

## United States Department of Agriculture Natural Resources Conservation Service

### Ecological Site Description

**Site Type:** Rangeland

**Site Name:** Claypan

**Site ID:** R064XY044NE

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



### Physiographic Features

This site occurs on nearly level or gently sloping upland fans and flats. In some cases, it also occurs on floodplains, terraces along drainageways, and on foot slopes on uplands. This site receives runoff from adjacent sites.

**Landform:** alluvial flat, alluvial fan, floodplain

**Aspect:** N/A

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	2,900	4,000
<b>Slope (percent):</b>	0	6
<b>Water Table Depth (inches):</b>	36	80
<b>Flooding:</b>		
<b>Frequency:</b>	None	Rare
<b>Duration:</b>	None	None
<b>Ponding:</b>		
<b>Depth (inches):</b>	None	None
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Runoff Class:</b>	High	Very 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>
<b>Frost-free period (days):</b>	115	143
<b>Freeze-free period (days):</b>	137	163
<b>Mean Annual Precipitation (inches):</b>	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 features common to soils in this site is the silt loam surface texture, which changes abruptly at about 6 to 11 inches below the surface, to an extremely hard clayey Bt horizon having round-topped or “bun shaped” columnar or prismatic structured subsoil. These subsoils are high in sodium. Saturated hydraulic conductivity is very slow, available water capacity is moderate, and permeability is very slow. Slopes range from zero to six percent. The soils on this site are moderately deep to deep, somewhat poorly to well-drained, and were formed residuum from siltstone or in silty and clayey alluvium. The surface layer is 4 to 10 inches thick. The texture of the subsoil ranges from loam to clay. The soils have a slow to very slow infiltration rate. This site should show slight to no evidence of rills, or wind scoured areas, but can exhibit moderate pedestalling of plants. Water flow paths are sometimes apparent and somewhat continuous. The soil surface is stable and intact. Subsurface soil layers are restrictive to water movement and root penetration.

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, alluvium  
 Parent Material Origin: siltstone, unspecified  
 Surface Texture: silt loam  
 Surface Texture Modifier: none  
 Subsurface Texture Group: clayey  
 Surface Fragments ≤3” (% Cover): 0  
 Surface Fragments >3” (%Cover): 0  
 Subsurface Fragments ≤3” (% Volume): 5  
 Subsurface Fragments >3” (% Volume): 0

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	somewhat poorly	well
Permeability Class:	very slow	very slow
Depth (inches):	20	80
Electrical Conductivity (mmhos/cm)*:	0	16
Sodium Absorption Ratio*:	0	20
Soil Reaction (1:1 Water)*:	5.6	9
Soil Reaction (0.1M CaCl2)*:	NA	NA
Available Water Capacity (inches)*:	5	6
Calcium Carbonate Equivalent (percent)*:	0	15

