

# Ecological site R065XY055NE Sands High P.Z. 22-25

Accessed: 04/28/2024

## General information

**Provisional.** A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

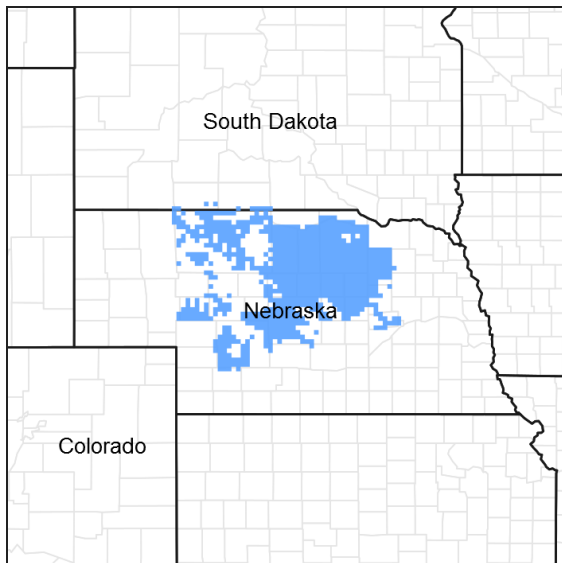


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

## MLRA notes

Major Land Resource Area (MLRA): 065X–Nebraska Sand Hills

This PROVISIONAL ECOLOGICAL SITE has been developed to meet the standards established in the National Ecological Site Handbook. The information associated with this ecological site does not meet the Approved Ecological Site Description Standard, but it has been through a Quality Control and Quality Assurance processes to assure consistency and completeness. Further investigations, reviews and correlations are necessary before it becomes an Approved Ecological Site Description.

## Classification relationships

Major Land Resource Area (MLRA): Major Land Resource Area (MLRA) and Land Resource Unit (LRU) (USDA-Natural Resources Conservation Service, 2006)

### Revision Notes:

A PROVISIONAL ECOLOGICAL SITE is a conceptual grouping of soil map unit components within a Major Land Resource Area (MLRA) based on the similarities in response to management. Although there may be wide variability in the productivity of the soils grouped into a Provisional Site, the soil vegetation interactions as expressed in the State and Transition Model are similar and the management actions required to achieve objectives, whether maintaining the existing ecological state or managing for an alternative state, are similar. Provisional Sites are likely to be refined into more precise group during the process of meeting the APPROVED ECOLOGICAL SITE

DESCRIPTION criteria.

## Ecological site concept

Landform/landscape position: The Sands site is positioned on a dune or hill, with a slope of greater than 3 percent. Edaphic: Soil textures are Loamy Fine Sand or courser, and have a dark colored surface horizon less than 10 inches thick. Catsteps are not evident on this site.

Vegetation Dynamics: This primary plant community for this site is the warm season mid-grass community with a native shrub component. A shift towards a cool-season and shorter warm season grasses will occur with excessive long-term grazing pressure. Eastern red cedars spreading from introduced windbreaks will increase and potentially dominate the grasslands in the absence of fire or other brush control practices.

## Associated sites

R065XY024NE	<b>Subirrigated</b> Subirrigated
R065XY041NE	<b>Shallow To Gravel</b> Shallow to Gravel 17-22" P.Z.
R065XY054NE	<b>Sandy High P.Z. 22-25</b> Sandy 22-25" P.Z.
R065XY056NE	<b>Choppy Sands High P.Z. 22-25</b> Choppy Sands 22-25" P.Z.

## Similar sites

R065XY056NE	<b>Choppy Sands High P.Z. 22-25</b> Choppy Sands 22-25" P.Z. (steeper slope; lower production; blowout grass present; shrubs more evident)
R065XY054NE	<b>Sandy High P.Z. 22-25</b> Sandy 22-25" P.Z. (slope not as steep; higher productions; prairie sandreed dominant)

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Andropogon hallii</i>

## Physiographic features

The site occurs on gently undulating to rolling land. It occupies sandhills that are part of upland landscapes.

This area consists of Quaternary sand dunes. The sands are derived from the underlying Tertiary Ogallala and Arikaree Groups. These units formed when rivers deposited sediments that originated as erosional detritus following the uplift of the Rocky Mountains to the west. The Ogallala aquifer underlies this area. It is the most extensive and heavily used aquifer on the high plains between the Rocky Mountains and the Mississippi River. The major recharge area for this aquifer is the Sand Hills.

Table 2. Representative physiographic features

Landforms	(1) Dune
Flooding frequency	None
Ponding frequency	None
Elevation	610–1,036 m
Slope	3–24%

Ponding depth	0 cm
Water table depth	0 cm
Aspect	Aspect is not a significant factor

## Climatic features

The mean average annual precipitation varies from 22 to 27 inches, but has varied from 13 to 29 inches in the driest to wettest season. Approximately 70 percent of the annual precipitation occurs during the growing season of mid-April to late September. The average annual snowfall varies from about 34 inches to about 42 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 8. July is the hottest month and January is the coldest. It is not uncommon for the temperature to reach 100 degrees Fahrenheit 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 negative 30 degrees Fahrenheit.

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.

