

United States Department of Agriculture Natural Resources Conservation Service

Ecological Site Description

Site Type: Rangeland

Site Name: Loamy Overflow

Site ID: R063AY020SD

Major Land Resource Area (MLRA): 63A –
Northern Rolling Pierre Shale Plains



Physiographic Features

This site occurs on nearly level areas that receive additional water from overflow of intermittent streams or runoff from adjacent slopes.

Landform: alluvial fan, flood plain, stream terrace

Aspect: N/A

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	1600	2700
Slope (percent):	0	3
Water Table Depth (inches):	42	80
Flooding:		
Frequency:	Occasional	Frequent
Duration:	Brief	Brief
Ponding:		
Depth (inches):	None	None
Frequency:	None	None
Duration:	None	None
Runoff Class:	Negligible	Medium

Climatic Features

MLRA 63A 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 ranges from 16 to 20 inches per year. The average annual temperature is about 47°F. January is the coldest month with average temperatures ranging from about 11°F (Pollock, South Dakota (SD)), to about 22°F (Cedar Butte, SD). July is the warmest month with temperatures averaging from about 72°F (Pollock, SD), to about 76°F (Cedar Butte, 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 11 miles per hour annually, ranging from about 13 miles per hour during the spring to

about 10 miles per hour 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 miles per hour.

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. Green up 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):	126	149
Freeze-free period (days):	149	165
Mean Annual Precipitation (inches):	16	20

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

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.40	0.41	-0.9	34.0
February	0.44	0.49	5.8	39.2
March	0.87	1.36	17.3	49.0
April	1.77	2.18	31.3	61.2
May	2.82	3.29	43.3	72.2
June	2.96	3.45	53.2	82.5
July	2.04	2.84	58.5	90.8
August	1.57	2.38	56.5	90.3
September	1.13	1.53	45.4	79.2
October	1.02	1.38	33.4	65.7
November	0.48	0.63	19.3	48.2
December	0.23	0.35	5.7	37.2

Climate Stations		Period	
Station ID	Location or Name	From	To
SD1539	Cedar Butte	1951	2004
SD1972	Cottonwood 3 E	1909	2004
SD6712	Pollock	1948	2004
SD6790	Presho 7 NW	1975	2004

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

Riparian and Wetland Features

Stream Type: B6, C6
 (Rosgen System)

Representative Soil Features

The soils in this site are moderately well to well drained and formed in alluvium. The silt loam to silty clay loam surface layer is 4 to 12 inches thick. The soils have a moderate to slow infiltration rate. This site should show no evidence of rills, wind scoured areas, or pedestalled plants. If present, water flow paths are broken, irregular in appearance, or discontinuous with numerous debris dams or vegetative barriers. The soil surface is stable and intact.

These soils are mainly susceptible to water erosion. The hazard of water erosion increases where vegetative cover is not adequate. A drastic loss of the soil surface layer 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: alluvium
Parent Material Origin: siltstone, unspecified
Surface Texture: silt loam, silty clay loam, silty clay
Surface Texture Modifier: none
Subsurface Texture Group: loamy
Surface Fragments ≤3" (% Cover): 0-10
Surface Fragments >3" (%Cover): 0
Subsurface Fragments ≤3" (% Volume): 0-10
Subsurface Fragments >3" (% Volume): 0

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	moderately well	well
Permeability Class:	slow	moderate
Depth (inches):	80	80
Electrical Conductivity (mmhos/cm)*:	0	4
Sodium Absorption Ratio*:	0	10
Soil Reaction (1:1 Water)*:	6.6	9.0
Soil Reaction (0.1M CaCl2)*:	NA	NA
Available Water Capacity (inches)*:	5	8
Calcium Carbonate Equivalent (percent)*:	0	20

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

Plant Communities

Ecological Dynamics of the Site:

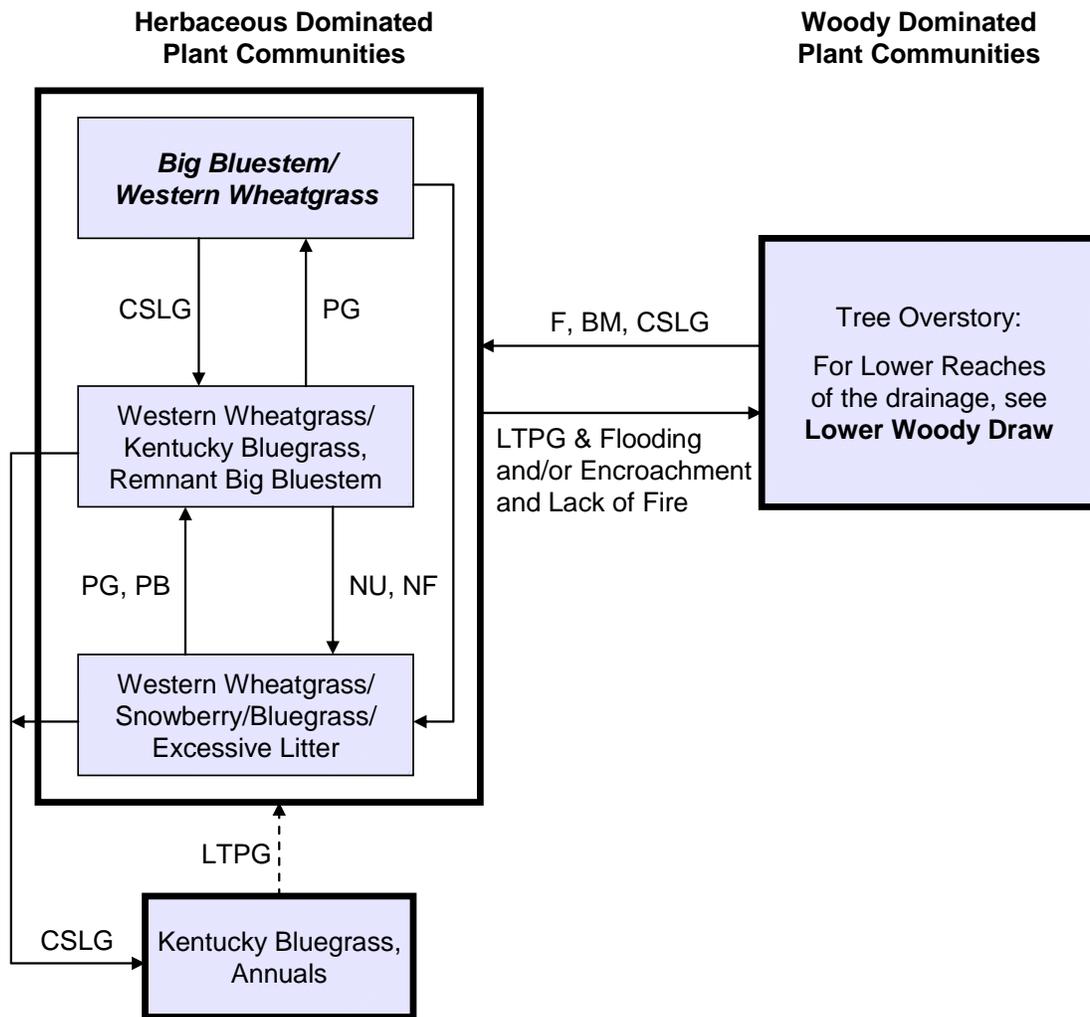
This site developed under Northern Great Plains climatic conditions, natural influences of large herbivores, occasional fire, and other biotic and abiotic factors that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts of native and/or exotic plant and animal species, and management actions. While the following plant community descriptions describe more typical transitions between communities 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 grazing without adequate recovery periods following each grazing occurrence over several years causes this site to depart from the climax plant community. Species such as western wheatgrass and blue grama will initially increase. Big bluestem, little bluestem, and green needlegrass will decrease in frequency and production. Heavy continuous grazing causes Kentucky bluegrass to increase and eventually develops into a sod condition. Under extended periods of nonuse and no fire will result in a plant community having high litter levels, which favors an increase in Kentucky bluegrass and annual bromes. In time, shrubs such as western snowberry and chokecherry will also increase. Flooding can create conditions suitable for establishment of various tree species, which if attaining sapling height may grow to maturity and develop a tree overstory.

The plant community upon which interpretations are primarily based is the Big Bluestem/Western Wheatgrass Plant Community, which is considered to be climax. The climax community has been determined by studying 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 communities, states, transitional pathways, and thresholds have been determined through similar studies and experience.

The following is a diagram that illustrates the common plant communities that can occur on the site and the transition pathways between communities. The ecological processes will be discussed in more detail in the plant community descriptions following the diagram.

Plant Communities and Transitional Pathways



BM – Brush management (fire, chemical, mechanical); **CSLG** – Continuous season-long grazing (grazing a unit for an entire growing season); **F** – Fire; **LTPG** – Long-term prescribed grazing; **NF** – No fire; **NU** – Non use; **PB** – Prescribed burning; **PG** – Prescribed grazing (planned, controlled harvest of vegetation with grazing or browsing animals – see FOTG, Section IV, 528).

