United States Department of Agriculture
Natural Resources Conservation Service

Ecological Site Description

Site Type: Rangeland

Site Name: Subirrigated

Site ID: R055CY003SD

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

Physiographic Features

This site occurs on nearly level flood plains or pothole rims.

Landform: flood plain, pothole, swale **Aspect:** N/A

	Minimum	Maximum
Elevation (feet):	1,300	2,000
Slope (percent):	1	2
Water Table Depth (inches):	18	48
Flooding:		
Frequency:	Rare	Frequent
Duration:	Very brief	Long
Ponding:		
Depth (inches):	None	12
Frequency:	None	Frequent
Duration:	None	Long
Runoff Class:	Negligible	Low

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

This ecological site (ES) has a combination of physical and hydrological features that: 1) typically provides ground water within two feet of the surface for most of the season, 2) allows relatively free movement of water and air in the upper part of the soil, and 3) are rarely to frequently flooded.

Wetland Description:	System	Subsystem	Class	Sub-class
Cowardin, et al., 1979	Palustrine	N/A	Emergent Wetland	Persistent

Representative Soil Features

These are very deep, poorly to somewhat poorly drained, coarse to moderately fine textured soils. Permeability is moderately slow to slow and available water capacity is moderate to high. Salinity is none to very slight and sodicity is typically none to slight. These soils have a high water table (one to three feet from the surface) which keeps the rooting zone moist for most of the growing season. This site is on flood plains and on the rims of potholes, swales, and depressions. Slope ranges from one to two percent. This site should show slight to no evidence of rills, wind scoured areas, or pedestalled plants. No water flow paths are seen on this site. The soil surface is stable and intact. Subsurface soil layers are nonrestrictive to water movement and root penetration.

Access Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm) for specific local soils information.

Parent Material Kind: alluvium, eolian deposits
Parent Material Origin:
Surface Texture: loam, loamy fine sand, silty clay loam
Surface Texture Modifier: none
Subsurface Texture Group: loamy
Surface Fragments ≤3" (% Cover): 0-7
Surface Fragments >3" (%Cover): 0-2
Subsurface Fragments ≤3" (% Volume): 0-34
Subsurface Fragments >3" (% Volume): 0-2

	Minimum	Maximum
Drainage Class:	poorly	somewhat poorly
Permeability Class:	slow	moderately slow
Depth (inches):	80	80
Electrical Conductivity (mmhos/cm)*:	0	4
Sodium Absorption Ratio*:	0	2
Soil Reaction (1:1 Water)*:	5.6	9.0
Soil Reaction (0.1M CaCl2)*:	NA	NA
Available Water Capacity (inches)*:	4	8
Calcium Carbonate Equivalent (percent)*:	0	30

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

Plant Communities

Ecological Dynamics of the Site:

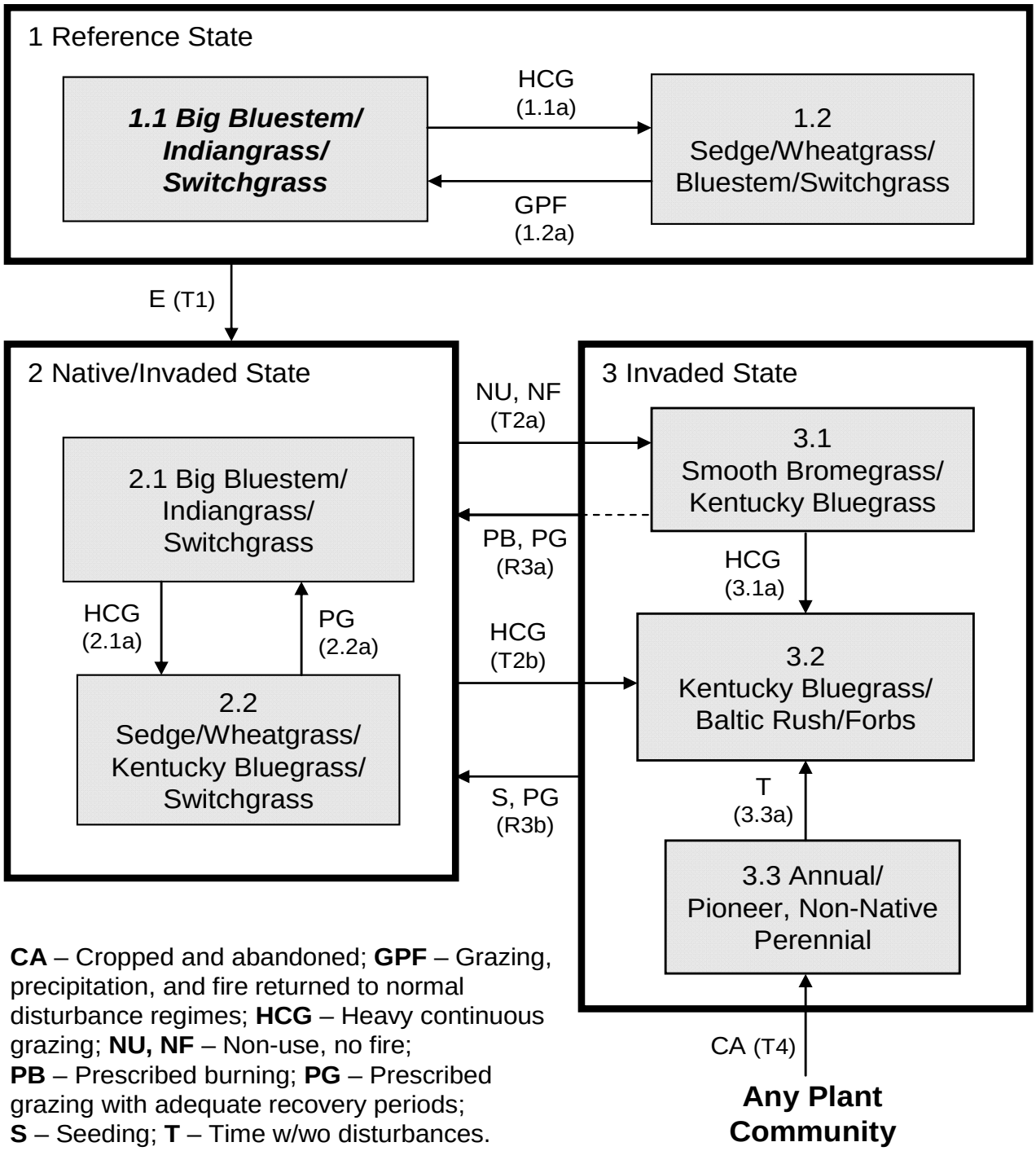
This site developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfire (often of light intensities), and other biotic and abiotic factors that typically influence soil/site development. Changes will occur 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 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. As this site deteriorates, species such as redtop, Kentucky bluegrass, and smooth bromegrass will increase. Warm-season grasses such as Indiangrass and big bluestem will decrease in frequency and production.

