

# United States Department of Agriculture Natural Resources Conservation Service

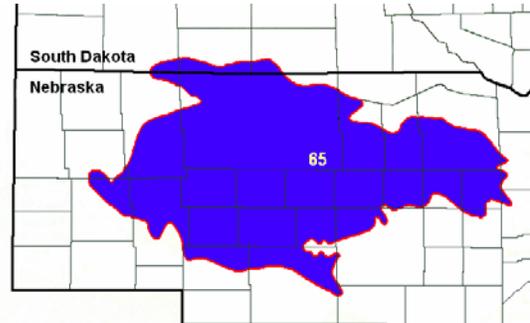
## Ecological Site Description

**Site Type:** Rangeland

**Site Name:** Subirrigated

**Site ID:** R065XY024NE

**Major Land Resource Area:**  
65 – Nebraska Sand Hills



### Physiographic Features

**Landform:** Interdune, alluvial flat

**Aspect:** N/A

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	2000	3900
<b>Slope (percent):</b>	0	2
<b>Water Table Depth (inches):</b>	18	36
<b>Flooding:</b>		
<b>Frequency:</b>	None	Occasional
<b>Duration:</b>	None	Brief
<b>Ponding:</b>		
<b>Depth (inches):</b>	None	None
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Runoff Class:</b>	Very Low	Low

### Climatic Features

The mean average annual precipitation varies from 14 to 25 inches, but has varied from 12 to 29 inches in the driest to wettest seasons. Approximately 65 percent of the annual precipitation occurs during the growing season of mid-April to late September. The average annual snowfall varies from about 30 inches to about 55 inches. The wind velocity is high throughout the year, averaging 10 to 12 miles per hour. Maximum wind velocities generally occur in the spring.

The average length of the growing season is 138 days, but the growing season has varied from 114 to 168 days. The average date of first frost in the fall is September 25, and the last frost in the spring is about May 10. July is the hottest month and January is the coldest. It is not uncommon for the temperature to reach 100°F during the summer. Summer humidity is low and evaporation is high. The winters are characterized with frequent northerly winds, producing severe cold with temperatures dropping to as low as -30°F.

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. Green up 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):	131	145
Freeze-free period (days):	150	165
Mean Annual Precipitation (inches):	14	25

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

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.33	0.51	8.0	37.8
February	0.39	0.66	12.7	43.7
March	0.86	1.54	21.3	50.0
April	1.51	2.31	31.4	62.1
May	2.87	3.54	41.5	72.7
June	2.94	4.15	51.3	82.2
July	2.05	3.29	57.2	88.9
August	1.07	3.12	55.2	87.0
September	1.16	2.37	44.7	77.7
October	0.87	1.61	32.7	66.6
November	0.51	0.94	20.5	49.6
December	0.31	0.61	11.4	40.3

<b>Climate Stations</b>		<b>Period</b>	
<b>Station ID</b>	<b>Location or Name</b>	<b>From</b>	<b>To</b>
NE1130	Brewster	1948	1997
NE2000	Crescent Lake Natl WLR	1948	1997
NE2805	Ewing	1948	1997
NE2647	Ellsworth 15 NNE	1963	1997
NE6970	Purdum	1948	1997
NE7665	Scottsbluff WSO AP	1948	1997

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

**Influencing Water Features**

This ecological site has a combination of physical and hydrological features that: 1) provide season-long ground water within 3.5 feet of the surface, 2) allows relatively free movement of water and air in the upper part of the soil, and 3) are rarely, or occasionally flooded.

<b>Wetland Description:</b>	<b>System</b>	<b>Subsystem</b>	<b>Class</b>	<b>Sub-class</b>
Cowardin, et al., 1979	Palustrine	N/A	Emergent Wetland	Persistent

**Stream Type:** None  
(Rosgen System)

**Representative Soil Features**

The features common to all soils in this site are the fine sand and loamy textured surface soils and slopes of zero to two percent. The soils in this site are somewhat poorly drained and formed in eolian sand and/or sandy alluvium. The surface layer is 3 to 10 inches thick. The texture of the subsurface ranges from loamy fine sand to fine sand. Runoff as evidenced by patterns of rill, gully or other water flow is negligible due to the low slope gradient and high intake rate of these soils. Cryptobiotic crusts are present, but their function is not well understood. Some pedestalling of plants occurs, but it is not very evident on casual observation and occurs on less than five percent of the plants.

