

## United States Department of Agriculture Natural Resources Conservation Service

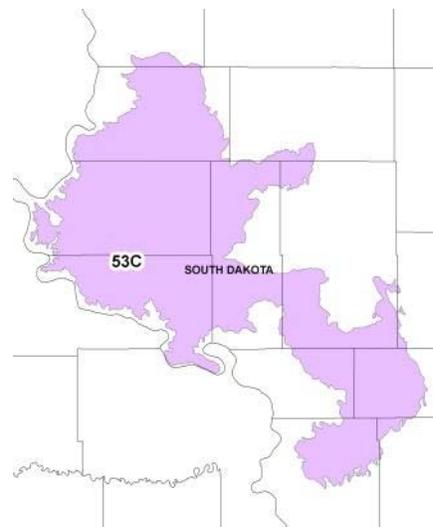
### Ecological Site Description

**Site Type:** Rangeland

**Site Name:** Shallow Marsh

**Site ID:** R053CY001SD

**Major Land Resource Area (MLRA):** 53C – Southern Dark Brown Glaciated Plains



### Physiographic Features

This site occurs on swales and depressions.

**Landform:** pothole

**Aspect:** N/A

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	1,300	2,300
<b>Slope (percent):</b>	0	1
<b>Water Table Depth (inches):</b>	0	18
<b>Flooding:</b>		
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Ponding:</b>		
<b>Depth (inches):</b>	0	24
<b>Frequency:</b>	Frequent	Frequent
<b>Duration:</b>	Very long	Very long
<b>Runoff Class:</b>	Negligible	Negligible

### Climatic Features

MLRA 53C 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 18 to 22 inches per year. The average annual temperature is about 45°F. January is the coldest month with average temperatures ranging from about 15°F (Stephan, South Dakota (SD)), to about 16°F (Onida 4 NW, SD). July is the warmest month with temperatures averaging from about 72°F (Stephan, SD), to about 74°F (Onida 4 NW, 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.

	<u>Minimum</u>	<u>Maximum</u>
Frost-free period (days):	125	141
Freeze-free period (days):	142	160
Mean Annual Precipitation (inches):	18	22

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

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.25	0.56	3.6	26.4
February	0.37	0.57	7.8	30.9
March	1.02	1.04	19.5	43.1
April	1.68	3.01	31.0	58.7
May	2.68	3.35	42.6	70.1
June	3.17	3.41	53.3	79.1
July	2.50	3.34	58.7	88.7
August	1.73	2.06	56.8	87.6
September	1.94	2.48	47.3	77.3
October	1.35	1.67	33.7	62.3
November	0.52	0.77	20.8	42.4
December	0.21	0.34	8.5	31.2

Climate Stations		Period	
Station ID	Location or Name	From	To
SD3608	Harrold 12 SSW	1963	2008
SD6292	Onida 4 NW	1913	2008
SD7992	Stephan	1903	2008
SD9077	Wessington Springs 7 SW	1948	1998

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

### Riparian and Wetland Features

Wetland Description:	<u>System</u>	<u>Subsystem</u>	<u>Class</u>	<u>Sub-class</u>
Cowardin, et al., 1979	Palustrine	N/A	Persistent Emergent Wetland	Semi-permanently or seasonally flooded

### Representative Soil Features

The common features of soils in this site are the clay loam to clay-textured subsoil and slopes of zero to one percent. The soils in this site are poorly to very poorly drained and formed in alluvium. The silt loam to silty clay loam surface layer is 6 to 13 inches thick. The soils have a very slow infiltration rate. This site should show no evidence of rills, wind scoured areas, or pedestalled plants. The soil surface is stable and intact. Subsurface soil layers are nonrestrictive to water movement and root penetration.

These soils are not susceptible to water erosion. Ponded water conditions and very slow permeability strongly influences the soil-water-plant relationship.

