Ecological site R075XY051NE
Sandy Floodplain

Accessed: 05/16/2024

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.

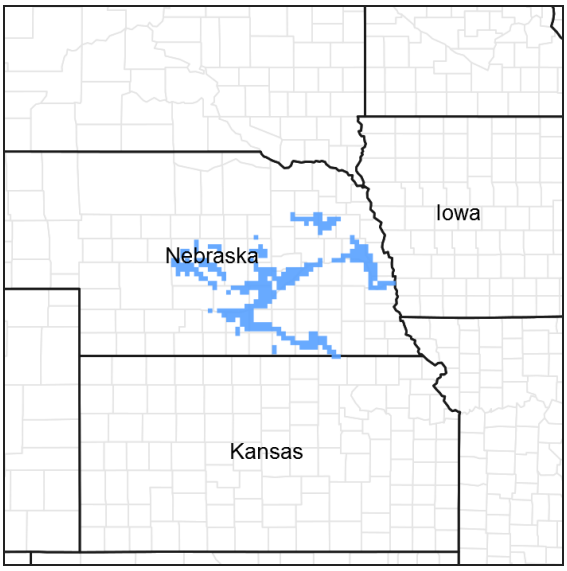

Figure 1. Mapped extent

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): 075X–Central Loess Plains

Named “The Central Loess Plains”, MLRA 75 is located primarily in South-central Nebraska, with about 10 percent lying in North-central Kansas. The approximately 5.3 million acre landscape covers all or parts of 21 counties, mainly Phelps, Kearney, Adams, Clay, Fillmore, York, Hamilton, Seward, Butler, Saline, Thayer, Nuckolls and Webster in Nebraska, with a significant presence in Republic and Washington counties in Kansas. The physical appearance is primarily gently rolling plains, with a number of narrow, shallow stream valleys. The river valleys are broader, and most feature a number of terraces. The Northern border is defined by the Platte River. This MLRA is home to the unique ecological system called “The Rainwater Basin”, which is comprised of a 24,000 acre network of wetlands and uplands that occupy portions of 13 of the northern counties.
The elevation in MLRA 75 ranges from nearly 3,000 to less than 1,100 feet above sea level. The local relief averages from 10 to 25 feet, but may stretch to a maximum of 165 feet in some areas.
The predominate soil orders are mesic, ustic Mollisols.
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 23 to 36 inches, with the number of freeze-free days ranging from 150 to 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 in the

dominant cool season grass.
Seventy two percent of the land in this MLRA has been broken out of native prairie and farmed; primarily, corn, wheat, and grain sorghum, while only eighteen percent of the grasslands remain intact. Livestock grazing, primarily cattle, is the main industry on these remnants. Irrigation of croplands uses over 90 percent of the total annual water withdrawal.
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 several upland bird species. Grassland bird populations are somewhat limited by the lack of contiguous native prairie and fragmented habitat created by the farmland.
The rivers, streams and lakes harbor excellent fisheries, and an estimated tens of millions of migrating and local waterfowl use the wetland complexes. These complexes provide ideal habitat for a number of wading and shore bird species as well.
This landscape serves as a backdrop for 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 6 to 8 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 (ERC) as a windbreak species further facilitates invasion by this species.
While eastern red cedar is native to Nebraska, the historic population in MLRA 75 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 successful application requires the use of specifically designed ignition and holding 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

NRCS FOTG Section 1 - Nebraska Vegetation Zone 3.

Major Land Resource Area (MLRA): Major Land Resource Area (MLRA) 75 (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

This site occurs on nearly level to moderately sloping floodplains and low terraces. The Sandy Floodplain site is characterized by soils with greater than 55 percent sand in the surface. The soils characteristic of this site formed in sandy alluvium from mixed sources.

Associated sites

R075XY046NE	**Subirrigated** The Subirrigated ecological site occurs adjacent to and in conjunction with Sandy Floodplain. This site occurs on nearly level to very gently sloping areas along drainageways of uplands and sand hills, below permanent springs, and on floodplains in valleys with high water tables. This site is subject to flooding except for positions on interdunes. The soils have a seasonal high water table within the root zone that limits the species capable of long-term survival within the site. This site receives runoff from areas higher on the landscape.
R075XY050NE	**Loamy Terrace** Loamy Terrace: Located above and adjacent to the Sandy Floodplain site.
R075XY054NE	**Sandy** The Sandy ecological site occurs adjacent to and in conjunction with the Sandy Floodplain sites. The Sandy ecological site occurs on plains.

Similar sites

R075XY068NE	**Loamy Floodplain** The Loamy Floodplain occurs in similar landscape positions to the Sandy Floodplain, but has silty textures, while the sandy Floodplain has sandy textures.

