

## United States Department of Agriculture Natural Resources Conservation Service

### Ecological Site Description

**Site Type:** Rangeland

**Site Name:** Shallow Marsh

**Site ID:** R102BY001SD

**Major Land Resource Area (MLRA):** 102B – Till Plains

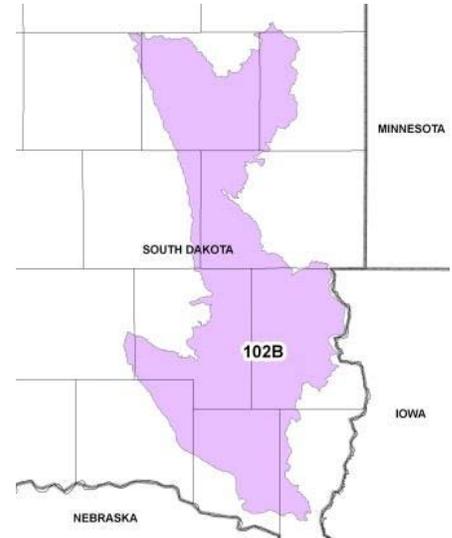
### Physiographic Features

This site occurs on nearly level to concave depressions on uplands.

**Landform:** pothole

**Aspect:** N/A

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	1,100	1,900
<b>Slope (percent):</b>	0	1
<b>Water Table Depth (inches):</b>	0	24
<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 102B is considered to have a continental climate – cold winters and relatively hot summers, low to moderate 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 24 to 26 inches per year. The average annual temperature is about 46°F. January is the coldest month with average temperatures ranging from about 14°F (Wentworth 2 WNW, South Dakota (SD)), to about 18°F (Canton 4 WNW, SD). July is the warmest month with temperatures averaging from about 72°F (Wentworth 2 WNW, SD), to about 73°F (Canton 4 WNW, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 57°F. This large annual range attests to the continental nature of this area's climate. Hourly winds are estimated to average about 11 miles per hour (mph) annually, ranging from about 13 mph during the spring to about 10 mph during the summer. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 mph.

Growth of cool-season plants begins in early to mid-March, slowing or ceasing in late June. Warm-season plants begin growth about mid-May and 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):	145	147
Freeze-free period (days):	162	165
Mean Annual Precipitation (inches):	24	26

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

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.51	0.52	4.0	28.3
February	0.58	0.69	7.0	31.6
March	1.13	1.71	20.1	45.0
April	2.36	3.05	33.2	60.3
May	3.25	3.85	44.4	72.2
June	3.86	4.28	54.5	81.1
July	2.97	3.16	59.2	85.8
August	3.02	3.03	57.2	84.4
September	2.55	2.77	48.4	76.2
October	1.63	2.19	36.0	63.8
November	0.96	1.33	21.6	44.9
December	0.48	0.54	9.7	31.3

Climate Stations		Period	
Station ID	Location or Name	From	To
SD1392	Canton 4 WNW	1896	2009
SD1579	Centerville 6 SE	1897	2009
SD7667	Sioux Falls WSFO	1948	2009
SD9042	Wentworth 2 WNW	1893	2006

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>Subclass</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 silty clay loam to clay-textured subsoil and slopes of zero to one percent. The soils in this site are very poorly drained and formed in alluvium. The silty clay loam to silty clay surface layer is 10 to 19 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. Pondered water conditions and very slow permeability strongly influences the soil-water-plant relationship.

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

Parent Material Kind: alluvium  
Parent Material Origin:  
Surface Texture: silty clay loam, silty clay  
Surface Texture Modifier: none  
Subsurface Texture Group: clayey  
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	4
Sodium Absorption Ratio*:	0	2
Soil Reaction (1:1 Water)*:	5.6	8.4
Soil Reaction (0.1M CaCl2)*:	NA	NA
Available Water Capacity (inches)*:	6	7
Calcium Carbonate Equivalent (percent)*:	0	25