Interpretations are primarily based on the Bluestem/Indiangrass/Switchgrass Plant Community. 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. Subclimax plant communities, states, transitional pathways, and thresholds have been determined through similar studies and experience. Following the state and transition diagram are narratives for each of the described states and community phases. These may not represent every possibility but they are the most prevalent and repeatable states/community phases. The plant composition tables shown below have been developed from the best available knowledge at the time of this revision. As more data are collected, some of these community phases and/or states may be revised or removed and new ones may be added. The main purpose for including the descriptions

here is to capture the current knowledge and experience at the time of this revision.

The following is a diagram that illustrates the common plant community phases that can occur on the site and the transition and community pathways between them. The ecological processes will be discussed in more detail in the plant community descriptions following the diagram.

Plant Communities and Transitional Pathways



CA – Cropped and abandoned; **GPF** – Grazing, precipitation, and fire returned to normal disturbance regimes; **HCG** – Heavy continuous grazing; **NU, NF** – Non-use, no fire;
PB – Prescribed burning; **PG** – Prescribed grazing with adequate recovery periods;
S – Seeding; **T** – Time w/wo disturbances.

Plant Community Composition and Group Annual Production

			1.1 Big Bluestem/Indiangrass/Sedge		
COMMON/GROUP NAME	**SCIENTIFIC NAME**	**SYMBOL**	**Group**	**lbs./acre**	**% Comp**
GRASSES & GRASS-LIKES				*4335 - 4845*	*85 - 95*
TALL WARM-SEASON GRASSES			**1**	**1530 - 3060**	**30 - 60**
big bluestem	Andropogon gerardii	ANGE	1	1020 - 2295	20 - 45
Indiangrass	Sorghastrum nutans	SONU2	1	255 - 1020	5 - 20
switchgrass	Panicum virgatum	PAVI2	1	153 - 1020	3 - 20
prairie cordgrass	Spartina pectinata	SPPE	1	51 - 255	1 - 5
green muhly	Muhlenbergia glomerata	MUGL3	1	0 - 153	0 - 3
MID & TALL COOL-SEASON GRASSES			**2**	**510 - 1020**	**10 - 20**
porcupine grass	Hesperostipa spartea	HESP11	2	102 - 408	2 - 8
Canada wildrye	Elymus canadensis	ELCA4	2	102 - 408	2 - 8
slender wheatgrass	Elymus trachycaulus	ELTR7	2	51 - 255	1 - 5
western wheatgrass	Pascopyrum smithii	PASM	2	0 - 255	0 - 5
northern reedgrass	Calamagrostis stricta ssp. inexpansa	CASTI3	2	51 - 255	1 - 5
plains bluegrass	Poa arida	POAR3	2	51 - 153	1 - 3
prairie wedgescale	Sphenopholis obtusata	SPOB	2	0 - 102	0 - 2
