textured subsoils and slopes of one to eight percent. The soils in this site are well to moderately well-drained and formed in alluvium and clayey till. The loam to silty clay loam surface layer is 5 to 15 inches thick. The soils have a slow to very slow infiltration rate. When dry these soils crack. When the soils are wet, surface compaction can occur with heavy traffic. This site typically should show slight to no evidence of rills, wind scoured areas, or pedestalled plants. If present, water flow paths are broken, irregular in appearance, or discontinuous. The soil surface is stable and intact. Subsurface soil layers are nonrestrictive to water movement and root penetration.

These soils are mainly susceptible to water erosion. The hazard of water erosion increases on slopes greater than about five percent. Loss of 50 percent or more of the surface layer of the soils on this site can result in a shift in species composition and/or production. Access Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm) for specific local soils information.

Parent Material Kind: till, unspecified, and alluvium
Parent Material Origin:
Surface Texture: loam, silty clay loam, silty clay
Surface Texture Modifier: none
Subsurface Texture Group: clayey
Surface Fragments ≤3" (% Cover): 0-4
Surface Fragments >3" (%Cover): 0-2
Subsurface Fragments ≤3" (% Volume): 0-8
Subsurface Fragments >3" (% Volume): 0-2

	Minimum	Maximum
Drainage Class:	well	well
Permeability Class:	very slow	slow
Depth (inches):	80	80
Electrical Conductivity (mmhos/cm)*:	0	16
Sodium Absorption Ratio*:	0	15
Soil Reaction (1:1 Water)*:	5.6	9.0
Soil Reaction (0.1M CaCl2)*:	NA	NA
Available Water Capacity (inches)*:	6	7
Calcium Carbonate Equivalent (percent)*:	0	20

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

Plant Communities

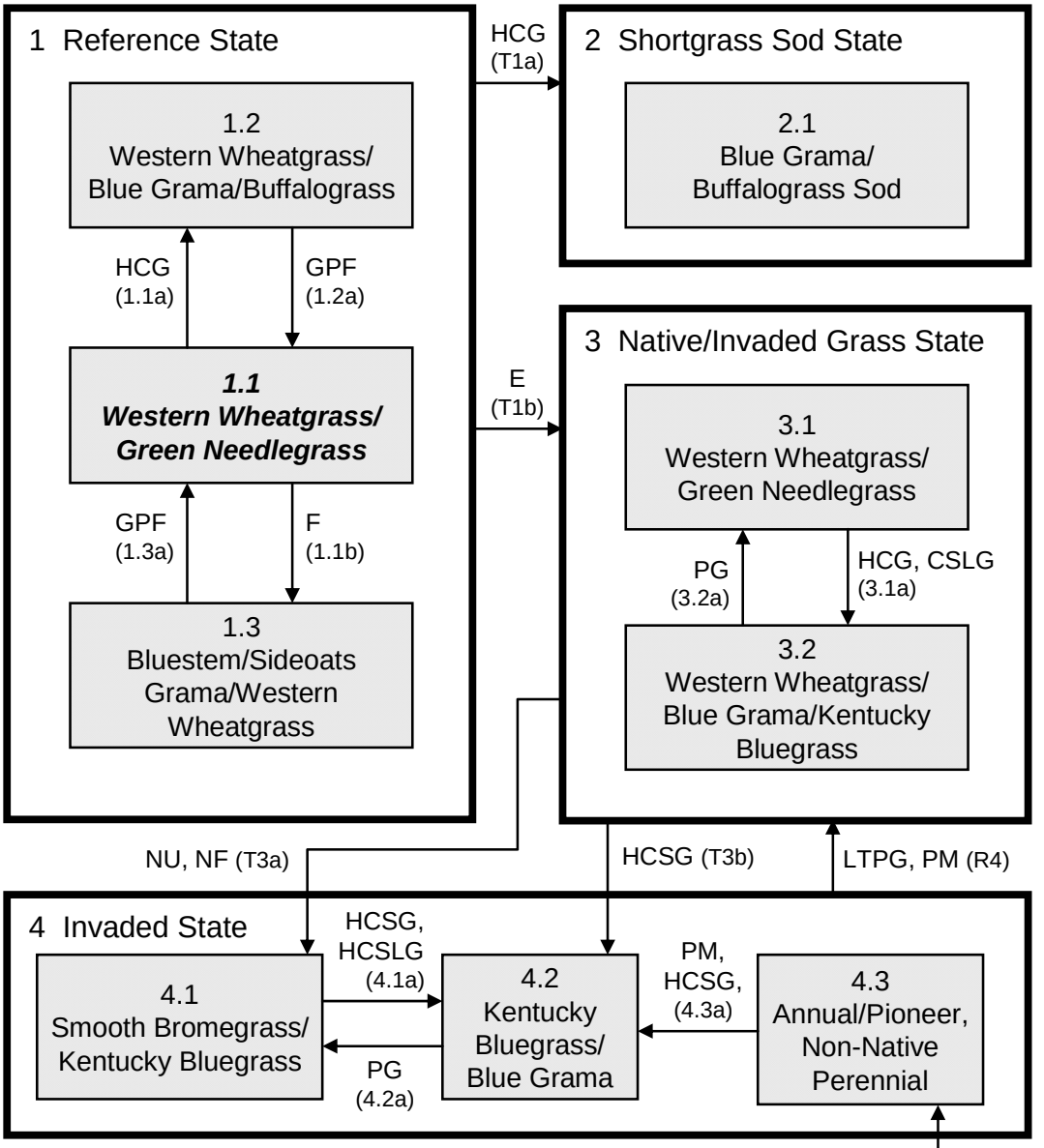
Ecological Dynamics of the Site
This site developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfire (often of light intensities), and other biotic and abiotic factors that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts of native and/or exotic plant and animal species, and management actions. While the following plant community descriptions describe more typical transitions that will occur, severe disturbances, such as periods of well below average precipitation, can cause significant shifts in plant communities and/or species composition.

