

United States Department of Agriculture Natural Resources Conservation Service

Ecological Site Description

Site Type: Rangeland

Site Name: Wet Meadow

Site ID: R102BY004SD

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

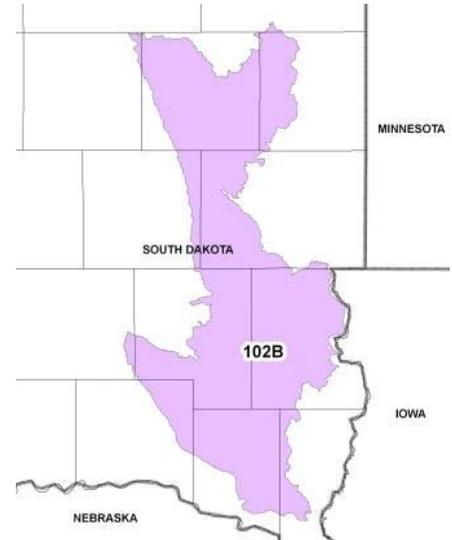
Physiographic Features

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

Landform: pothole, swale

Aspect: N/A

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	1,100	1,900
Slope (percent):	0	1
Water Table Depth (inches):	9	30
Flooding:		
Frequency:	None	None
Duration:	None	None
Ponding:		
Depth (inches):	0	12
Frequency:	Frequent	Frequent
Duration:	Long	Long
Runoff Class:	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>Sub-class</u>
Cowardin, et. al., 1979	Palustrine	N/A	Emergent	Persistent

Representative Soil Features

These are very deep, poorly drained, medium to fine textured soils. Permeability is slow and available water capacity is high. Salinity and sodicity are typically none to slight. Water tables on this site range from about 9 to 30 inches and ponding occurs frequently. The site normally receives additional water from surface runoff and/or underground seepage. This site occurs in potholes, swales, and closed depressions. Slope ranges from zero to one percent. 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. Ponded water conditions and 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: silt loam, silty clay loam
Surface Texture Modifier: none
Subsurface Texture Group: loamy
Surface Fragments ≤3” (% Cover): 0
Surface Fragments >3” (%Cover): 0
Subsurface Fragments ≤3” (% Volume): 1-4
Subsurface Fragments >3” (% Volume): 0

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	poorly	poorly
Permeability Class:	very slow	very slow
Depth (inches):	80	80
Electrical Conductivity (mmhos/cm)*:	0	4
Sodium Absorption Ratio*:	0	1
Soil Reaction (1:1 Water)*:	5.6	8.4
Soil Reaction (0.1M CaCl2)*:	NA	NA
Available Water Capacity (inches)*:	7	7
Calcium Carbonate Equivalent (percent)*:	0	10

