

# Ecological site R071XY054NE Sandy

Accessed: 04/25/2024

## 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.

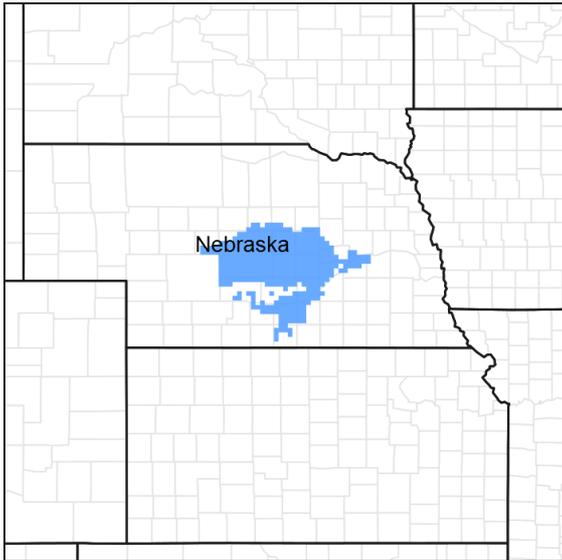


Figure 1. Mapped extent

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): 071X–Central Nebraska Loess 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.

MLRA 71 is named “The Central Nebraska Loess Hills”, and is located exclusively in Nebraska. The approximately 5.3 million acre landscape covers all or parts of 21 counties, primarily Custer, Dawson, Buffalo, Sherman, Howard, Valley, Greeley and Hall. The physical appearance of the landscape is dominated by loess hills dissected by the North, Middle and South Loup Rivers and their tributaries. The Platte River defines the southern border.

The elevation in MLRA 71 ranges from over 3,000 to less than 1,700 feet above sea level, with average local relief stretching from 20 to 200 feet. The predominate soil orders are mesic, udic Mollisols and Entisols, commonly represented by the Coly, Uly, Cozad, Hord, Hall and Holdredge soil series.

Loess overlays the surface of almost all of the uplands in this MLRA. Alluvial clay, silt, sand, and gravel are deposited in the stream and river valleys, and can be extensive in the major drainages. Terraces are common in the valleys along the river systems.

Average annual precipitation ranges from 21 to 26 inches, with the number of freeze-free days averaging around 200.

The matrix vegetation type is mixed-grass prairie, with big and little bluestem, switchgrass, Indiangrass, and

sideoats and blue grama making up the bulk of the warm-season species, while western wheatgrass is the dominant cool season species.

The primary large-patch vegetative component of the landscape is dominated by Needle-and-thread, prairie sandreed, sand and little bluestem, and blue grama grass.

The majority of the small-patch communities are associated with upland playas and the wetter sites found along the floodplains.

Forty four percent of the land in this MLRA has been broken out of native prairie and farmed; mostly corn, alfalfa and some soybeans, while 48 percent of the grasslands remain intact. Livestock grazing, primarily cattle, is a major industry here.

Wildlife flourishes in this combination of crop and grassland environment, with both mule and white-tailed deer being the most abundant wild ungulate. A variety of smaller species, including coyote, raccoon, opossum, porcupines, muskrat, beaver, squirrel and mink thrive in the region, as well as a suite of grassland and upland birds. The rivers, streams and lakes harbor excellent fisheries.

This landscape developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores and repeated natural or man-caused wildfire. Other biotic and abiotic factors also typically influence soil/site development. This is a disturbance driven ecosystem, evolving under the influences of herbivory, fire, and variable climate. Historically, these processes created a heterogenous mosaic of plant communities and structure heights across the region. Any given site in this landscape experienced fire every 7 to 9 years. The fires were caused both by lightning strikes, and were set by native Americans, who used fire for warfare, signaling, and to refresh the native grasses. These people understood the value of fire as a tool, and that the highly palatable growth following a fire provided both excellent forage for their horses, and attracted grazing game animals such as bison and elk.

Even as post European settlement's alteration of the fire regime allows the expansion of the woody component of the native prairie, introduction of eastern red cedar as a windbreak component further facilitates invasion by this species.

While eastern red cedar is native to Nebraska, the historic population in MLRA 71 was limited to isolated pockets in rugged river drainages that were subsequently insulated from fire, or non-existent. Widespread plantings of windbreaks with eastern red cedar as a primary component has provided a seed source for the aggressive woody plant. The ensuing encroachment into the native grasslands degrades the native wildlife habit and causes significant forage loss for domestic livestock. However, since it is not a root sprouter, eastern red cedar is very susceptible to fire when under six feet tall. Management with prescribed fire is exceedingly effective if applied before this stage. Larger cedars can also be controlled with fire, but requires the use of specially designed ignition and suppression techniques.

Fragmentation of the native grasslands by conversion to cropland, transportation corridors and other development by European man has effectively disrupted the natural fire regime of this ecosystem. This has allowed encroachment by native and introduced shrubs and trees into the remnants of the native prairie throughout the MLRA. Aggressive fire suppression policies have exacerbated this process to the point that shrub and tree encroachment is a major ecological issue in the majority of both native and re-seeded grasslands.

