

United States Department of Agriculture Natural Resources Conservation Service

Ecological Site Description

Site Type: Rangeland

Site Name: Loamy

Site ID: R058DY010SD

Major Land Resource Area (MLRA): 58D – Northern Rolling High Plains, Eastern Part



Physiographic Features

This site occurs on nearly level to moderately steep uplands.

Landform: hillslope, fan, terrace **Aspect:** N/A

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	2,300	4,000
Slope (percent):	1	12
Water Table Depth (inches):	80	80
Flooding:		
Frequency:	None	None
Duration:	None	None
Ponding:		
Depth (inches):	None	None
Frequency:	None	None
Duration:	None	None
Runoff Class:	Medium	High

Climatic Features

The climate in this MLRA is typical of the drier portions of the Northern Great Plains where sagebrush steppes to the west yield to grassland to the east. Annual precipitation ranges from 14 to 16 inches. Most of the rainfall occurs as frontal storms early in the growing season. Some high-intensity, convective thunderstorms occur in the summer. Precipitation in winter occurs as snow. Temperatures show a wide range between summer and winter and between daily maximums and minimums, due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Outbreaks of cold air from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring. The normal average annual temperature is about 44°F. January is the coldest month with average temperatures ranging from about 12°F (Marmarth, North Dakota (ND)), to about 20°F (Baker, Montana (MT)). July is the warmest month with temperatures averaging from about 70°F (Marmarth, ND), to about 76°F (Baker, MT). The range of normal average monthly temperatures between the coldest and warmest months is about 55°F. 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 can 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):	110	123
Freeze-free period (days):	130	140
Mean Annual Precipitation (inches):	14	16

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

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.39	0.46	-0.8	31.0
February	0.34	0.54	5.7	34.4
March	0.73	0.82	15.7	43.8
April	1.23	1.73	29.1	60.4
May	2.29	2.71	39.6	67.7
June	2.79	3.00	49.3	76.7
July	1.91	2.10	54.5	90.7
August	1.35	1.46	50.2	88.2
September	1.16	1.25	40.1	76.5
October	0.85	1.07	28.9	59.5
November	0.43	0.57	15.9	44.6
December	0.31	0.50	6.1	33.7

Climate Stations		Period	
Station ID	Location or Name	From	To
MT0412	Baker	1948	2005
SD1294	Camp Crook	1896	2006
SD3560	Harding 3 SE	1951	2006
ND5575	Marmarth	1950	2006
SD7062	Redig 11 NE	1948	2006

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

Influencing Water Features

No significant water features influence this site.

Representative Soil Features

The soils in this site are well-drained and formed in alluvium or residuum from various sedimentary materials. The surface layer is 10 to 20 inches thick. The texture of the surface soils are loam or fine sandy loam, while the subsoil ranges from fine sandy loam to clay loam. The soils have a moderate infiltration rate. Occasionally carbonates will occur at or near the surface on this site. This site should show slight to no evidence of rills, wind scoured areas or pedestalled plants. Water flow paths are typically not present, but when visible they are broken and 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 10 percent.

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

Parent Material Kind: residuum, alluvium
Parent Material Origin: sandstone or siltstone
Surface Texture: loam, fine sandy loam
Surface Texture Modifier: none
Subsurface Texture Group: loamy
Surface Fragments ≤ 3” (% Cover): 0-20
Surface Fragments > 3” (%Cover): 0-25
Subsurface Fragments ≤ 3” (% Volume): 0-25
Subsurface Fragments > 3” (% Volume): 0-20

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	well	well
Permeability Class:	moderately slow	moderately slow
Depth to Bedrock (inches):	20	80
Electrical Conductivity (mmhos/cm)*:	0	4
Sodium Absorption Ratio*:	0	5
Soil Reaction (1:1 Water)*:	6.1	9.0
Soil Reaction (0.1M CaCl₂)*:	NA	NA
Available Water Capacity (inches)*:	5	7
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

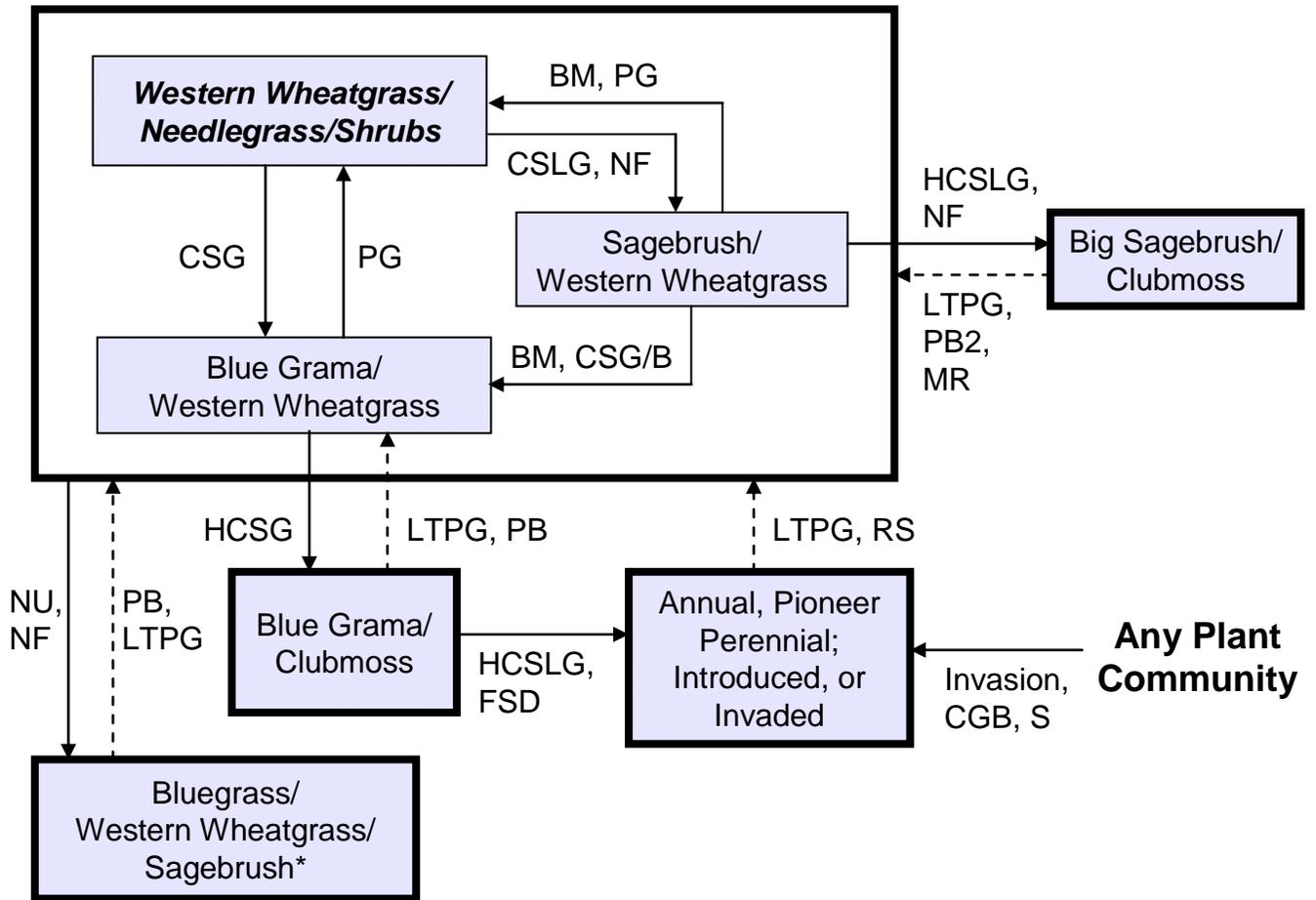
This site developed under Northern Great Plains climatic conditions, natural influences of large herbivores, occasional fire, and other biotic and abiotic factors that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts 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.

