USDA Natural Resources Conservation Service

Ecological site R079XY120KS
Saline Subirrigated

Last updated: 9/21/2018
Accessed: 05/10/2025

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.

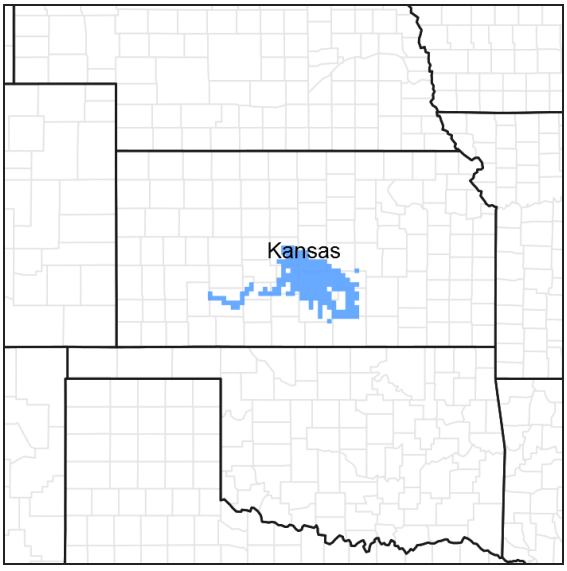


Figure 1. Mapped extent

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): 079X–Great Bend Sand Plains

MLRA 79 is entirely in Kansas. It makes up about 7,405 square miles (19,185 square kilometers). Great Bend, Hutchinson, and Wichita are in this MLRA. U.S. Highways 50, 54, and 56 cross the area. The western part of McConnell Air Force Base and the Quivira National Wildlife Refuge are in this area.

Following are the various kinds of land use in this MLRA: Cropland-private, 67%; Grassland-private, 23%; Federal, 1%; Forest-private, 1%; Urban development-private, 5%; Water-private, 1%; Other-private, 2%.

Nearly all of this area is in farms or ranches. Most of the area is cropland. Cash-grain farming is the principal enterprise. Hard winter wheat is the major crop, but grain sorghum and alfalfa also are grown. The grassland in the area consists of sandy soils and steeply sloping areas. It supports native grasses grazed by beef cattle.

The major soil resource concerns are the hazards of wind and water erosion, maintenance of the content of organic matter in the soils, and soil moisture management. The major management concerns on grassland are plant health and vigor, and control of noxious and invasive weeds.

Conservation practices on cropland generally include high residue crops in the cropping system; systems of crop

residue management, such as no-till and strip-till systems; conservation crop rotations; wind stripcropping; and nutrient and pest management. Conservation practices on rangeland generally include brush management, prescribed burning, control of noxious weeds, pest management, watering facilities, and proper grazing use.

Classification relationships

Major land resource area (MLRA): 079-Great Bend Sand Plains

Ecological site concept

The Saline Subirrigated ecological site (R079XY120) is made up of poorly drained to somewhat poorly drained and very deep soils. These soils have a seasonal or perennial high water table greater than 2 feet and less than 6 feet from the surface. This site has a high concentration of salts that include a sodium absorption ratio (SAR) of greater than 13 at depths greater than 7 inches from the soil surface. Generally this site is located on floodplains and stream terraces in major river valleys.

Associated sites

R079XY113KS	**Loamy Floodplain** The Loamy Floodplain ecological site sits adjacent to and in conjunction with the Saline Subirrigated site. This site occurs on nearly level or gently sloping alluvial lands that are subject to flooding. The Loamy Floodplain soils do not have a seasonal or perennial high water table that is less than 6 feet from the surface. This site is well drained.
R079XY132KS	**Subirrigated** This site sits adjacent to and in conjunction with the Saline Subirrigated site. The Subirrigated ecological site is characterized by somewhat poorly drained soils that have a seasonal or perennial high water table greater than 2 feet and less than 6 feet from the surface. This site is located on floodplains and interdunes. The Subirrigated site occurs on level to nearly level eolian and alluvial lands usually adjacent to major streams.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

Most of MLRA 79 is located in the Plains Border Section of the Great Plains Province of the Interior Plains. The eastern third is in the Osage Plains Section of the Central Lowland Province of the Interior Plains. The undulating to rolling plains in this area generally have narrow valleys, but broad flood plains and terraces are along the Arkansas River and its larger tributaries. Elevation ranges from 1,650 to 2,600 feet (505 to 795 meters), increasing from east to west.

The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA is as follows: Middle Arkansas (1103), 82 percent, and Arkansas-Keystone
(1106), 18 percent. The Arkansas River bisects the northern part of this MLRA, and the Ninnescah River crosses the southern part. In this MLRA, Rattlesnake Creek flows north and the Little Arkansas River flows south into the Arkansas River.

The Saline Subirrigated ecological site consists of very deep, poorly drained to somewhat poorly drained soils. These are saline-alkali soils that formed in alluvial sediments. This site occurs on nearly level floodplains and stream terraces of major stream valleys.