## **Classification relationships**

Major Land Resource Area (MLRA): Major Land Resource Area (MLRA) 71 USDA Natural Resources Conservation Service, 2006)

Ecoregions of Nebraska, Nebraska Natural Legacy Project: Mixed-grass Ecoregion

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**

This site can occupy a dune or interdune position. the soil texture is sandy loam or finer, or has a dark colored

surface greater than 10 inches thick.

When occupying dune positions, the slope is from 3 to 15 percent, but catsteps are not evident.

Sandy sites that are interdune features have less than 3 percent slope.

### Associated sites

R071XY024NE	<b>Subirrigated</b> Sub-irrigated-Lower on the landscape.
R071XY055NE	<b>Sands</b> Sands-Higher on the landscape, often adjacent to the Sandy site.

### Similar sites

R071XY037NE	<b>Limy Upland</b> Limy Upland-Differentiated by soil texture other than LFS, SL, LS or S, and has an effervescing soil.
R071XY055NE	<b>Sands</b> Sands-Occupies a higher landscape position, slopes are steeper, lower vegetative production.
R071XY036NE	<b>Loamy Upland</b> Loamy Upland-Differentiated by soil texture, not LFS,SL,LS or S.

**Table 1. Dominant plant species**

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Andropogon hallii</i> (2) <i>Calamovilfa longifolia</i>

### Physiographic features

This site occurs on uplands that are nearly level to steep slopes. Surface slope slips known as “catsteps” are not characteristic of this site. This site produces runoff to areas lower on the landscape. This site is subject to erosion by water if the vegetative cover is reduced or absent by such things as overgrazing and fire events. Livestock trailing on this site can lead to the formation of blowouts.

**Table 2. Representative physiographic features**

Landforms	(1) Dune (2) Interdune
Elevation	1,630–3,075 ft
Slope	0–15%
Aspect	Aspect is not a significant factor

### Climatic features

Annual precipitation ranges from 22 to 26 inches per year. Occasional strong storms may bring brief periods of high winds with gusts to more than 60 miles per hour.

Growth of native cool season plants begins in early April and continues to about mid June. Native warm season plants begin growth in early June, and continue to early August. Green up of cool season plants may occur in September and October.

**Table 3. Representative climatic features**

Frost-free period (average)	137 days
Freeze-free period (average)	156 days

Precipitation total (average)	26 in
-------------------------------	-------

### Climate stations used

- (1) ANSELMO 2 SE [USC00250245], Anselmo, NE
- (2) BROKEN BOW 2 W [USC00251200], Broken Bow, NE
- (3) STAPLETON 5W [USC00258133], Stapleton, NE
- (4) BURWELL [USC00251345], Burwell, NE
- (5) CANADAY STEAM PLT [USC00251450], Lexington, NE
- (6) COMSTOCK [USC00251835], Comstock, NE
- (7) LOUP CITY [USC00254985], Loup City, NE
- (8) MASON CITY [USC00255250], Mason City, NE
- (9) OVERTON 3 W [USC00256439], Overton, NE
- (10) GRAND ISLAND AP [USW00014935], Grand Island, NE
- (11) CENTRAL CITY [USC00251560], Central City, NE
- (12) KEARNEY 4 NE [USC00254335], Kearney, NE
- (13) NORTH LOUP [USC00256040], North Loup, NE
- (14) RAVENNA [USC00257040], Ravenna, NE
- (15) ARNOLD [USC00250355], Arnold, NE
- (16) GOTHENBURG [USC00253365], Gothenburg, NE
- (17) OCONTO [USC00256167], Oconto, NE
- (18) SAINT PAUL [USC00257515], Saint Paul, NE
- (19) TAYLOR [USC00258455], Taylor, NE

### Influencing water features

This site is an upland site and functions independently from ground and surface water features.

### Soil features

“The features common to all soils in this site are loam to fine sand surface textures and slopes of 0 to 15 percent. The soils in this site are from moderately well drained to excessively drained and formed in eolian sand or alluvium. The surface layer is 3 to 10 inches thick. The texture of the subsurface generally ranges from loam to fine sand. Runoff as evidenced by patterns of rill, gully or other water flow is generally low due to the moderate to gentle slope gradient and high intake rate of these soils. Some pedestalling of plants occurs, but it is not very evident on casual observation and occurs on less than 5 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 include more detail specific to your location.

Major soil series correlated to this ecological site include: Thurman, Ortello, O’Neill, Anselmo, Blendon and Hersh.

**Table 4. Representative soil features**

Surface texture	(1) Fine sandy loam (2) Loamy fine sand (3) Fine sand
Family particle size	(1) Sandy
Soil depth	80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	4.7–9.7 in
Calcium carbonate equivalent (0-40in)	0–6%

Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	5.7–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–28%

## 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 draughty 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 annual sunflower eventually colonized the areas between the perennials.

As this site deteriorates, species such as prairie sandreed, little bluestem, sand dropseed, and blue grama will increase initially. Species such as sand and/or big bluestem, switchgrass, and Indiangrass will decrease in frequency and production. With continued improper management, prairie sandreed and little bluestem will also decrease. The site is resilient and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allows for high drought resistance.