Plant Community Composition and Group Annual Production

			Big Bluestem/Western Wheatgrass		
COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Group	lbs./acre	% Comp
GRASSES & GRASS-LIKES				2720 - 3230	80 - 95
TALL WARM-SEASON GRASSES			1	680 - 1530	20 - 45
big bluestem	Andropogon gerardii	ANGE	1	680 - 1360	20 - 40
switchgrass	Panicum virgatum	PAV12	1	68 - 340	2 - 10
prairie sandreed	Calamovilfa longifolia	CALO	1	0 - 170	0 - 5
green muhly	Muhlenbergia racemosa	MURA	1	0 - 102	0 - 3
WHEATGRASSES			2	340 - 850	10 - 25
western wheatgrass	Pascopyrum smithii	PASM	2	340 - 680	10 - 20
slender wheatgrass	Elymus trachycaulus	ELTR7	2	34 - 340	1 - 10
COOL-SEASON BUNCHGRASSES			3	170 - 510	5 - 15
green needlegrass	Nassella viridula	NAVI4	3	170 - 510	5 - 15
needleandthread	Hesperostipa comata ssp. comata	HECOC8	3	0 - 170	0 - 5
Canada wildrye	Elymus canadensis	ELCA4	3	0 - 170	0 - 5
porcupine grass	Hesperostipa spartea	HESP11	3	0 - 170	0 - 5
Nuttall's alkaligrass	Puccinellia nuttalliana	PUNU2	3	0 - 170	0 - 5
MID WARM-SEASON GRASSES			4	68 - 340	2 - 10
little bluestem	Schizachyrium scoparium	SCSC	4	68 - 340	2 - 10
sideoats grama	Bouteloua curtipendula	BOCU	4	34 - 170	1 - 5
tall dropseed	Sporobolus compositus var. compositus	SPCOC2	4	34 - 102	1 - 3
SHORT WARM-SEASON GRASSES			5	34 - 170	1 - 5
blue grama	Bouteloua gracilis	BOGR2	5	34 - 170	1 - 5
buffalograss	Bouteloua dactyloides	BODA2	5	0 - 102	0 - 3
OTHER NATIVE GRASSES			6	34 - 238	1 - 7
prairie junegrass	Koeleria macrantha	KOMA	6	34 - 102	1 - 3
alkali muhly	Muhlenbergia asperifolia	MUAS	6	0 - 68	0 - 2
other grasses		2GRAM	6	0 - 170	0 - 5
GRASS-LIKES			7	34 - 170	1 - 5
needleleaf sedge	Carex duriuscula	CADU6	7	34 - 170	1 - 5
other grass-likes		2GL	7	0 - 170	0 - 5
FORBS			9	170 - 340	5 - 10
American licorice	Glycyrrhiza lepidota	GLLE3	9	34 - 68	1 - 2
American vetch	Vicia americana	VIAM	9	34 - 68	1 - 2
aster	Aster spp.	ASTER	9	0 - 68	0 - 2
cudweed sagewort	Artemisia ludoviciana	ARLU	9	34 - 102	1 - 3
false boneset	Brickellia eupatorioides	BREU	9	0 - 68	0 - 2
false Solomon's-seal	Maianthemum stellatum	MAST4	9	0 - 34	0 - 1
giant ragweed	Ambrosia trifida	AMTR	9	0 - 68	0 - 2
goldenrod	Solidago spp.	SOLID	9	34 - 102	1 - 3
heartleaf Alexanders	Zizia aptera	ZIAP	9	0 - 34	0 - 1
heath aster	Symphotrichum ericoides	SYER	9	34 - 68	1 - 2
Maximilian sunflower	Helianthus maximiliani	HEMA2	9	0 - 68	0 - 2
nettle	Urtica spp.	URTIC	9	0 - 34	0 - 1
northern bedstraw	Galium boreale	GABO2	9	0 - 34	0 - 1
prairie coneflower	Ratibida columnifera	RACO3	9	34 - 68	1 - 2
purple prairie clover	Dalea purpurea	DAPU5	9	0 - 68	0 - 2
scarlet gaura	Gaura coccinea	GACO5	9	0 - 34	0 - 1
scurfpea	Psoraleidium spp.	PSORA2	9	34 - 102	1 - 3
verbena	Verbena spp.	VERBE	9	34 - 68	1 - 2
wavyleaf thistle	Cirsium undulatum	CIUN	9	0 - 68	0 - 2
western ragweed	Ambrosia psilostachya	AMPS	9	34 - 68	1 - 2
western yarrow	Achillea millefolium var. occidentalis	ACMIO	9	34 - 68	1 - 2
native forbs		2FN	9	34 - 170	1 - 5
SHRUBS			10	68 - 272	2 - 8
American plum	Prunus americana	PRAM	10	34 - 102	1 - 3
chokecherry	Prunus virginiana	PRVI	10	0 - 102	0 - 3
golden currant	Ribes aureum	RIAU	10	0 - 68	0 - 2
leadplant	Amorpha canescens	AMCA6	10	34 - 102	1 - 3
rose	Rosa spp.	ROSA5	10	34 - 68	1 - 2
silver buffaloberry	Shepherdia argentea	SHAR	10	0 - 68	0 - 2
western snowberry	Symphoricarpos occidentalis	SYOC	10	34 - 170	1 - 5
other shrubs		2SHRUB	10	0 - 170	0 - 5
TREES			11	0 - 102	0 - 3
American elm	Ulmus americana	ULAM	11	0 - 102	0 - 3
boxelder	Acer negundo	ACNE2	11	0 - 102	0 - 3
bur oak	Quercus macrocarpa	QUMA2	11	0 - 102	0 - 3
green ash	Fraxinus pennsylvanica	FRPE	11	0 - 102	0 - 3
other trees		2TREE	11	0 - 102	0 - 3

Annual Production lbs./acre		LOW	RV	HIGH
GRASSES & GRASS-LIKES		2385 -	2924	-3375
FORBS		150 -	255	-400
SHRUBS		65 -	170	-315
TREES		0 -	51	-110
TOTAL		2600 -	3400	-4200

