USDA Natural Resources Conservation Service

Ecological site R071XY042NE
Loess Breaks

Accessed: 05/08/2024

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.

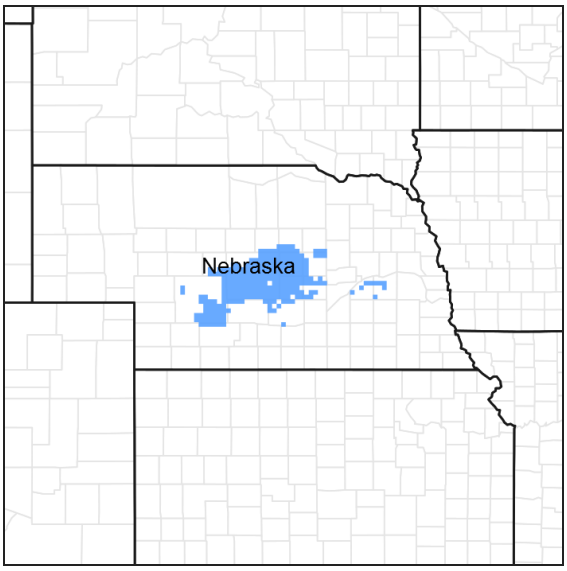


Figure 1. Mapped extent

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)

Level IV Ecoregions of the Conterminous United States

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 ecological site is an upland site located in a run-off position with slopes greater than 30 percent. Slip slopes and cat-steps are evident.

Associated sites

R071XY036NE	**Loamy Upland** Loamy Upland is adjacent to and usually below the Loess Breaks.
R071XY037NE	**Limy Upland** Limy Upland is located adjacent to and often below the Loess Breaks site.

Similar sites

R071XY036NE	**Loamy Upland** Loamy Uplands are differentiated from the Loess Breaks by being non-effervescent, occupying slopes of less than 30 percent, and have no catsteps.
R071XY037NE	**Limy Upland** Limy Upland has an effervescent soil, but is located on slopes of less than 30 percent. Slip slopes or cat steps are not present.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Andropogon gerardii* (2) *Schizachyrium scoparium*

Physiographic features

This site occurs on hillslopes and valley sides that have been dissected by geologic erosion. The very steep slopes of this site are characteristically broken with a series of short slope slips, commonly referred to as “catsteps”. The depth and height of these catsteps intensifies with increasing slope. Vertical faces of loess, areas of broken sod, and deep gullies are common on this site. Vehicular traffic is very limited to impossible on this site. This site produces runoff to areas lower on the landscape.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Valley
Flooding frequency	None
Ponding frequency	None
Elevation	497–937 m
Slope	30–100%
Water table depth	152–203 cm

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 late May, and continue to late 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)	660 mm

Climate stations used

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

This site is situated on very steep slope faces of loess hills and includes narrow ridges and divides between these slope faces. The slopes of the soils in this site range from 30 percent to near vertical, with slopes dominantly exceedingly 60 percent.

The soils on this site are very deep and have thin, normally calcareous, silty surface layers. Organic matter content is generally low to moderately low in the surface layer. The silty substratum is calcareous with relatively low inherent fertility, and generally has a CACO3 equivalent of less than 10 percent. Included within this site are surfaces that have broken sod and are generally unstabilized. The soils on this site are highly susceptible to both wind and water erosion when void of vegetative protection.

Coly is the only soil series associated with this site.

Table 4. Representative soil features

Surface texture	(1) Silt loam (2) Loam (3) Very fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to excessively drained
Permeability class	Moderate
Soil depth	20–203 cm

Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	16.26–23.88 cm
Calcium carbonate equivalent (0-101.6cm)	0–10%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

This site occurs on very steep uplands that have been dissected by geologic erosion.
The site is generally not a preferred grazing area because of the steepness of the slopes. Adjacent sites are much flatter and generally receive the majority of the grazing pressure. When excessive grazing does occur, erosion is greatly accelerated.
This site developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfire, and other biotic and abiotic factors that typically influence soil/site development. This is a disturbance driven site, with the disturbances being herbivory, fire, and variable climate. Changes will occur in the plant communities due to short-term weather variations, impacts of native and/or exotic plant and animal species, and management actions.
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 species has compounded the issue.
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.

