

## United States Department of Agriculture Natural Resources Conservation Service

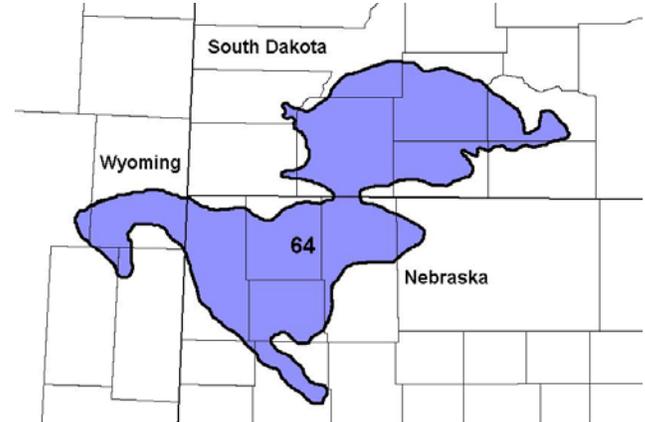
### Ecological Site Description

**Site Type:** Rangeland

**Site Name:** Badlands Overflow

**Site ID:** R064XY049NE

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



### Physiographic Features

This site occurs in the eroded badlands on nearly level areas that receive additional water from overflow of intermittent streams or runoff from adjacent slopes.

**Landform:** floodplain, drainageway, alluvial fan

**Aspect:** N/A

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	2,900	4,000
<b>Slope (percent):</b>	0	3
<b>Water Table Depth (inches):</b>	80	80
<b>Flooding:</b>		
<b>Frequency:</b>	Frequent	Frequent
<b>Duration:</b>	Brief	Brief
<b>Ponding:</b>		
<b>Depth (inches):</b>	None	None
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Runoff Class:</b>	Low	Medium

### 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 the winds 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 native cool-season plants begins mid- to late March and continues to late June. Native warm-season plants begin growth in early May and continue to late August. 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>.

**Influencing Water Features**

**Stream Type:** B6, C6 (Rosgen System)

**Representative Soil Features**

The soils of this site are very deep, well-drained soils that formed in sodium enriched alluvium. These soils typically have dispersive characteristics due to the high content of sodium. This feature tends to cause these soils to be naturally erosive as the aggregate stability is low in the surface and structure is lacking in all horizons. These soils have moderate to moderately slow permeability. The surface soil will vary from two to four inches deep and have loam or silt loam textures. These areas receive additional water from overflow of intermittent streams or runoff from adjacent slopes. Available water capacity is typically high. 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 not restrictive to water movement and root penetration.

These soils are mainly susceptible to water erosion. Headcuts may develop if adequate vegetative cover is not maintained or due to sinkholes or other soil sloughing due to piping as a result of natural features such as animal burrows, root channels, etc. 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 United States Department of Agriculture (USDA) Service Center for soil survey reports that include more detail specific to your location.

**Parent Material Kind:** alluvium  
**Parent Material Origin:** mixed  
**Surface Texture:** silt loam, 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>
<b>Drainage Class:</b>	well	well
<b>Permeability Class:</b>	moderately slow	moderate
<b>Depth (inches):</b>	80	80
<b>Electrical Conductivity (mmhos/cm)*:</b>	0	4
<b>Sodium Absorption Ratio*:</b>	10	35
<b>Soil Reaction (1:1 Water)*:</b>	7.4	9.0
<b>Soil Reaction (0.1M CaCl<sub>2</sub>)*:</b>	NA	NA
<b>Available Water Capacity (inches)*:</b>	8	9
<b>Calcium Carbonate Equivalent (percent)*:</b>	5	30

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

## Plant Communities

### Ecological Dynamics of the Site

The most significant influence in the development of this site is in relation to the geologic erosion episodes that occur on this and adjacent landscape positions in the White River Badlands. Due to the proximity of loose, weathered parent material, this site is constantly in flux. The Great Plains climate plays an important role as sporadic heavy rainfall events cause fluctuating erosion and deposition to occur on this site. Recent grazing or browsing patterns do have an effect but only if the site is stable long enough to establish vegetation for an extended period of time. While the following 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.