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

## Plant Communities

### Ecological Dynamics of the Site

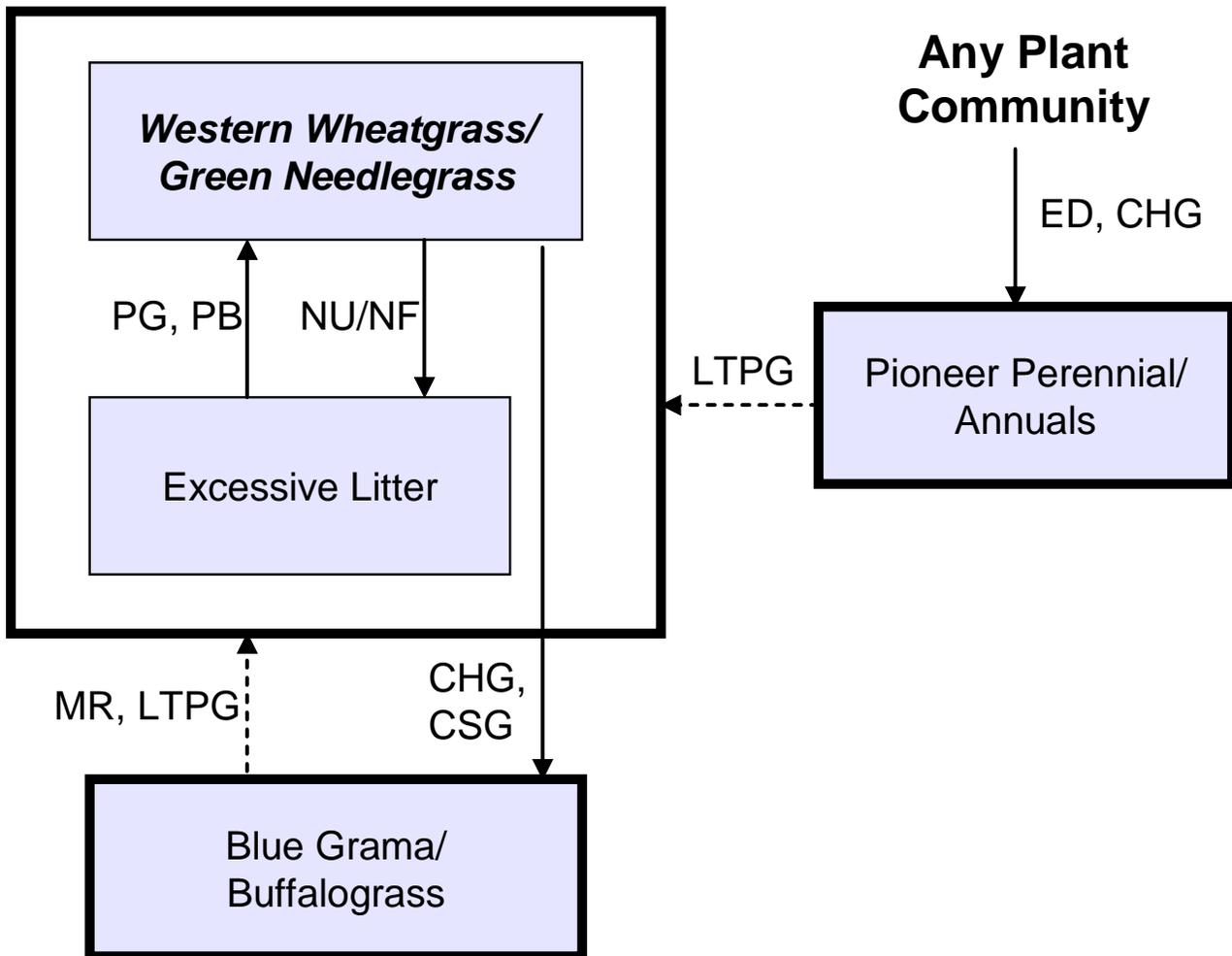
This site developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfire (often of light intensities), and other biotic and abiotic factors that typically influence soil/site development. Changes will occur 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 Western Wheatgrass/Green Needlegrass Plant Community. Blue grama and buffalograss will increase and may eventually dominate the plant community. Western wheatgrass, green Needlegrass, and porcupine grass will decrease in frequency and production. Excessive defoliation can cause threeawns and annuals to increase and dominate the site. Extended periods of nonuse and/or lack of fire or continuous seasonal grazing will result in a plant community dominated by cool-season grasses and excessive litter.

Interpretations are primarily based on the Western Wheatgrass/Green Needlegrass Plant Community. It has been determined by study of rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts also have been used. Plant 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 transitions between communities. The ecological processes will be discussed in more detail in the plant community narratives following the diagram.

### Plant Communities and Transitional Pathways



**CHG** – Continuous heavy grazing (heavy levels of grazing of a unit during most or all of the growing season); **CSG** - Continuous seasonal grazing (grazing a unit for an entire portion of a growing season, and the same season every year); **ED** – Excessive defoliation; **LTPG** - Long-term prescribed grazing; **MR** – Mechanical renovation followed by prescribed grazing; **PG** - Prescribed grazing (planned, controlled harvest of vegetation with grazing or browsing animals – see FOTG, Section IV, 528).

### Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SYMBOL	Western Wheatgrass/ Green Needlegrass			Excessive Litter			Blue Grama/Buffalograss		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
<b>GRASSES &amp; GRASS-LIKES</b>			1360 - 1520	85 - 95		1120 - 1330	80 - 95		640 - 720	80 - 90
western wheatgrass	PASM	1	320 - 640	20 - 40	1	210 - 420	15 - 30	1	0 - 80	0 - 10
<b>NEEDLEGRASS</b>		2	400 - 560	25 - 35	2	210 - 350	15 - 25	2	40 - 80	5 - 10
green needlegrass	NAVI4	2	160 - 480	10 - 30	2	70 - 210	5 - 15			
needleandthread	HECOC8	2	80 - 320	5 - 20	2	140 - 280	10 - 20	2	40 - 80	5 - 10
porcupine grass	HESP11	2	0 - 160	0 - 10	2	0 - 70	0 - 5			
<b>SHORT WARM-SEASON</b>		3	80 - 240	5 - 15	3	70 - 140	5 - 10	3	200 - 280	25 - 35
blue grama	BOGR2	3	80 - 240	5 - 15	3	70 - 140	5 - 10	3	200 - 280	25 - 35
buffalograss	BUDA	3	0 - 80	0 - 5	3	0 - 42	0 - 3	3	40 - 80	5 - 10
<b>GRASS-LIKES</b>		4	32 - 80	2 - 5	4	70 - 140	5 - 10	4	40 - 120	5 - 15
sedge	CAREX	4	32 - 80	2 - 5	4	70 - 140	5 - 10	4	40 - 120	5 - 15
<b>OTHER NATIVE GRASSES</b>		5	32 - 160	2 - 10	5	70 - 210	5 - 15	5	40 - 160	5 - 20
prairie junegrass	KOMA	5	16 - 48	1 - 3	5	28 - 56	2 - 4	5	8 - 24	1 - 3
Sandberg bluegrass	POSE	5	0 - 32	0 - 2	5	0 - 42	0 - 3	5	0 - 24	0 - 3
prairie sandreed	CALO	5	0 - 64	0 - 4						
threeawn	ARIST	5	0 - 32	0 - 2	5	28 - 140	2 - 10	5	16 - 80	2 - 10
dropseed	SPORO	5	16 - 48	1 - 3	5	28 - 140	2 - 10	5	16 - 80	2 - 10
inland saltgrass	DISP	5	0 - 16	0 - 1	5	0 - 14	0 - 1	5	8 - 24	1 - 3
other perennial grasses	2GP	5	0 - 80	0 - 5	5	0 - 70	0 - 5	5	0 - 40	0 - 5
<b>NON-NATIVE GRASSES</b>		6			6	70 - 140	5 - 10	6	40 - 80	5 - 10
cheatgrass	BRTTE				6	14 - 70	1 - 5	6	16 - 80	2 - 10
bluegrass	POA				6	70 - 140	5 - 10	6	16 - 80	2 - 10
<b>FORBS</b>		7	80 - 160	5 - 10	7	70 - 210	5 - 15	7	40 - 80	5 - 10
biscuitroot	LOMAT	7	16 - 32	1 - 2						
cudweed sagewort	ARLU	7	16 - 32	1 - 2	7	14 - 70	1 - 5	7	8 - 24	1 - 3
curlycup gumweed	GRSQ				7	0 - 70	0 - 5	7	8 - 40	1 - 5