With excessive overgrazing, or grazing without adequate recovery periods, little bluestem, sideoats grama, big bluestem, and other tall grasses are generally reduced. Blue grama, hairy grama, and dropseeds increase. Forbs and shrubs are a significant component on this site and increase significantly as excessive grazing occurs.

Grazing management that includes proper stocking with adequate rest periods for the entire grazing unit is usually all that this site needs to improve or maintain its present condition. Where more rapid improvement is desired, the use of a rotational grazing system is desirable. Concentrated grazing combined with needed rest periods can be very beneficial in improving forage utilization. Due to the rough topography, adequate grazing distribution is difficult to achieve.

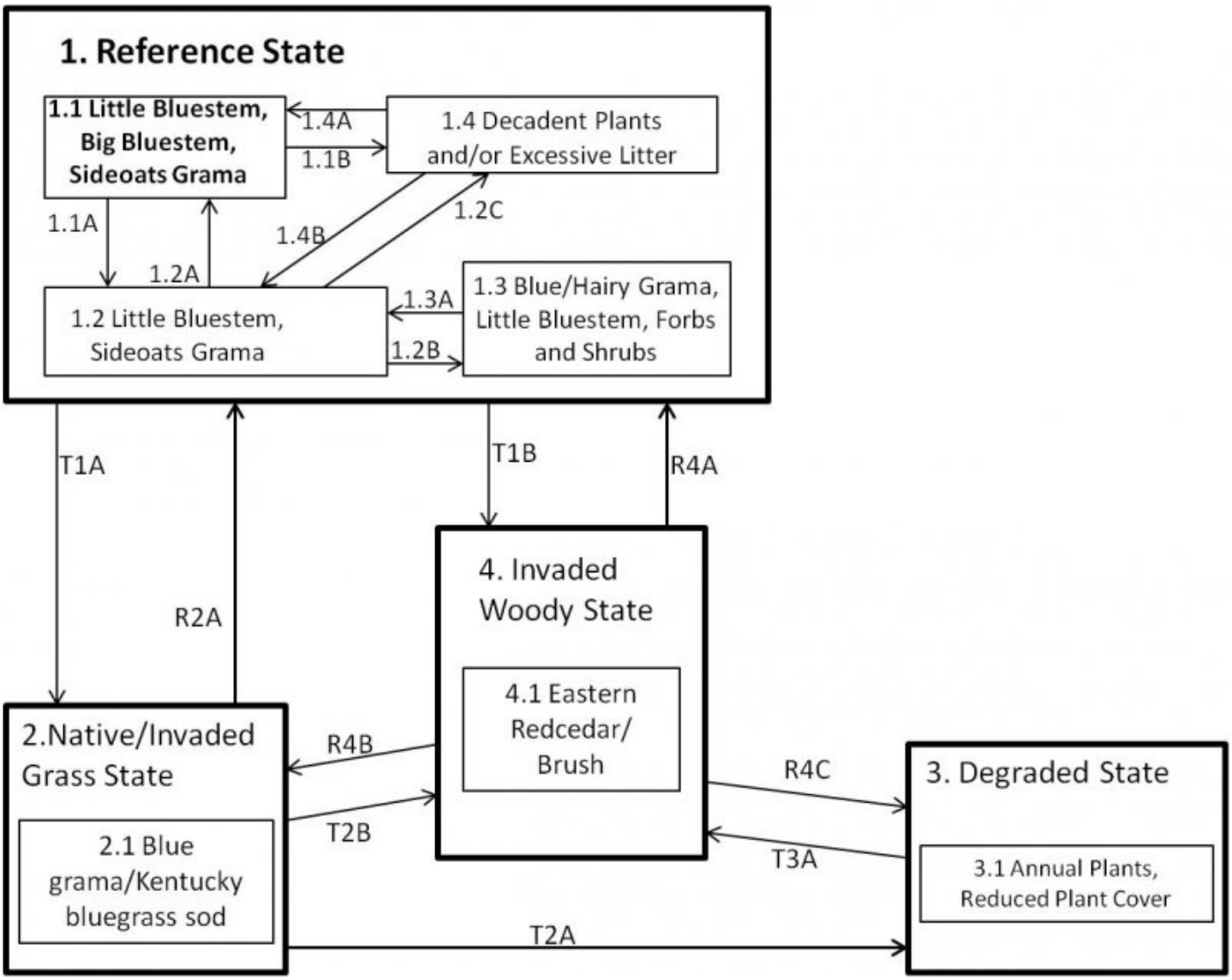
This site deteriorates from grazing without adequate recovery periods following each grazing occurrence. Species such as big bluestem, Indiangrass, little bluestem, sideoats grama, other tall and mixed grass species, and leadplant decrease in frequency and production. Forbs, small soapweed and buckbrush will increase. Due to the degree of slope and lack of soil development, these sites are fragile and are more susceptible to erosion than associated sites.

