

Ecological site R106XY068NE

Loamy Floodplain

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General information

Approved. An approved ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model, enough information to identify the ecological site, and full documentation for all ecosystem states contained in the state and transition model.

MLRA notes

Major Land Resource Area (MLRA): 106X–Nebraska and Kansas Loess-Drift Hills

Named the “Nebraska and Kansas Loess-Drift Hills,” Major Land Resource Area (MLRA) 106 is divided almost evenly between southeastern Nebraska (52%), and northeastern Kansas, (48%). The approximately seven-million-acre landscape covers all or parts of thirty counties between the two states. The northern border is located on the north end of Saunders County, Nebraska, and the MLRA extends into Douglas County, Kansas in the south. The Nebraska cities of Beatrice and Lincoln are the major population centers in the north, while Topeka and Lawrence in Kansas are the primary cities in the south. The Platte, Little Nemaha, and the North Fork of the Big Nemaha Rivers flow through the Nebraska side of the MLRA, while the Black Vermillion, the Soldier, and the Delaware Rivers are the major waterways on the Kansas side. The Big Blue River runs through both states, while the Salt Creek hydrologic system located near Lincoln, Nebraska provides habitat for the only known population of the Federally listed endangered Salt Creek Tiger Beetle. This dissected glacial drift plain primarily consists of broad, smooth ridgetops, and slopes ranging from nearly level to steep. The elevation in MLRA 106 decreases from west to east, and ranges from nearly 1,650 feet to less than 790 feet above sea level. Stream valleys in this landscape are narrow and bordered by steep hills, with 10 to 20 feet of local relief. The river valleys are broader and may drop up to over 160 feet below the adjacent hilltops. The uplands are primarily comprised of glacial drift underlying a mantle of loess, while alluvial deposits are found in the stream and river valleys. Limestone and shale quarries are also located in MLRA 106. The predominant soil orders in this MLRA are mesic, udic, Mollisols, Alfisols, and Entisols. Loams and clays are the primary soil textures in this landscape. Sixty-two percent of the land in this MLRA has been broken out of native prairie and farmed, while only 23 percent of the grasslands remain. Livestock grazing, primarily by cattle, is the main industry on these remnants. Corn, wheat, soybeans, and grain sorghum are the primary commodity crops, but a significant number of acres are also planted to alfalfa for harvest as hay. With annual precipitation averaging from 40 inches in the southeast, to 28 inches in the northwest, irrigation for crop production is not a critical factor in most years. The historical matrix vegetation type is Tallgrass Prairie, and big and little bluestem, switchgrass, Indiangrass, sideoats, and blue grama make up the bulk of the warm-season species. Historically, western wheatgrass was the dominant cool-season grass but today the dominant cool-season grasses are introduced grasses, smooth brome in the north and tall fescue in the south. Large and small patch vegetative communities are found primarily along the riparian zones, and on both upland and lowland saline sites. Woodlands make up about six percent of MLRA 106, consisting primarily of green ash, oak, hackberry, boxelder, and maple trees. Wildlife flourishes in this combination of crop and grassland environments. In a landscape historically occupied by bison herds, white-tailed deer are now the most abundant wild ungulates. A variety of smaller species, including coyote, raccoon, opossum, porcupines, muskrat, beaver, squirrel, and mink thrive in the region. Native grassland bird populations are limited by the lack of contiguous native prairie and the fragmented habitat created by the farmland. The rivers, streams, and lakes harbor excellent fisheries, and migrating and local waterfowl use the wetland complexes. These complexes provide ideal habitat for 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 heterogeneous mosaic of plant communities and structure heights across the region. Any given site in this landscape experienced fire every three to four years. Fires were caused by lightning strikes and also were set by Native Americans, who used fire for warfare, signaling, and to refresh the native grasses. The indigenous inhabitants understood the value of fire as a tool and that the highly palatable growth following a fire provided excellent forage for their horses and attracted grazing game animals such as bison and elk. Land use patterns by post European settlers have fragmented the native grasslands through conversion to cropland, transportation corridors, and other developments. This has significantly altered the natural fire regime allowing encroachment by native and introduced shrubs and trees into the native prairie remnants throughout the MLRA. Aggressive fire suppression policies have exacerbated this process to the point that shrub and tree encroachment is a major ecological threat in the majority of both native and reseeded grasslands. Introduction of eastern red cedar as a windbreak species further facilitates invasion by this species. While eastern red cedar is native to the landscape, the historic population in MLRA 106 was limited to isolated pockets in rugged river drainageways that were protected from fire. Widespread plantings of windbreaks with eastern red cedar as a primary component have 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. 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 eastern red cedars can also be controlled with fire, but successful application requires the use of specifically designed ignition and holding techniques.

