

United States Department of Agriculture Natural Resources Conservation Service

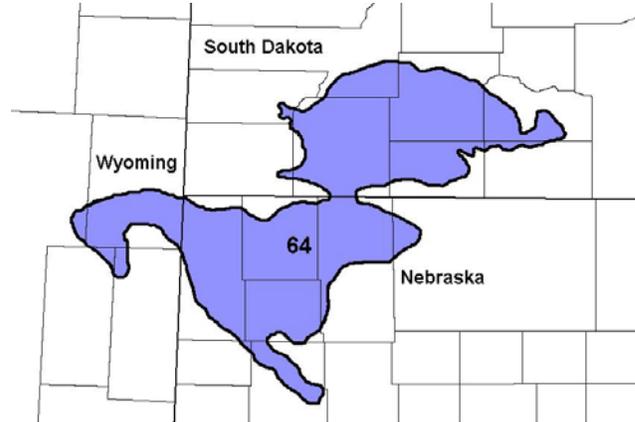
Ecological Site Description

Site Type: Rangeland

Site Name: Shallow

Site ID: R064XY040NE

Major Land Resource Area (MLRA): 64 – Mixed Sandy and Silty Tableland



Physiographic Features

This site occurs on side slopes and ridge tops of hills, plains, and uplands.

Landform: hill, ridge, plain

Aspect: N/A

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	2,900	4,000
Slope (percent):	0	60
Water Table Depth (inches):	None	None
Flooding:		
Frequency:	None	None
Duration:	None	None
Ponding:		
Depth (inches):	None	None
Frequency:	None	None
Duration:	None	None
Runoff Class:	Very low	High

Climatic Features

MLRA 64 is considered to have a continental climate – cold winters and hot summers, low humidity, light rainfall, and much sunshine. Extremes in temperature may also abound. The climate is the result of this MLRA's location near the geographic center of North America. There are few natural barriers on the Northern Great Plains and air masses move freely across the plains and account for rapid changes in temperature.

Annual precipitation ranges from 14 to 20 inches per year. The normal average annual temperature is about 47°F. January is the coldest month with average temperatures ranging from about 21°F (Wood, South Dakota (SD)), to about 25°F (Hemingford, Nebraska (NE)). July is the warmest month with temperatures averaging from about 70°F (Keeline 3 W, Wyoming (WY)), to about 76°F (Wood, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 55°F. This large annual range attests to the continental nature of this area's climate. Hourly winds average about 11 miles per hour (mph) annually, ranging from about 13 mph during the spring to about 10 mph during the summer. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 mph.

Growth of cool-season plants begins in early to mid-March, slowing or ceasing in late June. Warm-season plants begin growth about mid-May and continue to early or mid-September. Greenup of cool-season plants may occur in September and October when adequate soil moisture is present.

	<u>Minimum</u>	<u>Maximum</u>
Frost-free period (days):	138	143
Freeze-free period (days):	161	163
Mean Annual Precipitation (inches):	14	20

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

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.42	0.52	9.0	35.8
February	0.48	0.61	14.6	40.7
March	0.90	1.22	21.0	47.5
April	1.83	2.15	28.9	61.3
May	2.22	3.38	38.3	72.2
June	2.05	3.27	47.3	82.1
July	1.63	2.73	53.9	90.1
August	1.09	1.96	52.3	89.3
September	1.09	1.58	42.4	79.5
October	0.80	1.38	32.6	66.6
November	0.56	0.65	20.4	49.0
December	0.42	0.50	13.4	38.4

Climate Stations		Period	
Station ID	Location or Name	From	To
NE3755	Hemingford, NE	1964	1999
WY5085	Keeline 3 W, WY	1953	1986
SD9442	Wood, SD	1948	1999

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

Riparian and Wetland Features

No riparian areas or wetland features are directly associated with this site.

Representative Soil Features

The common features of soils in this site are the very fine sandy loam to silt loam textured subsoils and slopes of 0 to 60 percent. The soils in this site are well to somewhat excessively drained and formed in soft siltstone or sandstone. The very fine sandy loam to silt loam surface layer is 2 to 10 inches thick. The soils have a moderate infiltration rate. This site should show slight to 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. Subsurface soil layers are restrictive 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 15 percent. Low available water capacity caused by the shallow rooting depth strongly influences the soil-water-plant relationship.

