

United States Department of Agriculture Natural Resources Conservation Service

Ecological Site Description

Site Type: Rangeland

Site Name: Loamy

Site ID: R053CY010SD

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

Physiographic Features

This site occurs on nearly level to steeply sloping uplands.

Landform: plain, till plain, outwash plain

Aspect: N/A



	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	1,300	2,300
Slope (percent):	1	12
Water Table Depth (inches):	51	80
Flooding:		
Frequency:	None	None
Duration:	None	None
Ponding:		
Depth (inches):	None	None
Frequency:	None	None
Duration:	None	None
Runoff Class:	Low	High

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 15 to 25 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):	140	160
Mean Annual Precipitation (inches):	15	25

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

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

Representative Soil Features

The common features of soils in this site are loam to silty clay loam textured subsurface soils (occasionally clay), with slopes ranging from 1 to 12 percent. The soils in this site are well-drained and formed in till and alluvium. The soil surface texture is generally loam to silty clay loam. The soils have a moderate to slow infiltration rate. Some soils crack when dry. When these soils are wet, surface compaction can occur with heavy traffic. This site typically should show slight to no evidence of rills, wind scoured areas or pedestalled plants. If present, water flow paths are broken, irregular in appearance, or discontinuous. The soil surface is stable and intact. Subsurface soil layers are nonrestrictive to water movement and root penetration.

These soils are mainly susceptible to water erosion. The hazard of water erosion increases on slopes greater than about nine percent. Loss of 50 percent or more of the surface layer of the soils on this site can result in a shift in species composition and/or production.

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

Parent Material Kind: silty drift over loamy till, loamy till, loamy alluvium over outwash

Parent Material Origin:

Surface Texture: loam, silt loam, silty clay loam

Surface Texture Modifier: none

Subsurface Texture Group: silty

Surface Fragments ≤3" (% Cover): 0-0

Surface Fragments >3" (%Cover): 0-0

Subsurface Fragments ≤3" (% Volume): 0-42

Subsurface Fragments >3" (% Volume): 0-8

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	well	moderately well
Permeability Class:	very slow	moderately slow
Depth (inches):	80	80
Electrical Conductivity (mmhos/cm)*:	0	2
Sodium Absorption Ratio*:	0	3
Soil Reaction (1:1 Water)*:	6.1	8.4
Soil Reaction (0.1M CaCl₂)*:	NA	NA
Available Water Capacity (inches)*:	5	8
Calcium Carbonate Equivalent (percent)*:	0	15

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

Plant Communities

Ecological Dynamics of the Site

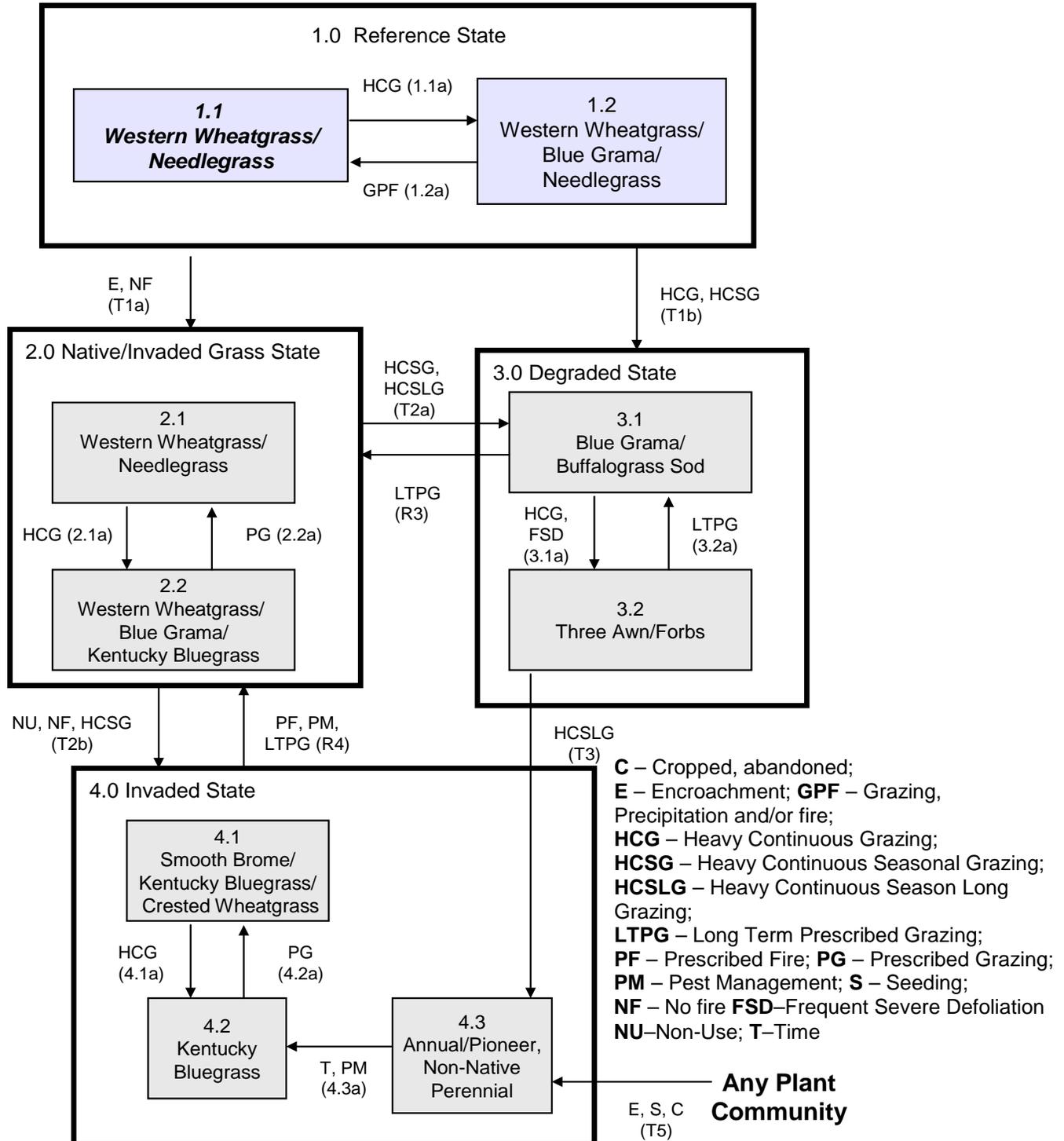
This site developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfire (often of light intensities), and other biotic and abiotic factors that typically influence soil/site development. Changes will occur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

Continuous season-long grazing (during the typical growing season of May through October) and/or repeated seasonal grazing (e.g., every spring, every summer) without adequate recovery periods following grazing events causes departure from the 2.1 Western Wheatgrass/Needlegrass Plant Community Phase. This Plant Community is most typically occurring in this ecological site (ES) in MLRA 53C. Blue grama will increase and eventually develop into a sod. Western wheatgrass will increase initially and then begin to decrease. Green needlegrass, needle-and-thread, porcupine grass, sideoats grama, big bluestem, and little bluestem will decrease in frequency and production. Extended periods of nonuse and/or lack of fire will result in excessive litter and a plant community dominated by cool-season grasses such as Kentucky bluegrass, smooth brome, green needlegrass, and cheatgrass.