deathcamas	ZIGAD	7	0 - 16	0 - 1	7	0 - 28	0 - 2	7	0 - 24	0 - 3
heath aster	SYER	7	0 - 16	0 - 1	7	14 - 42	1 - 3	7	8 - 16	1 - 2
Missouri goldenrod	SOMI2	7	0 - 16	0 - 1	7	14 - 28	1 - 2	7	8 - 16	1 - 2
prairie coneflower	RACO3	7	16 - 32	1 - 2	7	14 - 28	1 - 2	7	0 - 8	0 - 1
rose pussytoes	ANRO2	7	0 - 16	0 - 1	7	0 - 14	0 - 1	7	8 - 16	1 - 2
rush skeletonweed	LYJU	7	0 - 16	0 - 1	7	0 - 14	0 - 1	7	8 - 16	1 - 2
scarlet gaura	GACO5	7	0 - 16	0 - 1	7	0 - 14	0 - 1			
scarlet globemallow	SACO	7	16 - 32	1 - 2	7	14 - 28	1 - 2	7	0 - 8	0 - 1
scurfpea	PSORA2	7	16 - 32	1 - 2	7	14 - 28	1 - 2	7	0 - 8	0 - 1
wavyleaf thistle	CIUN	7	0 - 16	0 - 1	7	14 - 42	1 - 3	7	8 - 24	1 - 3
western salsify	TRDU				7	14 - 42	1 - 3	7	8 - 24	1 - 3
western yarrow	ACMI2	7	16 - 32	1 - 2	7	14 - 28	1 - 2	7	16 - 40	2 - 5
wild onion	ALLIU	7	16 - 32	1 - 2	7	0 - 14	0 - 1	7	8 - 16	1 - 2
wild parsley	MUDI	7	16 - 32	1 - 2						
woolly Indianwheat	PLPA2	7	0 - 16	0 - 1				7	8 - 16	1 - 2
other perennial forbs	2FP	7	0 - 32	0 - 2	7	0 - 28	0 - 2	7	0 - 16	0 - 2
other annual forbs	2FA	7	0 - 16	0 - 1	7	0 - 70	0 - 5	7	0 - 24	0 - 3
<b>SHRUBS</b>		8	16 - 80	1 - 5	8	14 - 70	1 - 5	8	40 - 80	5 - 10
brittle cactus	OPFR	8	0 - 16	0 - 1	8	0 - 14	0 - 1	8	8 - 16	1 - 2
broom snakeweed	GUSA2	8	0 - 16	0 - 1	8	0 - 14	0 - 1	8	8 - 24	1 - 3
fringed sagewort	ARFR4	8	16 - 32	1 - 2	8	14 - 42	1 - 3	8	8 - 40	1 - 5
plains pricklypear	OPPO	8	16 - 32	1 - 2	8	14 - 28	1 - 2	8	8 - 16	1 - 2
rubber rabbitbrush	ERNA10	8	0 - 32	0 - 2	8	0 - 28	0 - 2	8	0 - 24	0 - 3
silver sagebrush	ARCA13	8	0 - 32	0 - 2	8	0 - 28	0 - 2	8	0 - 32	0 - 4
<b>Annual Production lbs./acre</b>			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH	
<b>GRASSES &amp; GRASS-LIKES</b>			1110 - 1432 - 1750		925 - 1218 - 1510		330 - 680 - 1030			
<b>FORBS</b>			75 - 120 - 165		65 - 140 - 215		35 - 60 - 85			
<b>SHRUBS</b>			15 - 48 - 85		10 - 42 - 75		35 - 60 - 85			
<b>TOTAL</b>			1200 - 1600 - 2000		1000 - 1400 - 1800		400 - 800 - 1200			