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

## Plant Communities

### Ecological Dynamics of the Site

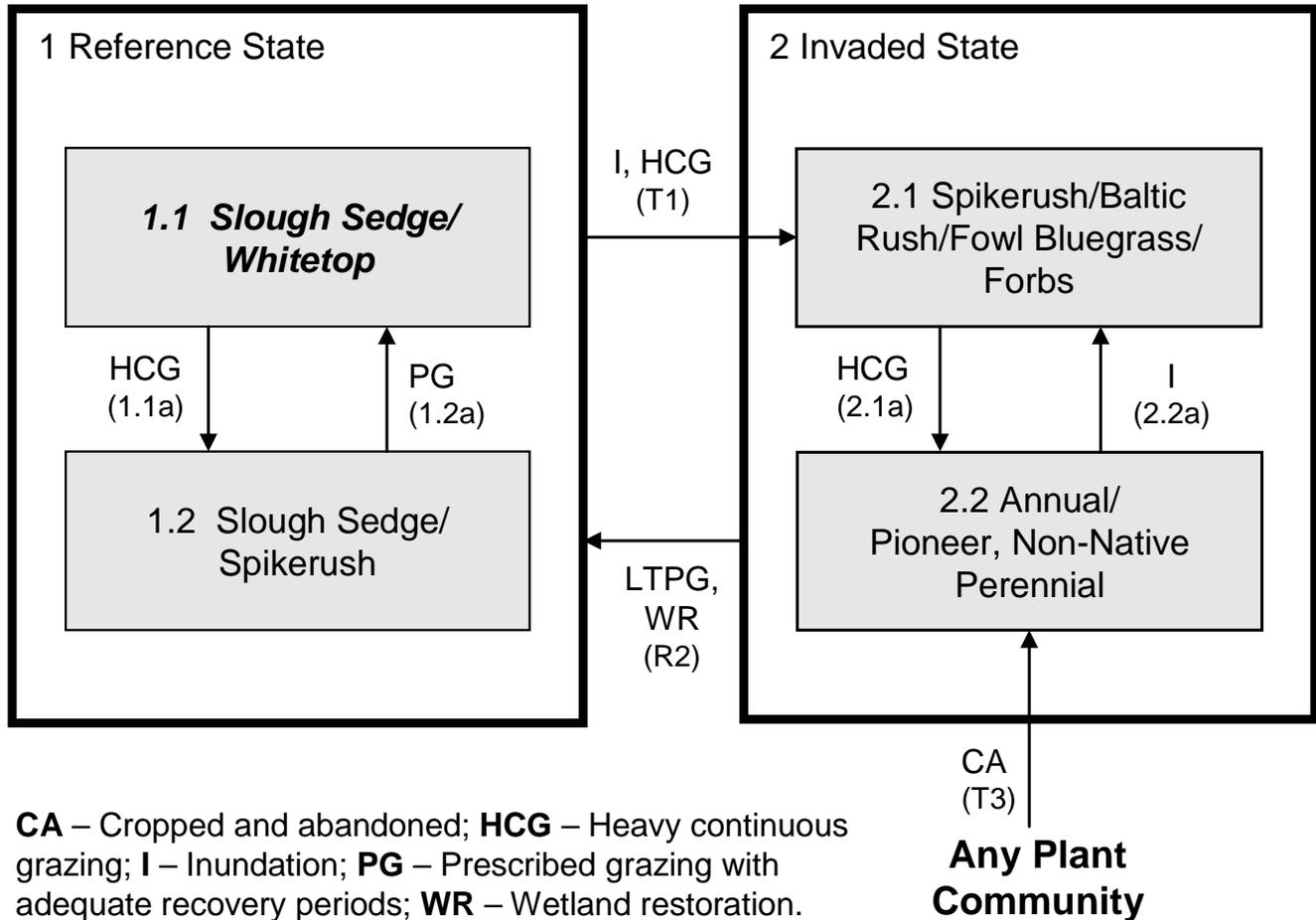
The site developed under Northern Great Plains climatic conditions and included natural influence of large herding herbivores and occasional fire. Changes will occur in the plant communities due to weather fluctuations and/or management actions. Under adverse impacts, a relatively rapid decline in vegetative 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 Slough Sedge/Whitetop Plant Community Phase (1.1). 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 domestic 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 a 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



Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	1.1 Slough Sedge/Whitetop			
			Group	lbs./acre	% Comp	
<b>GRASSES &amp; GRASS-LIKES</b>				5600 - 6650	80 - 95	
<b>GRASS-LIKES</b>			<b>1</b>	<b>1750 - 3850</b>	<b>25 - 55</b>	
slough sedge	Carex atherodes	CAAT2	1	700 - 2100	10 - 30	
woolly sedge	Carex pellita	CAPE42	1	140 - 700	2 - 10	
bottlebrush sedge	Carex hystericina	CAHY4	1	140 - 700	2 - 10	
smoothcone sedge	Carex laeviconica	CALA12	1	70 - 700	1 - 10	
spikerush	Eleocharis spp.	ELEOC	1	140 - 700	2 - 10	
flatsedge	Cyperus spp.	CYPER	1	0 - 350	0 - 5	
Baltic rush	Juncus balticus	JUBA	1	70 - 560	1 - 8	
rush	Juncus spp.	JUNCU	1	0 - 350	0 - 5	
green bulrush	Scirpus atrovirens	SCAT2	1	70 - 560	1 - 8	
river bulrush	Schoenoplectus fluviatilis	SCFL11	1	70 - 560	1 - 8	
other grass-likes		2GL	1	0 - 700	0 - 10	
<b>TALL COOL-SEASON GRASSES</b>			<b>2</b>	<b>350 - 1400</b>	<b>5 - 20</b>	
whitetop	Scolochloa festucacea	SCFE	2	140 - 1050	2 - 15	
American mannagrass	Glyceria grandis	GLGR	2	140 - 1050	2 - 15	
<b>TALL WARM-SEASON GRASSES</b>			<b>3</b>	<b>140 - 700</b>	<b>2 - 10</b>	
prairie cordgrass	Spartina pectinata	SPPE	3	140 - 700	2 - 10	
green muhly	Muhlenbergia glomerata	MUGL3	3	0 - 350	0 - 5	
<b>REEDGRASSES</b>			<b>4</b>	<b>0 - 350</b>	<b>0 - 5</b>	
northern reedgrass	Calamagrostis stricta ssp. inexpansa	CASTI3	4	0 - 350	0 - 5	
bluejoint reedgrass	Calamagrostis canadensis	CACA4	4	0 - 350	0 - 5	
narrow reedgrass	Calamagrostis stricta ssp. stricta	CASTS5	4	0 - 350	0 - 5	
<b>OTHER NATIVE GRASSES</b>			<b>5</b>	<b>350 - 700</b>	<b>5 - 10</b>	
American sloughgrass	Beckmannia syzigachne	BESY	5	140 - 560	2 - 8	
other grasses		2GRAM	5	140 - 560	2 - 8	
<b>FORBS</b>			<b>7</b>	<b>350 - 1400</b>	<b>5 - 20</b>	
arrowgrass	Triglochin palustre	TRPA6	7	0 - 70	0 - 1	
blue-eyed grass	Sisyrinchium spp.	SISYR	7	0 - 70	0 - 1	
broadleaf cattail	Typha latifolia	TYLA	7	0 - 140	0 - 2	
burreed	Sparganium spp.	SPARG	7	70 - 700	1 - 10	
cinquefoil	Potentilla spp.	POTEN	7	0 - 70	0 - 1	
common waterparsnip	Sium suave	SISU2	7	0 - 70	0 - 1	
Flodman's thistle	Cirsium flodmanii	CIFL	7	70 - 140	1 - 2	
giant goldenrod	Solidago gigantea	SOGI	7	70 - 140	1 - 2	
horsetail	Equisetum laevigatum	EQLA	7	0 - 70	0 - 1	
Indianhemp	Apocynum cannabinum	APCA	7	0 - 140	0 - 2	
Macoun's buttercup	Ranunculus macounii	RAMA2	7	0 - 70	0 - 1	
meadow anemone	Anemone canadensis	ANCA8	7	70 - 140	1 - 2	
New England aster	Symphotrichum novae-angliae	SYNO2	7	70 - 140	1 - 2	
northern water plantain	Alisma triviale	ALTR7	7	70 - 140	1 - 2	
pale dock	Rumex altissimus	RUAL4	7	0 - 140	0 - 2	
Pennsylvania smartweed	Polygonum pennsylvanicum	POPE2	7	70 - 140	1 - 2	
Rydberg's sunflower	Helianthus nuttallii ssp. rydbergii	HENUR	7	0 - 140	0 - 2	
smartweed	Polygonum spp.	POLYG4	7	70 - 140	1 - 2	
western dock	Rumex aquaticus	RUAQ	7	70 - 140	1 - 2	
white panic aster	Symphotrichum lanceolatum	SYLA6	7	0 - 70	0 - 1	
native forbs		2FN	7	70 - 280	1 - 4	
<b>Annual Production lbs./acre</b>				LOW	RV	HIGH
<b>GRASSES &amp; GRASS-LIKES</b>				5710 -	6125 -	6550
<b>FORBS</b>				290 -	875 -	1450
<b>TOTAL</b>				6000 -	7000 -	8000

