Ecological site R071XY027NE
Closed Upland Depression

Accessed: 04/16/2024

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.

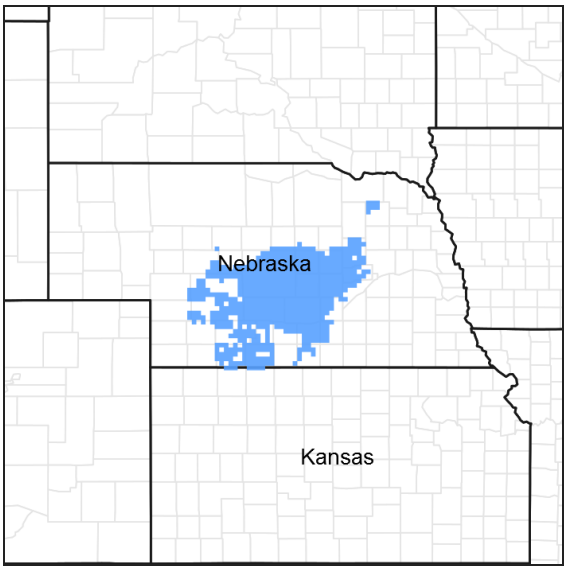


Figure 1. Mapped extent

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) 71. (USDA-Natural Resources Conservation Service, 2006)

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

Ecological site concept

The Closed Upland Depression is an upland run-on basin on the landscape, with no outlet. This site harbors two zones with distinctly different vegetation communities. These zones are based on depth, and length of inundation.

The Wheatgrass Prairie Zone occupies the intermittently flooded outer rim of the site, usually on topsoil one to three inches deep. The Sedge Meadow Zone lies inside the Wheatgrass Prairie Zone on three to six inches of topsoil, and is temporarily flooded.

Associated sites

R071XY036NE	**Loamy Upland** Loamy Upland- May be adjacent to the site, but occupies a run-off position on the landscape.
R071XY037NE	**Limy Upland** Limy Upland- May be adjacent to the site, but occupies a run-off position on the landscape.
R071XY042NE	**Loess Breaks** Loess Breaks- May be adjacent to the site, but occupies a run-off position on the landscape.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Pascopyrum smithii* (2) *Buchloe dactyloides*

Physiographic features

This site occurs in playas and depressions of the uplands, and occasionally on a depression on a fan. This site receives runoff from areas higher on the landscape. The site is ponded for brief to long periods from run-in water but is not subject to flooding.

Table 2. Representative physiographic features

Landforms	(1) Playa (2) Depression
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	Rare to frequent
Elevation	1,630–3,075 ft
Slope	0–7%
Ponding depth	0–24 in
Water table depth	60–80 in
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation averages 26 inches per year. Hourly winds are estimated to average about 14 miles per hour annually. 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) MASON CITY [USC00255250], Mason City, NE
- (4) BURWELL [USC00251345], Burwell, NE
- (5) CANADAY STEAM PLT [USC00251450], Lexington, NE
- (6) COMSTOCK [USC00251835], Comstock, NE
- (7) OVERTON 3 W [USC00256439], Overton, NE
- (8) STAPLETON 5W [USC00258133], Stapleton, NE
- (9) TAYLOR [USC00258455], Taylor, NE
- (10) CENTRAL CITY [USC00251560], Central City, NE
- (11) GOTHENBURG [USC00253365], Gothenburg, NE
- (12) NORTH LOUP [USC00256040], North Loup, NE
- (13) RAVENNA [USC00257040], Ravenna, NE
- (14) ARNOLD [USC00250355], Arnold, NE
- (15) KEARNEY 4 NE [USC00254335], Kearney, NE
- (16) LOUP CITY [USC00254985], Loup City, NE
- (17) OCONTO [USC00256167], Oconto, NE
- (18) SAINT PAUL [USC00257515], Saint Paul, NE
- (19) GRAND ISLAND AP [USW00014935], Grand Island, NE

Influencing water features

This site is a temporarily flooded run-on wetland site, but is independent of ground water influence.

