

## United States Department of Agriculture Natural Resources Conservation Service

### Ecological Site Description

**Site Type:** Rangeland

**Site Name:** Clayey

**Site ID:** R063AY011SD

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



### Physiographic Features

This site occurs on nearly level to steeply sloping uplands.

**Landform:** terrace, fan, hill, plain, break

**Aspect:** N/A

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	1600	2700
<b>Slope (percent):</b>	0	30
<b>Water Table Depth (inches):</b>	None	None
<b>Flooding:</b>		
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Ponding:</b>		
<b>Depth (inches):</b>	None	None
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Runoff Class:</b>	Low	Very high

### 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>
<b>Frost-free period (days):</b>	126	149
<b>Freeze-free period (days):</b>	149	165
<b>Mean Annual Precipitation (inches):</b>	16	20
<b>Average Monthly Precipitation (inches) and Temperature (°F):</b>		

	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

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 silty clay loam to clay textured subsoils and slopes of 0 to 30 percent. The soils in this site are moderately well to well drained and formed in shale and clayey alluvium. The loam to clay surface layer is three to nine inches thick. The soils have a moderately slow to slow infiltration rate. When dry these soils crack. When the soils are wet, surface compaction can occur with heavy traffic. This site typically should show slight to no evidence of rills, wind scoured areas, or pedestalled plants. If present, water flow paths are broken, irregular in appearance, or discontinuous. The soil surface is stable and intact. Subsurface soil layers are nonrestrictive to water movement and root penetration.

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

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

**Parent Material Kind:** shale, alluvium  
**Parent Material Origin:** shale, clayey  
**Surface Texture:** silty clay loam, silty clay, clay  
**Surface Texture Modifier:** none  
**Subsurface Texture Group:** clayey  
**Surface Fragments ≤3" (% Cover):** 0  
**Surface Fragments >3" (%Cover):** 0  
**Subsurface Fragments ≤3" (% Volume):** 0-13  
**Subsurface Fragments >3" (% Volume):** 0-6

	<u>Minimum</u>	<u>Maximum</u>
<b>Drainage Class:</b>	moderately well	well
<b>Permeability Class:</b>	very slow	moderately slow
<b>Depth (inches):</b>	20	80
<b>Electrical Conductivity (mmhos/cm)*:</b>	0	8
<b>Sodium Absorption Ratio*:</b>	0	16
<b>Soil Reaction (1:1 Water)*:</b>	6.1	9.0
<b>Soil Reaction (0.1M CaCl2)*:</b>	NA	NA
<b>Available Water Capacity (inches)*:</b>	4	6
<b>Calcium Carbonate Equivalent (percent)*:</b>	0	25

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

## **Plant Communities**

### **Ecological Dynamics of the Site:**

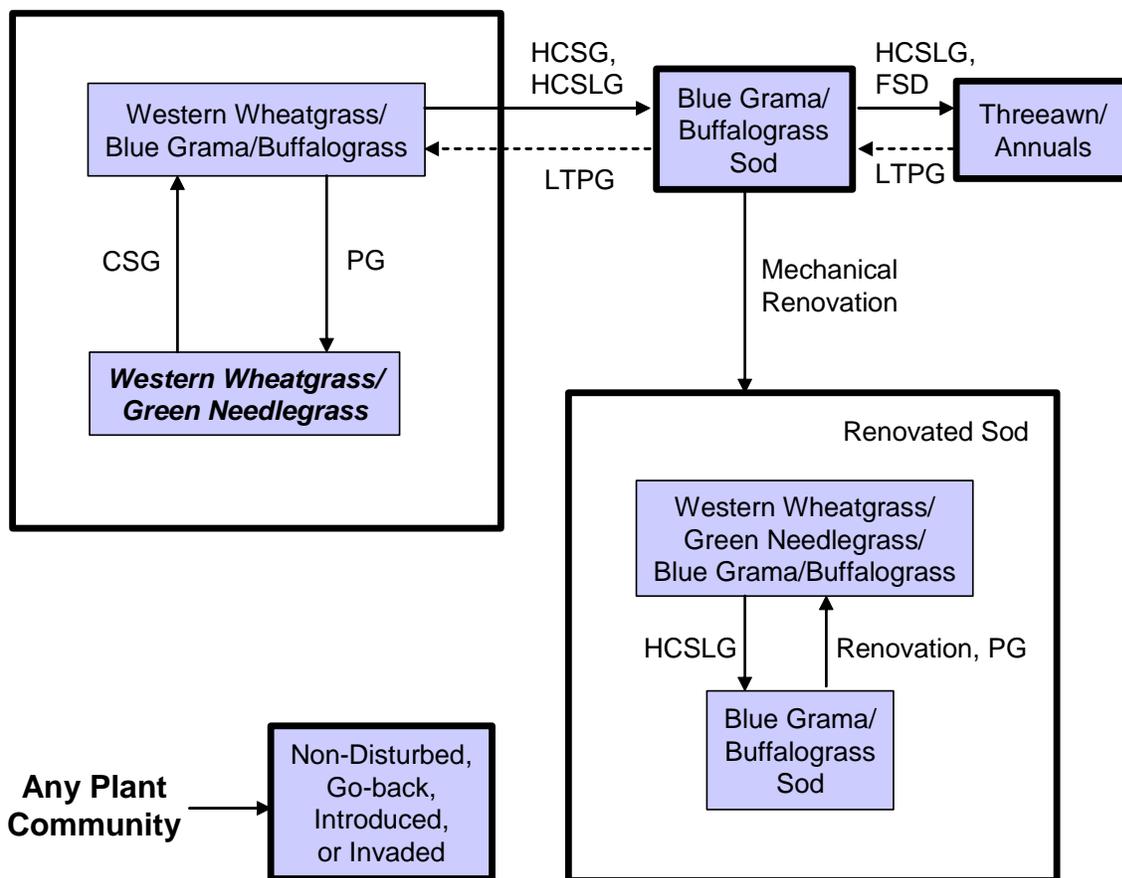
This site developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfire (often of light intensities), and other biotic and abiotic factors that typically influence soil/site development. Changes will occur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