Interpretations are primarily based on the 1.1 Western Wheatgrass/Needlegrass Plant Community Phase. It has been determined by study of rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts also have been used. Plant community phases, states, transitional pathways, and thresholds have been determined through similar studies and experience. Due to a general invasion of exotic species (such as Kentucky bluegrass and smooth brome) across the MLRA within this site, returning to the 1.1 Western Wheatgrass/Needlegrass Plant Community Phase may not be possible.

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

Plant Communities and Transitional Pathways



Plant Community Composition and Group Annual Production

			1.1 Western Wheatgrass/Needlegrass		
COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Group	lbs./acre	% Comp
GRASSES & GRASS-LIKES				2240 - 2520	80 - 90
WHEATGRASS			1	420 - 840	15 - 30
western wheatgrass	Pascopyrum smithii	PASM	1	280 - 840	10 - 30
slender wheatgrass	Elymus trachycaulus	ELTR7	1	0 - 140	0 - 5
NEEDLEGRASS			2	420 - 840	15 - 30
green needlegrass	Nassella viridula	NAVI4	2	280 - 700	10 - 25
porcupine grass	Hesperostipa spartea	HESP11	2	56 - 560	2 - 20
needleandthread	Hesperostipa comata ssp. comata	HECOC8	2	56 - 420	2 - 15
TALL WARM-SEASON GRASSES			3	280 - 560	10 - 20
big bluestem	Andropogon gerardii	ANGE	3	140 - 560	5 - 20
Indiangrass	Sorghastrum nutans	SONU2	3	56 - 420	2 - 15
switchgrass	Panicum virgatum	PAVI2	3	56 - 420	2 - 15
tall dropseed	Sporobolus compositus var. compositus	SPCOC2	3	0 - 140	0 - 5
MID WARM-SEASON GRASSES			4	280 - 560	10 - 20
sideoats grama	Bouteloua curtipendula	BOCU	4	140 - 420	5 - 15
little bluestem	Schizachyrium scoparium	SCSC	4	56 - 420	2 - 15
plains muhly	Muhlenbergia cuspidata	MUCU3	4	0 - 140	0 - 5
prairie dropseed	Sporobolus heterolepis	SPHE	4	0 - 112	0 - 4
SHORT WARM-SEASON GRASSES			5	28 - 140	1 - 5
blue grama	Bouteloua gracilis	BOGR2	5	28 - 140	1 - 5
buffalograss	Bouteloua dactyloides	BODA2	5	0 - 112	0 - 4
sand dropseed	Sporobolus cryptandrus	SPCR	5	0 - 84	0 - 3
threeawn	Aristida spp.	ARIST	5	0 - 28	0 - 1
OTHER NATIVE GRASSES			6	28 - 140	1 - 5
prairie junegrass	Koeleria macrantha	KOMA	6	28 - 112	1 - 4
Scribner panicum	Dichanthelium oligosanthes var. scribnerian	DIOLS	6	0 - 56	0 - 2
Wilcox panicum	Dichanthelium wilcoxianum	DIWI5	6	0 - 56	0 - 2
other grasses		2GRAM	6	0 - 112	0 - 4
GRASS-LIKES			7	28 - 140	1 - 5
sedge	Carex spp.	CAREX	7	28 - 140	1 - 5
other grass-likes		2GL	7	0 - 112	0 - 4
FORBS			9	140 - 280	5 - 10
American vetch	Vicia americana	VIAM	9	28 - 56	1 - 2
catclaw sensitive briar	Mimosa nuttallii	MINU6	9	0 - 56	0 - 2
cudweed sagewort	Artemisia ludoviciana	ARLU	9	28 - 84	1 - 3
deervetch	Lotus unifoliolatus var. unifoliolatus	LOUNU	9	0 - 28	0 - 1
dotted gayfeather	Liatris punctata	LIPU	9	28 - 56	1 - 2
false boneset	Brickellia eupatorioides	BREU	9	0 - 56	0 - 2
goldenrod	Solidago spp.	SOLID	9	28 - 84	1 - 3
green sagewort	Artemisia campestris	ARCA12	9	0 - 56	0 - 2
groundplum milkvetch	Astragalus crassicaepus	ASCR2	9	0 - 28	0 - 1
heath aster	Symphyotrichum ericoides	SYER	9	28 - 84	1 - 3
Illinois bundleflower	Desmanthus illinoensis	DEIL	9	0 - 56	0 - 2
penstemon	Penstemon spp.	PENST	9	0 - 28	0 - 1
prairie coneflower	Ratibida columnifera	RACO3	9	28 - 56	1 - 2
purple coneflower	Echinacea angustifolia	ECAN2	9	28 - 56	1 - 2
purple prairie clover	Dalea purpurea	DAPU5	9	28 - 84	1 - 3
rush skeletonweed	Lygodesmia juncea	LYJU	9	0 - 28	0 - 1
scarlet gaura	Gaura coccinea	GACO5	9	0 - 56	0 - 2
scarlet globemallow	Sphaeralcea coccinea	SPCO	9	28 - 56	1 - 2
scurfpea	Psoralegium spp.	PSORA2	9	28 - 112	1 - 4
stiff sunflower	Helianthus pauciflorus	HEPA19	9	28 - 56	1 - 2
western ragweed	Ambrosia psilostachya	AMPS	9	0 - 84	0 - 3
western yarrow	Achillea millefolium var. occidentalis	ACMO	9	28 - 56	1 - 2
native forbs		2FN	9	28 - 140	1 - 5
SHRUBS			10	56 - 140	2 - 5
fringed sagewort	Artemisia frigida	ARFR4	10	0 - 56	0 - 2
leadplant	Amorpha canescens	AMCA6	10	28 - 112	1 - 4
plains pricklypear	Opuntia polyacantha	OPPO	10	0 - 28	0 - 1
rose	Rosa spp.	ROSA5	10	28 - 56	1 - 2
western snowberry	Symphoricarpos occidentalis	SYOC	10	0 - 84	0 - 3
other shrubs		2SHRUB	10	0 - 56	0 - 2

Annual Production lbs./acre	LOW	RV	HIGH
GRASSES & GRASS-LIKES	1820 -	2492	-3125
FORBS	125 -	210	-320
SHRUBS	55 -	98	-155
TOTAL	2000 -	2800	-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.

