

Ecological site R071XY024NE Subirrigated

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.



Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 071X–Central Nebraska Loess Hills

This PROVISIONAL ECOLOGICAL SITE has been developed to meet the standards established in the National Ecological Site Handbook. The information associated with this ecological site does not meet the Approved Ecological Site Description Standard, but it has been through a Quality Control and Quality Assurance processes to assure consistency and completeness. Further investigations, reviews and correlations are necessary before it becomes an Approved Ecological Site Description.

MLRA 71 is named “The Central Nebraska Loess Hills”, and is located exclusively in Nebraska. The approximately 5.3 million acre landscape covers all or parts of 21 counties, primarily Custer, Dawson, Buffalo, Sherman, Howard, Valley, Greeley and Hall. The physical appearance of the landscape is dominated by loess hills dissected by the North, Middle and South Loup Rivers and their tributaries. The Platte River defines the southern border. The elevation in MLRA 71 ranges from over 3,000 to less than 1,700 feet above sea level, with average local relief stretching from 20 to 200 feet. The predominate soil orders are mesic, udic Mollisols and Entisols, commonly represented by the Coly, Uly, Cozad, Hord, Hall and Holdredge soil series. Loess overlays the surface of almost all of the uplands in this MLRA. Alluvial clay, silt, sand, and gravel are deposited in the stream and river valleys, and can be extensive in the major drainages. Terraces are common in the valleys along the river systems.

Average annual precipitation ranges from 21 to 26 inches.

The matrix vegetation type is mixed-grass prairie, with big and little bluestem, switchgrass, Indiangrass, and

sideoats and blue grama making up the bulk of the warm-season species, while western wheatgrass is the dominant cool season species.

The primary large-patch vegetative component of the landscape is dominated by Needle-and-thread, prairie sandreed, sand and little bluestem, and blue grama grass.

The majority of the small-patch communities are associated with upland playas and the wetter sites found along the floodplains.

Forty four percent of the land in this MLRA has been broken out of native prairie and farmed; mostly corn, alfalfa and some soybeans, while 48 percent of the grasslands remain intact. Livestock grazing, primarily cattle, is a major industry here.

Wildlife flourishes in this combination of crop and grassland environment, with both mule and white-tailed deer being the most abundant wild ungulate. A variety of smaller species, including coyote, raccoon, opossum, porcupines, muskrat, beaver, squirrel and mink thrive in the region, as well as a suite of grassland and upland birds. The rivers, streams and lakes harbor excellent fisheries.

This landscape developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores and repeated natural or man-caused wildfire. Other biotic and abiotic factors also typically influence soil/site development. This is a disturbance driven ecosystem, evolving under the influences of herbivory, fire, and variable climate. Historically, these processes created a heterogenous mosaic of plant communities and structure heights across the region. Any given site in this landscape experienced fire every 7 to 9 years. The fires were caused both by lightning strikes, and were set by native Americans, who used fire for warfare, signaling, and to refresh the native grasses. These people understood the value of fire as a tool, and that the highly palatable growth following a fire provided both excellent forage for their horses, and attracted grazing game animals such as bison and elk.

Even as post European settlement's alteration of the fire regime allows the expansion of the woody component of the native prairie, introduction of eastern red cedar as a windbreak component further facilitates invasion by this species.

While eastern red cedar is native to Nebraska, the historic population in MLRA 71 was limited to isolated pockets in rugged river drainages that were subsequently insulated from fire, or non-existent. Widespread plantings of windbreaks with eastern red cedar as a primary component has provided a seed source for the aggressive woody plant. The ensuing encroachment into the native grasslands degrades the native wildlife habit and causes significant forage loss for domestic livestock. However, since it is not a root sprouter, eastern red cedar is very susceptible to fire when under six feet tall. Management with prescribed fire is exceedingly effective if applied before this stage. Larger cedars can also be controlled with fire, but requires the use of specially designed ignition and suppression techniques.

Fragmentation of the native grasslands by conversion to cropland, transportation corridors and other development by European man has effectively disrupted the natural fire regime of this ecosystem. This has allowed encroachment by native and introduced shrubs and trees into the remnants of the native prairie throughout the MLRA. Aggressive fire suppression policies have exacerbated this process to the point that shrub and tree encroachment is a major ecological issue in the majority of both native and re-seeded grasslands.

