

## Ecological site R075XY062NE Gravelly Hills

Accessed: 04/24/2024

### 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.

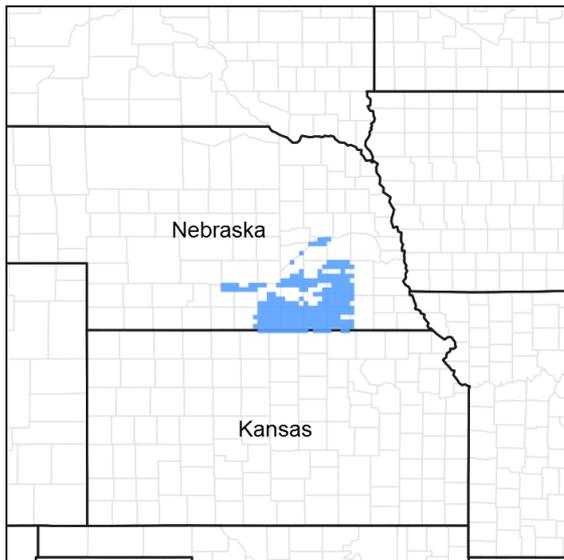


Figure 1. Mapped extent

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)

## Ecological site concept

The Gravelly Hills site is found on uplands, low ridges, terrace breaks, alluvial fans and foot slopes. The soils were formed in loamy and sandy material over gravelly material.

## Associated sites

R075XY050NE	<b>Loamy Terrace</b> Loamy Terrace occurs below and adjacent to Gravelly Hills.
R075XY058NE	<b>Loamy Plains</b> Loamy Plains occurs above and adjacent to Gravelly Hills.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Andropogon gerardii</i> (2) <i>Schizachyrium scoparium</i>

## Physiographic features

This site occurs on stream terraces and uplands where gravelly sediments are deposited. Slopes range from nearly level to very steep. This site may produce low runoff to areas lower on the landscape.

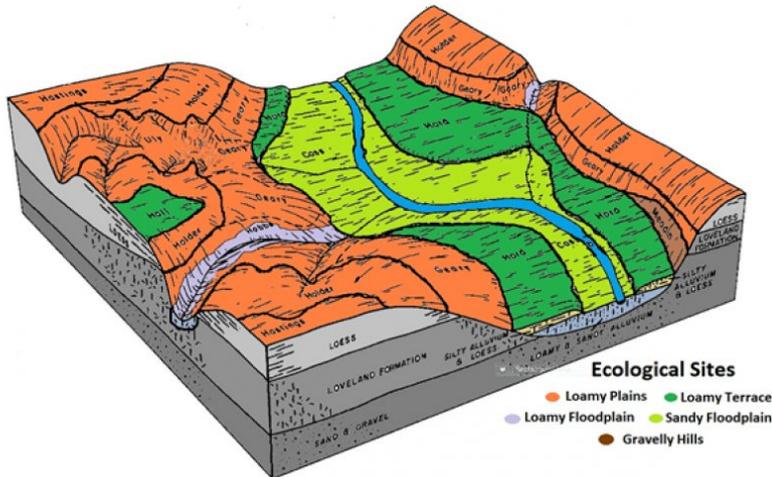


Figure 2. Block Diagram

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge (3) Plain
Flooding frequency	None
Ponding frequency	None
Elevation	1,630–2,650 ft
Slope	0–35%
Water table depth	80 in
Aspect	Aspect is not a significant factor

## 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)	157 days
Freeze-free period (average)	178 days
Precipitation total (average)	30 in