**Table 3. Representative climatic features**

Frost-free period (average)	130 days
Freeze-free period (average)	151 days
Precipitation total (average)	711 mm

## Climate stations used

- (1) BARTLETT 1S [USC00250525], Bartlett, NE
- (2) BREWSTER [USC00251130], Brewster, NE
- (3) CHAMBERS [USC00251590], Chambers, NE
- (4) EWING [USC00252805], Ewing, NE
- (5) ROSE 10 WNW [USC00257318], Long Pine, NE
- (6) ELSMERE 9 ENE [USC00252680], Johnstown, NE
- (7) ERICSON 8 WNW [USC00252770], Burwell, NE
- (8) GREELEY [USC00253425], Greeley, NE
- (9) NEWPORT [USC00255925], Newport, NE
- (10) PURDUM [USC00256970], Purdum, NE
- (11) ATKINSON 3SW [USC00250420], Atkinson, NE

## Influencing water features

This plant community is not influenced by the water features commonly associated with this site.

## Soil features

The features common to all soils in this site are the sandy textured surface soils and slopes of 3 to 24 percent. The soils in this site are excessively drained and formed in eolian sand. The surface layer is 2 to 10 inches thick. The subsurface texture ranges from loamy fine sand to fine sand. Runoff as evidenced by patterns of rill, gully or other water flow is low to very low due to the very 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 5% 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 include more detail specific to your location.

Major soil series correlated to this ecological site include: Valentine.

Other soil series that have been correlated to this site include: none

**Table 4. Representative soil features**

Surface texture	(1) Fine sand (2) Loamy fine sand
Family particle size	(1) Sandy
Drainage class	Excessively drained
Permeability class	Rapid
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	7.62 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	5.1–7.8
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

## Ecological dynamics

Historically, large areas of blowing sand resulted in the active movement of the sand dunes. Evaporation from the soil surface was extremely high due to the large areas of bare ground, lack of litter and sparse plant populations. The transpiration rate of these sparse plant populations was also high due to the harsh soil environment. Occasional wild fires, severe grazing by transient bison herds and drought contributed to the lack of stability of the sand dunes. This lack of stability caused the dunes to go back and forth through multiple stages of plant succession over the course of time. Early perennial plants such as sandhill muhly, blowout grass and blowout penstemon were common due to their ability to tolerate the movement of the sand and droughty conditions. As these plants began to colonize and stabilize the sand movement, other perennials such as prairie sandreed, sand bluestem, hairy grama, lemon scurfpea and rose slowly became evident on the site. Annual plants such as sandbur, Texas croton, and common sunflower eventually colonized the areas between the perennials.

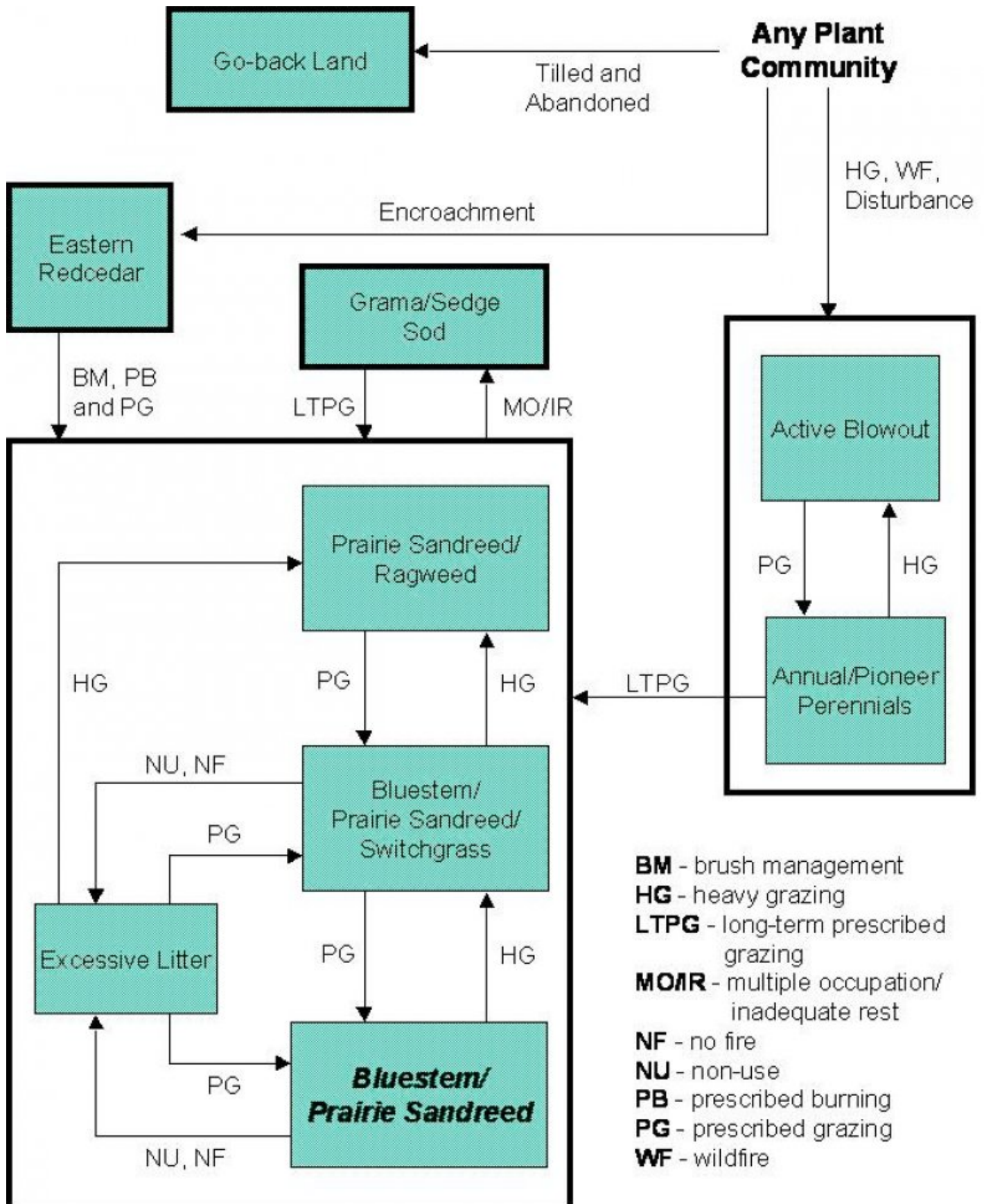
As this site deteriorates, prairie sandreed, sand dropseed, and blue grama will increase. Species such as sand bluestem and switchgrass will decrease in frequency and production. The site is extremely resilient and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allows for high drought resistance.