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

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

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	very poorly	very poorly
Permeability Class:	very slow	very slow
Depth (inches):	80	80
Electrical Conductivity (mmhos/cm)*:	0	2
Sodium Absorption Ratio*:	0	1
Soil Reaction (1:1 Water)*:	5.6	7.8
Soil Reaction (0.1M CaCl2)*:	NA	NA
Available Water Capacity (inches)*:	7	7
Calcium Carbonate Equivalent (percent)*:	0	5

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

## Plant Communities

### Ecological Dynamics of the Site

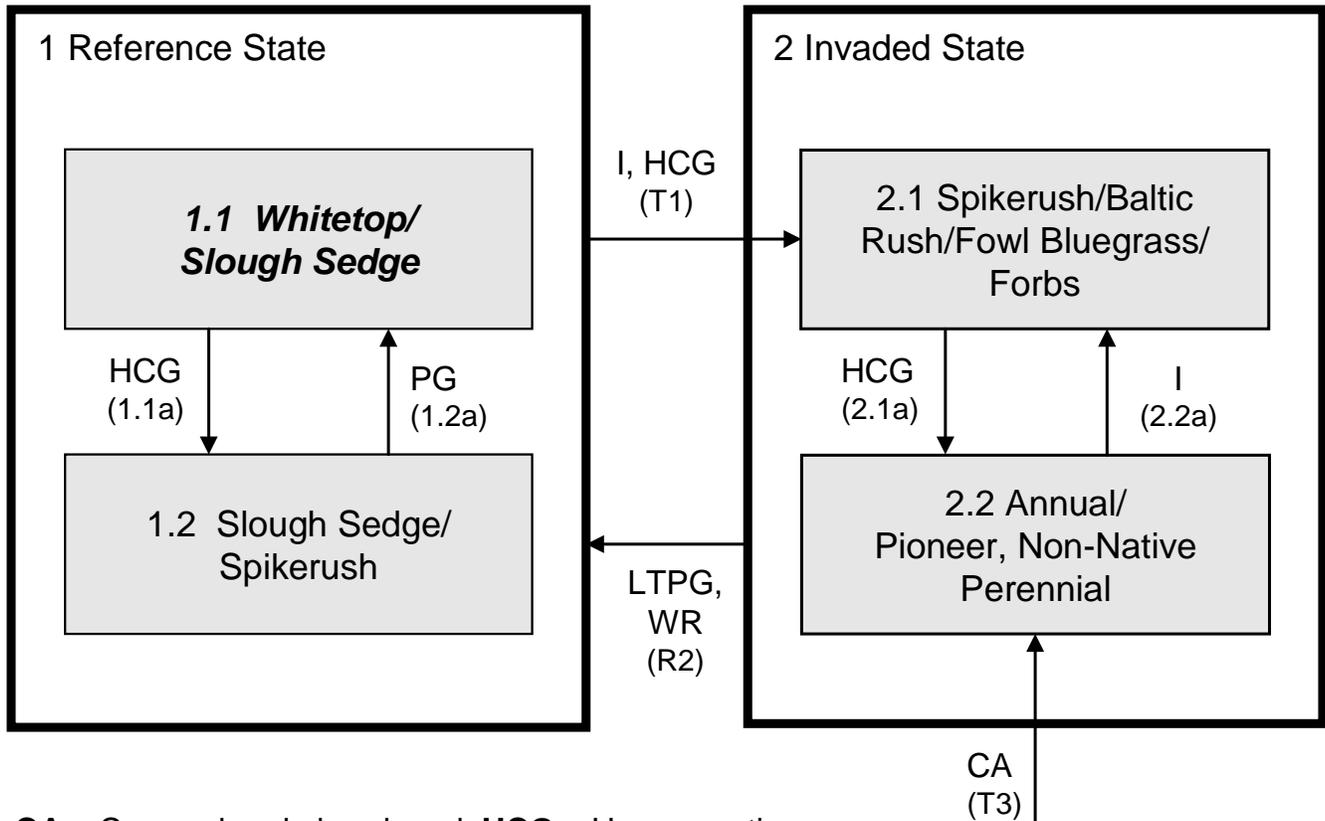
The site developed under Northern Great Plains climatic conditions and included natural influence of large herding herbivores and occasional fire. Changes will occur in the plant communities due to weather fluctuations and/or management actions. Under adverse impacts, a relatively rapid decline in vegetative vigor and composition can occur. Under favorable conditions, the site has the potential to resemble the Reference State. Interpretations for this site are based primarily on the 1.1 Whitetop/Slough Sedge Plant Community Phase. This community phase and the Reference State 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 considered. Community phases, community pathways, states, transitions, thresholds, and restoration pathways have been determined through similar studies and experience.

