

## United States Department of Agriculture Natural Resources Conservation Service

### Ecological Site Description

**Site Type:** Rangeland

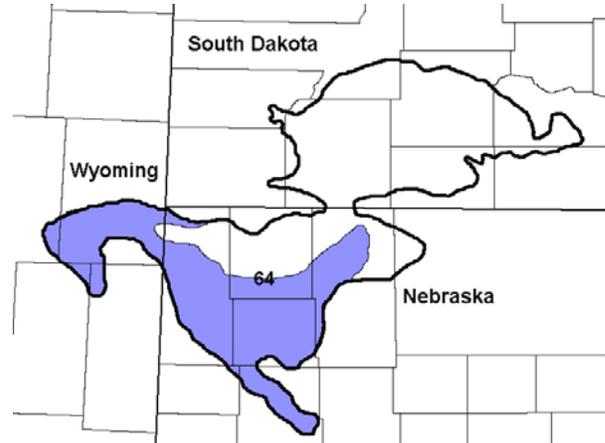
**Site Name:** Clayey 14-17" P.Z.

**Site ID:** R064XY014NE

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

### Physiographic Features

This site occurs on nearly level to steep uplands and colluvial fans.



**Landform:** fan, plain, hill, stream terrace

**Aspect:** N/A

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	2,900	4,000
<b>Slope (percent):</b>	0	30
<b>Water Table Depth (inches):</b>	None	None
<b>Flooding:</b>		
<b>Frequency:</b>	None	None
<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>	Low	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 17 inches per year. The normal average annual temperature is about 46°F. January is the coldest month with average temperatures ranging from about 22°F (Keeline 3 W, Wyoming (WY)), to about 25°F (Hemingford, Nebraska (NE)). July is the warmest month with temperatures averaging from about 70°F (Keeline 3 W, WY), to about 72°F (Hemingford, NE). The range of normal average monthly temperatures between the coldest and warmest months is about 50°F. This large annual range attests to the continental nature of this area's climate. Hourly winds are estimated to average about 11 miles per hour (mph) annually, ranging from about 13 mph during the spring to about 10 mph during the summer. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 mph.

Growth of cool-season plants begins in early to mid-March, slowing or ceasing in late June. Warm-season plants begin growth about mid-May and 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):	115	139
Freeze-free period (days):	137	163
Mean Annual Precipitation (inches):	14	17

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

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.46	0.52	10.0	35.8
February	0.48	0.55	15.1	40.7
March	0.90	1.00	21.0	47.5
April	1.83	1.95	28.9	56.8
May	2.22	3.26	38.3	67.4
June	2.05	2.89	47.3	78.2
July	1.63	2.38	53.9	86.5
August	1.09	1.59	52.3	84.6
September	1.09	1.33	42.4	74.6
October	0.80	1.02	32.6	62.4
November	0.56	0.64	20.4	46.8
December	0.42	0.49	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

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 silty clay loam to clay textured subsoils and slopes of 0 to 30 percent. The soils in this site are well-drained and formed in alluvium, colluvium, and residuum derived primarily from shale. The silty clay loam to loam surface layer is five to six inches thick. The soils have a moderately slow to slow infiltration rate. When dry, these soils crack. When wet, surface compaction can occur with heavy traffic. This site typically 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 nonrestrictive to water movement and root penetration.

These soils are mainly susceptible to water erosion. The hazard of water erosion increases on slopes greater than about five percent. Loss of 50 percent or more of the surface layer of the soils 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:** residuum, colluvium, alluvium  
**Parent Material Origin:** shale, clayey  
**Surface Texture:** loam, silty clay loam, clay loam  
**Surface Texture Modifier:** none  
**Subsurface Texture Group:** clayey  
**Surface Fragments ≤3” (% Cover):** 0  
**Surface Fragments >3” (%Cover):** 0  
**Subsurface Fragments ≤3” (% Volume):** 0-13  
**Subsurface Fragments >3” (% Volume):** 0-6