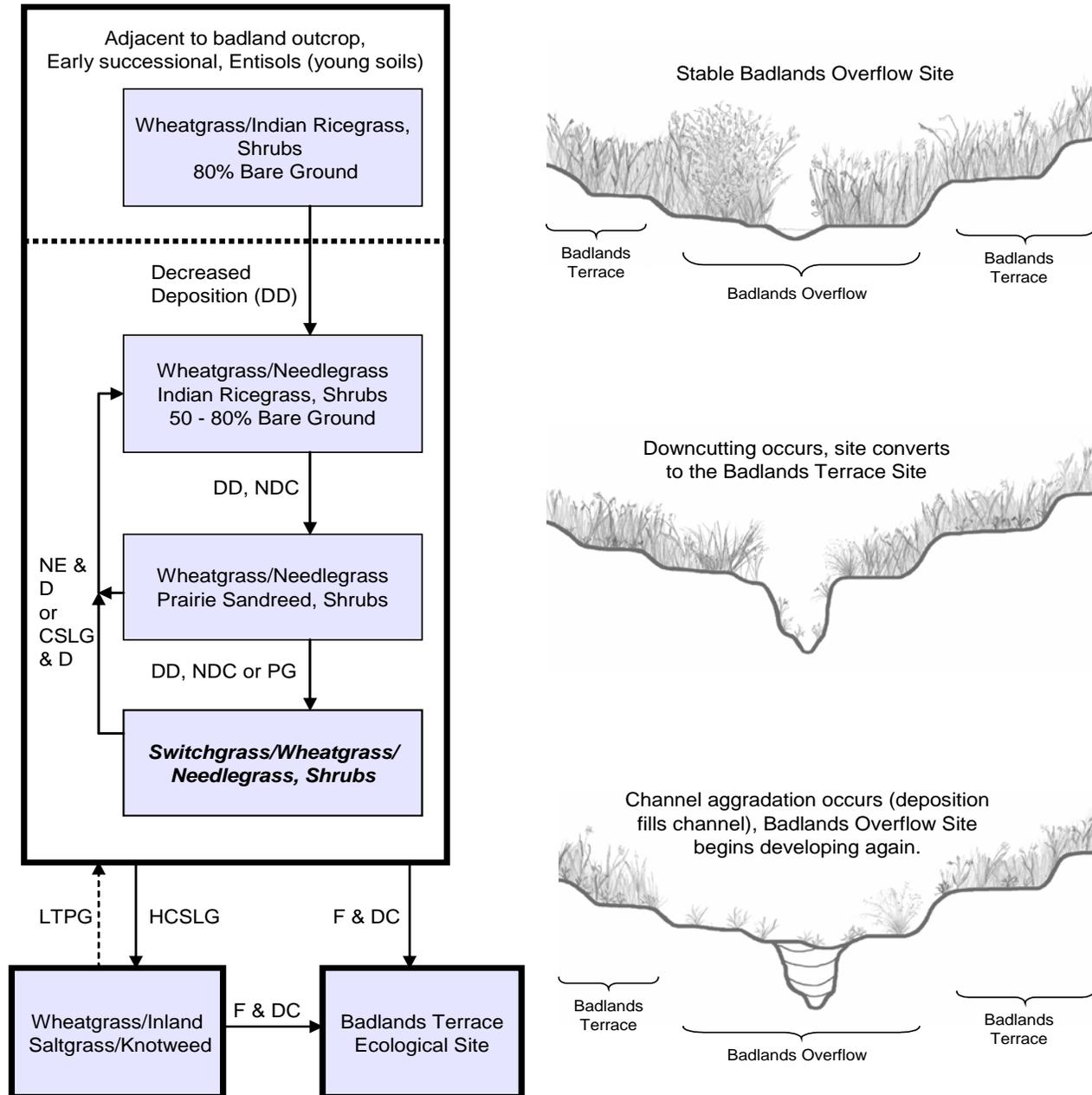
Continuous season-long grazing (during the typical growing season of May through October) and/or repeated seasonal grazing (e.g., every spring, every summer) without adequate recovery periods following each grazing occurrence causes this site to depart from the Switchgrass/Wheatgrass/Needlegrass, Shrubs Plant Community. Wheatgrass increases initially and will eventually decrease with continuous grazing. Grasses such as switchgrass and green needlegrass will decrease in frequency and production. Reduction of vegetative cover can result in rapid degeneration of the site and high amounts of soil erosion. Headcuts and downcutting are relatively common and can move this site to the Badlands Terrace site.

