USDA Natural Resources Conservation Service

Ecological site HX074XY120
Saline Lowland

Last updated: 10/04/2019
Accessed: 05/11/2025

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): 074X–Central Kansas Sandstone Hills

Major Land Resource Area (MLRA) 74, Central Kansas Sandstone Hills, is entirely located in Kansas. It makes up about 8,365 square miles (21,675 square kilometers). The city of Salina and the towns of Concordia, Junction City, McPherson, and Newton are in this MLRA. Interstate Highways 70 and 135 meet in Salina, and Interstate 35 crosses the southern part of this area. Wilson and Kanopolis State Parks are in this area. McConnell Air Force Base is in the southern part of the area.

Following are the various kinds of land use in this MLRA: Cropland-- private, 52 percent; Grassland--private, 38 percent, Federal 2 percent; Forest--private, 3 percent; Urban development--private, 3 percent; Water--private, 1 percent; Other- private, 1 percent.

Most of MLRA 74 is in farms. More than one-half of the area is in cropland. Winter wheat is the principal crop. Other small grains, grain sorghum, hay, and corn also are important crops. Some areas along the large rivers are irrigated. The crops grown in nonirrigated areas also are grown in irrigated areas, but more corn and less wheat are grown in the irrigated areas. More than one-third of the area supports native grasses grazed by cattle.

The major soil resource concerns are water erosion, maintenance of the content of organic matter and tilth of the soils, and soil moisture management. The resource concerns on pasture and rangeland are the productivity, health, and vigor of plants and the spread of noxious and invasive species.

Conservation practices on cropland generally include high-residue crops in the cropping system; systems of crop residue management, such as no-till and mulch-till; a combination of terraces and grassed waterways; contour farming; contour stripcropping; conservation crop rotations; and nutrient management. Conservation practices on rangeland generally include prescribed grazing, brush management, management of upland wildlife habitat, proper distribution of watering facilities, and control of noxious and invasive plant species.

Classification relationships

Major Land Resource Area (MLRA): 074X–Central Kansas Sandstone Hills

Ecological site concept

The Saline Lowland ecological site was formerly known as Saline Subirrigated R074XY020KS. This site is made up of alluvial soils that are located on stream terraces or floodplains in river valleys. This ecological site has a sodium absorption ratio greater than 13 in the surface horizon. The Saline Lowland site has deep to very deep soils with silt loam to silty clay surface textures.

Associated sites

HX074XY115	**Loamy Hills** The Loamy Hills ecological site sits adjacent to and in conjunction with the Saline Lowland ecological site. This site is made up of moderately deep to deep, moderately well to well drained upland soils. This site has a fine-silty and loamy surface texture and is non-calcareous to the surface. Generally, the Loamy Hills ecological site is located on uplands with a slope range of 0 to 16 percent.
HX074XY113	**Loamy Floodplain** The Loamy Floodplain ecological site sits adjacent to and in conjunction with the Saline Lowland ecological site. The Loamy Floodplain ecological site was formerly known as Loamy Lowland R074XY013KS. This site is made up of alluvial soils which occur on the floodplains of drainageways or river valleys. The Loamy Floodplain site has very deep soils with loamy to silty surface and subsurfaces. This site is occasionally or frequently flooded.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Spartina pectinata* (2) *Distichlis spicata*

Legacy ID

R074XY120KS

Physiographic features

The northwest half of MLRA 74 is in the Plains Border Section of the Great Plains Province of the Interior Plains. The northeast corner is in the Dissected Till Plains Section of the Central Lowland Province of the Interior Plains, and the rest of the area is in the Osage Plains Section of the same province and division. This area is an undulating to hilly, dissected plain. Wide flood plains and terraces are along the larger rivers, and narrow bottomland is along the small streams. The elevation ranges from generally 1,310 to 1,640 feet (400 to 500 meters), increasing from east to west. Local relief is typically 65 to 130 feet (20 to 40 meters).

The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA is as follows: Smoky Hill (1026), 47 percent; Middle Arkansas (1103), 22 percent; Kansas (1027), 11 percent; Republican (1025), 10 percent; and Neosho-Verdigris (1107), 10 percent. The Little Arkansas River forms the southwestern border of this area. From north to south, other rivers that cross the area include the Little Blue, Big Blue, Republican, Solomon, Salt, Saline, Cottonwood, Walnut, and Arkansas Rivers. The Solomon and Saline Rivers join the Smoky Hill River just south of Salina.

The Saline Lowland ecological site occurs in the floodplain and on stream terraces of major stream valleys.

Table 2. Representative physiographic features

Landforms	(1) River valley > Flood plain (2) River valley > Stream terrace
Runoff class	Low to medium
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Very rare to frequent
Elevation	984–1,968 ft
Slope	0–2%
Water table depth	18–80 in
Aspect	Aspect is not a significant factor

Climatic features

The average annual precipitation in MLRA 74 is 27 to 34 inches (680 to 860 millimeters). Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. The maximum precipitation occurs from the middle of spring to early in autumn. The annual snowfall averages 20 inches (50 centimeters). The average annual temperature is 54 to 57 degrees F (12 to 14 degrees C). The freeze-free period averages 185 days. Precipitation is usually evenly distributed throughout the year with the exception of November through February as the driest months and May and June as the wettest months. Summer precipitation occurs during intense summer thunderstorms. The following weather data originated from weather stations chosen across the geographical extent of the ecological site, and will likely vary from the data for the entire MLRA. The climate data from this narrative and from the tables below derives from the Natural Resources Conservation Service (NRCS) National Water and Climate Center. The dataset is from 1981-2010.

The climate data from the geographical extent of the ecological site could be different from the MLRA 74 data. The following climate stations listed are used to calculate the data for this ecological site.

Table 3. Representative climatic features

Frost-free period (characteristic range)	151-158 days
Freeze-free period (characteristic range)	188-192 days
Precipitation total (characteristic range)	31-33 in
Frost-free period (actual range)	148-158 days
Freeze-free period (actual range)	177-198 days
Precipitation total (actual range)	31-33 in
Frost-free period (average)	153 days
Freeze-free period (average)	189 days
Precipitation total (average)	32 in