Continuous season-long grazing (during the typical growing season of May through October) and/or repeated seasonal grazing (e.g., every spring, every summer) without adequate recovery periods following each grazing occurrence causes this site to depart from the Western Wheatgrass/Green Needlegrass Plant Community. Blue grama and buffalograss will increase and eventually develop into a sod. Western wheatgrass will increase initially and then begin to decrease. Green needlegrass, needleandthread, porcupine grass, sideoats grama, big bluestem, and little bluestem will decrease in frequency and production. Excessive defoliation can cause threeawns and annuals to increase and dominate the site. 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 western wheatgrass, bluegrass, and cheatgrass.

Interpretations are primarily based on the Western Wheatgrass/Green Needlegrass Plant Community. 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 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**



**CSG** – Continuous seasonal grazing (grazing a unit during the same season every year); **CSLG** – Continuous season-long grazing (grazing a unit for an entire growing season); **FSD** – Frequent, severe defoliation; **HCSG** – Heavy continuous seasonal grazing; **HCSLG** – Heavy continuous season-long grazing; **LTPG** – Long-term prescribed grazing; **PG** – Prescribed grazing (planned, controlled harvest of vegetation with grazing or browsing animals – see FOTG, Section IV, 528); Dashed lines signify transitions returning across a threshold, which typically require significant inputs or long periods of time.