The reference plant community has been determined by study of rangeland relic areas, areas protected from

excessive disturbance, seasonal use pastures, and short duration/time controlled grazing and historical accounts.

Following is a diagram that illustrates common plant communities that can occur on the site and the transition pathways among communities. The ecological processes will be discussed in more detail in the plant community descriptions following the diagram.

State and transition model



	State and Transition Diagram Legend for Loess Breaks MLRA 71
CP 1.1A CP 1.2B	Continuous season-long grazing, growing season haying, overstocking, prolonged drought
CP 1.1B CP 1.2C	Lack of natural disturbance processes, i.e. fire and grazing.
CP 1.2A CP 1.3A	Managed grazing, reduced stocking rate, appropriately timed prescribed fire.
CP 1.4A CB 1.4B	Introduction/allowance of natural disturbance regimes, i.e. grazing and fire.
T 1A T 2A	Continuous season-long grazing, growing season haying, overstocking, prolonged drought.
T 1B T 2B T 3A	Lack of fire allows the encroachment of eastern red cedar. Once the canopy cover reaches 15 percent with an average tree height exceeding 5 feet, the threshold is crossed to the Invaded Woody State.
R 2A	A combination of prescribed fire and grazing timed to impact the invading cool-season grasses followed by rest during the optimal growth period for the warm-season grasses will move this community back towards the reference state.
R 4A R 4B R 4C	This state can be converted back to the previous state with a combination of mechanical treatment and prescribed fire. In the case of dense canopies of mature trees, a combination of the mechanical operation of "cutting and stuffing' and specialized ignition techniques may be required. Maintenance burns will be needed to prevent re-invasion.

Figure 6. STM Legend for Loess Breaks STM MLRA 71

State 1
Reference State

The state contains four community phases that were historically maintained by frequesnt fire and herbivory (grazing)

with adequate recovery periods. The amount of grazing varied with the slopes. Areas with slopes steeper than 45 percent were rarely grazed. High perennial grass cover and production facilitates increased soil moisture retention, high infiltration rates, plant vigor and overall soil quality.

Community 1.1
Little bluestem/ Big bluestem/ Sideoats grama

The natural potential vegetation of this site is a mixed grass prairie. This plant community is made up of 75 – 85 percent grasses and grass-like plants, 5 – 10 percent forbs, and 2 – 5 percent shrubs. Little bluestem, big bluestem, and sideoats grama are the dominant species in this plant community. Secondary species include plains muhly, blue grama, and hairy grama. Forbs are diverse and include Nutall's sensitive-briar, dotted gayfeather, and scurfpeas. Shrubs include leadplant, rose, and western snowberry. This plant community is diverse and productive. With proper management and adequate recovery periods between grazing events, this site can withstand short-term environmental stress, short-term heavy use or several years of non-use. Total annual production during an average year ranges from 1800 to 2800 pounds of air dry vegetation per acre per year and will average 2125 pounds.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1855	2120	2774
Forb	118	178	241
Shrub/Vine	45	83	123
Total	**2018**	**2381**	**3138**

