

United States Department of Agriculture Natural Resources Conservation Service

Ecological Site Description

Site Type: Rangeland

Site Name: Clayey

Site ID: R102AY011SD

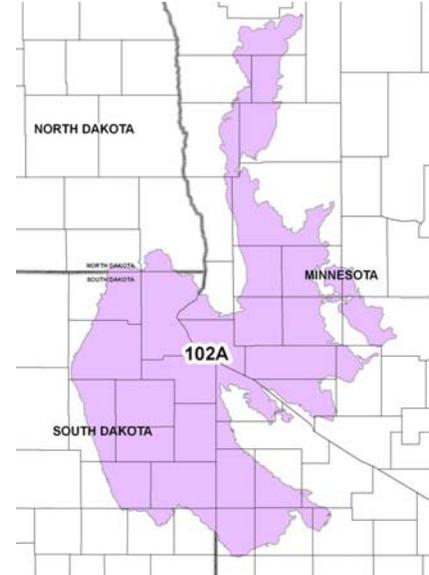
Major Land Resource Area (MLRA): 102A – Rolling Till Prairie

Physiographic Features

This site occurs on nearly level to steeply sloping uplands.

Landform: plain, till plain, collapsed ice-walled lakebed

Aspect: N/A



	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	1,000	2,000
Slope (percent):	0	30
Water Table Depth (inches):	30	80
Flooding:		
Frequency:	None	None
Duration:	None	None
Ponding:		
Depth (inches):	0	6
Frequency:	None	Occasional
Duration:	None	Long
Runoff Class:	Low	Very high

Climatic Features

MLRA 102A 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 21 to 27 inches per year. The average annual temperature is about 43°F. January is the coldest month with average temperatures ranging from about 5°F (Mahnomen 1 W, Minnesota (MN)), to about 14°F (Tracy, MN). July is the warmest month with temperatures averaging from about 69°F (Mahnomen 1 W, MN), to about 73°F (Tracy, MN). The range of normal average monthly temperatures between the coldest and warmest months is about 62°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):	121	152
Freeze-free period (days):	145	174
Mean Annual Precipitation (inches):	21	27

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

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.50	0.78	-5.9	23.1
February	0.50	0.76	1.1	27.8
March	0.86	1.46	15.0	39.4
April	2.00	2.52	30.5	56.5
May	2.93	3.14	42.5	70.0
June	3.67	4.14	52.0	79.4
July	3.17	3.66	56.3	84.7
August	2.64	3.60	54.2	82.3
September	1.98	2.83	44.6	73.6
October	1.52	2.14	34.1	60.8
November	0.74	1.23	18.4	41.9
December	0.45	0.76	2.8	27.9

Climate Stations		Period	
Station ID	Location or Name	From	To
SD0281	Arlington 1 W, SD	1928	2009
MN0667	Benson, MN	1952	2009
SD1739	Clark, SD	1893	2009
MN5012	Mahnomen 1 W, MN	1927	1998
MN8323	Tracy, MN	1912	2009
SD8980	Waubay National Wildlife Refuge, SD	1952	2009

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 the clay loam to clay textured subsurface soils with slopes ranging from 0 to 30 percent. The soils in this site are typically well to moderately well-drained and formed in till or glaciolacustrine deposits. The clay loam to clay surface layer is typically 6 to 12 inches thick. The soils have a slow to very slow infiltration rate. 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/HomePage.htm>) for specific local soils information.

Parent Material Kind: till, unspecified; and glaciolacustrine deposits

Parent Material Origin:

Surface Texture: clay loam, silty clay, clay

Surface Texture Modifier: none

Subsurface Texture Group: clayey

Surface Fragments ≤3” (% Cover): 0-5

Surface Fragments >3” (%Cover): 0

Subsurface Fragments ≤3” (% Volume): 0-7

Subsurface Fragments >3” (% Volume): 0-2

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	somewhat poorly	well
Permeability Class:	very slow	slow
Depth (inches):	80	80
Electrical Conductivity (mmhos/cm)*:	0	8
Sodium Absorption Ratio*:	0	10
Soil Reaction (1:1 Water)*:	6.1	8.4
Soil Reaction (0.1M CaCl₂)*:	NA	NA
Available Water Capacity (inches)*:	6	7
Calcium Carbonate Equivalent (percent)*:	0	30

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

Plant Communities

Ecological Dynamics of the Site:

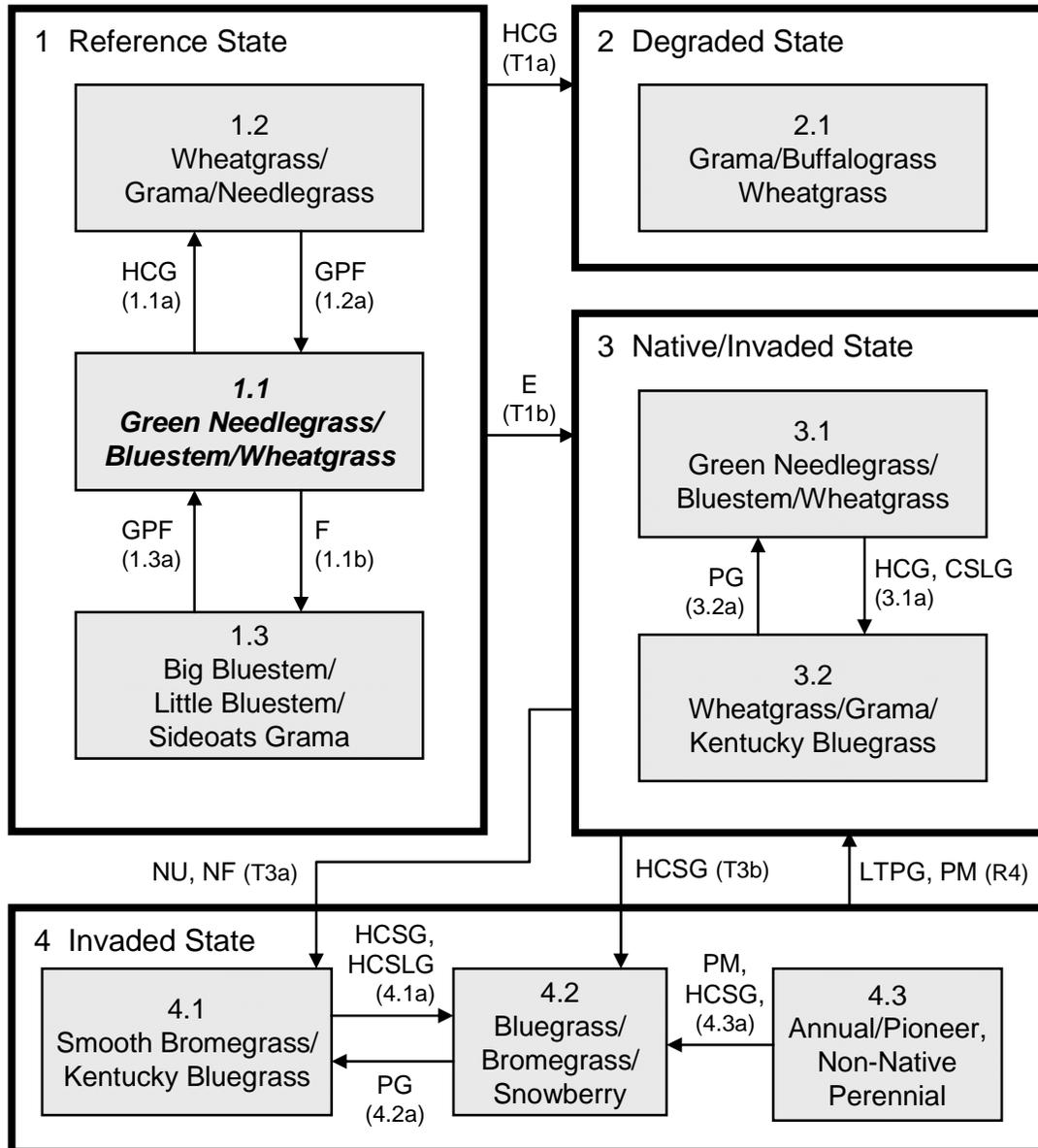
This site developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfire (often of light intensities), and other biotic and abiotic factors that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts of native and/or exotic plant and animal species, and management actions. While the following plant community descriptions describe more typical transitions that will occur, severe disturbances, such as periods of well below average precipitation, can cause significant shifts in plant communities and/or species composition that may not be described within this document.

Heavy continuous 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 cause departure from the 3.1 Green Needlegrass/Bluestem/Wheatgrass Plant Community Phase. Green needlegrass, little bluestem, and the tall warm-season grasses will decrease, while wheatgrass, sideoats grama, and blue grama will increase. Eventually, blue grama, quackgrass, and Kentucky bluegrass may develop into a sod. 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 and smooth brome grass.

Interpretations are primarily based on the 1.1 Green Needlegrass/Bluestem/Wheatgrass 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.

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



Refer to narrative for details on pathways: **C** – Cropped, abandoned; **CSLG** – Continuous season-long grazing; **E** – Encroachment of introduced species; **F** – Fire; **GPF** – Grazing, precipitation, and/or fire returning to more normal disturbance regime levels and frequencies; **HCG** – Heavy continuous grazing; **HCSG** – Heavy continuous seasonal grazing; **HCSLG** – Heavy continuous season-long grazing; **LTPG** – Long-term prescribed grazing; **NU, NF** – Non-use, no fire; **PG** – Prescribed grazing; **PM** – Pest management (herbicide); **S** – Seeding.

E, S,
C (T5)