This ecological site (ES) has been grazed by domestic livestock since introduced into the area. The introduction of livestock and the use of fencing and reliable water sources have changed the disturbance regime of this site. Heavy continuous grazing without adequate recovery periods following each grazing occurrence causes this site to depart from the Reference State. Species such as fowl bluegrass, spikerush, and Baltic rush will initially increase. Whitetop and slough sedge will decrease in frequency and production. Continued heavy grazing eventually causes dominance by spikerush, rushes, and unpalatable forbs such as curly dock.

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 is 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; **HCG** – Heavy continuous grazing; **I** – Inundation; **PG** – Prescribed grazing with adequate recovery periods; **WR** – Wetland restoration; **LTPG**– Long-Term Prescribed Grazing.

**Any Plant Community**

Plant Community Composition and Group Annual Production

			1.1 Whitetop/Slough Sedge		
COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Group	lbs./acre	% Comp
<b>GRASSES &amp; GRASS-LIKES</b>				5270 - 5890	85 - 95
<b>TALL COOL-SEASON GRASSES</b>			<b>1</b>	<b>1240 - 2480</b>	<b>20 - 40</b>
whitetop	Scolochloa festucacea	SCFE	1	930 - 2170	15 - 35
American mannagrass	Glyceria grandis	GLGR	1	310 - 620	5 - 10
<b>GRASS-LIKES</b>			<b>2</b>	<b>1240 - 2480</b>	<b>20 - 40</b>
slough sedge	Carex atherodes	CAAT2	2	620 - 1860	10 - 30
woolly sedge	Carex pellita	CAPE42	2	124 - 620	2 - 10
Sartwell's sedge	Carex sartwellii	CASA8	2	124 - 620	2 - 10
Nebraska sedge	Carex nebrascensis	CANE2	2	62 - 620	1 - 10
spikerush	Eleocharis spp.	ELEOC	2	124 - 620	2 - 10
flatsedge	Cyperus spp.	CYPER	2	0 - 310	0 - 5
Baltic rush	Juncus balticus	JUBA	2	62 - 496	1 - 8
rush	Juncus spp.	JUNCU	2	0 - 310	0 - 5
green bulrush	Scirpus atrovirens	SCAT2	2	62 - 496	1 - 8
river bulrush	Schoenoplectus fluviatilis	SCFL11	2	62 - 496	1 - 8
other grass-likes		2GL	2	0 - 620	0 - 10
<b>TALL WARM-SEASON GRASSES</b>			<b>3</b>	<b>124 - 620</b>	<b>2 - 10</b>
prairie cordgrass	Spartina pectinata	SPPE	3	124 - 620	2 - 10
green muhly	Muhlenbergia glomerata	MUGL3	3	0 - 310	0 - 5
<b>REEDGRASSES</b>			<b>4</b>	<b>0 - 310</b>	<b>0 - 5</b>
northern reedgrass	Calamagrostis stricta ssp. inexpansa	CASTI3	4	0 - 310	0 - 5
bluejoint reedgrass	Calamagrostis canadensis	CACA4	4	0 - 310	0 - 5
narrow reedgrass	Calamagrostis stricta ssp. stricta	CASTS5	4	0 - 310	0 - 5
<b>OTHER NATIVE GRASSES</b>			<b>5</b>	<b>310 - 620</b>	<b>5 - 10</b>
American sloughgrass	Beckmannia syzigachne	BESY	5	124 - 496	2 - 8
other grasses		2GRAM	5	124 - 496	2 - 8
<b>FORBS</b>			<b>7</b>	<b>310 - 930</b>	<b>5 - 15</b>
arrowgrass	Triglochin palustre	TRPA6	7	0 - 62	0 - 1
blue-eyed grass	Sisyrinchium spp.	SISYR	7	0 - 62	0 - 1
burreed	Sparganium spp.	SPARG	7	62 - 248	1 - 4
cattail	Typha latifolia	TYLA	7	0 - 124	0 - 2
cinquefoil	Potentilla spp.	POTEN	7	0 - 62	0 - 1
common waterparsnip	Sium suave	SISU2	7	0 - 62	0 - 1
Flodman's thistle	Cirsium flodmanii	CIFL	7	62 - 124	1 - 2
giant goldenrod	Solidago gigantea	SOGI	7	0 - 62	0 - 1
horsetail	Equisetum laevigatum	EQLA	7	0 - 62	0 - 1
Indianhemp	Apocynum cannabinum	APCA	7	0 - 124	0 - 2
Macoun's buttercup	Ranunculus macounii	RAMA2	7	0 - 62	0 - 1
meadow anemone	Anemone canadensis	ANCA8	7	62 - 124	1 - 2
New England aster	Symphyotrichum novae-angliae	SYNO2	7	0 - 62	0 - 1
northern water plantain	Alisma triviale	ALTR7	7	62 - 124	1 - 2
pale dock	Rumex altissimus	RUAL4	7	0 - 124	0 - 2
Pennsylvania smartweed	Polygonum pensylvanicum	POPE2	7	62 - 124	1 - 2
Rydberg's sunflower	Helianthus nuttallii ssp. rydbergii	HENUR	7	0 - 124	0 - 2
smartweed	Polygonum spp.	POLYG4	7	62 - 124	1 - 2
western dock	Rumex aquaticus	RUAQ	7	62 - 124	1 - 2
white panicle aster	Symphyotrichum lanceolatum	SYLA6	7	0 - 62	0 - 1
native forbs		2FN	7	62 - 248	1 - 4
<b>Annual Production lbs./acre</b>			<b>LOW</b>	<b>RV</b>	<b>HIGH</b>
<b>GRASSES &amp; GRASS-LIKES</b>			4740	5580	6090
<b>FORBS</b>			260	620	1010
<b>TOTAL</b>			5000	6200	7100