Soil features

The features common to all soils in this site include a closed upland depression landform, frequent ponding, low saturated hydraulic conductivity and slopes of 0 to 1 percent. The soils in this site are poorly to very poorly drained (Scott), and somewhat poorly drained (Fillmore, Fillmore Variant), and are all formed in loess. The surface layer is typically silt loam or silty clay loam but ranges to include loam and very fine sandy loam; and ranges from 2 to 17 inches thick. The texture of the subsurface [“E” – eluvial horizon, where it still exists] ranges from silt loam to very fine sandy loam. Depth to the argillic subsoil horizon [clay content 35-50 percent] ranges from 3 to 24 inches, except in the Fillmore Variant soil where this depth can approach or exceed 60 inches due to excessive accumulation of erosional sediments washed in from higher in the landscape. Runoff as evidenced by patterns of rill, gully or other water flow is negligible due to the low slope gradient. Pedestalling of plants does not typically occur on this site, however mucking by excessive hoof traffic can create an effect which appears exaggerated, but similar to pedestalling.

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

Major soils series correlated to this ecological site include: Scott series, Fillmore series, and Fillmore Variant mapping units.

Table 4. Representative soil features

Surface texture	(1) Silty clay loam (2) Silt loam
Drainage class	Somewhat poorly drained to poorly drained
Soil depth	80 in
Available water capacity (0-40in)	9.4–12.1 in
Calcium carbonate equivalent (0-40in)	0–3%

Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	5.6–7.5

Ecological dynamics

These sites occur on depressional playas or swales on an upland position subject to ponding and evolved under a disturbance regime that included periods of sporadic but often intensive grazing by large transient herbivores, and occasional wildfires. They are often referred to as buffalo wallows.

The length of time these areas hold water depends on the size of the drainage area; infiltration rate, type and amount of vegetative cover of surrounding soils; the frequency, intensity and total accumulation of rainfall; and the depth of the depression. Wind erosion can be a hazard if water drowns out the vegetation and then dries up leaving the soil surface bare.

Inundation is the driving force that controls vegetative dynamics of the site. Vegetation shifts as a result of climatic cycles. This site is rarely managed as a separate unit for livestock grazing. However, it is recognized as an important site for migratory waterfowl. In addition, many species of upland wildlife use this site as a seasonal water source.

This site harbors two zones with distinctly different vegetation communities. These zones are based on depth, and the resulting length of the inundation period.
The Wheatgrass Prairie Zone occurs around the intermittently flooded outer rim of the site, usually on topsoil one to three inches deep. The Sedge Meadow Zone lies inside the Wheatgrass Prairie Zone on three to six inches of topsoil, and is temporarily flooded.
Dominant grass species here include shortbeak sedge, ticklegrass, and bald spikerush. Plains coreopsis, western water clover, docks and smartweeds make up the bulk of the herbaceous plants.

At one time, the larger playas on this site may have been a significant source of water for the transient herbivores and early Americans who followed these herds, as evidenced by the flint tools found on higher landscapes that are in association with these playas.

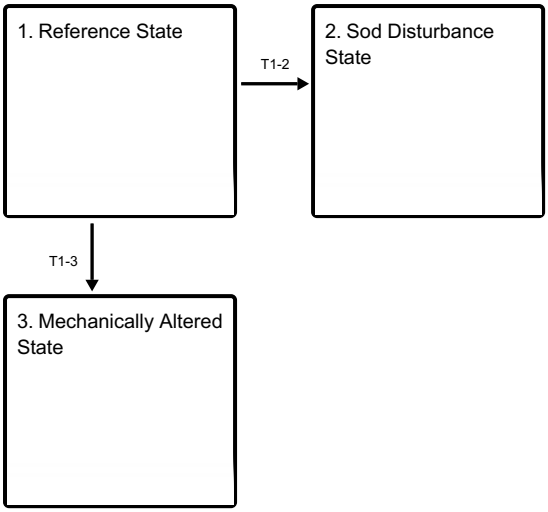
Growth of native cool season plants begins about April 15, and continues to about June 15. Native warm season plants begin growth about May 15, and continue to about August 15. Green up of cool season plants may occur in September and October if adequate moisture is available.