Interpretations are primarily based on the Switchgrass/Wheatgrass/Needlegrass, Shrubs 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



**CSLG** – Continuous season-long grazing (grazing a unit for an entire growing season; **D** – Deposition; **DD** – Decreased deposition; **F & DC** – Flooding and down cutting; **HCSLG** – Heavy, continuous season-long grazing (grazing a unit for an entire growing season, well above recommended stocking rates); **NDC** – No down cutting; **LTPG** – Long-term prescribed grazing; **NE** – Natural erosion; **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	Switchgrass/Wheatgrass/ Needlegrass, Shrubs			Wheatgrass/Needlegrass/ Prairie Sandreed, Shrubs			Wheatgrass/Needlegrass/ Indian Ricegrass, Shrubs			Wheatgrass/Inland Saltgrass/ Knotweed		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
<b>GRASSES &amp; GRASS-LIKES</b>													
<b>WHEATGRASS</b>													
western wheatgrass	PASM	1	240 - 600	10 - 25	1	300 - 600	15 - 30	1	300 - 500	30 - 50	1	90 - 240	15 - 40
thickspike wheatgrass	ELLAL	1	240 - 600	10 - 25	1	300 - 600	15 - 30	1	300 - 500	30 - 50	1	90 - 240	15 - 40
<b>NEEDLEGRASS</b>													
green needlegrass	NAVI4	2	120 - 360	5 - 15	2	100 - 500	5 - 25	2	50 - 200	5 - 20	2	0 - 30	0 - 5
needleandthread	HECOC8	2	120 - 360	5 - 15	2	100 - 400	5 - 20	2	50 - 200	5 - 20	2	0 - 30	0 - 5
<b>TALL WARM-SEASON GRASSES</b>													
switchgrass	PAVI2	3	120 - 480	5 - 20	3	200 - 400	10 - 20	3	0 - 50	0 - 5	3		
big bluestem	ANGE	3	120 - 360	5 - 15	3	0 - 60	0 - 3						
prairie sandreed	CALO	3	48 - 240	2 - 10	3	200 - 400	10 - 20	3	0 - 50	0 - 5			
prairie cordgrass	SPPE	3	0 - 120	0 - 5	3	0 - 20	0 - 1						
green muhly	MURA	3	0 - 120	0 - 5									
<b>WARM-SEASON GRASSES</b>													
little bluestem	SCSC	4	24 - 120	1 - 5	4	40 - 300	2 - 15	4	20 - 50	2 - 5			
sideoats grama	BOCU	4	48 - 120	2 - 5	4	40 - 160	2 - 8	4	0 - 50	0 - 5			
tall dropseed	SPCOC2	4	48 - 240	2 - 10	4	40 - 160	2 - 8	4	0 - 50	0 - 5			
blue grama	BOGR2	4	0 - 120	0 - 5	4	20 - 100	1 - 5	4	0 - 30	0 - 3			
hairy grama	BOHI2	4	0 - 120	0 - 5	4	0 - 100	0 - 5						
buffalograss	BUDA	4	0 - 120	0 - 5	4	0 - 100	0 - 5	4	0 - 30	0 - 3			
Inland saltgrass	DISP	4	0 - 72	0 - 3	4	20 - 100	1 - 5	4	20 - 80	2 - 8	4	60 - 240	10 - 40
plains muhly	MUCU3	4	0 - 72	0 - 3	4	0 - 40	0 - 2						
<b>NATIVE GRASSES/GRASS-LIKES</b>													
Indian ricegrass	ACHY	5	0 - 72	0 - 3	5	0 - 100	0 - 5	5	20 - 100	2 - 10	5	0 - 12	0 - 2
prairie junegrass	KOMA	5	0 - 72	0 - 3	5	0 - 60	0 - 3						
Sandberg bluegrass	POSE	5	0 - 72	0 - 3	5	0 - 60	0 - 3	5	0 - 10	0 - 1			
sedge	CAREX	5	0 - 72	0 - 3	5	0 - 60	0 - 3						
other perennial grasses	2GP	5	0 - 120	0 - 5	5	0 - 60	0 - 3	5	0 - 20	0 - 2	5	0 - 12	0 - 2