The plant community upon which interpretations are primarily based is the Western Wheatgrass/Needlegrass/Shrubs Plant Community. This plant 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.

Heavy continuous grazing and/or continuous seasonal (spring) grazing, without adequate recovery periods following each grazing occurrence causes this site to depart from the Western Wheatgrass/Needlegrass/Shrubs Plant Community. Blue grama will begin to increase. Western wheatgrass will increase initially and then begin to decrease. Green needlegrass will decrease in frequency and production. In time, heavy continuous grazing will likely cause upland sedges and blue grama to dominate and club moss to increase. This resulting plant community is relatively stable and the competitive advantage prevents other species from establishing. This plant community is less productive than the Western Wheatgrass/Needlegrass/Shrubs Plant Community. Runoff increases

and infiltration will decrease. Soil erosion will be minimal. Extended periods of non-use and/or lack of fire will result in a plant community having high litter levels, which favors an increase in Kentucky bluegrass. Shrubs such as western snowberry and chokecherry will also typically increase. 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 are discussed in more detail in the plant community descriptions following the diagram.

Plant Communities and Transitional Pathways



B – Browsing or mechanical disturbance of brush; **BM** – Brush management; **CSG** – Continuous seasonal grazing; **CSLG** – Continuous season-long grazing; **FSD** – Frequent and severe defoliation; **HCSG** – Heavy continuous seasonal grazing; **HCSLG** – Heavy continuous season-long grazing; **LTPG** – Long-term prescribed grazing; **NF** – No fire for extended periods; **NU** – Non-use for extended periods; **PB** – Prescribed burning; **PB2** – Prescribed burning, or combination of brush management and other control method for clubmoss; **PG** – Prescribed grazing; **RS** – Range seeding native species; **S** – Seeding of introduced species. * Sagebrush may be absent if sufficient fuels from non-use build up and a wildfire occurs.

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Western Wheatgrass/Needlegrass		
			Group	lbs./acre	% Comp
GRASSES & GRASS-LIKES				1680 - 1890	80 - 90
RHIZOMATOUS WHEATGRASS			1	420 - 735	20 - 35
western wheatgrass	Pascopyrum smithii	PASM	1	420 - 735	20 - 35
Montana wheatgrass	Elymus albicans	ELAL7	1	0 - 105	0 - 5
slender wheatgrass	Elymus trachycaulus	ELTR7	1	0 - 105	0 - 5
NEEDLEGRASS			2	420 - 630	20 - 30
green needlegrass	Nassella viridula	NAV14	2	210 - 525	10 - 25
needleandthread	Hesperostipa comata ssp. comata	HECOC8	2	105 - 315	5 - 15
porcupine grass	Hesperostipa spartea	HESP11	2	0 - 105	0 - 5
COOL SEASON GRASSES			3	42 - 168	2 - 8
plains reedgrass	Calamagrostis montanensis	CAMO	3	0 - 105	0 - 5
prairie junegrass	Koeleria macrantha	KOMA	3	21 - 63	1 - 3
Sandberg bluegrass	Poa secunda	POSE	3	0 - 42	0 - 2
WARM SEASON GRASSES			4	105 - 315	5 - 15
big bluestem	Andropogon gerardii	ANGE	4	0 - 210	0 - 10
little bluestem	Schizachyrium scoparium	SCSC	4	0 - 105	0 - 5
sideoats grama	Bouteloua curtipendula	BOCU	4	21 - 105	1 - 5
plains muhly	Muhlenbergia cuspidata	MUCU3	4	0 - 105	0 - 5
prairie sandreed	Calamovilfa longifolia	CALO	4	0 - 63	0 - 3
SHORT WARM-SEASON GRASSES			5	105 - 210	5 - 10
blue grama	Bouteloua gracilis	BOGR2	5	63 - 210	3 - 10
buffalograss	Bouteloua dactyloides	BODA2	5	0 - 105	0 - 5
GRASS-LIKES			6	42 - 168	2 - 8
threadleaf sedge	Carex filifolia	CAFI	6	21 - 105	1 - 5
needleleaf sedge	Carex duriuscula	CADU6	6	21 - 63	1 - 3
Sun sedge	Carex inops ssp. heliophila	CAINH2	6	21 - 105	1 - 5
other grass-likes		ZGL	6	0 - 63	0 - 3
FORBS			8	105 - 210	5 - 10
American vetch	Vicia americana	VIAM	8	21 - 63	1 - 3
bastard toadflax	Comandra spp.	COMAN	8	0 - 21	0 - 1
bighead pygmyweed	Evax prolifera	EVPR	8	0 - 21	0 - 1
cudweed sagewort	Artemisia ludoviciana	ARLU	8	21 - 63	1 - 3
dotted gayfeather	Liatris punctata	LIPU	8	21 - 42	1 - 2
false boneset	Brickellia eupatorioides	BREU	8	0 - 63	0 - 3
green sagewort	Artemisia dracunculoides	ARDR4	8	21 - 42	1 - 2
groundplum milkvetch	Astragalus crassicaulis	ASCR2	8	0 - 21	0 - 1
heath aster	Symphotrichum ericoides	SYER	8	21 - 42	1 - 2
Lambert crazyweed	Oxytropis lambertii	OXLA3	8	0 - 21	0 - 1
littlepod false flax	Camelina microcarpa	CAMI2	8	0 - 21	0 - 1
Missouri goldenrod	Solidago missouriensis	SOMI2	8	21 - 42	1 - 2
penstemon	Penstemon spp.	PENST	8	0 - 21	0 - 1
prairie coneflower	Ratibida columnifera	RACO3	8	0 - 21	0 - 1
prairie smoke	Geum triflorum	GETR	8	0 - 21	0 - 1
purple coneflower	Echinacea angustifolia	ECAN2	8	0 - 21	0 - 1
purple prairie clover	Dalea purpurea	DAPU5	8	21 - 63	1 - 3
pussytoes	Antennaria spp.	ANTEN	8	0 - 21	0 - 1
rush skeletonweed	Lygodesmia juncea	LYJU	8	0 - 21	0 - 1
scarlet gaura	Gaura coccinea	GACO5	8	0 - 42	0 - 2
scarlet globemallow	Sphaeralcea coccinea	SPCO	8	0 - 21	0 - 1
silverleaf scurfpea	Pediemelum argophyllum	PEAR6	8	0 - 42	0 - 2
textile onion	Allium textile	ALTE	8	0 - 21	0 - 1
western yarrow	Achillea millefolium var. occidentalis	ACMIO	8	0 - 21	0 - 1
woolly Indianwheat	Plantago patagonica	PLPA2	8	0 - 21	0 - 1
native forbs		ZFN	8	0 - 105	0 - 5
SHRUBS			9	105 - 210	5 - 10
big sagebrush	Artemisia tridentata	ARTR2	9	0 - 105	0 - 5
silver buffaloberry	Shepherdia argentea	SHAR	9	0 - 63	0 - 3
fringed sagewort	Artemisia frigida	ARFR4	9	21 - 42	1 - 2
leadplant	Amorpha canescens	AMCA6	9	0 - 105	0 - 5
plains pricklypear	Opuntia polyacantha	OPPO	9	0 - 21	0 - 1
prairie rose	Rosa arkansana	ROAR3	9	0 - 42	0 - 2
silver sagebrush	Artemisia cana	ARCA13	9	0 - 63	0 - 3
skunkbush sumac	Rhus trilobata	RHTR	9	0 - 21	0 - 1
western snowberry	Symphoricarpos occidentalis	SYOC	9	0 - 105	0 - 5
winterfat	Krascheninnikovia lanata	KRLA2	9	0 - 63	0 - 3

Annual Production lbs./acre	LOW	RV	HIGH
GRASSES & GRASS-LIKES	1300 -	1785	-2370
FORBS	100 -	158	-215
SHRUBS	100 -	158	-215
TOTAL	1500 -	2100	-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.