Interpretations are primarily based on the Bluestem/Prairie Sandreed 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.

### State and transition model



**State 1**  
**Bluestem/Prairie Sandreed Plant Community**

**Community 1.1**  
**Bluestem/Prairie Sandreed Plant Community**

Interpretations are primarily based on the Bluestem/Prairie Sandreed 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 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. This plant community consists chiefly of tall and mid warm season grasses. Principle dominants are sand bluestem, prairie sandreed, and little bluestem. Grasses of secondary importance are Indiangrass, needlegrasses, switchgrass, sand dropseed, and hairy or blue grama. Sedges occur in the understory. Forbs and shrubs such as blazing star (gayfeather), stiff sunflower, leadplant, rose, and sandcherry are significant. This plant community is about 85% grasses, 10% forbs, and 5% shrubs by weight. 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: NE6534 Growth curve name: Nebraska/South Dakota Sandhills, Native Grasslands Growth curve description: Warm-season dominant, cool-season subdominant, mid & tall grasses. Transitional pathways and/or community pathways leading to other plant communities are as follows: Heavy grazing and/or improper rest periods will convert this plant community to the Bluestem/Prairie Sandreed/Switchgrass Plant Community. Continuous heavy grazing tends to accelerate this movement. Non-use and no fire will convert this plant community to the Excessive Litter Plant Community.

**Table 5. Annual production by plant type**

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1961	2608	3127
Forb	140	219	308
Shrub/Vine	28	87	151
<b>Total</b>	<b>2129</b>	<b>2914</b>	<b>3586</b>

**Figure 7. Plant community growth curve (percent production by month). NE6534, NE/SD Sandhills, Native Grasslands. Warm-season dominant, cool-season subdominant, mid- and tallgrasses.**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		5	5	15	25	30	10	7	3		

**State 2**  
**Bluestem/Prairie Sandreed/Switchgrass Plant Community**

**Community 2.1**  
**Bluestem/Prairie Sandreed/Switchgrass Plant Community**

Plants resistant to grazing are maintaining themselves in this plant community which developed under grazing by domestic livestock. Most of the palatable plants from the Bluestem/Prairie Sandreed Plant Community are present but occur in lesser amounts. Warm-season grasses still comprise a significant component of this plant community. The potential vegetation is about 75% grasses or grass-like plants, 15% forbs, and 10% shrubs. Dominant grasses include sand bluestem, little bluestem, and prairie sandreed. Grasses of secondary importance include blue or hairy grama, switchgrass, sand dropseed, and Scribner's panicum. Forbs commonly found in this plant community include blazing star (gayfeather), stiff sunflower, white heath aster, and goldenrod. Indiangrass is no longer present and sand bluestem and perennial forbs are present in lesser amounts. This plant community has higher overall production of shrubs as compared to the Bluestem/Prairie Sandreed Plant Community, and other types of shrubs are present. Excessive removal of forage will cause shrubs to increase further. Strong healthy root systems allow

production to increase drastically with favorable precipitation. This plant community is drought resistance due to its tall and mid grass diversity which allows for summer months growth. These warm-season grasses cure well for winter forage stockpiling. This plant community has slightly less litter than the Bluestem/Prairie Sandreed Plant Community. This plant community is somewhat resistant to change if management remains essentially the same. However, either improved management or increased disturbance can move the plant community somewhat easily. This resiliency of this plant community is dependent on the type of management system implemented, and the intensity and duration of the disturbance. 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: NE6534 Growth curve name: Nebraska/South Dakota Sandhills, Native Grasslands Growth curve description: Warm-season dominant, cool-season subdominant, mid & tall grasses. Transitional pathways and/or community pathways leading to other plant communities are as follows: Prescribed grazing or prescribed grazing with periodic fire will convert the plant community to the Bluestem/Prairie Sandreed Plant Community. The probability of this occurring is high. Heavy grazing or improper rest periods will convert this plant community to the Prairie Sandreed/Ragweed Plant Community. High populations of gophers may cause the plant community to move to the Prairie Sandreed/Ragweed Plant Community as well. Continuous heavy grazing tends to accelerate this movement to the Prairie Sandreed/Ragweed Plant Community. Non-use and no fire will convert this plant community to the Excessive Litter Plant Community.