<b>NON-NATIVE GRASSES</b>													
bluegrass	POA				6	0 - 100	0 - 5	6	0 - 30	0 - 3			
cheatgrass	BRTE				6	20 - 60	1 - 3	6	10 - 50	1 - 5	6	0 - 30	0 - 5
<b>FORBS</b>													
American licorice	GLLE3	7	0 - 72	0 - 3	7	0 - 100	0 - 5						
American vetch	VIAM	7	24 - 48	1 - 2	7	0 - 60	0 - 3						
cocklebur	XANTH2				7	0 - 40	0 - 2	7	0 - 10	0 - 1	7	0 - 30	0 - 5
cutweed sagewort	ARLU	7	24 - 72	1 - 3	7	20 - 100	1 - 5	7	0 - 20	0 - 2			
curly dock	RUCR				7	0 - 40	0 - 2						
curlycup gumweed	GRSQ				7	0 - 40	0 - 2	7	0 - 30	0 - 3	7	0 - 30	0 - 5
dotted gayfeather	LIPU	7	0 - 48	0 - 2	7	0 - 40	0 - 2						
false boneset	BREU	7	0 - 72	0 - 3	7	0 - 20	0 - 1						
goldenrod	SOLID	7	24 - 72	1 - 3	7	20 - 60	1 - 3						
heath aster	SYER	7	24 - 48	1 - 2	7	20 - 100	1 - 5	7	0 - 20	0 - 2			
knotweed	POLYG4				7	0 - 20	0 - 1	7	0 - 50	0 - 5	7	0 - 150	0 - 25
prairie coneflower	RACO3	7	24 - 48	1 - 2	7	0 - 60	0 - 3						
scarlet gaura	GACO5	7	24 - 48	1 - 2	7	0 - 40	0 - 2						
scurfpea	PSORA2	7	24 - 72	1 - 3	7	20 - 60	1 - 3	7	0 - 20	0 - 2			
verbena	VERBE	7	0 - 24	0 - 1	7	0 - 40	0 - 2	7	0 - 10	0 - 1			
western ragweed	AMPS	7	0 - 48	0 - 2	7	20 - 60	1 - 3	7	0 - 20	0 - 2	7	0 - 6	0 - 1
western yarrow	ACMI2	7	24 - 48	1 - 2	7	20 - 100	1 - 5	7	0 - 20	0 - 2			
other annual forbs	2FA	7	0 - 24	0 - 1	7	0 - 100	0 - 5	7	0 - 30	0 - 3	7	0 - 6	0 - 1
other perennial forbs	2FP	7	24 - 72	1 - 3	7	20 - 60	1 - 3	7	10 - 20	1 - 2	7	0 - 18	0 - 3
<b>SHRUBS</b>													
big sagebrush	ARTR2	8	0 - 120	0 - 5	8	0 - 200	0 - 10	8	0 - 100	0 - 10			
broom snakeweed	GUSA2				8	0 - 60	0 - 3	8	0 - 50	0 - 5	8	0 - 18	0 - 3
fewflower buckwheat	ERPA9				8	0 - 20	0 - 1	8	10 - 50	1 - 5	8	0 - 30	0 - 5
rose	ROSA5	8	24 - 72	1 - 3	8	20 - 100	1 - 5	8	0 - 100	0 - 10	8	0 - 6	0 - 1
rubber rabbitbrush	ERNA10	8	0 - 24	0 - 1	8	0 - 40	0 - 2	8	0 - 30	0 - 3	8	6 - 60	1 - 10
silver buffaloberry	SHAR	8	0 - 72	0 - 3	8	0 - 60	0 - 3						
silver sagebrush	ARCA13	8	0 - 120	0 - 5	8	0 - 200	0 - 10	8	0 - 100	0 - 10	8	0 - 120	0 - 20
western snowberry	SYOC	8	24 - 120	1 - 5	8	20 - 100	1 - 5	8	0 - 30	0 - 3			
willow	SALIX	8	0 - 120	0 - 5									
other shrubs	2SHRUB	8	0 - 72	0 - 3	8	0 - 40	0 - 2	8	0 - 50	0 - 5			
<b>TREES</b>													
plains cottonwood	PODEM	9	0 - 24	0 - 1	9	0 - 20	0 - 1	9	0 - 10	0 - 1	9	0 - 6	0 - 1
other trees	2TREE				9	0 - 20	0 - 1	9	0 - 10	0 - 1	9	0 - 6	0 - 1
<b>Annual Production lbs./acre</b>													
<b>GRASSES &amp; GRASS-LIKES</b>													
1835 - 2172 - 2500													
<b>FORBS</b>													
20 - 72 - 125													
<b>SHRUBS</b>													
45 - 144 - 250													
<b>TREES</b>													
0 - 12 - 25													
<b>TOTAL</b>													
1900 - 2400 - 2900													