Any Plant Community

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	1.1 Green Needlegrass/ Bluestem/Wheatgrass		
			Group	lbs./acre	% Comp
GRASSES & GRASS-LIKES				2805 - 3135	85 - 95
COOL-SEASON BUNCHGRASSES			1	495 - 990	15 - 30
green needlegrass	Nassella viridula	NAVI4	1	330 - 990	10 - 30
porcupine grass	Hesperostipa spartea	HESP11	1	165 - 495	5 - 15
Canada wildrye	Elymus canadensis	ELCA4	1	0 - 99	0 - 3
TALL WARM-SEASON GRASSES			2	330 - 990	10 - 30
big bluestem	Andropogon gerardii	ANGE	2	231 - 990	7 - 30
Indiangrass	Sorghastrum nutans	SONU2	2	33 - 165	1 - 5
tall dropseed	Sporobolus compositus var. compositus	SPCOC2	2	33 - 165	1 - 5
switchgrass	Panicum virgatum	PAVI2	2	0 - 165	0 - 5
MID WARM-SEASON GRASSES			3	330 - 825	10 - 25
little bluestem	Schizachyrium scoparium	SCSC	3	165 - 660	5 - 20
sideoats grama	Bouteloua curtipendula	BOCU	3	165 - 495	5 - 15
prairie dropseed	Sporobolus heterolepis	SPHE	3	33 - 165	1 - 5
WHEATGRASS			4	264 - 495	8 - 15
western wheatgrass	Pascopyrum smithii	PASM	4	165 - 495	5 - 15
slender wheatgrass	Elymus trachycaulus	ELTR7	4	66 - 330	2 - 10
SHORT WARM-SEASON GRASSES			5	66 - 165	2 - 5
blue grama	Bouteloua gracilis	BOGR2	5	33 - 165	1 - 5
buffalograss	Bouteloua dactyloides	BODA2	5	33 - 165	1 - 5
threeawn	Aristida spp.	ARIST	5	0 - 66	0 - 2
OTHER NATIVE GRASSES			6	66 - 165	2 - 5
prairie junegrass	Koeleria macrantha	KOMA	6	33 - 99	1 - 3
Scribner panicum	Dichanthelium oligosanthes var. scribnerianum	DIOLS	6	33 - 66	1 - 2
other grasses		ZGRAM	6	0 - 132	0 - 4
GRASS-LIKES			7	33 - 165	1 - 5
needleleaf sedge	Carex duriuscula	CADU6	7	33 - 165	1 - 5
other grass-like		ZGL	7	0 - 99	0 - 3
FORBS			9	165 - 330	5 - 10
American vetch	Vicia americana	VIAM	9	33 - 66	1 - 2
candle anemone	Anemone cylindrica	ANCY	9	0 - 33	0 - 1
cutweed sagewort	Artemisia ludoviciana	ARLU	9	33 - 66	1 - 2
deervetch	Lotus unifoliolatus var. unifoliolatus	LOUNU	9	33 - 66	1 - 2
false boneset	Brickellia eupatorioides	BREU	9	0 - 66	0 - 2
gayfeather	Liatris spp.	LIATR	9	33 - 66	1 - 2
goldenrod	Solidago spp.	SOLID	9	33 - 66	1 - 2
heath aster	Symphotrichum ericoides	SYER	9	33 - 66	1 - 2
Lambert crazyweed	Oxytropis lambertii	OXLA3	9	0 - 33	0 - 1
Northern Idaho biscuitroot	Lomatium orientale	LOOR	9	33 - 66	1 - 2
penstemon	Penstemon spp.	PENST	9	0 - 66	0 - 2
prairie coneflower	Ratibida columnifera	RACO3	9	33 - 66	1 - 2
purple coneflower	Echinacea angustifolia	ECAN2	9	33 - 66	1 - 2
purple prairie clover	Dalea purpurea	DAPU5	9	0 - 66	0 - 2
pussytoes	Antennaria spp.	ANTEN	9	0 - 33	0 - 1
rush skeletonweed	Lygodesmia juncea	LYJU	9	0 - 33	0 - 1
scarlet gaura	Gaura coccinea	GACO5	9	0 - 33	0 - 1
silverleaf scurfpea	Pediomelum argophyllum	PEAR6	9	33 - 66	1 - 2
stiff sunflower	Helianthus pauciflorus	HEPA19	9	33 - 66	1 - 2
wavyleaf thistle	Cirsium undulatum	CIUN	9	0 - 66	0 - 2
western ragweed	Ambrosia psilostachya	AMPS	9	33 - 66	1 - 2
western wallflower	Erysimum capitatum var. capitatum	ERCAC	9	0 - 33	0 - 1
western yarrow	Achillea millefolium var. occidentalis	ACMIO	9	33 - 66	1 - 2
wild bergamot	Monarda fistulosa	MOFI	9	0 - 33	0 - 1
wild onion	Allium spp.	ALLIU	9	0 - 33	0 - 1
woolly verbena	Verbena stricta	VEST	9	0 - 66	0 - 2
native forbs		ZFN	9	33 - 99	1 - 3
SHRUBS			10	99 - 165	3 - 5
fringed sagewort	Artemisia frigida	ARFR4	10	0 - 33	0 - 1
leadplant	Amorpha canescens	AMCA6	10	33 - 99	1 - 3
rose	Rosa spp.	ROSA5	10	33 - 66	1 - 2
snowberry	Symphoricarpos spp.	SYMPH	10	33 - 66	1 - 2
other shrubs		ZSHRUB	10	0 - 66	0 - 2

Annual Production lbs./acre	LOW	RV	HIGH
GRASSES & GRASS-LIKES	2260	2921	3430
FORBS	145	248	385
SHRUBS	95	132	185
TOTAL	2500	3300	4000