Continuous season-long grazing (during the typical growing season of May through October) and/or repeated seasonal grazing (e.g., every spring, every summer) without adequate recovery periods following grazing events causes departure from the 3.1 Western Wheatgrass/Green Needlegrass Plant Community. Blue grama will increase and eventually develop into a sod. Western wheatgrass will increase initially and then begin to decrease. Green needlegrass, needleandthread, porcupine grass, sideoats grama, big bluestem, and little bluestem will decrease in frequency and production. Extended periods of nonuse and/or lack of fire will result in excessive litter and a plant community dominated by cool-season grasses such as Kentucky bluegrass, smooth bromegrass, green needlegrass, and cheatgrass.

Interpretations are primarily based on the 1.1 Western Wheatgrass/Green Needlegrass Plant Community Phase. It has been determined by study of rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts also have been used. Plant community phases, states, transitional pathways, and thresholds have been determined through similar studies and experience.

The following is a diagram that illustrates the common plant community phases that can occur on the site and the transition pathways between communities. These are the most common plant community phases based on current knowledge and experience and changes may be made as more data is collected. Narratives following the diagram contain more detail pertaining to the ecological processes.

Plant Communities and Transitional Pathways



Refer to narrative for details on pathways: **C** – Cropped, abandoned; **CSLG** – Continuous season-long grazing; **E** – Encroachment of introduced species; **F** – Fire; **GPF** – Grazing, precipitation, and/or fire returning to more normal disturbance regime levels and frequencies; **HCG** – Heavy continuous grazing; **HCSG** – Heavy continuous seasonal grazing; **HCSLG** – Heavy continuous season-long grazing; **LTPG** – Long-term prescribed grazing; **NU, NF** – Non-use, no fire; **PG** – Prescribed grazing; **PM** – Pest management (herbicide); **S** – Seeding.

Plant Community Composition and Group Annual Production

			1.1 Western Wheatgrass/ Green Needlegrass		
COMMON/GROUP NAME	**SCIENTIFIC NAME**	**SYMBOL**	**Group**	**lbs./acre**	**% Comp**
GRASSES & GRASS-LIKES				*2550 - 2850*	*85 - 95*
WHEATGRASS			**1**	**450 - 1050**	**15 - 35**
western wheatgrass	Pascopyrum smithii	PASM	1	450 - 1050	15 - 35
slender wheatgrass	Elymus trachycaulus	ELTR7	1	60 - 300	2 - 10
COOL-SEASON BUNCHGRASSES			**2**	**450 - 900**	**15 - 30**
green needlegrass	Nassella viridula	NAVI4	2	450 - 900	15 - 30
porcupine grass	Hesperostipa spartea	HESP11	2	60 - 300	2 - 10
needleandthread	Hesperostipa comata ssp. comata	HECOC8	2	0 - 150	0 - 5
Canada wildrye	Elymus canadensis	ELCA4	2	0 - 150	0 - 5
TALL WARM-SEASON GRASSES			**3**	**150 - 450**	**5 - 15**
big bluestem	Andropogon gerardii	ANGE	3	150 - 450	5 - 15
tall dropseed	Sporobolus compositus var. compositus	SPCOC2	3	30 - 150	1 - 5
switchgrass	Panicum virgatum	PAVI2	3	0 - 150	0 - 5
Indiangrass	Sorghastrum nutans	SONU2	3	0 - 150	0 - 5
MID WARM-SEASON GRASSES			**4**	**150 - 450**	**5 - 15**
little bluestem	Schizachyrium scoparium	SCSC	4	150 - 450	5 - 15
sideoats grama	Bouteloua curtipendula	BOCU	4	60 - 300	2 - 10
prairie dropseed	Sporobolus heterolepis	SPHE	4	0 - 150	0 - 5
SHORT WARM-SEASON GRASSES			**5**	**90 - 300**	**3 - 10**
blue grama	Bouteloua gracilis	BOGR2	5	60 - 240	2 - 8
buffalograss	Bouteloua dactyloides	BODA2	5	30 - 150	1 - 5
threeawn	Aristida spp.	ARIST	5	0 - 90	0 - 3
OTHER NATIVE GRASSES			**6**	**60 - 150**	**2 - 5**
prairie junegrass	Koeleria macrantha	KOMA	6	30 - 90	1 - 3
Scribner panicum	Dichanthelium oligosanthes var. scribnerianur	DIOLS	6	0 - 60	0 - 2
other grasses		2GRAM	6	30 - 150	1 - 5
GRASS-LIKES			**7**	**30 - 150**	**1 - 5**
sedge	Carex spp.	CAREX	7	30 - 150	1 - 5
other grass-likes		2GL	7	0 - 90	0 - 3
FORBS			*9*	*150 - 300*	*5 - 10*
American vetch	Vicia americana	VIAM	9	30 - 60	1 - 2
biscuitroot	Lomatium spp.	LOMAT	9	0 - 60	0 - 2
catclaw sensitive briar	Mimosa nuttallii	MINU6	9	0 - 60	0 - 2
cudweed sagewort	Artemisia ludoviciana	ARLU	9	30 - 90	1 - 3
deathcamas	Zigadenus spp.	ZIGAD	9	0 - 30	0 - 1
deervetch	Lotus unifoliolatus var. unifoliolatus	LOUNU	9	30 - 60	1 - 2
dotted gayfeather	Liatris punctata	LIPU	9	30 - 60	1 - 2
false boneset	Brickellia eupatorioides	BREU	9	0 - 90	0 - 3
goldenrod	Solidago spp.	SOLID	9	30 - 60	1 - 2
milkvetch	Astragalus spp.	ASTRA	9	0 - 60	0 - 2
penstemon	Penstemon spp.	PENST	9	30 - 60	1 - 2
prairie clover	Dalea spp.	DALEA	9	0 - 60	0 - 2
prairie coneflower	Ratibida columnifera	RACO3	9	30 - 60	1 - 2
prairie groundsel	Packera plattensis	PAPL12	9	0 - 30	0 - 1
pussytoes	Antennaria spp.	ANTEN	9	0 - 30	0 - 1
scarlet gaura	Gaura coccinea	GACO5	9	0 - 30	0 - 1
scarlet globemallow	Sphaeralcea coccinea	SPCO	9	30 - 60	1 - 2
scurfpea	Psoralidium spp.	PSORA2	9	30 - 60	1 - 2
spiny phlox	Phlox hoodii	PHHO	9	0 - 30	0 - 1
textile onion	Allium textile	ALTE	9	30 - 60	1 - 2
wavyleaf thistle	Cirsium undulatum	CIUN	9	0 - 60	0 - 2
western ragweed	Ambrosia psilostachya	AMPS	9	0 - 60	0 - 2
western wallflower	Erysimum capitatum var. capitatum	ERCAC	9	30 - 60	1 - 2
western yarrow	Achillea millefolium var. occidentalis	ACMIO	9	0 - 60	0 - 2
white prairie aster	Symphyotrichum falcatum	SYFA	9	30 - 60	1 - 2
wild parsley	Musineon divaricatum	MUDI	9	0 - 60	0 - 2
native forbs		2FN	9	30 - 90	1 - 3
SHRUBS			*10*	*60 - 150*	*2 - 5*
cactus	Opuntia spp.	OPUNT	10	0 - 30	0 - 1
fringed sagewort	Artemisia frigida	ARFR4	10	0 - 60	0 - 2
rose	Rosa spp.	ROSA5	10	30 - 60	1 - 2
western snowberry	Symphoricarpos occidentalis	SYOC	10	30 - 90	1 - 3
other shrubs		2SHRUB	10	0 - 90	0 - 3