Classification relationships

?USDA-NRCS (2022)? Land Resource Region – M, Central Feed Grains and Livestock Region Major Land Resource Area (MLRA) – 106
?Fenneman (1916) Physiographic Regions ? Division – Interior Plains Province – Central Lowland Section – Dissected Till Plains ?
USDA-USFS (2007) Ecoregions? Domain – Humid Temperate Division – Prairie Province – Prairie Parkland (Temperate) Section – Central Dissected Till Plains (251C) ?EPA Ecoregions (Omernik 1997)? I – Great Plains (9) II – Temperate Prairies (9.2) III – Western Corn Belt Plains (9.2.3) IV – Loess and Glacial Drift Hills (47i) ?Associated Counties? Nebraska: Butler, Cass, Gage, Jefferson, Johnson, Lancaster, Nemaha, Otoe, Pawnee, Richardson, Saline, Saunders, Seward Kansas: Atchison, Brown, Doniphan, Douglas, Franklin, Jackson, Jefferson, Johnson, Leavenworth, Marshall, Nemaha, Osage, Pottawatomie, Shawnee, Wabaunsee, Washington, Wyandotte

Ecological site concept

The Loamy Floodplain ecological site is primarily found in river valleys and located on active floodplains and low terraces. The site receives additional moisture from runoff originating from higher on the landscape and from periodic inundation from overflow. The slope is nearly level and typically ranges from 0 to 2 percent. Soils are very deep (60 inches or more) with surface textures of very fine sandy loam, fine sandy loam, silt loam, or silty clay loams that are 5 to 32 inches thick or thicker. These somewhat poorly to well drained soils are formed in alluvium. The vegetation of the Reference State is dominated by warm-season tall grasses. Big bluestem, Indiangrass, eastern gamagrass, prairie cordgrass, and switchgrass are the primary species. Scattered native, deciduous trees may be present. Occasional to frequent flooding redistributes soil and plant materials through erosion and deposition and can locally impact production and species composition.

Associated sites

R106XY032NE	Subirrigated The Subirrigated ecological site is often located adjacent to the Loamy Floodplain site.
R106XY074NE	Clayey Upland The Clayey Upland ecological site is often located adjacent to and higher on the landscape than the Loamy Floodplain ecological site.
R106XY075NE	Loamy Upland The Loamy Upland ecological site is often located adjacent to and higher on the landscape than the Loamy Floodplain ecological site.

Similar sites

R106XY070NE	Loamy Terrace The Loamy Terrace ecological site is found on similar soils but is found in a higher landscape position on stream terraces. It is not subject to the periodic flooding that occurs on Loamy Floodplain ecological sites.
R106XY032NE	Subirrigated The Subirrigated ecological site is located on a similar landscape position but has a higher water table than the Loamy Floodplain ecological site.

Figure 1. Block diagram of the Loamy Floodplain site in MLRA 106.

Table 2. Dominant plant species

Tree	(1) <i>Quercus</i> (2) <i>Ulmus</i>
Shrub	(1) <i>Rhus glabra</i> (2) <i>Symphoricarpos occidentalis</i>
Herbaceous	(1) <i>Andropogon gerardii</i> (2) <i>Sorghastrum nutans</i>

Physiographic features

Loamy Floodplain ecological site is found on the flood plains of river valleys and in narrow drainageways of valleys in uplands. It receives runoff from areas higher on the landscape and flooding is typically occasional to frequent. Sedimentation is common.

