Ecological site R072XY103KS
Subirrigated

Accessed: 04/10/2021

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.

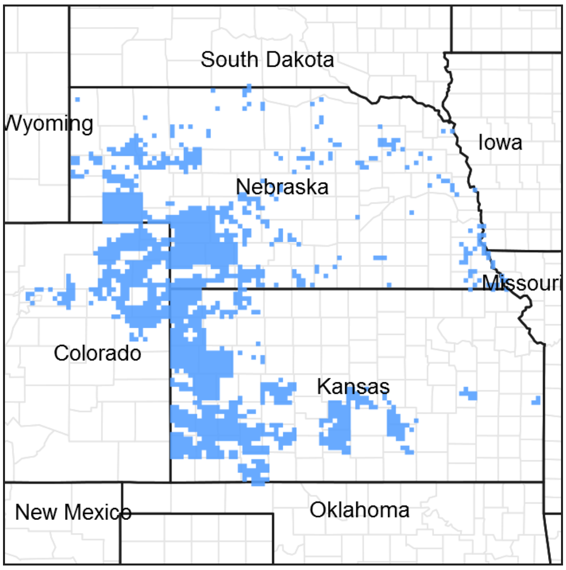


Figure 1. Mapped extent

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): 072X–Central High Tableland

Major Land Resource Area (MLRA) 72--Central High Tableland. This area is in Kansas (54 percent), Nebraska (25 percent), and Colorado (21 percent). A very small part of the area is in Wyoming. The area makes up about 34,550 square miles (89,535 square kilometers). It includes the towns of Garden City, Goodland, and Colby, Kansas; Imperial, North Platte, Ogallala, and Sidney, Nebraska; and Holyoke and Wray, Colorado. Interstate 70 bisects the area, and Interstates 76 and 80 follow the south side of the South and North Platte Rivers, respectively. The Cimarron National Grasslands occur in the southwest corner of the MLRA.

Classification relationships

MLRA 72 Central High Tableland

Ecological site concept

The Subirrigated ecological site is located on floodplains, terraces, and interdunes on river valleys, and dune fields. Soils correlated to this site have a seasonal or perennial high water table less than 6 feet from the surface. Soils correlated with this site are deep to very deep and have a surface that is 10 inches (25cm). The soil surface texture ranges from coarse sand to silty clay loam with the majority of the site surface texture loam.

Associated sites

R072XY102KS	**Saline Subirrigated** Saline Subirrigated is located adjacent to Subirrigated. The difference being the concentration of salts.
R072XY108KS	**Loamy Lowland** Loamy Lowland is adjacent to Subirrigated sites but will have a water table >6 feet from the surface
R072XY111KS	**Sandy Plains** Sandy ecological site can be found adjacent to Subirrigated. The difference being the water table and percentage of sand.

Similar sites

R072XY102KS	**Saline Subirrigated** Saline Subirrigated R072XY102KS is similar to Subirrigated in its landform position and water table <6 feet from the surface. Some of the same vegetation can occur on both sites.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Andropogon gerardii* (2) *Panicum virgatum*

Physiographic features

This site occurs on floodplains and terraces in valleys with a high water table, interdunal areas of the dune fields, and below permanent springs. This site is subject to flooding except for positions on interdunes. This site receives runoff from areas higher on the landscape.

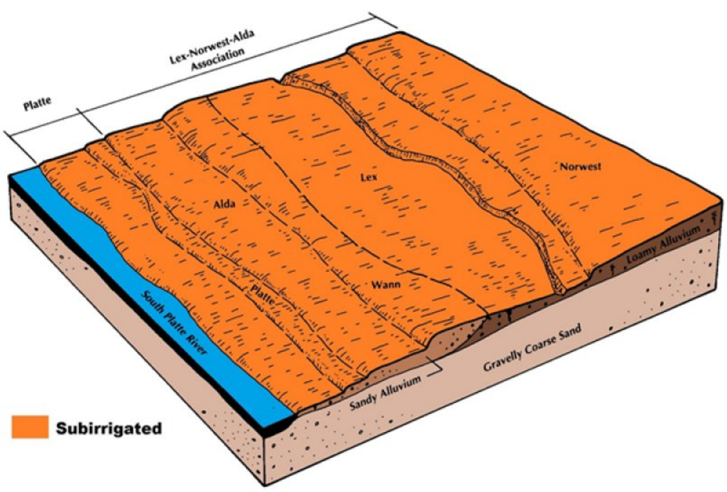


Figure 2. MRLA 72 Subirrigated block diagram

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Terrace (3) Interdune
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	None to frequent
Ponding frequency	None
Elevation	2,200–5,000 ft
Slope	0–3%

Ponding depth	0 in
Water table depth	0–36 in

Climatic features

Annual precipitation ranges from 13 to 23 inches per year with the mean annual precipitation at 19 inches. Hourly winds are estimated to average about 10 miles per hour annually, ranging from 15-30 miles per hour during the spring to 5-15 miles per hour during late summer. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 miles per hour.