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SYMBOL	1.1 Western Wheatgrass/ Needlegrass			2.2 Western Wheatgrass/Blue Grass/Kentucky Bluegrass			3.1 Blue Grama/ Buffalograss Sod			3.2 Threeawn/Forbs			
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	
GRASSES & GRASS-LIKES			2240 - 2520	80 - 90		1920 - 2160	80 - 90		1350 - 1620	75 - 90		600 - 800	60 - 80	
WHEATGRASS		1	420 - 840	15 - 30	1	360 - 720	15 - 30	1	0 - 180	0 - 10	1	0 - 50	0 - 5	
western wheatgrass	PASM	1	280 - 840	10 - 30	1	360 - 720	15 - 30	1	0 - 180	0 - 10	1	0 - 50	0 - 5	
slender wheatgrass	ELTR7	1	0 - 140	0 - 5	1	0 - 120	0 - 5							
NEEDLEGRASS		2	420 - 840	15 - 30	2	48 - 360	2 - 15	2	0 - 72	0 - 4	2			
green needlegrass	NAV4	2	280 - 700	10 - 25	2	24 - 240	1 - 10	2	0 - 54	0 - 3				
porcupine grass	HESP11	2	56 - 560	2 - 20	2	0 - 240	0 - 10	2	0 - 18	0 - 1				
needleandthread	HECOC8	2	56 - 420	2 - 15	2	0 - 240	0 - 10	2	0 - 72	0 - 4				
TALL WARM-SEASON GRASSES		3	280 - 560	10 - 20	3	48 - 240	2 - 10	3	0 - 54	0 - 3	3	0 - 20	0 - 2	
big bluestem	ANGE	3	140 - 560	5 - 20	3	24 - 120	1 - 5	3	0 - 54	0 - 3				
Indiangrass	SONU2	3	56 - 420	2 - 15	3	0 - 120	0 - 5							
switchgrass	PAV12	3	56 - 420	2 - 15	3	0 - 120	0 - 5							
tall dropseed	SPCOC2	3	0 - 140	0 - 5	3	24 - 192	1 - 8	3	0 - 54	0 - 3	3	0 - 20	0 - 2	
MID WARM-SEASON GRASSES		4	280 - 560	10 - 20	4	48 - 240	2 - 10	4	0 - 72	0 - 4	4			
sideoats grama	BOCU	4	140 - 420	5 - 15	4	48 - 240	2 - 10	4	0 - 72	0 - 4				
little bluestem	SCSC	4	56 - 420	2 - 15	4	0 - 120	0 - 5	4	0 - 72	0 - 4				
plains muhly	MUCU3	4	0 - 140	0 - 5	4	0 - 120	0 - 5							
prairie dropseed	SPHE	4	0 - 112	0 - 4	4	0 - 120	0 - 5							
SHORT WARM-SEASON GRASSES		5	28 - 140	1 - 5	5	240 - 480	10 - 20	5	360 - 810	20 - 45	5	200 - 450	20 - 45	
blue grama	BOGR2	5	28 - 140	1 - 5	5	240 - 480	10 - 20	5	360 - 720	20 - 40	5	0 - 100	0 - 10	
buffalograss	BODA2	5	0 - 112	0 - 4	5	24 - 120	1 - 5	5	36 - 270	2 - 15	5	0 - 50	0 - 5	
sand dropseed	SPCR	5	0 - 84	0 - 3	5	0 - 120	0 - 5	5	0 - 90	0 - 5	5	0 - 100	0 - 10	
threeawn	ARIST	5	0 - 28	0 - 1	5	0 - 72	0 - 3	5	0 - 144	0 - 8	5	150 - 400	15 - 40	
OTHER NATIVE GRASSES		6	28 - 140	1 - 5	6	24 - 120	1 - 5	6	18 - 72	1 - 4	6	0 - 30	0 - 3	
prairie junegrass	KOMA	6	28 - 112	1 - 4	6	24 - 120	1 - 5	6	18 - 54	1 - 3	6	0 - 10	0 - 1	
Scribner panicum	DIOLS	6	0 - 56	0 - 2	6	0 - 72	0 - 3	6	0 - 36	0 - 2	6	0 - 10	0 - 1	
Wilcox panicum	DIW15	6	0 - 56	0 - 2	6	0 - 48	0 - 2							
other grasses	2GRAM	6	0 - 112	0 - 4	6	0 - 96	0 - 4	6	0 - 54	0 - 3	6	0 - 20	0 - 2	
GRASS-LIKES		7	28 - 140	1 - 5	7	48 - 192	2 - 8	7	90 - 180	5 - 10	7	20 - 150	2 - 15	
sedge	CAREX	7	28 - 140	1 - 5	7	48 - 192	2 - 8	7	54 - 180	3 - 10	7	20 - 150	2 - 15	
other grass-likes	2GL	7	0 - 112	0 - 4	7	0 - 120	0 - 5	7	0 - 90	0 - 5	7	0 - 50	0 - 5	
NON-NATIVE GRASSES		8			8	120 - 360	5 - 15	8	0 - 450	0 - 25	8	50 - 200	5 - 20	
annual bromegrass	BROMU				8	0 - 72	0 - 3	8	0 - 90	0 - 5	8	0 - 50	0 - 5	
bluegrass	POA				8	48 - 240	2 - 10	8	0 - 450	0 - 25	8	50 - 200	5 - 20	
crested wheatgrass	AGCR				8	0 - 120	0 - 5	8	0 - 90	0 - 5	8	20 - 100	2 - 10	
smooth bromegrass	BRIN2				8	0 - 120	0 - 5	8	0 - 54	0 - 3	8	0 - 30	0 - 3	
FORBS		9	140 - 280	5 - 10	9	120 - 240	5 - 10	9	90 - 270	5 - 15	9	100 - 350	10 - 35	
American vetch	VIAM	9	28 - 56	1 - 2	9	0 - 48	0 - 2	9	0 - 18	0 - 1				
catclaw sensitive brier	MINU6	9	0 - 56	0 - 2	9	0 - 24	0 - 1							
cudweed sagewort	ARLU	9	28 - 84	1 - 3	9	24 - 96	1 - 4	9	18 - 54	1 - 3	9	10 - 30	1 - 3	
deervetch	LOUNU	9	0 - 28	0 - 1	9	0 - 24	0 - 1	9	0 - 18	0 - 1				
dotted gayfeather	LIPU	9	28 - 56	1 - 2	9	24 - 48	1 - 2	9	0 - 18	0 - 1				
false boneset	BREU	9	0 - 56	0 - 2	9	0 - 24	0 - 1							
fetid marigold	DYPA							9	0 - 18	0 - 1	9	20 - 150	2 - 15	
goldenrod	SOLID	9	28 - 84	1 - 3	9	24 - 96	1 - 4	9	18 - 54	1 - 3	9	0 - 20	0 - 2	
green sagewort	ARCA12	9	0 - 56	0 - 2	9	24 - 72	1 - 3	9	0 - 54	0 - 3	9	0 - 20	0 - 2	
groundplum milkvetch	ASCR2	9	0 - 28	0 - 1	9	0 - 24	0 - 1							
heath aster	SYER	9	28 - 84	1 - 3	9	24 - 96	1 - 4	9	18 - 72	1 - 4	9	0 - 20	0 - 2	
Illinois bundleflower	DEIL	9	0 - 56	0 - 2	9	0 - 24	0 - 1							
penstemon	PENST	9	0 - 28	0 - 1	9	0 - 24	0 - 1							
prairie coneflower	RACO3	9	28 - 56	1 - 2	9	24 - 48	1 - 2	9	0 - 18	0 - 1				
purple coneflower	ECAN2	9	28 - 56	1 - 2	9	0 - 24	0 - 1							
purple prairie clover	DAPU5	9	28 - 84	1 - 3	9	0 - 24	0 - 1							
rush skeletonweed	LYJU	9	0 - 28	0 - 1	9	0 - 24	0 - 1	9	0 - 18	0 - 1				
scarlet gaura	GAC05	9	0 - 56	0 - 2	9	0 - 24	0 - 1							
scarlet globemallow	SPCO	9	28 - 56	1 - 2	9	24 - 48	1 - 2	9	18 - 36	1 - 2	9	0 - 20	0 - 2	
scurfpea	PSORA2	9	28 - 112	1 - 4	9	24 - 72	1 - 3	9	18 - 36	1 - 2	9	0 - 10	0 - 1	
stiff sunflower	HEPA19	9	28 - 56	1 - 2	9	0 - 24	0 - 1							
sweetclover	MELIL				9	0 - 120	0 - 5	9	0 - 180	0 - 10	9	10 - 150	1 - 15	
western ragweed	AMPS	9	0 - 84	0 - 3	9	24 - 72	1 - 3	9	18 - 36	1 - 2	9	0 - 10	0 - 1	
western yarrow	ACMIO	9	28 - 56	1 - 2	9	24 - 72	1 - 3	9	18 - 54	1 - 3	9	10 - 50	1 - 5	
native forbs	2FN	9	28 - 140	1 - 5	9	24 - 72	1 - 3	9	0 - 36	0 - 2	9	0 - 100	0 - 10	
introduced forbs	2FI				9	24 - 72	1 - 3	9	18 - 144	1 - 8	9	20 - 150	2 - 15	
SHRUBS		10	56 - 140	2 - 5	10	48 - 168	2 - 7	10	36 - 180	2 - 10	10	20 - 50	2 - 5	
fringed sagewort	ARFR4	10	0 - 56	0 - 2	10	24 - 96	1 - 4	10	36 - 144	2 - 8	10	0 - 40	0 - 4	
leadplant	AMCA6	10	28 - 112	1 - 4	10	0 - 48	0 - 2							
plains pricklypear	OPPO	10	0 - 28	0 - 1	10	0 - 48	0 - 2	10	0 - 54	0 - 3	10	10 - 40	1 - 4	
rose	ROSA5	10	28 - 56	1 - 2	10	24 - 48	1 - 2	10	0 - 36	0 - 2				
western snowberry	SYOC	10	0 - 84	0 - 3	10	24 - 120	1 - 5	10	0 - 54	0 - 3				
other shrubs	2SHRUB	10	0 - 56	0 - 2	10	0 - 48	0 - 2	10	0 - 18	0 - 1	10	0 - 10	0 - 1	
Annual Production lbs./acre			LOW	RV	HIGH	LOW	RV	HIGH	LOW	RV	HIGH	LOW	RV	HIGH
GRASSES & GRASS-LIKES			1820	2492	-3125	1650	2112	-2535	1180	1512	-1690	390	740	-935
FORBS			125	210	-320	105	180	-275	85	180	-310	95	225	-410
SHRUBS			55	98	-155	45	108	-190	35	108	-200	15	35	-55
TOTAL			2000	2800	-3600	1800	2400	-3000	1300	1800	-2200	500	1000	-1400