Table 3. Representative physiographic features

Landforms	(1) River valley > Flood plain (2) Valley > Drainageway
Runoff class	Negligible to medium
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Occasional to frequent
Ponding frequency	None
Elevation	310 – 370 m
Slope	0 %
Water table depth	90 – 180 cm
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, 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 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.

About three-fourths of the precipitation falls as high intensity, convective thunderstorms from late in spring through early in autumn. The

average annual precipitation gradient trends higher from northwest (28") to southeast (40"), and the average annual temperature gradient trends higher from north (50°F) to south (55°F). 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.

Native cool-season plants begin growth in early April and continue 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 4 Representative climatic features

Frost-free period (characteristic range)	140-150 days
Freeze-free period (characteristic range)	160-190 days
Precipitation total (characteristic range)	790-970 mm
Frost-free period (actual range)	130-150 days
Freeze-free period (actual range)	150-190 days
Precipitation total (actual range)	740-990 mm
Frost-free period (average)	140 days
Freeze-free period (average)	170 days
Precipitation total (average)	860 mm

- (1) CENTRALIA [USC00141408], Centralia, KS
- (2) HOLTON [USC00143759], Holton, KS
- (3) HORTON [USC00143810], Horton, KS
- (4) PERRY LAKE [USC00146333], Perry, KS
- (5) ASHLAND NO 2 [USC00250375], Ashland, NE
- (6) TECUMSEH 1S [USC00258465], Tecumseh, NE
- (7) TOPEKA MUNI AP [USW00013996], Topeka, KS
- (8) LINCOLN UNIV PWR PLT [USW00014971], Lincoln, NE
- (9) MARYSVILLE [USC00145063], Marysville, KS
- (10) PAWNEE CITY [USC00256570], Pawnee City, NE
- (11) CLINTON LAKE [USC00141612], Lawrence, KS
- (12) HIAWATHA 9 ESE [USC00143634], Robinson, KS
- (13) VIRGINIA [USC00258875], Virginia, NE
- (14) WEEPING WATER [USC00259090], Weeping Water, NE
- (15) LINCOLN MUNI AP [USW00014939], Lincoln, NE
- (16) LAWRENCE [USC00144559], Lawrence, KS
- (17) OSKALOOSA 4 NE [USC00146100], Mc Louth, KS
- (18) AUBURN 5 ESE [USC00250435], Auburn, NE
- (19) BEATRICE 1N [USC00250622], Beatrice, NE
- (20) CRETE [USC00252020], Crete, NE
- (21) MEAD 6S [USC00255362], Ithaca, NE
- (22) RAYMOND 2NE [USC00257055], Raymond, NE
- (23) SYRACUSE [USC00258395], Syracuse, NE

- (24) TABLE ROCK 4 N [USC00258410], Table Rock, NE
- (25) WAHOO [USC00258905], Wahoo, NE

Influencing water features

The Loamy Floodplain ecological site occurs on nearly level areas that receive additional water from overflow of intermittent streams or runoff from adjacent slopes.

Soil features

The soils associated with the Loamy Floodplain ecological site are located in flood plains of river valleys and drainageways in valleys. Slopes range from 0 to 2 percent. These soils were formed in alluvium. Soil is very deep with fine sandy loam, silt loam, or silty clay loam surface textures. Most soils are moderately well to well drained and typically receive extra water from runoff. They are subject to flooding. The saturated hydraulic conductivity is moderately high, and the depth to carbonates is over 200 centimeters. The weighted average of the clay content in the particle size control section ranges from 18 to 35 percent, while the content of sand is less than 10 percent fine sand, or sand coarser than fine.

The major soil series correlated to this ecological site are Bismarkgrove, Eudora, Kennebec, and Nodaway. Additional information can be found in the various soil survey reports. Contact the local USDA Service Center for soil survey reports that include more detail specific to your location or visit Web Soil Survey (<https://websoilsurvey.sc.egov.usda.gov>).

Figure 7. Kennebec soil profile in MLRA 106.

