

United States Department of Agriculture Natural Resources Conservation Service

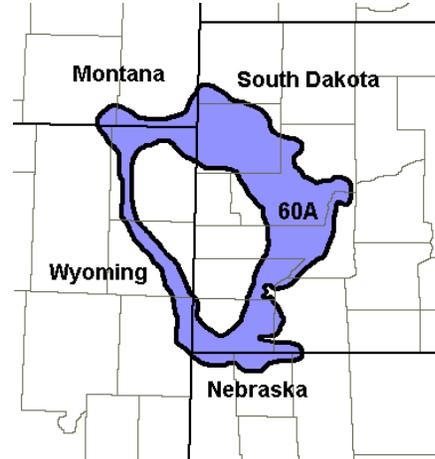
Ecological Site Description

Site Type: Rangeland

Site Name: Loamy Terrace

Site ID: R060AY022SD

Major Land Resource Area (MLRA): 60A – Pierre Shale Plains



Physiographic Features

This site occurs on nearly level to gently sloping uplands and valleys.

Landform: alluvial fan, terrace, plain

Aspect: N/A

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	2,500	4,300
Slope (percent):	0	6
Water Table Depth (inches):	42	80
Flooding:		
Frequency:	None	Very rare
Duration:	None	Very brief
Ponding:		
Depth (inches):	None	None
Frequency:	None	None
Duration:	None	None
Runoff Class:	Low	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 steppes to the east. Annual precipitation ranges from 13 to 18 inches per year, with most occurring during the growing season. 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. Cold air masses from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Chinook winds may occur in winter and bring rapid rises in temperature. 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 46°F. January is the coldest month with average temperatures ranging from about 19°F (Moorcroft CAA, Wyoming (WY)), to about 22°F (Belle Fourche, South Dakota (SD)). July is the warmest month with temperatures averaging from about 70°F (Moorcroft CAA, WY), to about 72°F (Belle Fourche, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 51°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):	122	129
Freeze-free period (days):	145	152
Mean Annual Precipitation (inches):	13	18

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

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.32	0.43	7.1	34.1
February	0.44	0.57	12.6	40.1
March	0.65	0.94	19.7	46.5
April	1.43	1.72	29.4	60.2
May	2.45	3.19	39.7	70.6
June	2.34	3.38	48.5	80.1
July	1.60	2.78	54.8	88.0
August	1.24	1.76	53.1	87.7
September	1.01	1.50	42.3	77.0
October	0.90	1.11	31.4	64.9
November	0.40	0.61	19.8	47.5
December	0.40	0.48	10.2	38.0

Climate Stations		Period	
Station ID	Location or Name	From	To
SD0236	Ardmore 2 N	1948	1999
SD0559	Belle Fourche	1948	1999
SD1124	Buffalo Gap	1951	1999
WY6395	Moorcroft CAA	1948	1998
WY9207	Upton 13 SW	1949	1998

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

Influencing Water Features

Stream Type: B6, C6 (Rosgen System)

Representative Soil Features

The soils in this site are moderately well to well-drained and formed in alluvium. The clay loam to very fine sandy loam surface layer is 5 to 20 inches thick. The soils have a moderately slow to moderately rapid infiltration rate. This site should show no evidence of rills, wind scoured areas, or pedestalled plants. Water flow paths are broken, irregular in appearance, or discontinuous with numerous debris dams or vegetative barriers. The soil surface is stable and intact.

These soils are mainly susceptible to water erosion, but sandy textured surface soils are susceptible to wind erosion. The hazard of water erosion increases where vegetative cover is not adequate. A drastic loss of the soil surface layer on this site can result in a shift in species composition and/or production. More information can be found in the various soil survey reports. Contact the local USDA Service Center for soil survey reports that include more detail specific to your location.

Parent Material Kind: alluvium
Parent Material Origin: sedimentary, unspecified
Surface Texture: silt loam, loam, clay loam, very fine sandy loam
Surface Texture Modifier: none
Subsurface Texture Group: loamy
Surface Fragments ≤3” (% Cover): 0
Surface Fragments >3” (%Cover): 0
Subsurface Fragments ≤3” (% Volume): 0-10
Subsurface Fragments >3” (% Volume): 0-5

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	moderately well	well
Permeability Class:	moderately slow	moderate
Depth (inches):	80	80
Electrical Conductivity (mmhos/cm)*:	0	4
Sodium Absorption Ratio*:	0	2
Soil Reaction (1:1 Water)*:	6.1	8.4
Soil Reaction (0.1M CaCl2)*:	NA	NA
Available Water Capacity (inches)*:	6	7
Calcium Carbonate Equivalent (percent)*:	3	15

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

Plant Communities

Ecological Dynamics of the Site:

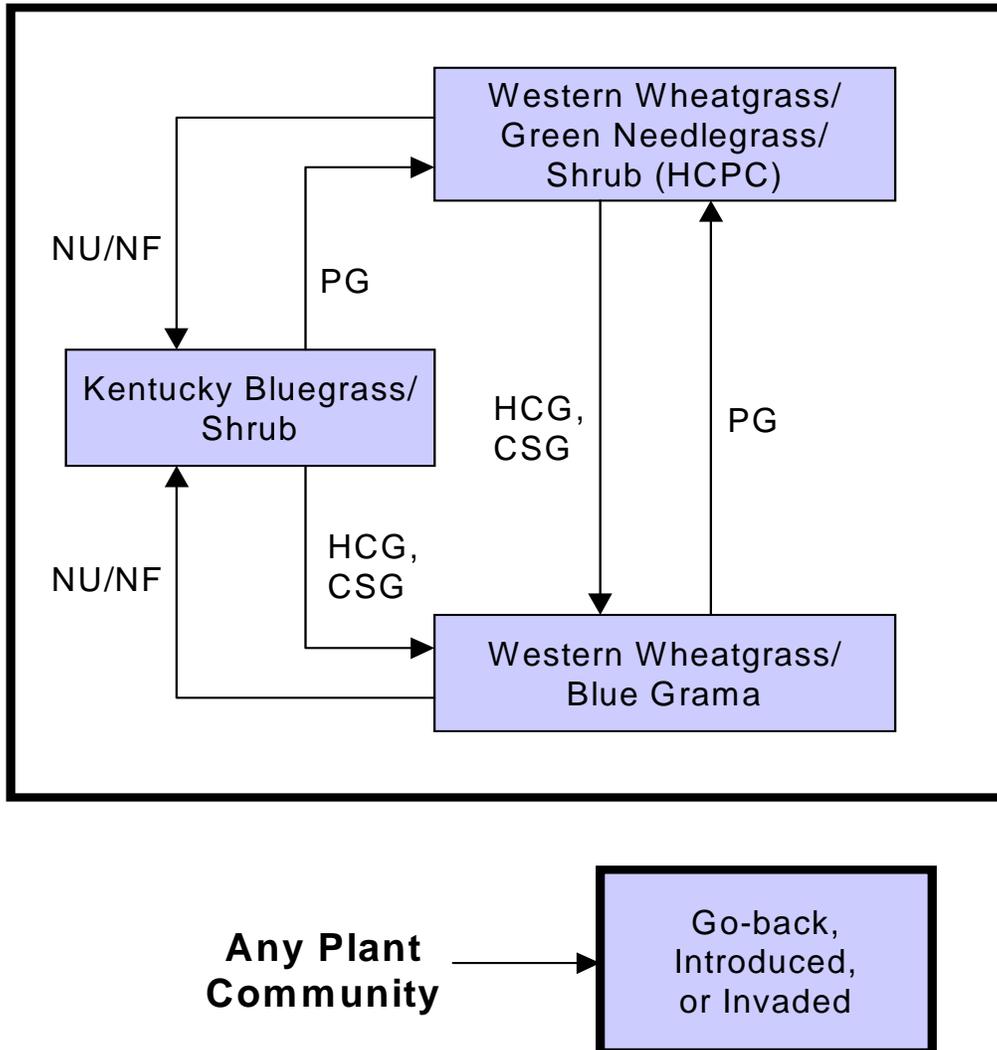
This site developed under Northern Great Plains climatic conditions, natural influences of large herbivores, occasional fire, and other biotic and abiotic factors that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts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

A high percentage of these areas have been tilled in the past and have been planted to alfalfa for haying or are in a winter wheat/fallow rotation. Also, many of these areas are located in good winter livestock areas and are used as calving/feeding areas. Very few areas exist that have not had severe soil disturbance. Many areas that have not been tilled have been continuously hayed resulting in a mono-culture of western wheatgrass. Continuous grazing without adequate recovery periods following each grazing occurrence over several years causes this site to depart from the HCPC. Species such as blue grama will initially increase. Western wheatgrass, green needlegrass, and sideoats grama will decrease in frequency and production. Extended periods of nonuse and/or lack of fire will result in a plant community having high litter levels, which favors an increase in Kentucky bluegrass and/or annual brome grass and in time, shrubs and trees such as western snowberry, chokecherry, and green ash.

The plant community upon which interpretations are primarily based is the HCPC. The HCPC has been determined by studying rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts also have been used. Plant communities, states, transitional pathways, and thresholds have been determined through similar studies and experience.

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

Plant Communities and Transitional Pathways



CSG - continuous seasonal grazing; **HCG** - heavy continuous grazing; **HCPC** - Historical Climax Plant Community; **NU/NF** - extended period of non-use & no fire; **PG** - prescribed grazing.