Table 1. Dominant plant species

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

Physiographic features

The Sandy Floodplain site occurs on nearly level to moderately sloping floodplains, upland drainageways, alluvial fans, and terraces. This site consists of deep, well drained to excessively well drained soils formed in stratified moderately coarse alluvium on bottomlands. The surface layer textures are sandy or loamy. The Sandy Floodplain site receives runoff from areas higher on the landscape and flooding frequency ranges from rare to occasional while flooding duration is very brief to brief. Sedimentation is usually rare, but is common on alluvial fans and terraces. The water table may enter the root zone, but is not the dominant factor controlling vegetative growth. This site often occupies the first bench between the streambed and higher sandy land.

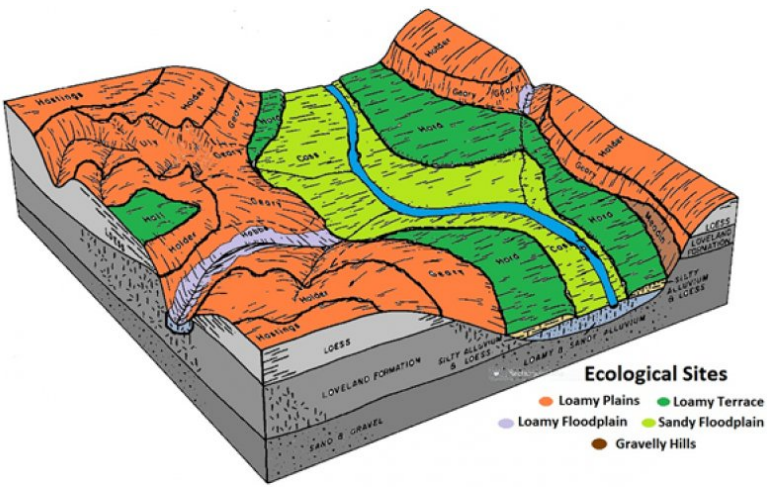

Figure 2. Sandy Floodplain Block diagram MLRA 75

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Alluvial fan (3) Terrace
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to occasional
Slope	0–8%
Ponding depth	0 cm
Water table depth	61–152 cm

Climatic features

Like most Great Plains landscapes, the climate in this MLRA is under the sway of the continental effect. This creates a regime of extremes, with summer highs often in the triple digits, and winter lows plunging well below zero. Blizzards can occur anytime between early fall and late spring, often dropping the temperature more than 50 degrees in just a few hours. These events can pile up several feet of snow, often driven by winds in excess of 50 miles an hour. The resulting huge snow drifts can cause serious hardship for livestock, wildlife and humans. Winters can be open, with bare ground for most of the season, or closed, with up to several feet of snow persisting until March. Most winters have a number of warm days, interspersed with dropping temperatures, usually associated with approaching cold fronts. Spring brings violent thunderstorms, hail and high winds. Tornadoes occur frequently. Daily winds range from an average of 14 miles per hour during the spring to 11 miles per hour during the late summer. Occasional strong storms may bring brief periods of high winds with gusts to more than 80 miles per hour. Growth of native cool season plants begin 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)	155 days
Freeze-free period (average)	177 days
Precipitation total (average)	762 mm

Climate stations used

- (1) YORK [USC00259510], York, NE
- (2) BELLEVILLE [USC00140682], Belleville, KS
- (3) AURORA [USC00250445], Aurora, NE
- (4) FRIEND 3E [USC00253065], Friend, NE
- (5) SUPERIOR 4E [USC00258320], Hardy, NE
- (6) GENEVA [USC00253175], Geneva, NE
- (7) MINDEN [USC00255565], Minden, NE
- (8) RED CLOUD [USC00257070], Red Cloud, NE
- (9) CLAY CTR [USC00251684], Saronville, NE
- (10) FAIRMONT [USC00252840], Fairmont, NE
- (11) HASTINGS 4N [USC00253660], Hastings, NE
- (12) HEBRON [USC00253735], Hebron, NE
- (13) OSCEOLA [USC00256375], Osceola, NE
- (14) RAGAN [USC00257002], Alma, NE
- (15) SURPRISE [USC00258328], Surprise, NE

Influencing water features

This site is made up of alluvial soils that have a water table greater than 6 feet from the surface. Fluctuations with this water table occur and there could be times throughout the year that it is less than 6 feet from the surface. Water influences this site due to landform position. This site is

adjacent to streams and is in a water receiving position.

Soil features

Representative Soil Features
The soils on this site are moderately deep to deep and range from well drained to excessively well drained. The parent material is local alluvium formed in stratified moderately coarse alluvium bottomlands. The surface soil is from 4 to 20 inches thick, generally is light colored, and ranges widely from very fine sandy loam to loamy fine sand in texture. The underlying material is light colored and also ranges widely in texture. Carbonates are often leached from the upper soil profile, but may occur throughout in some soils. The content of organic matter is generally low to moderately low. Available water capacity ranges from very low to moderate. Flooding is rare to occasional, depending on landform, and normally is very brief. Major soil series correlated to this ecological site are Inavale, and Cass.