More information can be found in the various soil survey reports. Contact the local United States Department of Agriculture (USDA) Service Center for soil survey reports that include more detail specific to your location.

Parent Material Kind: residuum
Parent Material Origin: sedimentary, unspecified
Surface Texture: loam, silt loam, very fine sandy loam
Surface Texture Modifier: none
Subsurface Texture Group: loamy
Surface Fragments ≤3" (% Cover): 0-10
Surface Fragments >3" (%Cover): 0-20
Subsurface Fragments ≤3" (% Volume): 0-15
Subsurface Fragments >3" (% Volume): 0

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	well	somewhat excessively
Permeability Class:	moderate	moderately rapid
Depth (inches):	10	20
Electrical Conductivity (mmhos/cm)*:	0	2
Sodium Absorption Ratio*:	0	0
Soil Reaction (1:1 Water)*:	6.6	8.4
Soil Reaction (0.1M CaCl ₂)*:	NA	NA
Available Water Capacity (inches)*:	2	3
Calcium Carbonate Equivalent (percent)*:	0	15

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

Plant Communities

Ecological Dynamics of the Site

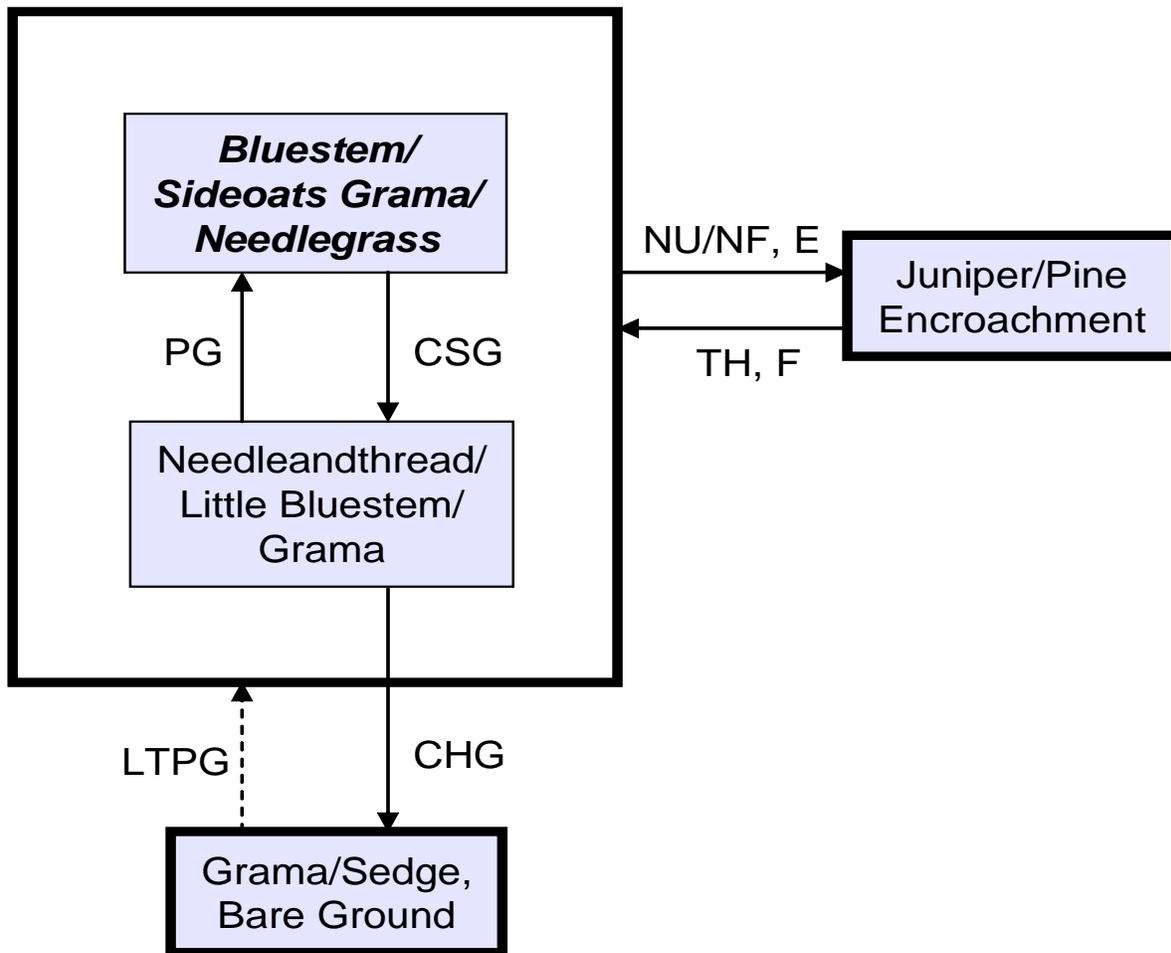
This site developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfire (often of light intensities), and other biotic and abiotic factors that typically influence soil/site development. Changes will occur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