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 Green Needlegrass/ Bluestem/Wheatgrass			3.2 Wheatgrass/Grama/ Kentucky Bluegrass			4.1 Smooth Bromegrass/ Kentucky Bluegrass			4.2 Bluegrass/ Bromegrass/Snowberry		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
GRASSES & GRASS-LIKES													
COOL-SEASON BUNCHGRASSES		1	495 - 990	15 - 30	1	26 - 260	1 - 10	1	0 - 210	0 - 7	1	0 - 44	0 - 2
green needlegrass	NAV14	1	330 - 990	10 - 30	1	26 - 260	1 - 10	1	0 - 210	0 - 7	1	0 - 44	0 - 2
porcupine grass	HESP11	1	165 - 495	5 - 15	1	0 - 130	0 - 5						
Canada wildrye	ELCA4	1	0 - 99	0 - 3				1	0 - 60	0 - 2			
TALL WARM-SEASON GRASSES		2	330 - 990	10 - 30	2	0 - 208	0 - 8	2	0 - 90	0 - 3	2		
big bluestem	ANGE	2	231 - 990	7 - 30	2	0 - 208	0 - 8						
Indiangrass	SONU2	2	33 - 165	1 - 5									
tall dropseed	SPCOC2	2	33 - 165	1 - 5	2	0 - 78	0 - 3	2	0 - 90	0 - 3			
switchgrass	PAV12	2	0 - 165	0 - 5									
MID WARM-SEASON GRASSES		3	330 - 825	10 - 25	3	26 - 390	1 - 15	3	0 - 150	0 - 5	3	0 - 132	0 - 6
little bluestem	SCSC	3	165 - 660	5 - 20	3	0 - 208	0 - 8	3	0 - 60	0 - 2	3	0 - 44	0 - 2
sideoats grama	BOCU	3	165 - 495	5 - 15	3	26 - 390	1 - 15	3	0 - 120	0 - 4	3	0 - 110	0 - 5
prairie dropseed	SPHE	3	33 - 165	1 - 5									
WHEATGRASS		4	264 - 495	8 - 15	4	130 - 650	5 - 25	4	0 - 150	0 - 5	4	0 - 88	0 - 4
western wheatgrass	PASM	4	165 - 495	5 - 15	4	130 - 650	5 - 25	4	0 - 150	0 - 5	4	0 - 88	0 - 4
slender wheatgrass	ELTR7	4	66 - 330	2 - 10	4	0 - 182	0 - 7	4	0 - 150	0 - 5			
SHORT WARM-SEASON GRASSES		5	66 - 165	2 - 5	5	130 - 390	5 - 15	5	0 - 90	0 - 3	5	0 - 176	0 - 8
blue grama	BOGR2	5	33 - 165	1 - 5	5	52 - 312	2 - 12	5	0 - 90	0 - 3	5	0 - 154	0 - 7
buffalograss	BODA2	5	33 - 165	1 - 5	5	26 - 208	1 - 8	5	0 - 60	0 - 2	5	0 - 154	0 - 7
threawn	ARIST	5	0 - 66	0 - 2	5	0 - 78	0 - 3	5	0 - 90	0 - 3	5	0 - 110	0 - 5
OTHER NATIVE GRASSES		6	66 - 165	2 - 5	6	52 - 130	2 - 5	6	0 - 150	0 - 5	6	0 - 110	0 - 5
prairie junegrass	KOMA	6	33 - 99	1 - 3	6	26 - 52	1 - 2	6	0 - 30	0 - 1			
Scribner panicum	DIOLS	6	33 - 66	1 - 2	6	26 - 52	1 - 2	6	0 - 30	0 - 1	6	0 - 22	0 - 1
other grasses	2GRAM	6	0 - 132	0 - 4	6	0 - 130	0 - 5	6	0 - 150	0 - 5	6	0 - 110	0 - 5
GRASS-LIKES		7	33 - 165	1 - 5	7	26 - 182	1 - 7	7	30 - 210	1 - 7	7	44 - 330	2 - 15
needleleaf sedge	CADU6	7	33 - 165	1 - 5	7	26 - 182	1 - 7	7	30 - 210	1 - 7	7	44 - 330	2 - 15
other grass-likes	2GL	7	0 - 99	0 - 3	7	0 - 104	0 - 4	7	0 - 90	0 - 3	7	0 - 110	0 - 5
NON-NATIVE GRASSES		8			8	130 - 390	5 - 15	8	1050 - 2100	35 - 70	8	660 - 1320	30 - 60
Kentucky bluegrass	POPR				8	78 - 390	3 - 15	8	300 - 1800	10 - 60	8	220 - 1320	10 - 60
quackgrass	ELRE4				8	0 - 130	0 - 5	8	0 - 150	0 - 5	8	0 - 220	0 - 10
smooth bromegrass	BRIN2				8	0 - 208	0 - 8	8	300 - 1800	10 - 60	8	0 - 220	0 - 10
FORBS		9	165 - 330	5 - 10	9	130 - 390	5 - 15	9	150 - 300	5 - 10	9	110 - 330	5 - 15
American vetch	VIAM	9	33 - 66	1 - 2	9	0 - 26	0 - 1						
candle anemone	ANCY	9	0 - 33	0 - 1									
cudweed sawwort	ARLU	9	33 - 66	1 - 2	9	26 - 78	1 - 3	9	30 - 90	1 - 3	9	22 - 110	1 - 5
deervetch	LOUNU	9	33 - 66	1 - 2	9	0 - 26	0 - 1						
false boneset	BREU	9	0 - 66	0 - 2									
gayfeather	LIATR	9	33 - 66	1 - 2	9	0 - 26	0 - 1	9	0 - 30	0 - 1			
goldenrod	SOLID	9	33 - 66	1 - 2	9	26 - 104	1 - 4	9	30 - 90	1 - 3	9	22 - 110	1 - 5
heath aster	SYER	9	33 - 66	1 - 2	9	26 - 78	1 - 3	9	30 - 90	1 - 3	9	22 - 66	1 - 3
Lambert crazyweed	OXL3	9	0 - 33	0 - 1	9	0 - 26	0 - 1						
Northern Idaho biscuitroot	LOOR	9	33 - 66	1 - 2	9	0 - 26	0 - 1	9	0 - 30	0 - 1			
penstemon	PENST	9	0 - 66	0 - 2									
prairie coneflower	RACO3	9	33 - 66	1 - 2	9	0 - 26	0 - 1	9	0 - 30	0 - 1			
purple coneflower	ECAN2	9	33 - 66	1 - 2	9	0 - 26	0 - 1						
purple prairie clover	DAPU5	9	0 - 66	0 - 2	9	0 - 26	0 - 1	9	0 - 30	0 - 1			
pussytoes	ANTEN	9	0 - 33	0 - 1	9	0 - 26	0 - 1				9	0 - 22	0 - 1
rush skeletonweed	LYJU	9	0 - 33	0 - 1	9	0 - 26	0 - 1	9	0 - 30	0 - 1			
scarlet gaura	GACO5	9	0 - 33	0 - 1									
silverleaf scurfpea	PEAR6	9	33 - 66	1 - 2	9	26 - 78	1 - 3	9	30 - 90	1 - 3	9	22 - 66	1 - 3
stiff sunflower	HEPA19	9	33 - 66	1 - 2									
wavyleaf thistle	CIUN	9	0 - 66	0 - 2	9	0 - 52	0 - 2	9	0 - 30	0 - 1			
western ragweed	AMPS	9	33 - 66	1 - 2	9	26 - 78	1 - 3	9	30 - 90	1 - 3	9	22 - 110	1 - 5
western wallflower	ERCAC	9	0 - 33	0 - 1									
western yarrow	ACMIO	9	33 - 66	1 - 2	9	26 - 78	1 - 3	9	30 - 60	1 - 2	9	22 - 88	1 - 4
wild bergamot	MOFI	9	0 - 33	0 - 1									
wild onion	ALLIU	9	0 - 33	0 - 1	9	0 - 26	0 - 1						
woolly verbena	VEST	9	0 - 66	0 - 2	9	0 - 52	0 - 2	9	0 - 60	0 - 2	9	0 - 44	0 - 2
native forbs	2FN	9	33 - 99	1 - 3	9	26 - 78	1 - 3	9	0 - 60	0 - 2	9	0 - 22	0 - 1
introduced forbs	2FI				9	26 - 78	1 - 3	9	30 - 90	1 - 3	9	22 - 110	1 - 5
SHRUBS		10	99 - 165	3 - 5	10	52 - 260	2 - 10	10	60 - 300	2 - 10	10	44 - 220	2 - 10
fringed sawwort	ARFR4	10	0 - 33	0 - 1	10	0 - 78	0 - 3	10	0 - 30	0 - 1	10	0 - 44	0 - 2
leadplant	AMCA6	10	33 - 99	1 - 3	10	0 - 26	0 - 1						
rose	ROSA5	10	33 - 66	1 - 2	10	26 - 52	1 - 2	10	0 - 60	0 - 2	10	0 - 22	0 - 1
snowberry	SYMPH	10	33 - 66	1 - 2	10	26 - 208	1 - 8	10	60 - 300	2 - 10	10	44 - 220	2 - 10
other shrubs	2SHRUB	10	0 - 66	0 - 2	10	0 - 52	0 - 2	10	0 - 60	0 - 2	10	0 - 44	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			2260 - 2921 - 3430		1835 - 2184 - 2445		2110 - 2595 - 3110		1460 - 1848 - 2165				
FORBS			145 - 248 - 385		115 - 260 - 460		135 - 225 - 345		100 - 220 - 385				
SHRUBS			95 - 132 - 185		50 - 156 - 295		55 - 180 - 345		40 - 132 - 250				
TOTAL			2500 - 3300 - 4000		2000 - 2600 - 3200		2300 - 3000 - 3800		1600 - 2200 - 2800				