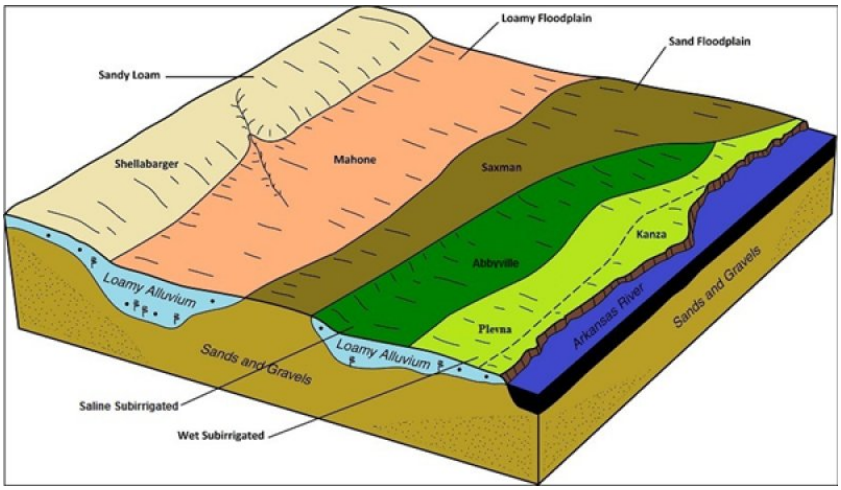


Figure 2.

Table 2. Representative physiographic features

Landforms	(1) Terrace (2) Flood plain
Flooding duration	Very brief (4 to 48 hours) to long (7 to 30 days)
Flooding frequency	None to occasional
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	1,650–2,600 ft
Slope	0–2%
Ponding depth	0–12 in
Water table depth	24–72 in
Aspect	Aspect is not a significant factor

Climatic features

The average annual precipitation in MLRA 79 is 25 to 33 inches (635 to 840 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 ranges from about 14 inches (35 centimeters) in the southern part of the area to 20 inches (50 centimeters) in the northern part. The average annual temperature is 55 to 57 degrees F (13 to 14 degrees C). The freeze-free period averages 197 days, increasing in length from northwest to southeast. 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 derives from the Natural Resources Conservation Service (NRCS) National Water and Climate Center. The dataset is from 1981-2010.

Table 3. Representative climatic features

Frost-free period (average)	182 days
Freeze-free period (average)	199 days
Precipitation total (average)	31 in

Climate stations used

- (1) GREAT BEND [USC00143218], Great Bend, KS
- (2) HUDSON [USC00143847], Hudson, KS
- (3) HUTCHINSON [USC00143929], Hutchinson, KS
- (4) HUTCHINSON 10 SW [USC00143930], Hutchinson, KS
- (5) WICHITA [USW00003928], Wichita, KS
- (6) STERLING [USC00147796], Sterling, KS

Influencing water features

The soils on this site are somewhat poorly to poorly drained. Permeability is moderately slow to slow. Normally the water table occurs between 2-6 feet below the soil surface during the growing season. The Saline Subirrigated ecological site is commonly flooded.

Soil inclusions with this wetland type may occur within this site.

Stream Types:
(Rosgen System) C6, F6, and E6 are potential stream types found on this site. The C6 stream type is slightly entrenched, meandering, silt-and clay- dominated, riffle-pool channel with a well developed flood plain. 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.

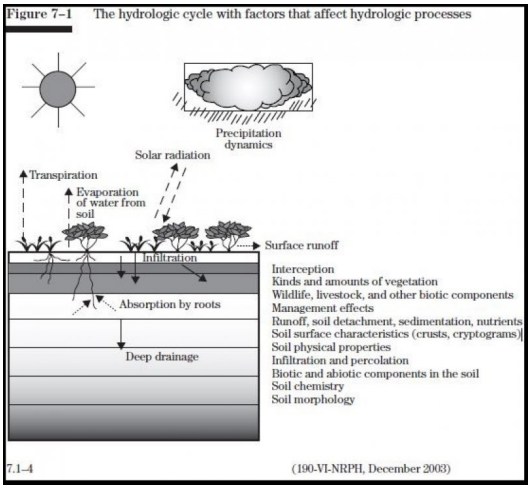


Figure 7.

Soil features

The soils representing the Saline Subirrigated ecological site are distinguished by their saline-alkali properties. These soils are deep and have loamy surface layers and the subsoils range from loamy to clayey. They commonly have a high water table, usually found between 2-6 feet below the surface during the growing season. Alkalinity and/or salinity are limitations and influence the kinds of plants found on this site as well as the annual productivity. Flooding, along with its attendant scouring and sedimentation, is the primary erosion hazard on this site.

The major soils that characterize this site include Abbyville, Buhler, Kisiwa, Ninnescah (map unit 5846), and Lesho (map unit).