	<u>Minimum</u>	<u>Maximum</u>
<b>Drainage Class:</b>	well	well
<b>Permeability Class:</b>	slow	moderately slow
<b>Depth (inches):</b>	20	>72
<b>Electrical Conductivity (mmhos/cm)*:</b>	0	4
<b>Sodium Absorption Ratio*:</b>	0	10
<b>Soil Reaction (1:1 Water)*:</b>	6.6	9.0
<b>Soil Reaction (0.1M CaCl2)*:</b>	NA	NA
<b>Available Water Capacity (inches)*:</b>	4	6
<b>Calcium Carbonate Equivalent (percent)*:</b>	0	30

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

## Plant Communities

### Ecological Dynamics of the Site

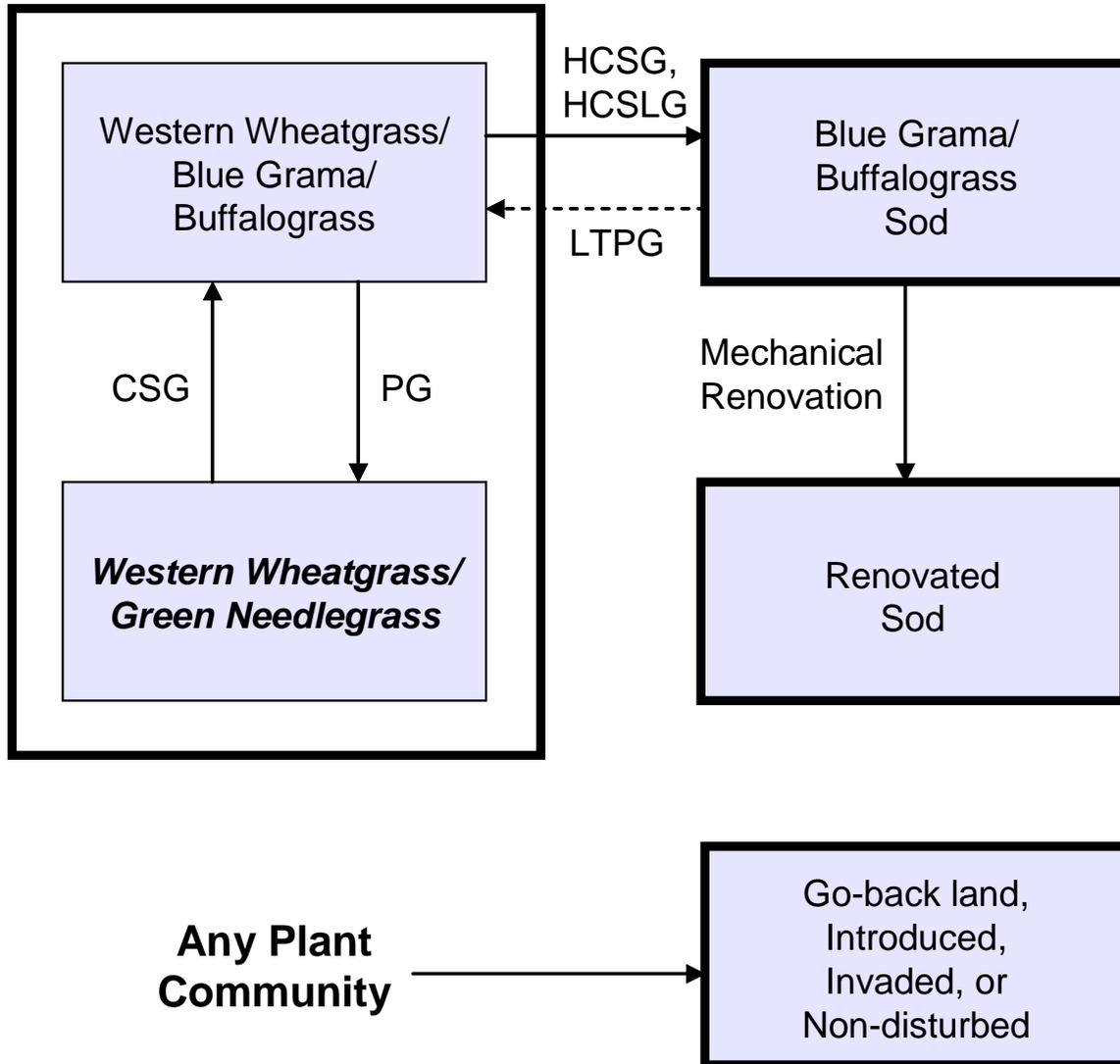
This site developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfire (often of light intensities), and other biotic and abiotic factors that typically influence soil/site development. Changes will occur 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 Western Wheatgrass/Green Needlegrass Plant Community. Encroachment may occur from associated sites. Black greasewood and Rocky Mountain juniper have the potential to shift site characteristics. These shifts can alter the site dynamics and potential. These species may occur in small amounts on several plant communities.