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Western Wheatgrass/Green Needlegrass/Shrub (HCPC)		
			Group	lbs./acre	% Comp
GRASSES & GRASS-LIKES				1875 - 2125	75 - 85
western wheatgrass	Pascopyrum smithii	PASM	1	625 - 1000	25 - 40
NEEDLEGRASS			2	500 - 750	20 - 30
green needlegrass	Nassella viridula	NAV14	2	375 - 500	15 - 20
needleandthread	Hesperostipa comata ssp. comata	HECOC8	2	125 - 250	5 - 10
SHORT WARM-SEASON GRASSES			3	125 - 250	5 - 10
blue grama	Bouteloua gracilis	BOGR2	3	125 - 250	5 - 10
OTHER WARM-SEASON GRASSES			4	50 - 375	2 - 15
big bluestem	Andropogon gerardii	ANGE	4	25 - 200	1 - 8
sideoats grama	Bouteloua curtipendula	BOCU	4	25 - 200	1 - 8
switchgrass	Panicum virgatum	PAV12	4	25 - 125	1 - 5
OTHER NATIVE GRASSES			5	125 - 375	5 - 15
prairie sandreed	Calamovilfa longifolia	CALO	5	125 - 375	5 - 15
prairie junegrass	Koeleria macrantha	KOMA	5	25 - 75	1 - 3
prairie dropseed	Sporobolus heterolepis	SPHE	5	50 - 125	2 - 5
inland saltgrass	Distichlis spicata	DISP	5	0 - 25	0 - 1
Canada wildrye	Elymus canadensis	ELCA4	5	0 - 25	0 - 1
other perennial grasses		2GP	5	25 - 75	1 - 3
GRASS-LIKES			6	125 - 250	5 - 10
sedge	Carex spp.	CAREX	6	125 - 250	5 - 10
other grass-likes		2GL	6	0 - 25	0 - 1
FORBS			8	125 - 250	5 - 10
American vetch	Vicia americana	VIAM	8	25 - 50	1 - 2
bluebells	Mertensia spp.	MERTE	8	0 - 25	0 - 1
cudweed sagewort	Artemisia ludoviciana	ARLU	8	25 - 125	1 - 5
dotted gayfeather	Liatris punctata	LIPU	8	0 - 25	0 - 1
goldenrod	Solidago spp.	SOLID	8	25 - 50	1 - 2
green sagewort	Artemisia dracunculoides	ARDR4	8	0 - 25	0 - 1
groundplum milkvetch	Astragalus crassicaepus	ASCR2	8	0 - 25	0 - 1
heath aster	Symphotrichum ericoides	SYER	8	25 - 125	1 - 5
larkspur	Delphinium spp.	DELPH	8	0 - 25	0 - 1
Maximilian sunflower	Helianthus maximiliani	HEMA2	8	25 - 125	1 - 5
mint	Mentha spp.	MENTH	8	25 - 125	1 - 5
prairie coneflower	Ratibida columnifera	RACO3	8	0 - 25	0 - 1
purple coneflower	Echinacea angustifolia	ECAN2	8	0 - 25	0 - 1
purple prairie clover	Dalea purpurea	DAPU5	8	25 - 50	1 - 2
rush skeletonweed	Lygodesmia juncea	LYJU	8	0 - 25	0 - 1
scarlet gaura	Gaura coccinea	GACO5	8	0 - 25	0 - 1
scarlet globemallow	Sphaeralcea coccinea	SPCO	8	0 - 25	0 - 1
scurfpea	Psoraleum spp.	PSORA2	8	0 - 50	0 - 2
silverleaf scurfpea	Pediemelum argophyllum	PEAR8	8	0 - 25	0 - 1
wavyleaf thistle	Cirsium undulatum	CIUN	8	0 - 25	0 - 1
western wallflower	Erysimum capitatum var. capitatum	ERCAC	8	0 - 25	0 - 1
western yarrow	Achillea millefolium	ACMI2	8	25 - 50	1 - 2
wild onion	Allium spp.	ALLIU	8	0 - 25	0 - 1
other perennial forbs		2FP	8	0 - 25	0 - 1
SHRUBS			9	250 - 375	10 - 15
big sagebrush	Artemisia tridentata	ARTR2	9	0 - 75	0 - 3
chokecherry	Prunus virginiana	PRVI	9	25 - 50	1 - 2
currant	Ribes spp.	RIBES	9	0 - 25	0 - 1
fringed sagewort	Artemisia frigida	ARFR4	9	25 - 75	1 - 3
leadplant	Amorpha canescens	AMCA8	9	0 - 50	0 - 2
rose	Rosa spp.	ROSA5	9	25 - 75	1 - 3
silver buffaloberry	Shepherdia argentea	SHAR	9	0 - 25	0 - 1
silver sagebrush	Artemisia cana	ARCA13	9	25 - 250	1 - 10
western snowberry	Symphoricarpos occidentalis	SYOC	9	25 - 250	1 - 10
wild plum	Prunus americana	PRAM	9	25 - 50	1 - 2
winterfat	Krascheninnikovia lanata	KRLA2	9	0 - 50	0 - 2
other shrubs		2SHRUB	9	0 - 25	0 - 1
TREES			10	0 - 50	0 - 2
American elm	Ulmus americana	ULAM	10	0 - 25	0 - 1
boxelder	Acer negundo	ACNE2	10	0 - 25	0 - 1
green ash	Fraxinus pennsylvanica	FRPE	10	0 - 25	0 - 1
plains cottonwood	Populus deltoides ssp. monilifera	PODEM	10	0 - 25	0 - 1

Annual Production lbs./acre	LOW	RV	HIGH
GRASSES & GRASS-LIKES	1380	1875	2570
FORBS	120	188	275
SHRUBS	220	313	400
TREES	0	25	55
TOTAL	1700	2500	3300