Table 5. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Silt loam (2) Fine sandy loam (3) Silty clay loam
Family particle size	(1) Loamy
Drainage class	Somewhat poorly drained to well drained
Permeability class	Moderately slow to moderate
Soil depth	150 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	14.99 – 26.92 cm

Calcium carbonate equivalent (0-101.6cm)	0 – 10 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	10 – 8.4
Subsurface fragment volume <=3" (0-101.6cm)	Not specified
Subsurface fragment volume >3" (0-101.6cm)	Not specified

Ecological dynamics

Loamy Floodplain ecological sites developed under Central 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 and site development. This continues to be a disturbance driven site by herbivory, fire, and variable climate. Changes occur in the plant communities due to short term weather variations, impacts of native and/or exotic plant and animal species, and management actions. The landscape position and association with streams make this site somewhat less susceptible to fire, which allowed woody species to become more abundant than on less sheltered sites in the MLRA.

One of the primary impacts to this site introduced by European settlement of North America 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 warm-season tall grasses. The resulting reduction of the plants ability to harvest sunlight depletes the root reserves, subsequently decreasing the root mass. This negatively impacts the ability of 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 avoids the negative grazing impacts by a growing season adaptation such as a cool-season, shorter structure, or a reduced palatability mechanism.

The State and Transition Model (STM) is depicted following this section and includes a Reference State (1), a Native/Invaded Grass State (2), a Sod-busted State (3), and an Invaded Woody State (4). 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 observation of heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts, as have plant communities, states, transitional pathways, and thresholds.

State and transition model

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Warm-Season Tallgrass			1569-2242	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	1121-1793	–
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	224-673	–
	eastern gamagrass	TRDA3	<i>Tripsacum dactyloides</i>	0-673	–
	prairie cordgrass	SPPE	<i>Spartina pectinata</i>	0-448	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	224-448	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-224	–
2	Warm-Season Midgrass			1121-1569	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	897-1345	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	224-448	–
	composite dropseed	SPCOC2	<i>Sporobolus compositus</i> var. <i>compositus</i>	0-224	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-224	–
3	Native Cool-Season Grasses			224-448	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	90-448	–
	needle and thread	HECOC8	<i>Hesperostipa comata</i> ssp. <i>comata</i>	45-224	–
	porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	0-224	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-224	–
	Scribner's rosette grass	DIOLS	<i>Dichanthelium oligosanthes</i> var. <i>scribnerianum</i>	0-135	–
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	0-90	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0-90	–
4	Warm-Season Shortgrass			45-224	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0-224	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-45	–
5	Grass-Like			90-224	
	sedge	CAREX	<i>Carex</i>	90-224	–
	Grass-like, perennial	2GLP	<i>Grass-like, perennial</i>	0-45	–
Forb					
6	Forb			224-448	
	Forb, perennial	2FP	<i>Forb, perennial</i>	45-224	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	0-90	–
	white heath aster	SYER	<i>Symphyotrichum ericoides</i>	0-90	–
	spiderwort	TRADE	<i>Tradescantia</i>	0-90	–
	purple prairie clover	DAPUA	<i>Dalea purpurea</i> var. <i>arenicola</i>	0-90	–
	scarlet beeblossom	GACO5	<i>Gaura coccinea</i>	0-90	–
	hairy false goldenaster	HEVI4	<i>Heterotheca villosa</i>	0-90	–
	dotted blazing star	LIPU	<i>Liatris punctata</i>	0-90	–
	Nuttall's sensitive-briar	MINU6	<i>Mimosa nuttallii</i>	0-90	–
	evening primrose	OENOT	<i>Oenothera</i>	0-90	–
	silverleaf Indian breadroot	PEAR6	<i>Pedimelum argophyllum</i>	0-90	–
	beardtongue	PENST	<i>Penstemon</i>	0-90	–
	slimflower scurfpea	PSTE5	<i>Psoralidium tenuiflorum</i>	0-90	–
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	0-90	–

	ragwort	SENEC	<i>Senecio</i>	0-45	–
	goldenrod	SOLID	<i>Solidago</i>	0-45	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	0-45	–
	compassplant	SILA3	<i>Silphium laciniatum</i>	0-45	–
Shrub/Vine					
7	Shrub			0-224	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0-135	–
	leadplant	AMCA6	<i>Amorpha canescens</i>	0-135	–
	prairie rose	ROAR3	<i>Rosa arkansana</i>	0-90	–
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	0-45	–
	smooth sumac	RHGL	<i>Rhus glabra</i>	0-45	–
Tree					
8	Tree			0-90	
	Tree	2TREE	<i>Tree</i>	0-45	–
	eastern cottonwood	PODE3	<i>Populus deltoides</i>	0-22	–
	elm	ULMUS	<i>Ulmus</i>	0-22	–
	oak	QUERC	<i>Quercus</i>	0-22	–
	green ash	FRPE	<i>Fraxinus pennsylvanica</i>	0-22	–