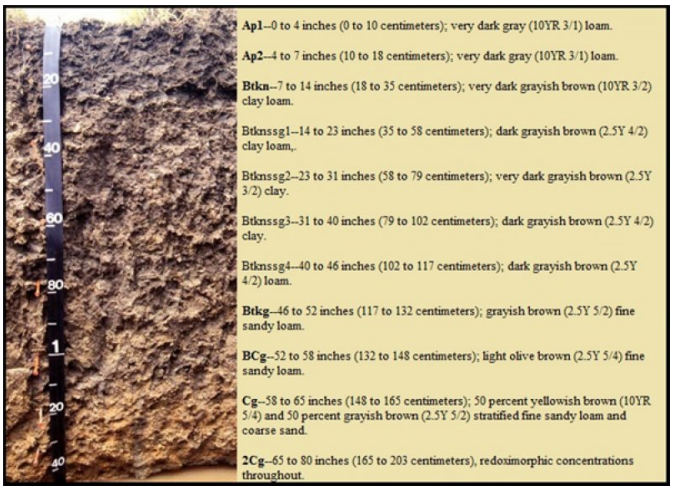


Figure 8.

Table 4. Representative soil features

Surface texture	(1) Loam (2) Sandy clay loam (3) Fine sandy loam
Family particle size	(1) Loamy
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Very slow to rapid
Soil depth	80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	6.5–10.5 in
Calcium carbonate equivalent (0-40in)	0–25%
Electrical conductivity (0-40in)	1–16 mmhos/cm
Sodium adsorption ratio (0-40in)	1–30
Soil reaction (1:1 water) (0-40in)	6.1–9
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

This is a dynamic plant community due to the complex interaction of many ecological processes. The vegetation evolved under a diverse and fluctuating climate on fragile soils, while grazed by herds of large herbivores and periodically subjected to intense wildfires.

These are deep, nearly level, somewhat poorly drained, saline and alkali soils on low terraces bordering floodplains. The taller grasses that evolved and dominated the original plant community had deep, efficient root systems capable of utilizing moisture that was nearly always within 2 to 5 feet of the surface. Seed heads of the major grasses often reach 6-7 feet in height.
Runoff is moderate, and the site may flood three or more times per year. The Saline Subirrigated ecological site can

be productive except where inhibited by high salt or sodium concentrations.

The Saline Subirrigated ecological site developed with occasional fires playing an important role in ecological processes. Historically, fires were infrequent and were usually started by lightning during spring and early summer thunderstorms. It is also known that early Native Americans often used fire to attract herds of migratory herbivores, especially bison. These intentional fires probably occurred more frequently than that of the natural disturbance regime. All of the dominant tallgrasses were rhizomatous, enabling them to survive the ravages of even intense wildfires and gain a competitive advantage in the plant community. By contrast, most trees and shrubs were suppressed by fire and occurred only sparsely on protected areas. Growth of forbs, especially legumes, was usually enhanced following a fire event. After a fire there was typically a substantial increase in the abundance of annual forbs as well. This increase was temporary, but may have lasted 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 but of short duration. As herds typically moved on to adjacent areas, the vegetation was afforded a period of recovery. Other grazing and feeding animals such as deer, rabbits, insects, and numerous burrowing rodents had secondary influences on plant community development.

Variations in climate had only minimal impact upon the development of the plant community due to the ever-present water table. The deeper-rooted major grasses would continue to benefit from the water table even during periods of extended drought. Occasional flooding that resulted from intense thunderstorms was usually brief in duration and the resulting inundation only temporarily affected major plants. Several of the tallgrasses, especially prairie cordgrass, had extensive rhizomes which enabled them to endure and recover from occasional siltation deposited during flood events.

Typically, growth of warm-season grasses on this site begins during the period of May 1 to May 15 and continues until mid-September. As a general rule, 70 percent of total production is completed by mid-July. This varies only slightly from year to year depending upon temperature and precipitation patterns. Cool-season grasses generally have two short growing periods, one in the fall (September and October) and again in the spring (April, May, and June).

As utilization of the area for production of domestic livestock replaced that of roaming bison herds, the ecological dynamics of the site were altered. In many areas the plant community changed from its original composition. Fencing enabled continuous grazing that in many areas led to overgrazing and accelerated changes in the vegetation. Alterations in the plant community were usually in proportion to when grazing occurred as well as its intensity. The taller grasses and forbs palatable to bison were equally relished and selected by cattle and other domestic livestock. When repeatedly overgrazed, these grasses were weakened and gradually diminished in the plant community. They were replaced by the increase and spread of less palatable midgrasses and forbs. Where the history of overgrazing by domestic livestock was more intense, even the plants that initially increased were often replaced by even less desirable, and usually lower-producing plants.

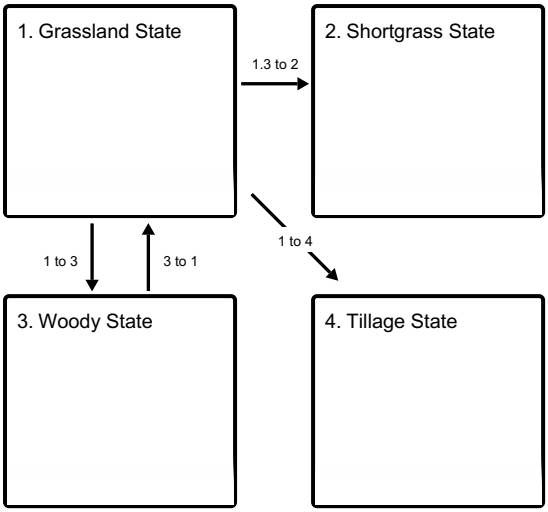
The occurrence of wildfires and the impact that fire played in maintaining the plant community was diminished with the advent of roads and cultivated fields. Use of prescribed fire as a management tool, often not an option in modern communities, also diminished. The absence of fire has contributed to a gradual increase of shrub and tree species in many areas. In some locations shrubs and trees have spread to the point they have become a major influence in the plant community.