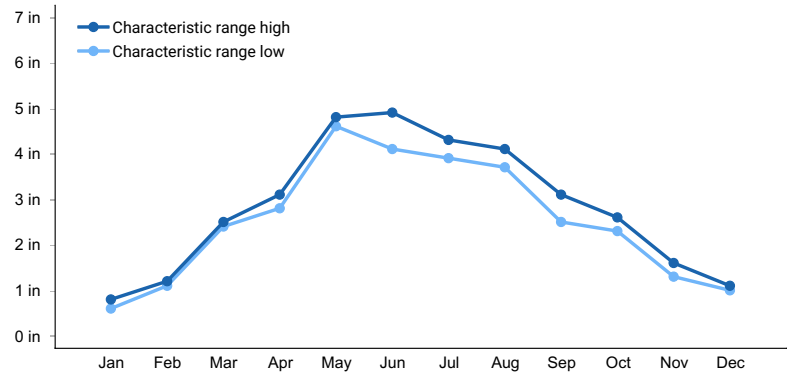


Figure 1. Monthly precipitation range

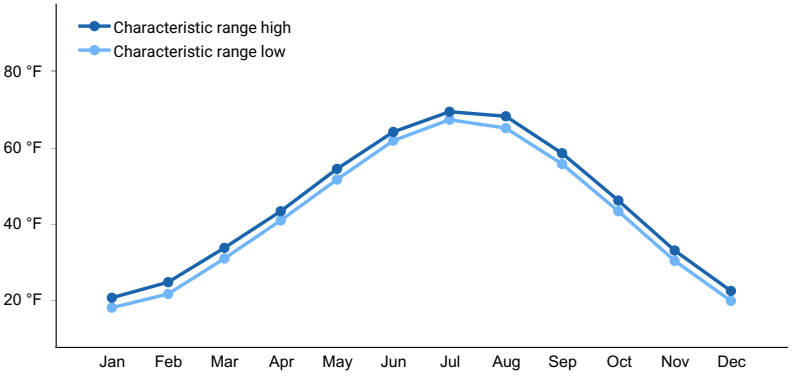


Figure 2. Monthly minimum temperature range

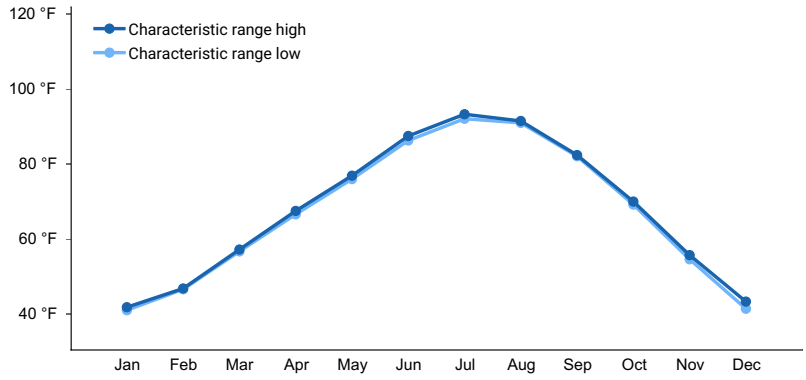


Figure 3. Monthly maximum temperature range

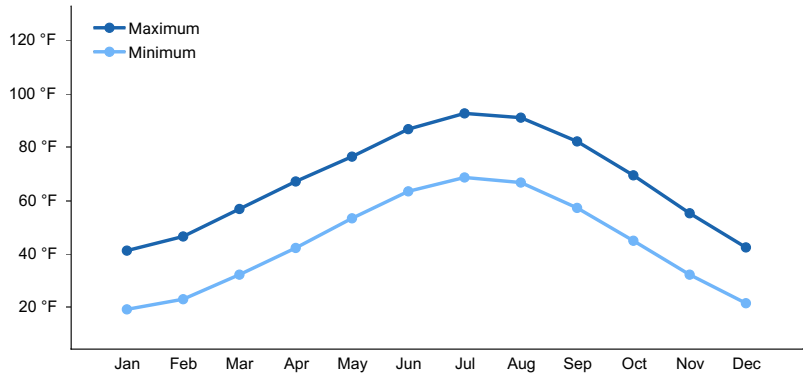


Figure 4. Monthly average minimum and maximum temperature

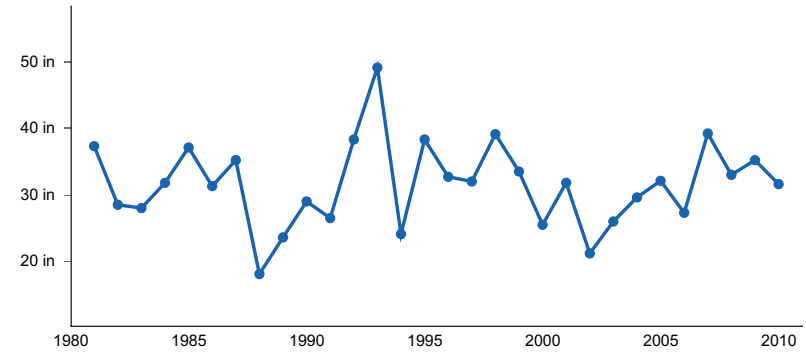


Figure 5. Annual precipitation pattern

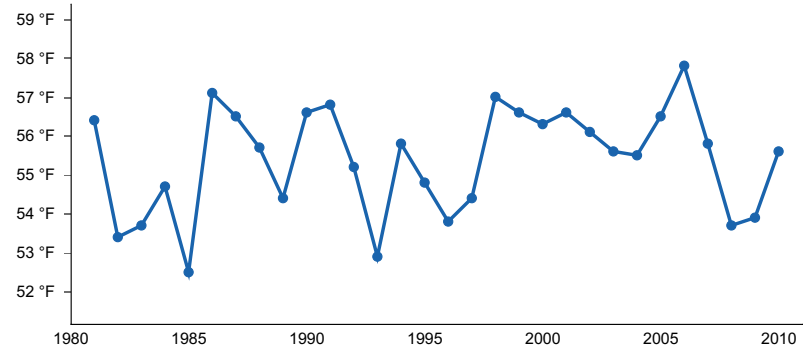


Figure 6. Annual average temperature pattern

Climate stations used

- (1) MINNEAPOLIS [USC00145363], Minneapolis, KS
- (2) SALINA MUNI AP [USW00003919], Salina, KS
- (3) SMOLAN 1NE [USC00147551], Lindsborg, KS

- (4) ABILENE [USC00140010], Abilene, KS
- (5) MILFORD LAKE [USC00145306], Junction City, KS
- (6) NEWTON [USC00145744], Newton, KS

Influencing water features

The soils on this site have moderately slow permeability and a high available water capacity. A water table can fluctuate up to three feet from the soil surface. The Saltine soils are occasionally to frequently flooded.

(Rosgen System) C6, F6, and E6 are potential stream types found on this site. The C6 stream type is a slightly entrenched, meandering, silt-clay dominated, riffle-pool channel with a well developed floodplain. The C6 stream type can be found in low relief basins typical of interior lowlands such as the Great Plains area. F6 stream types are entrenched, meandering, gentle gradient streams deeply incised in cohesive sediments of silt and clay. Characteristics of F6 streams include very high width/depth ratios, moderate sinuosity, and low to moderate meander width ratios. E6 stream types have channels with low to moderate sinuosity, gentle to moderately steep gradients, and very low width/depth ratios. E6 stream systems are very stable. Streambank disturbance through abuse or other disturbances within the watershed can lead to stream degradation and eventually to a change in the stream type to a less stable system.