Continuous season-long grazing (during the typical growing season of May through October) and/or repeated seasonal grazing (e.g., every spring, every summer) without adequate recovery periods following each grazing occurrence causes this site to depart from the Bluestem/Sideoats Grama/Needlegrass Plant Community.

Interpretations are primarily based on the Bluestem/Sideoats Grama/Needlegrass Plant Community. It has been determined by study of rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts also have been used. Plant communities, states, transitional pathways, and thresholds have been determined through similar studies and experience.

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

Plant Communities and Transitional Pathways



CSG - Continuous seasonal grazing (grazing a unit for an entire portion of a growing season, and the same season every year); **E** - Encroachment; **F** - Fire; **CHG** - Continuous heavy grazing (heavy levels of grazing of a unit during most or all of the growing season); **LTPG** - Long-term prescribed grazing; **NU/NF** - Non-use, no fire for extended periods; **PG** – Prescribed Grazing (planned, controlled harvest of vegetation with grazing or browsing animals – see FOTG, Section IV, 528); **TH** - Thinning.

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SYMBOL	Bluestem/Sideoats Grama/ Needlegrass			Needleandthread/Little Bluestem/Grama			Grama/Sedge, Bare Ground			Juniper/Pine Enchroachment		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
GRASSES & GRASS-LIKES													
big bluestem	ANGE	1	30 - 150	2 - 10	1	0 - 65	0 - 5	1	560 - 680	70 - 85	1	0 - 50	0 - 5
little bluestem	SCSC	2	75 - 225	5 - 15	2	130 - 325	10 - 25	2	0 - 80	0 - 10	2	0 - 100	0 - 10
sideoats grama	BOCU	3	150 - 300	10 - 20	3	65 - 195	5 - 15	3	0 - 80	0 - 10	3	0 - 200	0 - 20
western wheatgrass	PASM	4	0 - 225	0 - 15	4	26 - 130	2 - 10	4	8 - 40	1 - 5	4	0 - 100	0 - 10
NEEDLEGRASSES													
needleandthread	HECOC8	5	75 - 225	5 - 15	5	65 - 260	5 - 20	5	16 - 80	2 - 10	5	20 - 200	2 - 20
green needlegrass	NAV14	5	0 - 75	0 - 5	5	0 - 39	0 - 3				5	0 - 80	0 - 8
porcupine grass	HESP11	5	0 - 75	0 - 5	5	0 - 65	0 - 5				5	0 - 80	0 - 8
SHORT WARM-SEASON													
blue grama	BOGR2	6	75 - 225	5 - 15	6	130 - 260	10 - 20	6	80 - 280	10 - 35	6	0 - 150	0 - 15
hairy grama	BOH12	6	0 - 150	0 - 10	6	65 - 260	5 - 20	6	80 - 280	10 - 35	6	0 - 100	0 - 10
buffalograss	BUDA	6	0 - 75	0 - 5	6	0 - 65	0 - 5	6	0 - 40	0 - 5	6	0 - 200	0 - 2
OTHER NATIVE GRASSES													
plains muhly	MUCU3	7	0 - 75	0 - 5	7	0 - 39	0 - 3	7	0 - 16	0 - 2	7	10 - 40	1 - 4
prairie junegrass	KOMA	7	0 - 45	0 - 3	7	0 - 39	0 - 3	7	0 - 24	0 - 3	7	10 - 30	1 - 3
Canada wildrye	ELCA4										7	10 - 50	1 - 5
red threeawn	ARPU1	7	0 - 30	0 - 2	7	13 - 65	1 - 5	7	16 - 80	2 - 10	7	0 - 40	0 - 4
dropseed	SPOR0				7	0 - 39	0 - 3	7	16 - 80	2 - 10	7	0 - 20	0 - 2
sedge	CAREX	7	75 - 225	5 - 15	7	130 - 260	10 - 20	7	80 - 240	10 - 30	7	20 - 150	2 - 15
prairie sandreed	CALO	7	0 - 150	0 - 10	7	0 - 104	0 - 8				7	0 - 100	0 - 10
INTRODUCED GRASSES													
cheatgrass	BRTE				8	0 - 26	0 - 2	8	16 - 120	2 - 15	8	20 - 150	2 - 15