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

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SYMBOL	1.1 Whitetop/Slough Sedge			1.2 Slough Sedge/Spikerush			2.1 Spikerush/Baltic Rush/ Fowl Bluegrass/Forbs		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
<b>GRASSES &amp; GRASS-LIKES</b>			5270 - 5890	85 - 95		4675 - 5225	85 - 95		2240 - 2560	70 - 80
<b>TALL COOL-SEASON GRASSES</b>		1	1240 - 2480	20 - 40	1	0 - 440	0 - 8	1		
whitetop	SCFE	1	930 - 2170	15 - 35	1	0 - 275	0 - 5			
American mannagrass	GLGR	1	310 - 620	5 - 10	1	0 - 165	0 - 3			
<b>GRASS-LIKES</b>		2	1240 - 2480	20 - 40	2	2200 - 4125	40 - 75	2	800 - 1760	25 - 55
slough sedge	CAAT2	2	620 - 1860	10 - 30	2	825 - 2200	15 - 40	2	160 - 480	5 - 15
woolly sedge	CAPE42	2	124 - 620	2 - 10	2	275 - 825	5 - 15	2	0 - 256	0 - 8
Sartwell's sedge	CASA8	2	124 - 620	2 - 10	2	0 - 550	0 - 10	2	0 - 160	0 - 5
Nebraska sedge	CANE2	2	62 - 620	1 - 10	2	0 - 550	0 - 10	2	0 - 160	0 - 5
spikerush	ELEOC	2	124 - 620	2 - 10	2	550 - 1650	10 - 30	2	320 - 960	10 - 30
flatsedge	CYPER	2	0 - 310	0 - 5	2	0 - 550	0 - 10	2	0 - 256	0 - 8
Baltic rush	JUBA	2	62 - 496	1 - 8	2	275 - 825	5 - 15	2	160 - 640	5 - 20
rush	JUNCU	2	0 - 310	0 - 5	2	0 - 550	0 - 10	2	0 - 320	0 - 10
green bulrush	SCAT2	2	62 - 496	1 - 8	2	0 - 550	0 - 10	2	0 - 96	0 - 3
river bulrush	SCFL11	2	62 - 496	1 - 8	2	0 - 550	0 - 10	2	0 - 96	0 - 3
other grass-likes	2GL	2	0 - 620	0 - 10	2	0 - 440	0 - 8	2	0 - 160	0 - 5
<b>TALL WARM-SEASON GRASSES</b>		3	124 - 620	2 - 10	3	0 - 275	0 - 5	3		
prairie cordgrass	SPPE	3	124 - 620	2 - 10	3	0 - 275	0 - 5			
green muhly	MUGL3	3	0 - 310	0 - 5						
<b>REEDGRASSES</b>		4	0 - 310	0 - 5	4	0 - 110	0 - 2	4		
northern reedgrass	CASTI3	4	0 - 310	0 - 5	4	0 - 110	0 - 2			
bluejoint reedgrass	CACA4	4	0 - 310	0 - 5						
narrow reedgrass	CASTS5	4	0 - 310	0 - 5	4	0 - 110	0 - 2			
<b>OTHER NATIVE GRASSES</b>		5	310 - 620	5 - 10	5	0 - 275	0 - 5	5	0 - 320	0 - 10
American sloughgrass	BESY	5	124 - 496	2 - 8	5	0 - 275	0 - 5	5	0 - 320	0 - 10
other grasses	2GRAM	5	124 - 496	2 - 8	5	0 - 275	0 - 5	5	0 - 320	0 - 10
<b>NON-NATIVE GRASSES</b>		6			6	55 - 275	1 - 5	6	64 - 480	2 - 15
