USDA Natural Resources
Conservation Service

Ecological site R102CY063NE
Loess Breaks

Accessed: 05/19/2024

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.

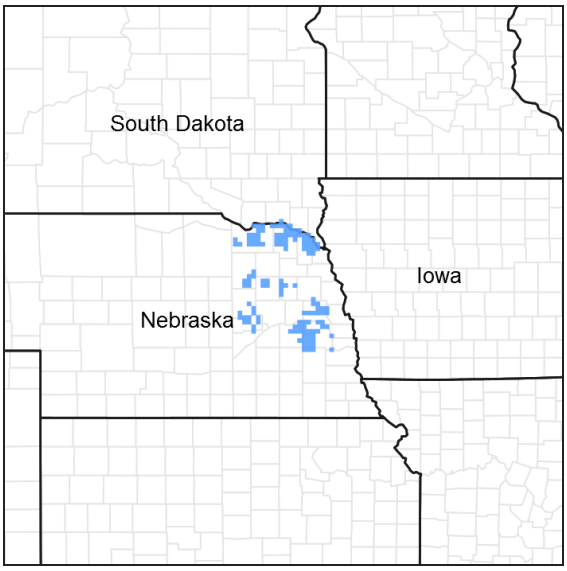


Figure 1. Mapped extent

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.

Classification relationships

"Thin Loess" range sites for NE NRCS Vegetation Zones 3 & 4

NE Natural Heritage Program/NE Game & Parks Commission: "Northern Loess/Shale Bluff Prairie"

General information for MLRA 102C:

Fenneman (1916) Physiographic Regions
Division - Interior Plains
East:
Province - Central Lowland
Section - Till Plains
West:
Province - Great Plains
Section - High Plains

USFS (2007) Ecoregions
Domain - Humid Temperate
Division - Prairie
Province - Prairie Parkland (Temperate)

Section - North-Central Glaciated Plains (251B)

EPA Ecoregions (Omernik 1997)
I - Great Plains (9)
II - Temperate Prairies (9.2)
III - Western Corn Belt Plains (9.2.3) IV - Loess Prairies (47a)
IV - Northeastern Nebraska Loess Hills (47k)
IV - Transitional Sandy Plain (47l)

Ecological site concept

The >30% slopes associated with this site cause a high proportion of natural precipitation to run off resulting in relatively high natural erosion rates, low organic matter, and limited soil development with carbonates remaining at or near the surface. These conditions are expressed as a site with the lowest production of all areas in the MLRA that do not include bedrock (or some other restrictive layer) within 20” of the surface, although outcrops and shallow solums may be encountered locally.

Associated sites

R102CY058NE	**Loamy Upland** May be encountered in upland drainageways as linear units between Loess Breaks areas depending on site-specific factors such as slope, surrounding topography, and size of the contributing watershed. Carbonates are leached beyond 10" of the surface.
R102CY059NE	**Limy Upland** Found on areas with <30% slope and carbonates within 10" of the surface. May also be encountered in upland drainageways as linear units between Loess Breaks areas depending on site-specific factors such as slope, surrounding topography, and size of the contributing watershed.

Similar sites

R102CY059NE	**Limy Upland** Slopes are <30%, the A horizon is typically deeper (although still not mollic), and infiltration is relatively higher supporting increased vegetative production.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site predominantly occurs on very steep loess hills and side slopes on dissected till plains, (>30% slopes) that have been dissected by geologic erosion. The slope shape is predominantly convex, generates runoff, has a water table greater than 203 centimeters deep, and does not flood or pond. Refer to the 102C Ecosite Key for field verification.

Table 2. Representative physiographic features

Landforms	(1) Loess hill
Flooding frequency	None
Ponding frequency	None
Elevation	305–610 m
Slope	30–60%
Water table depth	203 cm

Aspect	Aspect is not a significant factor

Climatic features

Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. Peak precipitation occurs from the middle of spring to early in autumn. Winter precipitation occurs as snow (USDA/NRCS 2006).

The average annual temperature gradient trends higher from north (45°F/7°C) to south (51°F/11°C).

The average annual precipitation gradient trends higher from northwest (25”/64cm) to southeast (31”/79cm).

The annual snowfall ranges from about 24" (60cm) in the southern part of the area to 34" (85cm) in the northern part.