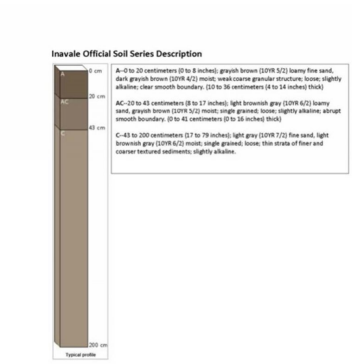

Figure 7. Inavale Soil Profile

Table 4. Representative soil features

Surface texture	(1) Sandy loam (2) Loamy sand
Drainage class	Well drained to excessively drained
Permeability class	Very rapid
Soil depth	0–203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	13.13–24.31 cm
Calcium carbonate equivalent (0-101.6cm)	0–8%
Electrical conductivity (0-101.6cm)	0–1 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.7–8
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

Ecological Dynamics of the Site
Sandy Flood Plain sites developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfires, and other biotic and abiotic factors which typically influence soil/site development. This continues to be a disturbance-driven site, by herbivory, fire, and variable climate. Changes occur in the plant communities due to weather variations, impacts of native and/or exotic plant and animal species, and management actions.

One of the primary impacts to this site introduced by European-man is season-long continuous grazing by domestic livestock. This management practice causes the repeated removal of the growing point and excessive defoliation of the leaf area of individual tall warm-season grasses. The resulting reduction of the ability of the plants to harvest sunlight depletes the root reserves, subsequently decreasing the root mass. This negatively impacts the ability of the plants to compete for life-sustaining nutrients, resulting in declining vigor and eventual mortality. The space created in the vegetative community is then occupied by a species that evades the negative grazing impacts by a growing season adaptation (such as a cool season), a shorter structure, or a reduced palatability mechanism.

The State-and-Transition Model (STM) is depicted below, and is made up of a Reference State, a Native/Invaded State, a Sod-busted State, and an Invaded Woody State. Each state represents the crossing of a major ecological threshold due to alteration of the functional dynamic properties of the ecosystem. The main properties observed to determine this change are the soil and vegetative communities and the hydrological cycle.

Each state may have one or more vegetative communities which fluctuate in species composition and abundance within the normal parameters of the state. Within each state, communities may degrade or recover in response to natural and man-caused disturbances such as variation in the degree and timing of herbivory, presence or absence of fire, and climatic and local fluctuations in the precipitation regime.

Interpretations are primarily based on the Reference State, and have 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 have been interpreted from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts. Plant communities, states, transitional pathways, and thresholds have been determined through similar studies and experience.

Growth of native cool-season plants begins about April 1, 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.

The following is a diagram illustrating the common plant communities that can occur on the site and the transition pathways between communities.