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 draughty 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 native plants such as sandbur, woolly Indianwheat, annual eriogonum and annual 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. Sub-climax 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.

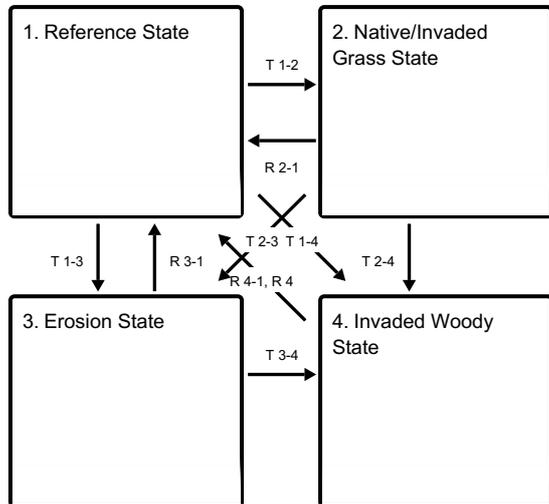
### Plant Community and Vegetation State Narratives

Following the diagram are the narratives for each of the described plant communities. These plant communities may

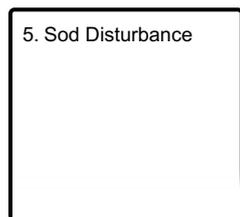
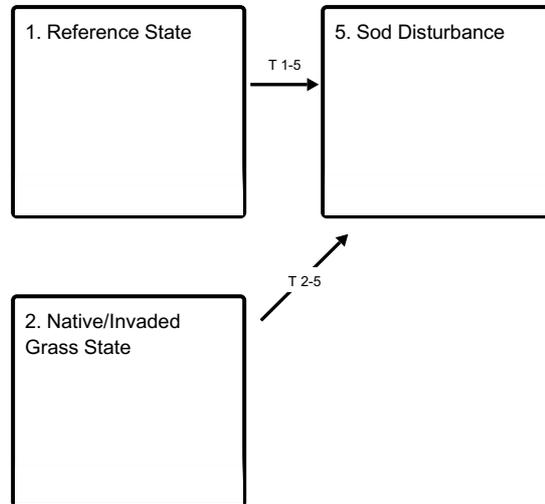
not represent every possibility, but they are the most prevalent and repeatable plant communities. The plant composition tables shown below have been developed from the best available knowledge at the time of this revision. As more data are collected, some of these plant communities may be revised or removed, and new ones may be added. 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.

## State and transition model

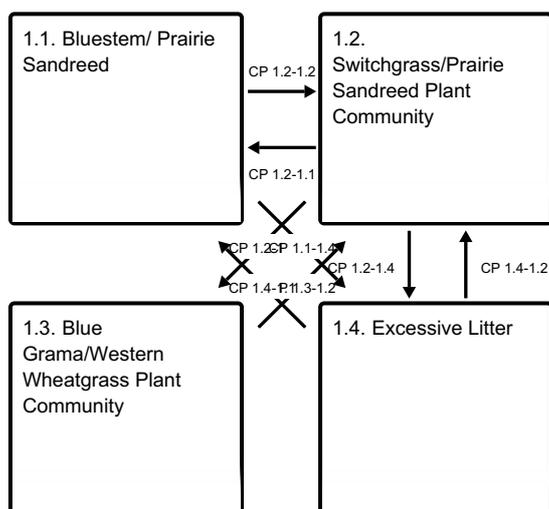
### Ecosystem states



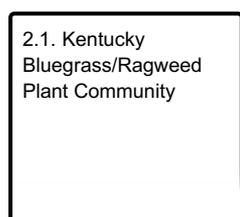
### States 1, 5 and 2 (additional transitions)



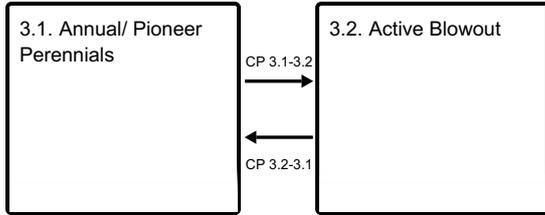
### State 1 submodel, plant communities



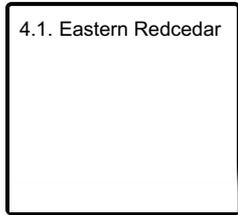
### State 2 submodel, plant communities



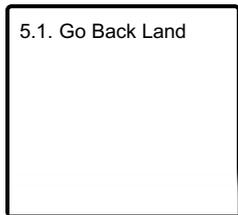
**State 3 submodel, plant communities**



**State 4 submodel, plant communities**



**State 5 submodel, plant communities**



**State 1  
Reference State**

This state contains four community phases historically maintained by frequent fire and herbivory (grazing) with adequate recovery periods. High perennial grass cover and production facilitates increased soil moisture retention, high infiltrates rates, plant vigor, and overall soil quality.