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.

### Western Wheatgrass/Green Needlegrass Plant Community

Interpretations are based primarily on the Western Wheatgrass/Green Needlegrass Plant Community (this is also considered to be climax). This plant community evolved with grazing by large herbivores and occasional prairie fires. This plant community can be found on areas having a history of proper grazing management, including adequate recovery periods between grazing events.

The potential vegetation is about 85 percent grasses or grass-like plants, 10 percent forbs, and 5 percent shrubs. Cool-season grasses dominate the community. The codominant grasses are western wheatgrass and green needlegrass. Other grasses and grass-like plants occurring include blue grama, needleandthread, buffalograss, dropseed, inland Saltgrass, and sedges. Significant forbs include cudweed sagewort, biscuitroot, wild parsley, scarlet globemallow, and scurfpea. Shrubs present on this plant community include fringed sagewort, silver sagebrush, rubber rabbitbrush, plains pricklypear, and brittle cactus.

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 fragile but sustainable plant community. Low to moderate available water capacity coupled with high accumulations of sodium and slow permeability strongly influences the soil-water-plant relationships.

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: NE6401

Growth curve name: Pine Ridge/Badlands, cool-season dominant.

Growth curve description: Cool-season dominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	5	15	28	30	10	2	5	5	0	0

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

- Nonuse and no fire for extended periods of time will convert this plant community to the *Excessive Litter Plant Community*.
- Heavy, continuous grazing will convert the plant community to the *Blue Grama/Buffalograss Plant Community*.
- Annual, early spring seasonal grazing will convert the plant community to the *Blue Grama/Buffalograss Plant Community*.

- Excessive defoliation (i.e., areas of heavy animal concentration, prairie dog habitation) will convert the plant community to the *Pioneer Perennial/Annuals Plant Community*.

### Excessive Litter Plant Community

This plant community develops after an extended period of 15 years or more of nonuse by herbivores or exclusion of fire. This plant community is dispersed throughout the pasture, encircling spot grazed areas, and areas distant from water sources. This is a typical pattern found in properly stocked pastures grazed season-long. Plant litter accumulates in large amounts as this community develops. Litter buildup reduces plant vigor and density and seedling recruitment declines. Eventually, litter levels become abundant enough to crowd out living plants and reduce plant density. Annual and/or biennial forbs, annual grasses, and cryptogams commonly fill these interspaces. Due to a lack of tiller stimulation and sunlight, native bunchgrasses typically develop dead centers and native rhizomatous grasses are limited to small colonies. Heavy litter covers shorter understory species (i.e., short grasses and sedges) restricting their ability to capture adequate sunlight for photosynthesis. Vigor and diversity of native plants are reduced.

Nonnative grasses, such as Kentucky bluegrass and cheatgrass, tend to increase on this plant community. Other grasses present include western wheatgrass, needleandthread, threeawns, and dropseed. The common forbs include cudweed sagewort, curlycup gumweed, heath aster, wavyleaf thistle, western salsify, and a number of annual forbs. Shrubs include fringed sagewort, silver sagebrush, rubber rabbitbrush, and plains pricklypear.

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/Green Needlegrass Plant Community. Soil erosion is low. Compared to the Western Wheatgrass/Green Needlegrass Plant Community, runoff is similar but infiltration is reduced to the lower root zone. This plant community tends to be moisture loving and usually tends to utilize the spring moisture quickly causing forage base to become dry and not very palatable early in the summer. Once this plant community is reached, time and external resources will be needed to see any immediate 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: NE6401

Growth curve name: Pine Ridge/Badlands, cool-season dominant.

Growth curve description: Cool-season dominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	5	15	28	30	10	2	5	5	0	0

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

- With prescribed grazing or prescribed burning followed by prescribed grazing, this plant community will move toward the *Western Wheatgrass/Green Needlegrass Plant Community*. This would require long-term management with prescribed grazing and/or prescribed burning under favorable climatic conditions.
- Heavy, continuous grazing and/or excessive defoliation may shift this plant community to the *Pioneer Perennial/Annuals Plant Community*.

### Blue Grama/Buffalograss Plant Community

This plant community can quickly result from heavy continuous grazing and/or annual, early spring seasonal grazing. Annual grazing too early in the spring depletes stored carbohydrates, resulting in

weakening and eventual death of the cool-season mid-grasses. Short grasses and forbs increase to dominate the plant community and annual production decreases dramatically. Lack of litter and short plant heights result in higher soil temperatures, poor water infiltration rates, and high evapotranspiration, which gives blue grama a competitive advantage over cool-season mid-grasses. This plant community can occur throughout the pasture, on spot grazed areas, and around water sources where season-long grazing patterns occur.

Blue grama and buffalograss are the prominent grass/grass-like species with the balance including needleandthread, sedge, threeawn, dropseed, inland Saltgrass, and prairie Junegrass. Forbs, such as, curlycup gumweed, cudweed sagewort, deathcamas, western salsify, and western yarrow will be prevalent. Shrubs that will increase include plains pricklypear, brittle cactus, broom snakeweed, rubber rabbitbrush, and silver sagebrush.