Table 7. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 1.4 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 13. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 14. Community 3.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 15. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Animal community

LIVESTOCK – GRAZING INTERPRETATIONS: Grazing by domestic livestock is one of the major income producing industries in the area. Rangeland in this area may provide yearlong forage for cattle, sheep, or horses. During the dormant period, the protein levels of the forage may be lower than the minimum needed to meet livestock (primarily cattle and sheep) requirements. The following table lists suggested stocking rates for cattle under continuous season long grazing under normal growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this, a field visit is recommended, in all cases, to document plant composition and production. More precise carrying capacity estimates should eventually be calculated using this information along with animal preference data, particularly when grazers other than cattle are involved. With consultation of the land manager, more intensive grazing management may result in improved harvest efficiencies and increased carrying capacity. Production and Carrying Capacity* Community 1.1, Reference Community (north): 4,000 lbs/acre, 1.10 AUM/acre Community 1.1, Reference Community (south): 9,000 lbs/acre, 2.50 AUM/acre *Based upon the following conditions: continuous season long grazing with cattle under average growing conditions, 25 percent harvest efficiency. Air dry forage requirements are based on 3 percent of animal body weight or 790 lbs per animal unit (AU) per month (M). An AU is generally one mature cow of approximately 1,000 pounds and a calf as old as 6 months or their equivalent. **WILDLIFE INTERPRETATIONS:** Major Land Resource Area (MLRA) 106 lies primarily within the tall grass prairie ecosystem. Prior to European settlement of North America, 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. Bobcats, wolves, and mountain lions occupied the apex predator niche. In addition, a wide variety of reptiles and amphibians thrived in this landscape. The tall grass prairie was a disturbance driven ecosystem with fire, herbivory, and climate functioning as the primary disturbances. Following European settlement of North America, 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 in this region. The loss of bison and fire as ecological drivers greatly influenced the character of the remaining native grasslands and the habitats they provide. Historically, an ecological mosaic of the 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. Fragmentation has reduced habitat quality for numerous area sensitive species, as highlighted by the decline of the greater prairie chicken. Grassland nesting bird populations such as dickcissel and Henslow's sparrow are also declining. 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 (musk thistle), and Canada thistle further degrade the biological integrity of many of these remnant prairies. 1. **REFERENCE STATE:** The predominance of tall grasses and forbs in this community makes it ideal for grazers and mixed feeders. Pollinating insects play a significant 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. The abundant prey base supports populations of Swainson's hawk, short eared and great horned owls, and other grassland raptors. The grasses, forbs, and shrubs provide high nutrition levels for small and large herbivores including moles, mice, ground squirrels, and white-tailed 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.

Hydrological functions

The very deep, moderately well drained soils of the Loamy Floodplain ecological site place it in classes B and C of the hydrological rating scale. The proximity of groundwater to the rooting zone of the deeply rooted tall grasses during the growing season provides an abundance of water for the tall grass component of the vegetative community. Production can be very high.

Recreational uses

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

Wood products

In MLRA 106, the Loamy Floodplain ecological sites often have scattered populations of deciduous trees. These stands can provide firewood, select hardwood finishing lumber, and in some cases, cottonwoods can be used to make pallets. In the Invaded Woody State (4) eastern red cedar may provide posts, and cedar boards from the larger trees.

Other products

None of significance.

Other information

Site Development and Testing Plan: Additional data collection and evaluation will be needed to develop this ESD to the 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.

Inventory data references

Information presented here has been derived from new and historic data collection, and field observations from range trained personnel.

Other references

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Contributors

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Approval

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.