### Climate stations used

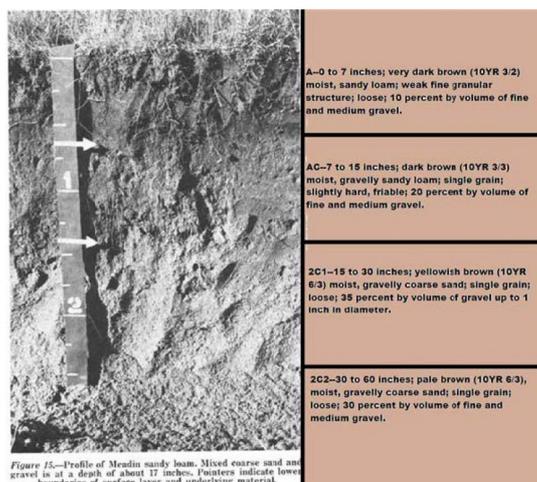
- (1) CLAY CTR [USC00251684], Saronville, NE
- (2) GENEVA [USC00253175], Geneva, NE
- (3) HASTINGS 4N [USC00253660], Hastings, NE
- (4) YORK [USC00259510], York, NE
- (5) FRIEND 3E [USC00253065], Friend, NE
- (6) HEBRON [USC00253735], Hebron, NE

### Influencing water features

This is an upland site and the plant community functions independently from the water table.

### Soil features

The Meadin series consists of very deep, excessively drained, rapidly permeable soils formed in loamy and sandy material over gravelly sand. These upland soils have slopes ranging from 0 to 35 percent.



**Figure 7. Meadin Soil Profile**

**Table 4. Representative soil features**

Surface texture	(1) Loam (2) Sandy loam (3) Fine sandy loam
Drainage class	Excessively drained
Permeability class	Rapid
Soil depth	80 in
Available water capacity (0-40in)	4 in
Electrical conductivity (0-40in)	0-2 mmhos/cm

### Ecological dynamics

Gravelly Hills sites 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 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 plants ability to harvest sunlight depletes the root reserves, subsequently decreasing the root mass. This negatively impacts the plants' ability 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, 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 that 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.

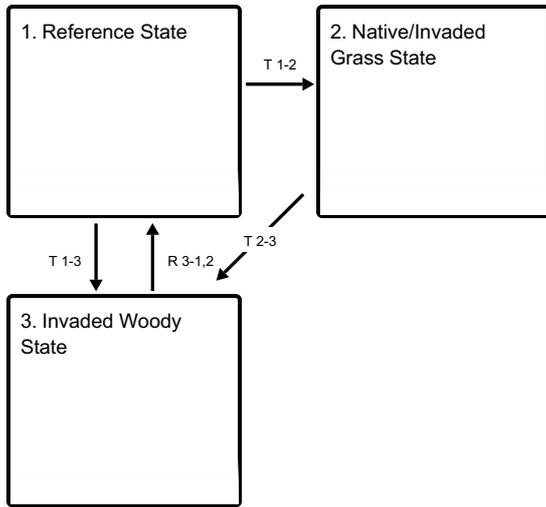
Growth of native cool season plants begins about April 1, and continues to about June 15. Native warm season plants begin growth about May 15, and continue to about August 15. Green up of cool season plants may occur in September and October if adequate moisture is available.

The species distribution and abundance on this site are also influenced by the degree of inclination and aspect of the local topography. Northern and eastern slopes are typically cooler and wetter, generally producing more biomass than the drier and warmer exposures. Severe inclines receive less grazing pressure than the more moderate slopes.

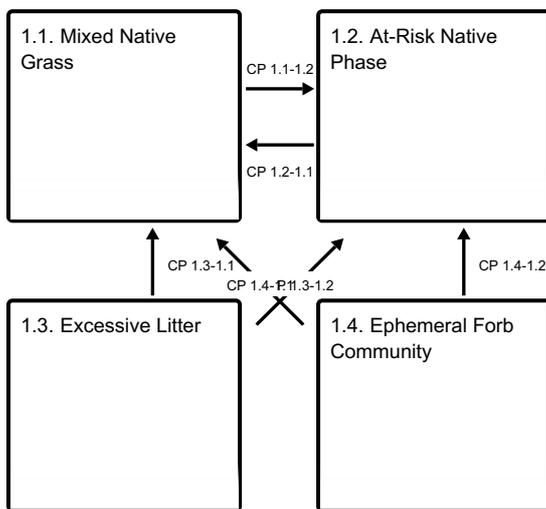
The following is a diagram that illustrates the common plant communities that can occur on the site and the transition pathways between communities.