Annual Production lbs./acre	LOW RV HIGH
GRASSES & GRASS-LIKES	2010 - 2670 - 3290
FORBS	135 - 225 - 345
SHRUBS	55 - 105 - 165
TOTAL	2200 - 3000 - 3800

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

		1.1 Western Wheatgrass/ Green Needlegrass			3.2 Western Wheatgrass/Blue Grama/Kentucky Bluegrass			4.1 Smooth Bromegrass/ Kentucky Bluegrass			4.2 Kentucky Bluegrass/ Blue Grama		
COMMON/GROUP NAME	**SYMBOL**	**Grp**	**lbs./acre**	**% Comp**	**Grp**	**lbs./acre**	**% Comp**	**Grp**	**lbs./acre**	**% Comp**	**Grp**	**lbs./acre**	**% Comp**
GRASSES & GRASS-LIKES			*2550 - 2850*	*85 - 95*		*1760 - 1980*	*80 - 90*		*2550 - 2850*	*85 - 95*		*1440 - 1620*	*80 - 90*
WHEATGRASS		**1**	**450 - 1050**	**15 - 35**	**1**	**220 - 550**	**10 - 25**	**1**	**0 - 300**	**0 - 10**	**1**	**0 - 90**	**0 - 5**
western wheatgrass	PASM	1	450 - 1050	15 - 35	1	220 - 550	10 - 25	1	0 - 300	0 - 10	1	0 - 90	0 - 5
slender wheatgrass	ELTR7	1	60 - 300	2 - 10	1	0 - 66	0 - 3						
COOL-SEASON BUNCHGRASSES		**2**	**450 - 900**	**15 - 30**	**2**	**22 - 220**	**1 - 10**	**2**	**0 - 300**	**0 - 10**	**2**	**0 - 54**	**0 - 3**
green needlegrass	NAVI4	2	450 - 900	15 - 30	2	22 - 220	1 - 10	2	0 - 300	0 - 10	2	0 - 54	0 - 3
porcupine grass	HESP11	2	60 - 300	2 - 10	2	0 - 44	0 - 2						
needleandthread	HECOC8	2	0 - 150	0 - 5									
Canada wildrye	ELCA4	2	0 - 150	0 - 5				2	0 - 90	0 - 3			
TALL WARM-SEASON GRASSES		**3**	**150 - 450**	**5 - 15**	**3**	**0 - 176**	**0 - 8**	**3**			**3**		
big bluestem	ANGE	3	150 - 450	5 - 15	3	0 - 110	0 - 5						
tall dropseed	SPCOC2	3	30 - 150	1 - 5	3	0 - 110	0 - 5						
switchgrass	PAVI2	3	0 - 150	0 - 5									
Indiangrass	SONU2	3	0 - 150	0 - 5									
MID WARM-SEASON GRASSES		**4**	**150 - 450**	**5 - 15**	**4**	**0 - 110**	**0 - 5**	**4**			**4**		
little bluestem	SCSC	4	150 - 450	5 - 15	4	0 - 110	0 - 5						
sideoats grama	BOCU	4	60 - 300	2 - 10	4	0 - 110	0 - 5						
prairie dropseed	SPHE	4	0 - 150	0 - 5									
SHORT WARM-SEASON GRASSES		**5**	**90 - 300**	**3 - 10**	**5**	**220 - 440**	**10 - 20**	**5**	**0 - 150**	**0 - 5**	**5**	**180 - 540**	**10 - 30**
blue grama	BOGR2	5	60 - 240	2 - 8	5	110 - 440	5 - 20	5	0 - 150	0 - 5	5	90 - 540	5 - 30
buffalograss	BODA2	5	30 - 150	1 - 5	5	44 - 176	2 - 8	5	0 - 90	0 - 3	5	36 - 180	2 - 10
threeawn	ARIST	5	0 - 90	0 - 3	5	0 - 110	0 - 5	5	0 - 60	0 - 2	5	0 - 90	0 - 5
OTHER NATIVE GRASSES		**6**	**60 - 150**	**2 - 5**	**6**	**22 - 110**	**1 - 5**	**6**	**0 - 150**	**0 - 5**	**6**	**18 - 90**	**1 - 5**
prairie junegrass	KOMA	6	30 - 90	1 - 3	6	22 - 44	1 - 2	6	0 - 30	0 - 1	6	18 - 36	1 - 2
Scribner panicum	DIOLS	6	0 - 60	0 - 2	6	0 - 66	0 - 3	6	0 - 30	0 - 1	6	0 - 18	0 - 1
other grasses	2GRAM	6	30 - 150	1 - 5	6	0 - 110	0 - 5	6	0 - 150	0 - 5	6	0 - 90	0 - 5
GRASS-LIKES		**7**	**30 - 150**	**1 - 5**	**7**	**22 - 154**	**1 - 7**	**7**	**60 - 300**	**2 - 10**	**7**	**36 - 180**	**2 - 10**