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

Table 3. Representative climatic features

Frost-free period (average)	145 days
Freeze-free period (average)	160 days
Precipitation total (average)	19 in

Climate stations used

- (1) LAKIN [USC00144464], Lakin, KS
- (2) SYRACUSE 1NE [USC00148038], Syracuse, KS
- (3) SIDNEY MUNI AP [USW00024030], Sidney, NE
- (4) SAINT FRANCIS [USC00147093], Saint Francis, KS
- (5) SHARON SPRINGS [USC00147397], Sharon Springs, KS
- (6) HAIGLER [USC00253515], Haigler, NE
- (7) OGALLALA [USC00256200], Ogallala, NE
- (8) BENKELMAN [USC00250760], Benkelman, NE

Influencing water features

Influencing water features on this ecological site include a water table less than 6 feet from the soil surface. This water table influences the kinds and amounts of vegetation, and the management of the site making it distinctive from other ecological sites.

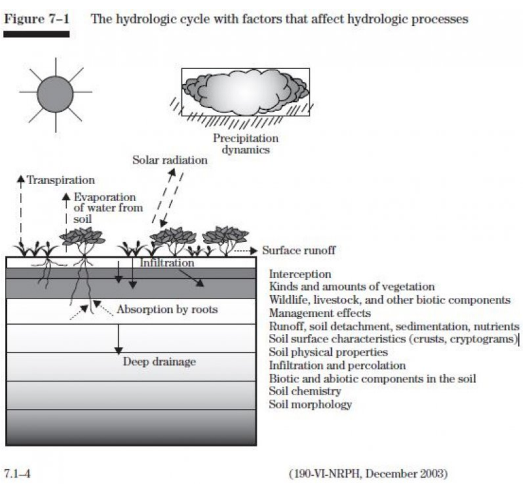


Figure 7. Fig. 7-1 from National Range and Pasture Handbook

Soil features

About 70 percent of the extent of soils in this site are somewhat poorly drained while 30 percent make up poorly drained. These soils are generally very deep, but some are shallow over gravelly coarse sand. The surface soil is generally darker colored and ranges from 2 to 30 inches thick. Texture of the surface soil ranges widely from silt loam to fine sand. The content of organic matter of the surface layer is generally 1 to 3 percent. The underlying material is lighter colored than the surface soil, and commonly has redoximorphic concentrations in the range of 0 to 11 inches. It ranges widely in texture from loam to gravelly course sand, and some of the profiles are stratified. Some soils in this site are calcareous to the surface.

Major soil series correlated to this ecological site include Alda, Bolent, Caruso, Elsmere, Gibbon, Las, Lawet, Platte, Sweetwater, and Wann.

Other soil series that have been correlated to this site include Gering, Lamo, Leshara, Lesho, McGrew, Merrick, and Yockey.

These attributes represent 0-40 inches in depth or to the first restrictive layer.

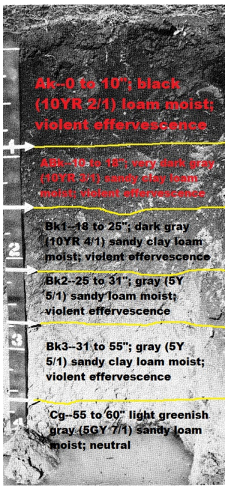


Figure 8. Lawet soil profile Pierce NE

Table 4. Representative soil features

Surface texture	(1) Loam (2) Loamy sand (3) Clay loam
Family particle size	(1) Sandy
Drainage class	Somewhat poorly drained
Permeability class	Moderately slow to moderately rapid
Soil depth	60–80 in
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0–2%
Available water capacity (0-40in)	5–14 in
Calcium carbonate equivalent (0-40in)	0–30%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0–10
Soil reaction (1:1 water) (0-40in)	6.1–9
Subsurface fragment volume <=3" (Depth not specified)	0–30%

Subsurface fragment volume >3" (Depth not specified)	0–10%

Ecological dynamics

The plant community for this site is dynamic due to the complex interaction of many ecological processes. The interpretive plant community for this site is the Reference Plant Community. The Reference community has been determined by the study of rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing strategies. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts have also been used.