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SYMBOL	Western Wheatgrass/ Needlegrass			Blue Grama/ Western Wheatgrass			Blue Grama/Clubmoss			Bluegrass/Western Wheatgrass/Sagebrush		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
GRASSES & GRASS-LIKES													
RHIZOMATOUS WHEATGRASS		1	420 - 735	20 - 35	1	120 - 300	10 - 25	1	8 - 80	1 - 10	1	85 - 425	5 - 25
western wheatgrass	PASM	1	420 - 735	20 - 35	1	60 - 240	5 - 20	1	8 - 80	1 - 10	1	85 - 340	5 - 20
Montana wheatgrass	ELAL7	1	0 - 105	0 - 5	1	0 - 24	0 - 2				1	0 - 34	0 - 2
slender wheatgrass	ELTR7	1	0 - 105	0 - 5	1	0 - 24	0 - 2				1	0 - 85	0 - 5
NEEDLEGRASS		2	420 - 630	20 - 30	2	24 - 120	2 - 10	2	0 - 40	0 - 5	2	85 - 340	5 - 20
green needlegrass	NAV14	2	210 - 525	10 - 25	2	12 - 60	1 - 5				2	34 - 255	2 - 15
needleandthread	HECOC8	2	105 - 315	5 - 15	2	12 - 96	1 - 8	2	0 - 40	0 - 5	2	34 - 255	2 - 15
porcupine grass	HESP11	2	0 - 105	0 - 5							2	0 - 51	0 - 3
COOL-SEASON GRASSES													
plains reedgrass	CAMO	3	0 - 105	0 - 5	3	0 - 24	0 - 2				3	0 - 51	0 - 3
prairie junegrass	KOMA	3	21 - 63	1 - 3	3	12 - 24	1 - 2	3	8 - 16	1 - 2	3	0 - 17	0 - 1
Sandberg bluegrass	POSE	3	0 - 42	0 - 2	3	0 - 24	0 - 2	3	0 - 16	0 - 2	3	0 - 17	0 - 1
WARM-SEASON GRASSES													
big bluestem	ANGE	4	0 - 210	0 - 10							4	0 - 51	0 - 3
little bluestem	SCSC	4	0 - 105	0 - 5									
sideoats grama	BOCU	4	21 - 105	1 - 5	4	0 - 36	0 - 3						
plains muhly	MUCU3	4	0 - 105	0 - 5							4	0 - 34	0 - 2
prairie sandreed	CALO	4	0 - 63	0 - 3	4	0 - 12	0 - 1				4	0 - 34	0 - 2
SHORT WARM-SEASON GRASSES													
blue grama	BOGR2	5	63 - 210	3 - 10	5	180 - 360	15 - 30	5	160 - 360	20 - 45	5	17 - 170	1 - 10
buffalograss	BODA2	5	0 - 105	0 - 5	5	60 - 180	5 - 15	5	40 - 160	5 - 20	5	0 - 51	0 - 3
GRASS-LIKES													
threadleaf sedge	CAFI	6	21 - 105	1 - 5	6	24 - 144	2 - 12	6	40 - 120	5 - 15	6	34 - 170	2 - 10
needleleaf sedge	CADU6	6	21 - 63	1 - 3	6	12 - 84	1 - 7	6	16 - 80	2 - 10	6	34 - 170	2 - 10
sun sedge	CAINH2	6	21 - 105	1 - 5	6	12 - 60	1 - 5	6	16 - 80	2 - 10	6	34 - 170	2 - 10
other grass-like	ZGL	6	0 - 63	0 - 3	6	0 - 60	0 - 5	6	0 - 40	0 - 5	6	0 - 85	0 - 5
NON-NATIVE GRASSES													
cheatgrass	BRTE	7			7	12 - 36	1 - 3	7	8 - 40	1 - 5	7	85 - 170	5 - 10
bluegrass	POA	7			7	12 - 60	1 - 5	7	8 - 40	1 - 5	7	340 - 595	20 - 35
FORBS													
American vetch	VIAM	8	21 - 63	1 - 3	8	0 - 12	0 - 1						
bastard toadflax	COMAN	8	0 - 21	0 - 1	8	12 - 24	1 - 2	8	0 - 8	0 - 1			
bighead pygmycudweed	EVPR	8	0 - 21	0 - 1	8	0 - 24	0 - 2	8	0 - 24	0 - 3			
common pepperweed	LEDE				8	0 - 24	0 - 2	8	8 - 24	1 - 3	8	0 - 34	0 - 2
cudweed sagewort	ARLU	8	21 - 63	1 - 3	8	12 - 48	1 - 4	8	8 - 24	1 - 3	8	17 - 85	1 - 5
curlycup gumweed	GRSQ				8	12 - 36	1 - 3	8	8 - 40	1 - 5	8	0 - 34	0 - 2
dotted gayfeather	LIPU	8	21 - 42	1 - 2	8	0 - 12	0 - 1						
false boneset	BREU	8	0 - 63	0 - 3	8	0 - 12	0 - 1						
fetid marigold	DYPA							8	0 - 16	0 - 2			
green sagewort	ARCA12	8	21 - 42	1 - 2	8	12 - 48	1 - 4	8	8 - 32	1 - 4	8	17 - 51	1 - 3
groundplum milkvetch	ASCR2	8	0 - 21	0 - 1									
heath aster	SYER	8	21 - 42	1 - 2	8	12 - 36	1 - 3	8	8 - 16	1 - 2	8	17 - 85	1 - 5
Lambert crazyweed	OXLA3	8	0 - 21	0 - 1	8	0 - 12	0 - 1						
littlepod false flax	CAMI2	8	0 - 21	0 - 1	8	0 - 12	0 - 1						
Missouri goldenrod	SOMI2	8	21 - 42	1 - 2	8	12 - 24	1 - 2	8	0 - 8	0 - 1	8	17 - 34	1 - 2
penstemon	PENST	8	0 - 21	0 - 1									
prairie coneflower	RACO3	8	0 - 21	0 - 1	8	0 - 12	0 - 1						
prairie smoke	GETR	8	0 - 21	0 - 1									
purple coneflower	ECAN2	8	0 - 21	0 - 1							8	0 - 17	0 - 1
purple prairie clover	DAPU5	8	21 - 63	1 - 3	8	0 - 12	0 - 1				8	0 - 17	0 - 1
pussytoes	ANTEN	8	0 - 21	0 - 1	8	0 - 12	0 - 1	8	0 - 8	0 - 1			
rush skeletonweed	LYJU	8	0 - 21	0 - 1	8	0 - 12	0 - 1	8	0 - 8	0 - 1	8	0 - 17	0 - 1
scarlet gaura	GACO5	8	0 - 42	0 - 2	8	0 - 12	0 - 1						
scarlet globemallow	SPCO	8	0 - 21	0 - 1	8	12 - 24	1 - 2	8	8 - 16	1 - 2	8	0 - 17	0 - 1
silverleaf scurflower	PEAR6	8	0 - 42	0 - 2	8	12 - 36	1 - 3	8	8 - 16	1 - 2	8	17 - 51	1 - 3
sweetclover	MELIL				8	12 - 120	1 - 10	8	8 - 120	1 - 15	8	17 - 136	1 - 8
textile onion	ALTE	8	0 - 21	0 - 1									
western salsify	TRDU				8	12 - 36	1 - 3	8	8 - 16	1 - 2	8	17 - 85	1 - 5
western yarrow	ACMIO	8	0 - 21	0 - 1	8	12 - 36	1 - 3	8	8 - 24	1 - 3	8	17 - 34	1 - 2
woolly Indianwheat	PLPA2	8	0 - 21	0 - 1	8	0 - 24	0 - 2	8	0 - 16	0 - 2			
native forbs	ZFN	8	0 - 105	0 - 5	8	0 - 60	0 - 5	8	0 - 40	0 - 5	8	0 - 51	0 - 3
introduced forbs	ZFI				8	0 - 60	0 - 5	8	0 - 120	0 - 15	8	17 - 85	1 - 5
SHRUBS													
big sagebrush	ARTR2	9	0 - 105	0 - 5	9	0 - 36	0 - 3				9	0 - 51	0 - 3
fringed sagewort	ARFR4	9	21 - 42	1 - 2	9	12 - 48	1 - 4	9	8 - 40	1 - 5	9	0 - 34	0 - 2
leadplant	AMCA6	9	0 - 105	0 - 5									
plains pricklypear	OPPO	9	0 - 21	0 - 1	9	12 - 36	1 - 3	9	8 - 40	1 - 5	9	0 - 17	0 - 1
prairie rose	ROAR3	9	0 - 42	0 - 2	9	12 - 36	1 - 3	9	8 - 24	1 - 3	9	0 - 17	0 - 1
silver buffaloberry	SHAR	9	0 - 63	0 - 3							9	0 - 17	0 - 1
silver sagebrush	ARCA13	9	0 - 63	0 - 3	9	0 - 24	0 - 2				9	0 - 51	0 - 3
skunkbush sumac	RHTR	9	0 - 21	0 - 1	9	0 - 12	0 - 1				9	0 - 34	0 - 2
western snowberry	SYOC	9	0 - 105	0 - 5	9	12 - 60	1 - 5	9	8 - 24	1 - 3	9	17 - 136	1 - 8
winterfat	KRLA2	9	0 - 63	0 - 3									
CRYPTOGAMS													
clubmoss	SEDE2	10			10	0 - 60	0 - 5	10	40 - 120	5 - 15	10	0 - 85	0 - 5
Annual Production lbs./acre													
GRASSES & GRASS-LIKES			LOW	RV	HIGH		LOW	RV	HIGH		LOW	RV	HIGH
			1300	1785	2370		635	984	1425		325	576	825
FORBS			100	158	215		55	120	185		35	100	165
SHRUBS			100	158	215		10	66	125		5	44	85
CRYPTOGAMS							0	30	65		35	80	125
TOTAL			1500	2100	2800		700	1200	1800		400	800	1200
											1200	1700	2200