sedge	CAREX	7	30 - 150	1 - 5	7	22 - 154	1 - 7	7	60 - 300	2 - 10	7	36 - 180	2 - 10
other grass-likes	2GL	7	0 - 90	0 - 3	7	0 - 66	0 - 3	7	0 - 90	0 - 3	7	0 - 36	0 - 2
NON-NATIVE GRASSES		**8**			**8**	**110 - 440**	**5 - 20**	**8**	**1050 - 1800**	**35 - 60**	**8**	**450 - 810**	**25 - 45**
annual bromegrass	BROMU				8	22 - 176	1 - 8	8	60 - 450	2 - 15	8	36 - 270	2 - 15
Kentucky bluegrass	POPR				8	110 - 440	5 - 20	8	300 - 1050	10 - 35	8	360 - 720	20 - 40
smooth bromegrass	BRIN2				8	0 - 110	0 - 5	8	900 - 1650	30 - 55	8	0 - 90	0 - 5
FORBS		*9*	*150 - 300*	*5 - 10*	*9*	*110 - 330*	*5 - 15*	*9*	*150 - 300*	*5 - 10*	*9*	*90 - 270*	*5 - 15*
American vetch	VIAM	9	30 - 60	1 - 2	9	0 - 22	0 - 1						
biscuitroot	LOMAT	9	0 - 60	0 - 2									
catclaw sensitive briar	MINU6	9	0 - 60	0 - 2									
cudweed sagewort	ARLU	9	30 - 90	1 - 3	9	22 - 110	1 - 5	9	30 - 120	1 - 4	9	18 - 90	1 - 5
deervetch	LOUNU	9	30 - 60	1 - 2	9	0 - 22	0 - 1						
dotted gayfeather	LIPU	9	30 - 60	1 - 2	9	0 - 44	0 - 2						
false boneset	BREU	9	0 - 90	0 - 3									
goldenrod	SOLID	9	30 - 60	1 - 2	9	22 - 110	1 - 5	9	30 - 120	1 - 4	9	18 - 108	1 - 6
milkvetch	ASTRA	9	0 - 60	0 - 2	9	0 - 22	0 - 1				9	0 - 18	0 - 1
penstemon	PENST	9	30 - 60	1 - 2	9	0 - 22	0 - 1						
prairie clover	DALEA	9	0 - 60	0 - 2	9	0 - 22	0 - 1						
prairie coneflower	RACO3	9	30 - 60	1 - 2	9	0 - 22	0 - 1						
prairie groundsel	PAPL12	9	0 - 30	0 - 1	9	0 - 22	0 - 1	9	0 - 30	0 - 1	9	0 - 18	0 - 1
pussytoes	ANTEN	9	0 - 30	0 - 1	9	0 - 22	0 - 1				9	0 - 18	0 - 1
scarlet gaura	GACO5	9	0 - 30	0 - 1									
scarlet globemallow	SPCO	9	30 - 60	1 - 2	9	22 - 44	1 - 2	9	0 - 30	0 - 1	9	0 - 36	0 - 2
scurfpea	PSORA2	9	30 - 60	1 - 2	9	22 - 88	1 - 4	9	30 - 60	1 - 2	9	18 - 72	1 - 4
spiny phlox	PHHO	9	0 - 30	0 - 1									
textile onion	ALTE	9	30 - 60	1 - 2	9	0 - 22	0 - 1						
wavyleaf thistle	CIUN	9	0 - 60	0 - 2	9	0 - 44	0 - 2	9	0 - 30	0 - 1	9	0 - 54	0 - 3
western ragweed	AMPS	9	0 - 60	0 - 2	9	22 - 66	1 - 3	9	30 - 60	1 - 2	9	18 - 90	1 - 5
western wallflower	ERCAC	9	30 - 60	1 - 2	9	0 - 22	0 - 1	9	30 - 120	1 - 4			
western yarrow	ACMIO	9	0 - 60	0 - 2	9	22 - 66	1 - 3	9	30 - 60	1 - 2	9	18 - 72	1 - 4
white prairie aster	SYFA	9	30 - 60	1 - 2	9	22 - 66	1 - 3	9	30 - 90	1 - 3	9	18 - 36	1 - 2
wild parsley	MUDI	9	0 - 60	0 - 2	9	0 - 22	0 - 1						
native forbs	2FN	9	30 - 90	1 - 3	9	22 - 88	1 - 4	9	0 - 90	0 - 3	9	0 - 54	0 - 3
introduced forbs	2FI				9	22 - 110	1 - 5	9	30 - 240	1 - 8	9	18 - 180	1 - 10
SHRUBS		*10*	*60 - 150*	*2 - 5*	*10*	*22 - 110*	*1 - 5*	*10*	*30 - 150*	*1 - 5*	*10*	*18 - 90*	*1 - 5*
cactus	OPUNT	10	0 - 30	0 - 1	10	0 - 44	0 - 2				10	0 - 54	0 - 3
fringed sagewort	ARFR4	10	0 - 60	0 - 2	10	0 - 66	0 - 3	10	0 - 30	0 - 1	10	0 - 72	0 - 4
rose	ROSA5	10	30 - 60	1 - 2	10	22 - 44	1 - 2	10	30 - 60	1 - 2	10	0 - 18	0 - 1
western snowberry	SYOC	10	30 - 90	1 - 3	10	22 - 88	1 - 4	10	30 - 150	1 - 5	10	0 - 54	0 - 3
other shrubs	2SHRUB	10	0 - 90	0 - 3	10	0 - 44	0 - 2	10	0 - 30	0 - 1	10	0 - 36	0 - 2