State and transition model

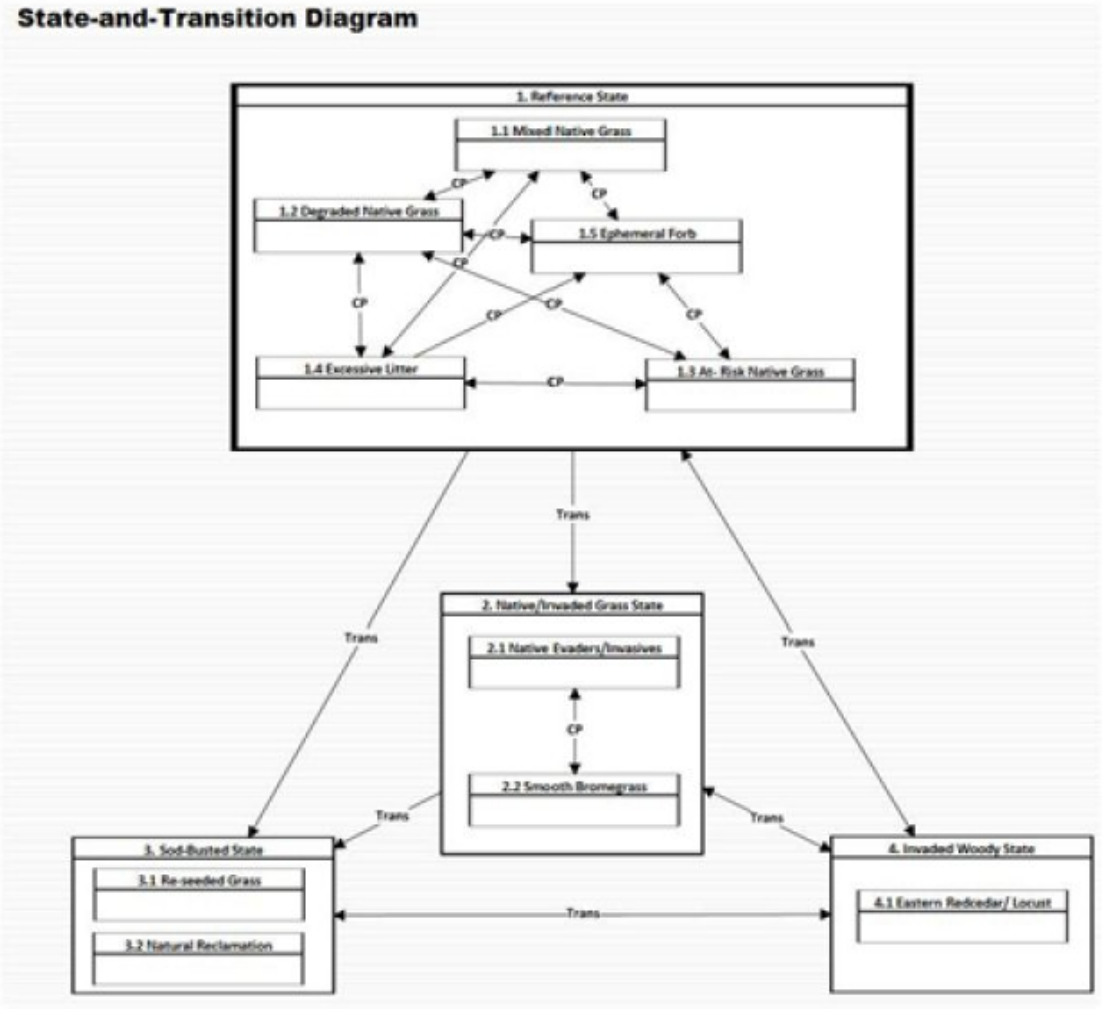

Figure 8. State-and-Transition Model

Diagram Legend

T 1-2	Long-term excessive livestock grazing or haying without appropriate growing-season rest periods; extreme drought.
T 1,2-3	Mechanical disturbance of the soil to facilitate production agricultural practices. Permanent alterations to the soil properties and hydrologic cycle make complete restoration to the Reference State unlikely.
T 1,2,3-4	Disruption of natural fire regime, planting of exotic and invasive native woody species.
R 4-1,2,3	Mechanical removal, immediate follow-up stump treatment of root-sprouting species, mechanical removal/application of prescribed fire for eastern redcedar. Development and implementation of a follow-up maintenance prescribed burn program.
CP 1.1-1.2: 1.2-1.3	Timing, frequency, and degree of herbivory/haying that negatively affects desirable mid-grass species; long-term drought.
CP 1.1,1.2,1.3-1.4	Lack of natural disturbance, i.e. herbivory and fire.
CP 1.1,1.2,1.3,1.4-1.5	A high-impact disturbance event or combination of events causing excessive defoliation of the vegetation, i.e. a growing season wildfire followed by a significant hailstorm, prolonged intensive grazing event, or long-term drought, etc.
CP 1.2-1.1: 1.3-1.2	Alter herbivory/haying regime to allow growing season rest of desirable mid-grass species; return to normal precipitation regime.
CP 1.4-1.1,1.2,1.3	Restoration of appropriate livestock grazing system; application of strategically timed prescribed fire.
CP 1.5-1.1,1.2,1.3	Restoration occurs naturally once the disturbance event has subsided. Allowing rest during growing season will accelerate the recovery.
CP 2.1-2.2	Introduced grass seeding, excessive warm-season grazing, inadequate growing season rest, multi-season haying, and nitrogen fertilizing in spring and/or fall.
CP 2.2-2.1	Restoration can be achieved by herbicide treatment and reseeding. If native remnants are present, appropriately timed prescribed fire and a follow-up prescribed grazing program may achieve the desired results.

Sandy Floodplain STM Legend.

Figure 9. Legend

State 1
Reference State

This state describes the range of vegetative community phases that occur on the Sandy Floodplain site where the

natural processes are mostly intact. The Reference Community is a representation of the native plant community phase that occupies a site that has been minimally altered by management. The Degraded Native Grass, the At-Risk Native Grass, and the Excessive Litter Communities are the phases that result from management decisions that are unfavorable for a healthy Reference Community. The Ephemeral Forb Community is the result of a high intensity disturbance event. High perennial grass cover and production allows for increased soil moisture retention, vegetative production, and overall soil quality.

Community 1.1
Mixed Native Grass

The Mixed Native Grass Community serves as a description of the native plant community that naturally occurs on the site when the natural disturbance regimes are intact, or closely mimicked by management practices. This phase is dynamic, with fluid relative abundance and spatial boundaries between the dominant structural vegetative groups. These fluctuations are primarily driven by different responses of the species to changes in precipitation timing and abundance, and fire and grazing events. The potential vegetation consists of approximately 70-90 percent grasses and grass-like plants, 5-10 percent forbs, and 5-10 percent shrubs. Sand bluestem, little bluestem, Indiangrass and switchgrass are the primary species in this community. Secondary species include prairie sandreed, sideoats grama, western wheatgrass, sand lovegrass, and Canada wildrye.. The site has a very diverse forb population. This plant community is highly productive, diverse, and resistant to short term stresses such as drought and short periods of heavy stocking. The well-developed root systems support resiliency when allowed adequate recovery periods between grazing events. When exposed to long-term or frequent over-grazing events without adequate rest, this plant community will degrade.