Due to the small patch distribution of this site, and the degree of disturbance in the landscape, it has been difficult to locate examples and reliable descriptions of examples of the pre-European reference plant community. The reference community description has been determined by study of the best remaining examples of relic areas, areas protected from excessive disturbance, and expert opinions and historical accounts.

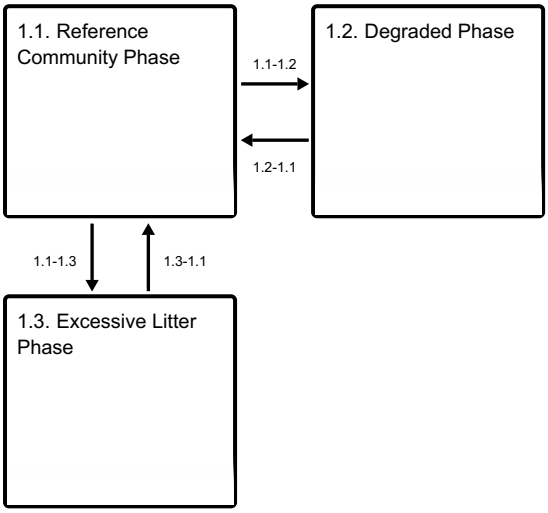
The following diagram illustrates the states and the plant communities within the states that can occur on the site. The transitions between the states, and between the communities are represented by the arrows.
The processes that cause the fluctuation between the states and communities are discussed in more detail in the plant community descriptions following the diagram.

State and transition model

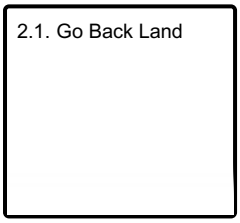
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Reference State

The Reference State is a dynamic state that encompasses the reference community, and the phases it may undergo in response to alterations in the environment. It serves as the base state for the subsequent States depicted in the model. The spatial fluctuation of the borders between the two described vegetative zones of the reference community is directly linked to the duration and depth of ponding. This is driven seasonally, and by local rainfall events. On the outer rim of the depression, where ponding is infrequent, mid and short grasses dominate the site. Western wheatgrass and buffalograss are the major grass species , and forb diversity is low. Deeper into the playa, as ponding increases, the amount of perennial grasses decreases and water-tolerant forbs, sedges, and annuals increase. Some of these areas may pond water long enough to drown out vegetation leaving bare soil during dry cycles or sparse annual vegetation. Human induced activities such unregulated grazing by domestic livestock, or interruption of the natural disturbance processes can result in community phase changes within the reference state. More severe disturbances, such as plowing, ditching or excavating can negatively impact the hydrological, soil and vegetative components of the system to the degree that they cross a threshold to a more degraded state.

Community 1.1
Reference Community Phase

This community serves as the baseline for the reference state. The borders between the vegetative zones fluctuate with the level of ponding spatially, seasonally and from local rainfall events. The Western Wheatgrass Prairie Zone occupies the outer rim of the depression, where ponding is infrequent. The dominant vegetation for this zone is primarily western wheatgrass, buffalograss, wedgeleaf fog-fruit and spotted evening-primrose. Deeper into the playa, as ponding increases, the amount of perennial grasses decreases and water-tolerant forbs, sedges, and annuals increase, creating the Sedge Meadow Zone. Dominant grass species here include shortbeak sedge, ticklegrass, and bald spikerush. Plains coreopsis, western water clover, docks and smartweeds make up the bulk of the herbaceous plants. Some of these areas may pond water long enough to drown out vegetation leaving bare soil during dry cycles or sparse annual vegetation. • Continuous grazing without adequate recovery periods will convert this community to a buffalograss/annual/forb plant community. Heavy grazing will accelerate the movement. • In the absence of excessive inundation, prescribed grazing with adequate recovery periods will maintain the original community. • Non-use and/or lack of fire will convert the wheatgrass/buffalograss zone to an excessive litter/western wheatgrass plant community.