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 Slough Sedge/Whitetop			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>			5600 - 6650	80 - 95		5015 - 5605	85 - 95		2380 - 2720	70 - 80
<b>GRASS-LIKES</b>		1	1750 - 3850	25 - 55	1	2360 - 4425	40 - 75	1	850 - 1870	25 - 55
slough sedge	CAAT2	1	700 - 2100	10 - 30	1	885 - 2360	15 - 40	1	170 - 510	5 - 15
woolly sedge	CAPE42	1	140 - 700	2 - 10	1	295 - 885	5 - 15	1	0 - 272	0 - 8
bottlebrush sedge	CAHY4	1	140 - 700	2 - 10	1	0 - 590	0 - 10	1	0 - 170	0 - 5
smoothcone sedge	CALA12	1	70 - 700	1 - 10	1	0 - 590	0 - 10	1	0 - 170	0 - 5
spikerush	ELOC	1	140 - 700	2 - 10	1	590 - 1770	10 - 30	1	340 - 1020	10 - 30
flatsedge	CYPER	1	0 - 350	0 - 5	1	0 - 590	0 - 10	1	0 - 272	0 - 8
Baltic rush	JUBA	1	70 - 560	1 - 8	1	295 - 885	5 - 15	1	170 - 680	5 - 20
rush	JUNCU	1	0 - 350	0 - 5	1	0 - 590	0 - 10	1	0 - 340	0 - 10
green bulrush	SCAT2	1	70 - 560	1 - 8	1	0 - 590	0 - 10	1	0 - 102	0 - 3
river bulrush	SCFL11	1	70 - 560	1 - 8	1	0 - 590	0 - 10	1	0 - 102	0 - 3
other grass-likes	ZGL	1	0 - 700	0 - 10	1	0 - 472	0 - 8	1	0 - 170	0 - 5
<b>TALL COOL-SEASON GRASSES</b>		2	350 - 1400	5 - 20	2	0 - 472	0 - 8	2		
whitetop	SCFE	2	140 - 1050	2 - 15	2	0 - 295	0 - 5			
American mannagrass	GLGR	2	140 - 1050	2 - 15	2	0 - 177	0 - 3			
<b>TALL WARM-SEASON GRASSES</b>		3	140 - 700	2 - 10	3	0 - 295	0 - 5	3		
prairie cordgrass	SPPE	3	140 - 700	2 - 10	3	0 - 295	0 - 5			
green muhly	MUGL3	3	0 - 350	0 - 5						
<b>REEDGRASSES</b>		4	0 - 350	0 - 5	4	0 - 118	0 - 2	4		
northern reedgrass	CASTI3	4	0 - 350	0 - 5	4	0 - 118	0 - 2			
bluejoint reedgrass	CACA4	4	0 - 350	0 - 5						
narrow reedgrass	CASTS5	4	0 - 350	0 - 5	4	0 - 118	0 - 2			
<b>OTHER NATIVE GRASSES</b>		5	350 - 700	5 - 10	5	0 - 295	0 - 5	5	0 - 340	0 - 10
American sloughgrass	BESY	5	140 - 560	2 - 8	5	0 - 295	0 - 5	5	0 - 340	0 - 10
other grasses	ZGRAM	5	140 - 560	2 - 8	5	0 - 295	0 - 5	5	0 - 340	0 - 10
<b>NON-NATIVE GRASSES</b>		6			6	59 - 295	1 - 5	6	68 - 510	2 - 15
barnyardgrass	ECCR				6	59 - 295	1 - 5	6	34 - 272	1 - 8