Figure 10. Plant community growth curve (percent production by month). NE7501, Central Loess Plains, warm season dominant. Native warm-season dominant, MLRA 75.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	7	21	33	18	8	6	3	1	0

Community 1.2
Degraded Native Grass Community

Sand bluestem, switchgrass, Indiangrass, prairie sandreed, and other desirable species lose productive capacity through loss of vigor and reproductive potential. Forb diversity is reduced. Periodic flooding and a fluctuating water table on this site help to sustain the tallgrasses in the plant community. However, midgrasses such as western wheatgrass, sideoats grama, and various sedges will increase to become the dominant species. This community phase signals a significant loss of production. This is due to continuous season-long grazing with inadequate recovery periods. Grazing-evasive warm-season and cool-season grasses increase. The composition of the forb component remains diverse, but the potential for encroachment by invasive woody species becomes more likely, due to fewer deep rooted species and a reduced fuel load to carry fire. While this plant community is less productive and less diverse than the representative plant community, it remains sustainable in regards to site/soil stability, watershed function, and biologic integrity.

Figure 11. Plant community growth curve (percent production by month). NE7501, Central Loess Plains, warm season dominant. Native warm-season dominant, MLRA 75.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	7	21	33	18	8	6	3	1	0

Community 1.3
At-Risk Native Grass Community

In this plant community, the more palatable tall warm-season grasses have been reduced to remnant populations by continued defoliation during their critical growth periods. Grazing-evasive warm-season and cool-season grasses increase significantly. Blue grama, western wheatgrass and sand dropseed are the dominant warm season grasses. Bluegrass encroachment also occurs on flatter slopes. Soil health is affected by reduced efficiency in the nutrient, mineral, and hydrologic cycles as a result of decreases in plant litter and rooting depths. Total annual

vegetative production declines significantly. Without a management change, this community is at-risk to degrade to the Native/Invaded Grass State.

Figure 12. Plant community growth curve (percent production by month). NE7502, Central Loess Plains, warm season at risk. Native warm-season at risk, reduced tall, warm-season grasses with increased cool-season grasses, MLRA 75.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	10	21	26	18	10	8	3	1	0

Community 1.4
Excessive Litter Community

The Excessive Litter Community Phase describes the response of the community to the removal of the natural disturbances of herbivory and fire. As the undisturbed duff layer deepens, infiltration of the precipitation is interrupted and evaporation increases significantly, simulating drought-like conditions.

Community 1.5
Ephemeral Forb Community

This community describes the flush of forbs that occurs in response to a major disturbance, or combination of disturbances. Growing season wildfire followed by hail, extreme prolonged drought, or extreme defoliation by herbivores are all examples of these disturbances. The native warm-season grasses re-establish dominance with-in a few years of the event.

Pathway CP 1.1-1.2
Community 1.1 to 1.2

A shift from the Mixed Native Grass to the Degraded Native Grass community occurs with continuous season long grazing and inadequate recovery periods during the growing season.

Pathway CP 1.1-1.4
Community 1.1 to 1.4

Prolonged interruption of the natural disturbances of herbivory and fire will result in conversion from this community to the Excessive Litter Community.

Pathway CP 1.1-1.5
Community 1.1 to 1.5

A high-impact disturbance event or combination of events causing excessive defoliation of the vegetation, i.e. a growing season wildfire followed by a significant hailstorm, or a prolonged intensive grazing event or long-term drought, etc.

Pathway CP 1.2-1.1
Community 1.2 to 1.1

A shift from the Degraded Native Grass community toward the Reference community can be achieved through prescribed grazing. Applying grazing pressure during the growth period of the undesirable cool season grasses, and allowing rest during the warm season growing season favors our desired species. This grazing regime will enable the deeply rooted tall warm season grasses to out compete the shallow rooted grazing evasive warm season and the cool season grasses. Appropriately timed prescribed fire will accelerate this process.

Conservation practices

Access Control
Prescribed Grazing

Pathway CP 1.2-1.3
Community 1.2 to 1.3

Maintaining continuous season long grazing with inadequate recovery periods during the growing season further degrades the site to the At-Risk Native Grass Community.

Pathway CP 1.2-1.4
Community 1.2 to 1.4

Prolonged interruption of the natural disturbances of herbivory and fire will result in conversion from this community to the Excessive Litter Community.

Pathway CP 1.2-1.5
Community 1.2 to 1.5

A high-impact disturbance event, or combination of events causing excessive defoliation of the vegetation, i.e. a growing season wildfire followed by a significant hailstorm, or a prolonged intensive grazing event, or long-term drought, etc.