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

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SYMBOL	Western Wheatgrass/ Needlegrass			Sagebrush/ Western Wheatgrass			Big Sagebrush/Clubmoss		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
GRASSES & GRASS-LIKES										
1680 - 1890 80 - 90 1020 - 1275 60 - 75 360 - 660 30 - 55										
RHIZOMATOUS WHEATGRASS		1	420 - 735	20 - 35	1	255 - 425	15 - 25	1	24 - 120	2 - 10
western wheatgrass	PASM	1	420 - 735	20 - 35	1	255 - 425	15 - 25	1	24 - 120	2 - 10
Montana wheatgrass	ELAL7	1	0 - 105	0 - 5	1	0 - 85	0 - 5			
slender wheatgrass	ELTR7	1	0 - 105	0 - 5	1	0 - 85	0 - 5			
NEEDLEGRASS		2	420 - 630	20 - 30	2	85 - 340	5 - 20	2	0 - 60	0 - 5
green needlegrass	NAVI4	2	210 - 525	10 - 25	2	34 - 170	2 - 10			
needleandthread	HECOC8	2	105 - 315	5 - 15	2	34 - 170	2 - 10	2	0 - 60	0 - 5
porcupine grass	HESP11	2	0 - 105	0 - 5						
COOL-SEASON GRASSES		3	42 - 168	2 - 8	3	17 - 85	1 - 5	3	0 - 36	0 - 3
plains reedgrass	CAMO	3	0 - 105	0 - 5	3	0 - 34	0 - 2	3	0 - 12	0 - 1
prairie junegrass	KOMA	3	21 - 63	1 - 3	3	17 - 51	1 - 3	3	0 - 24	0 - 2
Sandberg bluegrass	POSE	3	0 - 42	0 - 2	3	0 - 34	0 - 2	3	0 - 12	0 - 1
WARM-SEASON GRASSES		4	105 - 315	5 - 15	4	0 - 85	0 - 5	4		
big bluestem	ANGE	4	0 - 210	0 - 10	4	0 - 51	0 - 3			
little bluestem	SCSC	4	0 - 105	0 - 5	4	0 - 17	0 - 1			
sideoats grama	BOCU	4	21 - 105	1 - 5	4	0 - 51	0 - 3			
plains muhly	MUCU3	4	0 - 105	0 - 5	4	0 - 34	0 - 2			
prairie sandreed	CALO	4	0 - 63	0 - 3	4	0 - 17	0 - 1			
SHORT WARM-SEASON GRASSES		5	105 - 210	5 - 10	5	85 - 255	5 - 15	5	60 - 180	5 - 15
blue grama	BOGR2	5	63 - 210	3 - 10	5	85 - 255	5 - 15	5	60 - 180	5 - 15
buffalograss	BODA2	5	0 - 105	0 - 5	5	0 - 85	0 - 5	5	0 - 36	0 - 3
GRASS-LIKES		6	42 - 168	2 - 8	6	51 - 255	3 - 15	6	36 - 180	3 - 15
threadleaf sedge	CAFI	6	21 - 105	1 - 5	6	17 - 170	1 - 10	6	12 - 120	1 - 10
needleleaf sedge	CADU6	6	21 - 63	1 - 3	6	17 - 85	1 - 5	6	12 - 60	1 - 5
sun sedge	CAINH2	6	21 - 105	1 - 5	6	17 - 136	1 - 8	6	12 - 60	1 - 5
other grass-likes	ZGL	6	0 - 63	0 - 3	6	0 - 34	0 - 2	6	0 - 12	0 - 1
NON-NATIVE GRASSES		7			7	34 - 170	2 - 10	7	60 - 180	5 - 15
cheatgrass	BRTE				7	34 - 170	2 - 10	7	24 - 120	2 - 10
bluegrass	POA				7	0 - 85	0 - 5	7	24 - 120	2 - 10
FORBS		8	105 - 210	5 - 10	8	85 - 170	5 - 10	8	60 - 120	5 - 10
American vetch	VIAM	8	21 - 63	1 - 3	8	0 - 17	0 - 1			
bastard toadflax	COMAN	8	0 - 21	0 - 1	8	0 - 17	0 - 1	8	0 - 12	0 - 1
bighead pygmycudweed	EVPR	8	0 - 21	0 - 1	8	0 - 34	0 - 2	8	12 - 36	1 - 3
common pepperweed	LEDE				8	0 - 17	0 - 1	8	0 - 36	0 - 3
cudweed sagewort	ARLU	8	21 - 63	1 - 3	8	17 - 68	1 - 4	8	12 - 36	1 - 3
curlycup gumweed	GRSQ				8	17 - 34	1 - 2	8	12 - 36	1 - 3
dotted gayfeather	LIPU	8	21 - 42	1 - 2	8	0 - 17	0 - 1			
false boneset	BREU	8	0 - 63	0 - 3						
fetid marigold	DYPA									
green sagewort	ARDR4	8	21 - 42	1 - 2	8	17 - 51	1 - 3	8	12 - 48	1 - 4
groundplum milkvetch	ASCR2	8	0 - 21	0 - 1						
heath aster	SYER	8	21 - 42	1 - 2	8	17 - 51	1 - 3	8	12 - 24	1 - 2
Lambert crazyweed	OXLA3	8	0 - 21	0 - 1	8	0 - 17	0 - 1			
littlepod false flax	CAMI2	8	0 - 21	0 - 1	8	0 - 17	0 - 1			
Missouri goldenrod	SOMI2	8	21 - 42	1 - 2	8	17 - 34	1 - 2	8	0 - 12	0 - 1
penstemon	PENST	8	0 - 21	0 - 1						
prairie coneflower	RACO3	8	0 - 21	0 - 1	8	0 - 17	0 - 1			
prairie smoke	OETR	8	0 - 21	0 - 1						
purple coneflower	ECAN2	8	0 - 21	0 - 1	8	0 - 17	0 - 1			
purple prairie clover	DAPU5	8	21 - 63	1 - 3	8	17 - 34	1 - 2			
pussytoes	ANTEN	8	0 - 21	0 - 1	8	0 - 17	0 - 1	8	0 - 12	0 - 1
rush skeletonweed	LYJU	8	0 - 21	0 - 1	8	0 - 17	0 - 1	8	0 - 12	0 - 1
scarlet gaura	GACO5	8	0 - 42	0 - 2	8	0 - 17	0 - 1			
scarlet globemallow	SPCO	8	0 - 21	0 - 1	8	17 - 34	1 - 2	8	12 - 24	1 - 2
silverleaf scurfpea	PEAR6	8	0 - 42	0 - 2	8	17 - 34	1 - 2	8	12 - 24	1 - 2
sweetclover	MELIL				8	0 - 85	0 - 5	8	12 - 96	1 - 8
textile onion	ALTE	8	0 - 21	0 - 1	8	0 - 17	0 - 1	8	0 - 12	0 - 1
western salsify	TRDU				8	0 - 34	0 - 2	8	12 - 36	1 - 3
western yarrow	ACMIO	8	0 - 21	0 - 1	8	17 - 34	1 - 2	8	12 - 24	1 - 2
woolly Indianwheat	PLPA2	8	0 - 21	0 - 1	8	0 - 34	0 - 2	8	12 - 36	1 - 3
native forbs	ZFN	8	0 - 105	0 - 5	8	0 - 85	0 - 5	8	0 - 60	0 - 5
introduced forbs	ZFI				8	0 - 51	0 - 3	8	0 - 96	0 - 8
SHRUBS		9	105 - 210	5 - 10	9	170 - 425	10 - 25	9	420 - 660	35 - 55