The following data summary includes weather stations representing the full geographic extent of the MLRA, and is based on 70% probabilities (NOAA/UNL) meaning that actual observed climate conditions may fall outside these ranges 30% of the time. Furthermore, climatic events can manifest many different ways. For example, abnormally dry periods could occur as 3 consecutive drought years out of 10, 3 individual years separated by “normal” years, or some combination. Tree-ring records indicate that portions of the Great Plains have also historically experienced droughts lasting several decades, so plant community response will largely depend on the manner in which climatic variability is realized in interaction with past and current land management.

Table 3. Representative climatic features

Frost-free period (average)	172 days
Freeze-free period (average)	152 days
Precipitation total (average)	686 mm

Influencing water features

No riparian or wetland features are associated with this site.

Soil features

These are predominantly very deep, well drained soils and have >30% slopes. The surface texture is predominantly silt loam or silty clay loam from 0 to 15 centimeters and the Subsurface Texture Group is Loamy from 15 to 203 centimeters.

Rills and gullies are not inherent to this site. Water flow patterns should be irregular and disconnected, and pedestalling none to slight; although, both of these indicators may become more apparent as slope approaches the upper limit for the site. Soil aggregate stability should be high.

Major soils assigned to this site include Crofton and Ida

Table 4. Representative soil features

Surface texture	(1) Silt loam (2) Silty clay loam
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	203 cm
Surface fragment cover <=3"	0%

Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	17.27–22.35 cm
Calcium carbonate equivalent (0-101.6cm)	0–25%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–2%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The vast majority of this site’s spatial extent presently supports bur oak woodlands which includes other tree and shrub species with overall diversity increasing downriver along the Missouri. However, it’s assumed that most of these areas pre-settlement were tall/midgrass prairie with woody species occupying only a minor portion of the landscape largely restricted to pockets, protected draws, or open savannahs.

Soil texture often tends towards the coarse end of this site""s texture range with increasing proximity to the Missouri river due to eolian redistribution of alluvial material to the uplands (Hanna and Bidwell, 1955). This can affect overal plant composition with a noticable increase in species adapted to coarser and/or droughtier conditions, particularly prairie sandreed.

This site developed with fire as an integral part of the ecological processes and grassland maintenance. It is presumed that the historic fires generally occurred every 3-4 years, were randomly distributed, and ignited by lightning at various times throughout the summer when thunderstorms were likely to occur. Furthermore, it is also believed that pre-European inhabitants often used fire as a management tool for attracting herds of large migratory herbivores (bison, elk, and/or deer) as well as for warfare. However, the impact of fire over the past 100 years has been diminished due to human prevention and suppression of wildfire and the pervasive lack of cultural acceptance of prescribed fire as a surrogate (Helzer 2010).

The degree of herbivory (feeding on herbaceous plants) can have a significant impact on the dynamics of the site. Historically, periodic grazing by herds of large migratory herbivores was a major influence albeit herbivore use on this site was probably somewhat less relative to flatter areas due to landscape complexity, energy required to climb steeper slopes, and reduced forage production. For example, as a general rule, cattle use of this site and its 30-60% slope range mcan be assumed to be ~60% less than nearby sites with <10% slope. However, herbivory by species such as insects, rodents, and root feeding organisms also impacted the vegetation historically and continue to this day (Helzer 2010). Human control of large herbivore impacts through grazing of domestic livestock and/or manipulation of wildlife populations has been a major contemporary influence on the ecological dynamics of the site (USDA/SCS 1977.) Management coupled with climate largely dictates the plant communities observed.

The reference state characterizes the historic natural condition, and has been determined by the study of rangeland relic areas, areas protected from excessive disturbance, and/or areas under compatible grazing regimes. Trends in plant community dynamics ranging from heavily grazed to unused areas, seasonal use pastures, and historical accounts have also been considered.

The following is a diagram illustrating predictable and recurring plant communities inherent to this site, and the pathways of change between them (Bestelmeyer 2010). The ecological processes will be discussed in more detail in the plant community descriptions following the diagram.