Figure 8. Plant community growth curve (percent production by month). NE7138, Central NE Loess Hills, warm-season dominant. Warm-season grass dominant.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	7	15	20	30	15	5	5	0	0

Community 1.2
Little bluestem/ Sideoats grama

This plant community develops under grazing without adequate recovery periods between grazing events. Annual production is slightly reduced and diversity of grasses decreases. Little bluestem increases to dominate the site. Sideoats grama, big bluestem, indiangrass and other tall grass species have decreased. The tall grass species are replaced by an increase in little bluestem and sideoats grama. Forbs including Cuman ragweed, upright prairie coneflower, and slimflower scurfpea may increase as well. Timing of defoliation events will have an impact on the proportions of cool season grass species within the community. Overall community diversity will be reduced with grazing pressure. Due to the decrease in plant litter, effective precipitation is reduced, causing a significant decline in production compared to the reference plant community. Soil health is beginning to be affected by changes ino the nutrient, mineral, and hydrologic cycles. Total annual production during an average year ranges from 1250 to 2250 pounds of air dry vegetation per acre per year and will average 1750 pounds.

Figure 9. Plant community growth curve (percent production by month). NE7138, Central NE Loess Hills, warm-season dominant. Warm-season grass dominant.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	7	15	20	30	15	5	5	0	0

Community 1.3
Blue/Hairy grama/ Little bluestem/ Forbs and Shrubs

This community marks a shift in plant composition from that of a tall and mid grass community to a mid and short

grass community. Annual production is reduced and diversity of grasses is decreased. Little bluestem has decreased in production. Tall grass species are only remnants and little bluestem and sideoats grama have decreased. Blue and hairy grama are increasing as well as tall dropseed. Cool season species are also increasing. Shrubs such as soapweed, snowberry and sumac will increase. Due to the decrease in plant litter, effective precipitation is reduced, causing a significant decline in production compared to the Little Bluestem, Sideoats grama community. Soil health is affected by inefficient nutrient, mineral and hydrology cycles. The amount of bare ground has increased, and as a result, erosion rates have increased. Total annual production during an average year ranges from 850 to 1750 pounds of air dry vegetation per acre per year and will average 1300 pounds.

Figure 10. Plant community growth curve (percent production by month). NE7138, Central NE Loess Hills, warm-season dominant. Warm-season grass dominant.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	7	15	20	30	15	5	5	0	0

Community 1.4
Decadent Plants and/or Excessive Litter

This plant community occurs when grazing is removed for long periods of time in the absence of fire. Plant composition is similar to the reference plant community, however individual species production and frequency will be lower. Over time, species diversity decreases. Much of the nutrients on the site are tied up in excessive litter. Nutrient recycling is severely reduced by the lack of animal impact. Decomposition is slowed due to the semiarid environment. The litter limits sunlight from reaching root crowns, and many plants, especially bunchgrasses die. The reproductive potential of perennial plants is reduced. Bare ground is common in advanced stages. Annual forbs, grasses and cryptogamic crusts often occupy these areas. If periodic grazing and/or grazing and fire are limited, perennial plants die and erosion may increase on steeper slopes. Increased resource inputs and management will be required to establish a more productive perennial plant community.

Figure 11. Plant community growth curve (percent production by month). NE7138, Central NE Loess Hills, warm-season dominant. Warm-season grass dominant.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	7	15	20	30	15	5	5	0	0

Pathway 1.1A
Community 1.1 to 1.2

Continuous season-long grazing without adequate recovery periods during the growing season will shift this plant community to a Blue/Hairy Grama, Little Bluestem, Forbs and Shrub plant community. Continued defoliation without adequate rest periods will significantly reduce the proportions of the tall grass species and begin to reduce the proportions of mid grass species. The more accessible slopes of this site are preferred by livestock and can lead to uneven grazing distribution.

Pathway 1.1B
Community 1.1 to 1.4

No-fire or no livestock grazing will convert this to a Decadent Plants and or Excessive Litter plant community.