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

Plant Communities

Ecological Dynamics of the Site

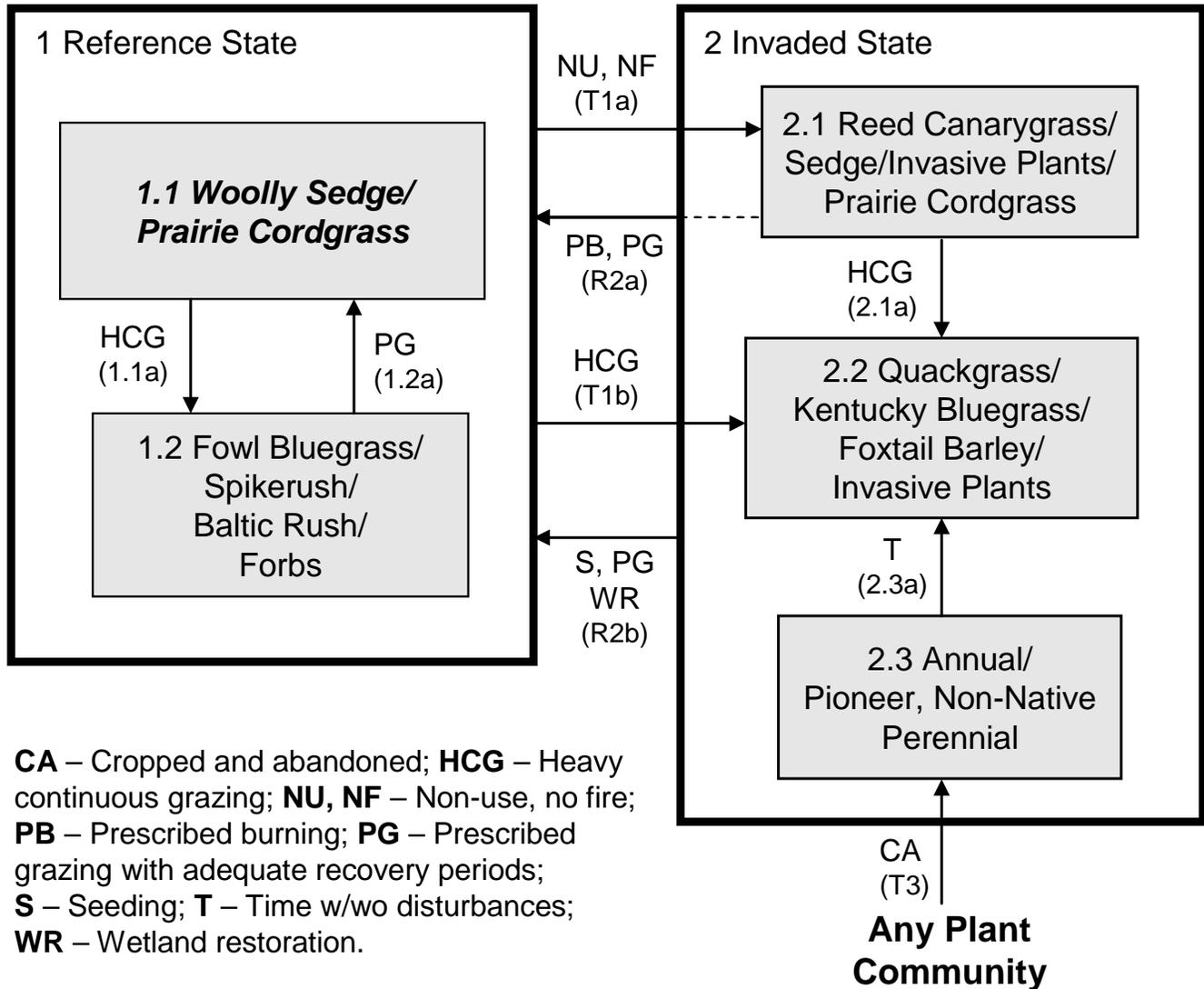
The site developed under Northern Great Plains climatic conditions and included natural influence of large herding herbivores and occasional fire. Under adverse impacts, a relatively rapid decline in vegetative vigor and composition can occur. Under favorable conditions, the site has the potential to resemble the Reference State. Interpretations for this site are based primarily on the Woolly Sedge/Prairie Cordgrass 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 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. Prairie cordgrass and northern reedgrass will decrease in frequency and production. Continued heavy grazing eventually causes quackgrass, foxtail barley, Kentucky bluegrass, Spikerush, and unpalatable forbs such as curly dock to increase and dominate.