**Table 6. Annual production by plant type**

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1659	2127	2214
Forb	123	258	420
Shrub/Vine	123	194	280
<b>Total</b>	<b>1905</b>	<b>2579</b>	<b>2914</b>

**Figure 9. Plant community growth curve (percent production by month). NE6534, NE/SD Sandhills, Native Grasslands. Warm-season dominant, cool-season subdominant, mid- and tallgrasses.**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		5	5	15	25	30	10	7	3		

### State 3 Prairie Sandreed/Ragweed Plant Community

#### Community 3.1 Prairie Sandreed/Ragweed Plant Community

This plant community is established under historic heavy grazing with continued seasonal grazing starting in early May. The plant community is a mix of warm season and short cool season grasses, with an increase of forbs and shrubs. The percent ground cover increases from the Bluestem/Prairie Sandreed Plant Community due to considerable encroachment by the bluegrasses. The potential vegetation is about 60% grasses or grass-like plants, 25% forbs, and 15% shrubs. The dominant grasses include prairie sandreed, bluegrass, and sand dropseed. Other grasses present include blue or hairy grama, Scribner's panicum, and needleandthread. Major forbs include Cuman(western ragweed), with lesser amounts of green sagewort and blazing star (gayfeather). The dominant shrubs include rose and snowberry. There is a total increase in shrubs, but a high increase of snowberry and other shrubs not present in the Bluestem/Prairie Sandreed Plant Community. There is a significant increase in ragweed and Kentucky bluegrass (a shift towards cool season plants). With the exception of an increase in prairie sandreed, a dramatic decrease occurs in mid to tall warm season grasses (sand bluestem, switchgrass, little bluestem). The soil surface has remained intact. Total annual production is significantly reduced by 25-35%. Plant diversity and amount of litter is lower. This plant community is considered stable, but is at risk if a major shift in climate or overgrazing occurs. The resiliency of this plant community is moderate depending on the intensity and duration of disturbance. Infiltration and runoff are not greatly affected due to the nature of the soil. 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: NE6539 Growth curve name: Nebraska/South Dakota Sandhills, Native Grasslands,

Disturbed Growth curve description: Warm-season and cool-season co-dominant, short, mid and tall grasses. Transitional pathways and/or community pathways leading to other plant communities are as follows: Prescribed grazing with periodic spring only grazing, or non-use during the growing season will convert the plant community to the Bluestem/Prairie Sandreed/Switchgrass Plant Community. Prescribed grazing with periodic early season prescribed burning will also convert this plant community to the Bluestem/Prairie Sandreed/Switchgrass Plant Community. Heavy grazing or improper rest periods will convert this plant community to the Annual/Pioneer Perennial Plant Community. Extended drought periods (generally below average precipitation for more than 10 years) will also move the plant community to the Annual/Pioneer Perennial Plant Community. Continuous heavy grazing tends to accelerate this movement.

**Table 7. Annual production by plant type**

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1182	1382	1653
Forb	185	334	504
Shrub/Vine	90	191	308
<b>Total</b>	<b>1457</b>	<b>1907</b>	<b>2465</b>

**Figure 11. Plant community growth curve (percent production by month). NE6539, NE/SD Sandhills, Native Grass, Disturbed. Warm-season and cool-season co-dominant, short-, mid-, and tallgrasses.**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		5	15	20	20	20	10	7	3		

## State 4 Excessive Litter Plant Community

### Community 4.1 Excessive Litter Plant Community

This plant community occurs after an extended period (10 - 30 years) of non-use by domestic livestock (periodic fire may extend the amount of time it will take to reach this plant community). Livestock grazing and fire has been eliminated. Litter amount has clearly increased and few or no sedges or understory plants (shortgrass) are present. There is reduced plant basal cover, which is replaced by litter. Bunch grass plants tend to colonize by individual species and are very mature. These mature plants tend to have dead centers, with high individual plant vigor, and pedestalling is evident. These plants have very few tillers for vegetative reproduction. The potential vegetation is about 90% grasses or grass-like plants, 5% forbs, and 5% shrubs. The dominant grasses include sand bluestem, prairie sandreed, little bluestem, and needlegrasses. Other grasses present include sand dropseed, switchgrass, and prairie junegrass. The dominant forbs include Cuman (western) ragweed and spiny phlox, with less dominant forbs including blazing star (gayfeather) and green sagewort. The shrubs present include rose, leadplant, and western sandcherry. Plant diversity has decreased and native plants tend to occur in individual colonies. This plant community has a high amount of litter covering the soil between widely dispersed mature plants. This plant community will change rapidly if plant manipulation is allowed to occur (grazing by domestic livestock or possibly periodic fire). If the intensity and duration of the disturbance is not great enough, it will return to this plant community somewhat easily. Soil erosion is low, and infiltration and runoff are not significantly different than the Bluestem/Prairie Sandreed Plant Community. 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: NE6536 Growth curve name: Nebraska/South Dakota Sandhills, Native Grasslands, Non-Use Growth curve description: Warm-season dominant, cool-season subdominant, excessive litter. Transitional pathways and/or community pathways leading to other plant communities are as follows: Prescribed grazing or prescribed grazing with fire will convert the plant community to the Bluestem/Prairie Sandreed Plant Community. Depending on the length of time non-use occurred and the composition of the plant species prior to removal of use and/or fire, these practices will move this plant community to the Bluestem/Prairie Sandreed Plant Community or the Bluestem/Prairie Sandreed/Switchgrass Plant Community. Heavy grazing or improper rest periods will convert this plant community to the Prairie Sandreed/Ragweed Plant Community. This change will be accelerated if coupled with several years of



below average precipitation. Multi-year continuous heavy use will convert this plant community to the Annual/Pioneer Perennial Plant Community.