Plant Community Composition and Group Annual Production

			Western Wheatgrass/Green Needlegrass		
COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Group	lbs./acre	% Comp
<b>GRASSES &amp; GRASS-LIKES</b>				2125 - 2375	85 - 95
<b>WHEATGRASS</b>			1	875 - 1250	35 - 50
western wheatgrass	Pascopyrum smithii	PASM	1	875 - 1250	35 - 50
slender wheatgrass	Elymus trachycaulus	ELTR7	1	0 - 125	0 - 5
<b>NEEDLEGRASS</b>			2	375 - 750	15 - 30
green needlegrass	Nassella viridula	NAVI4	2	375 - 750	15 - 30
porcupine grass	Hesperostipa spartea	HESP11	2	50 - 250	2 - 10
needleandthread	Hesperostipa comata ssp. comata	HECOC8	2	0 - 125	0 - 5
<b>TALL/MID WARM-SEASON</b>			3	250 - 375	10 - 15
sideoats grama	Bouteloua curtipendula	BOCU	3	125 - 375	5 - 15
big bluestem	Andropogon gerardii	ANGE	3	0 - 250	0 - 10
little bluestem	Schizachyrium scoparium	SCSC	3	0 - 125	0 - 5
<b>SHORT WARM-SEASON</b>			4	75 - 250	3 - 10
blue grama	Bouteloua gracilis	BOGR2	4	50 - 250	2 - 10
buffalograss	Bouteloua dactyloides	BODA2	4	25 - 125	1 - 5
threeawn	Aristida spp.	ARIST	4	0 - 75	0 - 3
<b>OTHER NATIVE GRASSES</b>			5	0 - 125	0 - 5
prairie junegrass	Koeleria macrantha	KOMA	5	0 - 125	0 - 5
plains muhly	Muhlenbergia cuspidata	MUCU3	5	0 - 75	0 - 3
other perennial grasses	0	2GP	5	0 - 50	0 - 2
<b>GRASS-LIKES</b>			6	25 - 125	1 - 5
threadleaf sedge	Carex filifolia	CAFI	6	25 - 75	1 - 3
needleleaf sedge	Carex duriuscula	CADU6	6	0 - 50	0 - 2
sun sedge	Carex inops ssp. heliophila	CAINH2	6	0 - 25	0 - 1
<b>FORBS</b>			8	125 - 250	5 - 10
American vetch	Vicia americana	VIAM	8	25 - 50	1 - 2
biscuitroot	Lomatium spp.	LOMAT	8	0 - 50	0 - 2
cudweed sagewort	Artemisia ludoviciana	ARLU	8	25 - 75	1 - 3
deathcamas	Zigadenus spp.	ZIGAD	8	0 - 25	0 - 1
deervetch	Lotus unifoliolatus var. unifoliolatus	LOUNU	8	0 - 25	0 - 1
dotted gayfeather	Liatris punctata	LIPU	8	25 - 50	1 - 2
false boneset	Brickellia eupatorioides	BREU	8	0 - 75	0 - 3
goldenrod	Solidago spp.	SOLID	8	25 - 50	1 - 2
milkvetch	Astragalus spp.	ASTRA	8	0 - 50	0 - 2
penstemon	Penstemon spp.	PENST	8	0 - 25	0 - 1
prairie clover	Dalea spp.	DALEA	8	0 - 50	0 - 2
prairie coneflower	Ratibida columnifera	RACO3	8	0 - 50	0 - 2
pussytoes	Antennaria spp.	ANTEN	8	0 - 25	0 - 1
scarlet gaura	Gaura coccinea	GACO5	8	0 - 25	0 - 1
scarlet globemallow	Sphaeralcea coccinea	SPCO	8	25 - 50	1 - 2
scurfpea	Psoraleum spp.	PSORA2	8	25 - 50	1 - 2
spiny phlox	Phlox hoodii	PHHO	8	0 - 25	0 - 1
textile onion	Allium textile	ALTE	8	25 - 50	1 - 2
wavyleaf thistle	Cirsium undulatum	CIUN	8	0 - 50	0 - 2
western ragweed	Ambrosia psilostachya	AMPS	8	0 - 50	0 - 2
western wallflower	Erysimum capitatum var. capitatum	ERCAC	8	25 - 50	1 - 2
western yarrow	Achillea millefolium var. occidentalis	ACMIO	8	0 - 50	0 - 2
white prairie aster	Symphotrichum falcatum	SYFA	8	25 - 50	1 - 2
wild parsley	Musineon divaricatum	MUDI	8	0 - 50	0 - 2
native forbs		2FN	8	0 - 75	0 - 3
<b>SHRUBS</b>			9	25 - 125	1 - 5
cactus	Opuntia spp.	OPUNT	9	0 - 25	0 - 1
fringed sagewort	Artemisia frigida	ARFR4	9	0 - 50	0 - 2
rose	Rosa spp.	ROSA5	9	0 - 50	0 - 2
other shrubs		2SHRUB	9	0 - 50	0 - 2

Annual Production lbs./acre	LOW	RV	HIGH
<b>GRASSES &amp; GRASS-LIKES</b>	1660 -	2238	- 2795
<b>FORBS</b>	120 -	188	- 275
<b>SHRUBS</b>	20 -	75	- 130
<b>TOTAL</b>	1800 -	2500	- 3200