State and transition model

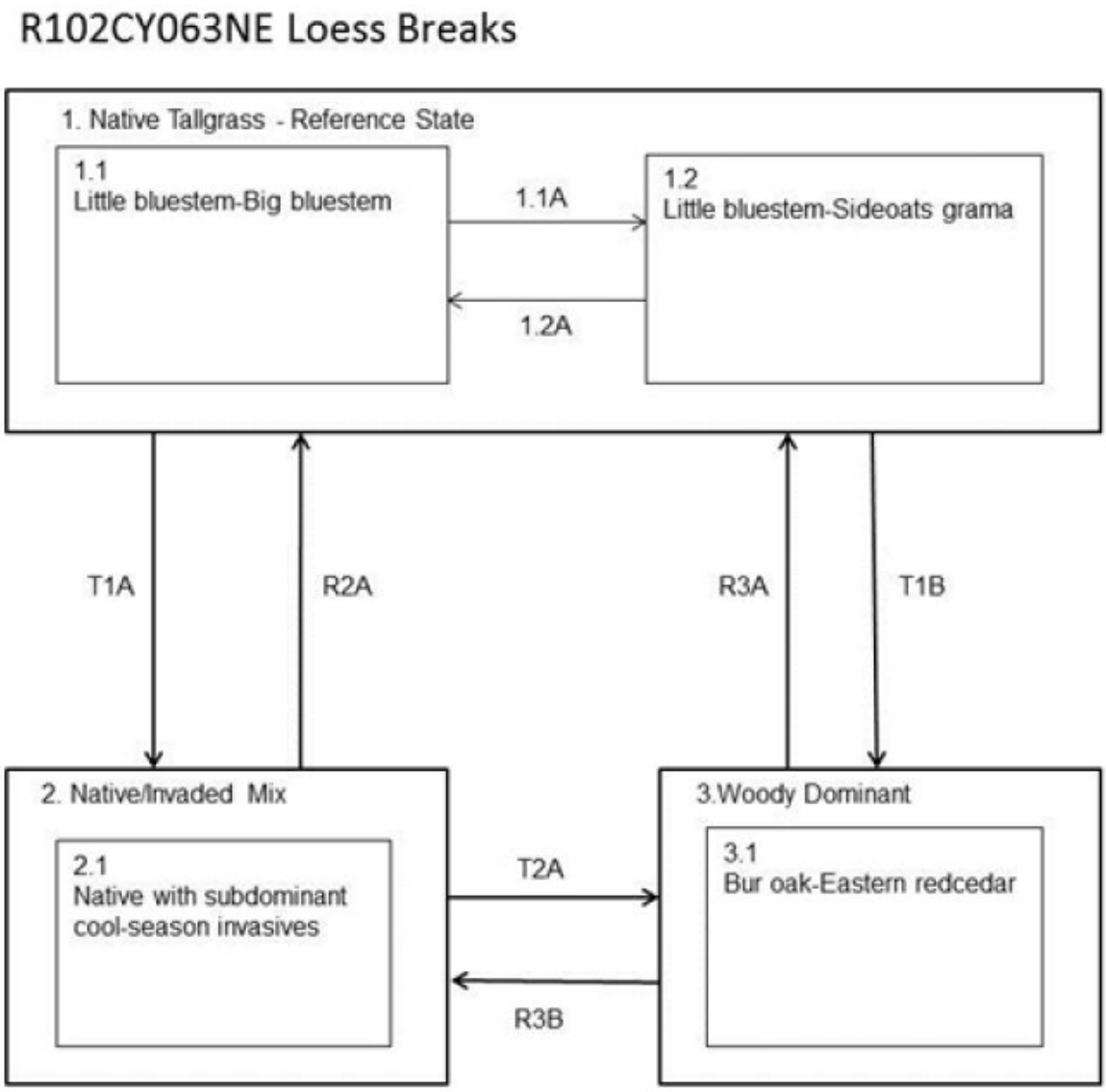


Figure 6. R102CY063NE Loess Breaks

State 1
Native tallgrass

This state comprises the communities within the range of natural variability under historic conditions and disturbance regimes. Patterns created by wildlife use and fire would have created a mosaic of communities across the landscape; however, tall and/or mid warm-season grasses would remain dominant, with a subdominant contribution from native cool-season grasses, forbs, and shrubs. The cool-season contribution increases with latitude, with species such as needleandthread and green needlegrass becoming more prevalent northward. Fire and bison herbivory were the dominant disturbance regimes that historically maintained the tallgrass dominance with a diverse forb component. Furthermore, bison grazing was closely linked to fire patterns as the animals preferred grazing burned areas offering lush regrowth devoid of decadence and of higher nutritive quality. Thus, historic plant communities were subjected to occasional burning and grazing, with substantial rest/recovery periods as the fuel load rebuilt to eventually start the process again. Fire return intervals of 3-4 years served to suppress woody

species, particularly non-sprouting eastern redcedar. The degree to which observed conditions represent this state largely depends on how closely the management has mimicked these past disturbance effects.