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Date	11/20/2024
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. Number and extent of rills: None. Rills are not expected on this site.

2. Presence of water flow patterns: None. Water flow patterns are not expected on this site.

3. Number and height of erosional pedestals or terracettes: None. Pedestals and terracettes are not expected to occur on this site.

4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):
Bare ground is 5 percent or less. Bare ground is exposed mineral soil that is not covered by vegetation (basal and/or foliar canopy), litter, standing dead vegetation, gravel/rock, and visible biological crust (e.g., lichen, mosses, algae).

5. Number of gullies and erosion associated with gullies: None. Gullies are not expected on this site.

6. Extent of wind scoured, blowouts and/or depositional areas: None. Wind scoured and/or depositional areas are not expected on this site.

7. Amount of litter movement (describe size and distance expected to travel): None. Litter movement is not expected on this site.

8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values): Soil stability ratings will be 5 to 6, typically 6. High root content and organic matter will be present in the soil surface.

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): The surface horizon (A) is typically 12 to 30 inches thick but may be thicker. Nodaway soils are thinner, and the A horizon may be as thin as 7 inches. Soil colors in the surface horizon are typically black, very dark grayish brown, or very dark gray (hue 10YR, value: 2 or 3, chroma: 1 or 2) when moist and grayish brown, dark grayish brown, or very dark grayish brown (hue: 10YR, value: 3 to 5, chroma: 1 or 2) when dry. Soil structure in the upper horizon is most often weak medium granular, weak fine granular, moderate fine granular parting to weak fine granular, or weak medium subangular blocky. See Official Soils Descriptions (OSD) for additional details. The soil series correlated to the site include Colo, Calco, Kimo, Lamo, Muscotah, Paxico, and Zook.

10. Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: Plant community composition of 80 to 90 percent grasses and grass-like, 5 to 10 percent forbs, and 0 to 5 percent shrubs will optimize infiltration on the site. The grass and grass-like portion are composed of warm-season, tall grasses (35-50%), warm-season, mid grasses (25-35%), cool-season grasses (5-10%), warm-season, short grasses (1-5%), and grass-like (2-5%). There may be a trace presence (0-2%) of native, deciduous trees on the site. Infiltration can be adversely impacted by the invasion of Kentucky bluegrass, smooth brome, tall fescue, and trees when present above 10 percent (subdominant designation).

11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site): None. No compaction layers are expected for 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: Phase 1.1: 1. Native, perennial, warm-season, tall grass (3 species minimum): big bluestem, Indiangrass, switchgrass, eastern gamagrass, prairie cordgrass. 2. Native, perennial, warm season, mid grass (2 species minimum): little bluestem, sideoats grama, composite dropseed, purple lovegrass. Phase 1.2: 1. Native, perennial, warm-season, mid grass (2 species minimum): little bluestem, sideoats grama, composite dropseed. 2. Native, perennial, cool-season grass (2 species minimum): western wheatgrass, Scribner's rosette grass, Canada wildrye, porcupinegrass, needleandthread, prairie junegrass. Phase 1.3: 1. Native, perennial, warm-season, short grass (1 species minimum): blue grama. 2. Native, perennial, cool-season grass (2 species minimum): western wheatgrass, Scribner's rosette grass, Canada wildrye, Virginia wildrye, porcupinegrass, prairie junegrass.

Sub-dominant: Phase 1.2: 1. Native, perennial, warm-season, tall grass (2 species minimum): big bluestem, Indiangrass, switchgrass, eastern gamagrass, prairie cordgrass. 2. Native, perennial, warm-season, short grass (1 species minimum): blue Grama. Phase 1.3: 1. Native, perennial, warm season, mid grass (2 species minimum): little bluestem, sideoats grama, prairie dropseed, purple lovegrass. 2. Grass-like (1 species minimum): sedge.