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

			1.1 Woolly Sedge/Prairie Cordgrass		
COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Group	lbs./acre	% Comp
GRASSES & GRASS-LIKES				4590 - 5130	85 - 95
GRASS-LIKES			1	1080 - 2700	20 - 50
woolly sedge	Carex pellita	CAPE42	1	270 - 2160	5 - 40
slough sedge	Carex atherodes	CAAT2	1	108 - 810	2 - 15
Sartwell's sedge	Carex sartwellii	CASA8	1	108 - 810	2 - 15
Bicknell's sedge	Carex bicknellii	CAB13	1	54 - 270	1 - 5
fox sedge	Carex vulpinoidea	CAVU2	1	54 - 270	1 - 5
fescue sedge	Carex brevior	CABR10	1	0 - 270	0 - 5
water sedge	Carex aquatilis	CAAQ	1	0 - 270	0 - 5
rush	Juncus spp.	JUNCU	1	54 - 162	1 - 3
spikerush	Eleocharis spp.	ELEOC	1	54 - 162	1 - 3
green bulrush	Scirpus atrovirens	SCAT2	1	0 - 54	0 - 1
river bulrush	Schoenoplectus fluviatilis	SCFL11	1	0 - 54	0 - 1
bulrush	Schoenoplectus spp.	SCHOE6	1	0 - 54	0 - 1
other grass-likes		2GL	1	54 - 270	1 - 5
WARM-SEASON GRASSES			2	540 - 1620	10 - 30
prairie cordgrass	Spartina pectinata	SPPE	2	270 - 1350	5 - 25
green muhly	Muhlenbergia glomerata	MUGL3	2	54 - 162	1 - 3
switchgrass	Panicum virgatum	PAV12	2	0 - 162	0 - 3
Mexican muhly	Muhlenbergia mexicana	MUME2	2	0 - 108	0 - 2
mat muhly	Muhlenbergia richardsonis	MURI	2	0 - 54	0 - 1
COOL-SEASON GRASSES			3	540 - 1350	10 - 25
northern reedgrass	Calamagrostis stricta ssp. inexpansa	CAST13	3	270 - 1080	5 - 20
American sloughgrass	Beckmannia syzigachne	BESY	3	54 - 270	1 - 5
reed canarygrass	Phalaris arundinacea	PHAR3	3	54 - 270	1 - 5
fowl bluegrass	Poa palustris	POPA2	3	54 - 270	1 - 5
prairie wedgescale	Sphenopholis obtusata	SPOB	3	0 - 162	0 - 3
other grasses		2GRAM	3	54 - 270	1 - 5
FORBS			5	270 - 810	5 - 15
American germander	Teucrium canadense	TECA3	5	0 - 54	0 - 1
American licorice	Glycyrrhiza lepidota	GLLE3	5	54 - 108	1 - 2
American water horehound	Lycopus americanus	LYAM	5	0 - 54	0 - 1
black-eyed Susan	Rudbeckia hirta	RUHI2	5	54 - 108	1 - 2
blue-eyed grass	Sisyrinchium spp.	SISYR	5	0 - 54	0 - 1
bristle dock	Rumex maritimus	RUMA4	5	0 - 54	0 - 1
broadleaf cattail	Typha latifolia	TYLA	5	0 - 54	0 - 1
cinquefoil	Potentilla spp.	POTEN	5	54 - 108	1 - 2
Flodman's thistle	Cirsium flodmanii	CIFL	5	0 - 162	0 - 3
gayfeather	Liatis spp.	LIATR	5	0 - 108	0 - 2
giant goldenrod	Solidago gigantea	SOGI	5	54 - 108	1 - 2
goldenrod	Solidago spp.	SOLID	5	54 - 108	1 - 2
horsetail	Equisetum laevigatum	EQLA	5	0 - 54	0 - 1
Illinois bundleflower	Desmanthus illinoensis	DEIL	5	54 - 108	1 - 2
Indian hemp	Apocynum cannabinum	APCA	5	54 - 162	1 - 3
Macoun's buttercup	Ranunculus macounii	RAMA2	5	54 - 108	1 - 2
meadow anemone	Anemone canadensis	ANCA8	5	54 - 108	1 - 2
mint	Mentha spp.	MENTH	5	54 - 108	1 - 2
New England aster	Symphotrichum novae-angliae	SYNO2	5	54 - 108	1 - 2
northern bog violet	Viola nephrophylla	VINE	5	0 - 54	0 - 1
Pennsylvania smartweed	Polygonum pennsylvanicum	POPE2	5	54 - 108	1 - 2
Rydberg's sunflower	Helianthus nuttallii ssp. rydbergii	HENUR	5	54 - 108	1 - 2
swamp milkweed	Asclepias incarnata	ASIN	5	54 - 108	1 - 2
swamp smartweed	Polygonum hydropiperoides	POHY2	5	54 - 108	1 - 2
western dock	Rumex aquaticus	RUAQ	5	0 - 108	0 - 2
white doll's daisy	Boltonia asteroides	BOAS	5	0 - 54	0 - 1
white panicle aster	Symphotrichum lanceolatum	SYLA6	5	54 - 108	1 - 2
wild strawberry	Fragaria virginiana	FRVI	5	0 - 54	0 - 1
wood lily	Lilium philadelphicum	LIPH	5	0 - 54	0 - 1
other forbs		2FORB	5	54 - 216	1 - 4
SHRUBS			6	0 - 162	0 - 3
willow	Salix spp.	SALIX	6	0 - 162	0 - 3
other shrubs		2SHRUB	6	0 - 108	0 - 2