Figure 6. 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

Community 1.2
Degraded Phase

In the upper zone, buffalograss, annual grasses and forbs are the dominant species. The community has a sod bound appearance in this phase, where the sod is broken and intermixed with areas of bare ground. Western wheatgrass may only be present in remnant amounts on this site. Annual grasses and forbs occupy the bare areas when moisture conditions allow for establishment. Perennial plant diversity is low and plant vigor is reduced. • Prescribed grazing with adequate recovery periods between grazing events will shift this plant community toward the Western Wheatgrass/Buffalograss plant community.

Community 1.3
Excessive Litter Phase

This plant community occurs in the upper zone of the site when grazing is removed for long periods of time in the absence of fire. Plant composition will shift to a dominant western wheatgrass plant community, due to the plants growth characteristics. Much of the nutrients on the site are tied up in excessive litter and recycling is severely reduced by the lack of animal impact. Individual plant mortality is high, and the thick litter and absence of natural vegetative disturbance reduces the reproductive potential of the surviving perennial plants.

Pathway 1.1-1.2
Community 1.1 to 1.2

Continuous season-long grazing, growing season haying, overstocking, prolonged drought will move this community to the degraded phase.

Pathway 1.1-1.3
Community 1.1 to 1.3

Lack of natural disturbance processes, i.e fire and grazing.

Pathway 1.2-1.1
Community 1.2 to 1.1

Managed grazing, reduced stocking rate, appropriately timed prescribed fire.

Pathway 1.3-1.1
Community 1.3 to 1.1

Introduction/allowance of natural disturbance regimes, i.e. grazing and fire, will shift this community back to the previous community.

State 2
Sod Disturbance State

This state is a result of sod-busting native grasslands to facilitate farming practices. The initial mechanical disturbance of the soil, and the repeated tillage associated with farming impacts the soil properties and disrupts the hydrological cycle to the degree that the threshold between the reference state and the sod disturbance state is crossed. It is unlikely that complete restoration of the ecological processes to the reference state is possible.

Community 2.1
Go Back Land

This community phase results when the native grassland is broken out, farmed, then abandoned to natural restoration. The vegetative community found here is comprised of those species adapted to extremely disturbed soil and hydrological processes.

State 3
Mechanically Altered State

This site has often been mechanically altered to either drain it to allow the land to be placed into production agriculture, or excavated to increase the water holding capacity of the basin as a re-use pit. These actions disrupt the ecological balance of the site to a degree that forces the site across the state threshold to the mechanically altered state. The magnitude of disruption of the soil processes and the hydrological cycle make it unlikely that the a return to the reference state is possible.

Transition T1-2
State 1 to 2

Sodbusting to convert this site to production agriculture significantly degrades the soil properties to the degree that a full recovery to the reference state is unlikely.

Transition T1-3
State 1 to 3

Mechanical alteration to either drain the site to allow the land to be placed into production agriculture, or excavated to increase the water holding capacity of the basin as a re-use pit.

Additional community tables

Animal community

Wildlife Interpretations

Historically these sites were often utilized for extended periods by large grazers such as elk and bison during wet periods because of their high forage production and ample water supply. It is no less true today that these sites are often over utilized during wet periods causing the plant communities to vary in species composition. Other species of wildlife also utilized these sites during periods of inundation. Mammals such as raccoons, coyotes and badgers took advantage of the abundant small mammal prey as did raptors such as short-eared owls and northern harriers. These areas also provided excellent habitat for ground nesting birds native to grassland habitats.