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	Western Wheatgrass/ Green Needlegrass			Western Wheatgrass/ Blue Grama/Bufalograss			Blue Grama/Bufalograss Sod			Threawn/Annuals		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
<b>GRASSES &amp; GRASS-LIKES</b>													
<b>WHEATGRASS</b>													
western wheatgrass	PASM	1	875 - 1250	35 - 50	1	285 - 380	15 - 20	1	55 - 110	5 - 10	1	7 - 35	1 - 5
slender wheatgrass	ELTR7	1	0 - 125	0 - 5	1	0 - 38	0 - 2	1	0 - 11	0 - 1			
<b>NEEDLEGRASS</b>													
green needlegrass	NAV4	2	375 - 750	15 - 30	2	95 - 285	5 - 15	2	22 - 55	2 - 5	2	0 - 35	0 - 5
porcupine grass	HESP11	2	50 - 250	2 - 10	2	0 - 95	0 - 5	2	0 - 22	0 - 2			
needleandthread	HECOB8	2	0 - 125	0 - 5	2	19 - 95	1 - 5	2	22 - 55	2 - 5	2	0 - 28	0 - 4
<b>TALL/MD WARM-SEASON</b>													
sideoats grama	BOCU	3	250 - 375	10 - 15	3	95 - 190	5 - 10	3	0 - 55	0 - 5	3	0 - 14	0 - 2
big bluestem	ANGE	3	0 - 250	0 - 10	3	0 - 38	0 - 2	3	0 - 11	0 - 1			
little bluestem	SC8C	3	0 - 125	0 - 5	3	0 - 38	0 - 2	3	0 - 11	0 - 1	3	0 - 7	0 - 1
<b>SHORT WARM-SEASON</b>													
blue grama	BOGR2	4	75 - 250	3 - 10	4	190 - 570	10 - 30	4	495 - 660	45 - 60	4	70 - 315	10 - 45
bufalograss	BODA2	4	25 - 125	1 - 5	4	95 - 190	5 - 10	4	275 - 385	25 - 35	4	7 - 140	1 - 20
threawn	ARIST	4	0 - 75	0 - 3	4	0 - 95	0 - 5	4	11 - 110	1 - 10	4	70 - 245	10 - 35
<b>OTHER NATIVE GRASSES</b>													
prairie junegrass	KOMA	5	0 - 125	0 - 5	5	0 - 95	0 - 5	5	0 - 55	0 - 5	5	0 - 14	0 - 2
plains muhly	MUCU3	5	0 - 75	0 - 3	5	0 - 57	0 - 3	5	0 - 33	0 - 3	5	0 - 7	0 - 1
other grasses	2GRAM	5	0 - 50	0 - 2	5	0 - 38	0 - 2	5	0 - 22	0 - 2	5	0 - 70	0 - 10
<b>GRASS-LIKES</b>													
threadleaf sedge	CAF1	6	25 - 75	1 - 3	6	95 - 190	5 - 10	6	55 - 165	5 - 15	6	14 - 35	2 - 5
needleleaf sedge	CADU6	6	0 - 50	0 - 2	6	0 - 95	0 - 5	6	0 - 55	0 - 5	6	0 - 14	0 - 2
sun sedge	CAINH2	6	0 - 25	0 - 1	6	0 - 19	0 - 1	6	0 - 22	0 - 2	6	0 - 7	0 - 1
<b>NON-NATIVE GRASSES</b>													
bluegrass	POA				7	0 - 190	0 - 10	7	0 - 55	0 - 5	7	0 - 14	0 - 2
smooth bromegrass	BRIN2				7	0 - 285	0 - 15	7	0 - 55	0 - 5	7	0 - 14	0 - 2
cheatgrass	BRTE				7	0 - 95	0 - 5	7	0 - 55	0 - 5	7	7 - 56	1 - 8
<b>FORBS</b>													
American vetch	VIAM	8	25 - 50	1 - 2	8	0 - 38	0 - 2	8	0 - 11	0 - 1			
biscuitroot	LOMAT	8	0 - 50	0 - 2	8	0 - 57	0 - 3	8	0 - 44	0 - 4	8	0 - 7	0 - 1
curlycup gumweed	GRSQ				8	0 - 19	0 - 1	8	0 - 33	0 - 3	8	0 - 35	0 - 5
deathcamas	ZIGAD	8	0 - 25	0 - 1	8	0 - 38	0 - 2	8	0 - 22	0 - 2			
deervetch	LOUNU	8	0 - 25	0 - 1	8	0 - 19	0 - 1	8	0 - 22	0 - 2			
dotted gayfeather	LIPU	8	25 - 50	1 - 2	8	0 - 38	0 - 2	8	0 - 22	0 - 2	8	0 - 7	0 - 1
false bonaset	BREU	8	0 - 75	0 - 3	8	0 - 38	0 - 2	8	0 - 11	0 - 1			
fetid marigold	DYPA				8			8	0 - 11	0 - 1	8	14 - 70	2 - 10
goldenrod	SOLID	8	25 - 50	1 - 2	8	0 - 38	0 - 2	8	0 - 22	0 - 2			
milkvetch	ASTRA	8	0 - 50	0 - 2	8	0 - 38	0 - 2	8	0 - 22	0 - 2			
penstemon	PENST	8	0 - 25	0 - 1	8	0 - 19	0 - 1	8	0 - 11	0 - 1			
prairie clover	DALEA	8	0 - 50	0 - 2	8	0 - 38	0 - 2	8	0 - 11	0 - 1			
prairie coneflower	RACO3	8	0 - 50	0 - 2	8	0 - 38	0 - 2	8	0 - 33	0 - 3	8	0 - 7	0 - 1
pussytoes	ANTEN	8	0 - 25	0 - 1	8	0 - 38	0 - 2	8	0 - 22	0 - 2	8	0 - 35	0 - 5
scarlet gaura	GACO5	8	0 - 25	0 - 1	8	0 - 19	0 - 1	8	0 - 11	0 - 1			
scarlet globemallow	SPCO	8	25 - 50	1 - 2	8	0 - 57	0 - 3	8	0 - 55	0 - 5	8	0 - 14	0 - 2
scurfpea	PSORA2	8	25 - 50	1 - 2	8	0 - 38	0 - 2	8	0 - 22	0 - 2			
spiny phlox	PHHO	8	0 - 25	0 - 1	8	0 - 38	0 - 2	8	0 - 22	0 - 2	8	0 - 7	0 - 1
sweetclover	MELL				8	0 - 190	0 - 10	8	0 - 110	0 - 10	8	0 - 70	0 - 10
textile onion	ALTE	8	25 - 50	1 - 2	8	0 - 38	0 - 2	8	0 - 22	0 - 2			
verbena	VERBE				8	0 - 19	0 - 1	8	0 - 22	0 - 2	8	14 - 35	2 - 5
wavyleaf thistle	CIUN	8	0 - 50	0 - 2	8	0 - 38	0 - 2	8	0 - 22	0 - 2			
western ragweed	AMPS	8	0 - 50	0 - 2	8	0 - 38	0 - 2	8	0 - 22	0 - 2	8	14 - 35	2 - 5
western salsify	TRDU				8	0 - 76	0 - 4	8	0 - 22	0 - 2	8	0 - 7	0 - 1
western wallflower	ERCAC	8	25 - 50	1 - 2	8	0 - 19	0 - 1	8	0 - 11	0 - 1			
western yarrow	ACMIO	8	0 - 50	0 - 2	8	0 - 38	0 - 2	8	0 - 22	0 - 2	8	0 - 14	0 - 2
white prairie aster	SYFA	8	25 - 50	1 - 2	8	0 - 57	0 - 3	8	0 - 33	0 - 3	8	0 - 14	0 - 2
wild parsley	MUDI	8	0 - 50	0 - 2	8	0 - 57	0 - 3	8	0 - 33	0 - 3			
native forbs	2FN	8	0 - 75	0 - 3	8	0 - 57	0 - 3	8	0 - 33	0 - 3	8	0 - 21	0 - 3
introduced forbs	2FI				8	0 - 38	0 - 2	8	0 - 44	0 - 4	8	0 - 70	0 - 10
<b>SHRUBS</b>													
broom snakeweed	GUSA2	9	25 - 125	1 - 5	9	95 - 190	5 - 10	9	55 - 110	5 - 10	9	35 - 175	5 - 25
cactus	OPUNT	9	0 - 25	0 - 1	9	0 - 57	0 - 3	9	11 - 55	1 - 5	9	7 - 70	1 - 10
fringed sagewort	ARFR4	9	0 - 50	0 - 2	9	0 - 95	0 - 5	9	0 - 55	0 - 5	9	14 - 105	2 - 15
rose	ROSA5	9	0 - 50	0 - 2	9	0 - 57	0 - 3	9	0 - 22	0 - 2	9	0 - 7	0 - 1
other shrubs	2SHRUB	9	0 - 50	0 - 2	9	0 - 38	0 - 2	9	0 - 22	0 - 2	9	0 - 7	0 - 1
<b>Annual Production lbs./acre</b>													
<b>GRASSES &amp; GRASS-LIKES</b>		LOW	RV	HIGH	LOW	RV	HIGH	LOW	RV	HIGH	LOW	RV	HIGH
<b>FORBS</b>		1660	2238	2795	1020	1615	2110	500	935	1370	305	473	740
<b>SHRUBS</b>		120	188	275	90	143	195	50	83	115	65	123	180
<b>TOTAL</b>		1800	2500	3200	1200	1900	2500	600	1100	1600	400	700	1100