foxtail barley	Hordeum jubatum	HOJU	2	0 - 102	0 - 2
GRASS-LIKES			**3**	**510 - 765**	**10 - 15**
clustered field sedge	Carex praegracilis	CAPR5	3	102 - 510	2 - 10
manyhead sedge	Carex sychnocephala	CASY	3	102 - 510	2 - 10
Sartwell's sedge	Carex sartwellii	CASA8	3	102 - 510	2 - 10
rush	Juncus spp.	JUNCU	3	51 - 255	1 - 5
other grass-likes		2GL	3	0 - 255	0 - 5
MID WARM-SEASON GRASSES			**4**	**153 - 510**	**3 - 10**
little bluestem	Schizachyrium scoparium	SCSC	4	102 - 510	2 - 10
sideoats grama	Bouteloua curtipendula	BOCU	4	51 - 255	1 - 5
OTHER NATIVE GRASSES			**5**	**102 - 255**	**2 - 5**
prairie junegrass	Koeleria macrantha	KOMA	5	51 - 102	1 - 2
Scribner panicum	Dichanthelium oligosanthes var. scribnerianur	DIOLS	5	51 - 102	1 - 2
other grasses		2GRAM	5	0 - 255	0 - 5
FORBS			*7*	*255 - 510*	*5 - 10*
American licorice	Glycyrrhiza lepidota	GLLE3	7	51 - 102	1 - 2
black-eyed Susan	Rudbeckia hirta	RUHI2	7	0 - 102	0 - 2
blue-eyed grass	Sisyrinchium spp.	SISYR	7	0 - 51	0 - 1
cinquefoil	Potentilla spp.	POTEN	7	51 - 102	1 - 2
cudweed sagewort	Artemisia ludoviciana	ARLU	7	51 - 102	1 - 2
gayfeather	Liatris spp.	LIATR	7	51 - 102	1 - 2
goldenrod	Solidago spp.	SOLID	7	51 - 102	1 - 2
heath aster	Symphyotrichum ericoides	SYER	7	0 - 51	0 - 1
horsetail	Equisetum laevigatum	EQLA	7	0 - 51	0 - 1
Illinois bundleflower	Desmanthus illinoensis	DEIL	7	0 - 102	0 - 2
Indianhemp	Apocynum cannabinum	APCA	7	0 - 102	0 - 2
Maximilian sunflower	Helianthus maximiliani	HEMA2	7	51 - 153	1 - 3
meadow anemone	Anemone canadensis	ANCA8	7	0 - 51	0 - 1
mint	Mentha spp.	MENTH	7	0 - 51	0 - 1
northern bedstraw	Galium boreale	GABO2	7	0 - 51	0 - 1
palespike lobelia	Lobelia spicata	LOSP	7	0 - 51	0 - 1
prairie coneflower	Ratibida columnifera	RACO3	7	0 - 51	0 - 1
purple prairie clover	Dalea purpurea	DAPU5	7	51 - 102	1 - 2
scurfpea	Psoralidium spp.	PSORA2	7	0 - 102	0 - 2
showy milkweed	Asclepias speciosa	ASSP	7	51 - 102	1 - 2
stickseed	Hackelia spp.	HACKE	7	0 - 51	0 - 1
stiff sunflower	Helianthus pauciflorus	HEPA19	7	0 - 51	0 - 1
western dock	Rumex aquaticus	RUAQ	7	51 - 102	1 - 2
western ragweed	Ambrosia psilostachya	AMPS	7	0 - 51	0 - 1
western yarrow	Achillea millefolium var. occidentalis	ACMIO	7	51 - 102	1 - 2
wild strawberry	Fragaria virginiana	FRVI	7	0 - 51	0 - 1
native forbs		2FN	7	51 - 153	1 - 3
SHRUBS			*8*	*51 - 255*	*1 - 5*
leadplant	Amorpha canescens	AMCA6	8	51 - 153	1 - 3
rose	Rosa spp.	ROSA5	8	51 - 102	1 - 2
snowberry	Symphoricarpos spp.	SYMPH	8	0 - 102	0 - 2
other shrubs		2SHRUB	8	0 - 153	0 - 3

Annual Production lbs./acre	LOW	RV	HIGH
GRASSES & GRASS-LIKES	3930 -	4565	- 5100
FORBS	220 -	383	- 610
SHRUBS	50 -	153	- 290
TOTAL	4200 -	5100	- 6000