creeping meadow foxtail	ALAR							6	0 - 340	0 - 10
quackgrass	ELRE4							6	0 - 204	0 - 6
other grasses	ZGRAM				6	0 - 177	0 - 3	6	0 - 272	0 - 8
<b>FORBS</b>		7	350 - 1400	5 - 20	7	295 - 1180	5 - 20	7	340 - 1020	10 - 30
arrowgrass	TRPA6	7	0 - 70	0 - 1	7	0 - 59	0 - 1	7	0 - 34	0 - 1
blue-eyed grass	SISYR	7	0 - 70	0 - 1						
broadleaf cattail	TYLA	7	0 - 140	0 - 2	7	59 - 236	1 - 4	7	34 - 272	1 - 8
burreed	SPARG	7	70 - 280	1 - 4	7	0 - 177	0 - 3	7	0 - 68	0 - 2
cinquefoil	POTEN	7	0 - 70	0 - 1	7	0 - 59	0 - 1	7	0 - 68	0 - 2
common waterparsnip	SISU2	7	0 - 70	0 - 1	7	0 - 118	0 - 2	7	0 - 102	0 - 3
curly dock	RUCR				7	59 - 177	1 - 3	7	68 - 340	2 - 10
Flodman's thistle	CIFL	7	70 - 140	1 - 2	7	0 - 118	0 - 2	7	0 - 34	0 - 1
giant goldenrod	SOGI	7	70 - 140	1 - 2	7	59 - 177	1 - 3	7	34 - 238	1 - 7
horsetail	EQLA	7	0 - 70	0 - 1	7	0 - 59	0 - 1	7	0 - 68	0 - 2
Indianhemp	APCA	7	0 - 140	0 - 2	7	0 - 118	0 - 2	7	0 - 102	0 - 3
Macoun's buttercup	RAMA2	7	0 - 70	0 - 1						
meadow anemone	ANCA8	7	70 - 140	1 - 2	7	0 - 59	0 - 1			
narrowleaf cattail	TYAN				7	59 - 177	1 - 3	7	34 - 272	1 - 8
New England aster	SYNO2	7	70 - 140	1 - 2	7	0 - 118	0 - 2	7	0 - 136	0 - 4
northern water plantain	ALTR7	7	70 - 140	1 - 2	7	0 - 59	0 - 1			
pale dock	RUAL4	7	0 - 140	0 - 2	7	0 - 118	0 - 2	7	0 - 34	0 - 1
Pennsylvania smartweed	POPE2	7	70 - 140	1 - 2	7	59 - 236	1 - 4	7	34 - 272	1 - 8
Rydberg's sunflower	HENUR	7	0 - 140	0 - 2	7	0 - 59	0 - 1			
smartweed	POLYG4	7	70 - 140	1 - 2	7	59 - 177	1 - 3	7	34 - 204	1 - 6
splitlip hempnettle	GABI3				7	0 - 118	0 - 2	7	0 - 136	0 - 4
western dock	RUAQ	7	70 - 140	1 - 2	7	0 - 59	0 - 1			
white panicle aster	SYLA6	7	0 - 70	0 - 1	7	0 - 118	0 - 2	7	0 - 136	0 - 4
native forbs	ZFN	7	70 - 280	1 - 4	7	59 - 236	1 - 4	7	34 - 204	1 - 6
introduced forbs	ZFI				7	0 - 236	0 - 4	7	34 - 340	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>			5710 - 6125 - 6550		4550 - 5163 - 5770		2115 - 2720 - 3450			
<b>FORBS</b>			290 - 875 - 1450		250 - 738 - 1230		285 - 680 - 1050			
<b>TOTAL</b>			6000 - 7000 - 8000		4800 - 5900 - 7000		2400 - 3400 - 4500			