**Table 8. Annual production by plant type**

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1917	2502	3082
Shrub/Vine	50	94	140
Forb	50	94	140
<b>Total</b>	<b>2017</b>	<b>2690</b>	<b>3362</b>

**Figure 13. Plant community growth curve (percent production by month). NE6536, NE/SD Sandhills, Native Grass, Non-Use. Warm-season dominant, cool-season subdominant, excessive litter.**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	15	20	20	20	10	7	3	0	0

## State 5 Grama/Sedge Sod Plant Community

### Community 5.1 Grama/Sedge Sod Plant Community

This plant community developed under an improperly managed rotational grazing system, consisting of multiple occupations and an inadequate recovery period during the growing season. While this is not a frequently occurring plant community, it needs to be recognized that improperly managed intensive systems will lead to a modified plant community. It is made up of warm-season short grasses, and cool-season grasses and grass-likes. The dominant grass is blue grama. Other grasses or grass-likes include hairy grama, sedges, sand dropseed, sand bluestem, prairie sandreed, needleandthread, and switchgrass. The dominant forbs include Cuman (western) ragweed and common sunflower. The dominant shrubs include rose and cactus. Compared to the Bluestem/Prairie Sandreed Plant Community, blue grama, hairy grama, sedges, ragweed, and rose have increased, while prairie sandreed, sand bluestem, and switchgrass have decreased. The plant diversity has decreased from that of the Bluestem/Prairie Sandreed Plant Community. This plant community is resistant to change due to a lower percentage of bare ground. Under disturbance, this plant community is also highly resilient. The soil erosion is low. The water cycle is impaired due to a reduction in litter and the potential for higher runoff and decreased infiltration. 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: NE6535 Growth curve name: Nebraska/South Dakota Sandhills, Grama Growth curve description: Warm-season dominant, short grass. Transitional pathways and/or community pathways leading to other plant communities are as follows: With long-term prescribed grazing, including adequate recovery periods, succession will progress leading to the Bluestem/Prairie Sandreed Plant Community. This change will require a long period of time, and may be difficult to attain if the grama sod is extensive.

**Figure 14. Plant community growth curve (percent production by month). NE6535, NE/SD Sandhills Blue Grama dominant. Warm-season dominant, short grass.**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	15	30	25	15	10	0	0	0

## State 6 Annual/Pioneer Perennial Plant Community

### Community 6.1 Annual/Pioneer Perennial Plant Community

As succession progresses, sandhill muhly, blowout grass, and sand bluestem begin to colonize. Sandbur, lemon scurfpea, Texas croton, and common sunflower begin to come in with prairie sandreed, hairy grama, and rose slowly becoming evident on this plant community. 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: NE6537 Growth curve name: Nebraska/South Dakota Sandhills, Annual/Pioneer Perennial Growth curve description: Short cool season grasses, and cool season annual forbs. Transitional pathways and/or community pathways leading to other plant communities are as follows: With continued disturbance (such as heavy grazing) and/or wildfire, this plant community will move towards the Active Blowout Plant Community. Under long-term prescribed grazing (10+ years), including adequate rest periods, succession will progress leading to the Bluestem/Prairie Sandreed Plant Community. The slope, aspect, size and relative abundance of perennial plants will influence the rate that change will occur.

**Figure 15. Plant community growth curve (percent production by month). NE6537, NE/SD Sandhills, Annual/Pioneer Perennial. Short cool season grasses, and cool season annual forbs..**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	10	20	30	20	5	5	5	0	0

## State 7 Eastern Redcedar Plant Community

### Community 7.1 Eastern Redcedar Plant Community

This plant community can develop whenever eastern redcedar is adjacent to the originating plant community, and encroachment of the eastern redcedar occurs. This can occur in areas adjacent to a seed source, such as near windbreaks. With properly managed intensive grazing, encroachment can be prevented. This plant community is made up of trees with a canopy cover of 15% or greater consisting of trees 6 feet or taller. The herbaceous component decreases proportionately in relation to the percent cover of eastern redcedar. This plant community is resistant to change, and resilient given normal disturbances. In higher canopy cover situations, the soil erosion will increase in relation to most of the plant communities from which this plant community originated. The water cycle is also significantly altered under higher canopies. Infiltration is reduced because of interception of rainfall by the canopy. Runoff is not greatly increased, as the soil is still capable of absorbing the rainfall that reaches the soil surface. 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: NE6542 Growth curve name: Nebraska/South Dakota Sandhills, Eastern Redcedar Encroachment Growth curve description: Closed or nearly closed canopy of eastern redcedar. Transitional pathways and/or community pathways leading to other plant communities are as follows: With brush management, followed by prescribed burning and prescribed grazing, succession will progress leading to the Bluestem/Prairie Sandreed Plant Community.

**Figure 16. Plant community growth curve (percent production by month). NE6542, NE/SD Sandhills, Eastern Redcedar Encroachment. Closed or nearly closed canopy of eastern redcedar.**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			10	30	25	20	10	5			

## State 8 Active Blowout Plant Community

### Community 8.1 Active Blowout Plant Community

This plant community can be reached from any other plant community with significant disturbances such as heavy grazing, and repeated wildfire. Large areas of blowing sand result in movement and possible enlargement of the blowout. Evaporation and transpiration are extremely high due to bare ground, lack of litter, fire, and few plants. This plant community is in a low successional stage from poor soil development, fire occurrence, and sporadic

herbivore use. Sandhill muhly and blowout grass are present due to their drought tolerance. 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: NE6538 Growth curve name: Nebraska/South Dakota Sandhills, Active Blowout Growth curve description: Areas of open, blowing sand and pioneer species. Transitional pathways and/or community pathways leading to other plant communities are as follows: With prescribed grazing and concentrated short-term animal impact (such as feeding hay on the blowout), this plant community will move to the Annual/Pioneer Perennial Plant Community. Establishment of vegetation may be accelerated by broadcast seeding of a temporary cover crop prior to removal of animal impact.