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.

### Switchgrass/Wheatgrass/Needlegrass, Shrubs Plant Community

Interpretations are based primarily on the Switchgrass/Wheatgrass/Needlegrass, Shrubs Plant Community (this is also considered climax). This plant community evolved with grazing by large herbivores and infrequent flooding. Potential vegetation is about 85 percent grasses or grass-like plants, 5 percent forbs, and 10 percent shrubs.

The plant community is dominated by both warm- and cool-season grasses. The major grasses include western wheatgrass and/or thickspike wheatgrass, switchgrass, green needlegrass, and needleandthread. Other grasses and grass-likes include big bluestem, prairie sandreed, and tall dropseed. Significant forbs include cudweed sagewort, goldenrod, and scurfpea. The dominant shrubs are rose, silver sagebrush, and western snowberry. Big sagebrush occurs on this site in the western portion of the MLRA.

This plant community is productive and diverse. The diversity in plant species allows for high drought tolerance. This is a sustainable plant community in regards to site/soil stability, watershed function, and biologic integrity as long as extreme erosion or depositional events do not occur.

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

Growth curve number: NE6408

Growth curve name: Pine Ridge/Badlands, lowland cool-season/warm-season codominant.

Growth curve description: Cool-season, warm-season codominant, lowland.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	5	12	20	25	19	11	5	3	0	0

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

- Continuous season-long grazing and/or deposition will shift this plant community toward the *Wheatgrass/Needlegrass/Prairie Sandreed, Shrubs Plant Community*.
- Natural erosion and/or deposition will shift this plant community toward the *Wheatgrass/Needlegrass/Prairie Sandreed, Shrubs Plant Community*.
- Flooding and downcutting will likely shift this site to the Badlands Terrace Ecological Site (ES).

### Wheatgrass/Needlegrass/Prairie Sandreed, Shrubs Plant Community

This plant community is a result of continuous season-long grazing, natural erosion and/or deposition. Western wheatgrass and/or thickspike wheatgrass increase. Switchgrass, big bluestem, and green needlegrass decrease, while prairie sandreed and needleandthread will increase. Other grasses and grass-likes include tall dropseed, little bluestem, sideoats grama, inland Saltgrass, and blue grama.