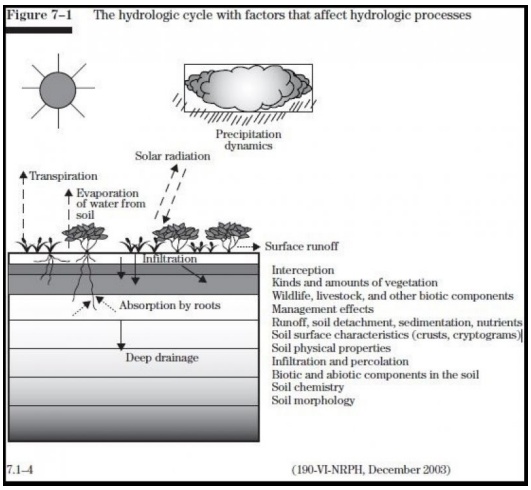


Figure 7. Fig. 7-1 from the National Range and Pasture Handbook.

Soil features

Saltine and Bavaria soils are found on this site. These are very deep, saline and saline-alkali soils with loamy to silty surfaces and subsoils. Saltine soils are susceptible to wind and water erosion if poorly managed.

The saline or saline-alkali condition of these soils affects the plant species present and their annual production. Plants typically growing on this site are salt-tolerant.

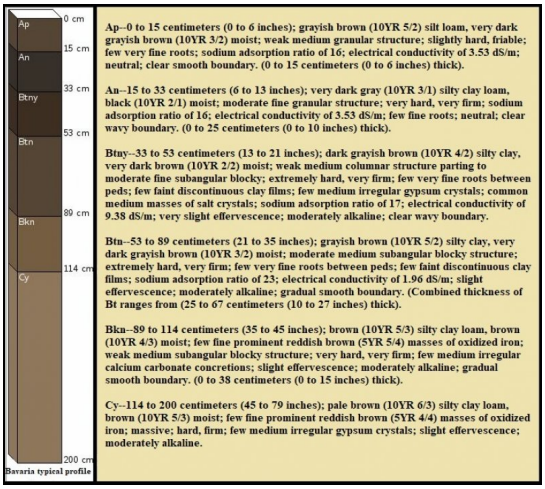


Figure 8. Bavaria typical soil profile.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Silty clay loam (2) Silt loam
Family particle size	(1) Fine-silty (2) Fine
Drainage class	Moderately well drained to somewhat poorly drained
Permeability class	Slow to moderately slow
Soil depth	80 in
Available water capacity (0-40in)	5.4–8.5 in
Calcium carbonate equivalent (0-40in)	0–25%
Electrical conductivity (0-40in)	1–16 mmhos/cm
Sodium adsorption ratio (0-40in)	5–30
Soil reaction (1:1 water) (0-40in)	7.8–9.6

Ecological dynamics

The Saline Lowland ecological site is a dynamic plant community resulting from the complex interaction of many ecological processes. The vegetation evolved on deep to very deep saline to saline-alkali soils under a diverse and fluctuating climate, grazed by herds of large herbivores, and subjected periodically to intense wildfires. The plants that evolved and dominated the original plant community were well adapted to these climatic, soil, and biological conditions.

The tallgrasses that evolved and dominated the original plant community are tolerant of saline-alkali conditions and have deep, efficient root systems capable of utilizing moisture throughout most of the profile. There is almost no runoff from this site except during intense thunderstorms, so most precipitation enters the root profile. The soil and plant moisture relationship is mutually proficient but productivity may be limited by the salt properties of the soil. Seed heads of the major grasses often reach five to six feet in height.

The original plant community developed with occasional fire as an integral part of ecological processes. Historically, fires were started by lightning during spring and early summer months when thunderstorms were most prevalent. It is also recognized that early Native Americans often used fire to attract herds of migratory herbivores, especially bison. These intentional fires probably occurred frequently. Because all of the dominant tallgrasses were rhizomatous, they were able to survive the ravages of even intense wildfires and gain a competitive advantage over bunch grasses in the plant community. In contrast, most trees and shrubs were suppressed by fire and occurred only sparsely on protected areas. Growth of perennial forbs, especially legumes, was usually enhanced following a fire event. After an intense fire there was also usually a substantial increase in the abundance of annuals. This increase was generally temporary, lasting for one to two years.

Grazing history had a major impact on the dynamics of the site. The vegetative community developed under a grazing regime that consisted primarily of periodic grazing by large herds of bison. As the herds moved through an area, grazing was probably intense. When herds moved to adjacent areas, grazed vegetation was afforded an extended period of rest and recovery during the growing season. However, this grazing regime was altered during extended drought periods.
Utilization could be much more concentrated in dry times versus during normal periods of precipitation. Other grazing and feeding animals such as elk, deer, rabbits, rodents, and insects had secondary influences on the development of the plant community.

Variations in climate, especially drought cycles, also had a major impact upon plant community development on the drier or fringe areas of the site. Species composition fluctuated according to the duration and severity of droughts. During prolonged dry cycles, many of the shallow-rooted and less salt-tolerant plants growing in these areas died out and the production of deeper-rooted plants significantly decreased. When sufficient rainfall occurred after an extended dry period, annual forbs and annual grasses would temporarily occur in great abundance before first being pushed out by numerous sedges and rushes and then by perennial grasses. As precipitation returned to normal or above-normal in a sequence of years, the deeper-rooted grasses responded and returned to production potentials.

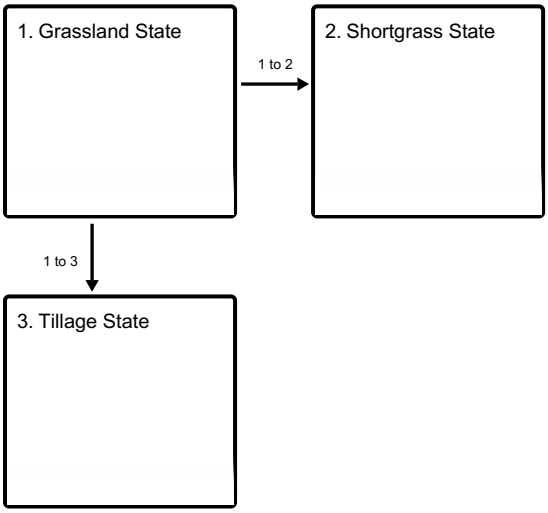
As utilization of the site for production of domestic livestock replaced roaming bison herds, the ecological dynamics were altered. Often the plant community changed from its original composition. Fencing enabled continuous grazing and, in many areas, this led to overgrazing and substantial changes in the vegetation. Changes were usually in proportion to the season and intensity of livestock grazing and were accelerated by a combination of drought and overgrazing. Because the taller grasses and forbs palatable to bison were equally relished and selected by cattle, they were weakened and gradually replaced by the increase and spread of less-palatable midgrasses, sedges, and rushes when repeatedly grazed. Where the history of overgrazing by domestic livestock was more intense for many years, even the plants that initially increased were often replaced by even less-desirable, lower-producing plants. In some areas plant cover was reduced to a mixture of native shortgrasses, sedges, annual grasses, and forbs.