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 Big Bluestem/Indiangrass/ Switchgrass			2.2 Sedge/Wheatgrass/Ken-tucky Bluegrass/Switchgrass			3.1 Smooth Bromegrass/ Kentucky Bluegrass			3.2 Kentucky Bluegrass/ Baltic Rush/Forbs		
COMMON/GROUP NAME	**SYMBOL**	**Grp**	**lbs./acre**	**% Comp**	**Grp**	**lbs./acre**	**% Comp**	**Grp**	**lbs./acre**	**% Comp**	**Grp**	**lbs./acre**	**% Comp**
GRASSES & GRASS-LIKES			*4335 - 4845*	*85 - 95*		*3570 - 3990*	*85 - 95*		*3740 - 4180*	*85 - 95*		*2475 - 2805*	*75 - 85*
TALL WARM-SEASON GRASSES		**1**	**1530 - 3060**	**30 - 60**	**1**	**420 - 840**	**10 - 20**	**1**	**0 - 220**	**0 - 5**	**1**		
big bluestem	ANGE	1	1020 - 2295	20 - 45	1	84 - 630	2 - 15	1	0 - 220	0 - 5			
Indiangrass	SONU2	1	255 - 1020	5 - 20	1	0 - 210	0 - 5						
switchgrass	PAVI2	1	153 - 1020	3 - 20	1	210 - 840	5 - 20	1	0 - 132	0 - 3			
prairie cordgrass	SPPE	1	51 - 255	1 - 5	1	0 - 126	0 - 3						
green muhly	MUGL3	1	0 - 153	0 - 3									
MID & TALL COOL-SEASON		**2**	**510 - 1020**	**10 - 20**	**2**	**630 - 1260**	**15 - 30**	**2**	**44 - 660**	**1 - 15**	**2**	**33 - 495**	**1 - 15**
porcupine grass	HESP11	2	102 - 408	2 - 8	2	0 - 126	0 - 3						
Canada wildrye	ELCA4	2	102 - 408	2 - 8	2	0 - 210	0 - 5	2	0 - 132	0 - 3			
slender wheatgrass	ELTR7	2	51 - 255	1 - 5	2	126 - 840	3 - 20	2	0 - 132	0 - 3			
western wheatgrass	PASM	2	0 - 255	0 - 5	2	126 - 840	3 - 20	2	0 - 220	0 - 5	2	0 - 99	0 - 3
northern reedgrass	CASTI3	2	51 - 255	1 - 5	2	0 - 84	0 - 2						
plains bluegrass	POAR3	2	51 - 153	1 - 3	2	84 - 420	2 - 10	2	0 - 132	0 - 3			
prairie wedgescale	SPOB	2	0 - 102	0 - 2									
foxtail barley	HOJU	2	0 - 102	0 - 2	2	42 - 336	1 - 8	2	44 - 440	1 - 10	2	33 - 495	1 - 15
GRASS-LIKES		**3**	**510 - 765**	**10 - 15**	**3**	**420 - 1260**	**10 - 30**	**3**	**220 - 880**	**5 - 20**	**3**	**165 - 825**	**5 - 25**
clustered field sedge	CAPR5	3	102 - 510	2 - 10	3	84 - 840	2 - 20	3	88 - 440	2 - 10	3	0 - 264	0 - 8
manyhead sedge	CASY	3	102 - 510	2 - 10	3	84 - 840	2 - 20	3	0 - 220	0 - 5			
Sartwell's sedge	CASA8	3	102 - 510	2 - 10	3	84 - 630	2 - 15	3	0 - 132	0 - 3			
rush	JUNCU	3	51 - 255	1 - 5	3	84 - 336	2 - 8	3	88 - 440	2 - 10	3	165 - 660	5 - 20
other grass-likes	2GL	3	0 - 255	0 - 5	3	0 - 210	0 - 5	3	0 - 220	0 - 5	3	0 - 165	0 - 5
MID WARM-SEASON GRASSES		**4**	**153 - 510**	**3 - 10**	**4**	**84 - 630**	**2 - 15**	**4**	**0 - 220**	**0 - 5**	**4**		
little bluestem	SCSC	4	102 - 510	2 - 10	4	84 - 630	2 - 15	4	0 - 220	0 - 5			
sideoats grama	BOCU	4	51 - 255	1 - 5	4	0 - 84	0 - 2						
OTHER NATIVE GRASSES		**5**	**102 - 255**	**2 - 5**	**5**	**42 - 210**	**1 - 5**	**5**	**0 - 220**	**0 - 5**	**5**	**0 - 165**	**0 - 5**
prairie junegrass	KOMA	5	51 - 102	1 - 2	5	42 - 84	1 - 2	5	0 - 44	0 - 1	5	0 - 33	0 - 1
Scribner panicum	DIOLS	5	51 - 102	1 - 2	5	0 - 42	0 - 1	5	0 - 44	0 - 1	5	0 - 33	0 - 1