This site developed with occasional fires being part of the ecological processes. Historically, it is believed that the fires were infrequent, randomly distributed, and started by lightning at various times throughout the season when thunderstorms were likely to occur. It is also believed that pre-European inhabitants may have used fire as a management tool for attracting herds of large migratory herbivores (bison, elk, deer, and pronghorn). The impact of fire over the past 100 years has been relatively insignificant due to the human control of wildfires and the lack of acceptance of prescribed fire as a management tool in the semi-arid, High Plains area.

The Subirrigated ecological site occurs on nearly level areas adjacent to streams or rivers characterized by a groundwater depth that ranges from 12 to 72 inches (30-183 cm) from 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. Historically, the flooding potential on this site was much greater. The control of river water over the past 80 years through the use of structures has greatly reduced the frequency of flooding.

Caution and consideration is essential when determining an ecological site as Subirrigated. Does the site still have a water table less than 6 feet from the surface? If loss of the water table is not from a natural event that will eventually return but rather from anthropogenic influence in which no timeframe of the water table return is known, then it is a different ecological site. Contributing factors to the change include species composition and production changes as well as soil properties which will affect the interpretations of the site.

The degree of herbivory (feeding on herbaceous plants) has a significant impact on the dynamics of the site. Historically, periodic grazing by herds of large migratory herbivores was a primary influence. Secondary influences of herbivory by species such as grasshoppers, gophers, and root feeding organisms impacted the vegetation historically, and continue to this day.

The management of herbivory by humans through grazing of domestic livestock and/or manipulation of wildlife populations has been a major influence on the ecological dynamics of the site. This management coupled with the High Plains climate largely dictates the plant communities for the site.

Drought cycles have historically had a less significant impact upon 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. 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.

The general response of this site to long term continuous grazing without adequate rest and recovery or annual summer haying in July is to gradually lose the vigor and reproductive potential of the tall and mid-grass species.

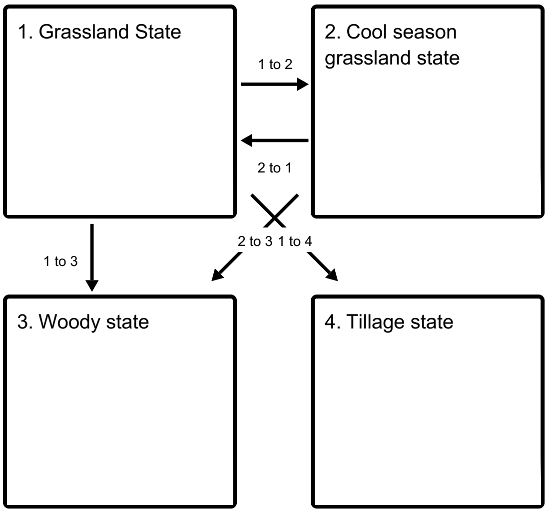
The use of grazing management that includes needed distribution tools, a forage and animal balance, and adequate recovery periods during the growing season, helps restore this site to its productive potential. Alternating the frequency and timing of annual haying will also maintain the production potential of the site.

The following diagram illustrates the common plant communities that can occur on the site and the pathways among those communities. Bold lines surrounding each state represent ecological thresholds and the transitions (arrows between states) describe the loss of ecological resilience from one state to the other. The ecological processes are discussed in more detail in the plant community descriptions following the diagram.

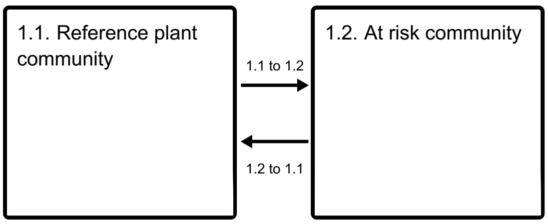
Following are the narratives for each of the described plant communities. These plant communities may not represent every possibility, but they represent the most prevalent and repeatable plant communities. The plant composition table has been developed from the best available knowledge at the time of this revision. As more data is collected, some of these plant communities may be revised or removed and new ones may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities”. According to the USDA NRCS National Range and Pasture Handbook, Desired Plant Communities will be determined by the decision-makers and will meet minimum quality criteria established by NRCS. The main purpose for including any description of a plant community is to capture the current knowledge and experience.