Annual Production lbs./acre	LOW RV HIGH	LOW RV HIGH	LOW RV HIGH	LOW RV HIGH
GRASSES & GRASS-LIKES	2010 - 2670 - 3290	1480 - 1914 - 2295	1840 - 2685 - 3490	1100 - 1566 - 1795
FORBS	135 - 225 - 345	100 - 220 - 385	135 - 225 - 345	85 - 180 - 310
SHRUBS	55 - 105 - 165	20 - 66 - 120	25 - 90 - 165	15 - 54 - 95
TOTAL	2200 - 3000 - 3800	1600 - 2200 - 2800	2000 - 3000 - 4000	1200 - 1800 - 2200

This list of plants and their relative proportions are based on near normal years. Fluctuations in species composition and relative production may change from year to year dependent upon precipitation or other climatic factors. RV = Representative value. Refer to PLANTS database for scientific names and codes: http://plants.usda.gov

Plant Community and Vegetation State Narratives

Reference State (State 1)

This state represents the natural range of variability that dominated the dynamics of this ecological site (ES). This state was dominated by cool-season grasses, with warm-season grasses being subdominant. In pre-European times, the primary disturbance mechanisms for this site in the reference condition included periods of below and/or above average precipitation, periodic fire, and herbivory by insects and large ungulates. Timing of fires and herbivory coupled with weather events dictated the dynamics that occurred within the natural range of variability. Cool-season and taller warm-season grasses would have declined and a corresponding increase in short, warm-season grasses would have occurred. Today, a similar state (State 3) can be found on areas that are properly managed with grazing and/or prescribed burning, and sometimes on areas receiving occasional short periods of rest.

1.1 Western Wheatgrass/Green Needlegrass Plant Community Phase

Interpretations are based primarily on the Western Wheatgrass/Green Needlegrass Plant Community Phase (this is also considered to be climax). The potential vegetation was about 85 percent grasses or grass-like plants, 10 percent forbs, and 5 percent shrubs. The community was dominated by cool-season grasses. The major grasses included western wheatgrass and green needlegrass. Other grass or grass-like species included big bluestem, little bluestem, sideoats grama, slender wheatgrass, porcupine grass, and blue grama. This plant community was resilient and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allowed for high drought tolerance. This was a sustainable plant community in regards to site/soil stability, watershed function, and biologic integrity.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during an average year:
Growth curve number: SD5502
Growth curve name: Southern Black Glaciated 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 were as follows:

- 1.1a – Heavy continuous grazing which included herbivory at moderate to heavy levels at the same time of year each year without adequate recovery periods, or a combination of disturbances such as extended periods of below average precipitation coupled with periodic or chronic heavy grazing will shift this community to the *1.2 Western Wheatgrass/Blue Grama/Buffalograss Plant Community Phase*.

- 1.1b – Fire occurring at relatively frequent intervals, and occasional grazing events immediately following early season fire caused a reduction in cool-season grasses and an increase in warm-season grasses. The warm-season grasses were more tolerant of shorter return intervals of fire, and would increase in vigor and production leading to a temporary shift to the *1.3 Bluestem/Sideoats Grama/Western Wheatgrass Plant Community Phase*.

1.2 Western Wheatgrass/Blue Grama/Buffalograss Plant Community Phase

This plant community evolved under heavy continuous grazing or from over utilization during extended drought periods. The potential plant community was made up of approximately 85 percent grasses and grass-like species, 10 percent forbs, and 5 percent shrubs. Dominant grasses included western wheatgrass, blue grama, buffalograss, green needlegrass, sideoats grama, and needleandthread. Grasses of secondary importance included little bluestem, porcupine grass, big bluestem, and sedge. Forbs commonly found in this plant community included cudweed sagewort, prairie coneflower, and western yarrow. This plant community had similar plant composition to the 3.2 Western Wheatgrass/Blue Grama/Kentucky Bluegrass Plant Community Phase (refer to the plant composition tables). The main difference is that this plant community phase did not have the presence of nonnative invasive species such as Kentucky bluegrass and smooth bromegrass.

When compared to the Western Wheatgrass/Green Needlegrass Plant Community Phase (1.1), blue grama, and buffalograss increased. Green needlegrass and porcupine grass decreased and production of mid- and tall warm-season grasses were also reduced. This plant community was moderately resistant to change. The herbaceous species present were well adapted to grazing; however, species composition could be altered through long-term overgrazing. If the herbaceous component was intact, it tended to be resilient if the disturbance was not long-term.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during an average year:
Growth curve number: SD5503
Growth curve name: Southern Black Glaciated 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 pathways leading to other plant communities are as follows:

- T1a – Heavy continuous grazing (stocking levels well above carrying capacity for extended portions of the growing season, and often at the same time of year each year, typically beginning early in the season), will convert this plant community to the *2.1 Blue Grama/Buffalograss Sod Plant Community Phase* and the *Shortgrass Sod State*.

- 1.2a – Grazing, precipitation, and/or fire returned to normal disturbance regime levels and frequencies or periodic light to moderate grazing possibly including periodic rest will convert this plant community to the *1.1 Western Wheatgrass/Green Needlegrass Plant Community Phase*.

2.1 Blue Grama/Buffalograss Sod Plant Community

This plant community evolved under heavy continuous season grazing or from over utilization during extended drought periods. The potential plant community was made up of approximately 85 percent grasses and grass-like species, 10 percent forbs, and 5 percent shrubs. Dominant grasses typically included blue grama and buffalograss. Grasses of secondary importance included sedge and western wheatgrass. Forbs commonly found in this plant community included cudweed sagewort, scurfpea, and western yarrow. When compared to the Western Wheatgrass/Green Needlegrass Plant Community Phase (1.1), blue grama and buffalograss were dominant on this plant community. Cool-season grasses decreased significantly. This vegetation state was very resistant to change. The herbaceous species present were well adapted to grazing. This plant community was less productive than other phases. The thick sod prevented other species from getting established.