These depressions remain critically important to migratory birds. The aquatic vegetation and associated invertebrates such as fairy shrimp, tadpole shrimp and clam shrimp provide a high energy source for several groups

of migratory birds such as shorebirds, ducks and geese during their stops in the spring and fall. These sites also provide important breeding habitat for many species of amphibians during periods of inundation in the spring.

Tree invasion is a potential problem on these sites due to the decreased threat of wildfires resulting from fragmentation of the grasslands surrounding these depressions. Once tree invasion begins you should expect to see wildlife species favoring this type of habitat replacing traditional grassland and wetland species.

Periodic events such as prolonged drought, wildfire, disease, or high insect numbers will alter plant community diversity and structure and associated wildlife species.

The reference vegetative community has the potential to provide excellent habitat for a variety of wildlife, especially under wet conditions. Several small mammal species will thrive under these conditions. Due to the abundance of these small mammals, these sites are often favorite hunting areas for predators including coyotes, short-eared owls, red-tailed hawks, and northern harriers. Whitetail and mule deer will both use these depressions for water when present, and as a food source, mainly utilizing a wide diversity of forbs. These sites are of critical importance to many species of water birds, especially when their inundated periods coincide with spring and fall migrations. Shorebirds take advantage of the abundant invertebrates like fairy shrimp whose eggs can remain viable in the soil for up to 15 years until a rainfall event. Ducks, geese and cranes will use these sites as roosting areas as well as feeding areas, taking advantage of a high energy food source supplied by seeds from wetland plants such as annual smartweed. Waterfowl will often winter on these sites until they freeze. Ring-necked pheasants may use this site for nesting, brood-rearing and roosting if adequate cover and forbs are present.

Animal Community – Grazing Interpretations

Over grazing has been the key element over the past number of years that has affected the declining condition on many range sites. It is during overstocking condition that many of the preferred species are taken out of these sites, reducing production, vigor and diversity. Many new grazing systems are being tested and tried, utilizing stocking rates, timing, stocking density, positive animal impacts and other factors to enhance ecological site condition.

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong 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.

Hydrological functions

This ecological site is found on nearly level uplands and is characterized by slight depressions or swales that have slow permeability due to a compact clay layer. Most of these upland depressions have been farmed because of the productivity of the adjacent soils and, as a result, are subject to sedimentation which can alter their hydrology. Pits are often dug in these sites in an attempt to enhance them by ponding water for longer periods of time. This practice can be detrimental to the proper functioning of these systems, altering the hydrology to the extent that the beneficial plant community structure and diversity is greatly diminished.

These sites are found in areas susceptible to drought and as a result offer an unpredictable yet highly important source of water for wildlife, especially waterfowl. The amount of water and length of inundation will also depend on the drainage area, the frequency of rainfall, and the depth of the depression

Recreational uses

Because of the additional water that is sometime present, these sites are popular for hunting, bird watching, plant collecting, etc.

The site exhibits some visual contrast and present a panoramic view of the wide-open spaces cherished by many in the Great Plains states.

Wood products

This site is not an important wood producing site.

Other products

No other products are produced in quantity.

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 field observations by trained and experienced range personnel.

Other references

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

LaGrange, T.G. 2015. Final Report submitted to EPA for the project entitled: Nebraska’s Wetland Condition Assessment: An Intensification Study in Support of the 2011 National Survey (CD# 97714601), and the related project entitled: Nebraska's Supplemental Clean Water Act §106 Funds, as Related to Participation in National Wetland Condition Assessment (I – 97726201). Nebraska Game and Parks Commission, Lincoln. 183 pp.

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Rolfsmeier, S.B. and G. Steinauer. 2010. "Terrestrial Ecological Systems and Natural Communities of Nebraska", (version IV)
Nebraska Natural Heritage Program

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. 2002. The PLANTS Database, Version 3.5 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

Contributors

Doug Whisenhunt

Acknowledgments

Site Development and Testing Plan

Future work needed to validate the information in this Provisional Ecological Site Description is needed to develop this ESD to the Approved, then Correlated level. This will 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 R071XY027NE- 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):**

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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:**