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.

#### Western Wheatgrass/Green Needlegrass Plant Community

Interpretations are based primarily on the Western Wheatgrass/Green Needlegrass Plant Community (this is also considered to be climax). This plant community can be found on areas that are properly managed with grazing and/or prescribed burning and sometimes on areas receiving occasional short periods of rest. The potential vegetation is about 85 percent grasses or grass-like plants, 10 percent forbs, and 5 percent woody plants. The community is dominated by cool-season grasses.

The major grasses include western wheatgrass, green needlegrass, needleandthread, and sideoats grama. Other grasses include blue grama, buffalograss, sedges, and porcupine grass. This plant community is extremely 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: 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:

- Continuous seasonal grazing (extended grazing at the same time of year each year) will shift this community to the *Western Wheatgrass/ Blue Grama/ Buffalograss Plant Community*.

#### Western Wheatgrass/Blue Grama/ Buffalograss Plant Community

This plant community evolved under continuous seasonal grazing or from over utilization during extended drought periods. The potential plant community is made up of approximately 80 percent grasses and grass-like species, 10 percent forbs, and 10 percent shrubs.

Dominant grasses include western wheatgrass, blue grama, and buffalograss. Grasses of secondary importance include sideoats grama, sedge, green needlegrass, and needleandthread. Forbs commonly found in this plant community include cudweed sagewort, prairie coneflower, and western yarrow. Shrub canopy ranges from 0 to 10 percent.