Annual Production lbs./acre		LOW	RV	HIGH
GRASSES & GRASS-LIKES		4170 -	4779	-5260
FORBS		230 -	540	-960
SHRUBS		0 -	81	-180
TOTAL		4400 -	5400	-6400

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 Woolly Sedge/ Prairie Cordgrass			1.2 Fowl Bluegrass/Spikerush/ Baltic Rush/Forbs			2.1 Reed Canarygrass/Sedge/ Invasive Plants/Prairie Cordgrass			2.2 Quackgrass/Kentucky Blue- grass/Foxtail Barley/Invasive Plants		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
GRASSES & GRASS-LIKES			4590 - 5130	85 - 95		3870 - 4085	90 - 95		3515 - 3626	95 - 98		2295 - 2565	85 - 95
GRASS-LIKES		1	1080 - 2700	20 - 50	1	1505 - 1935	35 - 45	1	740 - 1480	20 - 40	1	675 - 945	25 - 35
woolly sedge	CAPE42	1	270 - 2160	5 - 40	1	86 - 215	2 - 5	1	74 - 370	2 - 10	1	0 - 54	0 - 2
slough sedge	CAAT2	1	108 - 810	2 - 15	1	86 - 430	2 - 10	1	74 - 370	2 - 10			
Sartwell's sedge	CASA8	1	108 - 810	2 - 15	1	43 - 215	1 - 5	1	74 - 370	2 - 10	1	0 - 54	0 - 2
Bicknell's sedge	CABI3	1	54 - 270	1 - 5	1	0 - 43	0 - 1	1	0 - 37	0 - 1			
fox sedge	CAVU2	1	0 - 270	0 - 5	1	0 - 172	0 - 4	1	0 - 148	0 - 4	1	0 - 81	0 - 3
fescue sedge	CABR10	1	0 - 270	0 - 5	1	0 - 172	0 - 4	1	37 - 185	1 - 5	1	27 - 135	1 - 5
water sedge	CAAQ	1	0 - 270	0 - 5	1	0 - 129	0 - 3						
rush	JUNCU	1	54 - 162	1 - 3	1	215 - 430	5 - 10	1	37 - 185	1 - 5	1	270 - 540	10 - 20
spikerush	ELEOC	1	54 - 162	1 - 3	1	430 - 860	10 - 20	1	74 - 370	2 - 10	1	135 - 675	5 - 25
green bulrush	SCAT2	1	0 - 54	0 - 1	1	43 - 516	1 - 12	1	0 - 185	0 - 5	1	0 - 54	0 - 2
river bulrush	SCFL11	1	0 - 54	0 - 1	1	43 - 516	1 - 12	1	0 - 185	0 - 5	1	0 - 54	0 - 2
bulrush	SCHOE6	1	0 - 54	0 - 1	1	43 - 516	1 - 12	1	0 - 185	0 - 5	1	0 - 54	0 - 2
other grass-likes	2GL	1	54 - 270	1 - 5	1	43 - 301	1 - 7	1	37 - 185	1 - 5	1	0 - 54	0 - 2
WARM-SEASON GRASSES		3	540 - 1620	10 - 30	3	86 - 645	2 - 15	3	74 - 370	2 - 10	3	27 - 135	1 - 5
prairie cordgrass	SPPE	3	270 - 1350	5 - 25	3	86 - 645	2 - 15	3	74 - 370	2 - 10	3	0 - 135	0 - 5