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 Composition and Group Annual Production

COMMON/GROUP NAME	SYMBOL	1.1 Western Wheatgrass/ Needlegrass			4.1 Smooth Bromegrass/Kentucky Bluegrass/Crested Wheatgrass			4.2 Kentucky Bluegrass		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
GRASSES & GRASS-LIKES			2240 - 2520	80 - 90		2550 - 2850	85 - 95		1870 - 2090	85 - 95
WHEATGRASS		1	420 - 840	15 - 30	1	0 - 300	0 - 10	1	0 - 110	0 - 5
western wheatgrass	PASM	1	280 - 840	10 - 30	1	0 - 300	0 - 10	1	0 - 110	0 - 5
slender wheatgrass	ELTR7	1	0 - 140	0 - 5						
NEEDLEGRASS		2	420 - 840	15 - 30	2	0 - 300	0 - 10	2	0 - 110	0 - 5
green needlegrass	NAV4	2	280 - 700	10 - 25	2	0 - 300	0 - 10	2	0 - 110	0 - 5
porcupine grass	HESP11	2	56 - 560	2 - 20	2	0 - 90	0 - 3	2	0 - 22	0 - 1
needleandthread	HECOC8	2	56 - 420	2 - 15						
TALL WARM-SEASON GRASSES		3	280 - 560	10 - 20	3	0 - 90	0 - 3	3	0 - 110	0 - 5
big bluestem	ANGE	3	140 - 560	5 - 20	3	0 - 90	0 - 3	3	0 - 66	0 - 3
Indiangrass	SONU2	3	56 - 420	2 - 15						
switchgrass	PAV2	3	56 - 420	2 - 15						
tall dropseed	SPCOC2	3	0 - 140	0 - 5	3	0 - 90	0 - 3	3	0 - 110	0 - 5
MID WARM-SEASON GRASSES		4	280 - 560	10 - 20	4	0 - 60	0 - 2	4	0 - 44	0 - 2
sideoats grama	BOCU	4	140 - 420	5 - 15	4	0 - 60	0 - 2	4	0 - 44	0 - 2
little bluestem	SCSC	4	56 - 420	2 - 15						
plains muhly	MUCU3	4	0 - 140	0 - 5						
prairie dropseed	SPHE	4	0 - 112	0 - 4						
SHORT WARM-SEASON GRASSES		5	28 - 140	1 - 5	5	0 - 120	0 - 4	5	22 - 440	1 - 20
blue grama	BOGR2	5	28 - 140	1 - 5	5	0 - 90	0 - 3	5	0 - 220	0 - 10
buffalograss	BODA2	5	0 - 112	0 - 4	5	0 - 60	0 - 2	5	0 - 44	0 - 2
sand dropseed	SPCR	5	0 - 84	0 - 3	5	0 - 60	0 - 2	5	0 - 66	0 - 3
threeawn	ARIST	5	0 - 28	0 - 1	5	0 - 30	0 - 1	5	22 - 220	1 - 10
OTHER NATIVE GRASSES		6	28 - 140	1 - 5	6	0 - 120	0 - 4	6	0 - 110	0 - 5
prairie junegrass	KOMA	6	28 - 112	1 - 4	6	0 - 90	0 - 3	6	0 - 22	0 - 1
Scribner panicum	DIOLS	6	0 - 56	0 - 2	6	0 - 60	0 - 2	6	0 - 22	0 - 1
Wilcox panicum	DIW5	6	0 - 56	0 - 2	6	0 - 30	0 - 1	6	0 - 22	0 - 1
other grasses	2GRAM	6	0 - 112	0 - 4	6	0 - 90	0 - 3	6	0 - 110	0 - 5
GRASS-LIKES		7	28 - 140	1 - 5	7	0 - 90	0 - 3	7	0 - 66	0 - 3
sedge	CAREX	7	28 - 140	1 - 5	7	0 - 90	0 - 3	7	0 - 66	0 - 3
other grass-like	2GL	7	0 - 112	0 - 4	7	0 - 90	0 - 3	7	0 - 66	0 - 3
NON-NATIVE GRASSES		8			8	1200 - 2250	40 - 75	8	660 - 1540	30 - 70
annual bromegrass	BROMU				8	30 - 150	1 - 5	8	22 - 220	1 - 10
bluegrass	POA				8	150 - 900	5 - 30	8	660 - 1430	30 - 65
crested wheatgrass	AGCR				8	0 - 450	0 - 15	8	0 - 220	0 - 10
smooth bromegrass	BRIN2				8	600 - 2100	20 - 70	8	0 - 220	0 - 10
FORBS		9	140 - 280	5 - 10	9	150 - 300	5 - 10	9	44 - 220	2 - 10
American vetch	VIAM	9	28 - 56	1 - 2	9	0 - 30	0 - 1			
catclaw sensitive briar	MINU6	9	0 - 56	0 - 2						
cudweed sagewort	ARLU	9	28 - 84	1 - 3	9	0 - 90	0 - 3	9	0 - 66	0 - 3
deervetch	LOUNU	9	0 - 28	0 - 1	9	0 - 30	0 - 1			
dotted gayfeather	LIPU	9	28 - 56	1 - 2	9	0 - 30	0 - 1			
false boneset	BREU	9	0 - 56	0 - 2	9	0 - 30	0 - 1			
fetid marigold	DYPA									
goldenrod	SOLID	9	28 - 84	1 - 3	9	0 - 90	0 - 3	9	0 - 66	0 - 3
green sagewort	ARCA12	9	0 - 56	0 - 2	9	0 - 30	0 - 1	9	0 - 44	0 - 2
groundplum milkvetch	ASCR2	9	0 - 28	0 - 1						
heath aster	SYER	9	28 - 84	1 - 3	9	0 - 60	0 - 2	9	0 - 44	0 - 2
Illinois bundleflower	DEIL	9	0 - 56	0 - 2	9	0 - 30	0 - 1			
penstemon	PENST	9	0 - 28	0 - 1						
prairie coneflower	RACO3	9	28 - 56	1 - 2	9	0 - 30	0 - 1			
purple coneflower	ECAN2	9	28 - 56	1 - 2	9	0 - 30	0 - 1			
purple prairie clover	DAPU5	9	28 - 84	1 - 3	9	0 - 30	0 - 1	9	0 - 22	0 - 1
rush skeletonweed	LYJU	9	0 - 28	0 - 1	9	0 - 30	0 - 1			
scarlet gaura	GACO5	9	0 - 56	0 - 2						
scarlet globemallow	SPCO	9	28 - 56	1 - 2				9	0 - 22	0 - 1
scurfpea	PSORA2	9	28 - 112	1 - 4	9	0 - 90	0 - 3	9	0 - 22	0 - 1
stiff sunflower	HEPA19	9	28 - 56	1 - 2	9	0 - 30	0 - 1			
sweetclover	MELIL				9	0 - 300	0 - 10	9	0 - 220	0 - 10
western ragweed	AMPS	9	0 - 84	0 - 3	9	0 - 90	0 - 3	9	0 - 44	0 - 2
western yarrow	ACMIO	9	28 - 56	1 - 2	9	0 - 60	0 - 2	9	0 - 66	0 - 3
native forbs	2FN	9	28 - 140	1 - 5	9	0 - 60	0 - 2	9	0 - 44	0 - 2
introduced forbs	2FI				9	0 - 180	0 - 6	9	0 - 154	0 - 7
SHRUBS		10	56 - 140	2 - 5	10	30 - 300	1 - 10	10	0 - 110	0 - 5
fringed sagewort	ARFR4	10	0 - 56	0 - 2	10	0 - 30	0 - 1	10	0 - 110	0 - 5