Classification relationships

Major Land Resource Area (MLRA): Major Land Resource Area (MLRA)71. (USDA-Natural Resources Conservation Service, 2006)

Revision Notes:

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

Ecological site concept

The subirrigated ecological site occupies a run-on landscape position and is associated with stream and river

valleys. The slope is less than 3 percent, and there are no visible surface salts. The depth to the water table is 24 to 42 inches.

Associated sites

R071XY028NE	Loamy Lowland Central Nebraska Loess Hills- Loamy Lowland
R071XY054NE	Sandy Central Nebraska Loess Hills- Sandy

Similar sites

R071XY052NE	Saline Subirrigated Central Nebraska Loess Hills- Saline Subirrigated (high pH, presence of alkali sacaton and inland saltgrass)
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Andropogon gerardii</i> (2) <i>Panicum virgatum</i>

Physiographic features

This site occurs on nearly level to very gently sloping areas along floodplains in river valleys with a moderately high water table, and on lower levels of terraces in river valleys. This site is subject to flooding except for positions on stream terraces. This site receives runoff from areas higher on the landscape.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Terrace
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to occasional
Ponding frequency	None
Elevation	1,630–3,075 ft
Slope	0–3%
Ponding depth	0 in
Water table depth	12–42 in
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation ranges from 22 to 26 inches per year. Hourly winds are estimated to average about 14 miles per hour annually. Occasional strong storms may bring brief periods of high winds with gusts to more than 60 miles per hour.

Growth of native cool season plants begins in early April and continues to about mid June. Native warm season plants begin growth in early June, and continue to early August. Green up of cool season plants may occur in September and October.

Table 3. Representative climatic features

Frost-free period (average)	137 days
Freeze-free period (average)	156 days
Precipitation total (average)	26 in

Climate stations used

- (1) ANSELMO 2 SE [USC00250245], Anselmo, NE
- (2) MASON CITY [USC00255250], Mason City, NE
- (3) ARNOLD [USC00250355], Arnold, NE
- (4) CENTRAL CITY [USC00251560], Central City, NE
- (5) GOTHENBURG [USC00253365], Gothenburg, NE
- (6) NORTH LOUP [USC00256040], North Loup, NE
- (7) RAVENNA [USC00257040], Ravenna, NE
- (8) BROKEN BOW 2 W [USC00251200], Broken Bow, NE
- (9) BURWELL [USC00251345], Burwell, NE
- (10) CANADAY STEAM PLT [USC00251450], Lexington, NE
- (11) COMSTOCK [USC00251835], Comstock, NE
- (12) OCONTO [USC00256167], Oconto, NE
- (13) OVERTON 3 W [USC00256439], Overton, NE
- (14) STAPLETON 5W [USC00258133], Stapleton, NE
- (15) TAYLOR [USC00258455], Taylor, NE
- (16) KEARNEY 4 NE [USC00254335], Kearney, NE
- (17) LOUP CITY [USC00254985], Loup City, NE
- (18) SAINT PAUL [USC00257515], Saint Paul, NE
- (19) GRAND ISLAND AP [USW00014935], Grand Island, NE

Influencing water features

This ecological site has a combination of physical and hydrological features that: 1) normally has partial growing-season groundwater within the root zone (2 feet to 3 feet), 2) allowing relatively free movement of water and air (aerobic conditions) throughout the upper half of the root zone, and 3) normally is not ponded or flooded during the growing-season in most years

Soil features

The soils in this site are predominantly somewhat poorly drained, but inclusions of moderately well drained soils occur within some of the listed series. These soils are generally very deep, but some are shallow over coarse sand. The surface soil is generally dark colored and ranges from 7 to 38 inches thick. Less common are light colored soils with a surface soil of less than 7 inches thick. Organic matter content of the surface layer is generally moderate. The underlying material is lighter colored than the surface soil, and commonly has redoximorphic concentrations (soft masses of iron oxide) in the upper part. It ranges widely in texture from clay loam to gravelly coarse sand. Some of the soils in this site are calcareous at or near the surface.