green muhly	MUGL3	3	54 - 162	1 - 3	3	0 - 215	0 - 5						
switchgrass	PAVI2	3	0 - 162	0 - 3	3	0 - 86	0 - 2						
Mexican muhly	MUME2	3	0 - 108	0 - 2									
mat muhly	MURI	3	0 - 54	0 - 1	3	86 - 215	2 - 5	3	0 - 148	0 - 4	3	27 - 135	1 - 5
COOL-SEASON GRASSES		2	540 - 1350	10 - 25	2	215 - 1290	5 - 30	2	555 - 1295	15 - 35	2	135 - 540	5 - 20
northern reedgrass	CASTI3	2	270 - 1080	5 - 20	2	0 - 215	0 - 5	2	37 - 185	1 - 5			
American mangrass	GLGR	2	54 - 270	1 - 5	2	0 - 172	0 - 4	2	0 - 111	0 - 3			
reed canarygrass	PHAR3	2	54 - 270	1 - 5	2	86 - 430	2 - 10	2	555 - 1110	15 - 30	2	0 - 270	0 - 10
fowl bluegrass	POPA2	2	54 - 270	1 - 5	2	215 - 1075	5 - 25	2	74 - 555	2 - 15	2	0 - 135	0 - 5
prairie wedgescale	SPOB	2	0 - 162	0 - 3									
foxtail barley	HQJU				2	0 - 172	0 - 4	2	0 - 222	0 - 6	2	135 - 405	5 - 15
other grasses	2GRAM	2	54 - 270	1 - 5	2	0 - 215	0 - 5	2	0 - 185	0 - 5	2	0 - 135	0 - 5
NON-NATIVE GRASSES		4			4	215 - 645	5 - 15	4	370 - 1295	10 - 35	4	405 - 1215	15 - 45
creeping meadow foxtail	ALAR				4	0 - 430	0 - 10	4	0 - 925	0 - 25	4	0 - 945	0 - 35
Kentucky bluegrass	POPR				4	86 - 430	2 - 10	4	74 - 555	2 - 15	4	135 - 675	5 - 25
quackgrass	ELRE4				4	0 - 430	0 - 10	4	0 - 1110	0 - 30	4	135 - 945	5 - 35
FORBS		5	270 - 810	5 - 15	5	215 - 430	5 - 10	5	74 - 370	2 - 10	5	135 - 405	5 - 15
American germander	TECA3	5	0 - 54	0 - 1									
American licorice	GLLE3	5	54 - 108	1 - 2	5	0 - 129	0 - 3	5	0 - 74	0 - 2	5	0 - 27	0 - 1
American water horehound	LYAM	5	0 - 54	0 - 1									
black-eyed Susan	RUHI2	5	54 - 108	1 - 2	5	0 - 43	0 - 1						
blue-eyed grass	SISYR	5	0 - 54	0 - 1	5	0 - 43	0 - 1						
bristle dock	RUMA4	5	0 - 54	0 - 1	5	0 - 43	0 - 1						
broadleaf cattail	TYLA	5	0 - 54	0 - 1	5	0 - 86	0 - 2	5	0 - 37	0 - 1			
cinquefoil	POTEN	5	54 - 108	1 - 2	5	43 - 129	1 - 3	5	0 - 74	0 - 2	5	0 - 54	0 - 2
Flodman's thistle	CIFL	5	0 - 162	0 - 3	5	43 - 129	1 - 3	5	0 - 74	0 - 2	5	27 - 81	1 - 3
gayfeather	LIATR	5	0 - 108	0 - 2	5	0 - 43	0 - 1						