Some areas of the site that were formerly “broken out” and farmed for many years have since been returned to the production of native plant communities. Portions of these areas were reseeded and established to a prescribed mixture of plants. Other areas were allowed to reestablish naturally without the benefit of seeding and are in various stages of plant succession.

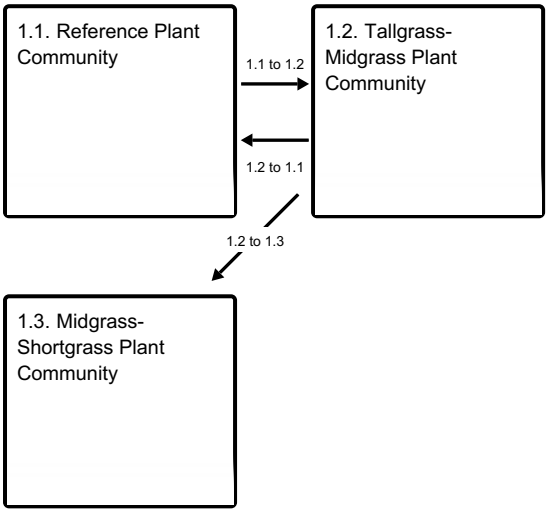
The following diagram illustrates some of the pathways that the vegetation on this site may take from the Reference Plant Community as influencing ecological factors change. There may be other states or plant communities not shown on the diagram.

State and transition model

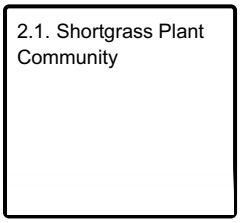
Ecosystem states



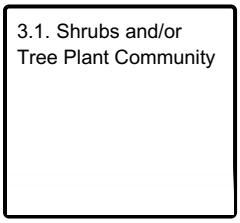
State 1 submodel, plant communities



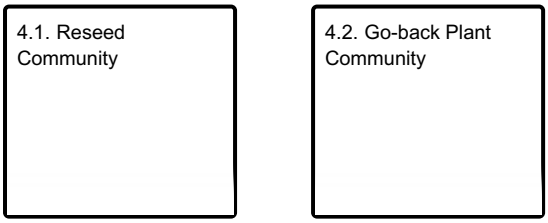
State 2 submodel, plant communities



State 3 submodel, plant communities



State 4 submodel, plant communities



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 Subirrigated 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 a result 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 Tallgrass-Midgrass community is made up primarily of warm-season midgrasses with an interspersed cool-season component and decreasing amounts of forbs and tallgrasses. The Midgrass/Shortgrass Plant Community is dominated by less desirable midgrasses, shortgrasses, and cool-season midgrasses.

Community 1.1
Reference Plant Community

The interpretive plant community for this site is the Reference Plant Community and represents the original plant community that existed prior to European settlement. The site is characterized as a grassland, essentially free of trees and large shrubs. It is dominated by tall, warm-season grasses including big bluestem, prairie cordgrass, switchgrass, Indiangrass, and inland saltgrass. The major midgrasses are alkali sacaton and composite dropseed. Combined, these grasses will account for 70 percent of vegetation produced annually. Other prevalent midgrasses are Canada wildrye, composite dropseed, sand dropseed, and Scribner's rosette grass. Scattered throughout are minor amounts of shortgrasses consisting of blue grama and buffalograss. The site supports a variety of legume and forb species which are interspersed throughout the grass sward. These include sessileleaf ticktrefoil, prairie bundleflower, Maximilian sunflower, and common sunflower. Other important forbs include Missouri goldenrod, Cuman ragweed, white heath aster, and Pennsylvania smartweed. Leadplant and false indigo bush are low-growing shrubs that occur over the site. Unlike most shrubs, these plants are both quite tolerant to fire. A few large clumps of common buttonbush, willow baccharis, and roughleaf dogwood may also be found. This can be maintained as a stable plant community when adequately managed. A prescribed grazing program that incorporates periods of deferment during the growing season benefits the tallgrasses and even the more palatable forb species.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	3700	4470	4800
Forb	200	380	800
Shrub/Vine	100	150	400
Total	**4000**	**5000**	**6000**