Pathway CP 1.3-1.2
Community 1.3 to 1.2

Reversing the downward trend to the previous community can be achieved with prescribed grazing early and late in the growing season to reduce undesirable cool season grasses. Targeting the peak growth period of cool season grasses with high intensity grazing events followed by rest will allow the tall native warm season grasses to rejuvenate. Appropriately timed prescribed fire will accelerate this process.

Conservation practices

Access Control
Prescribed Grazing

Pathway CP 1.3-1.4
Community 1.3 to 1.4

Interruption of the natural disturbances of herbivory and fire will result in conversion from this community to the Excessive Litter Community.

Pathway CP 1.3-1.5
Community 1.3 to 1.5

A high-impact disturbance event, or combination of events causing excessive defoliation of the vegetation, i.e. a growing season wildfire followed by a significant hailstorm, or a prolonged intensive grazing event, or long-term drought, etc.

Pathway CP 1.4-1.1
Community 1.4 to 1.1

Re-introduction of the natural processes of herbivory and fire will allow the vegetation to return to the previous community.

Pathway CP 1.4-1.2
Community 1.4 to 1.2

Re-introduction of the natural processes of herbivory and fire will allow the vegetation to return to the previous

community.

Pathway CP 1.4-1.3
Community 1.4 to 1.3

Re-introduction of the natural processes of herbivory and fire will allow the vegetation to return to the previous community.

Pathway CP 1.4-1.5
Community 1.4 to 1.5

A high-impact disturbance event, or combination of events causing excessive defoliation of the vegetation, i.e. a growing season wildfire followed by a significant hailstorm, or a prolonged intensive grazing event, or long-term drought, etc.

Pathway CP 1.5-1.1
Community 1.5 to 1.1

Restoration occurs naturally once the disturbance event has subsided. Allowing growing season rest will accelerate the recovery.

Pathway CP 1.5-1.2
Community 1.5 to 1.2

Restoration occurs naturally once the disturbance event has subsided. Allowing growing season rest will accelerate the recovery.

State 2
Native/Invaded Grass State

This state has been degraded from the Reference State and much of the native warm-season grass community has been replaced by less desirable plants. The loss of tall and mid- warm-season grasses has negatively impacted energy flow and nutrient cycling. Water infiltration is reduced due to the shallow root system and rapid runoff characteristics of the grazing-evasive plant communities. The Native Evaders/Invasives and the Smooth Bromegrass communities are the components of the Native/Invaded Grass State.

Community 2.1
Native Evaders/Invaded Grass

This plant community represents a shift from the Reference State across a plant community threshold. With continued grazing pressure, , Kentucky bluegrass, and composite dropseed will become the dominant plant species, with only trace remnants of the more palatable mid-warm-season grasses such as sideoats grama and little bluestem. Composite dropseed is a grazing-evasive warm-season mid-grass with low palatability. Continuous and heavy grazing pressure will maintain this plant community in a sod-bound condition. Forb richness and diversity has decreased. With the decline and loss of deeper penetrating root systems, a compacted layer may form in the soil profile below the more shallow replacement root systems. Grazing management practices that allow for adequate periods of recovery between grazing events will favor mid and tall warm-season grasses. Appropriately timed prescribed fire will accelerate the restoration process.

Figure 13. Plant community growth curve (percent production by month). NE7503, Central Loess Plains, warm season/cool season co-dominant. Native warm-season plant community encroached with cool-season grasses, MLRA 75.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	9	27	25	12	10	10	3	1	0

Community 2.2
Smooth Bromegrass

This plant community contains predominately smooth bromegrass but also contains some native warm-season grass remnants. Production of smooth bromegrass-dominated plant communities is highly variable, depending upon the percentages of composition present and outside inputs such as fertilizer and weed control.

Figure 14. Plant community growth curve (percent production by month). NE7504, Central Loess Plains, cool season dominant, warm season remnants. Cool season, smooth brome with native warm season remnants, MLRA 75.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	2	13	29	19	7	10	13	6	1	0

Pathway CP 2.1-2.2
Community 2.1 to 2.2

This community will be converted to a Smooth Bromegrass community through the following practices: introduced grass seeding, excessive warm season grazing, inadequate warm season rest, multi season haying and nitrogen fertilizing in spring and/or fall.

Pathway CP 2.2-2.1
Community 2.2 to 2.1

Restoration can be achieved by herbicide treatment and reseeding. If adequate native remnants are present, appropriately timed prescribed fire and a follow-up prescribed grazing program may achieve the desired results.

State 3
Sod-busted State

This threshold is crossed as a result of mechanical disturbance to facilitate production agriculture. If farming operations are suspended, the site can be abandoned, which will result in the Naturally Reclaimed Community, or be re-seeded to a desired perennial forage mixture, which is described as the Re-seeded Community. Permanent alterations of the soil community and the hydrological cycle make restoration to the original native Reference Community extremely difficult, if not impossible. Formation of a compacted plow pan in the soil profile is likely.