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



**CSG** - Continuous seasonal grazing (grazing a unit for an entire portion of a growing season, and the same season every year); **HCSG** - Heavy, continuous seasonal grazing; **HCSLG** - Heavy, continuous season-long grazing (grazing a unit for an entire growing season well above recommended stocking rates); **LTPG** - Long-term 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			Western Wheatgrass/Blue Grass/Bufalograss			Blue Grama/ Buffalograss Sod			Renovated Sod		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
<b>GRASSES &amp; GRASS-LIKES</b>			1350 - 1530	75 - 85		1120 - 1280	70 - 80		420 - 490	60 - 70		1120 - 1280	70 - 80
<b>RHIZOMATOUS WHEATGRASS</b>		1	540 - 900	30 - 50	1	320 - 640	20 - 40	1	35 - 105	5 - 15	1	320 - 640	20 - 40
western wheatgrass	PASM	1	540 - 900	30 - 50	1	320 - 640	20 - 40	1	35 - 105	5 - 15	1	320 - 640	20 - 40
thickspike wheatgrass	ELLAL	1	90 - 360	5 - 20	1	80 - 240	5 - 15	1	7 - 35	1 - 5	1	80 - 240	5 - 15
<b>COOL-SEASON MID GRASS</b>		2	450 - 720	25 - 40	2	160 - 320	10 - 20	2	0 - 35	0 - 5	2	160 - 320	10 - 20
green needlegrass	NAV14	2	450 - 720	25 - 40	2	160 - 320	10 - 20	2	0 - 35	0 - 5	2	160 - 320	10 - 20
<b>WARM-SEASON GRASSES</b>		3	36 - 180	2 - 10	3	240 - 480	15 - 30	3	140 - 420	20 - 60	3	240 - 480	15 - 30
blue grama	BOGR2	3	36 - 180	2 - 10	3	160 - 320	10 - 20	3	105 - 350	15 - 50	3	160 - 320	10 - 20
buffalograss	BUDA	3	0 - 90	0 - 5	3	80 - 160	5 - 10	3	35 - 175	5 - 25	3	80 - 160	5 - 10
sideoats grama	BOCU	3	90 - 270	5 - 15	3	0 - 80	0 - 5	3	0 - 14	0 - 2	3	0 - 80	0 - 5
<b>NATIVE GRASSES/GRASS-LIKES</b>		4	90 - 270	5 - 15	4	80 - 400	5 - 25	4	70 - 210	10 - 30	4	80 - 400	5 - 25
big bluestem	ANGE	4	0 - 90	0 - 5	4	0 - 16	0 - 1				4	0 - 16	0 - 1
needleandthread	HECOC8	4	0 - 90	0 - 5	4	0 - 80	0 - 5	4	0 - 14	0 - 2	4	0 - 80	0 - 5