The occurrence of wildfires and the impact that fire played in maintaining the plant community diminished with the advent of roads and cultivated fields, as did the use of prescribed fire as a management tool. In the absence of fire there has been a gradual increase of woody species in many areas. It is possible shrubs and trees have spread to the point they have become the dominant influence in the plant community.

The following diagram illustrates some of the pathways that the vegetation on this site may take from the Reference Plant Community as influencing ecological factors change. There may be other states or plant communities not shown on the diagram as well as noticeable variations within those illustrated.

State and transition model

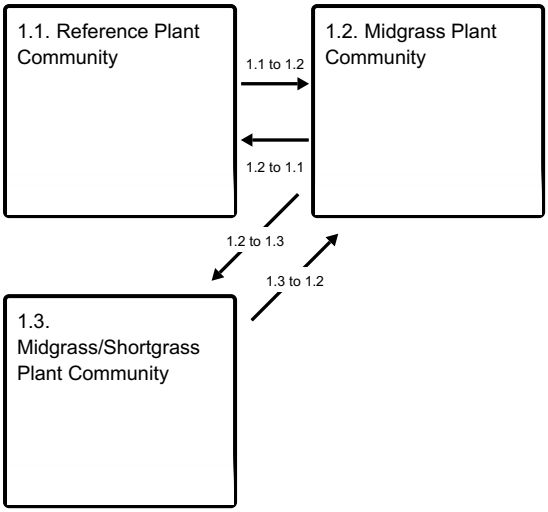
Ecosystem states



1 to 2 - Long-term, heavy, continuous overgrazing, no rest and recovery

1 to 3 - Tillage by machinery

State 1 submodel, plant communities



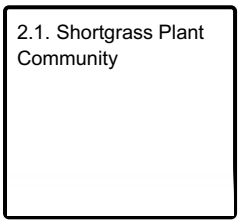
1.1 to 1.2 - Heavy, continuous grazing without adequate rest and recovery

1.2 to 1.1 - Prescribed grazing that incorporates periods of deferment during the growing season

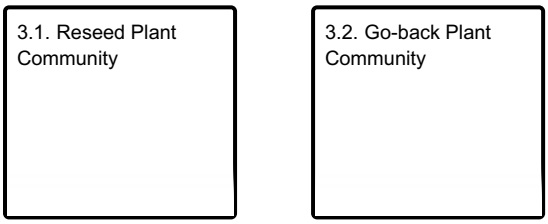
1.2 to 1.3 - Long-term (>20 years) continuous grazing with no rest and no recovery

1.3 to 1.2 - Prescribed grazing with adequate rest and recovery period during the growing season

State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Grassland State

The Grassland State defines the ecological potential and natural range of variability resulting from the natural disturbance regime of the Saline Lowland ecological site. This state is supported by empirical data, historical data, local expertise, and photographs. It is defined by a suite of native plant communities that are the results of periodic fire, drought, and grazing. These events are part of the natural disturbance regime and climatic process. The Reference Plant Community consists of warm-season tall- and midgrasses, cool-season and sod-forming grasses, forbs, and shrubs. The Midgrass Plant Community is made up primarily of warm-season midgrasses, with an interspersed cool-season component, forbs and tallgrasses. The Midgrass/Shortgrass Plant Community is dominated by midgrasses, shortgrasses, and cool-season midgrasses.

Characteristics and indicators. Tallgrasses and midgrasses are dominant in the Grassland State.

Resilience management. Management strategies that will sustain this state include monitoring key forage species and providing a forage and animal balance.

Community 1.1
Reference Plant Community

Figure 9. MLRA 74 Reference Plant Community.

The interpretive plant community for this site is the Reference Plant Community. This plant community represents the original plant community that existed prior to European settlement. The site is characterized as a grassland that is essentially free of trees and large shrubs. Salt marsh is a common term to describe this site. It is dominated by warm-season grasses including prairie cordgrass, alkali sacaton, switchgrass, big bluestem, and inland saltgrass. Major cool-season grasses and grass-like plants include western wheatgrass, prairie wedgescale, rushes, sedges, and foxtail barley. Other grasses and grass-like plants include little bluestem, buffalograss, common spikerush, cosmopolitan bulrush, Scribner’s rosette grass, and composite dropseed. These grasses and grass-like plants will account for about 70 percent of vegetation produced annually. The Saline Lowland ecological site has alkaline and sodic conditions that affect the kinds and amounts of vegetation present. The site supports a scattered population of legume species which are sparsely interspersed throughout the grass sward. Of these, prairie bundleflower is the most notable. Many legumes have a low tolerance to salt and occur in areas of low salt concentrations. Important forbs include broadleaf cattail, Maximilian sunflower, curly dock, common milkweed, Baldwin's ironweed, and giant ragweed. The most abundant shrub on this site is desert false indigo which is commonly present along incised areas. Small, green trees may be observed sparsely scattered over the site. Many of these are green ash trees apparently stunted in size by the saline-alkali soils. Small eastern cottonwood and black willow trees may also be noted along incised areas. Growth of warm-season grasses on this site typically begins during the period of May 1 to May 15 and continues until mid September. Cool-season grasses, sedges, and rushes generally have two primary growth periods, one in the fall (September and October) and again in the spring (April, May, and June). Some growth may occur in winter months during periods of unseasonably warm temperatures (Indian summers). As a general rule, 75 percent of total production is completed by mid-July. This varies only slightly from year to year depending upon temperature and precipitation patterns.

Resilience management. This is a stable plant community when grazing and fire are adequately managed. A prescribed grazing program that incorporates periods of rest and recovery during the growing season benefits the tallgrasses and even the more palatable forb species.