barnyardgrass	ECCR				6	55 - 275	1 - 5	6	32 - 256	1 - 8
creeping meadow foxtail	ALAR							6	0 - 320	0 - 10
quackgrass	ELRE4							6	0 - 192	0 - 6
other grasses	2GRAM				6	0 - 165	0 - 3	6	0 - 256	0 - 8
<b>FORBS</b>		7	310 - 930	5 - 15	7	275 - 1100	5 - 20	7	320 - 960	10 - 30
arrowgrass	TRPA6	7	0 - 62	0 - 1	7	0 - 55	0 - 1	7	0 - 32	0 - 1
blue-eyed grass	SISYR	7	0 - 62	0 - 1						
burreed	SPARG	7	62 - 248	1 - 4	7	0 - 165	0 - 3	7	0 - 64	0 - 2
cattail	TYLA	7	0 - 124	0 - 2	7	55 - 220	1 - 4	7	32 - 256	1 - 8
cinquefoil	POTEN	7	0 - 62	0 - 1	7	0 - 55	0 - 1	7	0 - 64	0 - 2
common waterparsnip	SISU2	7	0 - 62	0 - 1	7	0 - 110	0 - 2	7	0 - 96	0 - 3
curly dock	RUCR				7	55 - 165	1 - 3	7	64 - 320	2 - 10
Flodman's thistle	CIFL	7	62 - 124	1 - 2	7	0 - 110	0 - 2	7	0 - 32	0 - 1
giant goldenrod	SOGI	7	0 - 62	0 - 1	7	55 - 165	1 - 3	7	32 - 224	1 - 7
horsetail	EQLA	7	0 - 62	0 - 1	7	0 - 55	0 - 1	7	0 - 64	0 - 2
Indianhemp	APCA	7	0 - 124	0 - 2	7	0 - 110	0 - 2	7	0 - 96	0 - 3
Macoun's buttercup	RAMA2	7	0 - 62	0 - 1						
meadow anemone	ANCA8	7	62 - 124	1 - 2	7	0 - 55	0 - 1			
narrowleaf cattail	TYAN				7	55 - 165	1 - 3	7	32 - 256	1 - 8
New England aster	SYNO2	7	0 - 62	0 - 1	7	0 - 110	0 - 2	7	0 - 128	0 - 4
northern water plantain	ALTR7	7	62 - 124	1 - 2	7	0 - 55	0 - 1			
pale dock	RUAL4	7	0 - 124	0 - 2	7	0 - 110	0 - 2	7	0 - 32	0 - 1
Pennsylvania smartweed	POPE2	7	62 - 124	1 - 2	7	55 - 220	1 - 4	7	32 - 256	1 - 8
Rydberg's sunflower	HENUR	7	0 - 124	0 - 2	7	0 - 55	0 - 1			
smartweed	POLYG4	7	62 - 124	1 - 2	7	55 - 165	1 - 3	7	32 - 192	1 - 6
splitlip hempnettle	GABI3				7	0 - 110	0 - 2	7	0 - 128	0 - 4
western dock	RUAQ	7	62 - 124	1 - 2	7	0 - 55	0 - 1			
white panicle aster	SYLA6	7	0 - 62	0 - 1	7	0 - 110	0 - 2	7	0 - 128	0 - 4
native forbs	2FN	7	62 - 248	1 - 4	7	55 - 220	1 - 4	7	32 - 192	1 - 6
introduced forbs	2FI				7	0 - 220	0 - 4	7	32 - 320	1 - 10
<b>Annual Production lbs./acre</b>			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH	
<b>GRASSES &amp; GRASS-LIKES</b>			4740 - 5580 - 6090		4265 - 4813 - 5540		1930 - 2560 - 3190			
<b>FORBS</b>			260 - 620 - 1010		235 - 688 - 960		270 - 640 - 1010			
<b>TOTAL</b>			5000 - 6200 - 7100		4500 - 5500 - 6500		2200 - 3200 - 4200			