leadplant	AMCA6	10	28 - 112	1 - 4						
plains pricklypear	OPPO	10	0 - 28	0 - 1	10	0 - 30	0 - 1	10	0 - 66	0 - 3
rose	ROSA5	10	28 - 56	1 - 2	10	0 - 60	0 - 2	10	0 - 22	0 - 1
western snowberry	SYOC	10	0 - 84	0 - 3	10	30 - 300	1 - 10	10	0 - 110	0 - 5
other shrubs	2SHRUB	10	0 - 56	0 - 2	10	0 - 30	0 - 1	10	0 - 22	0 - 1
Annual Production lbs./acre			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH	
GRASSES & GRASS-LIKES			1820 - 2492 - 3125		1840 - 2610 - 3310		1660 - 2013 - 2330			
FORBS			125 - 210 - 320		135 - 225 - 345		40 - 132 - 250			
SHRUBS			55 - 98 - 155		25 - 165 - 345		0 - 55 - 120			
TOTAL			2000 - 2800 - 3600		2000 - 3000 - 4000		1700 - 2200 - 2700			

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

Plant Community and Vegetation State Narratives

Reference State (State 1)

This state represents the natural range of variability that dominated the dynamics of this ES. This site was dominated by cool-season grasses with warm-season grasses being subdominant. In pre-European times, the primary disturbance mechanisms for this site in the 1.0 Reference State include periods of below and/or above average precipitation, periodic fire, and herbivory by insects, large ungulates and other mammals. Timing of fire and herbivory coupled with weather events dictated the dynamics that occurred within the natural range of variability. Cool-season and taller warm-season grasses would have declined and a corresponding increase in short, warm-season grasses would have occurred. Today, a similar state can be found on areas that receive managed grazing and/or prescribed fire, and sometimes on areas receiving occasional short periods of rest. These sites are differentiated by the presence of exotic species such as Kentucky bluegrass and smooth brome. On most Loamy ESs within this MLRA, these species have invaded and are now present. It is likely that attaining the reference state as it is described here (without the presence of exotic herbaceous species) is not possible.

1.1 Western Wheatgrass/Needlegrass Plant Community Phase

Interpretations are based primarily on the 1.1 Western Wheatgrass/Needlegrass Plant Community Phase (this is also considered to be the “climax plant community”). The potential vegetation was about 85 percent grasses or grass-like plants, 10 percent forbs, and 5 percent shrubs. Due to the region’s spring and early summer precipitation pattern, this community was dominated by cool-season grasses, with warm-season grasses generally comprising a minority. The major grass species included western wheatgrass and green needlegrass. Other grass or grass-like species included big bluestem, little bluestem, sideoats grama, porcupine grass, and blue grama. This plant community expressed a high level of resilience and was well-adapted to the climate conditions in the Northern Great Plains, including extended periods of drought. This plant community was sustainable in regards to site/soil stability, watershed function, and biological integrity.

Growth curve number: SD5302

Growth curve name: Southern Dark Brown Glaciated Plains, cool-season dominant, warm-season subdominant.

Growth curve description: Cool-season dominant, warm-season subdominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	10	23	34	15	6	5	4	0	0

Transitions or Pathways leading to other plant communities were as follows:

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

1.2 Western Wheatgrass/Blue Grama/Needlegrass Plant Community Phase

This plant community evolved under heavy continuous grazing or from over-utilization during extended drought periods. The potential plant community was made up of approximately 85 percent grasses and grass-like species, 10 percent forbs, and 5 percent shrubs. Dominant grasses include western wheatgrass, blue grama, and green needlegrass. Little bluestem, sideoats grama, needle-and-thread, and big bluestem comprise a minority of the plant community. Forbs, such as, cudweed sagewort and western ragweed may be commonly found. This plant community had similar plant

composition to the 2.2 Western Wheatgrass/Blue Grama /Kentucky Bluegrass Plant Community Phase; however, exotic species such as Kentucky bluegrass and smooth brome are not present.