Pathway 1.2A
Community 1.2 to 1.1

Prescribed Grazing with adequate recovery periods will shift this plant community toward the Little Bluestem, Big bluestem, Sideoats Grama plant community.

Pathway 1.2B
Community 1.2 to 1.3

Continuous season-long grazing without adequate recovery periods during the growing season will shift this plant community to a Blue/Hairy Grama, Little Bluestem, Forbs and Shrub plant community. Continued defoliation without adequate rest periods will significantly reduce the proportions of the tall grass species and begin to reduce the proportions of mid grass species. The more accessible slopes of this site are preferred by livestock and can lead to uneven grazing distribution.

Pathway 1.2C
Community 1.2 to 1.4

No-fire or no livestock grazing will convert this to Decadent Plants and/or Excessive Litter community.

Pathway 1.3A
Community 1.3 to 1.2

Prescribed Grazing with adequate recovery periods will shift this plant community toward the Little Bluestem, Sideoats Grama plant community.

Pathway 1.4A
Community 1.4 to 1.1

Prescribed Grazing with adequate recovery periods will shift this plant community toward the Little Bluestem, Big bluestem, Sideoats Grama plant community.

Pathway 1.4B
Community 1.4 to 1.2

Prescribed Grazing with adequate recovery periods will shift this plant community toward the Little Bluestem, Sideoats Grama plant community.

State 2
Native/ Invaded Grass State

A state that has deteriorated in quality from the reference community and has is now dominated by native and invaded species not ideal to the area.

Community 2.1
Blue Grama/ Kentucky Bluegrass Sod

This plant community develops as continuous season-long heavy grazing continues. Annual production and diversity of grasses is dramatically reduced from the reference plant community. Blue grama and Kentucky bluegrass dominate the site. Annual grasses and annual forbs are common. Only remnants of mixed grasses remain. This plant community is at risk of losing all tall and mixed grass species and crossing a threshold. Once this occurs, considerable time and expense are needed to return the site to a more productive state. Community diversity is low due to continued grazing pressure. Areas of bare ground continue to expand, resulting in severe soil erosion. Total annual production during an average year ranges from 750 to 1250 pounds of air dry vegetation per acre per year and will average 1000 pounds.

Figure 12. Plant community growth curve (percent production by month). NE7136, Central NE Loess Hills, cool season/warm season co-dominant. Cool-season grass and warm-season grass co-dominant.

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

State 3
Degraded State

State contains poor rangeland that has been severely deteriorated from overgrazing and misuse. Weedy annuals have replaced the desirable species. Ground cover is reduced and the system becomes more vulnerable to soil erosion.

Community 3.1
Annual Plants/ Reduced Plant Cover

With continued season-long heavy grazing, perennial grass cover is decreased and this site becomes susceptible to erosion. Annual grasses and forbs dominate the plant community. Loss of desirable species results in an increase in bare ground. Plant diversity is low. Plant vigor and production is significantly reduced. Total annual production during an average year varies dramatically.

State 4
Invaded Woody State

Represents a vegetation state with woody species encroachement.

Community 4.1
Eastern Redcedar/ Brush Encroachment

This community can develop when fire is withheld from this site over an extended period of time. Generally this site is very conducive to cedar seedling invasion. Cedars will eventually dominate the site, reducing grass production and limiting grazing potential. Locust encroachment may occur as you move east within the MLRA. Eastern redcedar control can usually be accomplished with a controlled burn while the trees are six foot tall or less.

Transition T1A
State 1 to 2

Continuous season-long grazing without adequate recovery periods during the growing season will cause this plant community to lose all tall and mixed grass species and cross ecological threshold to the Native/Invaded Grass State. Once this occurs it will require considerable time (more than 30 years) and expense to return this site to a higher condition. Water infiltration will be reduced due to the root mass present of the blue grama and Kentucky bluegrass sod.

Transition T1B
State 1 to 4

No-fire or Non-use by browsing animals will convert this to an Invaded Woody State. Brush management, prescribed grazing, harvesting, prescribed burning or wildfire will maintain the plant community.