Community 1.1
Little bluestem-Big bluestem (Schizachyrium scoparium-Andropogon gerardii)

Figure 7. Loess Breaks 1.1

This is the reference plant community and can be found on areas that are managed to allow for adequate recovery periods following defoliation or drought stress. In addition to tallgrass vigor, suppression of woody species either through natural (e.g. fire) or artificial (e.g. chainsaw) methods is necessary to maintain herbaceous dominance. The plant community consists of 75-90% grasses and grass-likes, 5-10% forbs and 1-5% shrubs. Dominant grasses include little bluestem, big bluestem, sideoats grama, and plains muhly. Other grasses and grass-likes are indiangrass, blue grama, prairie junegrass, and switchgrass. Forb species are diverse and include prairieclovers, and goldenrods, and black samson. Common shrubs include leadplant and New Jersey tea (Kaul 2006, Steinauer 2010, USDA/NRCS 2012). This plant community is diverse, stable, and productive with nutrient and water cycles, and energy flow functioning near full potential considering the slope limitations. Plant litter is properly distributed with negligible movement off-site, and natural plant mortality is very low. This community is resistant to many disturbances except continuous season-long heavy grazing, tillage, or non-use. Broadcast herbicide application will dramatically reduce non-target forb diversity and abundance. Total annual production, during an average year, ranges from 2400 to 4300 pounds per acre air-dry weight and will average 3500 pounds.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1567	2287	2665
Shrub/Vine	118	202	308
Forb	118	202	308
Total	**1803**	**2691**	**3281**

Figure 9. Plant community growth curve (percent production by month). NE1021, 102C Warm-season. Warm-season grass, MLRA 102C.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	2	7	18	23	26	16	6	2	0	0

Community 1.2
Little bluestem-Sideoats grama (Schizachyrium scoparium-Bouteloua curtipendula)

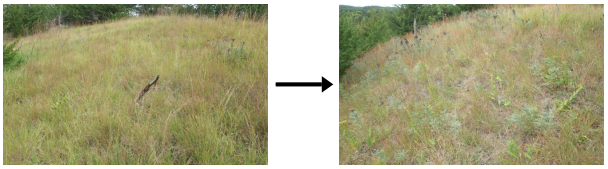
Figure 10. Loess Breaks 1.2

This community largely resembles central Great Plains mixed-grass prairies where rainfall is more limiting and overall conditions are relatively drier. Tallgrasses are a minor component with midgrasses - typically sideoats grama and little bluestem - dominating site structure and function. While still within the range of natural variability, energy capture, nutrient cycling, and hydrology are not functioning at their full potential relative to the reference condition. Reduced photosynthetic biomass does not capture as much light energy, less lignified plant material produces lower quality litter (e.g. less persistent, more easily transported), and reduced soil protection impairs the site"s ability to capture and retain moisture.

Figure 11. Plant community growth curve (percent production by month). NE1021, 102C Warm-season. Warm-season grass, MLRA 102C.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	2	7	18	23	26	16	6	2	0	0

Pathway 1.1A
Community 1.1 to 1.2

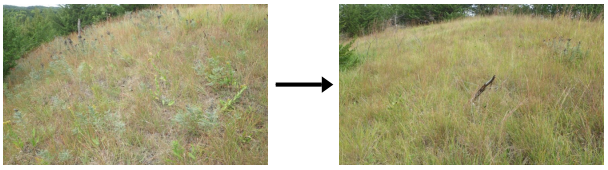


Little bluestem-Big bluestem (Schizachyrium scoparium-Andropogon gerardii)

Little bluestem-Sideoats grama (Schizachyrium scoparium-Bouteloua curtipendula)

Events which remove tallgrass growing points and photosynthetic tissues without adequate recovery periods will shift community composition towards shorter statured species, particularly little bluestem and sideoats grama. Likewise, shortgrasses such as hairy and/or blue grama may also proliferate. As cattle grazing pressure increases/persists, rhizomatous grasses may assume a more sodbound growth habit which can further reduce overall diversity and adversely affect both infiltration and litter. Periods of extended drought can have similar impacts on species composition and bring about a shift towards mixed/shortgrass prairie species more tolerant of drier conditions.