other grasses	2GRAM	5	0 - 255	0 - 5	5	0 - 210	0 - 5	5	0 - 220	0 - 5	5	0 - 165	0 - 5
NON-NATIVE GRASSES		**6**			**6**	**210 - 840**	**5 - 20**	**6**	**1320 - 2640**	**30 - 60**	**6**	**825 - 1980**	**25 - 60**
Kentucky bluegrass	POPR				6	210 - 840	5 - 20	6	132 - 880	3 - 20	6	660 - 1650	20 - 50
quackgrass	ELRE4				6	0 - 210	0 - 5	6	0 - 352	0 - 8	6	0 - 396	0 - 12
redtop	AGST2				6	0 - 210	0 - 5	6	0 - 352	0 - 8	6	0 - 495	0 - 15
smooth bromegrass	BRIN2				6	42 - 420	1 - 10	6	660 - 2200	15 - 50	6	33 - 495	1 - 15
FORBS		*7*	*255 - 510*	*5 - 10*	*7*	*210 - 420*	*5 - 10*	*7*	*220 - 440*	*5 - 10*	*7*	*165 - 660*	*5 - 20*
American licorice	GLLE3	7	51 - 102	1 - 2	7	0 - 84	0 - 2	7	0 - 88	0 - 2	7	0 - 66	0 - 2
black-eyed Susan	RUHI2	7	0 - 102	0 - 2									
blue-eyed grass	SISYR	7	0 - 51	0 - 1									
cinquefoil	POTEN	7	51 - 102	1 - 2	7	42 - 84	1 - 2	7	44 - 88	1 - 2	7	33 - 132	1 - 4
cudweed sagewort	ARLU	7	51 - 102	1 - 2	7	42 - 126	1 - 3	7	44 - 176	1 - 4	7	33 - 165	1 - 5
gayfeather	LIATR	7	51 - 102	1 - 2	7	0 - 42	0 - 1						
goldenrod	SOLID	7	51 - 102	1 - 2	7	42 - 126	1 - 3	7	44 - 176	1 - 4	7	33 - 165	1 - 5
heath aster	SYER	7	0 - 51	0 - 1	7	0 - 42	0 - 1	7	0 - 44	0 - 1	7	0 - 66	0 - 2
horsetail	EQLA	7	0 - 51	0 - 1	7	0 - 42	0 - 1	7	0 - 44	0 - 1	7	0 - 33	0 - 1
Illinois bundleflower	DEIL	7	0 - 102	0 - 2									
Indianhemp	APCA	7	0 - 102	0 - 2	7	0 - 84	0 - 2	7	0 - 88	0 - 2	7	0 - 66	0 - 2
Maximilian sunflower	HEMA2	7	51 - 153	1 - 3	7	0 - 42	0 - 1						
meadow anemone	ANCA8	7	0 - 51	0 - 1									
mint	MENTH	7	0 - 51	0 - 1									
northern bedstraw	GABO2	7	0 - 51	0 - 1									
palespike lobelia	LOSP	7	0 - 51	0 - 1									
prairie coneflower	RACO3	7	0 - 51	0 - 1	7	0 - 42	0 - 1						
purple prairie clover	DAPU5	7	51 - 102	1 - 2	7	0 - 42	0 - 1						
scurfpea	PSORA2	7	0 - 102	0 - 2	7	0 - 42	0 - 1	7	0 - 44	0 - 1			
showy milkweed	ASSP	7	51 - 102	1 - 2	7	42 - 84	1 - 2	7	44 - 132	1 - 3	7	33 - 99	1 - 3
stickseed	HACKE	7	0 - 51	0 - 1									
stiff sunflower	HEPA19	7	0 - 51	0 - 1									
western dock	RUAQ	7	51 - 102	1 - 2	7	0 - 42	0 - 1						
western ragweed	AMPS	7	0 - 51	0 - 1	7	42 - 84	1 - 2	7	44 - 132	1 - 3	7	33 - 165	1 - 5
western yarrow	ACMIO	7	51 - 102	1 - 2	7	42 - 126	1 - 3	7	44 - 176	1 - 4	7	33 - 165	1 - 5
wild strawberry	FRVI	7	0 - 51	0 - 1									
native forbs	2FN	7	51 - 153	1 - 3	7	42 - 126	1 - 3	7	0 - 132	0 - 3	7	0 - 66	0 - 2
introduced forbs	2FI				7	42 - 126	1 - 3	7	44 - 220	1 - 5	7	33 - 330	1 - 10
SHRUBS		*8*	*51 - 255*	*1 - 5*	*8*	*42 - 126*	*1 - 3*	*8*	*44 - 220*	*1 - 5*	*8*	*0 - 99*	*0 - 3*
leadplant	AMCA6	8	51 - 153	1 - 3	8	0 - 42	0 - 1						
rose	ROSA5	8	51 - 102	1 - 2	8	42 - 84	1 - 2	8	44 - 88	1 - 2	8	0 - 33	0 - 1
snowberry	SYMPH	8	0 - 102	0 - 2	8	0 - 84	0 - 2	8	0 - 220	0 - 5	8	0 - 33	0 - 1
other shrubs	2SHRUB	8	0 - 153	0 - 3	8	0 - 84	0 - 2	8	0 - 88	0 - 2	8	0 - 33	0 - 1