**Community 1.1  
Bluestem/ Prairie Sandreed**

Interpretations are primarily based on the Bluestem/Prairie Sandreed Plant Community. 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 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 lovegrass, 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 percent grasses, 10 percent forbs, and 5 percent shrubs by weight. This plant community is extremely resilient and well adapted to the Northern Great Plains climatic conditions. This is a sustainable plant community in terms of site/soil stability, watershed function, and biologic integrity. Plant litter is properly distributed with some movement off-site and natural plant mortality is low. The diversity in plant species allows for high drought tolerance. Moderate or high available water capacity provides a favorable soil-water-plant relationship.

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

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	2045	2417	2760
Forb	130	203	300
Shrub/Vine	25	81	140
<b>Total</b>	<b>2200</b>	<b>2701</b>	<b>3200</b>

Figure 7. Plant community growth curve (percent production by month). NE7137, Central NE Loess Hills, warm-season dominant, cool-season sub-dominant. Warm-season grass dominant with cool-season plants sub-dominant.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	8	15	24	23	15	5	5	0	0

## Community 1.2 Switchgrass/Prairie Sandreed Plant Community

This plant community is resilient and can be found on areas that have been season-long grazed for long periods of time. The potential vegetation is about 80 percent grasses or grass-like plants, 10 percent forbs and 10 percent shrubs. Dominant grasses include switchgrass, little bluestem, and prairie sandreed. Other grasses include sand bluestem and Indiangrass. Dominant forbs include white heath aster, blazing star (gayfeather), and Cuman (western) ragweed. Dominant shrubs include leadplant and rose. The bluestems and needlegrasses have decreased, while prairie sandreed and switchgrass have increased. Forbs remain in balance similar to the Bluestem/Prairie Sandreed Plant Community and shrubs, such as rose and leadplant, show a moderate increase under current management conditions. This plant community maintains diversity while sustaining production. 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.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1660	2175	2650
Shrub/Vine	20	138	275
Forb	120	188	275
<b>Total</b>	<b>1800</b>	<b>2501</b>	<b>3200</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		

## Community 1.3 Blue Grama/Western Wheatgrass Plant Community

This plant community develops with heavy livestock grazing, usually season-long. Plant diversity is diminished as the bluestems, prairie sandreed, switchgrass, and Indiangrass are removed from the plant community. Small isolated plants may exist in a prostrate form to avoid defoliation. The potential vegetation is about 80 percent grasses or grass-like plants, 15 percent forbs, and 5 percent shrubs. Dominant grasses include blue grama and western wheatgrass. Other grasses or grass-likes include sand dropseed, needleandthread, prairie sandreed, and sedges. Dominant forbs include green sagewort, white heath aster, blazing star (gayfeather), and Cuman (western) ragweed. Dominant shrubs include rose and western sandcherry. Cool season plants such as western wheatgrass, prairie junegrass, and Scribners panicum increase. Blue grama will actually increase due to its ability to avoid grazing because of its short growth form. Forbs such as western ragweed and green sagewort will tend to increase, especially in periods of favorable moisture. Rose, leadplant, and western sandcherry will diminish while small soapweed, cactus, and other less palatable shrubs will increase. 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: NE6540 Growth curve name: Nebraska/South Dakota Sandhills, Native Grasslands, Grama/Wheatgrass Growth curve description: Warm-season and cool-season co-dominant, short and mid grasses.

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

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1305	1479	1635
Forb	80	170	275
Shrub/Vine	15	51	90
<b>Total</b>	<b>1400</b>	<b>1700</b>	<b>2000</b>

**Figure 11. Plant community growth curve (percent production by month). NE6540, NE/SD Sandhills, Native Grass, Grama/Wheatgrass. Warm-season and cool-season co-dominant, short and mid grasses.**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	10	20	25	20	15	5	0	0	0

### **Community 1.4 Excessive Litter**

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, and pedestalling is usually evident. These plants have very few tillers for vegetative reproduction. The potential vegetation is about 90 percent grasses or grass-like plants, 5 percent forbs, and 5 percent 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 ragweed and green sagewort, with less dominant forbs including gayfeather and spiny phlox. The shrubs present on this plant community 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 periodic fire). Soil erosion is low, and infiltration and runoff are not significantly different than the Bluestem/Prairie Sandreed Plant Community.

**Figure 12. Plant community growth curve (percent production by month). NE7137, Central NE Loess Hills, warm-season dominant, cool-season sub-dominant. Warm-season grass dominant with cool-season plants sub-dominant.**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	8	15	24	23	15	5	5	0	0

### **Pathway CP 1.2-1.2 Community 1.1 to 1.2**

Continuous season-long grazing, growing season haying, overstocking, prolonged drought are all occurrences that will downgrade this community.

### **Pathway CP 1.1-1.4 Community 1.1 to 1.4**

Lack of natural disturbance processes, i.e fire and grazing will cause this community to degrade to the excessive litter community.

### **Pathway CP 1.2-1.1 Community 1.2 to 1.1**

Managed grazing, reduced stocking rate, appropriately timed prescribed fire will improve this community to the previous level.

### **Pathway CP 1.2-1.3 Community 1.2 to 1.3**

Continuous season-long grazing, growing season haying, overstocking, prolonged drought will further degrade this community, causing a shift to the Kentucky Bluegrass/Ragweed community.