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 weather fluctuations. Species that are desirable for livestock and wildlife can decline and a corresponding increase in less desirable species will occur.

### 1.1 Slough Sedge/Whitetop Plant Community Phase

Interpretations are based primarily on the 1.1 Slough Sedge/Whitetop 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 45 percent grasses, 40 percent grass-likes, and 15 percent forbs. The major grasses and grass-likes include slough sedge, whitetop, 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 off-site 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 a normal year:

Growth curve number: SD0216

Growth curve name: Till 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:

- 1.1a – 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 *1.2 Slough Sedge/Spikerush Plant Community Phase*.

### 1.2 Slough Sedge/Spikerush 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 Slough Sedge/Whiteop 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 a normal year:

Growth curve number: SD0216

Growth curve name: Till 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 (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 *1.1 Slough Sedge/Whitetop Plant Community Phase*. This pathway could also occur with a return to more normal precipitation levels and frequencies.

### Transition from Reference State (State 1) to the Invaded State (State 2)

- T1 – 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), and/or inundation for extended periods beyond normal ponding and drying patterns will eventually cause a shift over a threshold leading to the *2.1 Spikerush/Baltic Rush/Fowl Bluegrass/Forbs Plant Community Phase* within the *Invaded State (State 2)*. Grazing repeatedly in the early growing season can expedite this shift by causing mechanical disturbance due to trampling.

### Invaded State (State2)

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 Spikerush/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 Slough Sedge/Whitetop 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 a normal year:

Growth curve number: SD0216

Growth curve name: Till 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 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 *Annual/Pioneer, Non-native Perennial Plant Community Phase*.

### Transition from Any Plant Community to the Invaded State (State 2)

- T4 – Cropping followed by abandonment may lead this plant community phase over a threshold to the *Invaded State (State 2)* and more specifically 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 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.

### Restoration Pathway from Invaded State (State 2) to the Reference State (State 1)

- R2 – 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 *Reference State (State 1)*.

Wetland restoration techniques may be necessary to restore biotic integrity and plant diversity and productivity.

## **Ecological Site Interpretations**

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

-- Under Development --

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

**Slough Sedge/Spikerush 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 Grass-likes</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
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
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
bottlebrush 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
flatsedge	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 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
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
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
smoothcone 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
whitetop	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>							
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
broadleaf 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
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
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	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
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	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
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 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
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)
Slough Sedge/Whitetop (1.1)	7,000	1.92
Slough Sedge/Spikerush (1.2)	5,900	1.62
Spikerush/Baltic Rush/Fowl Bluegrass/Forbs (2.1)	3,400	0.93
Annual/Pioneer, Non-Native Perennial (2.2)	1,600	0.44

\*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 is dominated by soils in hydrologic group D. Infiltration and runoff potential for this site varies from moderate to high depending on soil hydrologic group, slope and ground cover. In many cases, areas with greater than 75% 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 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

Subirrigated (R102BY003SD), Wet Meadow (R102BY004SD), Loamy Overflow (R102BY020SD)

## Similar Sites

(R102BY004SD) – 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, NRCS.

## State Correlation

This site occurs entirely within SD.

## Field Offices/Counties

Brookings, SD	Brookings	Howard, SD	Miner	Salem, SD	McCook
Canton, SD	Lincoln	Madison, SD	Lake	Sioux Falls, SD	Minnehaha
Elk Point, SD	Union	Parker, SD	Turner	Vermillion, SD	Clay
Flandreau, SD	Moody	Parkston, SD	Hutchinson	Yankton, SD	Yankton

## Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 46k – Prairie Coteau; 46n – James River Lowland.

## 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.

## Site Description Approval

\_\_\_\_\_  
SD, State Range Management Specialist

\_\_\_\_\_  
Date