bluegrass	POA										8	0 - 50	0 - 5
FORBS													
cudweed sagewort	ARLU	9	15 - 45	1 - 3	9	65 - 130	5 - 10	9	40 - 120	5 - 15	9	50 - 100	5 - 10
dalea	DALEA	9	15 - 30	1 - 2	9	13 - 39	1 - 3	9	8 - 16	1 - 2	9	10 - 30	1 - 3
deervetch	LOUNU	9	0 - 30	0 - 2	9	0 - 26	0 - 2	9	0 - 24	0 - 3	9	0 - 30	0 - 3
dotted gayfeather	LIPU	9	15 - 75	1 - 5	9	13 - 65	1 - 5	9	0 - 24	0 - 3	9	0 - 30	0 - 3
green sagewort	ARDR4	9	0 - 30	0 - 2	9	13 - 39	1 - 3	9	24 - 40	3 - 5	9	30 - 50	3 - 5
hairy goldaster	HEV14	9	0 - 15	0 - 1	9	0 - 13	0 - 1	9	0 - 8	0 - 1	9	0 - 10	0 - 1
Indian breadroot	PEES	9	0 - 75	0 - 5	9	0 - 65	0 - 5	9	0 - 24	0 - 3	9	0 - 30	0 - 3
milkvetch	ASTRA	9	15 - 45	1 - 3	9	13 - 39	1 - 3	9	8 - 24	1 - 3	9	10 - 30	1 - 3
penstemon	PENST	9	0 - 15	0 - 1	9	0 - 13	0 - 1	9	0 - 8	0 - 1	9	0 - 10	0 - 1
prairie coneflower	RACO3	9	0 - 45	0 - 3	9	0 - 39	0 - 3	9	0 - 16	0 - 2	9	0 - 20	0 - 2
purple coneflower	ECAN2	9	45 - 75	3 - 5	9	13 - 39	1 - 3	9	8 - 16	1 - 2	9	10 - 20	1 - 2
purple prairie clover	DAPU5	9	45 - 75	3 - 5	9	0 - 39	0 - 3	9	0 - 16	0 - 2	9	0 - 20	0 - 2
pussytoes	ANTEN	9	0 - 30	0 - 2	9	0 - 26	0 - 2	9	8 - 24	1 - 3	9	0 - 30	0 - 3
scarlet gaura	GACO5	9	15 - 30	1 - 2	9	13 - 26	1 - 2	9	8 - 24	1 - 3	9	0 - 20	0 - 2
scarlet globemallow	SPCO	9	15 - 30	1 - 2	9	13 - 39	1 - 3	9	8 - 32	1 - 4	9	0 - 30	0 - 3
scurfpea	PSORA2	9	15 - 75	1 - 5	9	26 - 65	2 - 5	9	16 - 40	2 - 5	9	20 - 50	2 - 5
spiny phlox	PHHO	9	0 - 15	0 - 1	9	0 - 13	0 - 1	9	0 - 8	0 - 1	9	0 - 10	0 - 1
stemless hymenoxys	TEAC	9	0 - 30	0 - 2	9	0 - 26	0 - 2	9	0 - 24	0 - 3	9	0 - 20	0 - 2
stiff sunflower	HEPA19	9	0 - 15	0 - 1	9	0 - 13	0 - 1	9	0 - 8	0 - 1	9	0 - 10	0 - 1
western ragweed	AMPS	9	15 - 45	1 - 3	9	13 - 39	1 - 3	9	8 - 40	1 - 5	9	10 - 30	1 - 3
western yarrow	ACMI2	9	0 - 30	0 - 2	9	13 - 39	1 - 3	9	16 - 40	2 - 5	9	20 - 50	2 - 5
woolly Indianwheat	PLPA2	9	0 - 15	0 - 1	9	13 - 26	1 - 2	9	16 - 24	2 - 3	9	20 - 30	2 - 3
wooly verbena	#N/A	9	0 - 15	0 - 1	9	0 - 13	0 - 1	9	0 - 16	0 - 2	9	0 - 10	0 - 1
SHRUBS													
broom snakeweed	GUSA2				10	0 - 39	0 - 3	10	8 - 40	1 - 5			
cactus	OPUNT	10	0 - 75	0 - 5	10	13 - 65	1 - 5	10	8 - 40	1 - 5	10	30 - 50	3 - 5
fringed sagewort	ARFR4	10	15 - 75	1 - 5	10	26 - 104	2 - 8	10	40 - 120	5 - 15	10	10 - 70	1 - 7
leadplant	AMCA6	10	0 - 75	0 - 5	10	0 - 39	0 - 3				10	0 - 30	0 - 3
rose	ROSA5	10	0 - 75	0 - 5	10	13 - 65	1 - 5	10	0 - 24	0 - 3	10	10 - 30	1 - 3
skunkbush sumac	RHTR	10	0 - 75	0 - 5	10	0 - 65	0 - 5	10	0 - 40	0 - 5	10	0 - 80	0 - 8
winterfat	KRLA2	10	0 - 45	0 - 3	10	0 - 26	0 - 2				10	0 - 20	0 - 2
yucca	YUGL	10	0 - 75	0 - 5	10	13 - 65	1 - 5	10	16 - 40	2 - 5	10	30 - 50	3 - 5
TREES													
eastern redcedar	JUVI										11	50 - 100	5 - 10
ponderosa pine	PIPO										11	50 - 100	5 - 10
Rocky Mountain juniper	JUSC2										11	50 - 100	5 - 10
Annual Production lbs./acre													
GRASSES & GRASS-LIKES		LOW	RV	HIGH	LOW	RV	HIGH	LOW	RV	HIGH	LOW	RV	HIGH
FORBS		605	1335	1665	515	1125	1530	330	640	950	165	775	1585
SHRUBS		70	113	155	60	98	135	35	80	125	45	75	105
TREES		25	53	80	25	78	135	35	80	125	45	75	105
TOTAL		700	1500	1900	600	1300	1800	400	800	1200	300	1000	1900