State and transition model

Ecosystem states

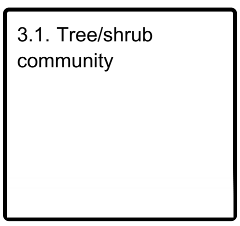


State 1 submodel, plant communities



State 2 submodel, plant communities

State 3 submodel, plant communities



State 4 submodel, plant communities

4.1. Reseed

4.2. Go-back

State 1
Grassland State

The Grassland State is supported by empirical data, historical data, local expertise, and photographs. This state is defined by two native plant communities that are a result of periodic fire, drought, and grazing. These events are part of the natural disturbance regime and climatic process. The Reference Plant Community consist of warm season tall grasses, forbs, and shrubs. The At-risk Plant Community is made up primarily of cool season grasses with decreasing amounts of remnant tallgrasses from the Reference Community. There is a possibility of woody encroachment of Eastern Red Cedar and Russian olive especially in the north part of MLRA72.

Community 1.1
Reference plant community

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 85-90 percent grasses and grass-like plants, 10-15 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, western wheatgrass, Canada wildrye, and prairie cordgrass. A diverse forb population exists.

This community has historically been used for haying during midsummer and grazing aftermath during the dormant season. This community is often used during the dormant season as winter grazing or a feeding area. American licorice and Canada thistle may increase where cattle are fed in the winter.

This plant community is diverse and highly productive. The abundance and diversity of vegetation results from a water table less than 6 feet from the soil surface. The abundant vegetation allows for excellent capture and storage of precipitation as well. The abundance of plant litter, minimal shrub growth and low mortality of plants contribute to the proper function of the water and mineral cycles. The amount of vegetation, high litter cover and decomposition of roots, contributes to the proper function of the nutrient cycle.

Total annual production by growth form ranges from 3000 (unfavorable year) to 5000 (favorable year) pounds per acre of air-dry weight and will average 4000 pounds (representative value). The fluctuations expected during the year are based on weather variability, primarily a result of timing, and amount of precipitation, and temperature.

Total annual production by growth form should not be confused with species productivity which is annual production and variability by species throughout the extent of the community phase.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	2625	3500	4375
Forb	300	400	500
Shrub/Vine	75	100	125
Total	**3000**	**4000**	**5000**

Figure 10. Plant community growth curve (percent production by month).
KS7274, Big Bluestem, Switchgrass, Indiangrass.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	15	35	30	10	5	0	0	0

Community 1.2
At risk community

The At-risk community phase is vulnerable to degradation. It is most vulnerable to exceeding the resilience limits of the state and transitioning to an alternative state. This community phase is considered to be a stage in a transition process that is reversible if management is changed.

This plant community is dominated by cool season grasses with native warm season remnants and/or woody encroachment. Cool season grasses consist of western wheatgrass and Kentucky bluegrass. The remnant tall warm season grasses include prairie cordgrass, switchgrass, and big bluestem.

The dominating presence of cool season grasses and/or tree encroachment is an indicator that the grassland state is at risk of transitioning to a cool season Grassland State and/or a Woody State. Prescription fires, timing, and season of use, and providing a forage and animal balance to favor the warm season grasses are management actions that are needed to avert a transition.

Pathway 1.1 to 1.2
Community 1.1 to 1.2

Repetitive heavy use (grazing/defoliation) during the growing season, lack of rest, and recovery of the grazed forage, non-existing fire prescription, and/or no forage and animal balance may contribute to the cause of shift between community phases.

Pathway 1.2 to 1.1
Community 1.2 to 1.1

Providing a forage and animal balance, adequate rest and recovery of target species, and/or woody removal can contribute to the cause of shift between community phases. Shifts in community phases are reversible through succession, natural disturbances, short-term climatic variations, and use of practices such as grazing management.

State 2
Cool season grassland state

The cool season state is supported by empirical data, historical data, local expertise and photographs. The reference grassland state ecosystem has been driven beyond the limits of ecological resilience and has crossed a threshold into the cool season state. The designation of the cool season state denotes changes in individual plant species and community composition. This change in plant species affects the biotic integrity of the ecosystem. The photosynthetic pathway of plants gradually transitioned from a warm to a cool season plant community. The replacement of plants will have an impact on grazing management influencing the timing and season of use. Hydrologic function of the ecosystem may also altered by the growing season of the cool season plants.