Figure 17. Plant community growth curve (percent production by month). NE6538, NE/SD Sandhills, Active Blowout. Areas of open, blowing sand and pioneer species.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	10	35	30	20	5	0	0	0

## State 9 Go-back Land Plant Community

### Community 9.1 Go-back Land Plant Community

This plant community can be reached whenever severe mechanical disturbance occurs. The vegetation on this plant community varies greatly, sometimes being dominated by little bluestem, three-awn, sand dropseed, prairie sandreed, marestalk, common sunflower, green sagewort, and/or ragweed. Other plants that occur include rose, yucca, sand bluestem, switchgrass, and needleandthread. Compared to the Bluestem/Prairie Sandreed Plant Community, warm-season natives have decreased. Annual forbs and grasses have become established in the plant community. This plant community is variable in its resistance to change and is resilient depending on past management practices. Soil erosion is typically evident in low successional stages. The water cycle is not greatly affected. Many of the areas seeded prior to the 1960's are now dominated by little bluestem.

### Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Sand Bluestem</b>			729–1166	
	sand bluestem	ANHA	<i>Andropogon hallii</i>	729–1166	–
2	<b>Prairie Sandreed</b>			437–729	
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	437–729	–
3	<b>Little Bluestem</b>			437–729	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	437–729	–
4	<b>Needlegrass</b>			146–291	
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	146–291	–
	porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	146–291	–
5	<b>Grama</b>			29–291	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	29–291	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	29–146	–
6	<b>Other Warm-Season Grasses</b>			437–874	
	switchgrass	PAVI2	<i>Panicum virgatum</i>	291–583	–
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	146–437	–
	sand lovegrass	ERTR3	<i>Eragrostis trichodes</i>	146–437	–

	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–117	–
	thin paspalum	PASE5	<i>Paspalum setaceum</i>	0–87	–
7	<b>Native Grass/Grass-Likes</b>			87–233	
	sedge	CAREX	<i>Carex</i>	29–146	–
	Scribner's rosette grass	DIOLS	<i>Dichanthelium oligosanthes</i> var. <i>scribnerianum</i>	29–146	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	29–146	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–58	–
<b>Forb</b>					
9	<b>Forbs</b>			146–291	
	scurfpea	PSORA2	<i>Psoralegium</i>	0–87	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–58	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	0–58	–
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	0–58	–
	stiff sunflower	HEPA19	<i>Helianthus pauciflorus</i>	0–58	–
	blazing star	LIATR	<i>Liatris</i>	0–58	–
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	0–29	–
	beardtongue	PENST	<i>Penstemon</i>	0–29	–
	thistle	CIRSI	<i>Cirsium</i>	0–29	–
	goldenrod	SOLID	<i>Solidago</i>	0–29	–
	white heath aster	SYER	<i>Symphotrichum ericoides</i>	0–29	–
	spiderwort	TRADE	<i>Tradescantia</i>	0–29	–
<b>Shrub/Vine</b>					
10	<b>Shrubs</b>			29–146	
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	29–87	–
	leadplant	AMCA6	<i>Amorpha canescens</i>	29–87	–
	western sandcherry	PRPUB	<i>Prunus pumila</i> var. <i>besseyi</i>	29–87	–
	rose	ROSA5	<i>Rosa</i>	29–87	–
	American plum	PRAM	<i>Prunus americana</i>	0–58	–

Table 10. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Sand Bluestem</b>			387–902	
	sand bluestem	ANHA	<i>Andropogon hallii</i>	387–902	–
2	<b>Prairie Sandreed</b>			258–516	
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	258–516	–
3	<b>Little Bluestem</b>			437–729	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	437–729	–
4	<b>Needlegrass</b>			0–129	
	needle and thread	HECOC8	<i>Hesperostipa comata</i> ssp. <i>comata</i>	0–129	–
	porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	0–129	–
5	<b>Gramma</b>			129–258	
	Blue grama	BOGRA	<i>Bouteloua curtipendula</i>	129–258	–