big sagebrush	ARTR2	9	0 - 105	0 - 5	9	85 - 340	5 - 20	9	360 - 600	30 - 50
fringed sagewort	ARFR4	9	21 - 42	1 - 2	9	17 - 85	1 - 5	9	24 - 96	2 - 8
leadplant	AMCA6	9	0 - 105	0 - 5	9	0 - 17	0 - 1			
plains pricklypear	OPPO	9	0 - 21	0 - 1	9	0 - 34	0 - 2	9	0 - 48	0 - 4
prairie rose	ROAR3	9	0 - 42	0 - 2	9	17 - 51	1 - 3	9	0 - 24	0 - 2
silver buffaloberry	SHAR	9	0 - 63	0 - 3	9	0 - 17	0 - 1			
silver sagebrush	ARCA13	9	0 - 63	0 - 3	9	17 - 170	1 - 10	9	24 - 144	2 - 12
skunkbush sumac	RHTR	9	0 - 21	0 - 1						
western snowberry	SYOC	9	0 - 105	0 - 5	9	0 - 51	0 - 3	9	0 - 36	0 - 3
winterfat	KRLA2	9	0 - 63	0 - 3						
CRYPTOGAMS		10			10	0 - 85	0 - 5	10	24 - 120	2 - 10
clubmoss	SEDE2				10	0 - 85	0 - 5	10	24 - 120	2 - 10
Annual Production lbs./acre			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH	
GRASSES & GRASS-LIKES			1300 - 1785 - 2370		855 - 1233 - 1585		405 - 498 - 800			
FORBS			100 - 158 - 215		80 - 128 - 175		55 - 90 - 125			
SHRUBS			100 - 158 - 215		165 - 298 - 450		220 - 540 - 650			
CRYPTOGAMS					0 - 43 - 90		20 - 72 - 125			
TOTAL			1500 - 2100 - 2800		1100 - 1700 - 2300		700 - 1200 - 1700			

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 repeatable plant communities. The plant composition tables shown above have been developed from the best available knowledge at the time of this revision. As more information is collected, some of these plant community descriptions may be revised or removed, and new ones added. None of these plant communities should necessarily be thought of as “Desired Plant Communities” (DPC). According to the 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/Needlegrass/Shrubs Plant Community

The interpretive plant community for this site is the Western Wheatgrass/Needlegrass/Shrubs 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 deferment.

The potential vegetation is about 80-90 percent grasses or grass-like plants, 5-10 percent forbs, and 5-10 percent shrubs. Cool-season grasses dominate this plant community. The major grasses include western wheatgrass, green needlegrass, and needleandthread. Other grasses or grass-likes occurring on the site include blue grama, big bluestem, sideoats grama, prairie Junegrass, buffalograss, and sedge. Significant forbs include scarlet globemallow, prairie coneflower, purple prairie clover, penstemon, American vetch, and green sagewort. The significant shrubs that occur include big sagebrush, leadplant, snowberry, winterfat, and rose.

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). The diversity in plant species allows for high drought tolerance. This is a healthy and sustainable plant community. Moderate or high available water capacity provides a favorable soil-water-plant relationship. Overall, the interpretive plant community has the appearance of being stable, diverse and productive. Plant litter is properly distributed with very little movement offsite and natural plant mortality is very low.

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: SD5801

Growth curve name: Northern Rolling High 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 community pathways leading to other plant communities are as follows:

- Continuous season-long grazing and no fire will lead to the *Sagebrush/Western Wheatgrass Plant Community*. This occurs with exposure to herbivory during the entire growing season at moderate stocking rates.

- Continuous seasonal grazing during the active growing period of cool-season plants will lead to the *Blue Grama/Western Wheatgrass Plant Community*.

Blue Grama/Western Wheatgrass Plant Community

This plant community develops under continuous seasonal grazing (i.e., grazing an area during the same season every year) or from over utilization during extended drought periods. The potential vegetation is made up of approximately 75-85 percent grasses and grass-like species, 5-15 percent forbs, and 1-10 percent shrubs. The dominant grasses include blue grama and western wheatgrass. Other grasses or grass-likes may include sedge, buffalograss, needleandthread and prairie Junegrass. Significant forbs include cudweed sagewort, curlycup gumweed, green sagewort, scarlet globemallow, scurfpea, and western yarrow. The dominant shrubs that occur include western snowberry, cactus, rose, and fringed sagewort.