Major soil series correlated to this ecological site include: Alda, Boel, Bolent, Caruso, Fonner, Gibbon, Lamo, Leshara, Lex, Merrick, Novina, Platte, Ord, Ovina, Wann

Other soil series that have been correlated to this site include: Cozad (wet phase), Libory, Lockton.

Table 4. Representative soil features

Surface texture	(1) Silt loam (2) Loam (3) Sandy loam
Family particle size	(1) Loamy
Drainage class	Somewhat poorly drained to moderately well drained

Permeability class	Moderately slow to rapid
Soil depth	80 in
Available water capacity (0-40in)	1.9–9.4 in
Calcium carbonate equivalent (0-40in)	0–23%
Electrical conductivity (0-40in)	0–5 mmhos/cm
Sodium adsorption ratio (0-40in)	0–9
Soil reaction (1:1 water) (0-40in)	5.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–50%
Subsurface fragment volume >3" (Depth not specified)	0–35%

Ecological dynamics

This site occurs on nearly level areas that are often adjacent to streams or rivers. The site is subirrigated by groundwater that ranges from 24 to 42 inches below the surface throughout the growing season. The availability of water has a major influence on the vegetation that will persist on this site. This site is subject to occasional flooding.

Even as post European settlement's alteration of the fire regime allows the expansion of the woody component of the native prairie, introduction of eastern red cedar as a windbreak species has compounded the issue. While eastern red cedar is native to Nebraska, the historic population in MLRA 71 was limited to isolated pockets in rugged river drainages that were subsequently insulated from fire, or non-existent. Widespread plantings of windbreaks with eastern red cedar as a primary component has provided a seed source for the aggressive woody plant. The ensuing encroachment into the native grasslands degrades the native wildlife habit and causes significant forage loss for domestic livestock. However, since it is not a root sprouter, eastern red cedar is very susceptible to fire when under six feet tall. Management with prescribed fire is exceedingly effective if applied before this stage.

Continuous grazing without adequate recovery periods following each grazing or haying occurrence will cause species such as Kentucky bluegrass and other cool season grasses to increase. The tall and mid grass species, such as big bluestem, little bluestem, Indiangrass, and switchgrass will decrease in frequency and production. Continued defoliation without adequate recovery periods will cause the plant community to shift to cool season grass species. There will be a drastic shift in forb composition as well.

The general response of this site to long term continuous grazing or annual summer haying in July is to gradually lose the vigor and reproductive potential of the tall and mid-grass species and shift the plant community toward short-grass species.

This site and adjacent level sites are preferred by livestock, which can lead to grazing distribution problems. Water locations, salt placement, and other aids help distribute grazing on this site. Other management techniques such as prescribed grazing help distribute grazing more evenly.

Grazing and/or haying management that includes proper stocking with adequate rest periods or alternating the frequency and timing of annual haying will maintain the production potential of the site. Where more rapid improvement is desired, a rotational grazing or haying system is desirable. Concentrated grazing, combined with needed rest periods, can be beneficial in improving forage utilization.

The reference plant community has been determined by study of rangeland relic areas, areas protected from excessive disturbance, seasonal use pastures, short-duration/time controlled grazing, and historical accounts.

The following diagram illustrates the common plant communities that can occur on the site and the transition pathways (arrows) among communities. Bold lines surrounding each plant community or communities represent ecological thresholds. The ecological processes are discussed in more detail in the plant community descriptions following the diagram.