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/Shrub (HCPC)			Western Wheatgrass/ Blue Grama			Kentucky Bluegrass/Shrub		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
GRASSES & GRASS-LIKES			1875 - 2125	75 - 85		600 - 680	75 - 85		1365 - 1680	65 - 80
western wheatgrass	PASM	1	625 - 1000	25 - 40	1	240 - 360	30 - 45	1	105 - 315	5 - 15
NEEDLEGRASS		2	500 - 750	20 - 30	2	16 - 40	2 - 5	2	42 - 315	2 - 15
green needlegrass	NAVI4	2	375 - 500	15 - 20	2	16 - 40	2 - 5	2	21 - 210	1 - 10
needleandthread	HECOC8	2	125 - 250	5 - 10	2	8 - 24	1 - 3	2	21 - 105	1 - 5
SHORT WARM-SEASON GRASSES		3	125 - 250	5 - 10	3	120 - 200	15 - 25	3	105 - 210	5 - 10
blue grama	BOGR2	3	125 - 250	5 - 10	3	120 - 200	15 - 25	3	105 - 210	5 - 10
OTHER WARM-SEASON GRASSES		4	50 - 375	2 - 15	4	8 - 40	1 - 5	4	21 - 105	1 - 5
big bluestem	ANGE	4	25 - 200	1 - 8	4	0 - 16	0 - 2	4	21 - 63	1 - 3
sideoats grama	BOCU	4	25 - 200	1 - 8	4	8 - 40	1 - 5	4	0 - 63	0 - 3
switchgrass	PAVI2	4	25 - 125	1 - 5	4	0 - 16	0 - 2	4	21 - 105	1 - 5
OTHER NATIVE GRASSES		5	125 - 375	5 - 15	5	40 - 120	5 - 15	5	105 - 315	5 - 15
prairie sandreed	CALO	5	125 - 375	5 - 15	5	16 - 40	2 - 5	5	42 - 168	2 - 8
prairie junegrass	KOMA	5	25 - 75	1 - 3	5	8 - 40	1 - 5	5	0 - 63	0 - 3
prairie dropseed	SPHE	5	50 - 125	2 - 5	5	0 - 8	0 - 1	5	0 - 105	0 - 5
inland saltgrass	DISP	5	0 - 25	0 - 1	5	0 - 40	0 - 5	5	0 - 42	0 - 2
sand dropseed	SPCR	5			5	16 - 80	2 - 10	5	21 - 105	1 - 5
Canada wildrye	ELCA4	5	0 - 25	0 - 1				5	0 - 63	0 - 3
other perennial grasses	2GP	5	25 - 75	1 - 3	5	16 - 40	2 - 5	5	42 - 105	2 - 5
GRASS-LIKES		6	125 - 250	5 - 10	6	80 - 120	10 - 15	6	105 - 210	5 - 10
sedge	CAREX	6	125 - 250	5 - 10	6	80 - 120	10 - 15	6	105 - 210	5 - 10
other grass-likes	2GL	6	0 - 25	0 - 1	6	0 - 40	0 - 5	6	0 - 42	0 - 2
NON-NATIVE GRASSES		7			7	0 - 80	0 - 10	7	210 - 630	10 - 30
Kentucky bluegrass	POPR	7			7	0 - 80	0 - 10	7	210 - 630	10 - 30
cheatgrass	BRTE	7			7	8 - 40	1 - 5	7	42 - 210	2 - 10
smooth bromegrass	BRIN2	7			7			7	0 - 105	0 - 5
FORBS		8	125 - 250	5 - 10	8	40 - 80	5 - 10	8	210 - 315	10 - 15
American vetch	VIAM	8	25 - 50	1 - 2	8	0 - 16	0 - 2	8	0 - 42	0 - 2
bluebells	MERTE	8	0 - 25	0 - 1				8	0 - 42	0 - 2
cutweed sagewort	ARLU	8	25 - 125	1 - 5	8	8 - 40	1 - 5	8	21 - 105	1 - 5
dotted gayfeather	LIPU	8	0 - 25	0 - 1	8	0 - 8	0 - 1	8	21 - 105	1 - 5
goldenrod	SOLID	8	25 - 50	1 - 2	8	0 - 16	0 - 2	8	21 - 105	1 - 5
green sagewort	ARDR4	8	0 - 25	0 - 1	8	8 - 24	1 - 3	8	21 - 84	1 - 4
groundplum milkvetch	ASCR2	8	0 - 25	0 - 1	8	8 - 24	1 - 3	8	0 - 21	0 - 1
heath aster	SYER	8	25 - 125	1 - 5	8	16 - 40	2 - 5	8	42 - 105	2 - 5
larkspur	DELPH	8	0 - 25	0 - 1	8	8 - 24	1 - 3	8	42 - 105	2 - 5
Maximilian sunflower	HEMA2	8	25 - 125	1 - 5						
mint	MENTH	8	25 - 125	1 - 5				8	0 - 63	0 - 3