Community 1.2
Tallgrass-Midgrass Plant Community

The composition of this plant community is similar to that of the Reference Plant Community. Comparatively, there has been a slight decrease of the more palatable tallgrasses, and forbs and a subsequent increase in midgrasses. The dominant grasses are prairie cordgrass and alkali sacaton with lesser amounts of switchgrass and Indiangrass. A number of midgrasses have increased in abundance as the taller grasses have been reduced by overgrazing. These include inland saltgrass, western wheatgrass, and composite dropseed. Other secondary grasses are sideoats grama, buffalograss, blue grama, and Scribner's rosette grass. Combined, these secondary grasses comprise 20-30 percent of the total herbage produced annually. Forbs such as Maximilian sunflower, roundhead lespedeza, prairie bundleflower, and Maryland senna have been partially replaced by Cuman ragweed, Fendler's aster, and curled dock. Forb species produce 10-12 percent of the total herbage. This site supports a few shrubs. Leadplant and indigobush amorpha may be scattered throughout the site. Common buttonbush and roughleaf dogwood are common and usually found in small clumps or mottes. Shrubs usually will not comprise over 10 percent of the total production. Periods of deferment from grazing are essential in maintaining this as a stable plant community. Indiangrass is preferred and readily selected and grazed by cattle. When the site is grazed continuously throughout the growing season, it is usually overgrazed and thus maintained in a state of low vigor. This results in

its gradual reduction in abundance over time. Where this occurs, sideoats grama and western wheatgrass replace the taller grasses. Total annual production ranges from 3,500-6500 pounds of air-dry vegetation per acre and averages about 5,000 pounds. Prescribed grazing that incorporates periods of deferment during the growing season will improve the vigor and gradual recovery of the more palatable tallgrasses and forbs.

Community 1.3
Midgrass-Shortgrass Plant Community

Midgrass-Shortgrass Plant Community developed as a result of many years of continuous overgrazing. Midgrasses dominate the site and comprise 60-70 percent of the annual production. Most abundant midgrasses include alkali sacaton, composite dropseed, and inland saltgrass. Shortgrasses such as buffalograss and blue grama produce 10-15 percent of the vegetation. Remnant plants of Indiangrass, switchgrass, and sideoats grama, although sparse, are often found scattered throughout the site. These plants are usually grazed repeatedly and remain in a low state of vigor. Of these remnants, switchgrass is generally the most abundant. When in this state, new growth consisting of 3-5 leaves will emerge in a prostate position rather than upright, allowing it to partially escape grazing. These remnants respond favorably to periods of rest from grazing and may regain vigor in 2-3 years. Forb production is quite variable and may range from 20-40 percent of the total vegetation depending upon the amounts and timing of rainfall and flooding. Perennial forbs include Carruth's sagewort, white sagebrush, red sorrel, curled dock, purple poppymallow, and Cuman ragweed. Annual forbs common on the site include common sunflower, broom snakeweed, and annual ragweed. In some locations shrubs such as common buttonbush and roughleaf dogwood comprise 20-40 percent of the vegetation. Total annual production ranges from 2,000-5,000 pounds of air-dry vegetation per acre and averages about 3,500 pounds. 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.

Pathway 1.1 to 1.2
Community 1.1 to 1.2

The following describes the mechanisms of change from Plant Community 1.1 to Plant Community 1.2. These mechanisms include management controlled by repetitive heavy use, no rest or recovery of the key forage species, and/or no forage and animal balance for many extended grazing seasons. This type of management for periods greater than ten years will shift functional and structural plant group dominance toward Plant Community 1.2.

Pathway 1.2 to 1.1
Community 1.2 to 1.1

The following describes the mechanisms of change from Plant Community 1.2 to Plant Community 1.1. Management (10-15 years) that includes adequate rest and recovery of the key forage species (big bluestem, switchgrass, and Indiangrass) 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 Burning
Prescribed Grazing

Pathway 1.2 to 1.3
Community 1.2 to 1.3

The following describes the mechanisms of change from Plant Community 1.2 to Plant Community 1.3. Long term (>10 years) management that includes continuous, heavy use of the native vegetation. Management is void of a forage and animal balance. Inadequate rest and recovery of native grasses during the growing season.

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. Species diversity has been reduced further. Water infiltration is reduced and runoff is increased due to the sod nature of the blue grama and buffalograss. Specific dynamic soil property changes between the Grassland State and the Shortgrass State has been documented. As plant community cover decreases from bunchgrasses to more of the sodgrasses, there is a decrease in infiltration and interception and an increase in surface runoff (Thurow T., 2003).

Community 2.1
Shortgrass Plant Community

The Shortgrass Plant Community developed as a result of many years of continuous overgrazing. Shortgrasses dominate the site and comprise 40-70 percent of annual production. Most abundant shortgrasses include inland saltgrass, blue grama, sand dropseed, buffalograss, and mat sandbur. Remnant plants of big bluestem, Indiangrass, and switchgrass are very sparse and scattered. They persist in a low state of vigor, often being semi-dormant or dormant. Forb production is variable and may range from 30-60 percent. Perennial forbs include Carruth's sagewort, common yarrow, wavyleaf thistle, Canadian horseweed, and Cuman ragweed. Annual forbs include common sunflower, broom snakeweed, and annual ragweed. Total annual production ranges from 1,000-3,500 pounds of dry vegetation per acre and averages about 2000 pounds. Where remnant tallgrasses persist, total rest from grazing or a prescribed grazing period can result in a significant increase in switchgrass, with lesser increases in big bluestem and Indiangrass.