giant goldenrod	SOGI	5	54 - 108	1 - 2	5	0 - 129	0 - 3	5	0 - 74	0 - 2	5	0 - 81	0 - 3
goldenrod	SOLID	5	54 - 108	1 - 2	5	43 - 129	1 - 3	5	0 - 74	0 - 2	5	27 - 108	1 - 4
horsetail	EQLA	5	0 - 54	0 - 1	5	0 - 43	0 - 1	5	0 - 37	0 - 1	5	0 - 27	0 - 1
Illinois bundleflower	DEIL	5	54 - 108	1 - 2	5	0 - 43	0 - 1						
Indian hemp	APCA	5	54 - 162	1 - 3	5	0 - 86	0 - 2	5	0 - 74	0 - 2	5	0 - 81	0 - 3
Macoun's buttercup	RAMA2	5	54 - 108	1 - 2	5	0 - 43	0 - 1						
meadow anemone	ANCA8	5	54 - 108	1 - 2	5	0 - 43	0 - 1						
mint	MENTH	5	54 - 108	1 - 2	5	0 - 86	0 - 2	5	0 - 37	0 - 1			
New England aster	SYNO2	5	54 - 108	1 - 2	5	43 - 86	1 - 2	5	0 - 37	0 - 1	5	27 - 81	1 - 3
northern bog violet	VINE	5	0 - 54	0 - 1									
Pennsylvania smartweed	POPE2	5	54 - 108	1 - 2	5	43 - 86	1 - 2	5	0 - 74	0 - 2	5	27 - 108	1 - 4
Rydberg's sunflower	HENUR	5	54 - 108	1 - 2	5	0 - 43	0 - 1						
swamp milkweed	ASIN	5	54 - 108	1 - 2	5	0 - 86	0 - 2	5	0 - 37	0 - 1			
swamp smartweed	POHY2	5	54 - 108	1 - 2	5	0 - 43	0 - 1						
western dock	RUAQ	5	0 - 108	0 - 2	5	0 - 86	0 - 2	5	0 - 37	0 - 1	5	0 - 27	0 - 1
white doll's daisy	BOAS	5	0 - 54	0 - 1									
white panicle aster	SYLA6	5	54 - 108	1 - 2	5	43 - 129	1 - 3	5	0 - 37	0 - 1	5	27 - 81	1 - 3
wild strawberry	FRVI	5	0 - 54	0 - 1									
wood lily	LIPH	5	0 - 54	0 - 1	5	0 - 43	0 - 1						
native forbs	2FN	5	54 - 216	1 - 4	5	43 - 129	1 - 3	5	0 - 74	0 - 2	5	27 - 108	1 - 4
introduced forbs	2FI				5	0 - 86	0 - 2	5	0 - 74	0 - 2	5	27 - 216	1 - 8
SHRUBS		6	0 - 162	0 - 3	6	0 - 86	0 - 2	6			6		
willow	SALIX	6	0 - 162	0 - 3	6	0 - 43	0 - 1						
other shrubs	2SHRUB	6	0 - 108	0 - 2	6	0 - 86	0 - 2						
Annual Production lbs./acre			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH
GRASSES & GRASS-LIKES			4400 5319 - 6220		3200 4257 - 5210		2700 3700 - 4700		1700 2700 - 3600				
FORBS			230 540 - 960		185 323 - 510		70 222 - 435		120 270 - 480				
SHRUBS			0 81 - 180		0 43 - 90								
TOTAL			4400 5400 - 6400		3200 4300 - 5300		2700 3700 - 4700		1700 2700 - 3600				