When compared to the Western Wheatgrass/Green Needlegrass Plant Community, blue grama and buffalograss have increased. Green needlegrass and sideoats grama have decreased and production of mid and tall warm-season grasses has also been 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.

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: SD6303

Growth curve name: Pierre Shale Plains, 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:

- Heavy continuous season-long grazing (stocking above capacity and grazing most or all of growing season) will convert this plant community to the *Blue Grama/Buffalograss Sod Plant Community*.
- Prescribed grazing (alternating season of use and providing adequate recovery periods) will convert this plant community to the *Western Wheatgrass/Green Needlegrass Plant Community*.

### **Blue Grama/Buffalograss Sod Plant Community**

This plant community evolved under heavy continuous season-long grazing or from over utilization during extended drought periods. The potential plant community is made up of approximately 80 percent grasses and grass-like species, 10 percent forbs, and 10 percent shrubs.

Dominant grasses include blue grama and buffalograss. Grasses of secondary importance include sedge and western wheatgrass. Forbs commonly found in this plant community include wild parsley and scarlet globemallow. Shrub canopy ranges from 0 to 10 percent. When compared to the Western Wheatgrass/Green Needlegrass Plant Community, blue grama and buffalograss are dominant on this plant community. Cool-season grasses have decreased significantly. This vegetation state is very resistant to change. The herbaceous species present are well adapted to grazing; however, composition can be altered through long-term prescribed grazing.

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: SD6305

Growth curve name: Pierre Shale Plains, 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 are as follows:

- Long-term prescribed grazing may potentially convert the plant community to the *Western Wheatgrass/Blue Grama/Buffalograss Plant Community*, assuming an adequate seed/vegetative source is present. This could require significant time and input to achieve.
- Heavy continuous season-long grazing and/or frequent severe defoliation will likely move this plant community to the *Threeawn/Annuals Plant Community*.

### Threeawn/Annuals Plant Community

This plant community developed under continuous heavy grazing or other excessive disturbances (e.g., heavy use areas, defoliation by rodents, etc.) The potential plant community is made up of approximately 50-75 percent grasses and grass-like species, 10-25 percent forbs, and 5-25 percent shrubs. The dominant grasses include threeawn and annual brome grasses. Other grasses may include little bluestem, blue grama, buffalograss, sedges, and western wheatgrass. The dominant forbs include fetid marigold, western ragweed, prostrate verbena, pussytoes, and other annual invader-like species. The dominant shrubs include fringed sagewort and cactus. Other plant species, from adjacent ecological sites, can become minor components of this plant community. This plant community is susceptible to invasion of Canada thistle and other nonnative species because of the relatively high percent of bare ground. Compared to the Western Wheatgrass/Needleandthread Plant Community, red threeawn, annual brome grasses, and percent of bare ground has increased. Western wheatgrass, needlegrasses, and other cool-season grasses and grass-like species have decreased as have the warm-season species including big bluestem, sideoats grama, blue grama, and buffalograss. Plant diversity is low (plant richness may be high, but areas are often dominated by a few species).

This plant community is difficult to return to the Western Wheatgrass/Green Needlegrass Plant Community because of the loss of plant diversity and overall soil disturbance. Soil erosion is potentially very high because of the bare ground and shallow rooted herbaceous plant community. Water runoff will increase and infiltration will decrease due to animal related soil compaction and loss of root mass due to low plant diversity and vigor. This plant community will require significant economic inputs and time to move towards another plant community. This movement is highly variable in its succession. This is due to the loss of diversity (including the loss of the seed bank), within the existing plant community, and the plant communities on adjacent sites. This community can be renovated to improve the production capability; however, if management changes are not made the vegetation could revert back to a threeawn/annual community.

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: SD6303

Growth curve name: Pierre Shale Plains, 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:

- Under long-term prescribed grazing, including adequate rest periods, this plant community will move through the successional stages leading to the *Western Wheatgrass/Green Needlegrass*

*Plant Community.* Depending on the slope, aspect, and size, and if adequate perennial plants exist, this change can occur more rapidly.

### **Renovated Sod Vegetation State**

An altered vegetation community can be achieved through mechanical renovation. Renovation creates microrelief that alters the water cycle by increasing infiltration and decreasing runoff. The renovation reduces the sod-bound conditions, increasing the production potential. These factors favor cool-season species such as western wheatgrass, green needlegrass, and a variety of forbs. With proper management after renovation, this plant community will have similar plant composition and growth curve characteristics as the Western Wheatgrass/Green Needlegrass/Blue Grama/ Buffalograss Plant Community. However, the production could be higher, depending on the degree of alteration. Proper grazing management must be implemented to maintain this plant community.

If this plant community is subjected to excessive disturbance after renovation (i.e., heavy continuous seasonal or season-long grazing, excessive defoliation, etc.) the plant community will shift to one similar to the Blue Grama/Buffalograss Sod Plant Community in most respects. The main difference is the microrelief created by the renovation, and the alteration to the soil flora and fauna.