Pathway 1.2A
Community 1.2 to 1.1



Little bluestem-Sideoats grama (Schizachyrium scoparium-Bouteloua curtipendula)

Little bluestem-Big bluestem (Schizachyrium scoparium-Andropogon gerardii)

Management that provides adequate recovery periods and does not annually prevent tallgrass seedset or otherwise impair vigor will facilitate a return to community phase 1.1. In the case of drought, the return to more typical precipitation patterns will promote shift towards tallgrass species.

State 2
Native/invaded mix

This state can manifest three ways: 1) the appearance of introduced cool-season grasses, 2) the expansion of deciduous shrubs and/or trees, or 3) some combination of these. Kentucky bluegrass and smooth brome are the primary cool-season grass invaders in this region, commonly found in roadsides, disturbed areas, and pastures intentionally seeded for cool-season forage. Management practices and/or environmental conditions that are not favorable to native grass vigor may allow introduced grasses to invade the site thereby decreasing native diversity and abundance, particularly of forbs. In the absence of the historic fire regime, woody deciduous species may also expand to become an influential component of the community. The invasive component tends to have very high reslience, is extremely difficult to eradicate, and what might be considered a new "contemporary" range of natural variability is seen as competition between the native grasses and introduced/woody species for space and resources.

Community 2.1
Subdominant Smooth brome-Kentucky bluegrass (Bromus inermis-Poa pratensis)

While native grasses still dominate the site, introduced cool-season species have established a foothold in the system and can be found interspersed throughout the stand. The stand may still have a native tall and midgrass appearance overall, but bluegrass and/or brome can be easily found. Deciduous shrub/tree species may also have begun to expand into areas where they did not persist historically, but the overall appearance can vary depending on the propagation method of a particular species. Seed propagated species, such as Siberian elm, tend to colonize further from the parent plant and affect larger areas, but in lower densities. In contrast, rhizomatous species such as smooth sumac tend to progress as a higher-density encroachment spreading directly from the parent plants.

Figure 12. Plant community growth curve (percent production by month). NE1022, Warm-season dominant, cool-season subdominant.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	2	9	19	23	24	13	7	3	0	0

State 3
Woody dominant

Woody species have established a significantly closed canopy that influences the herbaceous understory through processes such as stemflow, litterfall, and variable understory insolation, creating more heterogenous resource distribution relative to historic grassland conditions. Also, the precipitation gradient produces changes in both overstory and understory species composition seen as increased eastern deciduous forest influence mixing with bur oak southeasterly in MLRA.

Community 3.1
Bur oak-Eastern redcedar (Quercus macrocarpa-Juniperus virginiana)

Figure 13. Loess Breaks - Bur oak

Figure 14. Loess Breaks - Deciduous/cedar mix

Bur oak is the most common tree species, although mulberry, ash, and black walnut can often be found in lesser numbers. A profound shift in herbaceous plants is seen as a near total loss of warm-season tallgrasses towards native and/or introduced cool-season species such as Carex spp., and wildryes, as well as smooth brome and Kentucky bluegrass if present. Eastern redcedar can also be prominent, either as a subdominant component of a deciduous woodland or as the dominant with few to no interspersed deciduous.

Transition T1A
State 1 to 2

In the presence of introduced cool-season grasses, environmental conditions and/or management that reduces native vigor and stand resilience, and frees up resources (space, sunlight, nutrients, water) will allow for colonization of Kentucky bluegrass and smooth brome. Likewise, similar processes may also allow for deciduous woody shrubs and trees such as smooth sumac, roughleaf dogwood, and Siberian elm to expand.

Transition T1B
State 1 to 3

The presence of an invasion source coupled with fire exclusion allows woody species to expand and establish within the herbaceous stand. This typically begins near woody draws and accelerates outward as propagules increase. Lack of intervening action allows woody expansion to continue, and tree sizes to increase. Trees will eventually modify site function in ways that promote further encroachment such as rainfall interception and stemflow, heavy leaf litter, and shading of the herbaceous understory.