	blue grama	BOGRZ	<i>Bouteloua gracilis</i>	129–258	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	129–258	–
6	<b>Other Warm-Season Grasses</b>			258–387	
	switchgrass	PAVI2	<i>Panicum virgatum</i>	291–583	–
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	0–129	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–129	–
	purple lovegrass	ERSP	<i>Eragrostis spectabilis</i>	0–129	–
	sand lovegrass	ERTR3	<i>Eragrostis trichodes</i>	0–129	–
	thin paspalum	PASE5	<i>Paspalum setaceum</i>	0–87	–
	sandhill muhly	MUPU2	<i>Muhlenbergia pungens</i>	0–52	–
7	<b>Native Grass/Grass-Likes</b>			52–258	
	sedge	CAREX	<i>Carex</i>	26–129	–
	Scribner's rosette grass	DIOLS	<i>Dichanthelium oligosanthes</i> var. <i>scribnerianum</i>	26–129	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–129	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–52	–
<b>Forb</b>					
9	<b>Forbs</b>			129–387	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–103	–
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	0–103	–
	stiff sunflower	HEPA19	<i>Helianthus pauciflorus</i>	0–103	–
	blazing star	LIATR	<i>Liatris</i>	0–103	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	0–77	–
	scurfpea	PSORA2	<i>Psoraleidium</i>	0–77	–
	goldenrod	SOLID	<i>Solidago</i>	0–52	–
	white heath aster	SYER	<i>Symphyotrichum ericoides</i>	0–52	–
	spiderwort	TRADE	<i>Tradescantia</i>	0–52	–
	thistle	CIRSI	<i>Cirsium</i>	0–52	–
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	0–52	–
	beardtongue	PENST	<i>Penstemon</i>	0–52	–
<b>Shrub/Vine</b>					
10	<b>Shrubs</b>			129–258	
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	52–129	–
	leadplant	AMCA6	<i>Amorpha canescens</i>	52–129	–
	western sandcherry	PRPUB	<i>Prunus pumila</i> var. <i>besseyi</i>	52–129	–
	rose	ROSA5	<i>Rosa</i>	52–129	–

Table 11. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Sand Bluestem</b>			0–95	
	sand bluestem	ANHA	<i>Andropogon hallii</i>	0–95	–
2	<b>Prairie Sandreed</b>			381–572	
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	381–572	–

3	<b>Little Bluestem</b>			0–191	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	0–191	–
4	<b>Needlegrass</b>			0–95	
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	0–95	–
	porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	0–95	–
5	<b>Grama</b>			95–191	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	95–191	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	95–191	–
6	<b>Other Warm-Season Grasses</b>			95–381	
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	95–286	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	0–191	–
	thin paspalum	PASE5	<i>Paspalum setaceum</i>	0–95	–
	purple lovegrass	ERSP	<i>Eragrostis spectabilis</i>	0–95	–
	sandhill muhly	MUPU2	<i>Muhlenbergia pungens</i>	0–38	–
7	<b>Native Grass/Grass-Likes</b>			114–286	
	Scribner's rosette grass	DIOLS	<i>Dichanthelium oligosanthes var. scribnerianum</i>	95–191	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–95	–
	sedge	CAREX	<i>Carex</i>	19–95	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–38	–
8	<b>Non-Native Grasses</b>			381–762	
	bluegrass	POA	<i>Poa</i>	381–762	–
	cheatgrass	BRTE	<i>Bromus tectorum</i>	0–95	–
<b>Forb</b>					
9	<b>Forbs</b>			191–476	
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	191–381	–
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	0–191	–
	blazing star	LIATR	<i>Liatris</i>	0–152	–
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	0–95	–
	beardtongue	PENST	<i>Penstemon</i>	0–95	–
	scurfpea	PSORA2	<i>Psoralegium</i>	0–95	–
	goldenrod	SOLID	<i>Solidago</i>	0–95	–
	white heath aster	SYER	<i>Symphyotrichum ericoides</i>	0–95	–
	spiderwort	TRADE	<i>Tradescantia</i>	0–95	–
	thistle	CIRSI	<i>Cirsium</i>	0–95	–
	stiff sunflower	HEPA19	<i>Helianthus pauciflorus</i>	0–95	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–95	–
	Forb, annual	2FA	<i>Forb, annual</i>	0–57	–
<b>Shrub/Vine</b>					
10	<b>Shrubs</b>			95–286	
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	38–152	–
	rose	ROSA5	<i>Rosa</i>	38–95	–
	leadplant	AMCA6	<i>Amorpha canescens</i>	0–38	–
	western sandcherry	PRPUB	<i>Prunus pumila var. besseyi</i>	0–38	–

Table 12. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Sand Bluestem</b>			404–942	
	sand bluestem	ANHA	<i>Andropogon hallii</i>	404–942	–
2	<b>Prairie Sandreed</b>			269–538	
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	269–538	–
3	<b>Little Bluestem</b>			269–538	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	269–538	–
4	<b>Needlegrass</b>			269–538	
	needle and thread	HECOC8	<i>Hesperostipa comata</i> ssp. <i>comata</i>	269–538	–
	porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	269–538	–
5	<b>Grama</b>			0–135	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0–135	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	0–135	–
6	<b>Other Warm-Season Grasses</b>			269–538	
	switchgrass	PAVI2	<i>Panicum virgatum</i>	135–404	–
	sand lovegrass	ERTR3	<i>Eragrostis trichodes</i>	135–269	–
	thin paspalum	PASE5	<i>Paspalum setaceum</i>	0–135	–
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	0–135	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–135	–
7	<b>Native Grass/Grass-Likes</b>			135–269	
	Scribner's rosette grass	DIOLS	<i>Dichanthelium oligosanthes</i> var. <i>scribnerianum</i>	54–215	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	54–215	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–54	–
	sedge	CAREX	<i>Carex</i>	27–54	–
8	<b>Non-Native Grasses</b>			0–135	
	cheatgrass	BRTE	<i>Bromus tectorum</i>	0–135	–
	bluegrass	POA	<i>Poa</i>	0–135	–
<b>Forb</b>					
9	<b>Forbs</b>			54–135	
	spiny phlox	PHHO	<i>Phlox hoodii</i>	0–135	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–135	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	0–135	–
	scurfpea	PSORA2	<i>Psoraleidium</i>	0–81	–
	goldenrod	SOLID	<i>Solidago</i>	0–54	–
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	0–54	–
	stiff sunflower	HEPA19	<i>Helianthus pauciflorus</i>	0–54	–
	blazing star	LIATR	<i>Liatris</i>	0–54	–
	Forb, annual	2FA	<i>Forb, annual</i>	0–54	–
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	0–27	–
	beardtongue	PENST	<i>Penstemon</i>	0–27	–