State 3
Woody State

This state is dominated by a shrub and/or tree plant community. The increase and spread of shrubs and trees results from an absence of fire. Woody plants can increase up to 34 percent from a lack of fire according to a study from 1937 to 1969, in contrast to a 1 percent increase on burned areas (Bragg and Hulbert, 1976). Periodic burning tends to hinder the establishment of most woody species and favors forbs and grasses. However, it should be pointed out that not all unburned areas have a woody plant invasion. Hydrologic function is affected by the amount of vegetative cover. Canopy interception loss can vary from 25.4 percent to 36.7 percent (Thurow and Hester, 1997). A small rainfall event is usually retained in the foliage and does not reach the litter layer at the base of the tree. Only when canopy storage is reached and exceeded does precipitation fall to the soil surface. Interception losses associated with the accumulation of leaves, twigs, and branches at the base of trees are considerably higher than losses associated with the canopy. The decomposed material retains approximately 40 percent of the water that is not retained in the canopy (Thurow and Hester, 1997). Soil properties affected include biological activity, infiltration rates, and soil fertility. Special planning will be necessary to assure that sufficient amounts of fine fuel are available to carry fires with enough intensity to control woody species. In some locations the use of chemicals as a brush management tool may be desirable to initiate and accelerate this transition. Birds, small mammals, and livestock are instrumental in the distribution of seed and accelerating the spread of most tree and shrubs common to this site. The speed of encroachment varies considerably and can occur on both grazed and non-grazed pastures. Many species of wildlife, especially bobwhite quail, turkey, and white-tailed deer, benefit from the growth of trees and shrubs for both food and cover. When management for specific wildlife populations is desirable, these options should be considered in any brush management plan.

Community 3.1
Shrubs and/or Tree Plant Community

This plant community is dominated by shrubs consisting primarily of indigobush amorpha, common buttonbush, and Great Plains false willow. Roughleaf dogwood occurs in some locations. Trees, primarily saltcedar and Russian olive, have invaded and become established in isolated areas after being introduced to the site. Shrubs and trees combined may comprise 40-60 percent of the total vegetation. The spread of shrubs and trees results from the longtime absence of fire because periodic burning tends to hinder the establishment of most of these woody species and favors forbs and grasses. Birds and small mammals also play a role in the encroachment of woody species, distributing seed and accelerating the spread of shrubs and trees over the site. Encroachment may be on areas subjected to longterm continuous overgrazing. In these situations the associated grasses will usually consist of inland saltgrass, western wheatgrass, blue grama, and buffalograss. Shrubs also will invade and spread on areas where both grazing and fire have been excluded for many years. Grass production is significantly reduced because

of competition from shrubs. Grass yields vary from 20-40 percent of the total vegetative production. Forbs generally produce 20-40 percent of the total. Major forbs include curly dock and Cuman ragweed. Total annual production ranges from 1,200-3,000 pounds of air-dry vegetation per acre and averages about 1,800 pounds. Usually, a prescribed burning program accompanied by prescribed grazing will gradually return the plant community to one dominated by grasses and forbs. Special planning will be necessary to assure that sufficient amounts of fine fuel are available to carry fires with enough intensity to control woody species. Careful planning and execution of prescribed burning can result in brush control, reversal of grazing patterns, enhanced animal performance, and increased browse availability for deer. In some locations, use of chemicals as a brush management tool will be necessary to initiate and accelerate this transition.

State 4
Tillage State

The Tillage State consists of abandoned cropland that has been naturally revegetated (go-back) or planted/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). This is an alternative state since 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).

Community 4.1
Reseed Community

The Reseeded Plant Community occurs on areas that were formerly farmed. When farming operations ended, the area was seeded and established to a mixture of plants, usually native species commonly found in the Reference Plant Community. Most seeding mixtures consisted of a blend of grasses that included big bluestem, Indiangrass, switchgrass, and little bluestem. In some locations seed of additional plants such as alkali sacaton, prairie bundleflower, and Maximilian sunflower were included in the mixture. Once these areas become fully established, production is comparable to that of the Reference Plant Community. Total annual production ranges from 5,000-8,000 pounds of air-dry vegetation per acre and averages 6,500 pounds. 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 the plants on native rangeland areas. Thus, reseeded plant communities should be managed as separate pastures or units when feasible. These areas are generally productive when managed for hay production. Some seeded areas are invaded by trees and shrubs during the establishment period of the desired plants. These invader species commonly include Siberian elm, eastern redcedar, saltcedar, Russian olive, and Great Plains false willow. Occasional burning is effective in controlling the establishment of these woody plants.

Community 4.2
Go-back Plant Community

The Go-back Plant Community occurs on areas that were formerly farmed. When tillage operations were discontinued, the areas were allowed to revegetate or “go back” naturally. This was in contrast to artificial reseeding with selected species or a group of species. This is a slow, gradual process that entails 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, Canadian horseweed, common sunflower, Mexican fireweed (Kochia scoparia), lambsquarter (*Chenopodium album*), and broom snakeweed. Gradually these are replaced by annual grasses including prairie threeawn, prairie cupgrass (*Eriochloa contracta*), little barley (*Hordeum pusillum*), cheatgrass (*Bromus tectorum*), and fall panicgrass (*Panicum dichotomiflorum*). Usually plant succession will progress until the plant community is dominated by perennial grasses and grasslike plants including composite dropseed, alkali sacaton, foxtail barley (*Hordeum jubatum*), silver beardgrass, inland saltgrass, Texas dropseed (*Sporobolus texanus*), and buffalograss. These plants can form a stable community. In time, and with prescribed grazing management other perennial grasses and forbs common in the Reference Plant Community return to the site. Some go-back areas are invaded by trees and shrubs. The more

common invaders include Siberian elm, common hackberry, eastern redcedar, saltcedar, Russian olive, and Great Plains false willow. Occasional burning is effective in controlling these woody plants. Total annual production ranges from 3,000-5,000 pounds of air-dry vegetation per acre and averages about 4,000 pounds. Many species of wildlife, especially bobwhite quail and white-tailed deer, benefit from the growth of shrubs, both for food and as cover. When wildlife populations are a desirable component, this should be a consideration in any brush management plan.