prairie junegrass	KOMA	4	0 - 90	0 - 5	4	0 - 80	0 - 5	4	0 - 70	0 - 10	4	0 - 80	0 - 5
Sandberg bluegrass	POSE	4	0 - 36	0 - 2	4	0 - 48	0 - 3	4	0 - 14	0 - 2	4	0 - 32	0 - 2
sedge	CAREX	4	0 - 90	0 - 5	4	80 - 320	5 - 20	4	35 - 105	5 - 15	4	80 - 320	5 - 20
threeawn	ARIST	4	0 - 36	0 - 2	4	0 - 32	0 - 2	4	7 - 105	1 - 15	4	0 - 32	0 - 2
dropseed	SPORO	4	0 - 18	0 - 1	4	0 - 80	0 - 5	4	7 - 70	1 - 10	4	0 - 80	0 - 5
other perennial grasses	2GP	4	0 - 54	0 - 3	4	0 - 48	0 - 3	4	0 - 21	0 - 3	4	0 - 48	0 - 3
<b>NON-NATIVE GRASSES</b>		5			5			5	35 - 175	5 - 25	5	0 - 80	0 - 5
cheatgrass	BRTE							5	35 - 175	5 - 25	5	0 - 80	0 - 5
<b>FORBS</b>		6	90 - 270	5 - 15	6	80 - 240	5 - 15	6	70 - 140	10 - 20	6	80 - 240	5 - 15
American vetch	VIAM	6	0 - 18	0 - 1	6	0 - 16	0 - 1	6	0 - 7	0 - 1	6	0 - 16	0 - 1
aster	ASTER	6	0 - 18	0 - 1	6	0 - 16	0 - 1	6	0 - 7	0 - 1	6	0 - 16	0 - 1
biscuitroot	LOMAT	6	0 - 18	0 - 1	6	0 - 16	0 - 1	6	0 - 7	0 - 1	6	0 - 16	0 - 1
cudweed sagewort	ARLU	6	0 - 18	0 - 1	6	0 - 32	0 - 2	6	0 - 7	0 - 1	6	0 - 32	0 - 2
curlycup gumweed	GRSQ				6	0 - 16	0 - 1	6	0 - 35	0 - 5	6	0 - 16	0 - 1
cutleaf ironplant	MAPI	6	0 - 18	0 - 1	6	0 - 16	0 - 1	6	0 - 7	0 - 1	6	0 - 16	0 - 1
deathcamas	ZIGAD	6	0 - 18	0 - 1	6	0 - 16	0 - 1	6	0 - 7	0 - 1	6	0 - 16	0 - 1
deervetch	LOUNU	6	0 - 18	0 - 1	6	0 - 16	0 - 1	6	0 - 7	0 - 1	6	0 - 16	0 - 1
dotted gayfeather	LIPU	6	0 - 36	0 - 2	6	0 - 32	0 - 2	6	0 - 7	0 - 1	6	0 - 32	0 - 2
false bonaset	BREU	6	0 - 18	0 - 1	6	0 - 16	0 - 1	6	0 - 7	0 - 1	6	0 - 16	0 - 1
goldenrod	SOLID	6	0 - 18	0 - 1	6	0 - 16	0 - 1	6	0 - 7	0 - 1	6	0 - 16	0 - 1
penstemon	PENST	6	0 - 36	0 - 2	6	0 - 32	0 - 2	6	0 - 7	0 - 1	6	0 - 32	0 - 2
prairie coneflower	RACO3	6	0 - 36	0 - 2	6	0 - 32	0 - 2	6	0 - 7	0 - 1	6	0 - 32	0 - 2
pussytoes	ANTEN	6	0 - 18	0 - 1	6	0 - 32	0 - 2	6	0 - 35	0 - 5	6	0 - 32	0 - 2
scarlet gaura	GACO5	6	0 - 18	0 - 1	6	0 - 16	0 - 1	6	0 - 7	0 - 1	6	0 - 16	0 - 1