Dominant plant species

- prairie cordgrass (*Spartina pectinata*), grass
- alkali sacaton (*Sporobolus airoides*), grass
- switchgrass (*Panicum virgatum*), grass
- Indiangrass (*Sorghastrum nutans*), grass
- composite dropseed (*Sporobolus compositus*), grass
- big bluestem (*Andropogon gerardii*), grass

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	3720	4650	5580
Forb	200	250	300
Shrub/Vine	80	100	120
Total	**4000**	**5000**	**6000**

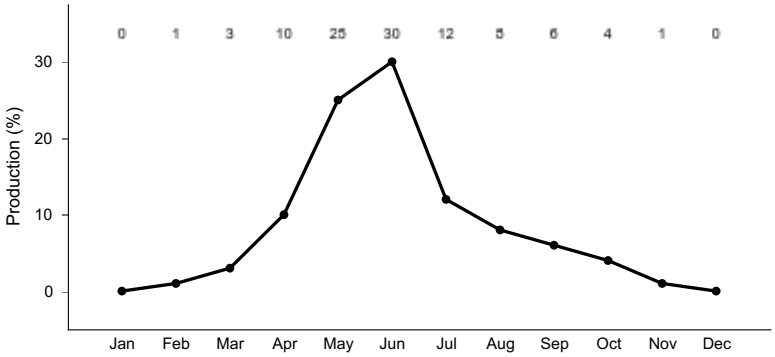


Figure 11. Plant community growth curve (percent production by month). KS7415, Reference Plant Community. Growth of warm-season grasses on this site typically begins during the period of May 1 to May 15 and continues until mid-September. Cool-season grasses, sedges, and rushes generally have two primary growth periods, one in the fall (September and October) and again in the spring (April, May, and June). Some growth may occur in winter months during periods of unseasonably warm temperatures (Indian summers). As a general rule, 75 percent of total production is completed by mid-July. This varies only slightly from year to year depending on temperature and precipitation patterns..

Community 1.2
Midgrass Plant Community

Figure 12. MLRA 74 Midgrass Plant Community.

This plant community developed as a result of many years of continuous overgrazing. Midgrasses and grass-like plants dominate the site and produce 40 to 60 percent of the vegetation. Remnant colonies of prairie cordgrass remain, but they are greatly reduced in size and vigor. The most abundant midgrasses include alkali sacaton, western wheatgrass, composite dropseed, several rush species, and tall sedges. Shortgrasses such as inland saltgrass, buffalograss, foxtail barley, Kentucky bluegrass, smoooth brome and sedges produce 20 to 30 percent of the vegetation. Remnant plants of big bluestem, switchgrass, and sideoats grama are often found sparsely scattered throughout the site. These plants are usually grazed repeatedly and remain in a low state of vigor. These remnants respond favorably to periods of rest from grazing and may regain vigor in two to three years. Forb production is variable and may range from 10 to 25 percent of the total vegetation depending upon the amounts and timing of rainfall and flooding. Perennial forbs include common milkweed, white sagebrush, red sorrel, curly dock, giant ragweed, and Cuman ragweed. Annual forbs common on the site include common sunflower and annual

ragweed. Desert false indigo is the dominant shrub on this site and normally makes up less than five percent of the vegetation. Small amounts of green ash, eastern cottonwood, osage orange, and black willow may be scattered throughout the site.

Resilience management. Periods of rest and recovery from grazing are essential in maintaining this as a stable plant community. When the site is grazed continuously throughout the growing season, prairie cordgrass is usually overgrazed and exists in a state of low vigor. Over time this results in a gradual reduction in abundance.

Dominant plant species

- alkali sacaton (*Sporobolus airoides*), grass
- western wheatgrass (*Pascopyrum smithii*), grass
- composite dropseed (*Sporobolus compositus*), grass
- rush (*Juncus*), grass
- sedge (*Carex*), grass

Community 1.3
Midgrass/Shortgrass Plant Community

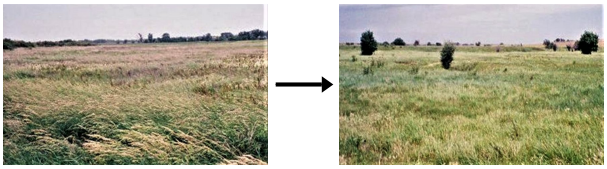
This plant community developed as a result of many years of heavy grazing without rest and recovery of the key forage species. Midgrasses and shortgrasses dominate the site and comprise 50 to 70 percent of the annual production. Most abundant midgrasses include inland saltgrass, composite dropseed, and western wheatgrass. Hairy grama, buffalograss, Kentucky bluegrass, smooth bromegrass, and blue grama produce 20-30 percent of the vegetation. Forb production is quite variable and may range from 10 to 30 percent of the total vegetation depending upon amounts and timing of rainfall events.

Resilience management. Remnant plants of prairie cordgrass, although sparse, are often found scattered throughout the site. These plants are usually grazed repeatedly and remain in a low state of vigor. Prescribed grazing with adequate rest and recovery periods during the growing season will shift this plant community to include more productive midgrasses. With continued management the taller grasses will gradually increase in abundance.

Dominant plant species

- saltgrass (*Distichlis spicata*), grass
- composite dropseed (*Sporobolus compositus*), grass
- western wheatgrass (*Pascopyrum smithii*), grass
- hairy grama (*Bouteloua hirsuta*), grass
- blue grama (*Bouteloua gracilis*), grass
- buffalograss (*Bouteloua dactyloides*), grass

Pathway 1.1 to 1.2
Community 1.1 to 1.2



Reference Plant Community **Midgrass Plant Community**

These mechanisms include management controlled by repetitive heavy use, no rest or recovery of the key forage species, and no forage and animal balance for many extended grazing seasons. This type of management lasting for periods greater than 10 years will shift functional and structural plant group dominance toward a midgrass plant community.

Context dependence. Plant community composition shifts from tallgrass- to midgrass-dominant.

Pathway 1.2 to 1.1
Community 1.2 to 1.1

Midgrass Plant Community

Reference Plant Community

Causes of plant community shift include management (10-15 years) with adequate rest and recovery of the key forage species (prairie cordgrass, big bluestem, switchgrass, Indiangrass, and inland saltgrass) within the Reference Plant Community. If woody species are present, prescription fires every 6-8 years will be necessary for their removal and/or maintenance.

Conservation practices

Prescribed Grazing

Pathway 1.2 to 1.3
Community 1.2 to 1.3

These mechanisms include management controlled by repetitive heavy use, no rest or recovery of the key forage species, and no forage and animal balance for many extended grazing seasons. This type of management lasting for periods greater than 20 years will shift functional and structural plant group dominance toward a Midgrass/Shortgrass Plant Community.

Pathway 1.3 to 1.2
Community 1.3 to 1.2

Causes of plant community shift include management (10-15 years) with adequate rest and recovery of the key forage species (little bluestem, sideoats grama, big bluestem, switchgrass, and Indiangrass) within the Tallgrass/Midgrass Plant Community. If woody species are present, prescription fires every 6-8 years will be necessary for their removal and maintenance.

Conservation practices

Prescribed Burning
Prescribed Grazing

State 2
Shortgrass State

With heavy, continuous grazing, blue grama and buffalograss will become the dominant species and have a sod-bound appearance. Unable to withstand the grazing pressure, only a remnant population of western wheatgrass remains.

Characteristics and indicators. The Shortgrass State is characterized with specific dynamic soil property changes. Changes between the Grassland State and the Shortgrass State have been documented. As plant community cover decreases from bunchgrasses to more of the sod grasses there is a decrease in infiltration and interception and an increase in surface runoff (Thurow, T., 2003).

Resilience management. This is a resistant and resilient state. Grazing management practice should include a forage and animal balance.