More information can be found in the various soil survey reports. Contact the local USDA Service Center for soil survey reports that includes more detail specific to your location.

Major soil series correlated to this ecological site include: Boel, Bolent, Els, Elsmere, and Ord.

Other soil series that have been correlated to this site include: Els Calcareous, Elsmere Calcareous, and Lamo.

**Parent Material Kind:** alluvium

**Parent Material Origin:** mixed

**Surface Texture:** fine sand, loamy fine sand, fine sandy loam

**Surface Texture Modifier:** none

**Subsurface Texture Group:** sandy

**Surface Fragments ≤ 3” (% Cover):** 0

**Surface Fragments > 3” (%Cover):** 0

**Subsurface Fragments ≤ 3” (% Volume):** 0-6

**Subsurface Fragments > 3” (% Volume):** 0

	<u>Minimum</u>	<u>Maximum</u>
<b>Drainage Class:</b>	somewhat poorly	somewhat poorly
<b>Permeability Class:</b>	moderate	rapid
<b>Depth (inches):</b>	>80	>80
<b>Electrical Conductivity (mmhos/cm):</b>	0	2
<b>Sodium Absorption Ratio:</b>	0	6
<b>Soil Reaction (1:1 Water):</b>	5.6	8.4
<b>Soil Reaction (0.1M CaCl<sub>2</sub>):</b>	NA	NA
<b>Available Water Capacity (inches):</b>	3	6
<b>Calcium Carbonate Equivalent (percent):</b>	0	10

## Plant Communities

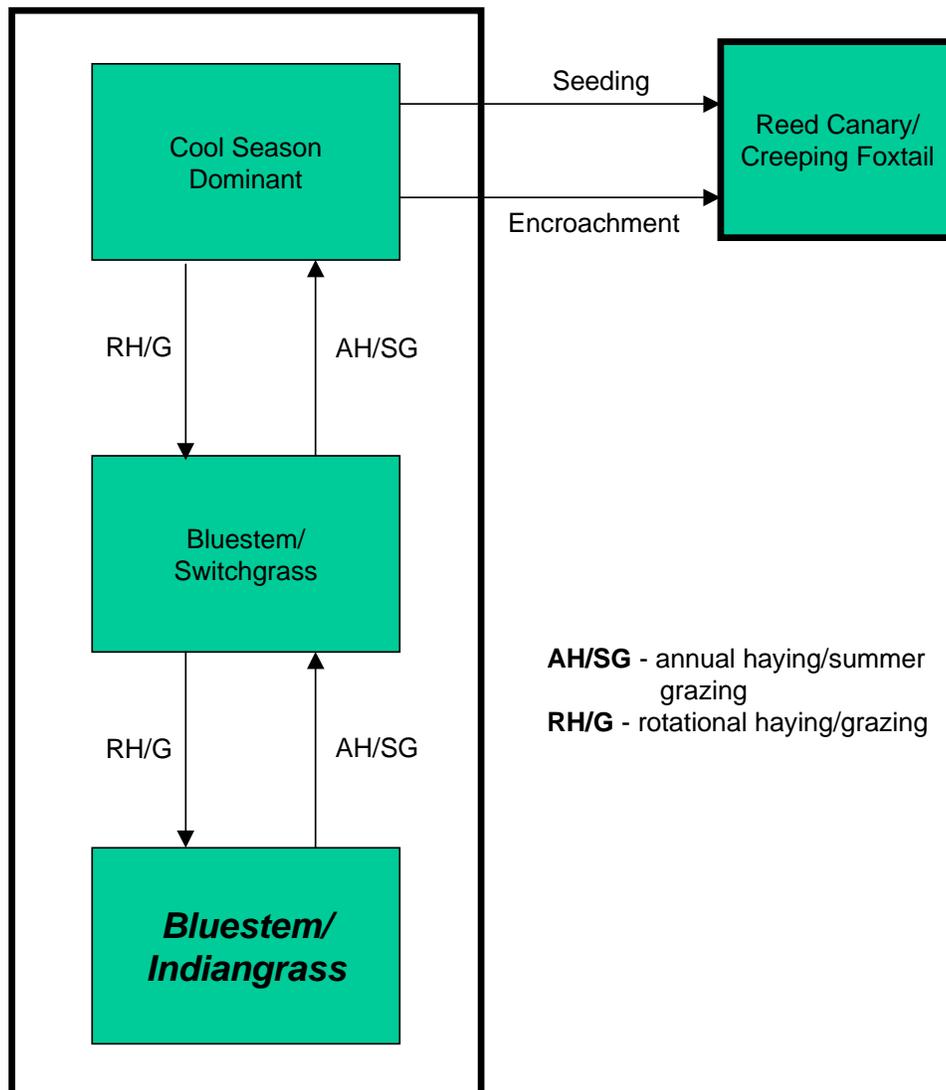
### Ecological Dynamics of the Site:

As this site deteriorates, species such as redtop, Kentucky bluegrass, slender wheatgrass, and smooth brome will increase. Warm season grasses such as Indiangrass and big bluestem will decrease in frequency and production.

Interpretations are primarily based on the Bluestem/Indiangrass 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. Subclimax 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 (diagram)





## 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 are 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 (DPC’s).” According to the USDA NRCS National Range and Pasture Handbook, DPC’s, be determined by the decision-makers and will meet minimum quality criteria established by the Natural Resources Conservation Service (NRCS). The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

### Bluestem/Indiangrass Plant Community

Interpretations are primarily based on the Bluestem/Indiangrass Plant Community (this is also considered climax). This site evolved with grazing by large herbivores and is well suited for grazing by domestic livestock. This plant community is found on areas that are properly managed with grazing and/or prescribed burning. Harvesting hay at a different time during the growing season each year allows this plant community to persist. The potential vegetation is about 75 percent grasses, 10 percent grass-like plants, 10 percent forbs, and 5 percent woody plants. Tall, warm-season grasses dominate.

The major grasses include big bluestem, Indiangrass, little bluestem, prairie cordgrass, switchgrass, and grass-likes include sedges, rushes, and bulrushes. Other grasses occurring on this plant community include plains bluegrass, slender wheatgrass, and western wheatgrass.

This plant community is extremely resilient and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allows for high drought tolerance. This is a healthy and sustainable plant community (site/soil stability, watershed function, and biologic integrity).

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

Growth curve number: NE6543

Growth curve name: Nebraska/South Dakota Sandhills, Native Grasslands, Wet

Growth curve description: Warm season dominant, cool season subdominant, mid- and tall grasses.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	0	5	20	35	25	10	5	0	0	0

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

- Haying (removed timely) or grazing can shift this plant community to the *Bluestem/Switchgrass Plant Community*. Haying or grazing at set times during the growing season can reduce plant diversity and reduce vigor of desirable plants.

### Bluestem/Switchgrass Plant Community

Historically, this plant community evolved under annual haying or moderate summer grazing followed by heavy grazing in the fall. This plant community closely resembles, but lacks the diversity of the Bluestem/Indiangrass Plant Community. The potential vegetation is about 80 percent grasses, 15 percent grass-like plants, 5 percent forbs, and 1 percent shrubs. Dominant grasses include big bluestem, switchgrass, little bluestem, and Kentucky bluegrass. Other grasses include needlegrasses, prairie cordgrass, wheatgrasses, and Indiangrass. Grass-like plants have increased. The abundance of forbs and shrubs remains constant, but species shifts have occurred. Tall, warm season grasses are suppressed, while cool season grasses have increased slightly.

This plant community is not resistant to change, but is resilient.

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

Growth curve number: NE6544

Growth curve name: Nebraska/South Dakota Sandhills, Hayed and Grazed Subirrigated Meadows

Growth curve description: Warm season dominant, cool season subdominant, mid- and tall grasses.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	0	10	20	25	20	15	10	0	0	0

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

- Timely haying and/or rotational grazing can shift this plant community back to the *Bluestem/Indiangrass Plant Community*. Haying or grazing prior to the onset of active warm season grass growth will improve warm season grass vigor. This early haying also reduces cool season grass competition, and provides quality hay. Grazing after a killing frost in the fall will also help reduce cool season grasses.
- Repeated annual mid summer haying or grazing can shift this plant community to the *Cool Season Dominant Plant Community*.