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 dominates the dynamics of this ES. This state is typically dominated by cool-season grass and grass-like species. Before European settlement, the primary disturbance mechanisms for this site in the reference condition included periodic fire, grazing by large herding ungulates, and fluctuations in the water table and ponding frequency and duration. 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, concentrated livestock grazing, and climatic fluctuations. Species that are desirable for livestock and wildlife can decline and a corresponding increase in less desirable species will occur.

### 1.1 Whitetop/Slough Sedge Plant Community Phase

Interpretations are based primarily on the 1.1 Whitetop/Slough Sedge Plant Community Phase (this is also considered to be climax). This plant community evolved with grazing by large herbivores, infrequent wild fires, and periodic flooding events and is suited for grazing by domestic livestock. This plant community can be found on areas that are grazed and where the grazed plants receive adequate periods of rest during the growing season in order to recover. Historically, fires occurred infrequently. The potential vegetation is about 50 percent grasses, 40 percent grass-likes, and 10 percent forbs. The major grasses and grass-likes include whitetop, slough sedge, woolly sedge, American mannagrass, prairie cordgrass, Sartwell's sedge, Nebraska sedge, and spikerush. Key forbs include smartweeds, western dock, and white panicle aster.

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 both the fluctuations of water table and reoccurring ponding. 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 an average year:

Growth curve number: SD5306

Growth curve name: Southern Dark Brown 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 were as follows:

- 1.1a – Heavy continuous grazing at the same time of year each year without adequate recovery periods or chronic heavy grazing will shift this community to the 1.2 Slough Sedge/Spikerush Plant Community Phase.

### 1.2 Slough Sedge/Spike Rush Plant Community Phase

This plant community will slowly develop from the adverse effects of continuous grazing without adequate recovery periods between each grazing event during the growing season. When compared to the 1.1 Whitetop/Slough Sedge Plant Community Phase, whitetop, prairie cordgrass, American mannagrass, and reedgrasses have decreased. The grass-like species, such as slough sedge, spikerush, woolly sedge, Sartwell's sedge, Nebraska sedge, and rushes have increased and tend to dominate this plant community.