scarlet globemallow	SPCO	6	0 - 36	0 - 2	6	0 - 32	0 - 2	6	0 - 35	0 - 5	6	0 - 32	0 - 2
scurfpea	PSORA2	6	0 - 36	0 - 2	6	0 - 48	0 - 3	6	0 - 70	0 - 10	6	0 - 48	0 - 3
thistle	CIRSI	6	0 - 18	0 - 1	6	0 - 16	0 - 1	6	0 - 7	0 - 1	6	0 - 16	0 - 1
western ragweed	AMPS	6	0 - 18	0 - 1	6	0 - 32	0 - 2	6	0 - 7	0 - 1	6	0 - 32	0 - 2
western wallflower	ERCAC	6	0 - 18	0 - 1	6	0 - 16	0 - 1	6	0 - 7	0 - 1	6	0 - 16	0 - 1
western yarrow	ACMI2	6	0 - 18	0 - 1	6	0 - 16	0 - 1	6	0 - 7	0 - 1	6	0 - 16	0 - 1
wild parsley	MUDI	6	0 - 18	0 - 1	6	0 - 16	0 - 1	6	0 - 7	0 - 1	6	0 - 16	0 - 1
woolly Indianwheat	PLPA2	6	0 - 18	0 - 1	6	0 - 16	0 - 1	6	0 - 7	0 - 1	6	0 - 16	0 - 1
other perennial forbs	2FP	6	0 - 36	0 - 2	6	0 - 32	0 - 2	6	0 - 14	0 - 2	6	0 - 32	0 - 2
<b>SHRUBS</b>		7	90 - 180	5 - 10	7	80 - 240	5 - 15	7	70 - 140	10 - 20	7	80 - 240	5 - 15
black greasewood	SAVE4	7	0 - 18	0 - 1	7	0 - 32	0 - 2	7	0 - 14	0 - 2	7	0 - 32	0 - 2
broom snakeweed	GUSA2	7	0 - 18	0 - 1	7	0 - 48	0 - 3	7	14 - 56	2 - 8	7	0 - 48	0 - 3
cactus	OPUNT	7	0 - 18	0 - 1	7	0 - 48	0 - 3	7	14 - 56	2 - 8	7	0 - 48	0 - 3
fourwing saltbush	ATCA2	7	0 - 36	0 - 2	7	0 - 32	0 - 2				7	0 - 48	0 - 3
fringed sagewort	ARFR4	7	0 - 18	0 - 1	7	0 - 48	0 - 3	7	21 - 70	3 - 10	7	0 - 48	0 - 3
rose	ROSA5	7	0 - 36	0 - 2	7	0 - 48	0 - 3	7	0 - 14	0 - 2	7	0 - 48	0 - 3
winterfat	KRLA2	7	0 - 36	0 - 2	7	0 - 16	0 - 1						
other shrubs	2SHRUB	7	0 - 36	0 - 2	7	0 - 32	0 - 2				7	0 - 32	0 - 2
<b>Annual Production lbs./acre</b>			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH
<b>GRASSES &amp; GRASS-LIKES</b>			730 - 1485 - 2015		550 - 1280 - 1600		270 - 490 - 710		550 - 1280 - 1600				
<b>FORBS</b>			85 - 180 - 300		75 - 160 - 250		65 - 105 - 145		75 - 160 - 250				
<b>SHRUBS</b>			85 - 135 - 185		75 - 160 - 250		65 - 105 - 145		75 - 160 - 250				
<b>TOTAL</b>			900 - 1800 - 2500		700 - 1600 - 2100		400 - 700 - 1000		700 - 1600 - 2100				