When compared to the 1.1 Western Wheatgrass/Needlegrass Plant Community Phase, blue grama and buffalograss have increased due to their relatively high tolerance of heavy continuous grazing pressure. Green needlegrass has decreased and composition of the mid and tall warm-season grasses has been reduced. If the tall and mid grasses remain intact, this plant community tended to be resilient if the disturbance was not long-term.

Growth curve number: SD5302

Growth curve name: Southern Dark Brown Glaciated Plains, cool-season dominant, warm-season subdominant.

Growth curve description: Cool-season dominant, warm-season subdominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	10	23	34	15	6	5	4	0	0

Transitions or Pathways leading to other plant communities were as follows:

- 1.2a – Grazing, Precipitation, and Fire returned to normal disturbance regime levels and frequencies, along with precipitation and periodic light to moderate grazing with possible periodic rest will increase tall and mid growing grasses such as western wheatgrass and green needlegrass causing a return to the 1.1 Western Wheatgrass/Needlegrass Plant Community Phase.

Transitions from Reference State (State 1) to Native/Invaded Grass State (State 2)

- T1a – Encroachment of nonnative species such as Kentucky bluegrass and smooth brome, in combination of disruption with natural regimes, typically No Fire (fire suppression) following settlement will shift this plant community to the 2.0 Native/Invaded Grass State.

Transitions from Reference State (State 1) to Degraded State (State 3)

- T1b – Heavy Continuous Grazing at the same time of year, each year, without adequate recovery periods or chronic heavy grazing and/or Heavy Continuous Seasonal Grazing with stocking levels well above carrying capacity for extended portions of the growing season, and at the same time of year, each year, will shift this plant community to the 3.0 Degraded State.

Native/Invaded Grass State (State 2)

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

2.1 Western Wheatgrass/Needlegrass Plant Community Phase

This plant community phase is similar to the 1.1 Western Wheatgrass/Needlegrass Plant Community Phase but it also contains minor amounts of nonnative invasive grass species such as Kentucky bluegrass and smooth brome (up to 20 percent by air-dry weight). The potential vegetation is about 85 percent grass or grass-like plants, 10 percent forbs, and 5 percent shrubs. The community is dominated by cool-season grasses with warm-season grasses being subdominant. The major grasses include western wheatgrass and green needlegrass. Other grass species include big

bluestem, little bluestem, sideoats grama, slender wheatgrass, porcupine grass, and blue grama. This plant community expressed a high level of resilience and was well-adapted to the climate conditions in the Northern Great Plains including extended periods of drought and was sustainable in regards to site/soil stability, watershed function, and biological 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: SD5301

Growth curve name: Southern Dark Brown Glaciated Plains, cool-season dominant.

Growth curve description: Cool-season dominant.

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

Pathways leading to other plant communities within this state:

- 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 Western Wheatgrass/Blue Grama/Kentucky Bluegrass Plant Community Phase.

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

This plant community is a result of heavy continuous grazing pressure or from over utilization during extended drought periods. The potential plant community is made up of 80 percent grasses and grass-like species, 15 percent forbs, and 5 percent shrubs. Dominant grasses include western wheatgrass, blue grama, and Kentucky bluegrass. Secondary grasses include sideoats grama, little bluestem, green needlegrass, needle-and-tread, porcupine grass, big bluestem, buffalo grass, smooth brome, and sedges. Cudweed sagewort and western ragweed may be commonly found.

When compared to the 2.1 Western Wheatgrass/Needlegrass Plant Community Phase, blue grama has decreased and green needlegrass and sideoats grama have decreased and the production of mid and tall warm-season grasses has been reduced. This plant community phase is moderately resilient. The herbaceous species present are well-adapted to grazing; however, species composition can be altered through long-term overgrazing. If the herbaceous component is intact, it tends to be resilient if the disturbance is not long-term.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during an average year:

Growth curve number: SD5302

Growth curve name: Southern Dark Brown Glaciated Plains, cool-season dominant, warm-season subdominant.

Growth curve description: Cool-season dominant, warm-season subdominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	10	23	34	15	6	5	4	0	0

Pathways leading to other plant communities within this state:

- 2.2a–Prescribed Grazing alternating season of use and providing adequate recovery periods or periodic light to moderate grazing possibly will convert this plant community to the 2.1 Western Wheatgrass/Needlegrass Plant Community Phase.

Transitions from Native/Invaded State (State 2) to Degraded State (State 3)

- T2a – Heavy Continuous Seasonal Grazing with stocking levels well above carrying capacity for extended portions of the growing season, and at the same time of year, each year, and/or Heavy Continuous Season-Long Grazing with stocking levels well above carrying capacity utilizing available forage through the majority of the growing season in the absence of adequate rest periods, and grazing at the same period each year will shift this plant community to the 3.1 Blue Grama/Buffalograss Sod Plant Community Phase within the 3.0 Degraded State.

Transitions from Native/Invaded Grass State (State 2) to Invaded State (State 4)

- T2b – Non-Use and No Fire for extended periods of time (typically for 10 or more years) can lead this state over a threshold to the 4.0 Invaded State. Heavy continuous Seasonal Grazing at the same time of year, each year, without adequate recovery periods or chronic heavy grazing will also result in crossing this threshold.

Degraded State (State 3)

This state is the result of heavy continuous grazing by large herbivores or excessive grazing by rodents. Extended drought periods attribute to and may hasten the transition to this state. This state is characterized by a dominance of blue grama and buffalograss. Heavy, repeated, continuous grazing eventually reduces the vigor and occurrence of the tall and mid grasses characteristic of the 1.0 Reference and 2.0 Native/Invaded Grass States. Low growth forms and low and late extending growing points allow blue grama, buffalograss, and upland sedges to tolerate and sometimes avoid heavy continuous grazing. Low desirability by herbivores also results in an increase in plants such as threeawn, sageworts, cactus, and various unpalatable forb or shrub species. This state has a high level of resiliency and changes occur very slowly with long-term prescribed grazing. In many cases, renovation may be the only feasible alternative to return this state to a state resembling the 2.0 Native/Invaded Grass State.

3.1 Blue Grama/Buffalograss Sod Plant Community Phase

This plant community evolved under heavy continuous grazing or from over utilization during extended drought periods. The potential plant community was made up of about 85 percent grasses or grass like species, 10 percent forbs, and 5 percent shrubs. Dominant grasses are blue grama and buffalograss. Sedges and western wheatgrass are usually of secondary importance. Cudweed sagewort, cactus, and scarlet globemallow are also present. When compared to the 1.1 Western Wheatgrass/Needlegrass Plant Community Phase, mid- and tall grasses have decreased significantly. This plant community phase is very resistant to change and the herbaceous species tolerate heavy grazing use. This plant community yields significantly less biomass than most other plant community phases found on this site. A thick “sod” of blue grama and buffalograss reduces the opportunity for other species to establish on this site.