Community 2.1
Shortgrass Plant Community

Figure 13. MLRA 74 Shortgrass Plant Community.

This plant community developed as a result of many years of heavy, continuous grazing with no rest and recovery of the key forage species. Shortgrasses dominate the site and comprise 50 to 70 percent of annual production. Most abundant shortgrasses include inland saltgrass, sand dropseed, buffalograss, and numerous rushes and sedge species. Western wheatgrass, although considered a midgrass, is an important part of this shortgrass plant community and is included in the annual production as a dominant species. Remnant plants of prairie cordgrass, big bluestem, and switchgrass are very sparse and scattered. They persist in a low state of vigor, often being semi-dormant or dormant. A significant population of alkali sacaton may also be scattered through this community but is generally in a state of low vigor. Forb production is variable and normally ranges from 20 to 30 percent of the total production on the Saline Lowland ecological site. Perennial forbs include common milkweed, curly dock, Carruth's sagewort, common yarrow, wavyleaf thistle, Canadian horseweed, Cuman ragweed, and giant ragweed. Annual forbs include common sunflower and annual ragweed. Where remnant tallgrasses persist, total rest from grazing or a prescribed grazing period can result in a significant increase in prairie cordgrass and switchgrass with lesser increases in big bluestem. Shrubs and trees tend to remain scattered in the shortgrass community and combined usually make up less than 10 percent of the total production. Scattered populations of desert false indigo and saltcedar may be observed along incised areas. Trees such as green ash, eastern cottonwood, black willow, eastern redcedar, and common hackberry may be sparsely scattered over the site.

Resilience management. If this plant community is grazed heavily, especially during hot, dry periods, it may result in large areas of bare alkaline ground which is very susceptible to wind erosion. With heavy rains following this condition, sheet erosion will occur within the site, making conditions ideal for large populations of forbs. Annual forbs such annual sunflower, annual ragweed, giant ragweed, curly dock, and others may dominate large portions of the site for one year or more.

Dominant plant species

- saltgrass (*Distichlis spicata*), grass
- sand dropseed (*Sporobolus cryptandrus*), grass
- buffalograss (*Bouteloua dactyloides*), grass
- rush (*Juncus*), grass
- sedge (*Carex*), grass
- western wheatgrass (*Pascopyrum smithii*), grass

State 3
Tillage State

There are areas of the historic Saline Lowland plant communities that were plowed and converted to production of cultivated crops by the early European settlers and subsequent generations. In addition to destroying the original plant community, repeated tillage commonly resulted in major changes in soil conditions. Reductions in organic matter, mineral levels, soil structure, oxygen levels, and water-holding capacity, along with increased runoff and erosion and shifts in the populations of soil-dwelling organisms, were common on these sites. The extent of these changes depended upon duration of cropping as well as crops grown and other management practices. The Tillage State consists of abandoned cropland that has been naturally revegetated (go-back) or planted or seeded to grassland. Many reseeded plant communities were planted with a local seeding mix under the Conservation

Reserve Program (CRP) or were planted to a monoculture of sideoats grama. Go-back communities are difficult to define due to the variability of plant communities that can exist. Many of these communities are represented by the genus Aristida (threeawns).

Characteristics and indicators. This is an alternative state because the energy, hydrologic, and nutrient cycles are altered to that of the Reference State in its natural disturbance regime. Bulk density, aggregate stability, soil structure, and plant functional and structural groups are not fully restored to that of the Reference State. Mechanical tillage can destroy soil aggregation. Soil aggregates are an example of dynamic soil property change. Aggregate stability is critical for infiltration, root growth, and resistance to water and wind erosion (Brady and Weil, 2008).

Resilience management. This state is a result of a land use management decision.

Community 3.1
Reseed Plant Community

Figure 14. MLRA 74 Seeded Plant Community.

This plant community occurs on areas that were formerly farmed or tilled for the purpose of seeding what were considered improved grasses. The two grasses found to be seeded on outer areas of this site were tall wheatgrass (*Thinopyrum ponticum*) and smooth bromegrass (*Bromus inermis*). These were seeded into areas that may have been cultivated for a short period of time or on low-producing zones which were tilled and seeded to improve forage production. They appear to have been seeded in single-species plantings. Once these areas become fully established, production is comparable to that of the Reference Plant Community. Total annual production varies according to the species planted, established plants, and years of establishment. When reseeded areas and areas supporting native rangeland exist in the same pasture, they seldom are utilized at the same intensity because domestic livestock usually prefer plants growing on the native rangeland areas. When feasible, reseeded plant communities should be managed as separate pastures or units. Some seeded areas are invaded by trees and shrubs during the establishment period of the desired plants. These invader species commonly include elm, common hackberry, eastern redcedar, and eastern cottonwood. Occasional burning is effective in controlling establishment of these woody plants. These areas, when established, may produce 5,000 to 6,000 pounds of forage, similar to the Reference Plant Community. However, without intensive agronomic management practices they rapidly yield to the rushes, sedges, and salt-tolerant grasses adapted to the wet soils. Older seeded areas seem to take on the characteristics of the Midgrass Plant Community with a component of about 15 to 20 percent of the seeded grass.

Resilience management. Following termination of cultivation, total annual production is quite variable and full recovery of the original plant community, including forbs and legumes, may take many decades. Additions of organic matter and minerals, deferred grazing, prescribed burning, and related management practices described earlier for this ecological site can be beneficial to the rehabilitation.

Community 3.2
Go-back Plant Community

This plant community also occurs on areas that were formerly farmed. When tillage operations ceased, the areas were allowed to revegetate or “go back” naturally in contrast to artificial reseeding to a selected species or group of

species. The go-back process is a slow, gradual transformation that requires many years and many successional changes or stages in the plant community. The speed and extent of revegetation depends on the size of the area, level of grazing management and the proximity of the area to existing seed sources. In the initial stages of revegetation the site is usually dominated by annual forbs such as annual ragweed, slender snakecotton, Canadian horseweed, prairie sunflower, common sunflower, Mexican fireweed, camphorweed, and annual buckwheat. Gradually these are replaced by annual grasses including prairie threeawn, mat sandbur, tumblegrass, little barley, cheatgrass, and witchgrass. As plant succession progresses the plant community gradually becomes dominated by perennials. The major grasses include sand dropseed, composite dropseed, thin paspalum, purple lovegrass, red lovegrass, Scribner's rosette grass, Carolina crabgrass, silver beardgrass, and tumble windmillgrass. Common forbs are Cuman ragweed, white sagebrush, Carruth's sagewort, white heath aster, Missouri goldenrod, and sand milkweed. Combinations of these plants can form a stable community. In time with prescribed grazing management, other perennial grasses and forbs common in the Reference Plant Community return to the site. Blue grama is a shortgrass that is very common to the native plant communities on this site. However, it seldom occurs in go-back communities, even after 40 to 50 years of plant succession. Some go-back areas are invaded by trees and shrubs. The more common include elm, common hackberry, eastern redcedar, eastern cottonwood, and roughleaf dogwood. Occasional burning is effective in controlling these woody plants. Total annual production varies by site. This depends upon seasonal precipitation and the stage of plant succession in the plant community.