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 data is collected, some of these plant communities may be revised or removed, and new ones may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities” (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.

Bluestem/Sideoats Grama/Needlegrass Plant Community

Interpretations are based primarily on the Bluestem/Sideoats Grama/Needlegrass Plant Community (this is also considered to be climax). This plant community can be found on areas that are properly managed with grazing and/or prescribed burning and sometimes on areas receiving occasional short periods of rest. The potential vegetation is about 85 percent grasses or grass-like plants, 10 percent forbs, and 5 percent shrubs. A mixture of cool- and warm-season grasses dominates the site.

The major grasses include sideoats grama, needleandthread, little bluestem, big bluestem, western wheatgrass, and blue grama. Other grasses and grass-likes occurring include hairy grama, plains muhly, and sedge. Significant forbs include purple coneflower and purple prairie clover. Shrubs occurring in this plant community fringed sagewort and yucca. Refer to the plant community composition and group annual production table for species composition and production.

This plant community is extremely resilient and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allows for high drought tolerance. 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.

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

Growth curve number: NE6404

Growth curve name: Pine Ridge/Badlands, 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	5	8	15	24	23	15	5	5	0	0

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

- Continuous seasonal grazing or low stock densities under continuous season-long grazing will convert this plant community to the *Needleandthread/Little Bluestem/Grama Plant Community*.
- Encroachment (or escaped), nonuse, and no fire will lead to a *Juniper/Pine Encroachment Plant Community*. This occurs when this plant community is protected from natural fires, or controlled burning.

Needleandthread/Little Bluestem/Grama Plant Community

This plant community evolved under continuous seasonal grazing or in some cases with low stock densities under continuous season-long grazing. Needleandthread, little bluestem, and blue grama are significant species in this plant community. Big bluestem and sideoats grama will decrease, while the short grasses and grass-likes, such as blue grama, hairy grama, and sedge will increase. Forbs commonly found in this plant community include purple coneflower and purple prairie clover.

Significant shrubs include yucca, cactus, rose, and fringed sagewort. Refer to the plant community composition and group annual production table for species composition and production.