This alternative state should be treated as a hypothesis that will be tested through long-term observation of ecosystem behavior and repeated application of conservation and restoration practices. This state should be re-evaluated and refined continually.

Community 2.1
Cool season community

This community phase is a unique assemblage of perennial, cool season grasses that have developed over time. This plant community is managed unlike the reference state communities in regards to timing of grazing and season of use. Cool season grasses can complement warm season rangeland by providing forage before and after the growing season of warm season grasses.

Western wheatgrass, Kentucky bluegrass, smooth bromegrass and sedges are the dominant species that make up this community phase. A range of variability in dominance and sub-dominance of species occurs across the extent of this MLRA and therefore is difficult to define this plant community. Reed canarygrass and phragmites are species that could occur in this plant community as well. Field determinations will be necessary to determine soil dynamic property changes due to plant community change among this state.

State 3
Woody state

The woody state is supported by empirical data, historical data, local expertise and photographs. The reference grassland state or the cool season state has been driven beyond the limits of ecological resilience and has crossed a threshold into the woody state. The designation of the woody state denotes changes in plant type and species. This change in plant species affects the hydrologic function and biotic integrity of the ecological processes.

This alternative state should be treated as a hypothesis that will be tested through long-term observation of ecosystem behavior and repeated application of conservation and restoration practices. This state should be re-evaluated and refined continually.

Community 3.1
Tree/shrub community

This plant community is highly variable across the extent of the MLRA and is difficult to define. In the northern part of MLRA72 it is known that Russian olive occur adjacent to streams where a seed source and plants have been established. It is estimated that canopy cover is greater than 15% and competition for sunlight, water and nutrients with the grasses is present. The understory in such condition consists of sparse amounts of Virginia wildrye, green muhly, Texas bluegrass, Kentucky bluegrass, Scribner’s rosette grass as well as various annuals.

State 4
Tillage state

The Tillage State is defined by two separate vegetation communities that are highly variable. They are derived through two distinct management scenarios, and are not related successionally. Infiltration, runoff and soil erosion varies depending on the vegetation present. A major flooding event with associated deposition may also occur in any of the following plant communities.

The Grassland State ecosystem has been driven beyond the limits of ecological resilience and has crossed a threshold into the Tillage State. The designation of the tillage state denotes changes in plant community composition and soil structure. This change in plant species and soil structure affects the following ecological processes; hydrologic function, biotic integrity, and soil site stability.

This alternative state should be treated as a hypothesis that will be tested through long-term observation of ecosystem behavior and repeated application of conservation and restoration practices. This state should be re-evaluated and refined continually.

Community 4.1
Reseed

This plant community can vary considerably depending on how eroded the soil was, the species seeded, the stand that was established, how long ago the stand was established, and the management of the stand since establishment. Prescribed grazing with adequate recovery periods will be necessary to maintain productivity and desirable species.

There are several factors that make seeded rangeland a different grazing resource than native rangeland. Factors such as species selected, stand density, varieties, and harvest efficiency all impact the production level and palatability. Uneven grazing distribution occurs when both seeded and native rangelands are in the same grazing unit. Therefore, the seeded rangeland should be managed as a separate grazing unit when feasible.

Seeding native tall and mid grass species can provide a productive haying resource.

Species diversity on seeded rangeland is often lower than that of the reference plant community and native forb species will generally take longer to re-establish.

Community 4.2
Go-back

This plant community develops when the soil is tilled or farmed (sod busted) for years and then deserted. All of the native plants are killed, soil organic matter/carbon reserves are reduced, soil structure is changed, and a plow pan or compacted layer may be formed. This compaction layer can decrease water infiltration rates. Synthetic chemicals may remain as a residual from farming operations. In early successional stages, this community is not stable. Erosion is a concern on this site.

An annual plant community such as Russian thistle, kochia, annual bromes, foxtail barley, and other introduced annuals invade. These plants give some protection from erosion and start to rebuild organic matter. Eventually other perennial warm and cool season species can establish. This successional process will take generations as the soil is being developed. The process can be accelerated with prescribed grazing.