State and transition model

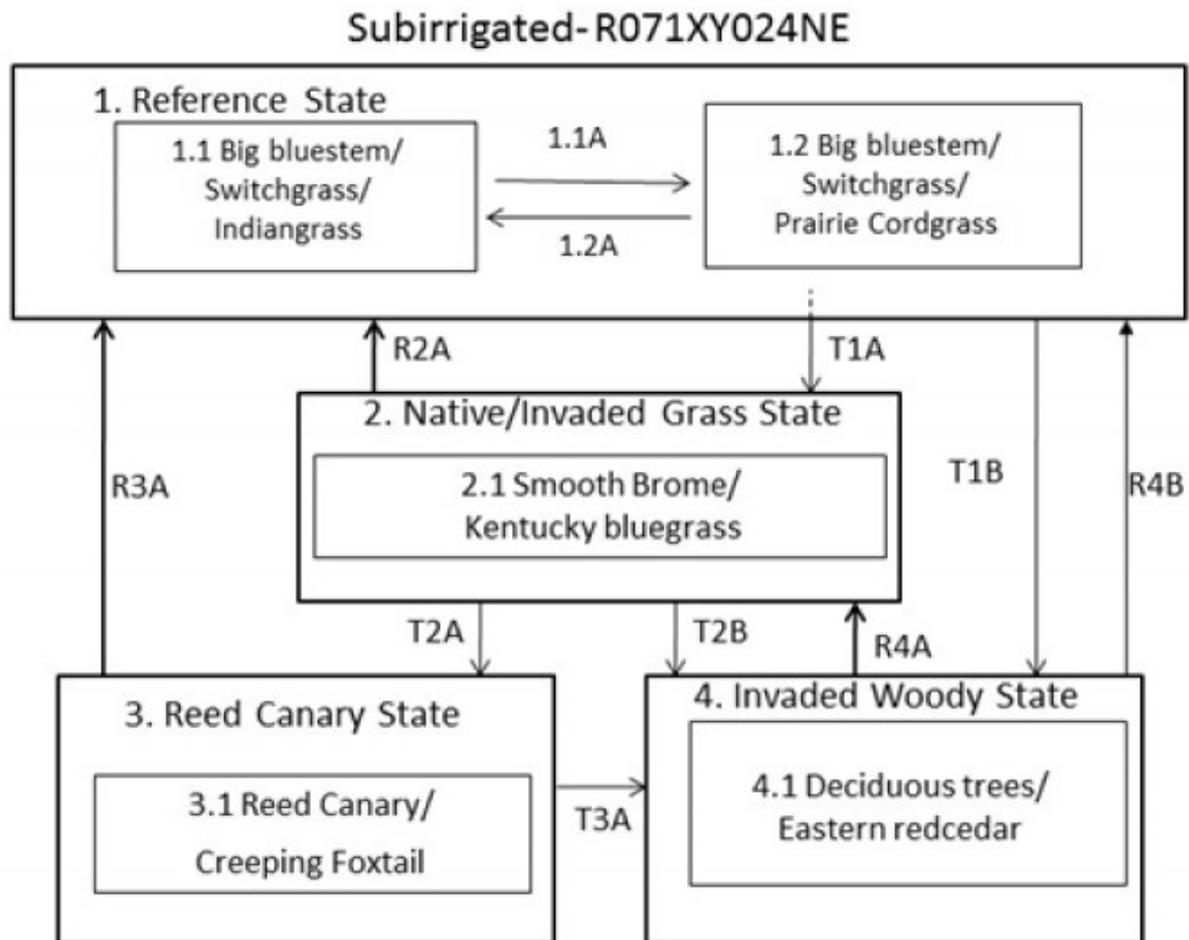


Figure 6. State and Transition Model

State and Transition Diagram Legend for Subirrigated MLRA 71	
CP 1.1A T 1A	Continuous season-long grazing, growing season haying, overstocking.
T 2A	Continuous season-long grazing, growing season haying, overstocking, seeding or encroachment by reed canary grass.
T 1B T 2B T 3A	Lack of fire and brush management allows the encroachment of eastern red cedar and deciduous trees. Once the canopy cover reaches 15 percent with an average tree height exceeding 5 feet, the threshold is crossed.
CP 1.2A R 2A R 3A	A combination of appropriately timed prescribed fire and grazing followed by rest during the optimal growth period for the warm-season grasses will move this community back towards the previous state. Rotational haying or non-haying will also contribute to recovery.
R 4A R 4B	A combination of mechanical treatment and prescribed fire. In the case of dense canopies of mature trees, a combination of the mechanical operation of "cutting and stuffing" and specialized ignition techniques may be required. Maintenance burns will be needed to prevent re-invasion.

Figure 7. STM Legend for Subirrigated in MLRA 71

**State 1
Reference State**

This state contains two community phases historically maintained by frequent fire and herbivory (grazing) with

adequate recovery periods. High perennial grass cover and production allows for increased soil moisture retention, vegetative production and overall soil quality.