	thistle	CIRSI	<i>Cirsium</i>	0-27	-
	white heath aster	SYER	<i>Symphotrichum ericoides</i>	0-27	-
	spiderwort	TRADE	<i>Tradescantia</i>	0-27	-
<b>Shrub/Vine</b>					
10	<b>Shrubs</b>			54-135	
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0-81	-
	leadplant	AMCA6	<i>Amorpha canescens</i>	0-81	-
	western sandcherry	PRPUB	<i>Prunus pumila var. besseyi</i>	0-81	-
	rose	ROSA5	<i>Rosa</i>	0-81	-

## Animal community

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.

## Hydrological functions

Water is the principal factor limiting forage production on this site. The Valentine soils on this site are in Hydrologic Soil Group A (low runoff and high infiltration even when thoroughly wetted). Water transmission through Group A soils is normally greater than 0.30 inches per hour. Runoff is expected to occur only during intense storms (refer to Section 4, NRCS National Engineering Handbook for runoff quantities and hydrologic curves).

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 in association with bunchgrasses such as little bluestem. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent. Cryptogamic crusts are present but only cover 1-2% of the soil surface. Overall this site has the appearance of being extremely stable and productive.

## Recreational uses

This site provides hunting opportunities for upland game species. The wide variety of plants which bloom from spring to fall have an aesthetic 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.

## Other information

Revision Notes: "This PROVISIONAL ecological site concept has been QC'd and QA'd to ensure that the site meets the NESH standards for a provisional ecological site that provides basic compiled information in one location. This site should not be considered an Approved ESD until further data entry and editing is completed.

## 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; Dave Steffen, Rangeland Management Specialist, NRCS.

There is one SCS-RANGE-417 record available from Custer county. The sample period is 1978.

## 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 Development and Testing Plan:

Future work is needed to validate the information in this Provisional Ecological Site Description. Additional data collection and evaluation may also be needed to develop this ESD to the Approved, then Correlated level. This could include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Field reviews of the project plan should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document.

The State and Transitional Model and corresponding pathways and associated vegetative communities will need to be reviewed and upgraded to adhere to the new guidelines.

Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team. The project plan is: ES- R065XY055NE - MLRA 65 -

## Contributors

Dana Larsen

## Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	Stan Boltz
Contact for lead author	Stan Boltz, stanley.boltz@sd.usda.gov, 605-352-1236
Date	10/31/2001
Approved by	Stan Boltz
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:** None.
- 

2. **Presence of water flow patterns:** None.
- 

3. **Number and height of erosional pedestals or terracettes:** Bunchgrasses may be pedestalled, but no exposed roots should be present.

- 
4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground typically less than 15 percent. Occasional small blowouts may occur immediately adjacent to areas receiving repeated disturbance, but areas should be few and typically not greater than a few feet in diameter.
- 
5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present.
- 
6. **Extent of wind scoured, blowouts and/or depositional areas:** Occasional areas associated with increased animal activity (e.g., rodent burrows, animal trailing) may exhibit small wind scoured areas, typically less than 10 feet in diameter.
- 
7. **Amount of litter movement (describe size and distance expected to travel):** Litter should fall in place. Slight amount of movement of smallest size class litter is possible, but not normal.
- 
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Some series on this site typically have little organic matter in the surface horizon, and the structure is single grain sand. Soil aggregate stability will be difficult to measure on these soils. Surface organic matter should still adhere to the soil surface. Surface erosion by water rarely occurs due to rapid infiltration, but surface is susceptible to wind erosion if vegetative cover is reduced due to drought or heavy grazing. Biological crusts are often present (up to 10% of the surface) and serve to provide resistance to erosion. The dominant rhizomatous warm-season species are adapted to these coarse soils and when vigorous are vital in preventing erosion by wind.
- 
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A-horizon should be 2 to 4 inches thick. Some soils have little organic matter in the A-horizon and dark grayish brown colors when moist, but possibly not mollic. Structure can be single grain to fine granular parting to single grain in the A-horizon.
- 
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Combination of shallow and deep rooted species (mid & tall rhizomatous and tufted perennial cool- and warm-season grasses) with fine and coarse roots positively influences infiltration. Infiltration is typically high due to the coarse nature of these soils.
- 
11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction layer should be present.
- 
12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**
- Dominant: Tall, warm-season grasses >>
- Sub-dominant: Mid, warm-season grasses >

Other: Mid, cool-season bunchgrasses = short, warm-season grasses = forbs > grass-like species = shrubs

Additional: Other native grasses occur in other functional groups in minor amounts.

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very little to no evidence of decadence or mortality.
- 
14. **Average percent litter cover (%) and depth ( in):** 40-60 percent plant litter cover, roughly 0.25 to 0.5 inches in depth. Litter cover is in contact with the soil surface.
- 
15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Total annual production ranges from 1,900 to 3,200 pounds/acre, with the reference value being 2,600 pounds/acre (air-dry basis).
- 
16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Refer to State and local Noxious Weed List.
- 
17. **Perennial plant reproductive capability:** All species exhibit high vigor relative to climatic conditions. Do not rate based solely on seed production. Perennial grasses should have vigorous rhizomes or tillers.
-