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

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SYMBOL	Big Bluestem/ Western Wheatgrass			Western Wheatgrass/Kentucky Bluegrass/Remnant Big Bluestem			Western Wheatgrass/Snowberry/ Bluegrass/Excessive Litter			Kentucky Bluegrass, Annals		
		Grp	Ibs./acre	% Comp	Grp	Ibs./acre	% Comp	Grp	Ibs./acre	% Comp	Grp	Ibs./acre	% Comp
GRASSES & GRASS-LIKES			2720 - 3230	80 - 95		1950 - 2340	75 - 90		1680 - 2040	70 - 85		1400 - 1700	70 - 85
TALL WARM-SEASON GRASSES		1	680 - 1530	20 - 45	1	130 - 390	5 - 15	1	48 - 240	2 - 10	1	0 - 60	0 - 3
big bluestem	ANGE	1	680 - 1360	20 - 40	1	130 - 390	5 - 15	1	48 - 240	2 - 10	1	0 - 60	0 - 3
switchgrass	PAVI2	1	68 - 340	2 - 10	1	0 - 130	0 - 5	1	0 - 72	0 - 3			
prairie sandreed	CALO	1	0 - 170	0 - 5									
green muhly	MURA	1	0 - 102	0 - 3				1	0 - 48	0 - 2			
WHEATGRASSES		2	340 - 850	10 - 25	2	520 - 910	20 - 35	2	360 - 720	15 - 30	2	0 - 300	0 - 15
western wheatgrass	PASM	2	340 - 680	10 - 20	2	390 - 780	15 - 30	2	360 - 720	15 - 30	2	0 - 300	0 - 15
slender wheatgrass	ELTR7	2	34 - 340	1 - 10	2	52 - 390	2 - 15	2	0 - 240	0 - 10			
COOL-SEASON BUNCHGRASSES		3	170 - 510	5 - 15	3	130 - 390	5 - 15	3	120 - 360	5 - 15	3	0 - 80	0 - 4
green needlegrass	NAVI4	3	170 - 510	5 - 15	3	52 - 312	2 - 12	3	120 - 360	5 - 15	3	0 - 60	0 - 3
needleandthread	HECOC8	3	0 - 170	0 - 5	3	0 - 130	0 - 5	3	0 - 120	0 - 5	3	0 - 40	0 - 2
Canada wildrye	ELCA4	3	0 - 170	0 - 5	3	0 - 130	0 - 5	3	0 - 192	0 - 8			
porcupine grass	HESP11	3	0 - 170	0 - 5	3	0 - 78	0 - 3	3	0 - 120	0 - 5			
Nuttall's alkaligrass	PUNU2	3	0 - 170	0 - 5	3	26 - 208	1 - 8	3	0 - 120	0 - 5	3	0 - 40	0 - 2
MID WARM-SEASON GRASSES		4	68 - 340	2 - 10	4	26 - 130	1 - 5	4	0 - 120	0 - 5	4		
little bluestem	SCSC	4	68 - 340	2 - 10	4	26 - 130	1 - 5	4	0 - 120	0 - 5			
sideoats grama	BOCU	4	34 - 170	1 - 5	4	0 - 78	0 - 3	4	0 - 72	0 - 3			
tall dropseed	SPCOC2	4	34 - 102	1 - 3	4	0 - 78	0 - 3	4	0 - 72	0 - 3			
SHORT WARM-SEASON GRASSES		5	34 - 170	1 - 5	5	52 - 208	2 - 8	5	0 - 72	0 - 3	5	40 - 200	2 - 10
blue grama	BOGR2	5	34 - 170	1 - 5	5	52 - 208	2 - 8	5	0 - 72	0 - 3	5	40 - 200	2 - 10
buffalograss	BODA2	5	0 - 102	0 - 3	5	0 - 130	0 - 5	5	0 - 24	0 - 1	5	0 - 100	0 - 5
OTHER NATIVE GRASSES		6	34 - 238	1 - 7	6	26 - 182	1 - 7	6	0 - 120	0 - 5	6	0 - 100	0 - 5
prairie junegrass	KOMA	6	34 - 102	1 - 3	6	0 - 78	0 - 3	6	0 - 48	0 - 2	6	0 - 20	0 - 1
alkali muhly	MUAS	6	0 - 68	0 - 2	6	0 - 78	0 - 3	6	0 - 24	0 - 1	6	0 - 60	0 - 3
other grasses	2GRAM	6	0 - 170	0 - 5	6	26 - 182	1 - 7	6	0 - 120	0 - 5	6	0 - 100	0 - 5
GRASS-LIKES		7	34 - 170	1 - 5	7	26 - 130	1 - 5	7	24 - 120	1 - 5	7	20 - 60	1 - 3
needleleaf sedge	CADU6	7	34 - 170	1 - 5	7	26 - 130	1 - 5	7	24 - 120	1 - 5	7	20 - 60	1 - 3
other grass-like	2GL	7	0 - 170	0 - 5	7	0 - 130	0 - 5	7	0 - 120	0 - 5	7	0 - 60	0 - 3
NON-NATIVE GRASSES		8			8	130 - 390	5 - 15	8	360 - 720	15 - 30	8	500 - 1200	25 - 60
bluegrass	POA				8	130 - 390	5 - 15	8	240 - 600	10 - 25	8	400 - 900	20 - 45
cheatgrass	BRTE				8	0 - 130	0 - 5	8	24 - 240	1 - 10	8	40 - 300	2 - 15
smooth bromegrass	BRIN2				8	0 - 130	0 - 5	8	0 - 240	0 - 10	8	0 - 300	0 - 15
FORBS		9	170 - 340	5 - 10	9	130 - 312	5 - 12	9	120 - 288	5 - 12	9	100 - 300	5 - 15
American licorice	GLLE3	9	34 - 68	1 - 2	9	26 - 78	1 - 3	9	24 - 96	1 - 4	9	0 - 40	0 - 2
American vetch	VIAM	9	34 - 68	1 - 2	9	0 - 26	0 - 1	9	0 - 24	0 - 1			
aster	ASTER	9	0 - 68	0 - 2	9	0 - 52	0 - 2	9	0 - 48	0 - 2	9	0 - 20	0 - 1
burdock	ARCTI				9	0 - 52	0 - 2	9	0 - 48	0 - 2	9	0 - 60	0 - 3
common mullein	VETH				9	0 - 78	0 - 3	9	0 - 72	0 - 3	9	20 - 120	1 - 6
cudweed sagewort	ARLU	9	34 - 102	1 - 3	9	26 - 104	1 - 4	9	24 - 120	1 - 5	9	20 - 100	1 - 5
curly dock	RUCR				9	0 - 26	0 - 1	9	0 - 24	0 - 1	9	0 - 40	0 - 2
false bonaset	BREU	9	0 - 68	0 - 2				9	0 - 24	0 - 1			
false Solomon's-seal	MAST4	9	0 - 34	0 - 1				9	0 - 24	0 - 1			
giant ragweed	AMTR	9	0 - 68	0 - 2	9	0 - 78	0 - 3	9	0 - 72	0 - 3	9	0 - 40	0 - 2
goldenrod	SOLID	9	34 - 102	1 - 3	9	26 - 104	1 - 4	9	24 - 72	1 - 3	9	20 - 60	1 - 3
heartleaf Alexanders	ZIAP	9	0 - 34	0 - 1									
heath aster	SYER	9	34 - 68	1 - 2	9	26 - 78	1 - 3	9	24 - 48	1 - 2	9	20 - 80	1 - 4
Maximilian sunflower	HEMA2	9	0 - 68	0 - 2				9	0 - 24	0 - 1			
nettle	UR TIC	9	0 - 34	0 - 1	9	0 - 52	0 - 2	9	0 - 48	0 - 2	9	0 - 60	0 - 3
northern bedstraw	GABO2	9	0 - 34	0 - 1				9	0 - 24	0 - 1			
prairie coneflower	RACO3	9	34 - 68	1 - 2	9	26 - 52	1 - 2	9	24 - 48	1 - 2	9	0 - 20	0 - 1
purple prairie clover	DAPU5	9	0 - 68	0 - 2	9	0 - 26	0 - 1	9	0 - 24	0 - 1			
scarlet gaura	GACO5	9	0 - 34	0 - 1				9	0 - 24	0 - 1			
scurpea	PSORA2	9	34 - 102	1 - 3	9	26 - 78	1 - 3	9	24 - 48	1 - 2	9	0 - 60	0 - 3
verbena	VERBE	9	34 - 68	1 - 2	9	26 - 78	1 - 3	9	24 - 72	1 - 3	9	20 - 80	1 - 4
wavyleaf thistle	CIUN	9	0 - 68	0 - 2	9	0 - 52	0 - 2	9	0 - 48	0 - 2	9	0 - 20	0 - 1
western ragweed	AMPS	9	34 - 68	1 - 2	9	26 - 78	1 - 3	9	24 - 72	1 - 3	9	20 - 80	1 - 4
western salsify	TRDU				9	0 - 52	0 - 2	9	0 - 72	0 - 3	9	20 - 60	1 - 3
western yarrow	ACMIO	9	34 - 68	1 - 2	9	26 - 78	1 - 3	9	24 - 48	1 - 2	9	20 - 100	1 - 5
native forbs	2FN	9	34 - 170	1 - 5	9	26 - 130	1 - 5	9	24 - 120	1 - 5	9	20 - 100	1 - 5
introduced forbs	2FI				9	0 - 130	0 - 5	9	0 - 120	0 - 5	9	0 - 140	0 - 7
SHRUBS		10	68 - 272	2 - 8	10	130 - 260	5 - 10	10	120 - 288	5 - 12	10	40 - 200	2 - 10
American plum	PRAM	10	34 - 102	1 - 3	10	0 - 52	0 - 2	10	0 - 72	0 - 3	10	0 - 20	0 - 1
chokecherry	PRVI	10	0 - 102	0 - 3	10	0 - 26	0 - 1	10	0 - 48	0 - 2			
golden currant	RIAU	10	0 - 68	0 - 2				10	0 - 24	0 - 1			
leadplant	AMCA6	10	34 - 102	1 - 3	10	0 - 26	0 - 1	10	0 - 48	0 - 2			
rose	ROSA5	10	34 - 68	1 - 2	10	26 - 78	1 - 3	10	24 - 48	1 - 2	10	20 - 40	1 - 2
silver buffaloberry	SHAR	10	0 - 68	0 - 2	10	0 - 26	0 - 1	10	0 - 48	0 - 2			
western snowberry	SYOC	10	34 - 170	1 - 5	10	52 - 182	2 - 7	10	48 - 240	2 - 10	10	20 - 160	1 - 8
other shrubs	2SHRUB	10	0 - 170	0 - 5	10	0 - 130	0 - 5	10	0 - 120	0 - 5	10	0 - 60	0 - 3
TREES		11	0 - 102	0 - 3	11	0 - 78	0 - 3	11	0 - 72	0 - 3	11	0 - 60	0 - 3
American elm	ULAM	11	0 - 102	0 - 3	11	0 - 78	0 - 3	11	0 - 72	0 - 3	11	0 - 60	0 - 3
boxelder	ACNE2	11	0 - 102	0 - 3	11	0 - 78	0 - 3	11	0 - 72	0 - 3	11	0 - 60	0 - 3
bur oak	QUMA2	11	0 - 102	0 - 3	11	0 - 78	0 - 3	11	0 - 72	0 - 3	11	0 - 60	0 - 3
green ash	FRPE	11	0 - 102	0 - 3	11	0 - 78	0 - 3	11	0 - 72	0 - 3	11	0 - 60	0 - 3
other trees	2TREE	11	0 - 102	0 - 3	11	0 - 78	0 - 3	11	0 - 72	0 - 3	11	0 - 60	0 - 3
Annual Production Ibs./acre			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH
GRASSES & GRASS-LIKES			2385 - 2924 - 3375		1570 - 2145 - 2465		1590 - 1956 - 2265		1070 - 1650 - 1965				
FORBS			150 - 255 - 400		115 - 221 - 360		105 - 204 - 330		95 - 200 - 345				
SHRUBS			65 - 170 - 315		115 - 195 - 295		105 - 204 - 330		35 - 120 - 225				
TREES			0 - 51 - 110		0 - 39 - 80		0 - 36 - 75		0 - 30 - 65				
TOTAL			2600 - 3400 - 4200		1800 - 2600 - 3200		1800 - 2400 - 3000		1200 - 2000 - 2600				