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 codominated by cool-season and 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 Woolly Sedge/Prairie Cordgrass Plant Community Phase

This community evolved with grazing by large herbivores, occasional prairie fires, and relatively frequent ponding events and 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. The potential vegetation is about 50 percent grass-like species, 35 percent grasses, and 15 percent forbs by air-dry weight. Prairie cordgrass is the dominant tall warm-season grass occupying this plant community. Northern reedgrass is the dominant tall cool-season species. A variety of sedges and rushes occur throughout this community, as well as, switchgrass and fowl bluegrass. Key forbs include Rydberg's sunflower, Canada goldenrod, Indian hemp, and cinquefoil.

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 a normal year:

Growth curve number: SD0218

Growth curve name: Till Plains, lowland cool-season/warm-season codominant.

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

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	4	11	19	23	20	12	6	5	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 Fowl Bluegrass/Spikerush/Baltic Rush/Forbs Plant Community Phase*.

1.2 Fowl Bluegrass/Spikerush/Baltic Rush/Forbs Plant Community Phase

This community develops with periods of heavy continuous grazing with lack of adequate recovery periods during the growing season following periods of below normal precipitation. Lack of litter and reduced plant heights result in higher soil temperatures and reduced water infiltration rates. Recognition of this plant community will enable the land user to implement key management decisions before a significant ecological threshold is crossed.

Prairie cordgrass has been reduced in this plant community but still persists. Fowl bluegrass, spikerush, other grass-likes, and forbs are the dominant species. Spikerush and Baltic rush, as well as, other grass-likes have increased. Northern reedgrass has been significantly reduced. Switchgrass may be removed at this stage. Reed canarygrass may begin to increase significantly. Forb species would include asters, goldenrod, and cinquefoil, as well as, a possible invasion of Canada thistle. Plant production and frequency have been reduced. The water cycle, nutrient cycle, and energy flow are slightly reduced but continue to function adequately.

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: SD0217

Growth curve name: Till 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 – 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 Woolly Sedge/Prairie Cordgrass Plant Community Phase*. This pathway could also occur with a return to more normal precipitation levels and frequencies.

Transitions from Reference State (State 1) to the Invaded State (State 2)

- T1a – Non-use and no fire for extended periods of time (typically for 10 or more years) will cause litter levels to become high enough to reduce native grass vigor, diversity, and density, and will likely lead this state over a threshold resulting in the *2.1 Reed Canarygrass/Sedge/Invasive Plants/Prairie Cordgrass Plant Community Phase* within the *Invaded State (State 2)*.
- T1b – 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) will eventually cause a shift over a threshold leading to the *2.2 Quackgrass/Kentucky Bluegrass/Foxtail Barley/Invasive Plants 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 dominance of invasive and/or nonnative species as a result of disturbance regimes outside the normal variability. Loss or reduction of native cool- and warm-season grasses and the forb component have negatively impacted energy flow and nutrient cycling. Infiltration is reduced and native plant mortality is increased. As the disturbance level increases, native plant density decreases even more, giving way to annual species and invasive perennial species, as well as, an increase in bare ground.

2.1 Reed Canarygrass/Sedge/Invasive Plants/Prairie Cordgrass Plant Community Phase

This plant community phase develops with a long-term lack of grazing and/or fire. Eventually, litter levels become high enough to reduce native grass vigor, diversity, and density. Years of accumulated

litter will tend to make this community wetter. Sedge, Baltic rush, Spikerush, and bulrush will increase. Hydrophytic forbs will also increase.

Reed canarygrass often will increase to the point of dominance, while prairie cordgrass will diminish significantly. Other invasive plants such as creeping meadow foxtail may become prevalent if a seed source is present or nearby. Nutrient cycling will be greatly diminished and the energy flow will shift significantly and be reduced as well due to the increase in plant litter. Infiltration will be reduced somewhat compared to the Reference State. This plant community is somewhat resistant to change. The combination of both grazing and fire is most effective in moving this plant community towards the Reference State.