prairie coneflower	RACO3	8	0 - 25	0 - 1	8	8 - 40	1 - 5	8	0 - 42	0 - 2
purple coneflower	ECAN2	8	0 - 25	0 - 1	8	0 - 8	0 - 1	8	0 - 21	0 - 1
purple prairie clover	DAPU5	8	25 - 50	1 - 2	8	0 - 8	0 - 1	8	21 - 42	1 - 2
rush skeletonweed	LYJU	8	0 - 25	0 - 1	8	0 - 16	0 - 2	8	0 - 21	0 - 1
scarlet gaura	GACO5	8	0 - 25	0 - 1	8	0 - 8	0 - 1	8	0 - 21	0 - 1
scarlet globemallow	SPCO	8	0 - 25	0 - 1	8	8 - 24	1 - 3	8	0 - 21	0 - 1
scurfpea	PSORA2	8	0 - 50	0 - 2	8	16 - 40	2 - 5	8	21 - 105	1 - 5
silverleaf scurfpea	PEAR6	8	0 - 25	0 - 1	8	8 - 16	1 - 2	8	21 - 105	1 - 5
wayleaf thistle	CIUN	8	0 - 25	0 - 1	8	8 - 16	1 - 2	8	0 - 21	0 - 1
western salsify	TRDU				8	8 - 16	1 - 2	8	21 - 63	1 - 3
western wallflower	ERCAC	8	0 - 25	0 - 1	8	0 - 8	0 - 1	8	0 - 21	0 - 1
western yarrow	ACMI2	8	25 - 50	1 - 2	8	8 - 24	1 - 3	8	0 - 42	0 - 2
wild onion	ALLIU	8	0 - 25	0 - 1	8	0 - 8	0 - 1	8	0 - 21	0 - 1
other perennial forbs	2FP	8	0 - 25	0 - 1	8	8 - 24	1 - 3	8	42 - 105	2 - 5
SHRUBS		9	250 - 375	10 - 15	9	40 - 80	5 - 10	9	315 - 420	15 - 20
big sagebrush	ARTR2	9	0 - 75	0 - 3	9	0 - 24	0 - 3	9	0 - 210	0 - 10
broom snakeweed	GUSA2				9	0 - 24	0 - 3	9	0 - 105	0 - 5
chokecherry	PRVI	9	25 - 50	1 - 2	9	0 - 16	0 - 2	9	21 - 105	1 - 5
currant	RIBES	9	0 - 25	0 - 1	9	0 - 8	0 - 1	9	21 - 105	1 - 5
fringed sagewort	ARFR4	9	25 - 75	1 - 3	9	16 - 40	2 - 5	9	42 - 105	2 - 5
leadplant	AMCA6	9	0 - 50	0 - 2				9	0 - 42	0 - 2
rose	ROSA5	9	25 - 75	1 - 3	9	8 - 24	1 - 3	9	21 - 63	1 - 3
silver buffaloberry	SHAR	9	0 - 25	0 - 1	9	0 - 8	0 - 1	9	0 - 21	0 - 1
silver sagebrush	ARCA13	9	25 - 250	1 - 10	9	8 - 40	1 - 5	9	105 - 315	5 - 15
western snowberry	SYOC	9	25 - 250	1 - 10	9	8 - 40	1 - 5	9	42 - 210	2 - 10
wild plum	PRAM	9	25 - 50	1 - 2	9	0 - 16	0 - 2	9	21 - 42	1 - 2
winterfat	KRLA2	9	0 - 50	0 - 2				9	0 - 21	0 - 1
other shrubs	2SHRUB	9	0 - 25	0 - 1				9	0 - 21	0 - 1
TREES		10	0 - 50	0 - 2	10	0 - 16	0 - 2	10	0 - 42	0 - 2
American elm	ULAM	10	0 - 25	0 - 1	10	0 - 8	0 - 1	10	0 - 21	0 - 1
boxelder	ACNE2	10	0 - 25	0 - 1	10	0 - 8	0 - 1	10	0 - 21	0 - 1
green ash	FRPE	10	0 - 25	0 - 1	10	0 - 8	0 - 1	10	0 - 21	0 - 1
plains cottonwood	PODEM	10	0 - 25	0 - 1	10	0 - 8	0 - 1	10	0 - 21	0 - 1
other trees	2TREE				10	0 - 8	0 - 1	10	0 - 21	0 - 1
Annual Production lbs./acre			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH	
GRASSES & GRASS-LIKES			1360 - 1975 - 2570		430 - 672 - 1210		1075 - 1449 - 1955			
FORBS			120 - 188 - 275		35 - 60 - 85		205 - 263 - 350			
SHRUBS			220 - 313 - 400		35 - 60 - 85		220 - 368 - 450			
TREES			0 - 25 - 55		0 - 8 - 20		0 - 21 - 45			
TOTAL			1700 - 2500 - 3300		500 - 800 - 1400		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 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” (DPCs). 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/Green Needlegrass/Shrub Plant Community