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

Following are the narratives for each of the described plant communities. These plant communities may not represent every possibility, but they are the most prevalent and recurring plant communities. The plant composition tables shown above have been developed from the best available knowledge at the time of this revision. As more data is collected, some of these plant communities may be revised or removed, and new ones may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities (DPC).” According to the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) National Range and Pasture Handbook, DPCs will be determined by the decision-makers and will meet minimum quality criteria established by the NRCS. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

Big Bluestem/Western Wheatgrass Plant Community

This plant community is considered to be climax. This community of plants can be found on areas that are properly managed with prescribed grazing that allows for adequate recovery periods following each grazing event.

The potential vegetation is about 70-95 percent grasses and grass-like plants, 5-10 percent forbs, 2-8 percent shrubs, and 0-3 percent trees. Major grasses include big bluestem, wheatgrasses, little bluestem, green needlegrass, and switchgrass. Prairie sandreed may be prevalent on the more sandy textured sites. Other grasses occurring on this community include blue grama, Canada wildrye, needleandthread, sideoats, and prairie sandreed. Major forbs include cudweed sagewort, goldenrod, and scurfpeas. Common shrubs include American plum, leadplant, and western snowberry. Scattered green ash, bur oak, boxelder, and American elm may occur.

This plant community is well adapted to the Northern Great Plains climatic conditions. Individual species can vary greatly in production depending on growing conditions (timing and amount of precipitation and temperature). Community dynamics, nutrient cycle, water cycle, and energy flow are functioning properly. Plant litter is properly distributed with very little movement off-site and natural plant mortality is very low. The diversity in plant species allows for high drought tolerance. Runoff from adjacent sites and moderate or high available water capacity provides a favorable soil-water-plant relationship.

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: SD6308

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

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

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	4	11	19	23	20	12	6	5	0	0

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

- Continuous season-long grazing and/or haying will convert the plant community to the *Western Western Wheatgrass/ Kentucky Bluegrass/Remnant Big Bluestem Plant Community*.
- Long-term prescribed grazing, flooding and/or encroachment, and lack of fire will shift this plant community to a woody dominated; *Tree Overstory Plant Community*.