## **State and transition model**

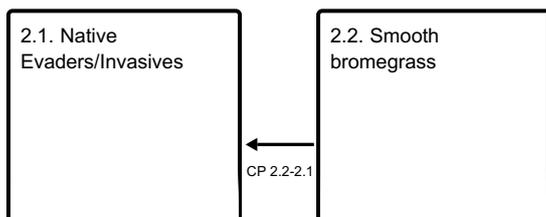
### Ecosystem states



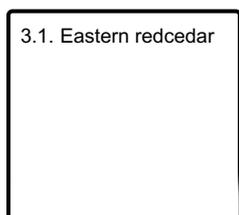
### State 1 submodel, plant communities



### State 2 submodel, plant communities



### State 3 submodel, plant communities



## State 1 Reference State

This state describes the range of vegetative community phases that occur on the Gravelly Hills 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 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. High perennial grass cover and production allows for increased soil moisture retention, vegetative production and overall soil quality.

## Community 1.1 Mixed Native Grass



Figure 8. Mixed Native Grass Community

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. This plant community is made up of 70-80 percent grasses and grass-like plants, 5-10 percent forbs, and 2-10 percent shrubs. Little bluestem, big bluestem, and sideoats grama are the dominant species in this community. Secondary grasses include blue grama, needleandthread, switchgrass, and indiagrass. The site has a very diverse forb population. Common forbs include Cuman ragweed, dotted blazing star and white heath aster. Shrubs include leadplant, smooth sumac and western snowberry. Though considered only moderately productive and less diverse than associated sites, this plant community is still resilient when management includes proper stocking and adequate rest periods between grazing events.

Figure 9. 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 At-Risk Native Phase

In this plant community, Big bluestem is significantly reduced, while other dominant warm season species experience decreased vigor. Timing of defoliation impacts the ratio of cool season grass species to warm season species in the community. Production declines, and soil health is affected by reduced efficiency in the nutrient, mineral and hydrologic cycles. Continued long-term growing-season heavy grazing will cause this community to

degrade to the point of crossing the state threshold into the Native/Invaded State. Drought or damaging hail will accelerate this degradation.

**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 1.3 Excessive Litter**

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 drouth-like conditions.

### **Community 1.4 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 reestablish dominance within 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 At-Risk Native Grass community occurs with continuous season long grazing and inadequate recovery periods during the growing season.

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

Altering the timing and degree of the disturbance regime will allow growing season rest of desirable mid-grass species, and facilitate a return to the Mid-Grass Community. In the presence of excessive drought, a return to the normal precipitation regime may be required to allow full recovery.

#### **Conservation practices**

Access Control
Prescribed Grazing

### **Pathway CP 1.3-1.1 Community 1.3 to 1.1**

Re-introduction of the natural processes of appropriately timed grazing and fire will convert this community back to the Native Mixed Grass Community.

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

Re-introduction of an appropriately timed grazing system, and the application of fire will facilitate restoration to community phase 1.2.

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

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

## Pathway CP 1.4-1.2 Community 1.4 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/Invasives

This plant community represents a shift from the Reference State across a plant community threshold. With continued grazing pressure, blue grama, Kentucky bluegrass and composite dropseed will become the dominant plant species, with only trace remnants of the more palatable tall and mid warm season grasses such as big 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.

Figure 11. 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

Smooth brome readily encroaches from adjacent fields, roadside ditches and seeded areas. It increases due to late spring Nitrogen fertilizer applications and heavy summer grazing reducing warm season grass vigor and under-utilization of Smooth bromegrass in the spring. Production on smooth brome dominated plant communities is highly variable depending on the percent composition of the plant in the community. Production can range from 1800 lbs /acre to 2800 pounds/acre with an average of 2300 lbs/acre in normal years on rangelands whose smooth brome component is 50 percent or more. Clipping or ocular estimates of production should be conducted to verify current annual production. Prescribed grazing, prescribed burning, or the use of herbicide treatments at critical time periods can reduce the smooth brome component in the plant community. Fertilization and other cultural practices in combination with prescribed grazing will maintain or increase the presence of smooth brome. Refer to Forage Suitability Group descriptions for more information on smooth brome production potentials under low and high management inputs.