Potential vegetation is about 80 percent grasses or grass-like plants, 10 percent forbs, and 10 percent shrubs.

Production and diversity has declined somewhat compared to the Switchgrass/Wheatgrass/Needlegrass, Shrubs Plant Community. There is typically more bare ground as a result of erosion and/or deposition. The plant community is still relatively stable but more prone to continued erosion.

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

Growth curve number: NE6407

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

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

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	5	8	25	30	15	10	2	5	0	0

Transitional pathways leading to other plant communities are as follows.

- Continuous season-long grazing and/or deposition will shift this plant community toward the *Wheatgrass/Needlegrass/Indian Ricegrass, Shrubs Plant Community*.
- Natural erosion and/or deposition will shift this plant community toward the *Wheatgrass/Needlegrass/Indian Ricegrass, Shrubs Plant Community*.
- Heavy continuous season-long grazing will tend to shift this plant community toward the *Wheatgrass/Inland Saltgrass/Knotweed Plant Community*.
- Flooding and downcutting will likely shift this site to the Badlands Terrace ES.
- Decreased deposition and no downcutting, or prescribed grazing will likely return this plant community to the *Switchgrass/Wheatgrass/Needlegrass, Shrubs Plant Community*.

### **Wheatgrass/Needlegrass/Indian Ricegrass, Shrubs Plant Community**

This plant community is a result continuous season-long grazing, natural erosion, and/or deposition. Western wheatgrass and/or thickspike wheatgrass continue to increase in composition. Switchgrass and big bluestem are no longer present and green needlegrass is nearly absent. While Indian ricegrass has increased and is relatively abundant, it stands out when looking across the aspect of the site. Other grasses and grass-likes include needleandthread, inland saltgrass and little bluestem. Shrubs of significance include silver sagebrush, rose, rubber rabbitbrush, fewflower buckwheat, and big sagebrush in the western portions of the MLRA. Potential vegetation is about 75 percent grasses or grass-like plants, 10 percent forbs, and 15 percent shrubs.

Production and diversity has declined considerably when compared to the Switchgrass/Wheatgrass/Needlegrass, Shrubs Plant Community. Bare ground is evident and occupies from 50 to 80 percent of the ground surface. The plant community has a greatly diminished effect on site stability and future weather events determine site aggradation or degradation.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during a normal 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 leading to other plant communities are as follows.

- Continuous season-long grazing and/or deposition will shift this plant community toward the *Wheatgrass/Needlegrass/Indian Ricegrass, Shrubs Plant Community*.
- Natural erosion and/or deposition will shift this plant community toward the *Wheatgrass/Needlegrass/Indian Ricegrass, Shrubs Plant Community*.
- Heavy continuous season-long grazing will tend to shift this plant community toward the *Wheatgrass/Inland Saltgrass/Knotweed Plant Community*.
- Flooding and downcutting will likely shift this site to the Badlands Terrace ES.
- Decreased deposition and no downcutting or prescribed grazing will likely return this plant community to the *Switchgrass/Wheatgrass/Needlegrass, Shrubs Plant Community*.

### Wheatgrass/Inland Saltgrass/Knotweed Plant Community

This plant community develops with heavy, continuous season-long grazing. The vegetation is mainly made up of western wheatgrass and/or thickspike wheatgrass, inland saltgrass, and knotweed. Most other species are either greatly diminished or absent. Silver sagebrush, rose, and broom snakeweed may survive under these extreme conditions.

This plant community is susceptible to increased erosion as the vigor of most plants is reduced and bare ground is prevalent. However, at times the inland saltgrass and knotweed, both of which either avoid or escape grazing, can persist and serve to stabilize the site.

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

Growth curve number: NE6409

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

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

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	8	18	27	23	12	6	3	0	0

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

- With long-term prescribed grazing this plant community may eventually move toward a higher successional stage which could lead to the *Switchgrass/Wheatgrass/Needlegrass, Shrubs Plant Community*. This transition will be difficult to achieve as the inland saltgrass and knotweed are persistent and competitive.
- Flooding and downcutting will likely shift this site to the Badlands Terrace ES.