Restoration pathway R2A
State 2 to 1

Long-Term Prescribed Grazing will shift the Native/ Invaded State to the Reference State. A shift to this community may take decades to achieve.

Transition T2A
State 2 to 3

Continuous season-long grazing without adequate recovery periods during the growing season will shift the Native/Invaded Grass State to the Degraded State. This state has a significant risk of soil erosion. The percent and aspect of slope will impact the rate of change.

Transition T2B
State 2 to 4

No-fire or Non-use by browsing animals will convert this and Any Plant Community to a Red Cedar/Brush Encroachment community. Brush management, prescribed grazing, harvesting, prescribed burning or wildfire will maintain the plant community

Transition T3A
State 3 to 4

No-fire or no livestock grazing will convert the Degraded State to the Invaded Woody State. Brush management, prescribed grazing, harvesting, prescribed burning or wildfire will maintain the plant community

Restoration pathway R4A
State 4 to 1

Brush management, prescribed grazing, harvesting, prescribed burning or wildfire will eventually cause the Invaded Woody State to shift back to the Reference State.

Restoration pathway R4B
State 4 to 2

Brush management, prescribed grazing, harvesting, prescribed burning or wildfire will eventually cause the Invaded Woody State to shift back to the Native/ Invaded Grass State.

Restoration pathway R4C
State 4 to 3

Brush management, prescribed grazing, harvesting, prescribed burning or wildfire will eventually cause the Invaded Woody State to shift back to the Degraded State.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Tall Warm Season Grasses**			358–595	
	big bluestem	ANGE	*Andropogon gerardii*	358–476	15–20
	switchgrass	PAVI2	*Panicum virgatum*	0–119	0–5
	Indiangrass	SONU2	*Sorghastrum nutans*	0–72	0–3
	prairie sandreed	CALO	*Calamovilfa longifolia*	0–72	0–3
2	**Mid Warm Season Grasses**			595–1191	
	little bluestem	SCSC	*Schizachyrium scoparium*	476–834	20–35
	sideoats grama	BOCU	*Bouteloua curtipendula*	239–476	10–20
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	0–119	0–5
3	**Native Cool Season Grasses**			0–119	
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	0–48	0–2
	Canada wildrye	ELCA4	*Elymus canadensis*	0–48	0–2
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–48	0–2
	porcupinegrass	HESP11	*Hesperostipa spartea*	0–48	0–2
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–48	0–2
	western wheatgrass	PASM	*Pascopyrum smithii*	0–48	0–2
4	**Short Warm Season Grasses**			0–119	

4	**Short Warm Season Grasses**			0–119	
	blue grama	BOGR2	*Bouteloua gracilis*	0–119	0–5
	hairy grama	BOHI2	*Bouteloua hirsuta*	0–48	0–2
	plains muhly	MUCU3	*Muhlenbergia cuspidata*	0–48	0–2
5	**Other Native Grasses and Grasslike**			0–72	
	threadleaf sedge	CAFI	*Carex filifolia*	0–72	0–3
	sedge	CAREX	*Carex*	0–48	0–2
	Grass, perennial	2GP	*Grass, perennial*	0–48	0–2
Forb					
6	**Forbs**			119–239	
	Forb, perennial	2FP	*Forb, perennial*	24–48	1–2
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	24–48	1–2
	white heath aster	SYER	*Symphyotrichum ericoides*	24–48	1–2
	spiderwort	TRADE	*Tradescantia*	0–48	0–2
	purple prairie clover	DAPUA	*Dalea purpurea var. arenicola*	24–48	1–2
	scarlet beeblossom	GACO5	*Gaura coccinea*	0–48	0–2
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	0–48	0–2
	dotted blazing star	LIPU	*Liatris punctata*	24–48	1–2
	Nuttall's sensitive-briar	MINU6	*Mimosa nuttallii*	0–48	0–2
	evening primrose	OENOT	*Oenothera*	0–48	0–2
	silverleaf Indian breadroot	PEAR6	*Pediomelum argophyllum*	24–48	1–2
	beardtongue	PENST	*Penstemon*	0–48	0–2
	slimflower scurfpea	PSTE5	*Psoralidium tenuiflorum*	0–48	0–2
	upright prairie coneflower	RACO3	*Ratibida columnifera*	24–48	1–2
	ragwort	SENEC	*Senecio*	0–24	0–1
	goldenrod	SOLID	*Solidago*	0–24	0–1
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–24	0–1
Shrub/Vine					
7	**Shrubs**			48–119	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	24–72	1–3
	leadplant	AMCA6	*Amorpha canescens*	24–72	1–3
	prairie rose	ROAR3	*Rosa arkansana*	24–48	1–2
	western snowberry	SYOC	*Symphoricarpos occidentalis*	24–48	1–2
	twistspine pricklypear	OPMA2	*Opuntia macrorhiza*	0–24	0–1