The plant community upon which interpretations are primarily based is the Western Wheatgrass/Green Needlegrass/Shrub Plant Community. This is also considered to be the HCPC. This plant community can be found on areas that are properly managed with prescribed grazing. The potential vegetation is about 75-85 percent grasses and grass-like plants, 5-10 percent forbs, 10-15 percent shrubs, and 0-2 percent trees. Major grasses include western wheatgrass and green needlegrass. Other grasses occurring on this community include prairie sandreed, needleandthread, blue grama, and big bluestem. Major forbs and shrubs include American vetch, purple prairie clover, cudweed sagewort, western yarrow, sunflower, winterfat, western snowberry, silver sagebrush, chokecherry, and fringed sagewort. Scattered green ash, plains cottonwood, and American elm may occur.

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

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

Growth curve number: SD6002

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

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

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

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Nonuse and lack of fire for extended periods of time will convert this plant community to the *Kentucky Bluegrass/Shrub Plant Community*.
- Heavy, continuous grazing will convert the plant community to the *Western Wheatgrass/Blue Grama Plant Community*.
- Continuous seasonal (i.e., spring) grazing will convert the plant community to the *Western Wheatgrass/Blue Grama Plant Community*.

Western Wheatgrass/Blue Grama Plant Community

This plant community can slowly develop from the adverse effects of continuous grazing without adequate recovery periods between each grazing event during the growing season. Recognition of this plant community will enable the land user to implement key management decisions before a significant ecological threshold is crossed. Blue grama and western wheatgrass are the dominant species. Green needlegrass has been greatly reduced. Forb species include western yarrow, asters, prairie coneflower, silverleaf scurfpea, wavyleaf thistle, and western salsify. Winterfat, chokecherry, and plum are greatly reduced while other shrub species would tend to be heavily browsed.

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

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: SD6003

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

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Prescribed grazing with adequate recovery periods following each grazing event and proper stocking will shift this plant community back to the *Western Wheatgrass/Green Needlegrass/Shrub Plant Community (HCPC)*.
- Nonuse and no fire for extended periods of time will convert this plant community to the *Kentucky Bluegrass/Shrub Plant Community*.

Kentucky Bluegrass/Shrub Plant Community

This plant community develops after an extended period of nonuse and exclusion of fire. Eventually, litter levels become high enough to reduce native grass vigor, diversity, and density. Kentucky bluegrass dominates this plant community. Common forbs include sweetclover, cudweed sagewort, and goldenrod species. Shrubs such as western snowberry and/or silver sagebrush, buffaloberry, and chokecherry will increase in density and cover and eventually tree species such as green ash.

This plant community is resistant to change without prescribed grazing and/or fire. The combination of both grazing and fire is most effective in moving this plant community toward the HCPC. Soil erosion is low. Runoff is similar to the HCPC. Once the advanced stage of this plant community is reached, time and external resources will be needed to see a recovery in the diversity of the site.

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

Growth curve number: SD6002

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

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

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

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Prescribed grazing will move this plant community toward the *HCPC*. This would require long-term management with prescribed grazing and/or prescribed burning under controlled conditions.
- Heavy continuous grazing will convert this plant community to the *Western Wheatgrass/Blue Grama Plant Community*.
- Continuous seasonal grazing will convert this plant community to the *Western Wheatgrass/Blue Grama Plant Community*.

Go-back, Introduced, or Invaded Plant Community

This plant community develops under severe disturbance and/or excessive defoliation. This can result from heavy livestock or wildlife concentration (i.e., water locations, bedding, or loafing grounds, feeding areas), cropping abandonment (go-back land), or prairie dog habitation. The dominant vegetation includes pioneer annual grasses and forbs and early successional biennial and perennial species. Grasses may include red threeawn, sixweeks fescue, smooth brome, annual brome, crested wheatgrass, needleandthread, prairie Junegrass, and western wheatgrass. The dominant forbs include curlycup gumweed, maretail, salsify, kochia, field bindweed, thistles, western ragweed, pussytoes, prostrate verbena, and other early successional species. Shrubs that may be present include prairie rose, fringed sagewort, and broom snakeweed. Plant species from adjacent ecological sites may become minor components of this plant community. The community also is susceptible to invasion of other nonnative species due to severe soil disturbances and relatively high percent of bare ground. Many annual and perennial forbs, including nonnative species, have invaded the site.

This plant community is resistant to change towards the HCPC, as long as soil disturbance or severe vegetation defoliation persists, thus holding back secondary plant succession. Soil erosion is potentially high in this vegetation state. Reduced surface cover, low plant density, low plant vigor, loss of root biomass, and soil compaction, all contribute to decreased water infiltration, increased runoff, and accelerated erosion rates.

Significant economic inputs and time would be required to move this plant community toward a higher successional stage and a more productive plant community. Secondary succession is highly variable, depending upon availability and diversity of a viable seed bank of higher successional species within the existing plant community and neighboring plant communities. This plant community can be renovated to improve the production capability, but management changes would be needed to maintain the new plant community. The total annual production ranges from 500 to 1,100 lbs./ac. (air-dry weight) depending upon growing conditions.

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

Growth curve number: SD6003

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

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

The MLRA 60A lies within the drier portion of the 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, in-stream 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 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 was a historical keystone species but have been extirpated as a free-ranging herbivore. The loss of the bison and prairie dog, and 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 60A, the Loamy Terrace Ecological Site provides upland grassland cover with an associated forb, shrub, and tree component. It was typically part of an expansive grassland landscape that included combinations of Shallow Loamy, Shallow Clayey, Thin Loamy, Thin Claypan, Sandy, Sandy Claypan, Loamy, Sandy Terrace and Clayey Ecological Sites.