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: SD5505
Growth curve name: Southern Black Glaciated 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

1.3 Bluestem/Sideoats Grama/Western Wheatgrass Plant Community Phase

This plant community was a result of fire occurring at relatively frequent intervals. This phase could have also resulted from a combination of grazing events immediately following early season fire (i.e., large ungulates attracted to highly nutritious vegetative growth following a fire). These events would have caused a reduction in cool-season grasses and an increase in warm-season grasses. The warm-season grasses were more tolerant of shorter return intervals of fire and would have increased in vigor and production leading to a temporary shift to this phase. Needlegrasses would have decreased most significantly amongst the cool-season grasses. The potential vegetation was about 80 percent grasses or grass-like plants, 15 percent forbs, and 5 percent shrubs. The community was dominated by warm-season grasses. The major grasses included little bluestem, big bluestem, Indiangrass, switchgrass, sideoats grama, and western wheatgrass. Other grass or grass-like species included green needlegrass, porcupine grass, needleandthread, blue grama, slender wheatgrass, tall dropseed, and sedges. This plant community was not resistant to change and would have readily shifted back to the 1.1 Western Wheatgrass/Green Needlegrass Plant Community Phase with a return of more normal fire return intervals.

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: SD5504
Growth curve name: Southern Black Glaciated 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 pathways leading to other plant communities were as follows:

- 1.3a – Grazing, precipitation, and/or fire returned to normal disturbance regime levels and frequencies or periodic light to moderate grazing possibly including periodic rest will convert this plant community to the *1.1 Western Wheatgrass/Green Needlegrass Plant Community Phase*.

Transition from Reference State (State 1) to the Native/Invaded Grass State (State 3)

- T1b – Encroachment of non-native grasses such as Kentucky bluegrass and smooth bromegrass, and disruption of natural disturbance regimes (typically as a result of fire suppression following settlement led this state over a threshold to the *Native/Invaded Grass State (State 3)*.

Native/Invaded Grass State (State 3)

This state represents the more common range of variability that exists with higher levels of grazing

management but in the absence of periodic fire due to fire suppression. This state is dominated by cool-season grasses. It can be found on areas that are properly managed with grazing and/or prescribed burning and sometimes on areas receiving occasional short periods of rest. Taller cool-season species can decline and a corresponding increase in short statured grass will occur.

3.1 Western Wheatgrass/Green Needlegrass Plant Community Phase

This plant community phase is similar to the 1.1 Western Wheatgrass/Green Needlegrass Plant Community Phase but it also contains minor amounts of nonnative invasive grass species such as Kentucky bluegrass and smooth bromegrass (up to about 15 percent by air-dry weight). The potential vegetation is about 85 percent grasses or grass-like plants, 10 percent forbs, and 5 percent shrubs. The community is dominated by cool-season grasses with warm-season grasses being subdominant. The major grasses include western wheatgrass and green needlegrass. Other grass or grass-like species include big bluestem, little bluestem, sideoats grama, slender wheatgrass, porcupine grass, and blue grama. This plant community is resilient and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allows for high drought tolerance. This is a sustainable plant community in regards to site/soil stability, watershed function, and biologic integrity.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during an average year:
Growth curve number: SD5502
Growth curve name: Southern Black Glaciated 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:

- 3.1a – Heavy continuous grazing (stocking levels well above carrying capacity for extended portions of the growing season, and often at the same time of year each year), or continuous season-long grazing, or a combination of disturbances such as extended periods of below average precipitation coupled with periodic heavy grazing will shift this community to the *3.2 Western Wheatgrass/Blue Grama/Kentucky Bluegrass Plant Community Phase*.

3.2 Western Wheatgrass/Blue Grama/Kentucky Bluegrass Plant Community Phase

This plant community is a result of heavy continuous grazing, continuous season-long grazing or from over utilization during extended drought periods. The potential plant community is made up of approximately 80 percent grasses and grass-like species, 15 percent forbs, and 5 percent shrubs. Dominant grasses include western wheatgrass, blue grama, and Kentucky bluegrass. Grasses of secondary importance include sideoats grama, little bluestem, green needlegrass, needleandthread, porcupine grass, big bluestem, buffalograss, smooth bromegrass, and sedge. Forbs commonly found in this plant community include cudweed sagewort, prairie coneflower, and western yarrow.

When compared to the Western Wheatgrass/Green Needlegrass Plant Community Phase (1.1), blue grama has increased. Green needlegrass and sideoats grama have decreased and production of mid and tall warm-season grasses has also been reduced. This plant community is moderately resistant to change. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. If the herbaceous component is intact, it tends to be resilient if the disturbance is not long-term.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during an average year:
Growth curve number: SD5502
Growth curve name: Southern Black Glaciated 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:

- T3b – Heavy continuous seasonal grazing (stocking levels well above carrying capacity for extended portions of the growing season, and at the same time of year each year, typically beginning early in the season) will cause a shift across a threshold leading to the *4.2 Kentucky Bluegrass/Blue Grama Plant Community Phase* within the *Invaded State (State 4)*.

- 3.2a – Prescribed grazing (alternating season of use and providing adequate recovery periods) or periodic light to moderate grazing possibly including periodic rest will convert this plant community to the *3.1 Western Wheatgrass/Green Needlegrass Plant Community Phase*.

Transitions from Native/Invaded Grass State (State 3) to the Invaded State (State 4)

- T3a – Non-use and no fire for extended periods of time (typically for 10 or more years) will likely lead this state over a threshold resulting in the *4.1 Smooth Bromegrass/Kentucky Bluegrass Plant Community Phase* within the *Invaded State (State 4)*.