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: SD5304

Growth curve name: Southern Dark Brown Glaciated Plains, warm-season dominant, cool-season subdominant.

Growth curve description: Warm-season dominant, cool-season subdominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	7	17	25	25	15	7	1	0	0

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

- 3.1a – Heavy Continuous Grazing at the same time of year, each year, without adequate recovery periods, or Frequent Severe Defoliation by mammals such as rodents will shift this community to the 3.2 Threeawn/Forb Plant Community Phase.
- R3 – 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 will shift this community to the 2.0 Native/Invaded Grass State.

3.2 Threeawn/Forbs Plant Community Phase

This plant community is a result of heavy continuous grazing, frequent severe defoliation, or from over utilization during extended drought periods. This is a short, warm-season dominated state with cool-season subdominant grasses. The potential plant community is made up of approximately 65 percent grasses and grass-like species, 30 percent forbs, and 5 percent shrubs. Dominant grasses include threeawn species and annual grasses. Grasses of secondary importance include annual bromes and Kentucky bluegrass. When compared to the 1.1 Western Wheatgrass/Needlegrass Plant Community Phase, western wheatgrass and green needlegrass have been greatly reduced. Production of mid- and tall warm-season grasses has also been reduced and invasive and less desirable grasses dominate. Percent bare ground is also increased. This plant community is resistant to change to a different state but is very sensitive to becoming an annual grass and invader state. The herbaceous species present are not well adapted to grazing and composition can be easily altered through long-term overgrazing.

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: SD5304

Growth curve name: Southern Dark Brown Glaciated Plains, warm-season dominant, cool-season subdominant.

Growth curve description: Warm-season dominant, cool-season subdominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	7	17	25	25	15	7	1	0	0

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

- 3.2a – 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 periods will shift this community to the 3.1 Blue Grama/Buffalograss Sod Plant Community Phase. 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.
- T3 – Heavy Continuous Season Long Grazing with stocking levels well above carrying capacity utilizing available forage through the majority of the growing season in the absence of adequate rest periods, and grazing at the same period each year will shift this plant community to the 4.3 Annual/Pioneer, Non-native Perennial Plant Community Phase within the 4.0 Invaded State.

Invaded State (State 4)

This state is the result of invasion and dominance of introduced species. This state is characterized by the dominance of smooth brome, crested wheatgrass, and Kentucky bluegrass, and an increasing thatch layer that effectively blocks introduction of other plants into the system. Plant litter accumulation tends to favor the more shade tolerant introduced grass species. The nutrient cycle is also impaired, and the result is typically a higher level of nitrogen which also favors the introduced species. Increasing plant litter decreases the amount of sunlight reaching plant crowns thereby shifting competitive advantage to shade tolerant introduced grass species. Studies indicate that soil biological activity is altered and this shift apparently exploits the soil microclimate and encourages growth of the introduced grass species. Once the threshold is crossed, a change in grazing management alone cannot cause a reduction in the invasive grass dominance. Preliminary studies tend to indicate this threshold may exist when Kentucky bluegrass exceeds 30 percent of the plant community and native grasses represent less than 40 percent of the plant community composition. Once the state is well established, even drastic events such as high intensity fires driven by high fuel loads of litter and thatch will not result in more than a very short-term reduction of Kentucky bluegrass. These events may reduce the dominance of Kentucky bluegrass but due to the large amount of rhizomes in the soil there is no opportunity for the native species to establish and dominate before Kentucky bluegrass rebounds and again dominates the system.

4.1 Smooth Brome/Kentucky Bluegrass/Crested Wheatgrass Plant Community Phase

This plant community phase is a result of extended periods of nonuse and no fire. Due to the relatively high grazing tolerance of smooth brome and Kentucky bluegrass, this plant community phase may also be the result of heavy continuous grazing that eventually eliminates many native grass species. It is characterized by a dominance of smooth brome and Kentucky bluegrass. Crested wheatgrass may also be present in varying amounts within this plant community phase but will rarely exceed 20 percent of total biomass. The dominance is at times so complete that other species are difficult to find on the site. A thick duff layer also accumulates at or above the soil surface. Nutrient cycling is greatly reduced and native plants have great difficulty becoming established. When dominated by smooth brome, infiltration is moderately reduced and runoff is moderate. Production can be equal to or higher than the interpretive plant community. However, when dominated by Kentucky bluegrass, infiltration is greatly reduced and runoff is high. Production in this case is similar to the interpretive plant community. In either case, the period that palatability is high is relatively short, as these cool-season species mature rapidly. Energy capture is also reduced.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during an average year:

Growth curve number: SD5301

Growth curve name: Southern Dark Brown Glaciated Plains, cool-season dominant.

Growth curve description: Cool-season dominant.

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

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

- 4.1a – Heavy Continuous Grazing at the same time of year, each year, without adequate recovery periods or chronic heavy grazing will shift this community to the 4.2 Kentucky Bluegrass Plant Community Phase.

4.2 Kentucky Bluegrass Plant Community Phase

This plant community phase is a result of heavy, continuous grazing. It is characterized by a dominance of Kentucky bluegrass. The dominance is at times so complete that other species are difficult to find on the site. A relatively thick duff layer can sometimes accumulate at or above the soil

surface. Nutrient cycling is greatly reduced and native plants have great difficulty becoming established. Infiltration is greatly reduced and runoff is high. Production will be significantly reduced when compared to the interpretive plant community. The period that palatability is high is relatively short as Kentucky bluegrass matures rapidly. Energy capture is also reduced. Biological activity in the soil is likely reduced significantly in this phase.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during an average year:

Growth curve number: SD5302

Growth curve name: Southern Dark Brown Glaciated Plains, cool-season dominant, warm-season subdominant.

Growth curve description: Cool-season dominant, warm-season subdominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	10	23	34	15	6	5	4	0	0

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

- 4.2a – Prescribed Grazing 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 4.1 Smooth Brome/Kentucky Bluegrass/Crested Wheatgrass Plant Community Phase.

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

This plant community developed under continuous heavy grazing or other excessive disturbances (e.g., heavy use areas, defoliation by rodents, etc.). The potential plant community is made up of approximately 40 to 80 percent grasses and grass-like species, 20 to 60 percent forbs, and 0 to 5 percent shrubs. The species present in this phase are highly variable but often include nonnative invasive and/or early seral species. Plant diversity is low (plant richness may be high but areas are often dominated by a few species). The ecological processes are difficult to restore because of the loss of plant diversity and overall soil disturbance. Soil erosion is potentially very high because of the bare ground and shallow rooted herbaceous plant community. Water runoff will increase and infiltration will decrease due to animal related soil compaction and loss of root mass due to low plant diversity and vigor. This plant community will require significant economic inputs and time to move towards another plant community. This movement is highly variable in its succession. This is due to the loss of diversity (including the loss of the seed bank), within the existing plant community, and the plant communities on adjacent sites. This community can be renovated to improve the production capability; however, if management changes are not made the vegetation could revert back to a threawn/annual community.