### **Pathway CP 1.2-1.4 Community 1.2 to 1.4**

Lack of natural disturbance processes, i.e fire and grazing will degrade this community to the Excessive Litter community.

### **Pathway CP 1.3-1.2 Community 1.3 to 1.2**

Managed grazing, reduced stocking rate, appropriately timed prescribed fire will allow this community to recover to the Switchgrass/Prairie Sandreed community.

### **Pathway CP 1.4-1.1 Community 1.4 to 1.1**

Prescribed grazing and/or prescribed 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).

### **Pathway CP 1.4-1.2 Community 1.4 to 1.2**

Introduction/allowance of natural processes such as appropriately timed burning and managed grazing.

## **State 2 Native/Invaded Grass State**

This state consists of one community phase that has deteriorated from the reference state and consists of warm season short grasses and cool season grasses. It may be invaded by introduced species such as smooth brome grass and Kentucky bluegrass. The loss of native warm season grasses/functional groups and increased bare soil will reduce forage productivity, soil moisture retention, organic matter, and plant vigor.

### **Community 2.1 Kentucky Bluegrass/Ragweed Plant Community**

With sustained heavy stocking during the summer months this plant community will become dominated by cool season grasses and forbs. The potential vegetation is about 75 percent grasses or grass-like plants, 20 percent forbs, and 5 percent shrubs. Dominant grasses include Kentucky bluegrass, sand dropseed, and blue grama. Other grasses or grass-likes include Scribner's panicum, sedges, and smooth brome grass. Dominant forbs include green sagewort, Cuman (western) ragweed, Rocky Mountain beeplant, common sunflower, and thistles. The palatable warm season grasses are replaced by blue grama and sand dropseed. Cool season grasses such as Scribner's panicum, annual brome, and bluegrass will increase and fill the void left by the disappearing warm season tall grasses. Sedges will flourish in the understory. Cuman (western) ragweed and green sagewort increase in abundance along with other less-palatable forbs. Invader thistles and annual forbs increase along with grazing resistant shrubs such as cactus and small soapweed. Once this plant community is reached, time and external resources will be needed to see any immediate recovery in the diversity of this plant community. Transitional pathways and/or community pathways leading to other plant communities are as follows: Prescribed grazing will

convert the plant community to either the Switchgrass/Prairie Sandreed Plant Community or the Blue Grama/Western Wheatgrass Plant Community. The direction this plant community moves depends on the characteristics of the plant community prior to converting to the Kentucky Bluegrass/Ragweed Plant Community.

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

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	835	1014	1185
Forb	55	150	250
Shrub/Vine	10	36	65
<b>Total</b>	<b>900</b>	<b>1200</b>	<b>1500</b>

**Figure 14. Plant community growth curve (percent production by month). NE6541, NE/SD Sandhills, Native Grass, Cool Seasons/Forbs. Cool-season dominant, warm-season subdominant, short & mid grasses.**

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

### **State 3 Erosion State**

This state includes two community phases that have very little plant cover, few native warm or cool season grasses and few perennial forbs. The vegetation that is present consists of pioneer species. The majority of the plants are annual forbs with a lesser amount of short-lived perennial species. Erosion has occurred and may still be occurring. There is very little plant cover, little forage production and poor soil quality.

#### **Community 3.1 Annual/ Pioneer Perennials**

As succession progresses, sandhill muhly, blowout grass and sand bluestem begin to colonize. Sandbur, lemon scurfpea and annual sunflower begin to come in with prairie sandreed, hairy grama, and rose slowly becoming evident on this plant community.

#### **Community 3.2 Active Blowout**

This plant community can be reached from any other plant community with significant disturbances such as heavy grazing. Large areas of blowing sand result in movement and possible enlargement of the blowout. Evaporation and transpiration of existing plants are extremely high due to bare ground, lack of litter, 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.

#### **Pathway CP 3.1-3.2 Community 3.1 to 3.2**

Heavy grazing or overgrazing will eventually shift Annual/Pioneer Perennials to the Active Blowout community phase.

#### **Pathway CP 3.2-3.1 Community 3.2 to 3.1**

With prescribed grazing, this plant community may move to the Annual/Pioneer Perennial Plant Community. Establishment of vegetation may be accelerated with concentrated short-term animal impact (such as feeding hay on the blowout), followed by broadcast seeding of a temporary cover crop prior to removal of animal impact.

## **State 4**

### **Invaded Woody State**

This state includes one plant community that has been invaded by Eastern red cedar. The woody species are present due to lack of prescribed fire and/or brush management measures. The sites typically have a loss of native warm season grasses, reduced forage production and reduced soil quality.

#### **Community 4.1**

##### **Eastern Redcedar**

This plant community can develop whenever eastern redcedar is adjacent to the originating plant community, and encroachment occurs. This can occur in areas adjacent to a seed source, such as near windbreaks or adjacent to ponderosa pine woodlands. With prescribed burning, encroachment can be controlled. This plant community has a canopy cover of 15% or more mature trees. Total tree canopy cover can exceed 40%. The herbaceous component decreases proportionately in relation to the increase in canopy cover. This plant community is resistant to change. In higher canopy cover situations, the soil erosion will increase. The water cycle is also significantly altered under higher canopy cover. 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.