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 ecological site (ES). This state was codominated by cool- and warm-season grasses. In pre-European times, the primary disturbance mechanisms for this site in the reference condition included periods of below and/or above average precipitation, periodic fire, and herbivory by insects and large ungulates. Timing of fires and herbivory coupled with weather events dictated the dynamics that occurred within the natural range of variability. In some locations, this site likely received relatively heavy grazing pressure. Tall warm-season grasses would have declined and cool-season bunchgrasses and short to mid-statured warm-season grasses would have increased. Today, a similar state (State 3) 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.

1.1 Green Needlegrass/Bluestem/Wheatgrass Plant Community Phase

Interpretations are based primarily on the Green Needlegrass/Bluestem/Wheatgrass Plant Community Phase (this is also considered to be climax). The potential vegetation was about 85 percent grasses or grass-like plants, 10 percent forbs, and 5 percent shrubs. The community was codominated by cool- and warm-season grasses. The major grasses included green needlegrass, big bluestem, little bluestem, western wheatgrass, porcupine grass, and sideoats grama. Other grass or grass-like species included slender wheatgrass, Indiangrass, tall dropseed, prairie dropseed, switchgrass, blue grama, buffalograss, and needleleaf sedge. This plant community was resilient and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allowed for high drought tolerance. This was a sustainable plant community in regards to site/soil stability, watershed function, and biologic integrity.

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

Growth curve number: SD0203

Growth curve name: Rolling Till Prairie, cool-season/warm-season codominant.

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

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	10	20	28	21	10	5	3	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 chronic heavy grazing would have shifted this community to the *1.2 Wheatgrass/Grama/Needlegrass Plant Community Phase*.
- 1.1b – Fire occurring at relatively frequent intervals and occasional grazing events immediately following early season fire caused a reduction in cool-season grasses and an increase in warm-season grasses. The warm-season grasses were more tolerant of shorter return intervals of fire and would increase in vigor and production leading to a temporary shift to the *1.3 Big Bluestem/Little Bluestem/Sideoats Grama Plant Community Phase*.

1.2 Wheatgrass/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 75 percent grasses and grass-like species, 15 percent forbs, and 10 percent shrubs. Dominant grasses included western wheatgrass, sideoats grama, blue grama, and green needlegrass. Grasses of secondary importance included big bluestem, little bluestem, buffalograss, slender wheatgrass, needleleaf sedge, and porcupine grass. Forbs commonly found in this plant community included goldenrod, cudweed sagewort, heath aster, scurfpea, western ragweed, and western yarrow. This plant community had similar plant composition to the 3.2 Wheatgrass/Grama/Kentucky Bluegrass Plant Community Phase (refer to the plant composition tables). The main difference is that this plant community phase did not have the presence of nonnative invasive cool-season species.

When compared to the Green Needlegrass/Bluestem/Wheatgrass Plant Community Phase (1.1), western wheatgrass, sideoats grama, and blue grama increased. Production of tall warm-season grasses and needlegrasses was reduced. This plant community was moderately resistant to change. The herbaceous species present were well adapted to grazing; however, species composition could be altered through long-term overgrazing. If the herbaceous component was intact, it tended to be resilient if the disturbance was not long-term. Most of the components of the ecological processes would have been functioning at optimum levels. However, the vigor and reproductive capability of the tall warm-season grasses would have been reduced due to grazing pressure or a combination of stressors. A reduction of this dominant functional group allowed for an increase in shorter-statured (and shallower rooted) species.