### Cool Season Dominant Plant Community

Historically, this plant community evolved under long-term annual haying in mid summer. Cool season grasses make up the majority of the plant community with the balance made up of warm season grasses and miscellaneous forbs.

The potential vegetation is about 65 percent grasses, 20 percent grass-like plants, 15 percent forbs, and 1 percent shrubs. Dominant grasses include red top, timothy, Kentucky bluegrass, slender wheatgrass, smooth brome, and prairie cordgrass. Grasses of secondary importance include big bluestem, Indiangrass, and switchgrass. Forbs commonly found in this plant community include red and white clover. This plant community produces from 2,700 to 3,700 pounds per acre (air-dry weight) annually, depending on growing conditions.

When compared to the Bluestem/Indiangrass Plant Community, Kentucky bluegrass and slender wheatgrass have increased. Big bluestem and Indiangrass have decreased, and production of other warm-season grasses has also been reduced. Smooth brome and quackgrass may invade this plant community.

This site is often over-used as winter feed ground. American licorice may become a problem in areas where the cattle are hayed in the winter and lower overall production of the site can be expected.

This plant community is moderately resistant to change.

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

Growth curve number: NE6545

Growth curve name: Nebraska/South Dakota Sandhills, Hayed and Grazed Cool-Season Meadows

Growth curve description: Cool season dominant, warm season subdominant, mid- and tall grasses.

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

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

- Timely haying and/or rotational grazing can shift this plant community back to the *Bluestem/Switchgrass Plant Community*. Haying or grazing prior to the onset of active warm-season grass growth will improve warm season grass vigor. This early haying also reduces cool season grass competition, and provides quality hay. Grazing after a killing frost in the fall will also help reduce cool season grasses. Grazing this plant community in mid-May to early June will suppress cool season grasses. Caution must be used on areas where Subirrigated and Wetland complexes exist, as concentrated spring grazing can cause damage on wetter sites.
- Seeding will move this plant community to the *Reed Canary/Creeping Foxtail Plant Community*.

### **Reed Canary/Creeping Foxtail**

When the Cool Season Dominant Plant Community is stressed by heavy grazing and repeated haying, reed canarygrass or creeping foxtail may encroach if a viable seed source is available. Reed canarygrass and creeping foxtail seedings have occurred when cool season grass production deteriorates. However, this seeding practice has serious repercussions on numerous wildlife species, and once established, becomes difficult to alter due to its aggressive behavior. While this plant community has a high production potential, forage quality is sacrificed.

## Ecological Site Interpretations Animal Community – Wildlife Interpretations

Bluestem/Indiangrass Plant Community:

Bluestem/Switchgrass Plant Community:

Cool Season Dominant Plant Community:

Reed Canary/Creeping Foxtail Plant Community:

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

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
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
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
black-eyed Susan	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
bulrush	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	U U U U
dwarf false indigo	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U
foxtail barley	U D N N	N P N N	U D N N	N P N N	N P N N	U D N N	U D N N
gayfeather	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
goldenrod	U U D U	N U U N	U U D U	N U U N	N U U N	U U D U	N U U N
green 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
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
Indiangrass	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
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
Maximilian sunflower	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U
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 bluegrass	U D U D	N D N U	U D U D	U P N D	U P N D	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 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
rush	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
scouringrush	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
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
slender wheatgrass	U P U U	N D U N	U P U U	N D U N	N D U N	U P U U	U P U U
spikerush	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
switchgrass	U D D U	U D U U	U D D U	N N N N	N N N N	U D D U	U D D U
western wheatgrass	U P D 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

**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 suggested stocking rates for cattle under continuous season-long grazing under normal growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological

site description). Because of this, a field visit is recommended, in all cases, to document plant composition and production. More precise carrying capacity estimates should eventually be calculated using this information along with animal preference data, particularly when grazers other than cattle are involved. With consultation of the land manager, more intensive grazing management may result in improved harvest efficiencies and increased carrying capacity.