## **State 5**

### **Sod Disturbance**

State influenced by some sort of sod disturbance, mainly tillage.

#### **Community 5.1**

##### **Go Back Land**

This plant community can be reached whenever severe mechanical disturbance occurs (e.g., abandoned farmland). The vegetation on this plant community varies greatly, sometimes being dominated by little bluestem, threeawn, sand dropseed, prairie sandreed, maretail, annual sunflower, green sagewort, and/or ragweed. Other plants that occur on this plant community 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 may not return to a higher successional plant community because of the long-term effects of the soil disturbance by tillage equipment. This plant community is variable in its resistance to change depending on past management practices. Soil erosion is typically evident in low successional stages. The water cycle is not greatly affected.

#### **Transition T 1-2**

##### **State 1 to 2**

Heavy grazing and improper rest periods can convert this plant state to the Native/Invaded Grass State. Continuous heavy grazing tends to accelerate this movement.

#### **Transition T 1-3**

##### **State 1 to 3**

Heavy grazing, prolonged drought, and soil disturbance can all cause the transition from the reference state to erosion state.

#### **Transition T 1-4**

##### **State 1 to 4**

Encroachment from lack of chemical or mechanical removal, of Eastern redcedar, as well as absence of prescribed burning causes a transition from the reference state to the invaded woody state.

#### **Transition T 1-5**

##### **State 1 to 5**

Tillage followed by abandonment of soil causes a transition from the reference state to sod disturbance state.

## Restoration pathway R 2-1

### State 2 to 1

With long-term prescribed grazing, including adequate recovery periods, this plant community will move through the successional stages 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.

## Transition T 2-3

### State 2 to 3

Heavy grazing, wildfires, and other disturbance causes transition from Native/Invaded Grass State to Erosion State.

## Transition T 2-4

### State 2 to 4

Encroachment of Eastern redcedar due to lack of chemical or mechanical removal as well as absence of prescribed burning causes transition from Native/Invaded Grass State to Invaded Woody State.

## Transition T 2-5

### State 2 to 5

Tillage and abandonment of farmland causes transition from Native/Invaded Grass State to Sod Disturbance State

## Restoration pathway R 3-1

### State 3 to 1

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.

## Transition T 3-4

### State 3 to 4

Encroachment of Eastern redcedar due to lack of chemical or mechanical removal or the absence of prescribed burning causes transition from Erosion State to Invaded Woody State.

## Restoration pathway R 4-1, R 4

### State 4 to 1

With brush management, or prescribed burning, followed by prescribed grazing, succession will progress leading to the Bluestem/Prairie Sandreed/Needlegrass Plant Community.

## Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Tall Warm Season</b>			945–1350	
	sand bluestem	ANHA	<i>Andropogon hallii</i>	540–945	20–35
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	540–810	20–30
	switchgrass	PAVI2	<i>Panicum virgatum</i>	270–540	10–20
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	135–270	5–10

2	<b>Mid Warm Season</b>			540–810	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	405–675	15–25
	sand lovegrass	ERTR3	<i>Eragrostis trichodes</i>	135–270	5–10
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–135	0–5
3	<b>Native Cool Season</b>			27–270	
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	135–270	5–10
	porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	135–270	5–10
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	27–81	1–3
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	27–81	1–3
	Scribner's rosette grass	DIOLS	<i>Dichanthelium oligosanthes var. scribnerianum</i>	27–81	1–3
4	<b>Short Warm Season</b>			135–270	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	27–135	1–5
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	0–135	0–5
	sandhill muhly	MUPU2	<i>Muhlenbergia pungens</i>	0–81	0–3
5	<b>Other native</b>			0–54	
	sedge	CAREX	<i>Carex</i>	27–81	1–3
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–54	0–2
<b>Forb</b>					
6	<b>Forbs</b>			135–270	
	Forb, perennial	2FP	<i>Forb, perennial</i>	27–54	1–2
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	0–54	0–2
	white heath aster	SYER	<i>Symphotrichum ericoides</i>	0–54	0–2
	spiderwort	TRADE	<i>Tradescantia</i>	0–54	0–2
	purple prairie clover	DAPUA	<i>Dalea purpurea var. arenicola</i>	0–54	0–2
	scarlet beeblossom	GACO5	<i>Gaura coccinea</i>	0–54	0–2
	hairy false goldenaster	HEVI4	<i>Heterotheca villosa</i>	0–54	0–2
	dotted blazing star	LIPU	<i>Liatris punctata</i>	0–54	0–2
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	0–54	0–2
	evening primrose	OENOT	<i>Oenothera</i>	0–54	0–2
	silverleaf Indian breadroot	PEAR6	<i>Pediomelum argophyllum</i>	0–54	0–2
	beardtongue	PENST	<i>Penstemon</i>	0–54	0–2
	slimflower scurfpea	PSTE5	<i>Psoralidium tenuiflorum</i>	0–54	0–2
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	0–54	0–2
	ragwort	SENEC	<i>Senecio</i>	0–27	0–1
	goldenrod	SOLID	<i>Solidago</i>	0–27	0–1
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	0–27	0–1
<b>Shrub/Vine</b>					
7	<b>Shrubs</b>			27–135	
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	27–81	1–3
	leadplant	AMCA6	<i>Amorpha canescens</i>	0–81	0–3
	pricklypear	OPUNT	<i>Opuntia</i>	0–54	0–2
	western sandcherry	PRPUB	<i>Prunus pumila var. besseyi</i>	0–27	0–1