Compared to the Western Wheatgrass/Needlegrass/Shrubs Plant Community, the shortgrass species including blue grama and threadleaf sedge have increased. The cool-season species including western wheatgrass and green needlegrass have decreased in composition. Annual bromes, curlycup gumweed, sweetclover, and other annual grasses and forbs can invade the site. This plant community can occur in a mosaic with patchy, slightly used areas occurring adjacent to and intermingled with this plant community.

This plant community is resistant to change. The dominant herbaceous species are very adapted to grazing; however, the mid-grass species and the more palatable forbs will decrease. If the herbaceous component is intact, it tends to be resilient if disturbance is not long-term. Because of the sod forming habit of the shortgrass species, water infiltration is low and runoff is moderate to high. Typically the runoff is very clean because of the low potential for onsite soil erosion. However, offsite areas may be affected by increased runoff.

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: SD5803

Growth curve name: Northern Rolling High 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 community pathways leading to other plant communities are as follows:

- Prescribed grazing, which allows for adequate plant recovery periods will move this plant community to the *Western Wheatgrass/Needlegrass/Shrubs Plant Community*.
- With heavy continuous seasonal grazing this plant community will move towards the *Blue Grama/Clubmoss Plant Community*.

Blue Grama/Clubmoss Plant Community

This plant community develops under heavy continuous season-long grazing, or with continuous seasonal grazing with concentrated use in the early part of the growing season (as in calving/lambing pastures). It is made up of approximately 70-80 percent grasses (primarily short, warm-season grasses), 5-20 percent forbs, 1-10 percent shrubs, and 5-15 percent cryptogams (clubmoss). The dominant grasses/grass-likes include blue grama and threadleaf sedge. Other grasses may include western wheatgrass, prairie Junegrass, buffalograss, and cheatgrass. The dominant forbs include

common pepperweed, curlycup gumweed, cudweed sagewort, green sagewort, sweetclover, and western yarrow. The dominant shrubs include fringed sagewort and cactus.

Compared to the Western Wheatgrass/Needlegrass/Shrubs Plant Community, blue grama and sedge have increased, and the cool-season mid-grasses have diminished greatly. Nonpalatable forbs and cactus have increased, and nonnative species have invaded the site. Plant diversity is low.

This plant community is very stable. Generally, this plant community will require significant management inputs (i.e., high animal impact, long-term prescribed grazing, favorable climatic conditions, etc.) and time to move it towards the Blue Grama/Western Wheatgrass Plant Community. Onsite soil erosion is low. Infiltration is low, and runoff is high. Typically the runoff is very clean because of the low potential for onsite soil erosion. However, offsite areas can be significantly impacted due to the increased runoff.

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: SD5805

Growth curve name: Northern Rolling High 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 community pathways leading to other plant communities are as follows:

- Long-term prescribed grazing, possibly including prescribed burning, and favorable climatic conditions, which allow for adequate plant recovery periods, may cause a shift to the *Blue Grama/Western Wheatgrass Plant Community*.
- Heavy, continuous season-long grazing, or frequent and severe defoliation (e.g., rodents) will move this plant community to the *Annual, Pioneer Perennial Plant Community*.

Bluegrass/Western Wheatgrass/Sagebrush Plant Community

This plant community develops after an extended period of 10 or more years of non-use by herbivores and exclusion of fire. Nonnative grasses, such as Kentucky bluegrass and Canada bluegrass, tend to invade and may dominate this plant community. Other grasses present include western wheatgrass, green needlegrass, cheatgrass, and slender wheatgrass. The common forbs include sweetclover, green sagewort, cudweed sagewort, and heath aster. Western snowberry is the principal shrub and tends to increase in density and cover. Sagebrush will typically be present, but may be absent if sufficient fuels from nonuse build up and a wildfire occurs.

Litter buildup reduces plant vigor and density, and native seedling recruitment declines. Due to a lack of tiller stimulation and sunlight, native bunchgrasses typically develop dead centers and native rhizomatous grasses are limited to small colonies. This plant community is dispersed throughout the pasture, encircling spot grazed areas, and areas distant from water sources. This plant community may be found intermingled in a mosaic with the Blue Grama/Western Wheatgrass Plant Community in properly stocked pastures grazed season-long.

This plant community is resistant to change without prescribed grazing or fire. The combination of both grazing and fire is most effective in moving this plant community towards the Western Wheatgrass/Needlegrass/Shrubs Plant Community. Soil erosion is low. Runoff is similar to the

interpretive plant community. Once this plant community is reached, time and external resources will be needed to see any immediate recovery in diversity.

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: SD5801

Growth curve name: Northern Rolling High 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 community pathways leading to other plant communities are as follows:

- Under long-term prescribed grazing and prescribed burning, including adequate recovery periods, this plant community may eventually move towards a plant community resembling the *Western Wheatgrass/Needlegrass/Shrubs Plant Community*. This will take a long period of time and intensive management.

Sagebrush/Western Wheatgrass Plant Community

This plant community develops from continuous season-long grazing and the absence of fire. It is made up of 60-75 percent mid cool-season and short warm-season grasses, 5-10 percent forbs, 10-25 percent shrubs, and 0-5 percent cryptogams. The dominant grasses and grass-likes include western wheatgrass, needleandthread, green needlegrass, blue grama, and threadleaf sedge. Forbs commonly found on this plant community include cudweed sagewort, green sagewort, scarlet globemallow, and heath aster. Sagebrush canopy typically ranges from 20-30 percent. Fringed sagewort is also common. As conditions deteriorate, desirable species are replaced by big sagebrush. Blue grama increases in the plant community. Cheatgrass, other annuals, and bluegrass can invade the plant community.

When compared to the Western Wheatgrass/Needlegrass/Shrubs, sagebrush has increased while most of the grass species have either remained the same or declined in production. The sagebrush canopy provides some protection to the cool-season mid grasses, by making them unavailable for grazing. Under proper management, this plant community is stable. The soil erosion is low to moderate. Infiltration and runoff are moderate. Subsoil moisture conditions are typically drier due to the high water demand of the big sagebrush. This makes big sagebrush highly competitive with other 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: SD5803

Growth curve name: Northern Rolling High 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 community pathways leading to other plant communities are as follows:

- With brush management and prescribed grazing, this plant community will move towards the *Western Wheatgrass/Needlegrass/Shrubs Plant Community*.
- With brush management alone or with continuous seasonal grazing and browsing or mechanical disturbance of the brush, this plant community will move towards the *Blue Grama/Western Wheatgrass Plant Community*.

- With heavy, continuous season-long grazing and no fire, this plant community will move to the *Big Sagebrush/Clubmoss Plant Community*.

Big Sagebrush/Clubmoss Plant Community

This plant community is the result of continuous season-long grazing and no fire. Sagebrush dominates with canopy cover often exceeding 60 percent. The understory of grass includes western wheatgrass, needleandthread, blue grama, Sandberg bluegrass, and prairie Junegrass. The sagebrush canopy protects the cool-season grasses, but this protection makes them unavailable for grazing. Big sagebrush is long-lived and will persist for a long period with a lack of fire.

This plant community differs from the Western Wheatgrass/Needlegrass/Shrubs Plant Community by an increase in big sagebrush and a decrease in grasses. Runoff will be higher due to a deterioration of the surface structure of the soil and the increase of clubmoss. The soils will tend to dry out much more quickly due to the high water use by sagebrush, making it less available for herbaceous 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: SD5804

Growth curve name: Northern Rolling High Plains, warm-season dominant, cool-season subdominant.