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 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 75 percent grasses or grass-like plants, 15 percent forbs, and 10 percent shrubs. Cool-season grasses dominate this plant community. The major grasses include western wheatgrass and green needlegrass. Other grasses occurring on the site include blue grama, buffalograss, sideoats grama, prairie Junegrass, and sedge. Significant forbs include scarlet globemallow, biscuitroot, deer vetch, wild parsley, American vetch, and milkvetch. The significant shrubs that occur include cactus, winterfat, rose, and fourwing saltbush.

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. Moderate or high available water capacity provides a favorable soil-water-plant relationship.

Overall, the interpretive plant community has the appearance of being extremely stable, diverse, and productive. Litter normally falls in place and does not occur in excess amounts. Most plant species have a wide range of age classes represented and reproduction is not limited. Plant roots occupy most of the soil profile which provides for soil stability and promotes infiltration.

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

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

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

#### Western Wheatgrass/Blue Grama/Buffalograss Plant Community

This plant community develops under continuous seasonal grazing (i.e., grazing an area during the same season every year) or from over utilization during extended drought periods. The potential vegetation is made up of approximately 70 percent grasses and grass-like species, 15 percent forbs,

and 15 percent shrubs. The dominant grasses include blue grama, buffalograss, and western and/or thickspike wheatgrass. Other grasses may include green needlegrass, prairie Junegrass, and Sandberg bluegrass. Significant forbs include scarlet globemallow, wild parsley, biscuitroot, deer vetch, asters, and milkvetch. The significant shrubs that occur include cactus, broom snakeweed, and rose.

Compared to the Western Wheatgrass/Green Needlegrass Plant Community, the shortgrass species including blue grama and buffalograss have increased. The cool-season species including western wheatgrass and green needlegrass have decreased in composition. Annual bromes, curlycup gumweed, sweet clover, and other annual grasses and forbs can invade the site. While plant diversity is relatively high, the structure of the community is dominated by short grasses.

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

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

Growth curve number: NE6402

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

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

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

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

- Prescribed grazing, which allows for adequate plant recovery periods, will move this plant community to the *Western Wheatgrass/Green Needlegrass Plant Community*. Periods of nonuse or deferment may be a management option to reach the *Western Wheatgrass/Green Needlegrass Plant Community*.
- With heavy continuous seasonal grazing or heavy continuous season long grazing this site will move towards the *Blue Grama/Buffalograss Sod Plant Community*.

### **Blue Grama/Buffalograss Sod Plant Community**

This plant community develops under heavy continuous season-long grazing, and with continuous seasonal grazing with concentrated use in the early part of the growing season (as in calving/lambing pastures). It is made up of approximately 90 percent grasses (primarily short, warm-season grasses), 8 percent forbs, and 2 percent shrubs. The dominant grasses include blue grama and buffalograss. Other grasses may include western wheatgrass, prairie Junegrass, threeawn, and annual brome. The dominant forbs include slimflower scurfpea, pussytoes, curlycup gumweed, and scarlet globemallow. The dominant shrub is cactus.

Compared to the Western Wheatgrass/Green Needlegrass Plant Community, short grasses have increased, and the cool-season mid-grasses have diminished greatly. Some forbs and cactus have either increased and/or invaded the site. Plant diversity is low.

This plant community is very stable. Generally, this plant community will require significant management inputs (i.e., high animal impact, long-term prescribed grazing, favorable climatic

conditions, etc.) and time to move it towards the Western Wheatgrass/Blue Grama/Buffalograss Plant Community. Onsite soil erosion is low. Infiltration is low and runoff is high. Typically, the runoff is very clean because of the low potential for onsite soil erosion. However, offsite areas can be significantly impacted due to the increased runoff.

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

Growth curve number: 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

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

- Long-term prescribed grazing and favorable climatic conditions, which allows for adequate plant recovery periods, will move this plant community towards the *Western Wheatgrass/Blue Grama/Buffalograss Plant Community*. Periods of nonuse or deferment may be a management option to facilitate this movement.
- Mechanical renovation (specifically contour furrowing) will move this plant community to the *Renovated Sod Plant Community*. Proper grazing management must be included in order to derive the benefits of renovation.

### Renovated Sod Vegetation State

An altered vegetation community can be achieved through mechanical renovation. Renovation creates microrelief that alters the water cycle by increasing infiltration and decreasing runoff. The renovation reduces the sod-bound conditions, increasing the vegetative production potential. These factors favor cool-season species such as western wheatgrass, green needlegrass, and a variety of forbs.