Western Wheatgrass/Kentucky Bluegrass/Remnant Big Bluestem Plant Community

This plant community results from continuous season-long grazing without adequate recovery periods between each grazing event during the growing season. Recognition of this plant community will enable the land user to implement key management decisions before a significant ecological threshold is crossed.

Western wheatgrass and Kentucky bluegrass are the dominant species. Big bluestem, little bluestem, green needlegrass, and switchgrass are greatly reduced. Significant forb species include American licorice, cudweed sagewort, goldenrod, heath aster, scurfpeas, and western yarrow. Leadplant is greatly reduced while other shrub species would tend to be heavily browsed. Rose and western snowberry are the dominant shrub species. Scattered American elm, boxelder, bur oak, and green ash are common on this site.

This plant community is relatively stable and less productive than the Big Bluestem/Western Wheatgrass. Reduction of litter and short plant heights result in higher soil temperatures, poor water, infiltration rates and increased runoff. This plant community can occur throughout the site, on spot grazed areas, and around water sources where season-long grazing patterns occur. Soil erosion will be minimal due to the sod forming habit of Kentucky bluegrass.

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: SD6307

Growth curve name: Pierre Shale Plains, cool-season dominant, warm-season subdominant.

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

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	5	13	20	25	18	11	5	3	0	0

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

- Nonuse and no fire will move this plant community to the *Western Wheatgrass/Snowberry/Bluegrass/Excessive Litter Plant Community*.
- Continuous season-long grazing will cause further deterioration resulting in a shift to the *Kentucky Bluegrass, Annuals Plant Community*.
- Prescribed grazing and proper stocking will eventually return this plant community to the *Big Bluestem/Western Wheatgrass Plant Community*.
- Long-term prescribed grazing, flooding and/or encroachment and lack of fire will shift this plant community to a woody dominated; *Tree Overstory Plant Community*.

Western Wheatgrass/Snowberry/Bluegrass/Excessive Litter Plant Community

This plant community develops after an extended period of nonuse and exclusion of fire. This plant community will also develop with moderate or heavy continuous seasonal grazing. In either case, shrubs increase and can sometimes dominate the plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses and miscellaneous forbs. Western wheatgrass and bluegrass are the dominant grasses. Grasses of secondary importance include big bluestem, little bluestem, Canada wildrye, green needlegrass, and needleandthread. Forbs commonly found in this plant community include American licorice, cudweed

sagewort, goldenrod, and verbena. Woody plants such as American plum and western snowberry can be found on the site and can comprise up to 12 percent of the total canopy.

This plant community is resistant to change without prescribed grazing and/or fire. The combination of both grazing and fire or other means to reduce shrub cover is most effective in moving this plant community toward the climax plant community. Soil erosion is low. Runoff is similar to the Big Bluestem/Western Wheatgrass Plant Community. Once the advanced stage of this plant community is reached, time and external resources will be needed to see recovery in the diversity of the 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: SD6306

Growth curve name: Pierre Shale Plains, lowland cool-season dominant.

Growth curve description: Cool-season dominant, lowland.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	6	15	20	26	17	9	4	3	0	0

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

- Continuous season-long grazing will likely move this plant community to the *Kentucky Bluegrass/Annuals Plant Community*.
- Prescribed grazing and/or prescribed burning may convert the plant community to the *Western Wheatgrass/Kentucky Bluegrass, Remnant Big Bluestem Plant Community* or to the associated successional plant community stages assuming an adequate seed/vegetative source is available.
- Under long-term prescribed grazing, flooding and/or encroachment and lack of fire will shift this plant community to a woody dominated; *Tree Overstory Plant Community*.

Kentucky Bluegrass/Annuals Plant Community

This plant community developed with continuous season-long grazing. Kentucky bluegrass dominates the community and can develop into a “sodbound” appearance. Low vigor western wheatgrass can be found scattered throughout the community. Green needlegrass has been greatly reduced. Big bluestem may persist in minor amounts, greatly reduced in vigor and not readily seen. Western yarrow, scurfpea, ragweed, and common mullein have increased. Nonnative grasses and forbs such as annual bromes, curlycup gumweed, thistle, and cocklebur will invade this plant community.

This plant community is resistant to change due to grazing tolerance of Kentucky bluegrass. A significant amount of production and diversity has been lost when compared to the Big Bluestem/Western Wheatgrass Plant Community. The dominance of Kentucky bluegrass and loss of other desirable species has negatively impacted energy flow and nutrient cycling. Water infiltration is reduced significantly. Soil loss may be accelerated where concentrated flows occur.

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: SD6301

Growth curve name: Pierre Shale 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:

- Under long-term prescribed grazing, including adequate rest periods, this plant community will move through the successional stages eventually leading to the *Big Bluestem/Western Wheatgrass Plant Community*. Depending on the slope, aspect, and size, and if adequate perennial plants exist, this change can occur more rapidly.