Community 3.1
Re-Seeded Grass

This plant community does not contain native remnants, and varies considerably depending on the seed mixture, the degree of soil erosion, the age of the stand, nitrogen fertilizer use, and past grazing management. Prescribed grazing with adequate recovery periods will be needed to maintain productivity and desirable species. Native range and seeded grasslands are ecologically different, and should be managed separately. Factors such as functional group, species, stand density, and improved varieties all impact the production level and palatability of the seedings. Species diversity is often limited, and when grazed in conjunction with native rangelands, uneven forage utilization may occur. Total annual production during an average year varies significantly depending on precipitation, management and grass species seeded.

Community 3.2
Natural Reclamation

This plant community consists of annual and perennial weeds and less desirable grasses. These sites have been farmed and abandoned without being reseeded. Soil organic matter/carbon reserves are reduced, soil structure is changed, and a plow-pan or compacted layer can be formed which decreases water infiltration. Residual synthetic chemicals may remain from farming operations. In early successional stages, this community is not stable. Erosion is a concern. Total annual production during an average year varies significantly depending on the succession stage of the plant community and any management applied to the system.

State 4
Invaded Woody State

Once the tree canopy cover reaches 15 percent with an average tree height exceeding 5 feet, the threshold is crossed to the Invaded Woody State. The primary coniferous interloper is Eastern redcedar. Locust, elm and green ash number among the deciduous native trees, along with several exotic introduced species. These woody species are encroaching due to lack of prescribed fire and other brush management practices. Typical ecological impacts are a loss of native warm season grasses, degraded forage productivity and reduced soil quality. This state consists of the Eastern Red Cedar/Locust Community.

Community 4.1
Eastern Red Cedar/Locust

This community has at least a 15 percent canopy of Eastern redcedar. Honey locust encroachment may occur as you move east within the MLRA, when brush management and prescribed burning is absent over an extended period of time. Generally this site is very conducive to cedar seedling invasion especially when adjacent to a seed source. Cedars will eventually dominate the site, resulting in a closed canopy, reduced forage production and limited livestock grazing and wildlife habitat value. Eastern redcedar control can usually be accomplished with prescribed burning while the trees are six foot tall or less and fine fuel production is over 1,500 pounds per acre. Trees of all heights can be controlled with the use of specifically adapted preparation, and ignition and holding techniques. Mechanical removal followed by a chemical treatment on stumps is effective on locust. Total annual production during an average year varies significantly, depending on the production level prior to encroachment and the percentage of canopy cover.

Figure 15. Plant community growth curve (percent production by month). NE7505, Central Loess Plains, woody encroachment. Woody plant encroachment with warm- and cool-season grasses MLRA 75.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	3	8	12	20	25	14	5	8	4	1	0

Transition T1-2
State 1 to 2

Heavy grazing without adequate recovery periods will cause this state to lose a significant proportion of tall and mid- warm-season grass species and cross a threshold to the Native/Invaded State. Water infiltration and other hydrologic functions will be reduced due to the root matting presence of sod-forming grasses. With the decline and loss of deeper penetrating root systems, soil structure and biological integrity are catastrophically degraded to the point that recovery is unlikely. Once this occurs, it is highly unlikely that grazing management alone will return the community to the Reference State.

Transition T1-3
State 1 to 3

The Reference State is significantly altered by mechanical tillage to allow the site to be placed into production agriculture. The disruption to the plant community, the soil and the hydrology of the system make restoration to a true reference state unlikely.

Transition T1-4
State 1 to 4

Disruption of the natural fire regime and the planting of invasive exotic and native woody species can cause this state to shift to the Invaded Woody State.

Transition T 2-3
State 2 to 3

The state is significantly altered by mechanical tillage to allow the site to be placed into production agriculture. The disruption to the plant community, the soil and the hydrology of the system make restoration to a true reference state unlikely.

Transition T 2-4
State 2 to 4

Disruption of the natural fire regime and the planting of invasive exotic and native woody species can cause this state to shift to the Invaded Woody State.

Transition T 3-4
State 3 to 4

Disruption of the natural fire regime and the planting of invasive exotic and native woody species can cause this state to shift to the Invaded Woody State.

Restoration pathway R 1,2,3
State 4 to 1

Prescribed burning, wildfire, harvest, and brush management will move this plant community toward one of the herbaceous plant dominated plant communities. The forb component of a site with heavy tree density or canopy cover will initially increase following tree removal through mechanical brush management treatments and prescribed fire. If re-sprouting brush such as Honey locust or Siberian elm is present, stumps must be chemically treated immediately after mechanical removal. Ongoing brush management such as hand cutting, chemical spot treatments or periodic prescribed burning is required to prevent a return to this state.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

Additional community tables

Animal community

WILDLIFE INTERPRETATIONS:
This ecological site is characterized by sandy soils that are nearly level to weakly hummocky and are usually associated with the sandy rivers and streams. These sites have historically been subject to frequent flooding, sorting, scouring, and redeposition. Therefore, vegetative composition can change quickly and frequently. As a result, virtually none of these sites have been cultivated. Since these areas are not farmed, they are often utilized for wintering areas by livestock, especially where trees are present. Overutilization by livestock tends to degrade terrestrial as well as aquatic wildlife habitat.