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

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	7	18	25	25	15	7	1	0	0

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

- With prescribed burning (or a combination of brush management and some other control of clubmoss) and long-term prescribed grazing, this plant community may eventually return to the *Sagebrush/Western Wheatgrass Plant Community*.

Annual, Pioneer Perennial; Introduced, or Invaded States

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

The **Annual, Pioneer Perennial** state can be reached whenever severe disturbance (i.e., abandoned farmland, severe continuous season-long grazing, frequent and severe defoliation by rodents, etc.) occurs. 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, cheatgrass, crested wheatgrass, buffalograss, broom snakeweed, sweetclover, and nonnative thistles. Other plants that commonly occur on the site include wheatgrass, deathcamas, prickly lettuce, marestalk, kochia, squirreltail, foxtail, and sunflowers.

The **Introduced** state is normally those areas seeded to crested wheatgrass, pubescent or intermediate wheatgrass, and alfalfa. It requires considerable investment to establish and has a variable life expectancy.

The **Invaded** state includes areas that have been invaded and are dominated by species such as smooth brome, Kentucky bluegrass, crested wheatgrass, nonnative thistles, field bindweed,

knapweeds, leafy spurge, hoary cress, and other introduced species.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

Major Land Resource Area 58D lies within the drier portion of Northern mixed-grass prairie ecosystem where sagebrush steppes to the west yield to grassland steppes to the east. Prior to European settlement, this area consisted of diverse grass/shrub land habitats interspersed with varying densities of depressional, instream wetlands, and woody riparian corridors. These habitats provided critical life cycle components for many of its users. Many species of grassland birds, small mammals, reptiles, amphibians, and herds of roaming bison, elk, and pronghorn were among the inhabitants adapted to this semi-arid region. Roaming herbivores, as well as, several small mammal and insect species, were the primary consumers linking the grassland resources to predators such as the wolf, mountain lion, and grizzly bear, as well as, smaller carnivores such as the coyote, bobcat, fox, and raptors. The black-tailed prairie dog was once abundant; however, the species remains a keystone species within its range. The black-footed ferret, burrowing owl, ferruginous hawk, mountain plover, and swift fox were associated with prairie dog complexes.

Historically, the Northern mixed-grass prairie was a disturbance-driven ecosystem with fire, herbivory, and climate functioning as the primary disturbance factors either singly or in combination. Following European settlement, livestock grazing, cropland conversion, elimination of fire, energy development, and other anthropogenic factors influenced species composition and abundance. Introduced and invasive species further impacted plant and animal communities. Bison were historically a keystone species but have been extirpated as a free-ranging herbivore. The loss of the bison, reduction of prairie dog colonies, and loss of fire as ecological drivers greatly influenced the character of the remaining native plant communities and altered wildlife habitats. Human development has reduced habitat quality for area-sensitive species.

Within MLRA 58D, the Loamy Ecological Site (ES) provides upland grassland cover with an associated forb and shrub component. It was typically part of an expansive grassland landscape that included combinations of Shallow Loamy, Shallow Clayey, Thin Loamy, Claypan, Sandy, Sandy Claypan, Clayey, and Thin Claypan ESs. This site provided habitat for species requiring unfragmented grassland. Important habitat features and components found commonly or exclusively on this site may include greater sage-grouse and sharp-tailed grouse leks; upland nesting habitat for grassland birds, forbs, and insects for brood habitat; and a forage source for small and large herbivores. Many grassland and shrub steppe nesting bird populations are declining. Extirpated species include free-ranging bison, grizzly bear, gray wolf, black-footed ferret, mountain plover, Rocky Mountain locust, and swift fox.

The majority of Loam ES remains intact and provides increasingly important habitat for grassland and shrub steppe nesting birds, small rodents, coyote, and a variety of reptiles, amphibians, and insects. Invasive species such as annual brome grasses and crested wheat have impacted the biological integrity of the site for some grassland birds such as greater sage-grouse. Changes in historic fire regime and domestic grazing have impacted the forb/shrub/grass percentages. Greater sage-grouse and Brewer's sparrow benefit when big sagebrush increases.

Western Wheatgrass/Needlegrass/Shrubs: The predominance of grasses plus high diversity of forbs and shrubs in this community favors grazers and mixed-feeders, such as deer and pronghorn. Insects, such as pollinators, play a large role in maintaining the forb community and provide a forage base for grassland birds and other species. The complex plant structural diversity provides habitat for

a wide array of migratory and resident birds. Brewer's and grasshopper sparrow, lark bunting, western meadowlark, greater sage-grouse, and sharp-tailed grouse are common and benefit from the structure and composition this plant community provides.

This site provides important breeding habitat for the loggerhead shrike. This site provides excellent nesting and brood rearing habitat for greater sage-grouse and sharp-tailed grouse. Diverse prey populations are available for grassland raptors such as ferruginous hawk, Swainson's hawk, golden eagle, and prairie falcon.

The diversity of grasses, forbs, and shrubs provide high nutrition levels for small and large herbivores including voles, mice, thirteen-lined ground squirrel, white-tailed jackrabbit, and deer. This ES provides excellent wintering habitat for pronghorn. The moderate stature of this plant community provides suitable thermal, protective, and escape cover for small herbivores and grassland birds. Predators utilizing this plant community include the coyote, American badger, red fox, and long-tailed weasel. This plant community provides habitat for spade foot toad, Great Plains toad, bull snake, and western rattlesnake.

Blue Grama/Western Wheatgrass: Resulting from continued heavy continuous season-long grazing without adequate recovery periods between grazing events or increased fire frequency, blue grama and western wheatgrass will dominate. The forb diversity has decreased. A shift to shorter plant structure will favor prairie dog expansion and associate species such as ferruginous hawk, burrowing owl, tiger salamander, and swift fox. Species such as the horned lark, long-billed curlew, upland sandpiper, and white-tailed jackrabbit will increase due to the loss of big sagebrush. The density of species such as Brewer's sparrow, greater sage-grouse, and desert cottontail will greatly decline. However, this plant community may provide areas suitable for lek site development.

The short stature of this plant community limits thermal, protective, and escape cover. Predators utilizing this plant community include the coyote, American badger, red fox, and long-tailed weasel.

Blue Grama/Clubmoss: This plant community develops under continuous seasonal grazing or from over utilization during extended drought periods. The forb diversity has decreased. A shift to short plant structure will favor prairie dog expansion with prairie dog town sites and associate species such as ferruginous hawk and burrowing owl. Species such as horned lark, long-billed curlew, upland sandpiper, and white-tailed jackrabbit will increase due to the loss of big sagebrush. Species such as Brewer's sparrow, greater sage-grouse, and desert cottontail will rarely use this site.

The short stature of this plant community limits thermal, protective, and escape cover. Prey populations are reduced but are more vulnerable to predation by raptors and mammalian predators. Predators utilizing this plant community include coyote, American badger, red fox, and long-tailed weasel.

Extreme impairment of the ecological processes impacts offsite aquatic habitats through excessive runoff, nutrient, and sediment loads. Elevated surface temperatures resulting from reduced cover and litter will greatly reduce habitat for most amphibian species, grassland birds, and mammals.