Resilience management. Following termination of cultivation, total annual production is quite variable and full recovery of the original plant community, including forbs and legumes, may take many decades. Additions of organic matter and minerals, deferred grazing, prescribed burning, and related management practices described earlier for this ecological site can be beneficial to the rehabilitation.

Transition 1 to 2
State 1 to 2

Long-term management (approximately 30 years) without a forage and animal balance and heavy, continuous grazing without adequate recovery periods between grazing events will convert the Grassland State to a Shortgrass State made up of blue grama and buffalograss sod. Drought in combination with this type of management will quicken the rate at which this transition occurs.

Constraints to recovery. The ecological processes affected are the hydrologic and nutrient cycles. There is an increase in evaporation rate, runoff, and bulk density. There is a decrease in infiltration, a change in plant composition, and the functional and structural groups have changed dominance. These are all examples of the soil and vegetation properties that have compromised the resilience of the Grassland State and therefore transitioned to a Shortgrass State.

Transition 1 to 3
State 1 to 3

This transition is triggered by a management action as opposed to a natural event. Tillage, or breaking the ground with machinery for crop production, will move the Grassland State to a Tillage State.

Constraints to recovery. The resilience of the Reference State has been compromised by the fracturing and blending of the native virgin sod. The energy, hydrologic, and nutrient cycles are altered and vary from that of the Grassland 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	**Tallgrasses dominant 54%**			1500–2700	
	prairie cordgrass	SPPE	*Spartina pectinata*	1000–1250	–
	alkali sacaton	SPAI	*Sporobolus airoides*	350–600	–
	switchgrass	PAVI2	*Panicum virgatum*	150–415	–

	switchgrass	PAVI2	*Panicum virgatum*	100–175	
	Indiangrass	SONU2	*Sorghastrum nutans*	100–300	–
	big bluestem	ANGE	*Andropogon gerardii*	25–250	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	50–100	–
2	**Midgrasses subdominant 20%**			600–1000	
	saltgrass	DISP	*Distichlis spicata*	600–1040	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0–100	–
3	**Cool-season grasses subdominant 12%**			310–600	
	western wheatgrass	PASM	*Pascopyrum smithii*	300–500	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	10–50	–
	Canada wildrye	ELCA4	*Elymus canadensis*	0–50	–
4	**Sedges and rushes minor 5%**			100–250	
	sedge	CAREX	*Carex*	75–125	–
	prairie wedgescale	SPOB	*Sphenopholis obtusata*	50–125	–
	common spikerush	ELPA3	*Eleocharis palustris*	20–80	–
	Torrey's rush	JUTO	*Juncus torreyi*	50–80	–
	common threesquare	SCPU10	*Schoenoplectus pungens*	20–80	–
	yellow nutsedge	CYES	*Cyperus esculentus*	10–50	–
	broadfruit bur-reed	SPEU	*Sparganium eurycarpum*	0–40	–
5	**Shortgrasses trace 2%**			0–100	
	blue grama	BOGR2	*Bouteloua gracilis*	0–50	–
	buffalograss	BODA2	*Bouteloua dactyloides*	0–50	–
Forb					
6	**Forbs minor 5%**			150–250	
	broadleaf cattail	TYLA	*Typha latifolia*	50–100	–
	curly dock	RUCR	*Rumex crispus*	20–40	–
	Pennsylvania smartweed	POPE2	*Polygonum pensylvanicum*	20–40	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	20–40	–
	common milkweed	ASSY	*Asclepias syriaca*	10–30	–
	Illinois bundleflower	DEIL	*Desmanthus illinoensis*	10–30	–
	white heath aster	SYER	*Symphyotrichum ericoides*	10–30	–
	prairie ironweed	VEFA2	*Vernonia fasciculata*	10–30	–
	sessileleaf ticktrefoil	DESE	*Desmodium sessilifolium*	5–25	–
	common sunflower	HEAN3	*Helianthus annuus*	5–25	–
	swamp smartweed	POHY2	*Polygonum hydropiperoides*	5–25	–
	common sheep sorrel	RUAC3	*Rumex acetosella*	5–20	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	5–20	–
	pitcher sage	SAAZG	*Salvia azurea var. grandiflora*	5–20	–
	Missouri goldenrod	SOMI2	*Solidago missouriensis*	5–20	–
	southern annual saltmarsh aster	SYDI2	*Symphyotrichum divaricatum*	5–20	–
	Fendler's aster	SYFE	*Symphyotrichum fendleri*	0–15	–
	arumleaf arrowhead	SACU	*Sagittaria cuneata*	0–15	–
	[illegible]	[illegible]	[illegible]	[illegible]	

	nineanther prairie clover	DAEN	*Dalea enneandra*	0–15	–
	roundhead lespedeza	LECA8	*Lespedeza capitata*	0–15	–
	slender lespedeza	LEVI7	*Lespedeza virginica*	0–10	–
	purple prairie clover	DAPUP	*Dalea purpurea var. purpurea*	0–10	–
	Maryland senna	SEMA11	*Senna marilandica*	0–10	–
Shrub/Vine					
7	**Shrubs/Trees trace 2%**			50–100	
	eastern cottonwood	PODE3	*Populus deltoides*	0–150	–
	black willow	SANI	*Salix nigra*	0–100	–
	false indigo bush	AMFR	*Amorpha fruticosa*	0–100	–
	willow baccharis	BASA	*Baccharis salicina*	0–50	–
	common buttonbush	CEOC2	*Cephalanthus occidentalis*	0–50	–
	roughleaf dogwood	CODR	*Cornus drummondii*	0–50	–
	prairie rose	ROAR3	*Rosa arkansana*	0–25	–
	leadplant	AMCA6	*Amorpha canescens*	0–25	–

Animal community

Wildlife

The Saline Lowland site with its scattered dense growth of alkali or prairie cordgrass, cattail, and bulrush provides excellent winter escape cover and spring nesting sites when in good condition. This is especially true for waterfowl when adjacent natural basins or potholes are in a wet cycle. Small birds such as the elusive marsh and sedge wrens nest in this habitat as does the more common red-winged blackbird. The northern harrier or “marsh hawk” is a common sight soaring low overhead in its distinctive hunting style.

Game animals such as the white-tailed deer, turkey, pheasant, and northern bobwhite quail use this site. Pheasant will use the site as escape cover. Both pheasants and waterfowl will use it for loafing areas.

Raccoon and mink frequent this site. The fox and coyote, along with the bobcat, are the larger predators found here.

Numerous species of amphibians, frogs and toads, can be found on this site, as well as many species of snakes such as the plains garter snake and the massasauga, the smallest rattlesnake in Kansas.