This plant community is moderately resistant to change. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. If the herbaceous component is intact, it tends to be resilient if the disturbance is not long-term.

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

Growth curve number: NE6404

Growth curve name: Pine Ridge/Badlands, 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	5	8	15	24	23	15	5	5	0	0

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

- Heavy continuous grazing will convert the plant community to the *Grama/Sedge, Bare Ground Plant Community*.
- Prescribed grazing will convert this plant community to the *Bluestem/Sideoats Grama/Needlegrass Plant Community*.

Blue Grama/Sedge, Bare Ground Plant Community

This plant community evolves from heavy grazing over several years time. Diversity is lost, as the short grasses become dominant in the plant community. The grazing tolerant blue or hairy grama and sedges replace big bluestem, little bluestem, western wheatgrass, and the needlegrasses. Sideoats grama remains in the plant community but is less productive because of the mid-summer grazing pressure. Because of the grazing pressure, fringed sagewort, broom snakeweed, yucca, woolly Indianwheat, pussytoes, western ragweed, and cactus become more prevalent in the plant community. Nonnative species such as cheatgrass will tend to invade this plant community.

This plant community is typically resistant to change. Runoff will increase and infiltration will decrease. Continued overuse results in considerable bare ground and high erosion potential.

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

Growth curve number: NE6404

Growth curve name: Pine Ridge/Badlands, 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	5	8	15	24	23	15	5	5	0	0

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

- Long-term prescribed grazing may convert this plant community to the *Needleandthread/Little Bluestem/Grama Plant Community*.

Juniper/Pine Encroachment Plant Community

Historically, ponderosa pine and juniper was confined to ridges and steep shallow slopes located adjacent to this ES. Currently, ponderosa pine and juniper are expanding on to this ES due to the

suppression of fire. Juniper/pine canopy is greater than 15 percent of mature trees. The understory is made up of about 80 percent grasses and grass-like species, 10 percent forbs, and 10 percent shrubs.

Dominant grasses and grass-likes include needleandthread, little bluestem, sideoats grama, blue grama, and sedge. Grasses of secondary importance include Canada wildrye, green Needlegrass, and western wheatgrass. Forbs commonly found in this community include green sagewort, western yarrow, and pussytoes. Nonnative species such as cheatgrass and bluegrass will tend to invade this plant community.

When compared to the Bluestem/Sideoats Grama/Needlegrass Plant Community, ponderosa pine, or juniper increases significantly. The grass component decreases dramatically as the buildup of pine and juniper needles increases. Annual production also decreases significantly. While the juniper/pine canopy provides excellent protection from the weather for both livestock and wildlife, it is not capable of supporting large numbers of wildlife and livestock due to decreased production.

This plant community is resistant to change. A significant reduction of juniper/pine can only be accomplished through timber harvesting or crown fire. The vegetation in the understory is capable of enduring fire; however, very hot crown fires will have a detrimental effect to the plant community. Reclamation of juniper/pine dominated areas can be costly and prove to be temporary without proper management (i.e., prescribed burning and prescribed grazing).

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

Growth curve number: NE6411

Growth curve name: Pine Ridge/Badlands, heavy conifer canopy.

Growth curve description: Mature ponderosa pine/juniper overstory.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	3	7	10	20	28	15	5	4	4	2	1

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

- Wildfire (hot, crown fires) will move this plant community to the *Needleandthread/Little Bluestem/Grama Plant Community*.
- Removal of juniper/pine by timber harvest will allow the understory to develop and convert to the *Needleandthread/Little Bluestem/Grama Plant Community*.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

MLRA 64 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 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. The bison was a historical keystone species but have been extirpated as a free-ranging herbivore. The loss of the bison and reduction of prairie dog populations 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 64, the Shallow ES 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 Badlands, Thin Breaks, Clayey, Claypan, Dense Clay, Loamy, Saline, Sandy, Overflow, Subirrigated, and Terrace ESs. This site provided habitat for species requiring unfragmented grassland. Important habitat features and components found commonly or exclusively on this site may include 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 American bison, grizzly bear, gray wolf, black-footed ferret, mountain plover, Rocky Mountain locust, and swift fox.

The majority of the Shallow 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 cheatgrass have impacted the biological integrity of the site for some grassland birds. Changes in historic fire regime and domestic grazing have impacted the forb/shrub/grass percentages.