	rose	ROSA5	Rosa	0–27	0–1
--	------	-------	------	------	-----

Table 10. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Bluestems</b>			250–500	
	sand bluestem	ANHA	<i>Andropogon hallii</i>	250–500	–
	big bluestem	ANGE	<i>Andropogon gerardii</i>	0–250	–
2	<b>Prairie Sandreed</b>			500–750	
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	500–750	–
3	<b>Little Bluestem</b>			500–750	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	500–750	–
4	<b>Needlegrass</b>			125–250	
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	125–250	–
	porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	0–125	–
5	<b>Grama</b>			25–250	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	25–250	–
6	<b>Other Warm-Season Grasses</b>			500–875	
	switchgrass	PAVI2	<i>Panicum virgatum</i>	375–625	–
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	125–375	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–250	–
	purple lovegrass	ERSP	<i>Eragrostis spectabilis</i>	0–125	–
	thin paspalum	PASE5	<i>Paspalum setaceum</i>	0–125	–
7	<b>Native Grass/Grass-Likes</b>			125–375	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	25–250	–
	sedge	CAREX	<i>Carex</i>	25–125	–
	Scribner's rosette grass	DIOLS	<i>Dichanthelium oligosanthes var. scribnerianum</i>	25–125	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	25–125	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–50	–
8	<b>Non-Native Grasses</b>			0–125	
	smooth brome	BRIN2	<i>Bromus inermis</i>	0–125	–
	bluegrass	POA	<i>Poa</i>	0–125	–
	cheatgrass	BRTE	<i>Bromus tectorum</i>	0–50	–
<b>Forb</b>					
9	<b>Forbs</b>			125–250	
	white heath aster	SYER	<i>Symphotrichum ericoides</i>	0–50	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–50	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	0–50	–
	blazing star	LIATR	<i>Liatis</i>	0–50	–
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	0–25	–
	beardtongue	PENST	<i>Penstemon</i>	0–25	–
	scurfpea	PSORA2	<i>Psoraleidum</i>	0–25	–
	upright prairie	PAO2	<i>Batipida columifera</i>	0–25	–

	upright prairie coneflower	RACCO3	<i>Rauvolfia columbiana</i>	0-25	-
	Missouri goldenrod	SOMI2	<i>Solidago missouriensis</i>	0-25	-
	pussytoes	ANTEN	<i>Antennaria</i>	0-25	-
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	0-25	-
	thistle	CIRSI	<i>Cirsium</i>	0-25	-
	spiderwort	TRADE	<i>Tradescantia</i>	0-25	-
	vervain	VERBE	<i>Verbena</i>	0-25	-
	Forb, annual	2FA	<i>Forb, annual</i>	0-25	-
<b>Shrub/Vine</b>					
10	<b>Shrubs</b>			25-250	
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0-125	-
	leadplant	AMCA6	<i>Amorpha canescens</i>	0-125	-
	western sandcherry	PRPUB	<i>Prunus pumila var. besseyi</i>	0-25	-
	rose	ROSA5	<i>Rosa</i>	0-15	-

Table 11. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Bluestem</b>			0-85	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	0-85	-
	sand bluestem	ANHA	<i>Andropogon hallii</i>	0-85	-
2	<b>Prairie Sandreed</b>			85-255	
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	85-255	-
3	<b>Little Bluestem</b>			85-255	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	85-255	-
4	<b>Needlegrass</b>			0-170	
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	0-170	-
	porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	0-85	-
5	<b>Grama</b>			340-510	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	340-510	-
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	0-85	-
6	<b>Other Warm-Season Grasses</b>			170-425	
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	85-255	-
	purple lovegrass	ERSP	<i>Eragrostis spectabilis</i>	85-170	-
	thin paspalum	PASE5	<i>Paspalum setaceum</i>	0-85	-
	switchgrass	PAVI2	<i>Panicum virgatum</i>	0-85	-
7	<b>Native Grass/Grass-Likes</b>			340-680	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	170-340	-
	sedge	CAREX	<i>Carex</i>	85-170	-
	Scribner's rosette grass	DIOLS	<i>Dichanthelium oligosanthes var. scribnerianum</i>	85-170	-
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	17-170	-
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-34	-
8	<b>Non-Native Grasses</b>			85-340	