Other: Minor - Phase 1.1: 1. Native, perennial, cool-season grass: western wheatgrass, Scribner's rosette grass, Canada wildrye, porcupinegrass, needleandthread, prairie junegrass. 2. Native forbs: forbs present vary from location to location. 3. Grass-likes: sedges. 4. Native, perennial, warm-season, short grass: blue grama. 5. Shrubs: leadplant, prairie rose, smooth sumac, western snowberry, and other shrubs that vary from location to location. Minor - Phase 1.2: 1. Grass-likes: sedges. 2. Native forbs: forbs present vary from location to location. 3. Shrubs: shrubs present vary from location to location. Minor - Phase 1.3: 1. Native, perennial, warm-season, tall grass: big bluestem, switchgrass, eastern gamagrass. 2. Native forbs: forbs present vary from location to location. 3. Shrubs: shrubs present vary from location to location. 4. Native, deciduous trees: willow, elm, cottonwood, and other trees which vary from location to location. 5. Non-native, cool-season grass: Kentucky bluegrass, annual bromes, tall fescue, smooth brome. Trace - Phase 1.1: 1. Native, deciduous trees: elm, oak, green ash, eastern cottonwood, and other trees which vary from location to location. Trace - Phase 1.2: 1. Native, deciduous trees: willow, elm, cottonwood, and other trees which vary from location to location. 2. Non-native, cool-season grass: Kentucky bluegrass, annual bromes, tall fescue, smooth brome. Trace - Phase 1.3: 1. Native coniferous trees: eastern red cedar.

Additional: The Reference Community (1.1) includes eight F/S groups which are in order of abundance are native, perennial, warm-season, tall grass; native, perennial, warm-season, mid grass; native, perennial, cool-season grass; forbs; grass-likes; native, perennial, warm-season, short grass; shrubs; native, deciduous trees. The Degraded Native Grass Community (1.2) includes nine F/S groups which are native, perennial, warm-season, mid grass; native, perennial, cool-season grass; native, perennial, warm-season, tall grass; perennial, warm-season, short grass; grass-likes; native forbs; shrubs; native, deciduous trees; non-native, cool-season grass. The At-Risk Community (1.3) contains ten F/S groups. These groups include native, perennial, warm-season, short grass; native, perennial, cool-season grass; native, perennial, warm-season, mid grass; grass-likes; native, perennial, warm-season, tall grass; native forbs; native, deciduous trees; shrubs; non-native, cool-season grass; native, coniferous trees.

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13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence): Recruitment of plants is occurring; there is a diverse mixture of age classes among the plants. A few (less than 3 percent) dead centers may occur in bunchgrasses. Shrubs and trees may show some dead branches (less than 5 percent) as plants age. Plant mortality may increase to 10 to 15 percent following a multi-year drought, wildfire, or a combination of the two events.

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14. Average percent litter cover (%) and depth (in): Plant litter is expected to be 70 to 80 percent cover, at a depth of approximately 0.5 inch (1.25 cm) and evenly distributed throughout the site. Kentucky bluegrass, smooth brome, and reed canary grass are known to produce excessive litter accumulations that negatively impact site functionality.

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15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production): North: Representative Value (RV) = 4,000 pounds per acre. Low production years = 3,500 pounds per acre. High production years = 4,500 pounds per acre. South: Representative Value (RV) = 8,000 pounds per acre. Low production years = 7,000 pounds per acre. High production years = 9,000 pounds per acre

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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: No non-native, invasive species are present. Kentucky bluegrass, smooth brome, reed canary grass, Caucasian bluestem, tall fescue, eastern red cedar, honey locust, rough leaf dogwood, Siberian elm, Osage-orange, leafy spurge, and sericea lespedeza are known invasives that have the potential to be dominant or co-dominant on the site. Consult the state noxious weed and state watch lists for potential invasive species on each ecological site. NOTE: Invasive plants (for the purposes of the IIRH protocol) are plant species that are typically not found on the ecological site or should only be in trace or minor categories under the natural disturbance regime and have the potential to become a

dominant or co-dominant species on the site if their establishment and growth are not actively controlled by natural disturbances or management interventions. Species listed characterize degraded states AND have the potential to become a dominant or co-dominant species.

17. **Perennial plant reproductive capability:** Perennial species exhibit high vigor relative to climatic conditions. Perennial grasses should have vigorous rhizomes or tillers; vegetative and reproductive structures are not stunted. All perennial species should be capable of reproducing annually.
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