This plant community is relatively stable. The thick sod and competitive advantage prevents other species from establishing. This plant community is less productive than the Western Wheatgrass/Green Needlegrass Plant Community. Runoff increases and infiltration will decrease. Soil erosion will be minimal due to the sod forming habit of blue grama and buffalograss.

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: NE6405

Growth curve name: Pine Ridge/Badlands, warm-season dominant.

Growth curve description: Warm-season dominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	7	15	20	30	15	5	5	0	0

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

- Long-term prescribed grazing that includes changing season of use and allowing adequate recovery periods to enhance cool season grasses can slowly shift this plant community back towards the *Western Wheatgrass/Green Needlegrass Plant Community*.
- Mechanical renovation treatments such as chiseling followed by prescribed grazing is an aggressive measure to accelerate a transition leading to a plant community that closely resembles the *Western Wheatgrass/Green Needlegrass Plant Community*.
- Heavy, continuous grazing and/or excessive defoliation may shift this plant community to the *Pioneer Perennial/Annuals Plant Community*.

### **Pioneer Perennial/Annuals 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), or prairie dog habitation. The dominant vegetation includes pioneer annual grasses and forbs and early successional biennial and perennial species. Grasses may include threeawn, sixweeks fescue, bluegrass, cheatgrass, needleandthread, prairie Junegrass, and western wheatgrass. The dominant forbs include curlycup gumweed, marestail, salsify, kochia, field bindweed, thistles, fringed sagewort, pussytoes, prostrate verbena, and other early successional species. Shrubs that may be present include rubber rabbitbrush and broom snakeweed.

Plant species from adjacent ecological sites (ES) may become minor components of this plant community. The community also is susceptible to invasion of nonnative annual and perennial forbs due to severe soil disturbances and relatively high percent of bare ground. Compared to the Western

Wheatgrass/Green Needlegrass Plant Community, western wheatgrass, green needlegrass, needleandthread, and blue grama have decreased.

This plant community is resistant to change 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 200 to 1,000 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: NE6403

Growth curve name: Pine Ridge/Badlands, 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	5	10	20	25	20	10	5	5	0	0

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

- Long-term prescribed grazing will move this plant community toward the *Western Wheatgrass/Green Needlegrass Plant Community*, assuming an adequate seed/vegetative source exists. This would require long-term management with prescribed grazing under favorable climatic conditions.

## **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 Claypan 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, Dense Clay, Loamy, Saline, Sandy, Shallow, Overflow, Subirrigated, and Terrace ESs. This site provided habitat for species requiring unfragmented grassland. Important habitat features include 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. Swift fox, black-footed ferret, and American bison have been reintroduced into certain areas within this MLRA.

This site is subject to invasion by annual bromegrasses and cheatgrass. This site provides habitat for grassland nesting birds, small rodents, bats, mammalian predators, and a variety of reptiles and insects.

**Western Wheatgrass/Green Needlegrass (HCPC):** This site is dominated by western wheatgrass and green needlegrass with a minor shrub community generally dominated by cactus, broom snakeweed, sagewort, sagebrush, and rubber rabbitbrush. Raptors such as red-tailed hawk, Ferruginous hawk, northern harrier, and golden eagle may use this site. Insects, such as pollinators, play a limited role in maintaining the forb community but do provide a significant forage base for birds and various bats, especially species such as the Western small-footed Myotis, the fringe-tailed Myotis, and the Townsend's big-eared bat. Prey populations are available for grassland raptors and mammalian predators. Other mammalian predators utilizing this plant community include the coyote, red fox, and badger.

The relatively tall stature of this plant community provides suitable thermal, protective, and escape cover for small and large mammals. This site provides a diversity of grasses, forbs, and shrubs for small and large herbivores including shrews, mice, spotted ground squirrel, desert cottontail rabbit, white-tailed and black-tailed jackrabbits, and deer. This site provides limited habitat for sharp-tailed grouse, white-tailed deer, and 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 lesser numbers of various lizard species.