Restoration pathway R2A
State 2 to 1

Eradication of introduced cool-season grasses from this site will require long-term, targeted management efforts to create an adverse environment during the spring and late fall when bluegrass and brome are most actively growing, with favorable conditions during the summer to promote native warm-season species. Targeted practices such as prescribed burning, flash grazing, and herbicide are often employed at strategic times of the year to set back undesirable species. The combination of practices should strive to mimic the historic disturbance regimes to which the desirable native species are best adapted.

Transition T2A
State 2 to 3

The presence of an invasion source coupled with fire exclusion allows woody species to expand and establish within the herbaceous stand. This typically begins near woody draws and accelerates outward as propagules increase. Lack of intervening action allows woody expansion to continue, and tree sizes to increase. Trees will eventually modify site function in ways that promote further encroachment such as rainfall interception and stemflow, heavy leaf litter, and shading of the herbaceous understory.

Restoration pathway R3A/B
State 3 to 1

With deciduous dominance, taller trees, thicker bark, and reduced understory ladder fuels have created a woodland community virtually invulnerable to fire. Overstory thinning/removal will require labor-intensive mechanical and/or chemical methods on difficult terrain. Solid cedar stands may be able to carry an effective fire, but this will steep slopes largely denuded and exposed thereby requiring additional mitigative actions to preserve site stability. The outcomes of restoration activities can vary, depending heavily on both the present understory and the seedbank, and may instead result in a rapid increase of sprouting species such as roughleaf dogwood and/or smooth sumac which will require further efforts.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Tall warm-season**			538–1345	
	big bluestem	ANGE	*Andropogon gerardii*	404–538	–
	Indiangrass	SONU2	*Sorghastrum nutans*	0–269	–
	composite dropseed	SPCO16	*Sporobolus compositus*	0–135	–
	prairie sandreed	CALO	*Calamovilfa longifolia*	0–135	–
	switchgrass	PAVI2	*Panicum virgatum*	0–135	–
2	**Mid warm-season**			942–1749	
	little bluestem	SCSC	*Schizachyrium scoparium*	538–942	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	269–538	–

	plains muhly	MUCU3	*Muhlenbergia cuspidata*	135–269	–
3	**Shortgrasses**			27–269	
	blue grama	BOGR2	*Bouteloua gracilis*	27–135	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	0–135	–
4	**Cool-season**			27–269	
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	0–135	–
	Canada wildrye	ELCA4	*Elymus canadensis*	0–135	–
	needle and thread	HECO26	*Hesperostipa comata*	0–135	–
	porcupinegrass	HESP11	*Hesperostipa spartea*	0–135	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–135	–
5	**Grass-like**			27–269	
	shortbeak sedge	CABR10	*Carex brevior*	0–135	–
	heavy sedge	CAGR4	*Carex gravida*	0–135	–
	sedge	CAREX	*Carex*	27–135	–
	long-stolon sedge	CAIN9	*Carex inops*	0–81	–
Forb					
6	**Forbs**			135–269	
	purple prairie clover	DAPU5	*Dalea purpurea*	0–135	–
	blacksamson echinacea	ECAN2	*Echinacea angustifolia*	0–135	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–135	–
	white prairie clover	DACA7	*Dalea candida*	0–135	–
	dotted blazing star	LIPU	*Liatris punctata*	0–135	–
	rush skeletonplant	LYJU	*Lygodesmia juncea*	0–135	–
	stiff goldenrod	OLRI	*Oligoneuron rigidum*	0–135	–
	purple locoweed	OXLA3	*Oxytropis lambertii*	0–135	–
	prairie groundsel	PAPL12	*Packera plattensis*	0–135	–
	silverleaf Indian breadroot	PEAR6	*Pediomelum argophyllum*	0–135	–
	large beardtongue	PEGR7	*Penstemon grandiflorus*	0–135	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–135	–
	Missouri goldenrod	SOMI2	*Solidago missouriensis*	27–135	–
	white heath aster	SYER	*Symphyotrichum ericoides*	0–135	–
	Baldwin's ironweed	VEBA	*Vernonia baldwinii*	0–135	–
	nineanther prairie clover	DAEN	*Dalea enneandra*	0–81	–
	field pussytoes	ANNE	*Antennaria neglecta*	0–81	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	0–81	–
Shrub/Vine					
7	**Shrubs**			135–269	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–135	–
	leadplant	AMCA6	*Amorpha canescens*	0–135	–
	smooth sumac	RHGL	*Rhus glabra*	0–135	–
	prairie rose	ROAR3	*Rosa arkansana*	0–135	–

	western snowberry	SYOC	*Symphoricarpos occidentalis*	0–135	–

Animal community

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 browsing livestock such as goats or sheep that will more heavily utilize invasive forbs and brush. Carrying capacity and production estimates are conservative estimates that should be used only as guidelines in initial stages of grazing lands planning.