Other wildlife species may be attracted to the site for its mineral content depending upon the salinity and alkalinity of the area.

Some animals are important because of their threatened and endangered status and require special consideration. Please check the Kansas Department of Wildlife and Parks and Tourism (KDWPT) website at www.ksoutdoors.com for the most current listing for your county.

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 preference of plant species or grazing system, and site grazeability 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 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

Following are the estimated withdrawals of freshwater by use in MLRA 74: Public supply—surface water, 6.6%; ground water, 5.7%; Livestock—surface water, 0.3%; ground water, 4.2%; Irrigation— surface water, 70.7%; ground water, 0.5%; Other—surface water, 12.0%; ground water, 0.0%.

The total withdrawals average 210 million gallons per day (795 million liters per day). About 10 percent is from ground water sources, and 90 percent is from surface water sources. If moisture is carefully conserved, the moderate precipitation generally is adequate for crops and pasture. The surface water is generally suitable for most uses with appropriate treatment. Water is stored in reservoirs outside this area for public supply, industry, and irrigation within this area. Some in-stream diversions also are used.

Saltine soils are hydrologic group C soils. These are deep, poorly to somewhat poorly drained soils. They have moderately slow permeability. Please refer to the NRCS National Engineering Handbook Section 4 (NEH-4) for runoff quantities and hydrologic curves when making hydrology determinations.

Recreational uses

This site provides opportunities for a variety of outdoor activities which might include bird watching, hiking, outdoor and wildlife photography, and hunting. It is an attractive area to many amateur naturalists because of the unique salt-tolerant plant communities and individual plant species found. This site is subject to both wind and water erosion when mismanaged.

Wood products

No wood products are normally produced on this site.

Other products

None

Other information

Site Development and Testing Plan

This site went through the approval process.

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-trained personnel were used extensively to develop this ecological site description.

NRCS contracted the development of MLRA 79 ESDs in 2005. Extensive review and improvements were made to those foundational ESDs in 2017-2018 which provided an approved product.

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Contributors

Chris Tecklenburg

Approval

David Kraft, 10/04/2019

Acknowledgments

The ecological site development process is a collaborative effort, conceptual in nature, dynamic, and is never considered complete. I thank all those who set the foundational work in the mid-2000s in regard to this ESD. I thank all those who contributed to the development of this site. In advance, I thank those who would provide insight, comments, and questions about this ESD in the future.

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)	Chris Tecklenburg/Revision 12-12-2018 David Kraft, John Henry, Doug Spencer and Dwayne Rice/original authors 1-15-2005.
Contact for lead author	State Rangeland Management Specialist for Kansas.
Date	10/03/2019
Approved by	Chris Tecklenburg
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** No natural rill formation common or part of the Saline Lowland ecological site.

2. **Presence of water flow patterns:** There are no water flow patterns evidenced by litter, soil, or gravel redistribution, or pedestalling of vegetation or stones that break the flow of water as a result of overland flow.

3. **Number and height of erosional pedestals or terracettes:** There is no evidence of pedestals or terracettes that would indicate the movement of soil by water and/or by wind on this 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. It is the remaining ground cover after accounting for ground surface covered by vegetation (basal and canopy [foliar] cover), litter, standing dead vegetation, gravel/rock, and visible biological crust (e.g., lichen, mosses, algae).

5. **Number of gullies and erosion associated with gullies:** No evidence of accelerated water flow resulting in downcutting of the soil.

6. **Extent of wind scoured, blowouts and/or depositional areas:** No wind-scoured or blowout areas where the finer particles of the topsoil have blown away, sometimes leaving residual gravel, rock, or exposed roots on the soil surface. Also, there are no areas of redeposited soil onto this site from another site due to the wind, i.e., depositional areas.

7. **Amount of litter movement (describe size and distance expected to travel):** No evidence of litter movement (i.e., dead plant material that is in contact with the soil surface).

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surfaces may be stabilized by soil organic matter which has been fully incorporated into aggregates at the soil surface, adhesion of decomposing organic matter to the soil surface, and biological crusts. A soil stability kit will score a range from 5-6.

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

   Ap--0 to 15 centimeters (0 to 6 inches); grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; slightly hard, friable; few very fine roots; sodium adsorption ratio of 16; electrical conductivity of 3.53 dS/m; neutral; clear smooth boundary. (0 to 15 centimeters (0 to 6 inches) thick).

   An--15 to 33 centimeters (6 to 13 inches); very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; moderate fine granular structure; very hard, very firm; sodium adsorption ratio of 16; electrical conductivity of 3.53 dS/m; few fine roots; neutral; clear wavy boundary. (0 to 25 centimeters (0 to 10 inches) thick).

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Functional and structural groups have not changed that inhibits the capture and storage of precipitation.

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 a compacted soil layer less than 6 inches from the soil surface. Soil structure is similar to that described in Indicator 9. Compacted physical features will include platy, blocky, dense soil structure over less dense soil layers, horizontal root growth, and increase bulk density (measured by weighing a known volume of oven-dry soil).

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: Group 1 Tallgrass dominant 54% 2700 lbs.; prairie cordgrass 1000-1250, alkali sacaton 350-600, switchgrass 150-415, Indiangrass 100-300, composite dropseed 50-100, big bluestem 25-250

    Sub-dominant: Group 2 Midgrass subdominant 20% 1000 lbs.; saltgrass 600-1040, little bluestem 0-100
    Group 3 Cool-season subdominant 12% 600 lbs.; western wheatgrass 300-500, Scribner's rosette grass 10-50, Canada wildrye 0-50

    Other: Group 4 Sedges and rushes minor 5% 250 lbs.; sege 75-125, prairie wedgscale 50-125, Torrey's rush 50-80, common spikerush 20-80, common threesquare 20-80, yellow nutsedge 10-50, broadfruit bur-reed 0-40
    Group 5 Shortgrasses trace 2% 100 lbs.; blue grama 0-50, buffalograss 0-50

    Additional: Group 6 Forbs minor 5% 250 lbs.
    Group 7 Shrubs and Trees trace 2% 100 lbs.

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Recruitment of plants is occurring and there is a mixture of many age classes of plants. The majority of the plants are alive and vigorous. Some mortality and decadence is expected for the site, due to drought, unexpected wildfire, or a combination of the two events. This would be expected for both dominant and subdominant groups.

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.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** All species (e.g., native, seeded, and weeds) alive in the year of the evaluation, are included in the determination of total above ground production. Site potential (total annual production) ranges from 4,000 lbs in a below-average rainfall year and 6,000 lbs in an above-average rainfall year. The representative value for this site is 5,000 lbs production per year.

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:** The number and distribution of tillers or rhizomes is assessed on perennial plants occupying the evaluation area. No reduction in vigor or capability to produce seed or vegetative tillers given the constraints of climate and herbivory.