Community 1.1 Big Bluestem/Indiangrass/Switchgrass

This plant community developed under large herbivore grazing and occasional wildfire. Drought cycles have had historically minimal impact up on the vegetation of this site due to the presence of the water table. The species composition remains relatively stable depending upon the duration and severity of the drought cycle. The interpretive plant community for this site is the Reference Plant Community. The natural potential vegetation of this community is a mixed grass prairie. This community is comprised of 75-85 percent grasses and grass-like plants, 5-15 percent forbs and 0-5 percent shrubs. Big bluestem, Indiangrass and switchgrass are the dominant species in this community. Secondary species include little bluestem, sideoats grama and prairie cordgrass. A diverse forb population exists, including American licorice, Illinois bundleflower, maximillain sunflower, and goldenrods. The dominant shrub species is leadplant. This plant community is highly productive and diverse. Grazing and/or haying management that includes proper stocking with adequate rest periods or alternating the frequency and timing of annual haying will maintain the production potential of the site. Prescribed Grazing with adequate recovery periods will maintain the production, vigor and health of the tall grass species within the Bluestem/Indiangrass/Switchgrass Plant Community. Total annual production ranges from 4400 to 5600 pounds of air-dried vegetation per acre per year with a representative value of 5101 pounds.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	4180	4590	4775
Forb	220	383	550
Shrub/Vine	0	128	275
Total	4400	5101	5600

Figure 9. Plant community growth curve (percent production by month). NE7143, Central NE Loess Hills, lowland warm-season dominant. Warm-season grass dominant on lowlands.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	7	15	25	25	17	6	2	0	0

Community 1.2 Big Bluestem/Switchgrass/Prairie Cordgrass

This plant community developed under continuous season-long grazing or repeated annual haying/summer grazing. Tall grass species lose productive capacity through loss of vigor and reproductive potential. Indiangrass decreases to a remnant population. Overall forb production increases and there is a shift in species composition. Dominant forbs include Cuman ragweed, Louisiana sagewort, blue verbena, and Baldwin's ironweed. Total annual production ranges from 3500 to 4500 pounds of air-dried vegetation per acre per year and will average 4000 pounds.

Figure 10. Plant community growth curve (percent production by month). NE7143, Central NE Loess Hills, lowland warm-season dominant. Warm-season grass dominant on lowlands.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	7	15	25	25	17	6	2	0	0

Pathway 1.1A Community 1.1 to 1.2

Annual haying and/or Summer grazing during the growth stage each year will shift the community to Bluestem/Switchgrass/Prairie Cordgrass Plant Community. Continuous season-long grazing without adequate

recovery periods will convert this plant community to a Big Bluestem/Switchgrass/Prairie Cordgrass Plant Community. Continued defoliation will significantly reduce the proportions of the tall grass species. The easy accessibility of this site when included in upland pastures can lead to heavy grazing pressure due to livestock preference for these sites.

Pathway 1.2A
Community 1.2 to 1.1

Prescribed grazing over a long time period will move this plant community back toward the Big Bluestem/Indiangrass/Switchgrass Plant Community or associated successional plant communities assuming an adequate seed/vegetative source exists. This transition may take greater than 20 years to accomplish. Rotational haying or haying in rotation with grazing will move this plant community back toward the Big Bluestem/Indiangrass/Switchgrass Plant Community or associated successional plant communities assuming an adequate seed/vegetative source exists. This transition may take greater than 20 years to accomplish.

State 2
Native/Invaded Grass State

This state consists of one community phase that has been invaded by smooth brome grass and Kentucky bluegrass. Loss of native warm season species/ functional groups and increased bare soil degrade forage productivity, soil moisture retention, organic matter, soil surface structure, plant vigor, etc.

Community 2.1
Kentucky Bluegrass/ Smooth Brome grass

With continuous grazing, rhizomatous species such as Kentucky bluegrass, smooth brome grass, western wheatgrass, and foxtail barley will become the dominant species replacing the tall and midgrass species. This causes the plant community to move toward a sod-bound condition. Tall warm season grasses such as prairie cordgrass, big bluestem, Indiangrass, and switchgrass have been removed. Midsummer haying at the same time each year and/or continued heavy grazing without adequate recovery periods will accelerate this process. Total annual production, during an average year, ranges from 3000 to 3500 pounds per acre air-dry weight and will average 3250 pounds.