Transition 1.3 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. Ecological processes affected are the hydrologic and nutrient cycles. There is an increase in evaporation rate, runoff, and in bulk density. There is a decrease in infiltration, plant composition change, and the functional and structural groups have shifted 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

Changes from a Grassland State to a Woody State lead to changes in hydrologic function, forage production, dominant functional and structural groups, and wildlife habitat. Understory plants may be negatively affected by trees and shrubs by a reduction in light, soil moisture, and soil nutrients. Increases in tree and shrub density and size have the effects of reducing understory plant cover and productivity, and desirable forage grasses often are most severely reduced (Eddleman, 1983). As vegetation cover changes from grasses to trees, a greater proportion of precipitation is lost throughout interception and evaporation; therefore, less precipitation is available for producing herbaceous forage or for deep drainage or runoff (Thurow and Hester, 1997). Tree and shrub establishment becomes increasingly greater while fine fuel loads decrease. As trees and shrubs increase at levels of greater than 20 percent canopy cover, the processes and functions that allow the Woody State to become resilient are active and dominate over the processes and systems inherent of the Grassland State. Using prescribed fire as a standalone management tool is unsuccessful to eradicate the trees and shrubs due to a lack of fine fuel loads.

Transition 1 to 4
State 1 to 4

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. 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.

Restoration pathway 3 to 1
State 3 to 1

Restoration efforts will be costly, labor-intensive, and can take many years, if not decades, to return to a Grassland State. Once canopy levels reach greater than 20 percent, estimated cost to remove trees is very expensive and includes high energy inputs. The technologies needed in order to go from an invaded Woody State to a Grassland State include but are not limited to: prescribed burning—the use of fire as a tool to achieve a management objective on a predetermined area under conditions where the intensity and extent of the fire are controlled; brush management—manipulating woody plant cover to obtain desired quantities and types of woody cover and/or to reduce competition with herbaceous understory vegetation, in accordance with overall resource management objectives; and prescribed grazing—the controlled harvest of vegetation with grazing or browsing animals managed with the intent to achieve a specified objective, and to manage grazing intensity to maintain enough cover to protect the soil and maintain or improve the quantity and quality of desirable vegetation. When a juniper tree is cut and removed, the soil structure and the associated high infiltration rate may be maintained for over a decade (Hester, 1996). This explains why the area near the dripline usually has substantially greater forage production for many years after the tree has been cut. It also explains why runoff will not necessarily dramatically increase once juniper

is removed. Rather, the water continues to infiltrate at high rates into soils previously ameliorated by junipers, thereby increasing deep drainage potential. In rangeland, deep drainage amounts can be 16 percent of the total rainfall amount per year (Thurow and Hester, 1997).

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

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	**Grasses Dominant 53%**			1400–3000	
	prairie cordgrass	SPPE	*Spartina pectinata*	900–1890	–
	switchgrass	PAVI2	*Panicum virgatum*	600–1510	–
	saltgrass	DISP	*Distichlis spicata*	500–1130	–
	western wheatgrass	PASM	*Pascopyrum smithii*	200–755	–
	Indiangrass	SONU2	*Sorghastrum nutans*	100–380	–
	big bluestem	ANGE	*Andropogon gerardii*	100–380	–
2	**Grasses Subdominant 35%**			800–1640	
	alkali sacaton	SPAI	*Sporobolus airoides*	800–1890	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	200–755	–
	Canada wildrye	ELCA4	*Elymus canadensis*	100–380	–
	buffalograss	BODA2	*Bouteloua dactyloides*	100–380	–
	blue grama	BOGR2	*Bouteloua gracilis*	100–380	–
3	**Grasses Minor 5%**			100–380	
	cosmopolitan bulrush	BOMA7	*Bolboschoenus maritimus*	70–190	–
	sedge	CAREX	*Carex*	70–190	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	0–50	–
Forb					
4	**Forb Minor 5%**			150–380	
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	30–80	–
	Illinois bundleflower	DEIL	*Desmanthus illinoensis*	30–65	–
	sessileleaf ticktrefoil	DESE	*Desmodium sessilifolium*	20–50	–
	common sunflower	HEAN3	*Helianthus annuus*	20–50	–
	Pennsylvania smartweed	POPE2	*Polygonum pensylvanicum*	10–40	–
	Missouri goldenrod	SOMI2	*Solidago missouriensis*	10–40	–
	white heath aster	SYERE	*Symphyotrichum ericoides var. ericoides*	10–40	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	10–40	–
	purple prairie clover	DAPU5	*Dalea purpurea*	10–40	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	5–20	–
Shrub/Vine					
5	**Shrubs and Cacti Trace 2%**			0–150	
	leadplant	AMCA6	*Amorpha canescens*	0–30	–
	false indigo bush	AMFR	*Amorpha fruticosa*	0–30	–
	willow baccharis	BASA	*Baccharis salicina*	0–30	–
	common buttonbush	CEOC2	*Cephalanthus occidentalis*	0–30	–
	roughleaf dogwood	CODR	*Cornus drummondii*	0–30	–