The abundant production and proximity to water make this plant community important for livestock and wildlife such as birds, mule deer, and antelope. The plant community is stable and protected from excessive erosion. The biotic integrity of this plant community is usually intact. The watershed is usually functioning.

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: SD5306

Growth curve name: Southern Dark Brown 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:

- 1.2a – Prescribed grazing that includes alternating season of utilization while providing adequate rest recovery periods of periodic light to moderate grazing will shift this plant community to the 1.1 Whitetop/Slough Sedge Plant Community Phase.

### Transitional Pathways from Reference State (State 1) to Invaded State (State 2)

- T1 – Inundation of water for extended periods beyond normal ponding and drying patterns and/or Heavy Continuous Grazing at the same time of year, each year, without adequate recovery periods or chronic heavy grazing will shift this community to the 2.1 Spikerush/Baltic Rush/Fowl Bluegrass/Forbs Plant Community Phase within the 2.0 Invaded State. In addition, repeated early season grazing can expedite this shift with mechanical disturbance due to trampling.

### Invaded State (State 2)

This state is characterized by the increase in bare ground due to trampling caused by excessive use or by inundation for extended periods which causes a temporary shift in the plant composition and cover. This allows for the invasion of nonnative species which with continued heavy grazing can increase to eventual dominance. Loss or reduction of native cool- and warm-season species can negatively impacted energy flow and nutrient cycling. Infiltration will be reduced and native plant mortality will increase. As the disturbance level increases, native plant density decreases even more, giving way to annual species and invasive perennial species, as well as, a further increase in bare ground.

### 2.1 Spike Rush/Baltic Rush/Fowl Bluegrass/Forbs Plant Community Phase

This plant community developed with heavy continuous grazing without adequate recovery periods between grazing events and/or inundation during periods of extended above-average precipitation. Spikerush, Baltic rush, bulrush, and other less desirable grass-likes, along with grasses such as fowl bluegrass and American sloughgrass, dominate the community. Quackgrass, creeping meadow foxtail, Kentucky bluegrass, and other nonnative species can invade on drier portions of the community. Whitetop, slough sedge, other sedges, prairie cordgrass, and reedgrasses will be virtually eliminated from the plant community. Smartweeds, dock, and cinquefoil have increased. Areas of bare ground can be present throughout the site.

A significant amount of production and diversity has been lost when compared to the 1.1 Whitetop/Slough Sedge Plant Community Phase. Loss or reduction of native grasses, grass-likes, and forbs has negatively impacted energy flow and nutrient cycling. It will take a long time to restore this plant community with improved management or return of more normal precipitation patterns.

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: SD5306

Growth curve name: Southern Dark Brown 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:

- 2.1a – Heavy continuous grazing at the same time of year, each year, without adequate recovery periods or chronic heavy grazing will shift this community to the 2.2 Annual/Pioneer, Non-Native Perennial Plant Community Phase.

## 2.2 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 burweed, knotweed, 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 1,000 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.

No growth curve has been assigned to this plant community phase.

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

- 2.2a – Inundation of water for extended periods beyond normal ponding and drying patterns will cause a plant community shift to the 2.1 Spikerush/Balticrush/Fowl Bluegrass/Forbs Plant Community Phase. In addition, repeated early season grazing can expedite this shift with mechanical disturbance due to trampling.

## Restoration Pathways from Invaded State (State 2) to Reference State (State 1)

- R2 – Long-term prescribed grazing with moderate stocking levels coupled with adequate recovery periods, or grazing systems such as high-density, low-frequency, etc., intended to treat specific species or periodic light to moderate stocking levels including possible rest periods and/or wetland restoration, will shift this community to the 1.0 Reference State. Pest management may also be needed to suppress invasive grasses. Success depends on whether native reproductive propagates remain intact onsite and may take a long period of time (10 years or more). Recovery may not be attainable. Note that wetland restoration techniques can be costly and results may not be satisfactory.