This ecological site can support an abandoned floodplain plant community and may be associated with an adjacent riparian plant community. The abandoned floodplain plant community may be composed of mature cottonwood and various age classes of elm, green ash, and boxelder; with a shrub component of chokecherry, wild plum, western snowberry, silver sagebrush, wild rose, etc. The presence or absence of this tree/shrub component is an important factor influencing wildlife species composition.

Rare flooding events deposit silt on the site which may allow the potential sprouting of plains cottonwood. However, due to the droughtiness of this site, cottonwood establishment does not occur.

This site is subject to invasion of grass species such as annual brome grasses and Kentucky bluegrass. Woody species such as Eastern red cedar, Rocky Mountain juniper, and Russian-olive may invade this site.

The Loamy Terrace Ecological Site has been subject to conversion to cropland or hayland, some sites being irrigated. Where intact, the site provides important habitat for grassland, woodland and shrub nesting birds, small rodents, bats, mammalian predators, and a variety of reptiles, amphibians, and insects. Within the MLRA, this site provides the suitable habitat for herptiles and raccoons. These sites also provide forage sites for greater sage-grouse broods. Invasive grass or woody species have impacted the biological integrity of the site, particularly for ground nesting birds.

Western Wheatgrass/Green Needlegrass/Shrub (HCPC): The predominance of grasses plus high diversity of forbs and shrubs in this community favors grazers and mixed-feeders, such as white-tailed deer. Plant communities associated with woody habitat provide habitat for songbirds such as brown thrasher, redheaded woodpecker, warbling vireo, yellow warbler, gray catbird, Say's phoebe, loggerhead shrike, Lazuli bunting, yellow breasted chat, and black-headed grosbeak; and raptors such as red-tailed hawk, Swainson's hawk, American kestrel, and great-horned owl. Insects, such as pollinators, play a large role in maintaining the forb community and provide a forage base for birds and other species. Diverse prey populations are available for grassland raptors and mammalian predators, especially bobcat.

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 brood rearing habitat for greater sage-grouse and sharp-tailed grouse.

The diversity of grasses, forbs, and shrubs provide high nutrition levels for small and large herbivores including voles, mice, thirteen-lined ground squirrel, Eastern cottontail rabbit, white-tailed jackrabbit, and deer. This ecological site provides excellent fawning habitat for white-tailed deer. The relatively high stature of this plant community provides suitable thermal, protective, and escape cover for small and large mammals. This plant community provides habitat for tiger salamander, various frog and toad species, and bull and garter snakes. Introduced bird species such as European starling, ring-necked pheasant, and gray partridge will use this site.

Western Wheatgrass/Blue Grama: Resulting from heavy continuous season-long grazing without adequate recovery periods between grazing events, western wheatgrass, and blue grama will dominate. Forb and shrub diversity and density are decreased. The tree component is aging and the tree diversity and density remains largely unchanged. Livestock damage to trees is often noticeable. The reduction in the shrub component results in reduced habitat for brown thrasher, yellow warbler, gray catbird, loggerhead shrikes, Lazuli bunting, and yellow breasted chat. The tall tree component continues to provide habitat for red-tailed hawk, American kestrel, redheaded woodpecker, warbling vireo, black-headed grosbeak, and Say's phoebe. This site provides suboptimal brood rearing habitat for greater sage-grouse and sharp-tailed grouse. This plant community provides habitat for tiger salamander, leopard frog, and bull and garter snakes.

Kentucky Bluegrass/Shrub: Long periods of nonuse and loss of fire allows the Kentucky bluegrass and shrub component to dominate the shorter vegetative stratum. Increased litter cools the soil surface allowing for shrubs such as western snowberry and sagebrush to establish. The taller vegetative stratum will become dominated by green ash, boxelder, and Rocky Mountain juniper. Wildlife diversity is increased due to changes in the vegetative community. The increase in big sagebrush and other shrubs provides excellent nesting and brood rearing habitat for greater sage-

grouse and sharp-tailed grouse. Prominent species will include meadow vole, common yellowthroat, savannah sparrow, and northern harrier.

Ecological processes on this site have been impacted by increased litter interfering with nutrient and water cycles decreasing forb and graminoid diversity.

Go Back, 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 **Go-back** state can be reached whenever severe mechanical disturbance (i.e., abandoned farmland) is eliminated. Early successional plant communities include annual and perennial weedy type species first to occupy the site. These sites provide diverse foraging, reproductive, and escape cover favoring multiple edge species. This pioneer plant community provides abundant opportunity for insect, bird, and small mammal foraging due to abundant flowers and seed sources.