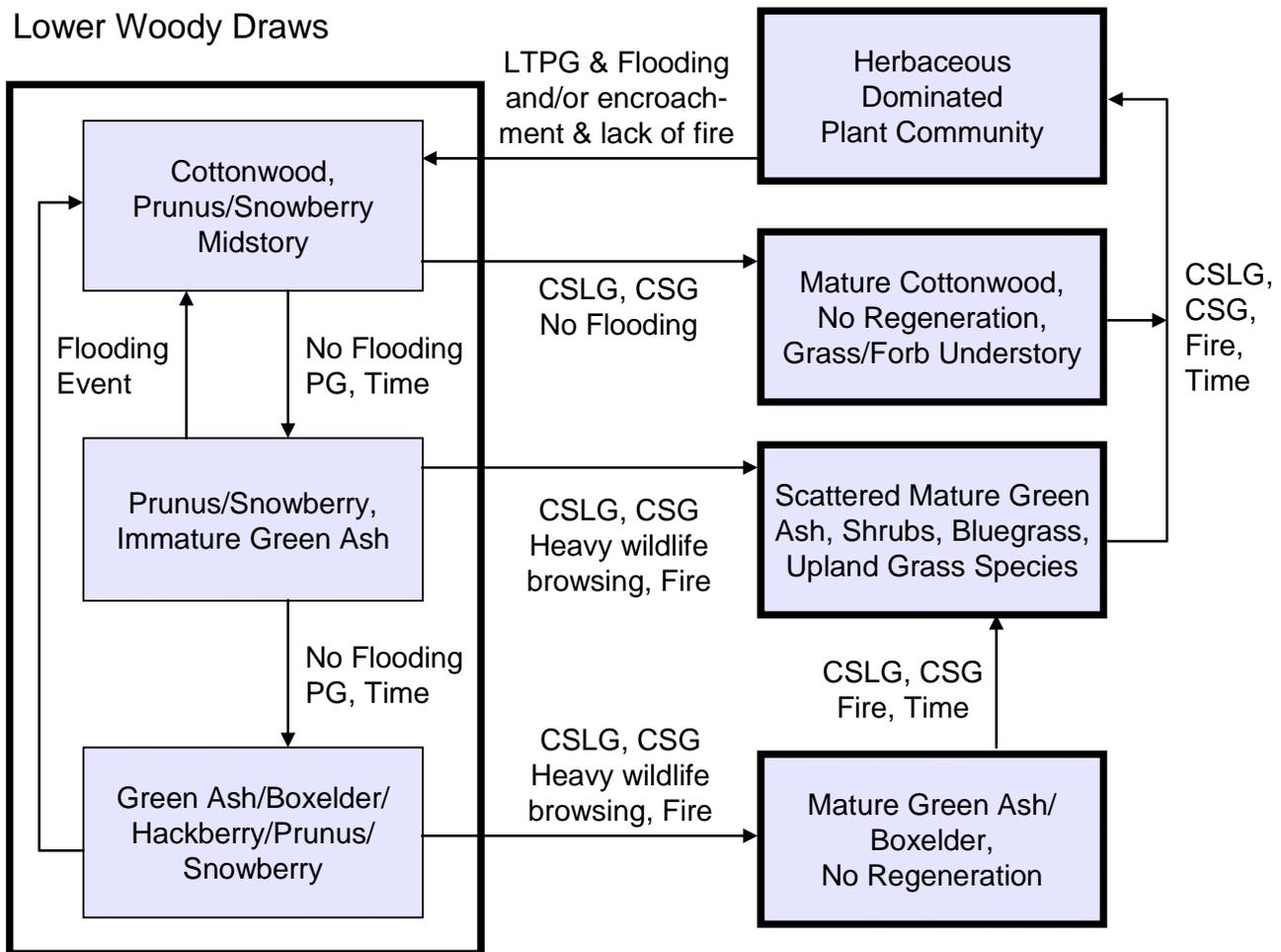
Tree Overstory

Woody shrubs and especially trees can establish and/or encroach on this site. The succession will take different paths depending on where on the drainage this occurs. For lower reaches of the drainage, refer to the Lower Woody Draw descriptions. For upper reaches of the drainage, refer to the Upper Woody Draw descriptions.

Lower Woody Draw

The following diagram depicts the successional changes that can occur on lower reaches of the drainage when trees encroach onto the site. Following the diagram are descriptions of each of the plant communities in the diagram.

Lower Woody Draws



Cottonwood, Prunus/Snowberry Midstory Plant Community

This plant community typically occurs after a flooding event and with prescribed grazing. Flooding reduces herbaceous competition through scouring of the soil surface, and provides a site for establishment and regeneration to occur. Prescribed grazing is necessary for this plant community to establish in order to prevent grazing of sapling cottonwood trees. Trees will be from seedling to immature stages, and the herbaceous understory will still be productive as a result of the filtered canopy of the deciduous trees. Understory shrubs, primarily plum and/or chokecherry, and snowberry will be most likely to establish. However, other species, including silver buffaloberry and currants can establish and dominate the shrub layer.

Prunus/Snowberry, Immature Green Ash Plant Community

If the cottonwood trees remain intact and green ash establishes on the site, prescribed grazing will allow this plant community to develop. The cottonwood trees and woody shrubs provide a suitable microclimate for establishment of other deciduous trees such as green ash. Green ash is typically the first tree to establish, but other species such as boxelder and hackberry will often become established as well. Cottonwood trees will be from the immature to young mature stage, and green ash will be from the sapling to immature stages. The herbaceous plant community will remain relatively productive, but will be reduced somewhat from the Big Bluestem/Western Wheatgrass Plant Community. This is due mainly to the competition from the woody shrub understory.

Green Ash/Boxelder/Hackberry/Prunus/Snowberry Plant Community

This plant community develops over time, with prescribed grazing and no flooding. Cottonwood trees will likely remain in lesser numbers, but the dominant trees will normally be green ash, boxelder, and/or hackberry. At times there will be a mix of all three species. However, some areas will be dominated by one or two of these species. Woody shrubs will remain in the understory, but typically in lesser amounts than in the previous two plant communities. While somewhat reduced, the herbaceous understory will remain relatively productive. The trees will mostly be in the mature stage, but regeneration will normally be evident (i.e., seedlings and saplings should be present).

Mature Cottonwood, No Regeneration, Grass/Forb Understory Plant Community

This plant community is typically derived from the Cottonwood, Prunus/Snowberry Midstory Plant Community as a result of continuous season-long grazing or continuous seasonal grazing and no flooding. With time, the cottonwood trees that survive become mature, and little or no regeneration occurs due mainly to grazing of seedlings and saplings. The type of grazing that limits regeneration also results in a reduction of the desirable native herbaceous species, often resulting in a dominance of species such as bluegrass and/or smooth brome grass, and forbs such as American licorice, aster, cudweed sagewort, goldenrod, and western ragweed. Introduced forbs such as Canada thistle, burdock, curly dock, and others will likely invade the site.