**Buffalograss/Blue Grama and Excessive Litter:** Resulting from continuous seasonal grazing or from continuous heavy grazing, buffalograss and blue grama will become dominant. The forb diversity and abundance has remained relatively unchanged. Shrub abundance increases significantly, especially sagewort and sagebrush. A shift to shorter plant structure will favor prairie dog expansion and associated species such as ferruginous hawk, burrowing owl, and swift fox. Species such as horned lark, long-billed curlew, upland sandpiper, desert cottontail, and white-tailed jackrabbit may be present or increase. This plant community may provide areas suitable for sharp-tailed grouse lek site development. The short stature of this plant community limits suitable thermal, protective and escape cover. Predators utilizing this plant community include the coyote, American badger, red fox, and long-tailed weasel.

Resulting from extended periods of nonuse or no fire, the plant community will become decadent and build up litter. As plant litter accumulates, the grassland nesting bird composition may shift to favor

those species that prefer dense litter (nonshort grass species) otherwise the wildlife community will remain largely unchanged.

**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. 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. A shift to shorter plant structure will favor prairie dog expansion and associate species such as ferruginous hawk, burrowing owl, and swift fox. Species such as horned lark, long-billed curlew, upland sandpiper, desert cottontail, and white-tailed jackrabbit may be present or increase. This plant community may provide areas suitable for sharp-tailed grouse lek site development. The short stature of this plant community limits suitable thermal, protective, and escape cover. Predators utilizing this plant community include the coyote, American badger, red fox, and long-tailed weasel.

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.

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

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
<b>Grasses &amp; Grass-likes</b>							
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
dropseed	N U N N	N U N N	N U N N	N U N N	N U N N	N U N N	N U N N
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
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
sedge	U D U D	U P N D	U D U D	U D U D	U D U D	U D U D	U D U D
threeawn	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N
western wheatgrass	U P D U	N D N N	U P D U	N D N N	N D N N	U P D U	U P D U
<b>Forbs</b>							
biscuitroot	U D U U	U D D U	U D U U	U D D U	U D D U	U D U U	U D D U
cudweed sagewort	U U U U	U U D U	U U U U	U U D U	U U D U	U U U U	U U D U
deathcamas	T T T T	T T T T	T T T T	T T T T	T T T T	T T T T	T T T T
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
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
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
rose 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 skeletonplant	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
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 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
wild parsley	U D U U	U D D U	U D U U	U D D U	U D D U	U D U U	U D D U
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
<b>Shrubs</b>							
brittle 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
broom snakeweed	N N N N	U U U U	N N N N	U U U U	U U U U	N N N N	U 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 U D
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
rubber rabbitbrush	N N N N	D U U D	N N N N	D U U D	U D D U	N N N N	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

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.

<b>Plant Community</b>	<b>Average Annual Production (lbs./acre, air-dry)</b>	<b>Stocking Rate* (AUM/acre)</b>
Western Wheatgrass/Green Needlegrass	1,600	0.50
Excessive Litter	1,400	0.44**
Blue Grama/Buffalograss	800	0.25
Pioneer Perennial/Annuals	600	**

\*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 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 higher 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, hiking, photography, bird watching, and other opportunities. The wide varieties of plants that bloom from spring until fall have an esthetic value that appeals to visitors.

## Wood Products

No appreciable wood products are present on the site.

## Other Products

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

## Supporting Information

### Associated Sites

(064XY014NE) – Clayey 14-17" P.Z.  
 (064XY015NE) – Loamy 14-17" P.Z.  
 (064XY030NE) – Saline Lowland

(064XY035NE) – Clayey 17-20" P.Z.  
 (064XY036NE) – Loamy 17-20" P.Z.  
 (064XY046NE) – Thin Claypan

## Similar Sites

(064XY014NE & 064XY035NE) – Clayey 14-17” P.Z. & Clayey 17-20” P.Z. [more green needlegrass; higher production]

(064XY046NE) – Thin Claypan [lower production; more short grasses and salt tolerant species]

## 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>Number of Records</u>	<u>Sample Period</u>	<u>State</u>	<u>County</u>
SCS-RANGE-417				

## 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