Annual Production lbs./acre	LOW RV HIGH	LOW RV HIGH	LOW RV HIGH	LOW RV HIGH
GRASSES & GRASS-LIKES	3930 · 4565 · 5100	3175 · 3801 · 4360	3370 · 3938 · 4425	2255 · 2838 · 3205
FORBS	220 · 383 · 610	185 · 315 · 500	190 · 330 · 525	145 · 413 · 790
SHRUBS	50 · 153 · 290	40 · 84 · 140	40 · 132 · 250	0 · 50 · 105
TOTAL	4200 · 5100 · 6000	3400 · 4200 · 5000	3600 · 4400 · 5200	2400 · 3300 · 4100

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 ES. This state was typically dominated by warm-season grasses. Pre-European settlement, the primary disturbance mechanisms for this site in the reference condition included periodic fire and grazing by large herding ungulates. Timing of fires and grazing coupled with weather events dictated the dynamics that occurred within the natural range of variability. Today, the primary disturbance is from a lack of fire and concentrated livestock grazing. Grasses that are desirable for livestock and wildlife can decline and a corresponding increase in less desirable grasses will occur.

1.1 Big Bluestem/Indiangrass/Switchgrass Plant Community Phase

This community evolved with grazing by large herbivores, occasional prairie fires, and relatively frequent flooding events. The potential vegetation was about 85 percent grass and grass-like species, 10 percent forbs, and 5 percent shrubs by air-dry weight. The dominant grasses included big bluestem, Indiangrass, and switchgrass. Other grass and grass-like species that occurred were sedges, little bluestem, porcupine grass, Canada wildrye, slender wheatgrass, and western wheatgrass. Common forbs were likely Maximilian sunflower, Illinois bundleflower, Indian hemp, goldenrod, showy milkweed, gayfeather, black-eyed Susan, and American licorice. This site does not typically support a large amount of woody species, but rose, leadplant, and snowberry were the most common shrubs.

This plant community phase is diverse, stable, and productive, and is well adapted to the Northern Great Plains. The high water table supplies much of the moisture for plant growth. Community dynamics, nutrient cycle, water cycle, and energy flow are functioning properly. Plant litter is properly distributed with very little movement offsite and natural plant mortality is very low. The diversity in plant species allows for the variability of the water table. This is a sustainable plant community in terms of 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 a normal year:
Growth curve number: SD5510
Growth curve name: Southern Black Glaciated Plains, lowland warm-season dominant.
Growth curve description: Warm-season dominant, lowland.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	2	8	15	21	26	15	8	5	0	0

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

- <u>1.1a – Heavy continuous grazing</u> which includes herbivory at moderate to heavy levels at the same time of year each year without adequate recovery periods or during periods of below normal precipitation when grazing frequency and intensity increases on these sites due to limited forage availability on adjacent upland sites will shift this community to the *1.2 Sedge/Wheatgrass/Bluestem/Switchgrass Plant Community Phase*.

1.2 Sedge/Wheatgrass/Bluestem/Switchgrass 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 grass and grass-

like species included sedges, slender wheatgrass, western wheatgrass, switchgrass, big bluestem, and little bluestem.

Other grass and grass-like species included plains bluegrass, rushes, Indiangrass, Canada wildrye, and foxtail barley. Forbs commonly found in this plant community included cudweed sagewort, goldenrod, and western yarrow. This plant community had similar plant composition to the 2.2 Sedge/Wheatgrass/Kentucky Bluegrass/Switchgrass 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 Big Bluestem/Indiangrass/Switchgrass Plant Community Phase (1.1), sedges, slender wheatgrass, and western wheatgrass increased. Big bluestem and Indiangrass decreased, and production of all tall warm-season grasses was 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 a normal year:
Growth curve number: SD5507
Growth curve name: Southern Black Glaciated Plains, cool-season dominant, warm-season subdominant.
Growth curve description: Cool-season dominant, warm-season subdominant, lowland.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	5	13	20	25	18	11	5	3	0	0

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

- 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 Big Bluestem/Indiangrass/Switchgrass Plant Community Phase*.

Transition from Reference State (State 1) to the Native/Invaded State (State 2)

- T1 – 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 2)*.

Native/Invaded State (State 2)

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

2.1 Big Bluestem/Indiangrass/Switchgrass Plant Community Phase

This plant community phase is similar to the 1.1 Big Bluestem/Indiangrass/Switchgrass 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 grass and grass-like species, 10 percent forbs, and 5 percent shrubs by air-dry weight. The dominant grasses include big bluestem, Indiangrass, and switchgrass. Other grass and grass-like species that occur are sedges, little bluestem, porcupine grass, Canada wildrye, slender wheatgrass, and western wheatgrass.

Common forbs are Maximilian sunflower, Illinois bundleflower, Indian hemp, goldenrod, showy milkweed, gayfeather, black-eyed Susan, and American licorice. This site does not typically support a large amount of woody species, but rose, leadplant, and snowberry are the most common shrubs. 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 a normal year:
Growth curve number: SD5510
Growth curve name: Southern Black Glaciated Plains, lowland warm-season dominant.
Growth curve description: Warm-season dominant, lowland.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	2	8	15	21	26	15	8	5	0	0

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

- 2.1a – Heavy continuous grazing which includes herbivory at moderate to heavy levels at the same time of year each year without adequate recovery periods or during periods of below normal precipitation when grazing frequency and intensity increases on these sites due to limited forage availability on adjacent upland sites will shift this community to the *2.2 Sedge/Wheatgrass/Kentucky Bluegrass/Switchgrass Plants Plant Community Phase*.