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: SD0202

Growth curve name: Rolling Till Prairie, 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:

- T1a – 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) would have converted this plant community to the *2.1 Grama/Buffalograss/Wheatgrass Plant Community Phase* and the *Degraded State*.
- 1.2a – Grazing, precipitation, and/or fire returned to normal disturbance regime levels and frequencies or periodic light to moderate grazing possibly including periodic rest would have converted this plant community to the *1.1 Green Needlegrass/Bluestem/Wheatgrass Plant Community Phase*.

2.1 Grama/Buffalograss/Wheatgrass Plant Community Phase

This plant community evolved under heavy continuous season grazing or from over utilization during extended drought periods. The potential plant community was made up of approximately 80 percent grasses and grass-like species, 15 percent forbs, and 5 percent shrubs. Dominant grasses included blue grama, sideoats grama, buffalograss, western wheatgrass, and needleleaf sedge. Grasses of secondary importance included big bluestem, little bluestem, green needlegrass, slender wheatgrass, tall dropseed, and threeawn. Forbs commonly found in this plant community included cudweed sagewort, goldenrod, scurfpea, and western yarrow.

When compared to the Green Needlegrass/Bluestem/Wheatgrass Plant Community Phase (1.1), tall warm-season grasses were reduced, and the more grazing tolerant species such as blue grama, buffalograss, and sideoats grama were dominant on this plant community. With the exception of western wheatgrass, cool-season grasses decreased significantly. This vegetation state was very resistant to change especially if the disturbance continued and the short-statured species such as blue grama increased. The herbaceous species present were well adapted to grazing. This plant community was less productive than other phases.

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: SD0204

Growth curve name: Rolling Till Prairie, 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

1.3 Big Bluestem/Little Bluestem/Sideoats Grama Plant Community Phase

This plant community was a result of fire occurring at relatively frequent intervals. This phase could have also resulted from a combination of grazing events immediately following early season fire (i.e., large ungulates attracted to highly nutritious vegetative growth following a fire). These events would have caused a reduction in cool-season grasses and an increase in warm-season grasses. The warm-season grasses were more tolerant of shorter return intervals of fire and would have increased in vigor and production leading to a temporary shift to this phase. Needlegrasses would have decreased most significantly amongst the cool-season grasses. The potential vegetation was about 80 percent grasses or grass-like plants, 15 percent forbs, and 5 percent shrubs. The community was dominated by warm-season grasses. The major grasses included big bluestem, little bluestem, sideoats grama, Indiangrass, switchgrass, tall dropseed, and prairie dropseed. Other grass or grass-like species included green needlegrass, porcupine grass, western wheatgrass, blue grama, slender wheatgrass, and needleleaf sedge. This plant community was not resistant to change and would have readily shifted back to the 1.1 Green Needlegrass/Bluestem/Wheatgrass Plant Community Phase with a return of more normal fire return intervals.

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: SD0205

Growth curve name: Rolling Till Prairie, warm-season dominant.

Growth curve description: Warm-season dominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	2	5	15	25	30	15	7	1	0	0

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

- 1.3a – Grazing, precipitation, and/or fire returned to normal disturbance regime frequencies and levels or periodic light to moderate grazing including periodic rest would have converted this plant community to the *1.1 Green Needlegrass/Bluestem/Wheatgrass Plant Community Phase*.

Transition from Reference State (State 1) to the Native/Invaded Grass State (State 3)

- T1b – Encroachment of non-native grasses such as Kentucky bluegrass and smooth brome grass, and disruption of natural disturbance regimes (typically as a result of fire suppression following settlement) led this state over a threshold to the *Native/Invaded State (State 3)*.

Native/Invaded State (State 3)

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

3.1 Green Needlegrass/Bluestem/Wheatgrass Plant Community Phase

This plant community phase is similar to the 1.1 Green Needlegrass/Bluestem/Wheatgrass Plant Community Phase but it also contains minor amounts of nonnative invasive grass species such as Kentucky bluegrass and smooth brome grass (up to about 10 percent by air-dry weight). The potential vegetation is about 85 percent grasses or grass-like plants, 10 percent forbs, and 5 percent shrubs. This community is codominated by cool- and warm-season grasses. The major grasses include green needlegrass, big bluestem, little bluestem, western wheatgrass, porcupine grass, and sideoats grama. Other grass or grass-like species include slender wheatgrass, Indiangrass, tall dropseed, prairie dropseed, switchgrass, blue grama, buffalograss, and needleleaf sedge. This plant community is resilient and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allows for high drought tolerance. This is a sustainable plant community in regards to site/soil stability, watershed function, and biologic integrity.

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

Growth curve number: SD0203

Growth curve name: Rolling Till Prairie, cool-season/warm-season codominant.

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

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	10	20	28	21	10	5	3	0	0

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

- 3.1a – Heavy continuous grazing (stocking levels well above carrying capacity for extended portions of the growing season, and often at the same time of year each year), or continuous season-long grazing, or a combination of disturbances such as extended periods of below average precipitation coupled with periodic heavy grazing will shift this community to the *3.2 Wheatgrass/Grama/Kentucky Bluegrass Plant Community Phase*.

3.2 Wheatgrass/Grama/Kentucky Bluegrass Plant Community Phase

This plant community is a result of heavy continuous grazing or from over utilization during extended drought periods. The potential plant community is made up of approximately 75 percent grasses and grass-like species, 15 percent forbs, and 10 percent shrubs. Dominant grasses include western wheatgrass, sideoats grama, blue grama, green needlegrass, and Kentucky bluegrass. Grasses of secondary importance include big bluestem, little bluestem, buffalograss, slender wheatgrass,

needleleaf sedge, and porcupine grass. Forbs commonly found in this plant community include goldenrod, cudweed sagewort, heath aster, scurfspea, western ragweed, and western yarrow.