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 & Grass-likes							
big bluestem	U D P D	U U D 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 D	D P P D	U D P U	D P P D	D P P D	U D P U	U D P U
Canada wildrye	U D U U	N U N N	U D U U	N U N N	N U N N	U D U U	U D U U
green needlegrass	U P U D	N P N P	U P U D	N P N P	N P N P	U P U D	U P U D
inland saltgrass	N U U N	N N N N	N U U N	N N N N	N N N N	N U U N	N U U N
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
prairie dropseed	N U P U	N U D U	N U P U	N U D U	N U D U	N U P U	N U P U
prairie junegrass	U D U D	N D N U	U D U D	N D N U	N D N U	U D U D	U D U D
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
sedge	U P U D	U P U D	U D U D	U D U D	U D U D	U D U D	U D U D
sideoats grama	U D P D	U P D D	U D P U	U P D U	U P D U	U D P U	U D P U
switchgrass	U D D U	U D U U	U D D U	N N N N	N N N N	U D D U	U D D U
western wheatgrass	U P D D	U D U U	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
bluebells	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
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
goldenrod	U U D U	N U U N	U U D U	N U U N	N U U N	U U D U	N U U N
green sagewort	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U
groundplum milkvetch	U D U U	U D D U	U D U U	U D D U	U D D U	U D U U	U D D U
heath aster	U U D U	U U P U	U U D U	U U P U	U U P U	U U D U	U U P U
larkspur	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
Maximilian sunflower	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U
mint	N N U N	N U U N	N N U N	N U U N	N U U N	N N U N	N N U N
prairie coneflower	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
purple coneflower	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
purple prairie clover	U D P U	U P P U	U D P U	U P P U	U P P U	U D P U	U P P U
rush skeletonweed	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
scarlet gaura	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
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
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
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 wallflower	U D U U	N U U N	U D U U	N U U N	N U U N	U D U U	N U U N
western yarrow	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
wild 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
Shrubs							
big sagebrush	U U 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
chokecherry	D T T D	D T T D	D T T D	P U D P	D U U D	D T T D	P U U P
currant	D U U D	D U U D	D U U D	D U U D	U U U U	D U U D	D U U D
fringed sagewort	U U U U	U U U U	U U U U	U D D U	U P P D	U U U U	U U U D
leadplant	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U
rose	U D D U	U D D U	U D D U	U D D U	U D D U	U D D U	U D D U
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
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
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
wild plum	D U U D	D U U D	D U U D	P U D D	D U U D	D U U D	D U U D
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
Trees							
American elm	N N N N	N N N N	N N N N	N U D N	N N N N	N N N N	N N N N
boxelder	N N N U	N N U U	N N N U	N N U U	N N U U	N N N U	N N U U
green ash	N U D U	N D D U	N U D U	N D D U	N U D U	N U D U	N D D U
plains cottonwood	D U U D	D U U D	D U U D	D U D D	D U U D	D U U D	D U U D

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

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

Animal Community – Grazing Interpretations

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

Plant Community	Average Annual Production (lbs./acre, air-dry)	Stocking Rate* (AUM/acre)
Western Wheatgrass/Green Needlegrass/Shrub (HCPC)	2,500	0.78
Western Wheatgrass/Blue Grama	800	0.25
Kentucky Bluegrass/Shrub	2,100	0.66**
Go-back, Introduced, or Invaded	800	**

* Based on 790 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).

**Highly variable; stocking rate needs to be determined onsite.

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 herbage production on this site. The site is dominated by soils in hydrologic groups B and C. Infiltration and runoff potential for this site varies from moderate to high depending on soil hydrologic group, slope, and ground cover. In many cases, areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower runoff. An exception would be where shortgrasses form a dense sod and dominate the site. Normally, areas where ground cover is less than 50 percent have the greatest potential to have reduced infiltration and higher runoff (refer to Section 4, NRCS National Engineering Handbook for runoff quantities and hydrologic curves).

Recreational Uses

This site provides hunting 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

Other Products

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

Supporting Information

Associated Sites

(060AY010SD) – Loamy 13-16” P.Z.
(060AY041SD) – Loamy 16-18” P.Z.

(060AY020SD) – Loamy Overflow

Similar Sites

(060AY003SD) – Loamy Overflow [more big bluestem; higher production]
(060AY010SD or 060AY041SD) – Loamy 13-16” P.Z. or Loamy 16-18” P.Z. [less big bluestem; lower production]

Inventory Data References

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel were also used. Those involved in developing this site description include: Stan Boltz, Range Management Specialist (RMS), NRCS; Darrel DuVall, RMS, NRCS; Cheryl Nielsen, RMS, NRCS; Rick Peterson, RMS, NRCS; and Mike 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				

State Correlation

This site has been correlated between Montana (MT), Nebraska (NE), SD, and WY in MLRA 60A.

Field Offices

Belle Fourche, SD	Custer, SD	Hot Springs, SD	Pine Ridge, SD	Sundance, WY
Broadus, MT	Ekalaka, MT	Lusk, WY	Rapid City, SD	Wall, SD
Buffalo, SD	Faith, SD	Martin, SD	Rushville, NE	
Chadron, NE	Gillette, WY	Newcastle, WY	Sturgis, SD	

Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 43e – Sagebrush Steppe, 43g – Semi-arid Pierre Shale Plains, and 43k – Dense Clay Prairie.

Other References

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

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

USDA, NRCS. National Range and Pasture Handbook, September 1997.

USDA, NRCS. National Soil Information System, Information Technology Center, 2150 Centre Avenue, Building A, Fort Collins, CO 80526. (<http://soils.usda.gov/technical/nasis>)

USDA, NRCS, 2002. National Soil Survey Handbook, Title 430-VI. (<http://soils.usda.gov/technical/handbook/>)

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

NE, State Range Management Specialist Date

SD, State Range Management Specialist Date

WY, State Range Management Specialist Date