Transition 1 to 2
State 1 to 2

Long term heavy grazing, inadequate rest and recovery of reference plant species, and an absence of prescription fire all contribute to the variables or events that contribute directly to loss of state resilience and result in shifts between states. This transition involves a change in vegetation photosynthetic pathways resulting in a shift from warm season dominated grasses to cool season.

Transition 1 to 3
State 1 to 3

A transition occurs as a result of prescription fires that occur less frequent (>20 years)than fires of the natural disturbance regime, and/or there is an absence of woody encroachment control. The woody plant community has increased to levels that begin competing with the grasses for water, sunlight, and space. Tree/shrub canopy cover is greater than 30%.

Transition 1 to 4
State 1 to 4

T 1-4. Tillage by machinery is an event that contributes directly to loss of state resilience and result in shifts between states. Tillage removes existing vegetation and affects structure and aggregate stability resulting in a change to hydrologic function.

Restoration pathway 2 to 1
State 2 to 1

R 2-1. Long term grazing management with adequate rest and recovery of the remnant reference plant community species and a prescription fire are the management actions required to recover to the grassland state. The species to target for management are those that were dominant or sub-dominant within the reference plant community according to the functional/structural group sheet. This restoration may take greater than 20 years to accomplish.

Transition 2 to 3
State 2 to 3

T 2-3. The absence of managing woody species are the variables that contribute directly to loss of state resilience and result in shifts between states. This transition involves a change in vegetation type. This transition could take generations and possibly will not occur if there is not a seed source available.

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	**Warm season Tallgrasses**			900–2600	
	big bluestem	ANGE	*Andropogon gerardii*	700–1000	–
	sand bluestem	ANHA	*Andropogon hallii*	0–400	–
	switchgrass	PAVI2	*Panicum virgatum*	100–400	–
	Indiangrass	SONU2	*Sorghastrum nutans*	100–400	–
	prairie cordgrass	SPPE	*Spartina pectinata*	0–400	–
2	**Warm season Midgrasses**			125–400	
	little bluestem	SCSC	*Schizachyrium scoparium*	75–200	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	50–125	–
	marsh muhly	MURA	*Muhlenbergia racemosa*	0–75	–
3	**Cool season grasses**			10–225	
	Canada wildrye	ELCA4	*Elymus canadensis*	40–100	–
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	0–75	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–75	–
	western wheatgrass	PASM	*Pascopyrum smithii*	10–75	–
4	**Sedges and grasslikes**			10–225	
	Nebraska sedge	CANE2	*Carex nebrascensis*	0–75	–
	sedge	CAREX	*Carex*	10–75	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	0–75	–
Forb					
5	**Forbs**			75–525	
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	25–75	–
	Illinois bundleflower	DEIL	*Desmanthus illinoensis*	25–75	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	25–75	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	0–30	–
	scarlet beeblossom	OESU3	*Oenothera suffrutescens*	0–30	–
	goldenrod	SOLID	*Solidago*	0–30	–
	white heath aster	SYER	*Symphyotrichum ericoides*	0–30	–
	longbract spiderwort	TRBR	*Tradescantia bracteata*	0–30	–
	textile onion	ALTE	*Allium textile*	0–30	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–30	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–30	–
	white prairie clover	DACA7	*Dalea candida*	0–30	–
	nineanther prairie clover	DAEN	*Dalea enneandra*	0–30	–
Shrub/Vine					
6	**Shrubs**			0–90	
	false indigo	AMORP	*Amorpha*	0–30	–
	prairie rose	ROAR3	*Rosa arkansana*	0–30	–
	western snowberry	SYOC	*Symphoricarpos occidentalis*	0–30	–

Animal community

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

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

Often the current plant community does not entirely match any particular community phase as described in this ecological site description. Because of this, a forage resource inventory is necessary to document plant composition and production. Proper interpretation of inventory data will permit the establishment of a safe initial stocking rate.

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

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

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

Hydrological functions

Progressively working on a narrative.

Recreational uses

The wide variety of plants which bloom from spring until fall have an aesthetic value that appeals to visitors.

Wood products

No appreciable wood products are present on the site.

Other products

None noted.

Other information

Site Development and Testing Plan.
Future work (for approved ESD) includes field visits to verify ecological site concepts with field staff. Field staff include but are not limited to project office leader, area soil scientist, state soil scientist, ecological site specialist, state rangeland conservationist, area rangeland management specialist, and local field personnel. This site includes collaboration between Kansas, Colorado, and Nebraska. Field visits are to be determined by spatial extent of the site, as well as personal knowledge of the site. Activity during field visits will include but are not limited to identifying the soil, landform, plant community, and verifying existing site concepts.