### **Non-Disturbed, Go-back, Introduced, or Invaded**

This group includes four separate vegetation states that are highly variable in nature. They are derived through three distinct management scenarios and are not related successional. Infiltration, runoff, and soil erosion varies depending on the vegetation present on the site.

The **Non-Disturbed** state develops from extended periods of exclusion by large herbivores, fire suppression, and lack of other vegetation disturbance. Plant litter accumulates in large amounts when this community first develops. Litter buildup reduces mature plant vigor and density, and seedling recruitment declines. Eventually litter levels become high enough that plant density decreases. Interspaces are commonly filled by annual forbs, annual grasses, and cryptogams. Typically, rhizomatous grasses form small colonies because of a lack of tiller stimulation. While many of the species present in the Western Wheatgrass/Green Needlegrass plant community also occur here, other species tend to increase or invade such as bluegrass, smooth brome, threeawn, cheatgrass, and sweetclover. This plant community can return to a plant community similar to the Western Wheatgrass/Green Needlegrass plant community with practices such as prescribed burning and/or long-term prescribed grazing.

The **Go-back Land** state can be reached whenever severe mechanical disturbance occurs (e.g., tilled and abandoned land, either past or present). During the early successional stages, the species that mainly dominate are annual grasses and forbs, later being replaced by both native and introduced perennials. The vegetation on this site varies greatly, sometimes being dominated by threeawn, bluegrass, smooth brome, annual brome, crested wheatgrass, buffalograss, broom snakeweed, sweetclover, and nonnative thistles. Other plants that commonly occur on the site include western wheatgrass, deathcamas, prickly lettuce, maretail, kochia, foxtail, and sunflowers. Bare ground is prevalent due to the loss of organic matter and lower overall soil health.

The **Introduced** state is normally those areas seeded to crested wheatgrass, pubescent wheatgrass, intermediate wheatgrass, alfalfa, or other introduced species. Refer to the associated Forage Suitability Group description for adapted species.

The **Invaded** state includes areas that have been invaded by species such as smooth brome, bluegrass, nonnative thistles, field bindweed, knapweeds, leafy spurge, hoary cress, and other introduced species.

## **Ecological Site Interpretations**

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

-- Under Development --

**Western Wheatgrass/Green Needlegrass Plant Community:**

**Western Wheatgrass/Blue Grama/Buffalograss Plant Community:**

**Blue Grama/Buffalograss Sod Plant Community:**

**Threeawn/Annuals Plant Community:**

**Non-disturbed, Go-back Land, Introduced, Invaded Plant Community:**

### Animal Preferences (Quarterly – 1,2,3,4<sup>†</sup>)

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
<b>Grasses &amp; Grass-like</b>							
big bluestem	U D P D	U D U U	U D P D	U D U U	U D U U	U D P D	U D P D
blue grama	U D P U	D P P D	U D P U	D P P D	D P P D	U D P U	U D P U
buffalograss	U U D U	N U D U	U U D U	N U D U	N U D U	U U D U	U U D U
green needlegrass	U P U D	N P N P	U P U D	N P N P	N P N P	U P U D	U P U D
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
plains muhly	U U D U	U U D U	U U D U	N N N N	N N N N	U U D U	U U D U
porcupine grass	U P U D	N D N U	U P U D	N D N U	N D N U	U P U D	U P U D
prairie 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
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
sun 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
threadleaf 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
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
<b>Forbs</b>							
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
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
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
deathcamas	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
deervetch	U U U U	U D D U	U U U U	U D D U	U D D U	U U U U	U D D U
dotted gayfeather	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
false boneset	U U D U	N D U N	U U D U	N D U N	N D U N	U U D U	N D U N
goldenrod	U U D U	N U U N	U U D U	N U U N	N U U N	U U D U	N U U N
milkvetch	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 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 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
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
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
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
scarlet globemallow	U U D U	U D D U	U U D U	U D D U	U D D U	U U D U	U D D U
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
spiny phlox	U D U U	U P P U	U D U U	U P P U	U P P U	U D U U	U P 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
white prairie aster	U U D U	N N N N	U U D U	N N N N	N N N N	U U D U	N N N N
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
wild parsley	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
<b>Shrubs</b>							
cactus	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
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
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

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

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

## Animal Community – Grazing Interpretations

The following table lists annual, suggested initial stocking rates with average growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of conservation planning. Often, the current plant composition does not entirely match any particular plant community (as described in this 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)
Western Wheatgrass/Green Needlegrass	2500	0.69
Western Wheatgrass/Blue Grama/Buffalograss	1900	0.52
Blue Grama/Buffalograss Sod	1100	0.30
Threeawn/Annuals	700	0.19