2.2 Sedge/Wheatgrass/Kentucky Bluegrass/Switchgrass 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 87 percent grasses and grass-like species, 10 percent forbs, and 3 percent shrubs. Dominant grass and grass-like species include sedges, slender wheatgrass, western wheatgrass, switchgrass, Kentucky bluegrass, big bluestem, and little bluestem. Other grass and grass-like species include plains bluegrass, rushes, Indiangrass, Canada wildrye, and foxtail barley. Forbs commonly found in this plant community include cudweed sagewort, goldenrod, and western yarrow.

When compared to the Big Bluestem/Indiangrass/Switchgrass Plant Community Phase (1.1), sedges, slender wheatgrass, and western wheatgrass increase. Big bluestem and Indiangrass decrease and production of all tall warm-season grasses is 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 a normal year:
Growth curve number: SD5507
Growth curve name: Southern Black Glaciated Plains, cool-season dominant, warm-season subdominant.
Growth curve description: Cool-season dominant, warm-season subdominant, lowland.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	5	13	20	25	18	11	5	3	0	0

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

- 2.2a – Prescribed grazing (alternating season of use and providing adequate recovery periods) or periodic light to moderate grazing possibly including periodic rest will convert this plant community to the *2.1 Big Bluestem/Indiangrass/Switchgrass Plant Community Phase*.

Transitions from Native/Invaded Grass State (State 2) to the Invaded State (State 3)

- T2a – 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 *3.1 Smooth Bromegrass/Kentucky Bluegrass Plant Community Phase* within the *Invaded State (State 3)*.

- T2b – Heavy continuous grazing (stocking levels well above carrying capacity for extended portions of the growing season and at the same time of year each year) will cause a shift across a threshold leading to the *3.2 Kentucky Bluegrass/Baltic Rush/Forbs Plant Community Phase* within the *Invaded State (State 3)*.

Invaded State (State 3)

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.

3.1 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: SD5506
Growth curve name: Southern Black Glaciated Plains, lowland cool-season dominant.
Growth curve description: Cool-season dominant, lowland.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	6	15	20	26	17	9	4	3	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 at the same time of year each year) will convert this plant community to the *3.2 Kentucky Bluegrass/Baltic Rush/Forbs Plant Community Phase*.

- R3a - 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) coupled with prescribed burning may lead this plant community phase over a threshold to the *Native/Invaded State (State 2)*. Pest management (i.e., herbicide) may also be needed to suppress cool-season invasive grasses. This will likely take a long period of time and recovery may not be attainable. Success depends on whether native reproductive propagules remain intact on the site.

3.2 Kentucky Bluegrass/Baltic Rush/Forbs 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, Baltic rush, and forbs. The dominance of Kentucky bluegrass 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: SD5506
Growth curve name: Southern Black Glaciated Plains, lowland cool-season dominant.
Growth curve description: Cool-season dominant, lowland.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	6	15	20	26	17	9	4	3	0	0

Transition from Any Plant Community to the Invaded State (State 3)

- T4 – Cropping followed by abandonment may lead this plant community phase over a threshold to the *Invaded State (State 3)* and more specifically to the *3.3 Annual/Pioneer, Non-native Perennial Plant Community Phase*.

3.3 Annual/Pioneer, Non-native Perennial Plant Community Phase

This plant community develops under severe disturbance, typically abandonment after cropping. The dominant vegetation includes pioneer annual or perennial grasses, forbs, invaders, and early successional biennial and perennial species. Grasses may include foxtail barley, barnyardgrass, quackgrass, fowl bluegrass, Kentucky bluegrass, Baltic rush, and sedges. The dominant forbs include curlycup gumweed, Canada thistle, and other early successional species. The community is susceptible to invasion of nonnative species due to severe soil disturbances and relatively high percent of bare ground. This plant community is resistant to change, as long as soil disturbance or severe vegetation defoliation persists, thus holding back secondary plant succession.

Significant economic inputs, management, and time would be required to move this plant community toward a higher successional stage. Secondary succession is highly variable,depending upon availability and diversity of a viable reproductive source of higher successional species. This plant community may be renovated to improve the production capability but management changes would be needed to maintain the new plant community. The total annual production ranges from 500 to 1,500 lbs./ac. (air-dry weight) depending upon growing conditions. No growth curve has been assigned to this plant community phase due to the highly variable nature of the plant community.

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

- 3.3a – This community pathway occurs with the passage of time as successional processes take place and perennial plants gradually begin to establish on the site again. This pathway will lead to the *3.2 Kentucky Bluegrass/Baltic Rush/Forbs Plant Community Phase*.