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
	smooth brome	BRIN2	<i>Bromus inermis</i>	0–170	–
	bluegrass	POA	<i>Poa</i>	0–170	–
	cheatgrass	BRTE	<i>Bromus tectorum</i>	0–85	–
<b>Forb</b>					
9	<b>Forbs</b>			85–255	
	white heath aster	SYER	<i>Symphotrichum ericoides</i>	0–51	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	0–51	–
	Forb, annual	2FA	<i>Forb, annual</i>	0–34	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–34	–
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	0–34	–
	blazing star	LIATR	<i>Liatris</i>	0–34	–
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	0–17	–
	beardtongue	PENST	<i>Penstemon</i>	0–17	–
	scurfpea	PSORA2	<i>Psoralegium</i>	0–17	–
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	0–17	–
	Missouri goldenrod	SOMI2	<i>Solidago missouriensis</i>	0–17	–
	spiderwort	TRADE	<i>Tradescantia</i>	0–17	–
	vervain	VERBE	<i>Verbena</i>	0–17	–
	thistle	CIRSI	<i>Cirsium</i>	0–17	–
	Rocky Mountain beeplant	CLSE	<i>Cleome serrulata</i>	0–17	–
	common sunflower	HEAN3	<i>Helianthus annuus</i>	0–17	–
	pussytoes	ANTEN	<i>Antennaria</i>	0–17	–
<b>Shrub/Vine</b>					
10	<b>Shrubs</b>			17–85	
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0–85	–
	western sandcherry	PRPUB	<i>Prunus pumila var. besseyi</i>	0–17	–
	rose	ROSA5	<i>Rosa</i>	0–17	–

Table 12. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
2	<b>Prairie Sandreed</b>			0–60	
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	0–60	–
3	<b>Little Bluestem</b>			0–60	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	0–60	–
4	<b>Needlegrass</b>			0–120	
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	0–120	–
	porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	0–60	–
5	<b>Grama</b>			60–180	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	60–180	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	0–60	–
6	<b>Other Warm-Season Grasses</b>			120–240	

	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	120–240	–
	purple lovegrass	ERSP	<i>Eragrostis spectabilis</i>	0–120	–
7	<b>Native Grass/Grass-Likes</b>			180–300	
	sedge	CAREX	<i>Carex</i>	60–120	–
	Scribner's rosette grass	DIOLS	<i>Dichanthelium oligosanthes</i> var. <i>scribnerianum</i>	60–120	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	12–120	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	12–60	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–24	–
8	<b>Non-Native Grasses</b>			120–420	
	bluegrass	POA	<i>Poa</i>	120–240	–
	smooth brome	BRIN2	<i>Bromus inermis</i>	0–180	–
	cheatgrass	BRTE	<i>Bromus tectorum</i>	0–120	–
<b>Forb</b>					
9	<b>Forbs</b>			60–240	
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	0–60	–
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	0–60	–
	thistle	CIRSI	<i>Cirsium</i>	0–36	–
	Rocky Mountain beeplant	CLSE	<i>Cleome serrulata</i>	0–36	–
	common sunflower	HEAN3	<i>Helianthus annuus</i>	0–36	–
	Forb, annual	2FA	<i>Forb, annual</i>	0–36	–
	white heath aster	SYER	<i>Symphotrichum ericoides</i>	0–36	–
	vervain	VERBE	<i>Verbena</i>	0–36	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–24	–
	pussytoes	ANTEN	<i>Antennaria</i>	0–12	–
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	0–12	–
	scurfpea	PSORA2	<i>Psoralegium</i>	0–12	–
	Missouri goldenrod	SOMI2	<i>Solidago missouriensis</i>	0–12	–
<b>Shrub/Vine</b>					
10	<b>Shrubs</b>			12–60	
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0–60	–
	rose	ROSA5	<i>Rosa</i>	0–12	–

## Animal community

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide year-long forage for cattle, sheep, or horses. During the dormant period, the protein levels of the forage may be lower than the minimum needed to meet livestock (primarily cattle and sheep) requirements.

## Hydrological functions

### Hydrology Functions

Water is the principal factor limiting forage production on this site. Normal rainfall is 18-25 inches per year. 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 the most intense storms (refer to Section 4, NRCS National Engineering Handbook for runoff quantities and hydrologic curves).

For the Bluestem/Prairie Sandreed 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. Overall this site has the appearance of being very stable and productive.

## **Recreational uses**

This site provides hunting opportunities for upland game species. The wide variety 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.

## **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.

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range-trained personnel were also used.

## **Other references**

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

## **Contributors**

Doug Whisenhunt

## **Acknowledgments**

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 R071XY054NE- MLRA 71 -

## 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)	
Contact for lead author	
Date	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

### Indicators

- 1. Number and extent of rills:**  
\_\_\_\_\_
- 2. Presence of water flow patterns:**  
\_\_\_\_\_
- 3. Number and height of erosional pedestals or terracettes:**  
\_\_\_\_\_
- 4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**  
\_\_\_\_\_
- 5. Number of gullies and erosion associated with gullies:**  
\_\_\_\_\_
- 6. Extent of wind scoured, blowouts and/or depositional areas:**  
\_\_\_\_\_
- 7. Amount of litter movement (describe size and distance expected to travel):**  
\_\_\_\_\_
- 8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**  
\_\_\_\_\_
- 9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**  
\_\_\_\_\_
- 10. Effect of community phase composition (relative proportion of different functional groups) and spatial**

distribution on infiltration and runoff:

---

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**
- 

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:

Sub-dominant:

Other:

Additional:

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**
- 

14. **Average percent litter cover (%) and depth ( in):**
- 

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**
- 

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:**
- 

17. **Perennial plant reproductive capability:**
-