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

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

- 4.3a – Time 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 shift this plant community to the 4.2 Kentucky Bluegrass Plant Community Phase. Pest Management may also be required to control non-native and pioneer invasive species.

Restoration Pathway From Invaded State (State 4) to the Native/Invaded State (State 2)

- R4 – Prescribed Fire occurring at relatively frequent intervals and occasional grazing events immediately following early season fire will cause a reduction in cool-season grasses such as

Kentucky bluegrass and smooth brome and an increase in warm-season and later growing cool-season grasses. Warm-season grasses are more tolerant of short fire return intervals. Fire will temporarily increase the vigor and production of warm-season grasses and many native cool-season grasses when fire is timed properly. Pest management using chemical or mechanical treatment to suppress invasive cool-season grasses may also be required. This results in a shift to the 2.0 Native/Invaded Grass State. This would also require Long-Term Management with Prescribed Grazing (periodic light to moderate grazing with possible periodic rest). This may take up to 10 years or more, and recovery may not be attainable.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

-- Under Development --

Western Wheatgrass/Needlegrass Plant Community Phase (1.1):

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

Western Wheatgrass/Needlegrass Plant Community Phase (2.1):

Western Wheatgrass/Blue Grama/Kentucky Bluegrass Plant Community Phase (2.2):

Blue Grama/Buffalograss Sod Plant Community Phase (3.1):

Three Awn/Forbs Plant Community Phase (3.2):

Smooth Brome/Kentucky Bluegrass/Crested Wheatgrass Plant Community Phase (4.1):

Kentucky Bluegrass Plant Community Phase (4.2):

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

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

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
Grass and Grasslike							
big bluestem	U D P D	U D U U	U D P D	U D U U	U D U U	U D P D	U D P D
blue grama	U D P U	D P P D	U D P U	D P P D	D P P D	U D P U	U D P U
buffalograss	U U D U	N U D U	U U D U	N U D U	N U D U	U U D U	U U D U
green needlegrass	U P U D	N P N P	U P U D	N P N P	N P N P	U P U D	U P U D
Indiangrass	U D P D	U D U U	U D P D	U D U U	U D U U	U D P D	U D P D
little bluestem	U D D U	N D N N	U D D U	N D N N	N D N N	U D D U	U D D U
needleandthread	U D U D	N D N U	U D U D	N D N U	N D N U	U D U D	U D U D
plains muhly	U U D U	U U D U	U U D U	N N N N	N N N N	U U D U	U U D U
porcupine grass	U P U D	N D N U	U P U D	N D N U	N D N U	U P U D	U P U D
prairie dropseed	N U P U	N U D U	N U P U	N U D U	N U D U	N U P U	N U P U
prairie junegrass	U D U D	N D N U	U D U D	N D N U	N D N U	U D U D	U D U D
sand dropseed	N U N N	N U N N	N U N N	N U N N	N U N N	N U N N	N U N N
Scribner panicum	U U D U	N U N N	U U D U	N U N N	N U N N	U U D U	U U D U
sedge	U D U D	U P N D	U D U D	U D U D	U D U D	U D U D	U D U D
sideoats grama	U D P U	U P D U	U D P U	U P D U	U P D U	U D P U	U D P U
slender wheatgrass	U P U U	N D U N	U P U U	N D U N	N D U N	U P U U	U P U U
switchgrass	U D U U	U D U U	U D U U	N N N N	N N N N	U D U U	U D U U
tall dropseed	N U N N	N U N N	N U N N	N U N N	N U N N	N U N N	N U N N
threeawn	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N
western wheatgrass	U P D U	N D N N	U P D U	N D N N	N D N N	U P D U	U P D U
Forbs							
American vetch	U D P U	U P P U	U D P U	U P P U	U P P U	U D P U	U P P U
catclaw sensitive briar	U D P U	U P P U	U D P U	U P P U	U P P U	U D P U	U P P U
cudweed sagewort	U U U U	U U D U	U U U U	U U D U	U U D U	U U U U	U U D U
deervetch	U U U U	U D D U	U U U U	U D D U	U D D U	U U U U	U D D U
dotted gayfeather	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
false boneset	U U D U	N D U N	U U D U	N D U N	N D U N	U U D U	N D U N
goldenrod	U U D U	N U U N	U U D U	N U U N	N U U N	U U D U	N U U N
green sagewort	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
groundplum milkvetch	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
heath aster	U U D U	U U P U	U U D U	U U P U	U U P U	U U D U	U U P U
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
penstemon	U U U U	U P P U	U U U U	U P P U	U P P U	U U U U	U P P U
prairie coneflower	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
purple coneflower	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
purple prairie clover	U D P U	U P P U	U D P U	U P P U	U P P U	U D P U	U P P U
rush skeletonweed	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
scarlet gaura	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
scurfpea	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
stiff sunflower	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U
western ragweed	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
western yarrow	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
Shrubs							
fringed sagewort	U U U U	U U U U	U U U U	U D D U	U P P D	U U U U	U U U D
leadplant	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U
plains pricklypear	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
rose	U D D U	U D D U	U D D U	U D D U	U D D U	U D D U	U D D U
western snowberry	U U U U	U U U U	U U U U	D U D D	U U U U	U U U U	D U U U

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

[†] Quarters: 1 – Jan., Feb., Mar.; 2 – Apr., May, Jun.; 3 – Jul., Aug., Sep.; 4 – Oct., Nov., Dec.

Animal Community – Grazing Interpretations

The following table lists annual, suggested initial stocking rates with average growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of conservation planning. Often, the current plant composition does not entirely match any particular plant community (as described in this ES description). Because of this, a resource inventory is necessary to document plant composition and production. More accurate carrying capacity estimates should eventually be calculated using the following stocking rate information along with animal preference data and actual stocking records, particularly when grazers other than cattle are involved. With consultation of the land manager, more intensive grazing management may result in improved harvest efficiencies and increased carrying capacity.

Plant Community	Average Annual Production (lbs./acre, air-dry)	Stocking Rate* (AUM/acre)
Western Wheatgrass/Needlegrass (1.1):	2,800	0.77
Western Wheatgrass/Blue Grama/Kentucky Bluegrass (2.2):	2,400	0.66
Blue Grama/ Buffalograss Sod (3.1):	1,800	0.49
Three Awn/ Forbs (3.2):	1,000	0.27
Smooth Brome/Kentucky Bluegrass/Crested Wheatgrass (4.1):	3,000	0.82
Kentucky Bluegrass Plant Community Phase (4.2):	2,200	0.60
Annual/Pioneer, Non-native Perennial (4.3):	900	0.25

*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 B with localized areas in hydrologic group C. 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 blue grama, buffalograss, bluegrass, and/or smooth brome grass 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

Clayey (R053CY011SD), Thin Upland (R053CY012SD), Loamy Overflow (R053CY020SD)

Similar Sites

(R053CY020SD) – Loamy Overflow [more big bluestem; higher production]

(R053CY011SD) – Clayey [more green needlegrass; less needleandthread and big bluestem]

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; Mitch Faulkner, RMS, NRCS; and Kelly Stout, 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

SD, State Range Management Specialist

Date