Plant Community	Production (lbs./acre)	Carrying Capacity* (AUM/acre)
Bluestem/Indiangrass	4700	1.49
Bluestem/Switchgrass	4000	1.27
Cool Season Dominant	3200	1.01
Reed Canary/Creeping Foxtail	-	-

\* Continuous season-long grazing with proper livestock distribution under average growing conditions. If distribution problems occur, stocking rates must be reduced to maintain plant health and vigor.

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

Moisture conditions are ideal for forage production on this site. Soils on this site are mostly in Hydrologic Soil Group A, but may include soils in Group B, and local areas in Group C. Although most of these soils are very permeable, water tables provide subirrigation of grasses and other vegetation. Surrounding upland areas tend to also have permeable soils and surface inflow peaks on these sites are often muted. These sites are rarely to occasionally flooded.

For the interpretive plant community, rills and gullies should not typically be present. Water flow patterns should be barely distinguishable if at all present. Pedestals are only slightly present. Litter falls in place and signs of movement are not common. Chemical and physical crusts are rare to non-existent. Cryptogamic crusts may be present but are not significant for hydrologic considerations. Overall, this site has the appearance of being very stable and extremely productive.

## 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

- (065XY011NE) – Sandy 14-17” P.Z.
- (065XY032NE) – Sandy 17-22” P.Z.
- (065XY054NE) – Sandy 22-25” P.Z.
- (065XY012NE) – Sands 14-17” P.Z.
- (065XY033NE) – Sands 17-22” P.Z.
- (065XY055NE) – Sands 22-25” P.Z.
- (065XY022NE) – Wetland
- (065XY023NE) – Wet Subirrigated

### Similar Sites

- (065XY023NE) – Wet Subirrigated  
[less big bluestem; no little bluestem, more prairie cordgrass; bluejoint reedgrass common; more production]

### Inventory Data References

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel was also used. Those involved in developing this site include: Dave Cook, Rangeland Management Specialist, NRCS; Dwight Hale, Engineer, NRCS; Sheila Luoma, Resource Conservationist, NRCS; Marla Shelbourn, Rangeland Management Specialist, NRCS; and Dave Steffen, Rangeland Management Specialist, NRCS.

<u>Data Source</u>	<u>Number of Records</u>	<u>Sample Period</u>	<u>State</u>	<u>County</u>
SCS-RANGE-417	27	1968 – 1999	NE, SD	Blaine, Cherry, Custer, Garden, Garfield, Grant, Morrill, Lincoln, Loup, Thomas, Todd, Wheeler county
Ocular estimates	0	19 -19	XX	county

### State Correlation

This site has been correlated with South Dakota.

### Type Locality

State:

County:

Latitude:

Longitude:

Township:

Range:

Section:

Is the type locality sensitive? (Y/N):

General Legal Description:

### Field Offices

Ainsworth, NE  
Albion, NE  
Alliance, NE  
Bridgeport, NE  
Broken Bow, NE  
Burwell, NE  
Greeley, NE  
Martin, SD  
Neligh, NE  
North Platte, NE  
Ogallala, NE  
O'Neill, NE  
Oshkosh, NE  
Rushville, NE  
Thedford, NE  
Valentine, NE  
White River, SD

### Counties

Brown, Keya Paha and Rock, NE  
Boone, NE  
Box Butte, NE  
Morrill, NE  
Custer, NE  
Garfield, Loup and Wheeler, NE  
Greeley, NE  
Bennett and Shannon, SD  
Antelope, NE  
Lincoln, Logan and McPherson, NE  
Arthur and Keith, NE  
Holt, NE  
Garden, NE  
Sheridan, NE  
Blaine, Grant, Hooker and Thomas, NE  
Cherry, NE  
Todd, SD

### Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States; 44a – Nebraska Sand Hills.

### Other References

Other sources used as references include: USDA NRCS Water & Climate Center, USDA NRCS National Range and Pasture Handbook, USDA NRCS Soil Surveys from various counties, Atlas of the Sandhills.

### Site Description Approval

\_\_\_\_\_  
State Range Management Specialist

\_\_\_\_\_  
Date

\_\_\_\_\_  
State Range Management Specialist

\_\_\_\_\_  
Date