Scattered Mature Green Ash, Shrubs, Bluegrass, Upland Grass Species Plant Community

This plant community is derived from the Prunus/Snowberry Immature Green Ash Plant Community or the Mature Green Ash/Boxelder, No Regeneration Plant Community as a result of continuous season-long grazing or continuous seasonal grazing and no flooding, or heavy wildlife browsing and no flooding. Fire may also be a factor in this transition. With time, the green ash trees that survive become mature, and little or no regeneration occurs due mainly to grazing of seedlings and saplings. The type of grazing that limits regeneration also results in a reduction of the desirable native herbaceous species, often resulting in a dominance of species such as bluegrass and/or smooth brome grass, and forbs such as American licorice, aster, cudweed sagewort, goldenrod, and western ragweed. Introduced forbs such as Canada thistle, burdock, curly dock, and others will likely invade the site. The trees are scattered, and the site may have a “park-like” appearance with few trees and reduced understory.

Mature Green Ash/Boxelder, No Regeneration Plant Community

This plant community is typically derived from the Green Ash/Boxelder/Hackberry/Prunus/Snowberry Plant Community as a result of continuous season-long grazing or continuous seasonal grazing and no flooding, or heavy wildlife browsing and no flooding. Fire may also be a factor in this transition. With time, the trees that survive become mature, and little or no regeneration occurs due mainly to grazing of seedlings and saplings. The type of grazing that limits regeneration also results in a reduction of the desirable native herbaceous species, often resulting in a dominance of species such as bluegrass and/or smooth brome grass, and forbs such as American licorice, aster, cudweed sagewort, goldenrod, and western ragweed. Introduced forbs such as Canada thistle, burdock, curly dock, and others will likely invade the site.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

-- Under Development --

Big Bluestem/Western Wheatgrass Plant Community:

Western Wheatgrass/Kentucky Bluegrass/Remnant Big Bluestem Plant Community:

Western Wheatgrass/Snowberry/Bluegrass/Excessive Litter Plant Community:

Kentucky Bluegrass/ Annuals Plant Community:

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

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
Grasses & Grass-likes							
alkali 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
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 muhly	U D D U	N U N N	U D D U	N U N N	N U N N	U D D U	U D D U
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
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
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
Nuttall's alkaligrass	U P D D	P P P P	U P D D	P P P P	P P P P	U P D D	U P D 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 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
prairie sandreed	U D D U	U D U U	U D D U	U U D U	U U D U	U D D U	U D 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
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 licorice	U U D U	N U U N	U U D U	N U U N	N U U N	U U D U	N U U N
American 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
aster	U U D U	U U D U	U U D U	U U D U	U U D U	U U D U	U U D 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
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
false Solomon's-seal	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
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
heartleaf Alexanders	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
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
Maximilian 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
northern bedstraw	N N N N	N U D N	N N N N	N U D N	N U D N	N N N N	N N N N
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 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
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
verbena	U U D U	U U U U	U U D U	U U U U	U U U U	U U D U	U U U U
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 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							
American plum	D U U D	D U U D	D U U D	P U D D	D U U D	D U U D	D U U D
chokecherry	D T T D	D T T D	D T T D	P U D P	D U U D	D T T D	P U U P
golden currant	U D D U	U P P D	U D D U	U P P D	U U U U	U D D U	U P P 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
silver buffaloberry	D U U U	D U U U	D U U U	P U D P	U U U U	D U U U	D U U 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
Trees							
American elm	N N N N	N N N N	N N N N	N U D N	N N N N	N N N N	N N N N
boxelder	N N N U	N N U U	N N N U	N N U U	N N U U	N N N U	N N U U
bur oak	T T T T	T T T T	N N N N	N U D U	N N N N	T T T T	N U D U
green ash	N U D U	N D D U	N U D U	N D D U	N U D U	N U D U	N D D 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 ecological site 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)
Big Bluestem/Western Wheatgrass	3400	0.93
Western Wheatgrass/Kentucky Bluegrass, Remnant Big Blue	2600	0.71
Western Wheatgrass/Snowberry/Bluegrass/Excessive Litter	2400	0.66
Kentucky Bluegrass/Annuals	2000	0.55

*Based on 912 lbs./acre (air-dry weight) per Animal Unit Month (AUM), and on 30 percent harvest efficiency (refer to USDA 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 groups B and 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 exception would be where shortgrasses form a dense sod and dominate the site. Normally 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 aesthetic value that appeals to visitors.

Other Products

Seed harvest of native plant species can provide additional income on this site.

Supporting Information

Associated Sites

(063AY010SD) – Loamy

(063AY003SD) – Subirrigated

(063AY022SD) – Loamy Terrace

Similar Sites

(063AY003SD) – Subirrigated [more big bluestem and prairie cordgrass, less green needlegrass; higher production]

(063AY010SD) – Loamy [less big bluestem, more green needlegrass; lower production]

Inventory Data References

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range-trained personnel were also used. Those involved in developing this site include: April Boltjes, Range Management Specialist (RMS), NRCS; Stan Boltz, RMS, NRCS; Kent Cooley, Soil Scientist, NRCS; Rick Peterson, RMS, NRCS; and L. Michael Stirling, RMS, NRCS. No SCS-RANGE-417 clipping data forms have been collected and recorded on this site.

State Correlation

MLRA 63A lies entirely within SD, so no cross-state correlation has occurred.

Field Offices/Counties

Dupree, SD	Ziebach	McIntosh, SD	Corson	Pierre, SD	Hughes/Stanley
Faith, SD	Meade	Mound City, SD	Campbell	Selby, SD	Walworth
Gettysburg, SD	Potter	Murdo, SD	Jones	Timber Lake, SD	Dewey
Kadoka, SD	Jackson	Onida, SD	Sully	Wall, SD	East Pennington
Kennebec, SD	Lyman	Philip, SD	Haakon	White River, SD	Mellette

Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 43c – River Breaks and 43f – Subhumid Pierre Shale Plains.

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://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