With proper management after renovation, this plant community will have similar plant composition and growth curve characteristics as the Western Wheatgrass/Blue Grama/Buffalograss Plant Community. However, the production could be higher depending on the degree of alteration. Proper grazing management must be implemented to maintain this plant community.

If this plant community is subjected to excessive disturbance after renovation (i.e., heavy continuous seasonal or season-long grazing, excessive defoliation, etc.) the plant community will be similar to the Blue Grama/Buffalograss Sod Plant Community in most respects. The main difference is the microrelief created by the renovation.

### Non-Disturbed, Go-back, Introduced, Invaded

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

The **Go-back** state can be reached whenever severe mechanical disturbance (i.e., abandoned farmland) occurs. During the early successional stages, the species that mainly dominate are annual grasses and forbs, later being replaced by both native and introduced perennials. The vegetation on this site varies greatly, sometimes being dominated by three-awn, dropseed, annual brome, crested wheatgrass, buffalograss, broom snakeweed, sweet clover, and nonnative thistles. Other plants that

commonly occur on the site include western wheatgrass, deathcamas, prickly lettuce, maretail, kochia, squirreltail, foxtail, and annual sunflower.

The **Introduced** state is normally those areas seeded to crested wheatgrass, pubescent, or intermediate wheatgrass and alfalfa. It may require considerable investment.

The **Invaded** state includes areas that have been invaded by species such as smooth brome, Kentucky bluegrass, nonnative thistles, field bindweed, knapweeds, leafy spurge, hoary cress, and other introduced species.

The **Non-Disturbed** state develops from extended periods of exclusion by large herbivores, fire suppression, and lack of other surface disturbance. Plant litter accumulates in large amounts when this community first develops. Litter buildup reduces mature plant vigor and density and seedling recruitment declines. Eventually, litter levels become high enough that plant density decreases. Interspaces are commonly filled by annual forbs, annual grasses, and cryptogams. Typically, rhizomatous grasses form small colonies because of a lack of tiller stimulation.

## **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 Clayey 14-17” P.Z. Ecological Site (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, Shallow, 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 Clayey 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 bromegrasses 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.

**Western Wheatgrass/Green Needlegrass (HCPC):** 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, savannah sparrow, lark bunting, western meadowlark, and sharp-tailed grouse are common and benefit from the structure and composition this plant community provides. This site provides important breeding habitat for the loggerhead shrike. This site provides excellent nesting and brood rearing habitat for sharp-tailed grouse. Diverse prey populations are available for grassland raptors such as ferruginous hawk, Swainson's hawk, golden eagle, and prairie falcon.

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

**Western Wheatgrass/Blue Grama/Buffalograss:** Resulting from continuous seasonal grazing or from overutilization during extended drought periods, blue grama and buffalograss will become dominate. The forb and shrub diversity and abundance increase. Density of species such as sharp-tail grouse and desert cottontail should remain unchanged. However, the shift to shorter plant structure will favor prairie dog expansion and associate species such as ferruginous hawk, burrowing owl, tiger salamander, and swift fox. Species such as the horned lark, long-billed curlew, upland sandpiper, and white-tailed and black-tailed jackrabbit will increase. This plant community may provide areas suitable for sharp-tailed grouse lek site development. The short stature of this plant community limits thermal, protective, and escape cover. Predators utilizing this plant community include the coyote, American badger, red fox, and long-tailed weasel.