Figure 12. 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 2.1**

Introduced grass seeding, excessive warm season grazing, inadequate warm season rest, multi season haying and nitrogen fertilizing in spring and/or fall are all practices that will convert this community to the Smooth Bromegrass Community.

## **Pathway CP 2.2-2.1 Community 2.2 to 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.

## **State 3 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. Typical ecological impacts are a loss of native warm season grasses, degraded forage productivity and reduced soil quality.

## **Community 3.1 Eastern redcedar**

This community has at least a 15 percent canopy of Eastern redcedar. 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 1500 pounds per acre. Trees of all heights can be controlled with the use of specifically adapted preparation, and ignition and holding techniques. Total annual production during an average year varies significantly, depending on the production level prior to encroachment and the percentage of canopy cover.

**Figure 13. 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 T 1-2 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 T 1-3 State 1 to 3**

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**

Disruption of the natural fire regime and the planting of invasive exotic and native woody species all contribute to shifting this state to the Invaded Woody State.

## **Restoration pathway R 3-1,2**

### **State 3 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.

### **Additional community tables**

#### **Animal community**

##### **LIVESTOCK – GRAZING INTERPRETATIONS:**

This site is well adapted to managed grazing by domestic livestock. The predominance of herbaceous plants across all plant community phases best lends these sites to grazing by cattle, but also to browsing by livestock such as goats or sheep that will more heavily utilize invasive forbs and brush.

##### **WILDLIFE INTERPRETATIONS:**

Major Land Resource Area (MLRA) 75 lies primarily within the loess mixed-grass prairie ecosystem mixed with tallgrass prairie in lower areas. Prior to European settlement, this area consisted of diverse grassland habitats interspersed with varying densities of depressional wetlands and limited woody riparian corridors. These habitats provided critical life cycle components for the grassland birds, prairie dogs, and herds of roaming bison, elk, and pronghorn that historically occupied this landscape. Diverse populations of small mammals and insects provided a bountiful prey base for raptors and omnivores such as coyotes, foxes, raccoons, and opossums. Native Americans, bobcats, wolves, and mountain lions occupied the apex predator niche. In addition, a wide variety of reptiles and amphibians thrived in this landscape.

The loess mixed-grass prairie was a disturbance-driven ecosystem with fire, herbivory, and climate functioning as the primary disturbances. Following European settlement, elimination of fire, widespread conversion to cropland, and other sources of habitat fragmentation significantly altered the appearance and functionality of the entire ecosystem. The reduced stability of the system is reflected by major changes in the composition and abundance of the native flora and fauna. Introduced and invading species further degrade the ecological integrity of the plant and animal communities. Bison and prairie dogs were historically keystone species but free-roaming bison herds and nearly all prairie dogs have been extirpated. The loss of bison and fire as ecological drivers greatly influenced the character of the remaining native grasslands and the habitats that they provide. Fragmentation has reduced habitat quality for numerous area-sensitive species, as highlighted by the decline of the greater prairie chicken. Many grassland nesting bird populations, such as dickcissel and Henslow's sparrow, are also declining. In addition to free-ranging bison, extirpated species include pronghorn, wolves, and swift fox.

Historically, an ecological mosaic of Loamy Plains, Clayey Plains, Gravelly Hills, Closed Upland Depression, Loamy Terrace, and Loamy Floodplain sites provided habitat for species requiring unfragmented grasslands. Important habitat features and components found commonly or exclusively on modern day remnants include upland nesting habitat for grassland birds and game birds; nesting and escape cover for waterfowl; forbs and insects for brood rearing habitat; and a forage source for small and large herbivores. Within MLRA 75, remaining Shallow Limy ecological sites provide grassland cover with an associated forb and limited shrub component.

In this fragmented landscape, native grassland bird populations face increasing competition from the opportunistic European starlings and house sparrows, and are subject to nest parasitism from brown-headed cowbirds.

Tree encroachment creates habitat that favors generalist species such as American robin and mourning dove, and provides perches for raptors, increasing the predation mortality.