Animal community

The plant diversity associated with the Saline Subirrigated ecological site, wetland inclusions, and the fact that it is frequently in riparian areas makes this site excellent wildlife habitat for white-tailed deer, wild turkey, bobwhite quail,

and pheasant. Furbearers such as mink, raccoon, skunk, and opossum are common, as are predators like the bobcat, coyote, and red fox. When in good to excellent condition, the site is especially valuable as winter cover for many of these same species.

A variety of birds are common to the site and may include scissortailed flycatchers, eastern and western kingbirds, brown thrasher, mourning dove, and red-winged blackbird. Hawks and owls commonly use this habitat, and bald eagles are occasional visitors. Waterfowl are commonly seen during their spring and fall migrations. Many species of amphibians (toads and frogs) along with numerous reptiles (lizards and snakes) reside on the site.

Some animals are important because of their threatened and endangered status and require special consideration. Please check the Kansas Department of Wildlife and Parks (KDWP) 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, and/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

These have a high water table which normally varies from 2-6 feet below the soil surface. Runoff potential for this site is very low to high.

Following are the estimated withdrawals of freshwater by use in MLRA 79:
Public supply—surface water, 6.8%; ground water, 4.0%; Livestock—surface water, 0.4%; ground water, 1.2%; Irrigation—surface water, 0.7%; ground water, 80.6%; Other—surface water, 2.0%; ground water, 4.3%.

The total withdrawals average 740 million gallons per day (2,800 million liters per day). About 90 percent is from ground water sources, and 10 percent is from surface water sources. The source of water for crops and pasture is the moderate, somewhat erratic precipitation. In the northern part of the area, the Arkansas River is a potential source of irrigation water, but it currently is little used for this purpose. The Ninnescah River is another potential source of surface water in the area. Deep sand in the High Plains or Ogallala aquifer yields an abundance of good-quality ground water. This aquifer provides water primarily for irrigation, but also for domestic supply and livestock in rural areas, and for industry and public supply in Wichita and in other towns and cities in the MLRA. The ground water in this aquifer has the lowest levels of total dissolved solids of any aquifer in Kansas; 340 parts per million (milligrams per liter).

Recreational uses

This site is very desirable for outdoor recreational pursuits because of its plant and wildlife diversity. Big game, white-tailed deer, and wild turkey are abundant and commonly hunted on this site, along with a wide variety of small game such as pheasant, quail, rabbits, squirrels, and raccoons. In addition, this site provides opportunities for bird watching, hiking, outdoor/wildlife photography, and a variety of other outdoor activities. There are a wide variety of plants in bloom throughout the growing season that provide much aesthetic appeal to the landscape. Recreation can be a high value use, but excessive wetness due to the prevalent high water table is a significant site consideration. Common flooding may also be a hazard.

Wood products

Eastern redcedar can reach logging size on this site.

Other products

Except for use as rangeland, wildlife habitat, and recreation, common flooding, and the relatively high alkalinity and/or salinity content of the soils can severely limit the use of this site.

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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Approval

David Kraft, 9/21/2018

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.

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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.

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Date	04/03/2018
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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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.

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

   A--0 to 8 inches (0 to 20 centimeters); dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; weak fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots throughout; 17 percent clay; noneffervescent throughout (HCl, 1 normal); moderately alkaline; abrupt smooth boundary. (2 to 9 inches thick; 5 to 23 centimeters thick.)

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. Interspacial distribution is consistent with expectation for the site.

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.

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: Grasses dominant 53% or 4,000lbs.: prairie cordgrass 900-1,890, switchgrass 600-1,510, inland saltgrass 500-1,130, western wheatgrass 200-755, big bluestem 100-380, Indiangrass 100-380

Sub-dominant: Grasses sub-dominant 35% or 2,640lbs, alkali sacaton 800-1,890, composite dropseed 200-755, blue grama 100-380, buffalograss 100-380, Canada wildrye 100-380

Other: Other grasses minor 5% 380 lbs. sedge, rush, Scribner's rosette grass
Forbs Minor 5% 380 lbs.

Additional: Shrubs trace 2% 150 lbs

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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 subdominant 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):** 5,750-9,250 lbs/acre. Representative value is 7,550 lbs/forage/acre. Below-normal precipitation during the growing season expect 5,750 lbs/forage/acre; and above-normal precipitation during the growing season expect 9,250 lbs/forage/acre. If utilization has occurred, estimate the annual production removed or expected and include this amount when making the total site production estimate.

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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:** None.

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17. **Perennial plant reproductive capability:** The number and distribution of tillers or rhizomes is assessed relative to the expected production of the perennial, warm-season, midgrasses, and shortgrasses.