When compared to the Green Needlegrass/Bluestem/Wheatgrass Plant Community Phase (1.1), western wheatgrass, sideoats grama and blue grama increased. Production of tall warm-season grasses and needlegrasses was reduced. This plant community is moderately resistant to change. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. If the herbaceous component is intact, it tends to be resilient if the disturbance is not long-term.

Most of the components of the ecological processes are functioning at optimum levels. However, the vigor and reproductive capability of the tall warm-season grasses are reduced due to grazing pressure or a combination of stressors. A reduction of this dominant functional group allows for an increase in shorter-statured (and shallower rooted) species. The introduction of nonnative invasive species such as Kentucky bluegrass and smooth brome grass results in alterations to the soil profile. Organic matter levels tend to decrease and begin to be concentrated more in the surface layers and the structure will begin to be modified. These changes favor the shallow-rooted species and hasten their eventual dominance if steps are not taken to reduce these species.

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: SD0202

Growth curve name: Rolling Till Prairie, 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:

- T3b – Heavy continuous seasonal grazing (stocking levels well above carrying capacity for extended portions of the growing season and at the same time of year each year) will cause a shift across a threshold leading to the *4.2 Bluegrass/Brome grass/Snowberry Plant Community Phase* within the *Invaded State (State 4)*.
- 3.2a – 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 *3.1 Green Needlegrass/Bluestem/Wheatgrass Plant Community Phase*.

Transition from the Native/Invaded State (State 3) to the Invaded State (State 4)

- T3a – Non-use and no fire for extended periods of time (typically for 10 or more years) will likely lead this state over a threshold resulting in the *4.1 Smooth Brome grass/Kentucky Bluegrass Plant Community Phase* within the *Invaded State (State 4)*.

Invaded State (State 4)

This state is a result of encroachment mainly by invasive introduced cool-season grasses. The ecological processes are not functioning, especially the biotic processes and the hydrologic functions. The introduced cool-season grasses cause reduced infiltration and increased runoff. Preliminary studies would tend to indicate this threshold may exist when Kentucky bluegrass exceeds 30 percent of the plant community and native grasses represent less than 40 percent of the plant community

composition. The opportunity for high intensity spring burns is severely reduced by early greenup and increased moisture and humidity at the soil surface and grazing pressure cannot cause a reduction in sodgrass dominance. Production is limited to the sod forming species. Infiltration continues to decrease and runoff increases and energy capture into the system is restricted to early season low producing species. Nutrient cycling is limited by root depth of the dominant species.

4.1 Smooth Bromegrass/Kentucky Bluegrass Plant Community Phase

This plant community phase is a result of extended periods of nonuse and no fire or occasionally light levels of grazing over several years. It is characterized by dominance of smooth bromegrass and to a lesser extent Kentucky bluegrass. The dominance is at times so complete that other species are difficult to find on the site. A thick duff layer also accumulates at or above the soil surface.

Nutrient cycling is greatly reduced and native plants have great difficulty becoming established. When dominated by smooth bromegrass, infiltration is moderately reduced and runoff is moderate. Production can be equal to or higher than the interpretive plant community. However, when dominated by Kentucky bluegrass, infiltration is greatly reduced and runoff is high. Production in this case will likely be significantly less. In either case, the period that palatability is high is relatively short, as these cool-season species mature rapidly. Energy capture is also reduced.

The dominance of these introduced species has been shown to alter the biotic component of the soil, as well as, organic matter levels and eventually the soil structure. These alterations perpetuate the dominance of Kentucky bluegrass and smooth bromegrass and tend to make establishment of native species extremely difficult.

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: SD0201

Growth curve name: Rolling Till Prairie, 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 seasonal grazing (stocking levels well above carrying capacity for extended portions of the growing season and at the same time of year each year) or heavy continuous season-long grazing will convert this plant community to the 4.2 *Bluegrass/Bromegrass/Snowberry Plant Community Phase*.

4.2 Bluegrass/Bromegrass/Snowberry Plant Community Phase

This plant community phase is a result of heavy, continuous seasonal grazing or heavy, continuous season-long grazing. It is characterized by a dominance of Kentucky bluegrass, smooth bromegrass, and snowberry. 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: SD0201

Growth curve name: Rolling Till Prairie, 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:

- 4.2a – Prescribed grazing (alternating season of use and providing adequate recovery periods) or periodic light to moderate grazing possibly including periodic rest may convert this plant community to the *4.1 Smooth Bromegrass/Kentucky Bluegrass Plant Community Phase*.

Transition Pathway from Any Plant Community to the 4.3 Annual/Pioneer, Non-Native Perennial Plant Community Phase within the Invaded State (State 4)

- T5 – Encroachment of non-native invasive/noxious species, abandonment of cropping, or seeding of introduced and/or native improved varieties of forage species may lead this plant community phase over a threshold to the *Invaded State (State 4)* and more specifically to the *4.3 Annual/Pioneer, Non-native Perennial Plant Community Phase*. In the case of a seeding, refer to the corresponding Forage Suitability Group (FSG) description for adapted species and expected production (production estimates in the FSG description may be unrealistically high due to the degraded condition of the site at this phase).

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

This plant community developed under continuous heavy grazing or other excessive disturbances. 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 early seral species.

Transitions or pathways leading to other states are as follows:

- 4.3a – Pest management (herbicides) and often heavy continuous seasonal grazing will likely result in an eventual dominance by Kentucky bluegrass which will lead to a plant community resembling the *4.2 Bluegrass/Bromegrass/Snowberry Plant Community Phase*.