Inventory data references

Information presented here has been derived from NRCS clipping data, numerous ocular estimates and other inventory data. Field observations from experienced range personnel were used extensively to develop this ecological site description.

NRCS individuals involved in developing the Subirrigated (South) ESD in 2001 include Tim Watson, Amanda Shaw, Robert Schiffner, Susan Francis, and Jon Deege from Kansas; Harvey Sprock and Josh Saunders from Colorado.

NRCS individuals involved in developing the Subirrigated (North) ESD in 2001 include Harvey Sprock from Colorado; Carol Eakins, Chuck Markley, Jeff Nichols, and Mary Schrader from Nebraska; Joan Gienger and Ted Houser from Kansas.

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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)	Original reference sheet created by David Kraft, John Henry, Doug Spencer, and Dwayne Rice in February 2005. Entered information and made minor revisions on #5, #7, #12, #14, #15 by Chris Tecklenburg 2-24-2016.
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Date	02/24/2016
Approved by	David Kraft
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

2. **Presence of water flow patterns:** There is little, if any, evidence of soil deposition or erosion. Water generally flows evenly over the entire landscape.

3. **Number and height of erosional pedestals or terracettes:** There is no evidence of pedestaled plants or terracettes or the site.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Less than 5% bare ground is found on this site. Cover can be defined as live plants, litter, rocks, moss, lichens, etc.

5. **Number of gullies and erosion associated with gullies:** None

6. **Extent of wind scoured, blowouts and/or depositional areas:** There is no evidence of wind erosion creating bare areas or denuding vegetation.

7. **Amount of litter movement (describe size and distance expected to travel):** Plant litter is distributed evenly throughout the site. During major flooding events this site slows water flow and captures litter and sediment.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Plant canopy is large enough to intercept the majority of raindrops. A soil fragment will not “melt” or lose its structure when immersed in water for 30 seconds. There is no evidence of pedestaled plants or terracettes. Soil stability scores will range from 5-6.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The topsoil layer has not been disturbed or eroded. Ak horizon 0 to 10 inches; sandy clay loam, very dark gray (10YR 3/1) moist, moderate fine and very fine granular structure; hard, friable; violent effervescence (18 percent calcium carbonate equivalent); moderately alkaline.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** There is no negative effect on water infiltration and/or runoff due to plant composition or distribution. Plant composition and distribution are adequate to prevent any rill formation and/or pedastalling. Inter-spacial distribution is consistent with expectation for the site.

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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):** There is no evidence of compacted soil layers due to cultural practices. Soil structure is conducive to water movement and root penetration.

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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 tallgrasses 65%: big bluestem > switchgras = indiangrass > prairiecordgrass = sand bluestem

    Sub-dominant: warm season midgrasses 10%: little bluestem > sideoats grama > marsh muhly
    forbs 10%: prairie bundleflower = American licorice = Maximillian sunflower > all other forbs

    Other: cool season grasses 7.5%: Canada wildrye > western wheatgrass > slender wheatgrass > needle and thread.

    Additional: sedges and grasslikes 5%: sedge = scribner's rosette grass = Nebraska sedge
    shrubs 2.5%: false indigo = prairie rose = snowberry

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** The majority of plants are alive and vigorous. Some mortality and decadence is expected for the site. This in part is due to drought, unexpected wildfire or a combination of the two events. This would be expected for both dominant and sub-dominant groups.

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14. **Average percent litter cover (%) and depth (in):** Plant litter is distributed evenly throughout the site. There is no restriction to plant regeneration due to depth of litter. When prescribed burning is practiced there will be little litter the first half of the growing season.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 4000 lbs in representative year. 3000 lbs in a below average precipitation year and 5000 lbs in an above

average precipitation year. Vegetative production is 95-100% of normal based upon the ecological site description and the weather the past year. (refer to ecological site description for favorable or unfavorable growing conditions)

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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:** There are no noxious weeds present. Invasive plants make up a small percentage of plant community, and invasive brush species are < 5% canopy.

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17. **Perennial plant reproductive capability:** Plants on site exhibit the required vigor and growth to be able to reproduce vegetatively or by seed.