Invaded State (State 4)

This state is the result of invasion and dominance of introduced species. This state is characterized by the dominance of Kentucky bluegrass and smooth bromegrass and an increasing thatch layer that effectively blocks introduction of other plants into the system. Plant litter accumulation tends to favor the more shade tolerant introduced grass species. The nutrient cycle is also impaired and the result is typically a higher level of nitrogen which also favors the introduced species. Increasing plant litter decreases the amount of sunlight reaching plant crowns thereby shifting competitive advantage to shade tolerant introduced grass species. Studies indicate that soil biological activity is altered and this shift apparently exploits the soil microclimate and encourages growth of the introduced grass species. Once the threshold is crossed, a change in grazing management alone cannot cause a reduction in the invasive grass dominance. Preliminary studies would tend to indicate this threshold may exist when Kentucky bluegrass exceeds 30 percent of the plant community and native grasses represent less than 40 percent of the plant community composition.

Once the state is well established, even drastic events such as high intensity fires driven by high fuel loads of litter and thatch will not result in more than a very short-term reduction of Kentucky bluegrass. These events may reduce the dominance of Kentucky bluegrass, but due to the large amount of rhizomes in the soil, there is no opportunity for the native species to establish and dominate before Kentucky bluegrass rebounds and again dominates the system.

4.1 Smooth Bromegrass/Kentucky Bluegrass Plant Community Phase

This plant community phase is a result of extended periods of nonuse and no fire. It is characterized by a dominance of smooth bromegrass and Kentucky bluegrass. The dominance is at times so

complete that other species are difficult to find on the site. A thick duff layer also accumulates at or above the soil surface. Nutrient cycling is greatly reduced and native plants have great difficulty becoming established. When dominated by smooth bromegrass, infiltration is moderately reduced and runoff is moderate. Production can be equal to or higher than the interpretive plant community. However, when dominated by Kentucky bluegrass, infiltration is greatly reduced and runoff is high. Production in this case will likely be significantly less. In either case, the period that palatability is high is relatively short as these cool-season species mature rapidly. Energy capture is also reduced.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during an average year:
Growth curve number: SD5501
Growth curve name: Southern Black Glaciated Plains, cool-season dominant.
Growth curve description: Cool-season dominant.

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

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

- 4.1a – Heavy continuous seasonal grazing (stocking levels well above carrying capacity for extended portions of the growing season and at the same time of year each year) or heavy continuous season-long grazing will convert this plant community to the *4.2 Kentucky Bluegrass/Blue Grama Plant Community Phase*.

4.2 Kentucky Bluegrass/Blue Grama Plant Community Phase

This plant community phase is a result of heavy, continuous seasonal grazing or heavy, continuous season-long grazing. It is characterized by a dominance of Kentucky bluegrass and blue grama. The dominance is at times so complete that other species are difficult to find on the site. A relatively thick duff layer can sometimes accumulate at or above the soil surface. Nutrient cycling is greatly reduced and native plants have great difficulty becoming established. Infiltration is greatly reduced and runoff is high. Production will be significantly reduced when compared to the interpretive plant community. The period that palatability is high is relatively short as Kentucky bluegrass matures rapidly. Energy capture is also reduced. Biological activity in the soil is likely reduced significantly in this phase.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during an average year:
Growth curve number: SD5502
Growth curve name: Southern Black Glaciated 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:

- 4.2a – Prescribed grazing (alternating season of use and providing adequate recovery periods) or periodic light to moderate grazing possibly including periodic rest may convert this plant community to the *4.1 Smooth Bromegrass/Kentucky Bluegrass Plant Community Phase*.

Transition Pathway from Any Plant Community to the 4.3 Annual/Pioneer, Non-Native Perennial Plant Community Phase within the Invaded State (State 4)

- T5 – Encroachment of non-native invasive/noxious species, abandonment of cropping, or seeding of introduced and/or native improved varieties of forage species may lead this plant community phase over a threshold to the *Invaded State (State 4)* and more specifically to the *4.3 Annual/Pioneer, Non-native Perennial Plant Community Phase*. In the case of a seeding, refer to the corresponding Forage Suitability Group (FSG) description for adapted species and expected production (production estimates in the FSG description may be unrealistically high due to the degraded condition of the site at this phase).

4.3 Annual/Pioneer, Non-Native Perennial Plant Community Phase

This plant community developed under continuous heavy grazing or other excessive disturbances (e.g., heavy use areas, defoliation by rodents, etc.). The potential plant community is made up of approximately 40 to 80 percent grasses and grass-like species, 20 to 60 percent forbs, and 0 to 5 percent shrubs. The species present in this phase are highly variable but often include nonnative invasive and/or early seral species. Plant diversity is low (plant richness may be high, but areas are often dominated by a few species). The ecological processes are difficult to restore because of the loss of plant diversity and overall soil disturbance. Soil erosion is potentially very high because of the bare ground and shallow rooted herbaceous plant community. Water runoff will increase and infiltration will decrease due to animal related soil compaction and loss of root mass due to low plant diversity and vigor. This plant community will require significant economic inputs and time to move towards another plant community. This movement is highly variable in its succession. This is due to the loss of diversity (including the loss of the seed bank) within the existing plant community and the plant communities on adjacent sites.

Transitions or pathways leading to other states are as follows:

- 4.3a – Pest management (herbicides) and often heavy continuous seasonal grazing will likely result in an eventual dominance by Kentucky bluegrass which will lead to the *4.2 Kentucky Bluegrass/Blue Grama Plant Community Phase*.