Restoration Pathway from the Invaded State (State 4) to the Native/Invaded Grass State (State 3)

- R4 - Long-term prescribed grazing (moderate stocking levels coupled with adequate recovery periods, or other grazing systems such as high-density, low-frequency intended to treat specific species dominance, or periodic light to moderate stocking levels possibly including periodic rest) may lead this plant community phase over a threshold to the *Native/Invaded State (State 3)*. Pest management (i.e., herbicide) may also be needed to suppress cool-season invasive grasses. This will likely take a long period of time, possibly up to 10 years or more, and recovery may not be attainable. Success depends on whether native reproductive propagules remain intact on the site.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

-- Under Development --

Green Needlegrass/Bluestem/Wheatgrass Plant Community Phases (1.1 & 3.1):

Wheatgrass/Grama/Needlegrass Plant Community Phase (1.2):

Big Bluestem/Little Bluestem/Sideoats Grama Plant Community Phase (1.3):

Grama/Buffalograss/Wheatgrass Plant Community Phase (2.1):

Wheatgrass/Grama/Kentucky Bluegrass Plant Community Phase (3.2):

Smooth Bromegrass/Kentucky Bluegrass Plant Community Phase (4.1):

Bluegrass/Bromegrass/Snowberry 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
Grasses and Grass-likes							
big bluestem	U D P D	U D U U	U D P D	U D U U	U D U U	U D P D	U D P D
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
Canada wildrye	U D U U	N U N N	U D U U	N U N N	N U N N	U D U U	U D U U
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
needleleaf 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
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
Scribner panicum	U U D U	N U N N	U U D U	N U N N	N U N N	U U D U	U U D U
sideoats grama	U D P U	U P D U	U D P U	U P D U	U P D U	U D P U	U D P U
slender wheatgrass	U P U U	N D U N	U P U U	N D U N	N D U N	U P U U	U P U U
switchgrass	U D D U	U D U U	U D D U	N N N N	N N N N	U D D U	U D D U
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
candle 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
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
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
gayfeather	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
goldenrod	U U D U	N U U N	U U D U	N U U N	N U U N	U U D U	N U U N
heath aster	U U D U	U U P U	U U D U	U U P U	U U P U	U U D U	U U P U
Lambert crazyweed	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
Northern Idaho biscuitroot	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
pussytoes	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
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
silverleaf 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
wavyleaf thistle	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 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 wallflower	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
western yarrow	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
wild bergamot	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
wild onion	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
woolly verbena	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
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
rose	U D D U	U D D U	U D D U	U D D U	U D D U	U D D U	U D D U
snowberry	U U U U	U U U U	U U U U	D U D D	U U U U	U U U U	D U U U

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

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

Animal Community – Grazing Interpretations

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

Plant Community	Average Annual Production (lbs./acre, air-dry)	Stocking Rate* (AUM/acre)
Green Needlegrass/Bluestem/Wheatgrass (1.1 & 3.1)	3,300	0.90
Wheatgrass/Grama/Kentucky Bluegrass (3.2)	2,600	0.71
Smooth Bromegrass/Kentucky Bluegrass (4.1)	3,000	0.82
Bluegrass/Bromegrass/Snowberry (4.2)	2,200	0.60
Annual/Pioneer, Non-Native Perennial (4.3)	1,000	0.27

*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. Infiltration is typically slow to very slow and runoff potential for this site varies from low to very 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 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

Thin Loamy (R102AY012SD), Loamy Overflow (R102AY020SD)

Similar Sites

(R102AY020SD) – Loamy Overflow [more big bluestem; higher production]

(R102AY010SD) – Loamy [more big bluestem, less green needlegrass; 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; and Bruce Kunze, Soil Scientist, NRCS.

<u>Data Source</u>	<u>Number of Records</u>	<u>Sample Period</u>	<u>State</u>	<u>County</u>
SCS-RANGE-417	5	1984 – 2006	SD	Grant, Roberts

State Correlation

This site has been correlated in MN, North Dakota (ND), and South Dakota (SD) in MLRA 102A.

Field Offices/Counties

Ada, MN/Norman	Forman, ND/Sargent	Olivia, MN/Renville
Alexandria, MN/Douglas	Glenwood, MN/Pope	Ortonville, MN/Big Stone
Benson, MN/Swift	Hayti, SD/Hamlin	Pipestone, MN/Pipestone
Breckenridge, MN/Wilkin	Ivanhoe, MN/Lincoln	Redwood Falls, MN/Redwood
Britton, SD/Marshall	Long Prairie, MN/Todd	Sisseton, SD/Roberts
Brookings, SD/Brookings	Madison, MN/Lac Qui Parle	Slayton, MN/Murray
Clark, SD/Clark	Madison, SD/Lake	Wahpeton, ND/Richland
Clarkfield, MN/Yellow Medicine	Mahnomen, MN/Mahnomen	Waite Park, MN/Stearns
Clear Lake, SD/Deuel	Marshall, MN/Lyon	Watertown, SD/Codington
De Smet, SD/Kingsbury	McIntosh, MN/Polk	Webster, SD/Day
Detroit Lakes, MN/Becker	Milbank, SD/Grant	Wheaton, MN/Traverse
Elbow Lake, MN/Grant	Montevideo, MN/Chippewa	Willmar, MN/Kandiyohi
Fergus Falls, MN/Otter Tail	Moorhead, MN/Clay	Windom, MN/Cottonwood
Flandreau, SD/Moody	Morris, MN/Stevens	

Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 46e – Tewaukon Dead Ice Moraine, 46k – Prairie Coteau, 46l – Prairie Coteau Escarpment, 46m – Big Sioux Basin, 46o – Minnesota River Prairie, 47b – Des Moines Lobe, 48d – Lake Agassiz Plain, 51j – Alexandria Moraines and Detroit Lakes Outwash Plain.

Other References

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

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

MN, State Grazing Lands Specialist

Date

ND, State Range Management Specialist

Date

SD, State Range Management Specialist

Date