Figure 11. Plant community growth curve (percent production by month). NE7139, Central NE Loess Hills, lowland cool-season dominant. Cool-season dominant, lowlands.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	13	28	28	12	5	6	3	0	0

State 3
Reed Canary State

This state contains one plant community dominated by reed canary and creeping foxtail. Although both are native species, they can greatly take away from the forage quality as both are undesirable or not consumed by most species throughout the majority of the year.

Community 3.1
Reed Canary/ Creeping Foxtail

This plant community occurs when a viable reproductive source is available due to proximity, or when seeded with reed canarygrass and/or creeping foxtail. Reed canarygrass and creeping foxtail seedlings have often been established when cool-season grass production deteriorates. However, this seeding practice has compromised habitat for certain wildlife species, and once established becomes difficult to alter due to its aggressive and invasive behavior. While this plant community has a high production potential, forage quality is sacrificed. Total annual production ranges significantly depending upon precipitation and the degree of encroachment.

Figure 12. Plant community growth curve (percent production by month).

NE7139, Central NE Loess Hills, lowland cool-season dominant. Cool-season dominant, lowlands.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	13	28	28	12	5	6	3	0	0

State 4 Invaded Woody State

This state is invaded by woody species, primarily Eastern redcedar, Russian olive, dogwood and American basswood. These woody species are present due to lack of prescribed fire and/or brush management measures. These sites typically have a loss of native warm season grasses, degraded forage productivity and reduced soil quality.

Community 4.1 Deciduous Trees/Eastern Redcedar

Generally this site is very conducive to cottonwood seedling establishment when flooding events exist or when other disturbances occur that mimic flooding events, such as tilling. Co-dominant species include silver maple, green ash and occasionally, American elm. The mid-story plant community consists of green ash, boxelder, and hackberry, with Kentucky coffeetree and American basswood as lesser components. Invading exotic species include Siberian elm, Russian olive, white mulberry and buckthorns. Native shrubs include grey dogwood, redosier dogwood and gooseberry. As this site grades into a wet sub-irrigated ecological site, the plant component will transition into cottonwood, grey dogwood, redosier dogwood, shrub willows and false indigo. Trees will eventually dominate the site, reducing grass production and limiting grazing potential. Kentucky bluegrass and sedges may persist in areas of open canopy. Eastern red cedar will invade the site in the absence of flooding. Trees will establish and grow until a high water table or prolonged periods of flooding occur. Eastern redcedar may be managed with prescribed burning and/or browsing animals while the trees are six feet tall or less.

Figure 13. Plant community growth curve (percent production by month). NE7139, Central NE Loess Hills, lowland cool-season dominant. Cool-season dominant, lowlands.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	13	28	28	12	5	6	3	0	0

Transition T1A State 1 to 2

Annual haying, summer grazing, or continuous season long grazing can cause the reference state to transition to the Native/Invaded Grass State.

Transition T1B State 1 to 4

No fire, encroachment of woody species, and flooding can cause the Reference State to transition to the Invaded Woody State. Flooding will establish habitat conditions for cottonwood generation. Eastern red cedar will establish but will die out when the water table rises or when periods of repeated or prolonged flooding occur.

Restoration pathway R2A State 2 to 1

Prescribed grazing over a long time period will move this plant community back toward the Big Bluestem/Switchgrass/Prairie Cordgrass Plant Community or associated successional plant communities assuming an adequate seed/vegetative source exists. This transition may take greater than 20 years to accomplish. Rotational haying or haying in rotation with grazing will move this plant community back toward the Big Bluestem/Switchgrass/Prairie Cordgrass Plant Community or associated successional plant communities assuming an adequate seed/vegetative source exists. This transition may take greater than 20 years to accomplish.

Transition T2A

State 2 to 3

Seeding or Encroachment of reed canary grass, as well as continuous season long grazing, can cause the Native/Invaded Grass State to transition to the Reed Canary State.

Transition T2B

State 2 to 4

No fire, as well as encroachment of woody species, can cause the Native/Invaded Grass State to transition to the Invaded Woody State

Restoration pathway R3A

State 3 to 1

Prescribed grazing over a long time period will move this plant community back toward the Big Bluestem/Switchgrass/Prairie Cordgrass Plant Community or associated successional plant communities assuming an adequate seed/vegetative source exists. This transition may take greater than 20 years to accomplish. Rotational haying or haying in rotation with grazing will move this plant community back toward the Big Bluestem/Switchgrass/Prairie Cordgrass Plant Community or associated successional plant communities assuming an adequate seed/vegetative source exists. This transition may take greater than 20 years to accomplish.