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 forage for livestock use needs to be supplemented with protein because the quality does not meet minimum livestock requirements.

The following table lists suggested stocking rates for cattle under continuous growing season-long grazing under normal growing conditions. These conservative estimates should be used only as guidelines in the initial stages of the conservation planning process. Often, the current plant composition does not entirely match any particular plant community/vegetative state (as described in this ecological site description). Because of this, a field visit is

recommended, in all cases, to document plant composition and production. More precise carrying capacity estimates should eventually be calculated using this information along with animal preference data, particularly when grazers other than cattle are involved. Under more intensive grazing management, improved harvest efficiencies can result in an increased carrying capacity.

Plant Community - Total Production (lbs./ac.)- Carrying Capacity* (AUM/Ac.)**
Little Bluestem, Big Bluestem, Sideoats Grama - 2125 - 0.58
Little Bluestem, Sideoats grama - 1750 - 0.48
Blue/Hairy Grama, Little Bluestem, Forbs, Shrubs - 1300 - 0.36
Blue Grama, Kentucky bluegrass sod - 1000 - 0.27

* Continuous season-long grazing by cattle under average growing conditions (utilizing 50 percent of usable production or 25 percent harvest efficiency).

**AUM = The amount of forage required by one animal unit (one mature cow weighing 1000 pounds and her calf as old as 3 months, or their equivalent) for one month or 912 pounds air dry forage.

Hydrological functions

Water is the principal factor limiting forage production on this site, which is dominated by soils in hydrologic group B. Permeability is moderate, and runoff potential is medium to high. In general, the infiltration rate is directly proportional to vegetative cover, while the run off potential is inversely proportional. An exception is sod-bound short grasses. The T erosion factor is 5.
(Refer to NRCS Section 4, National Engineering Handbook (NEH-4) for runoff quantities and hydrologic curves).

Recreational uses

The sloping portions of this site provide a colorful and rustic landscape desired by many people. The less sloping portions are often used for cropland.

Wood products

No appreciable wood products are present on the site.

Other products

None noted.

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 were also used. Those involved in developing this site include: Dana Larsen, State Rangeland Management Specialist, NRCS; Chuck Markley, Resource Soil Scientist, NRCS., Neil Dominy, Resource Soil Scientist, NRCS.

Field Offices/Counties:
Broken Bow, Thedford, North Platte, Lexington, Kearney, Grand Island, Fullerton, Central City, St. Paul, Loup City, Ord, Greeley, Albion, Burwell

Other references

High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-0728. (http://hpccsun.unl.edu)

USDA, NRCS. National Water and Climate Center, 101 SW Main, Suite 1600, Portland, OR 97204-3224. (http://wcc.nrcs.usda.gov)

USDA, NRCS. National Range and Pasture Handbook, September 1997.

USDA, NRCS. National Soil Information System, Information Technology Center, 2150 Centre Avenue, Building A, Fort Collins, CO 80526. (http://nasis.nrcs.usda.gov)

USDA, NRCS. 2001. The PLANTS Database, Version 3.1 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

USDA, NRCS, Various Published Soil Surveys.

Contributors

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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 R071XY042NE- 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:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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

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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:

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

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

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

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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:**

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17. **Perennial plant reproductive capability:**