\*Based on 912 lbs./acre (air-dry weight) per Animal Unit Month (AUM), and on 25 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 group D, with localized areas in hydrologic group C. Infiltration and runoff potential for this site varies from moderate to high depending on soil hydrologic group, slope, and ground cover. In many cases, areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where shortgrasses form a strong sod and dominate the site. Dominance by blue grama, buffalograss, bluegrass, and/or smooth 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

Loamy (R063AY010SD), Thin Upland (R063AY012SD), Shallow Clay (R063AY017SD), Clayey Overflow (R063AY021SD)

### Similar Sites

(R063AY021SD) – Clayey Overflow [more big bluestem; higher production]  
(R063AY010SD) – Loamy [less green needlegrass; more needleandthread]

### 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.

<u>Data Source</u>	<u>Number of Records</u>	<u>Sample Period</u>	<u>State</u>	<u>County</u>
SCS-RANGE-417	20	1968 – 1986	SD	Campbell, Corson, Haakon, Jones Lyman, Mellette, Stanley, Walworth, Ziebach

### State Correlation

MLRA 63A lies primarily 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 Type: Rangeland**  
**MLRA: 63A – Northern Rolling Pierre Shale Plains**

**Clayey**  
**R063AY011SD**

## **Site Description Approval**

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

\_\_\_\_\_  
Date

Ecological Reference Worksheet

Author(s)/participant(s): Stan Boltz

Contact for lead author: \_\_\_\_\_ Reference site used? Yes/No

Date: 7/02/07 MLRA: 63A Ecological Site: Clayey This *must* be verified based on soils and climate (see Ecological Site Description). Current plant community *cannot* be used to identify the ecological site.

<p><b>Indicators.</b> For each indicator, describe the potential for the site. Where possible, (1) use numbers, (2) include expected range of values for above- and below-average years for <b>each</b> community within the reference state, when appropriate &amp; (3) cite data. Continue descriptions on separate sheet.</p>
<p><b>1. Number and extent of rills:</b> Rills should not be present.</p>
<p><b>2. Presence of water flow patterns:</b> Barely observable.</p>
<p><b>3. Number and height of erosional pedestals or terracettes:</b> Essentially, nonexistent.</p>
<p><b>4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are <i>not</i> bare ground):</b> Bare ground less than five percent and less than two inches in diameter.</p>
<p><b>5. Number of gullies and erosion associated with gullies:</b> Active gullies should not be present.</p>
<p><b>6. Extent of wind scoured, blowouts and/or depositional areas:</b> None.</p>
<p><b>7. Amount of litter movement (describe size and distance expected to travel):</b> Little to no plant litter movement. Plant litter remains in place and is not moved by erosional forces.</p>
<p><b>8. Soil surface (top few mm) resistance to erosion (stability values are averages – most sites will show a range of values for both plant canopy and interspaces, if different):</b> Stability class usually 6. Typically, high root content, organic matter, and granular structure. Soil surface is very resistant to erosion.</p>
<p><b>9. Soil surface structure and SOM content (include type and strength of structure, and A-horizon color and thickness for both plant canopy and interspaces, if different):</b> Use soil series description for depth and color of A-horizon.</p>
<p><b>10. Effect of plant community composition (relative proportion of different functional groups) &amp; spatial distribution on infiltration &amp; runoff:</b> Healthy, deep rooted native grasses enhance infiltration and reduce runoff.</p>
<p><b>11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):</b> No compaction layer should be evident. Somewhat restrictive layers of clayey texture can occur at depths of less than 14 inches.</p>
<p><b>12. Functional/Structural Groups (list in order of descending dominance by above-ground weight using symbols: &gt;&gt;, &gt;, = to indicate much greater than, greater than, and equal to):</b> Cool-season deep-rooted rhizomatous grasses &gt;&gt; cool-season bunchgrasses &gt; tall/mid warm-season grasses &gt; short warm-season grasses = forbs &gt; shrubs</p>
<p><b>13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):</b> Very little to no evidence of decadence or mortality.</p>
<p><b>14. Average percent litter cover.</b> 70-80 percent, roughly 0.5 inch thick or less. Litter cover is in contact with soil surface.</p>
<p><b>15. Expected annual production (this is TOTAL above-ground production, not just forage production):</b> 1,800 – 3,200 lbs./acre air-dry weight, average 2,500 lbs./acre air-dry weight.</p>
<p><b>16. Potential invasive (including noxious) species (native and non-native). List species which characterize degraded states and which, after a threshold is crossed, “can, and often do, continue to increase regardless of the management of the site and may eventually dominate the site.”</b> Refer to State and Local Noxious Weed List, also Kentucky bluegrass, smooth brome grass.</p>
<p><b>17. Perennial plant reproductive capability:</b> All species are capable of reproducing.</p>

Rev. 12/15/02