### Wheatgrass/Indian Ricegrass, Shrubs Plant Community

This plant community is unique in that it provides a view into the development of an ES. This plant community is the early successional stage of this site and occurs near steep badland outcrops. It is characterized by bare ground and scattered plants of western wheatgrass and/or thickspike wheatgrass, Indian ricegrass, fewflower buckwheat, Visher's buckwheat, and rubber rabbitbrush. These species are adapted to readily survive when buried by new soil. Some individual plants of

silver sagebrush and occasionally rose occur sporadically. Erosion occurs but is usually not a concern as deposition is typically the dominant process.

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

- With decreased deposition and more with distance from the source of erosion, this site will begin to stabilize and move gradually to the next successional stage, which is the *Wheatgrass/Needlegrass/Indian Ricegrass, Shrubs 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 Badlands Overflow ES provides upland grassland cover with an associated forb and shrub component. It was typically part of a an expansive grassland landscape that included combinations of Thin Breaks, Clayey, Claypan, Dense Clay, Loamy, Saline, Sandy, Shallow, Overflow, Subirrigated, and Terrace ESs.

Although this ES is primarily dominated by tall and medium warm- and cool-season grasses, this site can support a shrub community composed of big and silver sagebrush, rose, willow, western snowberry, and silver buffaloberry. The presence or absence of this shrub component is an important factor influencing wildlife species composition.

This site provides habitat for mule deer, pronghorn antelope; grassland and shrub steppe nesting birds; small mammals, mammalian predators, and a variety of reptiles, amphibians, and insects. Within the MLRA, this site provides important riparian habitat. This site provides foraging and brood rearing habitat for upland game birds such as the sharp-tailed grouse.

**Switchgrass/Wheatgrass/Needlegrass, Shrubs (HPC), Wheatgrass/Needlegrass/Prairie Sandreed, Shrubs; Wheatgrass/Needlegrass/Indian Ricegrass, Shrubs; and Wheatgrass/Indian Ricegrass, Shrubs:** Multiple successional changes can occur as a result of stream channel aggradation and degradation. During favorable climatic conditions and the lack of significant grazing in a given area, medium and tall grass habitat provides denser cover and stabilizes the area along the stream channel. When present, seeps and springs provide vital water supply and localized wildlife habitat especially for reptiles and amphibians, bats, and game species (both predators and prey).

This site is dominated by medium to tall warm- and cool-season grasses with a shrub community generally dominated by big and silver sagebrush, rose, willow, western snowberry, and silver buffaloberry favoring grazers and mixed-feeders, such as mule deer and pronghorn antelope. This site may contain a substantial amount (50-80 percent) of bare ground as a result of channel evolution. The interspersed bare ground and shrubs provides habitat for species such as desert cottontail and white- and black-tailed jackrabbit but also diminishes ungulate wildlife foraging opportunities. However, as prairie ricegrass abundance increases, grazing wildlife such as mule deer will heavily utilize the site. As silver buffaloberry and other fruiting shrub abundance increases, then species such as brown thrasher, Say's phoebe, and loggerhead shrike may utilize this site. The complex plant structural diversity provides habitat for a wide array of migratory and resident birds. Grasshopper sparrow, lark bunting, chestnut-collared longspur, horned lark, western meadowlark, and sharp-tailed grouse are common and benefit from the structure and composition this plant community provides.

This site provides a diversity of grasses, forbs, and shrubs for small and large herbivores including shrews, voles, mice, spotted ground squirrel, desert cottontail rabbit, white-tailed and black-tailed jackrabbits, and deer. Raptors such as red-tailed hawk, ferruginous hawk, Swainson's hawk, American kestrel, and barn owl 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. Diverse prey populations are available for grassland raptors and mammalian predators, especially bobcat and mountain lion. Other mammalian predators utilizing this plant community include the coyote, mink, long-tailed and least weasels, and spotted and striped skunks.