**Blue Grama/Buffalograss Sod:** This plant community develops under heavy continuous season-long grazing and with continuous seasonal grazing with concentrated use in the spring. Forb diversity and abundance and shrub abundance increases while shrub diversity declines. A shift to short plant structure will favor prairie dog expansion with prairie dog town sites and associate species such as ferruginous hawk, burrowing owl, tiger salamander, and swift fox. Species such as the horned lark, long-billed curlew, upland sandpiper, and white-tailed and black-tailed jackrabbit will increase. This plant community may provide areas suitable for sharp-tailed grouse lek site development. The short stature of this plant community limits thermal, protective, and escape cover. Predators utilizing this plant community include the coyote, American badger, red fox, and long-tailed weasel. Species such as the desert cottontail will rarely use this site.

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

**Blue Grama/Buffalograss Sod (Renovated):** See the description under the Blue Grama/Buffalograss Sod Plant Community.

**Go-back, Introduced, and/or Invaded States**

This group includes separate vegetation states that are highly variable in nature. They are derived through distinct management scenarios. These plant communities have been or are highly susceptible to invasion of annual brome grasses, bluegrasses, crested wheatgrass, and other nonnative species.

Since secondary succession is highly variable plant and wildlife species will vary. This plant community provides habitat for generalist or early successional species. In addition, these communities may contain prairie dog towns.

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

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

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

### Animal Preferences (Quarterly – 1,2,3,4<sup>†</sup>)

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
<b>Grasses &amp; Grass-like</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
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
needleandthread	U D U D	N D N U	U D U D	N D N U	N D N U	U D U D	U D U D
prairie 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
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
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
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>							
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
aster	U U D U	U U D U	U U D U	U U D U	U U D U	U U D U	U U D U
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
cutweed 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
cutleaf ironplant	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
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
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
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
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
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
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 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 wallflower	U D U U	N U U N	U D U U	N U U N	N U U N	U D U U	N U U N
western yarrow	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
wild 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>							
black greasewood	U D D U	T T T T	U D D U	D U U D	D U U D	U D D U	D U U U
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
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
fourwing saltbush	P D D P	P D D P	P D D P	P D D P	P D D P	P D D P	P D D P
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
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
winterfat	P P P P	P P P P	P P P P	P P P P	P P P P	P P P P	P P P P

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

<sup>†</sup> 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	1,800	0.50 – 0.60
Western Wheatgrass/Blue Grama/Buffalograss	1,600	0.45 – 0.55
Blue Grama/Buffalograss Sod	700	0.20 – 0.25
Renovated Sod	1,600	0.50**

\*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 C. Infiltration varies from very low to moderate and runoff potential varies from moderate to very high depending on soil hydrologic group, slope, and ground cover. In many cases, areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be high runoff when 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, 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

(064XY027NE) – Clayey Overflow  
(064XY015NE) – Silty 14-17" P.Z.

(064XY039NE) – Shallow Clay  
(064XY045NE) – Dense Clay

### Similar Sites

(064XY027NE) – Clayey Overflow [more big bluestem; higher production]  
(064XY015NE) – Silty 14-17" P.Z. [less green needlegrass; more needleandthread]

### 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	1	1969	NE	Sioux

### State Correlation

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

### Field Offices

Alliance, NE	Box Butte	Douglas, WY	Converse	Scottsbluff, NE	Scottsbluff
Bridgeport, NE	Morrill	Lusk, WY	Niobrara	Torrington, WY	Goshen
Chadron, NE	Dawes/Sioux	Rushville, NE	Sheridan	Wheatland, WY	Platte

### Relationship to Other Established Classifications

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

### Other References

High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-0728. (<http://www.hprcc.unl.edu/>)  
USDA, NRCS. National Water and Climate Center, 101 SW Main, Suite 1600, Portland, OR 97204-3224. (<http://www.wcc.nrcs.usda.gov>)  
USDA, NRCS. National Range and Pasture Handbook, September 1997.  
USDA, NRCS. National Soil Information System, Information Technology Center, 2150 Centre Avenue, Building A, Fort Collins, CO 80526. (<http://soils.usda.gov/technical/nasis/>)  
USDA, NRCS. 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**

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NE, State Range Management Specialist

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Date

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SD, State Range Management Specialist

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Date

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WY, State Range Management Specialist

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Date