Transition T3A

State 3 to 4

No fire or Encroachment will convert this plant community to a Deciduous Trees and/or Eastern redcedar Plant Community.

Restoration pathway R4B

State 4 to 1

Mechanical or chemical brush management, prescribed burning or timber harvest combined with prescribed grazing can cause the Invaded Woody State to shift back to the Reference State.

Restoration pathway R4A

State 4 to 2

Mechanical or chemical brush management, prescribed burning or timber harvest combined with prescribed grazing can cause the Invaded Woody State to shift back to the Native/Invaded Grass State.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	Tall/Warm Season			1785–2550	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	1275–2040	25–40
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	510–1020	10–20
	switchgrass	PAVI2	<i>Panicum virgatum</i>	255–765	5–15
	prairie cordgrass	SPPE	<i>Spartina pectinata</i>	255–510	5–10
	marsh muhly	MURA	<i>Muhlenbergia racemosa</i>	0–255	0–5
2	Mid Warm Season			765–1275	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	765–1275	15–25

	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	0–510	0–10
	purple lovegrass	ERSP	<i>Eragrostis spectabilis</i>	0–255	0–5
3	Rhizomatous Cool Season			102–255	
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	0–255	0–5
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	0–255	0–5
	plains bluegrass	POAR3	<i>Poa arida</i>	0–153	0–3
	prairie wedgescale	SPOB	<i>Sphenopholis obtusata</i>	0–153	0–3
4	Cool Season Bunch			51–255	
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	0–255	0–5
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	0–255	0–5
	porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	0–255	0–5
	foxtail barley	HOJU	<i>Hordeum jubatum</i>	0–153	0–3
5	Other Native Grasses			0–255	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–153	0–3
	reed canarygrass	PHAR3	<i>Phalaris arundinacea</i>	0–153	0–3
6	Grass-Like			255–510	
	sedge	CAREX	<i>Carex</i>	51–357	1–7
	Sartwell's sedge	CASA8	<i>Carex sartwellii</i>	51–255	1–5
	awlfuit sedge	CAST5	<i>Carex stipata</i>	0–255	0–5
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0–255	0–5
	rush	JUNCU	<i>Juncus</i>	0–255	0–5
	bulrush	SCHOE6	<i>Schoenoplectus</i>	0–255	0–5
	spikerush	ELEOC	<i>Eleocharis</i>	0–153	0–3
Forb					
8	Forbs			255–510	
	Forb, native	2FN	<i>Forb, native</i>	51–255	1–5
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	51–153	1–3
	American licorice	GLLE3	<i>Glycyrrhiza lepidota</i>	51–153	1–3
	Maximilian sunflower	HEMA2	<i>Helianthus maximiliani</i>	51–153	1–3
	stiff sunflower	HEPA19	<i>Helianthus pauciflorus</i>	0–153	0–3
	cinquefoil	POTEN	<i>Potentilla</i>	51–153	1–3
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	0–102	0–2
	Missouri goldenrod	SOMI2	<i>Solidago missouriensis</i>	0–102	0–2
	white heath aster	SYER	<i>Symphyotrichum ericoides</i>	51–102	1–2
	tall blazing star	LIAS	<i>Liatris aspera</i>	51–102	1–2
	stiff goldenrod	OLRI	<i>Oligoneuron rigidum</i>	51–102	1–2
	Pennsylvania smartweed	POPE2	<i>Polygonum pensylvanicum</i>	0–102	0–2
	showy milkweed	ASSP	<i>Asclepias speciosa</i>	51–102	1–2
	false boneset	BREU	<i>Brickellia eupatorioides</i>	0–102	0–2
	white prairie clover	DACA7	<i>Dalea candida</i>	0–102	0–2
	purple prairie clover	DAPU5	<i>Dalea purpurea</i>	51–102	1–2
	Illinois bundleflower	DEIL	<i>Desmanthus illinoensis</i>	0–102	0–2
	western yarrow	ACMIO	<i>Achillea millefolium var.</i>	51–102	1–2