Introduced species such as smooth brome grass, reed canarygrass, Kentucky bluegrass, nodding plumeless thistle, and Canada thistle further degrade the biological integrity of many of these remnant prairies.

1. REFERENCE STATE: The predominance of tall and mid-statured grasses plus a high diversity of forbs and shrubs in this community makes it ideal for grazers and mixed-feeders. Pollinating insects play a large role in maintaining the forb community and provide a food source for grassland birds and other grassland-dependent

species. The vegetative structural diversity provides habitat for reptiles, amphibians, and a wide array of native and introduced bird species including Henslow's sparrow, Western meadowlark, Northern bobwhite, and ring-necked pheasants. The abundant prey base supports populations of Swainson's hawk, burrowing, short-eared, and great horned owls, and other grassland raptors.

Western meadowlark and American crow over-winter in this habitat.

The diversity of grasses, forbs and shrubs provide high nutrition levels for small and large herbivores including moles, mice, ground squirrels, white-tailed jackrabbit, and whitetail deer. The structure of this plant community provides suitable thermal, protective, and escape cover for small herbivores and grassland birds. Many wide-ranging predators utilize this plant community, including coyote, badger, red fox, and least- and long-tailed weasels.

As the plant community degrades to more mid-grasses and fewer tall grasses, less winter and escape cover are provided. It also provides less cover for predators. As the plant community shifts from tall warm-season grasses to mid-height grasses, it favors grassland birds that prefer shorter vegetation. This structural community provides better habitat for greater prairie chicken, lark bunting, and lark sparrow populations. Habitat in plant community 1.3 is much the same as 1.2, but provides less winter protection because of the reduced plant height and cover.

2. NATIVE/INVADED STATE: Although the amount of Kentucky bluegrass in this plant community varies, the generally lower structure height favors the suite of grassland birds that prefer more visual space. Increased dominance by Kentucky bluegrass with lower plant diversity provides less habitat for ring-necked pheasant, Northern bob-white, and mixed-feeders, such as whitetail deer and small mammals. Insect populations are somewhat reduced, but still play a large role in maintaining the forb community and providing a moderate forage supply for grassland birds and other species.

The reduced stature of this plant community still provides suitable thermal, protective, and escape cover for small herbivores and grassland birds.

3. INVADED WOODY STATE: The Eastern Red Cedar/Locust Community provides habitat niches for white-tailed deer, wild turkey, raccoon, and Cooper's and sharp-shinned hawk, among other species.

Birds that are habitat generalists, such as the Bell's Vireo, common yellowthroat, Eastern kingbird, mourning dove, American goldfinch, Northern bobwhite, field sparrow, solitary vireo, and pigmy nuthatch use woody cover for nesting, food, and breeding habitats.

While a woody component of the grassland provides specific short-term habitats for some species, an expansive forest component is very detrimental to grassland wildlife species diversity and abundance overall.

## **Hydrological functions**

Adequate available soil moisture for plant growth is the principal factor limiting forage production on this site. Runoff occurs only during the most intense storms or when soils are saturated (refer to Section 4, NRCS National Engineering Handbook for runoff quantities and hydrologic curves).

For the interpretive plant community, rills and gullies should typically not be present. Water flow patterns should be barely distinguishable if at all present. Pedestals are only slightly present, in association with bunchgrasses such as little bluestem. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent. Overall this site has the appearance of being stable and productive.

## **Recreational uses**

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

## **Wood products**

No appreciable wood products are present on the site. Redcedar can be utilized for veneer and/or cedar furniture.

## Other products

No appreciable other products are present on the site.

## Other information

Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team. The project plan is: ES R075XY062NE- MLRA 75.

## Inventory data references

Information presented here has been derived from field observations from range-trained personnel and literature and soil surveys.

## Other references

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## Contributors

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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:**

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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):**

- 
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**
- 
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**
- 
11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**
- 
12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**
- Dominant:
- Sub-dominant:
- Other:
- Additional:
- 
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**
- 
14. **Average percent litter cover (%) and depth ( in):**
- 
15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**
- 
16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**
- 
17. **Perennial plant reproductive capability:**
-