Bluegrass/Western Wheatgrass/Sagebrush (western snowberry):

This plant community develops after an extended period of ten or more years of nonuse by herbivores and exclusion of fire. Habitat diversity declines due to encroachment of nonnative bluegrasses. As big sagebrush becomes scarce, species such as greater sage-grouse, Brewer's sparrow, and desert cottontail will decline. Chestnut-collared longspur may increase with the decrease of big sagebrush while species such as vesper sparrow and western meadowlark are still common. Prey populations

are available for grassland raptors such as golden eagle, ferruginous hawk, Swainson's hawk, and northern harrier. Predators utilizing this plant community include coyote, American badger, red fox, and long-tailed weasel.

Big Sagebrush/Western Wheatgrass: This plant community develops from continuous season-long grazing and the absence of fire. The increased occurrence of big sage favors species such as greater sage-grouse, Brewer's sparrow, and desert cottontail. This site provides excellent habitat for wintering pronghorn and greater sage-grouse. Chestnut-collared longspur may decrease with the increase of big sagebrush while vesper sparrow and western meadowlark are still common. Prey populations are still available for grassland raptors such as golden eagle, ferruginous hawk, Swainson's hawk, and northern harrier.

Big Sagebrush/Clubmoss: In comparison to the big sagebrush/western wheatgrass/blue grama plant community, this plant community develops after an extended fire free period and extended periods of heaving grazing favoring species such as big sage brush and clubmoss. The loss of understory grasses limits this vegetative community for big sagebrush-associated species such as greater sage-grouse, Brewer's sparrow, and desert cottontail. Prey populations are limited reducing availability for grassland raptors such as golden eagle, ferruginous hawk, and Swainson's hawk.

Extreme impairment of the ecological processes impacts offsite aquatic habitats through excessive runoff, nutrient, and sediment loads. Increased amount of bare ground causes elevated surface temperatures resulting from reduced cover and litter will greatly reduce habitat for most amphibian species, grassland birds, and mammals.

Annual/Pioneer Plant Community: This plant community develops under severe disturbance and/or excessive defoliation. This can result from heavy livestock or prairie dog concentration or cropping abandonment (Go-back land). The dominant vegetation includes pioneer annual grasses, forbs, invaders, and early successional biennial and perennial species. Plant species from adjacent ESs may become minor components of this plant community. The community is susceptible to invasion of annual brome grasses, crested wheatgrass, and other nonnative species due to severe soil disturbances and relatively high percent of bare ground. Soil erosion is potentially high, impacting offsite aquatic habitats through increased runoff, nutrient, and sediment loads. Reduced surface cover, low plant density, low plant vigor, loss of root biomass, and soil compaction, all contribute to decreased wildlife abundance and diversity. Since secondary succession is highly variable plant and wildlife species will vary. This plant community provides habitat for generalist or early successional species. In addition, these communities may contain prairie dog towns. Prairie dog towns are sites of high plant and wildlife diversity.

Introduced, and/or Invaded States

This group includes separate vegetation states that are highly variable in nature. They are derived through distinct management scenarios. These plant communities have been or are highly susceptible to invasion of annual brome grasses, bluegrasses, crested wheatgrass, and other nonnative species. Since secondary succession is highly variable plant and wildlife species will vary. This plant community provides habitat for generalist or early successional species. In addition, these communities may contain prairie dog towns. Prairie dog towns are sites of high plant and wildlife diversity.

The **Introduced** state provides increased forage and; therefore, a potential for increased herbivore populations such as deer, pronghorn, and various small mammals. These sites provide diverse foraging, reproductive, and escape cover favoring multiple edge species.

The **Invaded** state includes areas that have been invaded and are dominated by species such as smooth brome, Kentucky bluegrass, crested wheatgrass, nonnative thistles, field bindweed, knapweeds, leafy spurge, hoary cress, and other introduced species. These sites greatly reduce foraging, reproductive, and escape cover for grassland nesting bird species.

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

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
Grasses and Grass-like							
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
Montana 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
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 reedgrass	U D U U	N D N N	U D U U	N D N N	N D N N	U D U U	U D U 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
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
Sandberg bluegrass	N U N N	N D N N	N U N N	N D N N	N D N N	N U N N	N U N N
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
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
bastard toadflax	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
bighead pygmyweed	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
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
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
green sagewort	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U
groundplum milkvetch	U D U U	U D D U	U D U U	U D D U	U D D U	U D U U	U D D U
heath aster	U U D U	U U P U	U U D U	U U P U	U U P U	U U D U	U U P U
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
littlepod false flax	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
Missouri 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
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
prairie smoke	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
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
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
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
textile 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
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
woolly Indianwheat	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							
big sagebrush	U N U U	D U U D	U N U U	P U D P	P P P P	U N U U	D U U 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
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 D U
leadplant	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U
plains pricklypear	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N
prairie 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 sagebrush	D U U D	D U U D	D U U D	P D D P	P P P P	D U U D	D U U D
skunkbush sumac	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 U D
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
winterfat	P P P P	P P P P	P P P P	P P P P	P P P P	P P P P	P P P P

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

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

Animal Community – Grazing Interpretations

As this site improves in condition through proper management (from the more short grass dominated plant communities to the interpretive plant community), the advantage for livestock production includes: higher forage production from cool-season grasses, improved early spring forage production, and higher water infiltration. The disadvantage for livestock include: reduction in cool-/warm-season grass mix which would provides better management flexibility, less plant diversity, and a potential increase in soil erosion. The Annual, Pioneer Perennial Plant Community is of limited value for livestock production.

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage. During the dormant period, the forage for livestock will likely be lacking protein to meet livestock requirements, and added protein will allow ruminants to better utilize the energy stored in grazed plant materials. A forage quality test (either directly or through fecal sampling) should be used to determine the level of supplementation needed.

Hydrology Functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group B 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 strong 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 opportunities for upland game species. The wide varieties of plants which 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

(R058DY011SD) – Clayey

(R058DY020SD) – Loamy Overflow

(R058DY024SD) – Shallow Loamy

(R058DY013SD) – Claypan

(R058DY009SD) – Sandy

(R058DY012SD) – Thin Loamy

Similar Sites

(R058DY011SD) – Clayey [more green needlegrass; needleandthread minor component]

(R058DY013SD) – Claypan [more blue grama; more cactus; less productive]

(R058DY020SD) – Loamy Overflow [less needleandthread; more big bluestem; more productive]

Inventory Data References

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations and experience were also used. Those involved in developing this site description include: Ryan Beer, Range Management Specialist (RMS), NRCS; Chuck Berdan, Biologist (BIO), Bureau of Land Management (BLM); Stan Boltz, RMS, NRCS; Dave Dewald, Wildlife BIO, NRCS; Jody Forman, RMS, NRCS; Dennis Froemke, RMS, NRCS; Tom Juntti, BIO, USFS; Cheryl Nielsen, RMS, NRCS; Jeff Printz, RMS, NRCS; Mike Stirling, RMS, NRCS; Dan Svingen, BIO, United States Forest Service; Darrell Vanderbusch, Soil Scientist, NRCS; Cindy Zachmeier, BIO, NRCS; and Tim Zachmeier, BIO, BLM.

<u>Data Source</u>	<u>Number of Records</u>	<u>Sample Period</u>	<u>State</u>	<u>County</u>
SCS-RANGE-417	2	1972 – 2004	SD	Harding

State Correlation

This site has been correlated between MT, ND, and South Dakota (SD) in MLRA 58D.

Field Offices

Baker, MT (Fallon County)

Belle Fourche, SD (Butte County)

Bowman, ND (Bowman & Slope Counties)

Buffalo, SD (Harding County)

Ekalaka, MT (Carter County)

Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 43e – Sagebrush Steppe.

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

MT, State Range Management Specialist Date

ND, State Range Management Specialist Date

SD, State Range Management Specialist Date