			<i>occidentalis</i>		
	autumn onion	ALST	<i>Allium stellatum</i>	0–102	0–2
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	51–102	1–2
	smooth horsetail	EQLA	<i>Equisetum laevigatum</i>	0–51	0–1
	swamp verbena	VEHA2	<i>Verbena hastata</i>	0–51	0–1
	ragwort	SENEC	<i>Senecio</i>	0–51	0–1
Shrub/Vine					
9	Shrubs			0–255	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0–153	0–3
	leadplant	AMCA6	<i>Amorpha canescens</i>	0–153	0–3
	rose	ROSA5	<i>Rosa</i>	0–153	0–3
	willow	SALIX	<i>Salix</i>	0–153	0–3
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	0–153	0–3
	western poison ivy	TORY	<i>Toxicodendron rydbergii</i>	0–51	0–1

Animal community

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage. During the dormant period, the forage for livestock will likely be lacking protein to meet livestock requirements, and added protein will allow ruminants to better utilize the energy stored in grazed plant materials. A forage quality test (either directly or through fecal sampling) should be used to determine the level of supplementation needed.

The following table lists suggested initial stocking rates for cattle under average growing conditions. These are 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/vegetative state (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 herbivores other than cattle are involved. Under more intensive management systems, improved harvest efficiencies can result in an increased carrying capacity.

Production Carrying Capacity*

Plant Community: (lbs./acre) (AUM/acre)**

Bluestem/Indiangrass/Switchgrass: (5100 lbs) (1.39)

Bluestem,/Switchgrass/Prairie Cordgrass: (4000 lbs) (1.09)

Kentucky Bluegrass/Smooth brome grass: (3250 lbs) (0.89)

* Continuous growing season-long grazing by cattle under average growing conditions (utilizing 50% of usable production or 25% harvest efficiency).

**AUM = The amount of forage required by one animal unit (one mature cow weighing 1000 lbs. and her calf as old as 3 months, or their equivalent) for one month or 912 pounds of air dry forage.

Hydrological functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group A and B. Infiltration is moderate and runoff potential for this site varies from moderately poor to poor depending on ground cover. Areas where ground cover is less than 50 percent have the greatest potential to have reduced infiltration and higher runoff (refer to NRCS Section 4, National Engineering Handbook (NEH-4) for runoff quantities and hydrologic curves).

Recreational uses

This site provides excellent hunting areas. This site attracts many different species of birds, and is popular for bird watching. The wide varieties of plants, which bloom from spring until fall, have an esthetic value that appeals to visitors.

Wood products

No appreciable wood products are present on the site.

Other products

None noted.

Other information

Revision Notes: "This PROVISIONAL ecological site concept has been QC'd and QA'd to ensure that the site meets the NESH standards for a provisional ecological site that provides basic compiled information in one location. This site should not be considered an Approved ESD until further data entry and editing is completed.

Inventory data references

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel was also used. Those involved in developing this site include: Dana Larsen, State Rangeland Management Specialist, NRCS; Chuck Markely, Resource Soil Scientist, NRCS; Neil Dominy, Resource Soil Scientist, NRCS.

Other references

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

USDA, NRCS. National Water and Climate Center, 101 SW Main, Suite 1600, Portland, OR 97204-3224. (<http://wcc.nrcs.usda.gov>)

USDA, NRCS. National Range and Pasture Handbook, September 1997

USDA, NRCS. National Soil Information System, Information Technology Center, 2150 Centre Avenue, Building A, Fort Collins, CO 80526. (<http://nasis.nrcs.usda.gov>)

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

Contributors

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Acknowledgments

Site Development and Testing Plan:

Future work is needed to validate the information in this Provisional Ecological Site Description. Additional data collection and evaluation may also be needed to develop this ESD to the Approved, then Correlated level. This could include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Field reviews of the project plan should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document.

The State and Transitional Model and corresponding pathways and associated vegetative communities will need to be reviewed and upgraded to adhere to the new guidelines.

Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team. The project plan is: ES R071XY024NE

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Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

Dominant:

Sub-dominant:

Other:

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

17. **Perennial plant reproductive capability:**