This site provides foraging and brood rearing habitat for sharp-tailed grouse and fawning habitat for deer. The relatively tall stature of the stable plant community provides suitable thermal, protective, and escape cover for small and large mammals. 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 along with lesser numbers of various lizard species.

**Wheatgrass/Inland Saltgrass/Knotweed:** Resulting from heavy continuous season-long grazing the plant community becomes dominated by inland saltgrass and wheatgrass. The warm-season grass component virtually vanishes, especially Switchgrass, bluestem, prairie sandreed, and Indian ricegrass. The loss of the warm season grass component significantly reduces the abundance and diversity of wildlife species using this site. Lesser numbers of small mammals and large herbivores will utilize this site. Raptor and mammalian predators will continue to utilize this site. Sharp-tailed grouse, reptiles, and amphibians may not fully utilize this site. Forb diversity is substantially decreased; however, knotweed abundance substantially increases. Knotweeds are a food source for songbirds, sharp-tailed grouse, small mammals, antelope, and deer. Shrub diversity substantially decreases but silver sagebrush and rubber rabbitbrush abundance increases, favoring mule deer and pronghorn antelope.

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

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
<b>Grasses &amp; Grass-likes</b>							
big bluestem	U D P D	U D U U	U D P D	U D U U	U D U U	U D P D	U D P D
blue grama	U D P U	D P P D	U D P U	D P P D	D P P D	U D P U	U D P U
buffalograss	U U D U	N U D U	U U D U	N U D U	N U D U	U U D U	U U D U
green muhly	U D D U	N U N N	U D D U	N U N N	N U N N	U D D U	U D 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
Indian ricegrass	D P U D	N P N D	D P U D	N P N D	N P N D	D P U D	D 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
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
prairie cordgrass	U D D U	N N N N	U D D U	N N N N	N N N N	U D D U	U D D 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
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
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
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
tall 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
thickspike wheatgrass	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
western wheatgrass	U P D U	N D N N	U P D U	N D N N	N D N N	U P D U	U P D U
<b>Forbs</b>							
American licorice	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
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
cudweed sagewort	U U U U	U U D U	U U U U	U U D U	U U D U	U U U U	U U D U
dotted gayfeather	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
false boneset	U U D U	N D U N	U U D U	N D U N	N D U N	U U D U	N D U N
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
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
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
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
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
verbena	U U D U	U U U U	U U D U	U U U U	U U U U	U U D U	U U U 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
<b>Shrubs</b>							
big sagebrush	U N U U	D U U D	U N U U	P U D P	P P P P	U N U U	D U U U
fewflower buckwheat	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 U U 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
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 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
willow	P U D P	P U D P	P U D P	P U D P	U U U U	P U D P	P U D P

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

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

## Animal Community – Grazing Interpretations

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>
Switchgrass/Wheatgrass/Needlegrass, Shrubs	2,400	0.76
Wheatgrass/Needlegrass/Prairie Sandreed, Shrubs	2,000	0.63
Wheatgrass/Needlegrass/Indian Ricegrass, Shrubs	1,000	0.32
Wheatgrass/Inland Saltgrass/Knotweed	600	0.19
Wheatgrass/Indian Ricegrass, Shrubs	**	**

\*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 forage production on this site. This site is dominated by soils in hydrologic group B. Infiltration rate is moderate. Runoff potential for this site varies from moderate to high depending on soil hydrologic group and ground cover. In many cases, areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where short-grasses form a strong 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).

## 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 this site.

## Other Products

None noted.

## Supporting Information

### Associated Sites

(064XY048NE) – Badlands Terrace

### Similar Sites

(064XY049NE) – Badlands Terrace [no switchgrass; more little bluestem; 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; Kent Cooley, Soil Scientist, NRCS; Rick Peterson, RMS, NRCS; and L. Michael Stirling RMS, NRCS.

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

### 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: 43h – White River Badlands.

### Other References

Carey, Carol. 2004. Provided art work for Plant Communities and Transitional Pathways diagram. 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