## **Ecological Site Interpretations**

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

-- Under Development --

**Whitetop/Slough Sedge Plant Community Phase (1.1):**

**Slough Sedge/Spike Rush Plant Community Phase (1.2):**

**Spikerush/Baltic Rush/Fowl Bluegrass/Forbs Plant Community Phase (2.1):**

**Annual/Pioneer, Non-Native Perennial Plant Community Phase (2.2):**

### Animal Preferences (Quarterly – 1,2,3,4<sup>†</sup>)

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
<b>Grasses and Grasslikes</b>							
American mannagrass	N U U N	N D D U	N U U N	N D D U	N U U N	N U U N	N U U N
Baltic 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
bluejoint reedgrass	U P D U	N D U N	U P D U	N D U N	N D U N	U P D U	U P D U
flatsedge	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
green bulrush	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	U U U U
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
narrow reedgrass	U P U D	N D U N	U P U D	N D U N	N D U N	U P U D	U P U D
Nebraska sedge	U P U D	U P N D	U P U D	U D U D	U D U D	U P U D	U P U D
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
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
river bulrush	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	U U U U
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
slough 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
spikerush	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
whiteweed	U P U D	N P N U	U P U D	N P N U	N P N U	U P U D	U P U D
woolly 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
<b>Forbs</b>							
American sloughgrass	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
arrowgrass	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
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
burreed	N U U N	N D D U	N U U N	N D D U	N D D U	N U U N	N U U N
cattail	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
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
common waterparsnip	N U U N	N U U N	N U U N	N U U N	N U U N	N U U N	N U U N
Flodman's thistle	N U U N	N U U N	N U U N	N U U N	N U U N	N U U N	N U U N
giant goldenrod	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
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
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
Macoun's buttercup	N U U N	N U U N	N U U N	N U U N	N U U N	N U U N	N U U N
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
New England 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
northern water plantain	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
pale 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
Pennsylvania smartweed	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
Rydberg's 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
smartweed	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 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
white panicle 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

**N** = not used; **U** = undesirable; **D** = desirable; **P** = preferred; **T** = toxic

<sup>†</sup> 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)
Whitetop/Slough Sedge (1.1):	6,200	1.70
Slough Sedge/Spike rush (1.2):	5,500	1.51
Spikerush/Balticrush/Fowl Bluegrass/Forbs (2.1):	3,200	0.88
Annual/Pioneer, Non-Native Perennial (2.2):	1,800	0.50

\*Based on 912 lbs./acre (air-dry weight) per Animal Unit Month (AUM), and on 25 percent harvest efficiency (refer to the 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 is very 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 higher infiltration. Areas where ground cover is less than 50 percent have the greatest potential to have reduced infiltration. Runoff is negligible on this site (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

Subirrigated (R053CY003SD), Wet Meadow (R053CY004SD), Loamy Overflow (R053CY020SD)

## Similar Sites

(R053CY004SD) – Wet Meadow [more 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 (RMS), NRCS; Shane Deranleau, RMS, NRCS; and Mitch Faulkner, RMS, NRCS.

## State Correlation

This site has been correlated in SD in MLRA 53C.

## Field Offices/Counties

Chamberlain	Brule/Bufalo	Huron	Beadle	Plankinton	Aurora
Faulkton	Faulk	Miller	Hand	Selby	Walworth
Gettysburg	Potter	Onida	Sully	Wessington Springs	Jerauld
Highmore	Hyde	Pierre	Hughes		

## Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 42a – Missouri Coteau, 42e – Southern Missouri Coteau, 42f – Southern Missouri Coteau Slope.

## Other References

High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-0728. (<http://hpccsun.unl.edu>).

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

USDA, NRCS. National Range and Pasture Handbook, September 1997.

USDA, NRCS. National Soil Information System, Information Technology Center, 2150 Centre Avenue, Building A, Fort Collins, CO 80526. (<http://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.

USDA, NRCS, Various Published Soil Surveys.

## Site Description Approval

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SD, State Range Management Specialist

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Date