Bluestem/Sideoats Grama/Needlegrass (HCPC) and Needleandthread/ Little Bluestem/ Grama: 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. Grasshopper sparrow, chestnut-collared longspur, Sprague's pipit, horned lark, lark bunting, and sharp-tailed grouse are common and benefit from the structure and composition this plant community provides. 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, spotted ground squirrel, desert cottontail, white-tailed and black-tailed jackrabbit, and deer. The higher stature of this plant community provides thermal, protective, and escape cover for herbivores and grassland birds. Predators utilizing this plant community include coyote, American badger, red fox, and long-tailed weasel. This plant community provides limited habitat for amphibians, mostly toads (i.e., Great Plains, Woodhouse's, and Plains spadefoot). Prey abundance and shade opportunities may attract multiple reptile species such as gopher snake, milk snake, prairie rattlesnake, and western ornate box turtle to this site. Several species of sand loving lizards such as the lesser earless lizard, prairie lizard, many-lined skink, and six-lined racerunner utilize this site.

Resulting from continuous seasonal grazing the grass component a shift to a medium to short height plant community occurs. Forb and shrub abundance increases; however, the plant community changes do not significantly change the wildlife community form the HCPC.

Grama/Sedge/Bare Ground: Resulting from continuous heavy grazing grama species (e.g., blue) and sedges will dominate. Forb and shrub abundance increases and provides valuable wildlife cover in the absence of adequate grass cover. However, the decrease in diversity of grasses will result in less seed production or lower quality nutrition for small herbivores including voles, mice, and spotted ground squirrel. Species such as desert cottontail may frequently use this site.

The short stature of this plant community limits suitable thermal, protective, and escape cover. Prey populations are reduced and are more vulnerable to raptor and mammalian predation. Predators utilizing this plant community include the 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.

Juniper/Ponderosa Pine: Resulting from no fire, nonuse, and/or encroachment, juniper and Ponderosa pine will expand from wildlife plantings, shelterbelts, and natural sources such as ridges and steep shallow slopes. Forb diversity has decreased while shrub abundance has increased. Juniper and Ponderosa pine increase significantly. Grass species decline dramatically while the grass species composition shifts and can become dominated by invasive species. Juniper and Ponderosa pine stands provide nesting cover, escape cover, and den sites for a variety of species. Species such as mule deer, white-footed mice, bushy-tailed woodrat, black-billed magpie, Townsend's solitaire, western meadowlark, Bohemian waxwing, dark-eyed junco, brown thrasher, lark sparrow, and white-crowned sparrow will increase. Species such as meadow voles, spotted ground squirrel, thirteen-lined ground squirrel, northern grasshopper mice, and western harvest mice will not utilize this site. Grassland nesting songbirds will be significantly reduced. Raptors, such as the long-eared owl, will increase.

If the tree canopy is high enough then bare ground will likely increase and excessive runoff, nutrient and sediment loads may impact offsite aquatic habitat.

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

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
Grasses & 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
hairy 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
little bluestem	U D D U	N D N N	U D D U	N D N N	N D N N	U D D U	U D D U
needleandthread	U D U D	N D N U	U D U D	N D N U	N D N U	U D U D	U D U D
plains muhly	U U D U	U U D U	U U D U	N N N N	N N N N	U U D U	U U D U
porcupine grass	U P U D	N D N U	U P U D	N D N U	N D N U	U P U D	U P U D
prairie junegrass	U D U D	N D N U	U D U D	N D N U	N D N U	U D U D	U D U D
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
red threeawn	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N
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
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
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							
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
dalea	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
deervetch	U U U U	U D D U	U U U U	U D D U	U D D U	U U U U	U D D U
dotted gayfeather	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
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
hairy goldaster	U U D U	N N N N	U U D U	N N N N	N N N N	U U D U	N N N N
Indian breadroot	U U U U	U D U U	U U U U	U D U U	U D U U	U U U U	U D U U
milkvetch	U U U U	U D U U	U U U U	U D U U	U D U U	U U U U	U D U U
penstemon	U U U U	U P P U	U U U U	U P P U	U P P U	U U U U	U P P U
prairie coneflower	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
purple coneflower	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
purple prairie clover	U D P U	U P P U	U D P U	U P P U	U P P U	U D P U	U P P U
pussytoes	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U
scarlet gaura	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
scarlet globemallow	U U D U	U D D U	U U D U	U D D U	U D D U	U U D U	U D D U
scurfpea	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
spiny phlox	U D U U	U P P U	U D U U	U P P U	U P P U	U D U U	U P P U
stemless hymenoxys	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
stiff sunflower	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U
western ragweed	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
western yarrow	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
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
woolly verbena	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							
cactus	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N
fringed sagewort	U U U U	U U U U	U U U U	U D D U	U P P D	U U U U	U U U D
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
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
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
yucca	D N N D	D U U D	D N N D	D U U D	D U U D	D N N 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 ES description). Because of this, a resource inventory is necessary to document plant composition and production. More accurate carrying capacity estimates should eventually be calculated using the following stocking rate information along with animal preference data and actual stocking records, particularly when grazers other than cattle are involved. With consultation of the land manager, more intensive grazing management may result in improved harvest efficiencies and increased carrying capacity.