Restoration Pathway from the Invaded State (State 4) to the Native/Invaded Grass State (State 3)

- R4 - Long-term prescribed grazing (moderate stocking levels coupled with adequate recovery periods, or other grazing systems such as high-density, low-frequency intended to treat specific species dominance, or periodic light to moderate stocking levels possibly including periodic rest) may lead this plant community phase over a threshold to the *Native/Invaded Grass State (State 3)*. Pest management (i.e., herbicide) may also be needed to suppress cool-season invasive grasses. This will likely take a long period of time, possibly up to 10 years or more, and recovery may not be attainable. Success depends on whether native reproductive propagules remain intact on the site.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

-- Under Development --

Western Wheatgrass/Green Needlegrass Plant Community Phases (1.1 & 3.1):

Western Wheatgrass/Blue Grama/Buffalograss Plant Community Phases (1.2):

Bluestem/Sideoats Grama/Western Wheatgrass Plant Community Phase (1.3):

Blue Grama/Buffalograss Sod Plant Community Phase (2.1):

Western Wheatgrass/Blue Grama/Kentucky Bluegrass Plant Community Phase (3.2):

Smooth Bromegrass/Kentucky Bluegrass Plant Community Phase (4.1):

Kentucky Bluegrass/Blue Grama Plant Community Phase (4.2):

Annual/Pioneer, Non-native Perennial Plant Community Phase (4.3):

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

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
Grasses and Grass-likes							
big bluestem	U D P D	U D U 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 U	D P P D	U D P U	D P P D	D P P D	U D P U	U D P U
buffalograss	U U D U	N U D U	U U D U	N U D U	N U D U	U U D U	U U D U
Canada wildrye	U D U U	N U N N	U D U U	N U N N	N U N N	U D U U	U D U 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
Indiangrass	U D P D	U D U U	U D P D	U D U U	U D U U	U D P D	U D P D
little bluestem	U D D U	N D N N	U D D U	N D N N	N D N N	U D D U	U D D U
needleandthread	U D U D	N D N U	U D U D	N D N U	N D N U	U D U D	U D U D
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 dropseed	N U P U	N U D U	N U P U	N U D U	N U D U	N U P U	N U P 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
Scribner panicum	U U D U	N U N N	U U D U	N U N N	N U N N	U U D U	U U D U
sedge	U D U D	U P N D	U D U D	U D U D	U D U D	U D U D	U D U D
sideoats grama	U D P U	U P D U	U D P U	U P D U	U P D U	U D P U	U D P U
slender wheatgrass	U P U U	N D U N	U P U U	N D U N	N D U N	U P U U	U P U U
switchgrass	U D D U	U D U U	U D D U	N N N N	N N N N	U D D U	U D D U
tall dropseed	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 N
threeawn	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N
western wheatgrass	U P D U	N D N N	U P D U	N D N N	N D N N	U P D U	U P D U
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
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
catclaw sensitive briar	U D P U	U P P U	U D P U	U P P U	U P P U	U D P U	U P P U
cudweed sagewort	U U U U	U U D U	U U U U	U U D U	U U D U	U U U U	U U D U
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 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
prairie coneflower	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
prairie groundsel	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
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 P P U	U D U U	U P P U	U P P U	U D U U	U P P U
textile onion	U D U U	U D D U	U D U U	U D D U	U D D U	U D U U	U D D U
wavyleaf thistle	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
western ragweed	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
western wallflower	U D U U	N U U N	U D U U	N U U N	N U U N	U D U U	N U U N
western yarrow	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
white prairie aster	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
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
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
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
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
western 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 ES description). Because of this, a resource inventory is necessary to document plant composition and production. More accurate carrying capacity estimates should eventually be calculated using the following stocking rate information along with animal preference data and actual stocking records, particularly when grazers other than cattle are involved. With consultation of the land manager, more intensive grazing management may result in improved harvest efficiencies and increased carrying capacity.

Plant Community	Average Annual Production (lbs./acre, air-dry)	Stocking Rate* (AUM/acre)
Western Wheatgrass/Green Needlegrass (1.1 & 3.1)	3,000	0.82
Western Wheatgrass/Blue Grama/Kentucky Bluegrass (3.2)	2,200	0.60
Smooth Bromegrass/Kentucky Bluegrass (4.1)	3,000	0.82
Kentucky Bluegrass/Blue Grama (4.2)	1,800	0.49
Annual/Pioneer, Non-Native Perennial (4.3)	800	0.22

*Based on 912 lbs./acre (air-dry weight) per Animal Unit Month and on 25 percent harvest efficiency (refer to United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), National Range and Pasture Handbook).

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

Hydrology Functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group D. Infiltration varies from very slow to slow and runoff potential for this site varies from high to very high depending on soil hydrologic group, slope, and ground cover. In many cases, areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where shortgrasses form a strong sod and dominate the site. Dominance by blue grama, buffalograss, bluegrass, and/or smooth bromegrass will result in reduced infiltration and increased runoff. Areas where ground cover is less than 50 percent have the greatest potential to have reduced infiltration and higher runoff (refer to Section 4, NRCS National Engineering Handbook for runoff quantities and hydrologic curves).

Recreational Uses

This site provides hunting, hiking, photography, bird watching, and other opportunities. The wide varieties of plants that bloom from spring until fall have an esthetic value that appeals to visitors.

Wood Products

No appreciable wood products are typically present on this site.

Other Products

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

Supporting Information

Associated Sites

Loamy (R055CY010SD), Claypan (R055CY013SD), Clayey Overflow (R055CY021SD)

Similar Sites

(R055CY021SD) – Clayey Overflow [more big bluestem; higher production]
(R055CY013SD) – Claypan [less green needlegrass; lower production]

Inventory Data References

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range-trained personnel were also used. Those involved in developing this site include: Stan Boltz, Range Management Specialist, NRCS.

Data Source	Number of Records	Sample Period	State	County
SCS-RANGE-417	1	1968	SD	Charles Mix

State Correlation

This site has been correlated in South Dakota in MLRA 55C.

Field Offices/Counties

Armour	Douglas	Huron	Beadle	Plankinton	Aurora
Chamberlain	Brule	Lake Andes	Charles Mix	Redfield	Spink
Clark	Clark	Madison	Lake	Salem	McCook
De Smet	Kingsbury	Miller	Hand	Tyndall	Bon Homme
Faulkton	Faulk	Mitchell	Davison/Hanson	Wessington Springs	Jerauld
Highmore	Hyde	Parker	Turner	Woonsocket	Sanborn
Howard	Miner	Parkston	Hutchinson	Yankton	Yankton

Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 42e – Southern Missouri Coteau, 42f – Southern Missouri Coteau Slope, 46n – James River Lowland.

Other References

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Site Description Approval

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SD, State Range Management Specialist Date