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 Quackgrass/Kentucky Bluegrass/Foxtail Barley/Invasive Plants Plant Community Phase*.
- R2a - 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 *Reference State (State 1)*. 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.

2.2 Quackgrass/Kentucky Bluegrass/Foxtail Barley/Invasive Plants Plant Community Phase

This plant community phase occurs after prolonged heavy disturbance such as described above in the community pathway (i.e., heavy grazing pressure without adequate recovery). The prolonged nature of this disturbance will tend to increase soil temperatures and evaporation, causing this site to become drier than normal. This allows the increase/invasion of typically less hydrophytic vegetation such as quackgrass and Kentucky bluegrass. Occasionally, the soils on this site exhibit higher salinity/sodicity and these characteristics may become amplified with this shift in vegetation. A significant amount of production and diversity has been lost when compared to the Reference State. Loss or reduction of native cool- and warm-season grasses, and the native forb component have negatively impacted energy flow and nutrient cycling.

It will take an extended period of time to restore this plant community back to the Reference State with improved management. Renovation is typically not practical but may be the only means to significantly restore the ecological processes on this site.

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

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

- T3 – Cropping followed by abandonment may lead this plant community phase over a threshold to the *Invaded State (State 2)* and more specifically to the *2.3 Annual/Pioneer, Non-native Perennial Plant Community Phase*.

2.3 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 inland saltgrass, 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:

- 2.3a – 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 *2.2 Quackgrass/Kentucky Bluegrass/Foxtail Barley/Invasive Plants Plant Community Phase*.

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

- R2b – Seeding followed by prescribed grazing may lead this plant community phase over a threshold to the *Reference State (State 1)*. Wetland restoration techniques may also be effective but will likely be costly and the results may not be satisfactory.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

-- Under Development --

Woolly Sedge/Prairie Cordgrass Plant Community Phase (1.1):

Fowl Bluegrass/Spikerush/Baltic Rush/Forbs Plant Community Phase (1.2):

Reed Canarygrass/Sedge/Invasive Plants/Prairie Cordgrass Plant Community Phase (2.1):

Quackgrass/Kentucky Bluegrass/Foxtail Barley/Invasive Plants Plant Community Phase (2.2):

Annual/Pioneer, Non-native Perennial Plant Community Phase (2.3):

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

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
Grasses and Grass-likes							
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
Bicknell'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
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
fescue 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
fowl bluegrass	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
fox sedge	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
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
mat muhly	N U U N	U U D U	N U U N	U U U U	U U U U	N U U N	N U U N
Mexican 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
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
prairie wedgescale	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
reed canarygrass	U D U U	N N N N	U D U U	N N N N	N N N N	U D U U	U D U 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 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
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
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
water sedge	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
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
Forbs							
American germander	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
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
American water horehound	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
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
bristle 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
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
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
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
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
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
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
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
Indian hemp	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 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
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
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 bog violet	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
swamp milkweed	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
swamp 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
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 doll's daisy	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
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
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
wood lily	N U U N	N U D U	N U U N	N U D U	N U D U	N U U N	N U U N
Shrubs							
willow	P U D P	P U D P	P U D P	P U D P	U U U U	P U D P	P U D P

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)
Woolly Sedge/Prairie Cordgrass (1.1)	5,400	1.48
Fowl Bluegrass/Spikerush/Baltic Rush/Forbs (1.2)	4,300	1.18
Reed Canarygrass/Sedge/Invasive Plants/Prairie Cordgrass (2.1)	3,700	1.01
Quackgrass/Kentucky Bluegrass/Foxtail Barley/Invasive Plants (2.2)	2,700	0.74
Annual/Pioneer, Non-Native Perennial (2.3)	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 is dominated by soils in hydrologic group C and 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 percent ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where shortgrasses form a strong sod and dominate the site. Dominance by 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), Shallow Marsh (R102BY001SD), Loamy Overflow (R102BY020SD)

Similar Sites

(R102BY001SD) – Shallow Marsh [less prairie cordgrass; higher 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