Plant Community	Average Annual Production (lbs./acre, air-dry)	Stocking Rate* (AUM/acre)
Bluestem/Sideoats Grama/Needlegrass	1,500	0.45 – 0.50
Needleandthread/Little Bluestem/Grama	1,300	0.35 – 0.45
Grama/Sedge, Bare Ground	800	0.20 – 0.30
Juniper/Pine Encroachment	1000	**

*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 group D. Infiltration varies from moderately slow to moderate and runoff varies from low to high depending on 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 short grasses form a dense sod and dominate the site. 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 present on the site.

Other Products

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

Supporting Information

Associated Sites

(064XY011NE) – Sandy 14-17" P.Z. (064XY032NE) – Sandy 17-20" P.Z.
(064XY015NE) – Loamy 14-17" P.Z. (064XY036NE) – Loamy 17-20" P.Z.
(064XY037NE) – Thin Upland

Similar Sites

(064XY037NE) – Thin Upland [more little bluestem; more productive]
(064XY047NE) – Very Shallow [less little bluestem; considerably less productive]

Inventory Data References

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range-trained personnel were also used. Those involved in developing this site include: Stan Boltz, Range Management Specialist (RMS), NRCS; Jill Epley, RMS, NRCS; Rick Peterson, RMS, NRCS; David Steffen, RMS, NRCS; Jeff Vander Wilt; RMS, NRCS; and Phil Young, Soil Scientist, NRCS.

<u>Data Source</u>	<u>No. of Records</u>	<u>Sample Period</u>	<u>State</u>	<u>County</u>
SCS-RANGE-417	8	1969 – 1986	NE, SD	Bennett, Dawes, Morrill, Sheridan, Sioux

State Correlation

This site has been correlated with NE, SD, and WY in MLRA 64.

Field Offices/Counties

Alliance, NE	Box Butte	Kadoka, SD	Jackson	Rushville, NE	Sheridan
Bridgeport, NE	Morrill	Lusk, WY	Niobrara	Scottsbluff, NE	Scottsbluff
Chadron, NE	Dawes/Sioux	Martin, SD	Bennett/Shannon	Torrington, WY	Goshen
Custer, SD	Custer	Pine Ridge, SD	Pine Ridge IR	Valentine, NE	Cherry
Douglas, WY	Converse	Rapid City, SD	Pennington	Wall, SD	East Pennington
Hot Springs, SD	Fall River	Rosebud, SD	Rosebud IR	Wheatland, WY	Platte
White River, SD	Mellette/Todd				

Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 25a – Pine Ridge Escarpment, 43h – White River Badlands, and 43i – Keya Paha Tablelands.

Other References

High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-0728. (<http://www.hprcc.unl.edu/>)
USDA, NRCS. National Water and Climate Center, 101 SW Main, Suite 1600, Portland, OR 97204-3224. (<http://www.wcc.nrcs.usda.gov>)
USDA, NRCS. National Range and Pasture Handbook, September 1997.
USDA, NRCS. National Soil Information System, Information Technology Center, 2150 Centre Avenue, Building A, Fort Collins, CO 80526. (<http://soils.usda.gov/technical/nasis/>)
USDA, NRCS. 2001. The PLANTS Database, Version 3.1 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
USDA, NRCS, Various Published Soil Surveys.

Site Description Approval

NE, State Range Management Specialist

Date

SD, State Range Management Specialist

Date

WY, State Range Management Specialist

Date