Historically these sites have supported a diversity of wildlife because of the mixture of forbs and grasses and the nearly steady supply of water. These forbs and grasses were utilized by a number of large mammals including deer, elk, and bison. Due to all landscape’s inherent heterogeneity, some areas were not grazed uniformly by these historic large herds of grazing animals. This type of grazing enhanced habitat for wildlife by creating a mosaic pattern, or patchiness, of vegetative structural diversity throughout the landscape. Wildlife native to the site depend on a plant community diverse in species and structure. This need is evident in the variability of known habitat requirements of grassland associated wildlife.

If cottonwood trees become established on these sites, the types of wildlife species using the area will shift from grassland species to woodland species. Striped skunks, opossums, porcupines, and whitetail deer habitat will increase. Habitat also becomes more suitable for northern bobwhite quail and turkeys.

In recent times cottonwood trees have begun dying off as a result of irrigation and a corresponding reduction in the

water table. With the loss of water flows, very few new trees are able to replace them. These dead cottonwood trees have created ideal habitat for species that utilize dead “snags” such as northern flickers, red-headed woodpeckers, wood ducks, and raccoons.

The site's close proximity to permanent or seasonal water in streams generally meets the needs of wildlife requiring open water for drinking. Seasonal pools present during the spring offer breeding habitat for amphibians.

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 Plant Community

The high diversity of grasses and forbs in this community provides habitat for a diverse group of insects. Areas with high forb diversity will generally support more insects such as the leaf-hoppers important to young grassland nesting birds. Grasshoppers, associated with grasses, are a critical food source for birds in later stages of development. Plains garter snakes and northern water snakes are common reptiles on the site. Areas with high forb and insect populations coupled with nearby

roost trees offer suitable brood habitat for wild turkeys. Reference Plant Communities with tall-, native, warm-season bunchgrasses, and openings at ground level offer suitable northern bobwhite quail nesting habitat. Small mammals such as white-footed mice are common and will attract raptors such as red-tailed hawks, great-horned owls, and eagles if suitable perches are available. Small mammals also provide prey for coyotes and other predators.

Animal Community – Grazing Interpretations

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangelands in this area provide yearlong forage under prescribed grazing for cattle, sheep, horses, and other herbivores. During the dormant period, livestock may need supplementation based on reliable forage analysis.

Calculating Safe Stocking Rates: Proper stocking rates should be incorporated into a grazing management strategy that protects the resource, maintains or improves rangeland health, and is consistent with management objectives. In addition to usable forage, safe stocking rates should consider ecological condition, trend of the site, past grazing use history, season of use, stock density, kind and class of livestock, forage digestibility, forage nutritional value, variation of harvest efficiency based on preference of plant species, and/or grazing system, and site grazeability factors (such as steep slopes, site inaccessibility, or distance to drinking water).

Often the current plant community does not entirely match any particular Community Phase as described in this Ecological Site Description. Because of this, a resource inventory is necessary to document plant composition and production. Proper interpretation of inventory data will permit the establishment of a safe initial stocking rate.

No two years have exactly the same weather conditions. For this reason, year-to-year and season-to season fluctuations in forage production are to be expected on grazing lands. Livestock producers must make timely adjustments in the numbers of animals or in the length of grazing periods to avoid overuse of forage plants when production is unfavorable and to make advantageous adjustments when forage supplies are above average.

Initial stocking rates should be improved through the use of vegetation monitoring and actual use records that include number and type of livestock, the timing and duration of grazing, and utilization levels. Actual use records over time will assist in making stocking rate adjustments based on the variability factors.

Average annual production must be measured or estimated to properly assess useable forage production and stocking rates.

Hydrological functions

Water is the principal factor limiting forage production on this site. The soils on this site are moderately deep to deep and range from well drained to excessively well drained.

Recreational uses

This site provides hunting for upland game species and white-tailed deer, along with hiking, photography, bird watching and. The wide varieties of plants which bloom from spring until fall have an aesthetic value that appeals to visitors.

Wood products

Firewood can be cut from this site. Red cedar can be utilized for veneer and/or cedar furniture. Cottonwood can be harvested for pallets.

Other products

None of significance.

Other information

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.

Inventory data references

Information presented here has been derived from NRCS Soil Surveys, similar sites in adjacent MLRAs, and field observations from trained personnel.

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Contributors

Doug Whisenhunt

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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:**

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17. **Perennial plant reproductive capability:**