Often, the plant community does not entirely match any particular plant community (as described in the ecological site description). Because of this, a resource inventory is necessary to document plant composition and production. Proper interpretation of this inventory data will permit the establishment of a safe, initial stocking rate for the type and class of animals and level of grazing management. Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide year-long forage for cattle, sheep, or horses. During the dormant period, the protein levels of the forage may be lower than the minimum needed to meet livestock (primarily cattle and sheep) requirements.

Suggested stocking rates (carrying capacity*) for cattle under continuous season-long grazing under normal growing conditions are listed below:

- 1.1 Big bluestem-Little bluestem; 2400 lbs/acre production and 0.66 AUM/acre

- 1.2 Little bluestem-Sideoats grama; 2100 lbs/acre production and 0.58 AUM/acre

- 2.1 Subdominant smooth brome-KY bluegrass; 1600 lbs/acre production and 0.44 AUM/acre

*Carrying capacity based on continuous season-long grazing by cattle under average growing conditions, 25% harvest efficiency. Air dry forage requirements based on 3% of animal body weight, or 912 lbs/AU/month.

If grazing distribution problems occur, stocking rates must be reduced to maintain plant health and vigor. Carrying capacity and production estimates are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process. Utilizing a rotational grazing system that allows for adequate rest and recovery will increase plant vigor and carrying capacity. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this, a field visit is recommended to document plant composition and production. More precise carrying capacity estimates can be calculated based on actual site information along with animal preference data, particularly when livestock other than cattle are involved. With consultation of the land manager, more intensive grazing management may result in improved harvest efficiencies and increased carrying capacity.

Inventory data references

Information presented here has been derived from RANGE-417 archives, Rangeland NRI, and other inventory data. Field observations from range-trained personnel were also used. In addition to the multitude of NRCS field office employees and private landowners that helped with site visits and local knowledge, those involved in developing this site include:

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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)	Stu McFarland, Nadine Bishop
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Date	08/01/2013
Approved by	Nadine Bishop
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None.

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2. **Presence of water flow patterns:** None to few, short (<2") and disconnected.

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3. **Number and height of erosional pedestals or terracettes:** Minimal, no exposed roots.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** <10% as very small (<3”) patches, however, bare ground can be expected to be much higher if litter has been consumed by recent fire.

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5. **Number of gullies and erosion associated with gullies:** Only as expected from natural erosional process; no active headcutting.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None.

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7. **Amount of litter movement (describe size and distance expected to travel):** Minimal with very short (<4") movemen of the smallest litter class.

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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):** Soil stability rating of =>5.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Mollic colors may exist at surface, but a mollic epipedon is not present. Refer to the Official Series Description for the range of characteristics of site-specific soils.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Robust herbaceous canopy provides nearly ~95%% coverage reducing raindrop energy, and abundant litter slows overland flow for improved infiltration.

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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):** None.

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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: warm-season midgrasses >= warm-season tallgrasses

    Sub-dominant: cool-season grasses = grasslikes = forbs = shrubs

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very little to no evidence of perennial decadence or mortality.

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14. **Average percent litter cover (%) and depth (in):** Litter cover could be much lower if consumed by recent fire.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Production ranges from 1,400 - 2,930 lbs/ac (air-dry weight) depending on climatic conditions. The reference representative value production is 2,400 lbs/ac (air-dry weight).

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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:** Woody species are the primary encroachment threat with the most prominent being: roughleaf dogwood, smooth sumac, eastern redcedar, Siberian elm, and snowberry. Kentucky bluegrass and smooth brome are somewhat common, but to a much lesser degree than flatter sites. Introduced thistles (e.g. musk, Canada, plumeless) are the most common forbs. Refer to state and county weed agencies for a comprehensive list.

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17. **Perennial plant reproductive capability:** Flowering, seed production, and rhizomatous/stoloniferous growth are apparent and not hindered by plant stress/reduced vigor.