Restoration Pathway from Invaded State (State 3) to the Native/Invaded State (State 2)

- R3b – Seeding followed by prescribed grazing may lead this plant community phase over a threshold to the *Native/Invaded State (State 2)*.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

-- Under Development --

Big Bluestem/Indiangrass/Switchgrass Plant Community Phases (1.1 & 2.1):

Sedge/Wheatgrass/Bluestem/Switchgrass Plant Community Phases (1.2):

Sedge/Wheatgrass/Kentucky Bluegrass/Switchgrass Plant Community Phase (2.2):

Smooth Bromegrass/Kentucky Bluegrass Plant Community Phase (3.1):

Kentucky Bluegrass/Baltic Rush/Forbs Plant Community Phase (3.2):

Annual/Pioneer, Non-native Perennial Plant Community Phase (3.3):

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
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
clustered field sedge	U D U U	U P N D	U D U U	U D U D	U D U D	U D U U	U D U U
foxtail barley	U D N N	N P N N	U D N N	N P N N	N P N N	U D N N	U D N N
green muhly	U D D U	N U N N	U D D U	N U N N	N U N N	U D D U	U D D U
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
manyhead sedge	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U
northern reedgrass	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
plains bluegrass	U D U D	N D N U	U D U D	U P N D	U P N D	U D U D	U D U D
porcupine grass	U P U D	N D N U	U P U D	N D N U	N D N U	U P U D	U P U D
prairie cordgrass	U D D U	N N N N	U D D U	N N N N	N N N N	U D D U	U D D U
prairie junegrass	U D U D	N D N U	U D U D	N D N U	N D N U	U D U D	U D U D
prairie wedgescale	U D N N	N P N N	U D N N	N P N N	N P N N	U D N N	U D N N
rush	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
Sartwell's sedge	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U
Scribner panicum	U U D U	N U N N	U U D U	N U N N	N U N N	U U D U	U U D U
sideoats grama	U D P U	U P D U	U D P U	U P D U	U P D U	U D P U	U D P U
slender wheatgrass	U P U U	N D U N	U P U U	N D U N	N D U N	U P U U	U P U U
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
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 licorice	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
black-eyed Susan	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
blue-eyed grass	U U U U	U U P U	U U U U	U U P U	U U P U	U U U U	U U P U
cinquefoil	U U D U	U U U U	U U D U	U U U U	U U U U	U U D U	U U U 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
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
goldenrod	U U D U	N U U N	U U D U	N U U N	N U U N	U U D U	N U U N
heath aster	U U D U	U U P U	U U D U	U U P U	U U P U	U U D U	U U P U
horsetail	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
Illinois bundleflower	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
Indianhemp	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
Maximilian sunflower	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U
meadow anemone	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 U U
mint	N N U N	N U U N	N N U N	N U U N	N U U N	N N U N	N N U N
northern bedstraw	N N N N	N U D N	N N N N	N U D N	N U D N	N N N N	N N N N
palespike lobelia	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
prairie coneflower	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
purple 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
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
showy milkweed	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
stickseed	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
stiff sunflower	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U
western dock	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
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 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
wild strawberry	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
Shrubs							
leadplant	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U
rose	U D D U	U D D U	U D D U	U D D U	U D D U	U D D U	U D D U
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)
Big Bluestem/Indiangrass/Switchgrass (1.1 & 2.1)	5,100	1.40
Sedge/Wheatgrass/Kentucky Bluegrass/Switchgrass (2.2)	4,200	1.15
Smooth Bromegrass/Kentucky Bluegrass (3.1)	4,400	1.21
Kentucky Bluegrass/Baltic Rush/Forbs (3.2)	3,300	0.90
Annual/Pioneer, Non-Native Perennial (3.3)	1,200	0.33

*Based on 912 lbs./acre (air-dry weight) per Animal Unit Month (AUM) 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 contains soils in all hydrologic groups A, B, C, and D. Infiltration is slow to moderately slow and runoff potential for this site is negligible. In many cases, areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower 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
Wet Meadow (R055CY004SD), Loamy Overflow (R055CY020SD)

Similar Sites
(R055CY020SD) – Loamy Overflow [less sedges and prairie cordgrass; 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	2	2005	SD	Jerauld

State Correlation
This site has been correlated in SD 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
High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-0728. (http://www.hprcc.unl.edu/)
USDA, NRCS. National Water and Climate Center, 101 SW Main, Suite 1600, Portland, OR 97204-3224. (http://wcc.nrcs.usda.gov)
USDA, NRCS. National Range and Pasture Handbook, September 1997
USDA, NRCS. National Soil Information System, Information Technology Center, 2150 Centre Avenue, Building A, Fort Collins, CO 80526. (http://nasis.nrcs.usda.gov)
USDA, NRCS. 2001. The PLANTS Database, Version 3.1 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

Site Description Approval _____ _____
SD, State Range Management Specialist Date