

Ecological site R079XY103KS

Choppy Sands

Last updated: 11/08/2018
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General information

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

MLRA notes

Major Land Resource Area (MLRA): 079X–Great Bend Sand Plains

MLRA 79 is located 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 is within MLRA 79. 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 used as 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 Choppy Sands ecological site is made up of well drained and very deep (60 inches) soils. These soils have more than 70 percent sand throughout the profile. There is none to very few lamellae (thin layers of higher clay content) in the soil profile. The Choppy Sands ecological site is characterized by a short, steep, and hummocky landform. Generally this site is located on strongly sloping to moderately steep dunes on paleoterraces (erosional remnant of a terrace) with slopes reaching 15 percent and greater.

Associated sites

R079XY121KS	Sand Plains The Sand Plains ecological site sits adjacent to and in conjunction with the Choppy Sands ecological site. This ecological site was formerly known as Sands R079XY021KS. The Sand Plains ecological site is made up of well drained and very deep (60 inches) soils. These soils have greater than 70 percent sand in the surface. Soils that make up the Sand Plains ecological site have a surface texture of fine sand or loamy sand. Generally this site is located on dunes on paleoterraces (erosional remnant of a terrace) with a slope range of 0 to 15 percent.
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R079XY132KS	Subirrigated This site sits adjacent to and in conjunction with the Choppy Sands 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.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Andropogon hallii</i> (2) <i>Schizachyrium scoparium</i>

Physiographic features

Most of this area is 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. The 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 Choppy Sands ecological site occurs on uplands with strongly sloping to moderately steep somewhat unstable dunes, commonly known as sandhills. Unstable sand dunes with occasional “blowouts” do occur. Langdon, Tivin, and Tivoli are the soils that characterize this site. This site consists of very deep soils with fine sand and loamy fine sand surface layers and sandy subsoils. The Choppy Sands site is very permeable and produces little or no runoff. This site is subject to high evaporation and severe erosion by wind if the vegetative cover is reduced or absent due to grazing or wildfire. This site is very fragile. Heavy use areas and trailing due to recreational vehicles or grazing pressure can lead to the creation of blowouts.

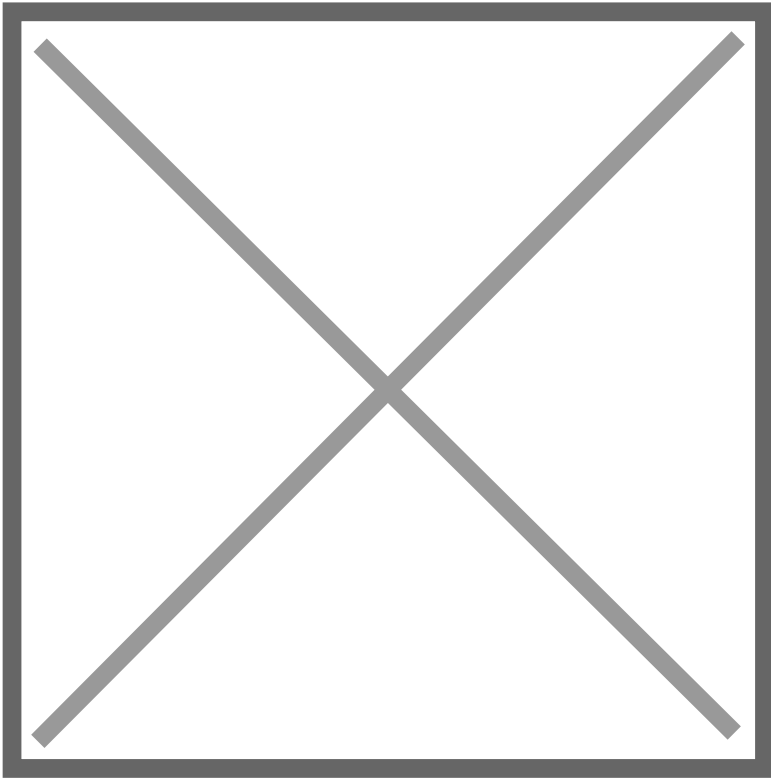


Figure 1.

Table 2. Representative physiographic features

Landforms	(1) River valley > Paleoterrace (2) River valley > Dune
Runoff class	Negligible to low
Flooding frequency	None
Ponding frequency	None
Elevation	500 – 790 m
Slope	0 – 30 %
Water table depth	200 cm
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 (characteristic range)	150-160 days
Freeze-free period (characteristic range)	190-200 days
Precipitation total (characteristic range)	690-810 mm
Frost-free period (actual range)	150-180 days
Freeze-free period (actual range)	180-200 days
Precipitation total (actual range)	660-810 mm
Frost-free period (average)	160 days
Freeze-free period (average)	190 days
Precipitation total (average)	740 mm

- (1) NORWICH [USC00145870], Norwich, KS
- (2) HUTCHINSON [USC00143929], Hutchinson, KS
- (3) GREENSBURG [USC00143239], Greensburg, KS
- (4) KINGMAN [USC00144313], Kingman, KS
- (5) PRATT [USC00146549], Pratt, KS
- (6) STERLING [USC00147796], Sterling, KS
- (7) HUDSON [USC00143847], Hudson, KS
- (8) HUTCHINSON 10 SW [USC00143930], Hutchinson, KS
- (9) KINSLEY 2E [USC00144333], Kinsley, KS

Influencing water features

These soils are well drained. Available soil moisture is low to very low. Soil permeability is rapid, so this site produces little or no runoff. This site is subject to high evaporation and severe wind erosion if the vegetative cover is reduced or absent due to grazing or wildfire.

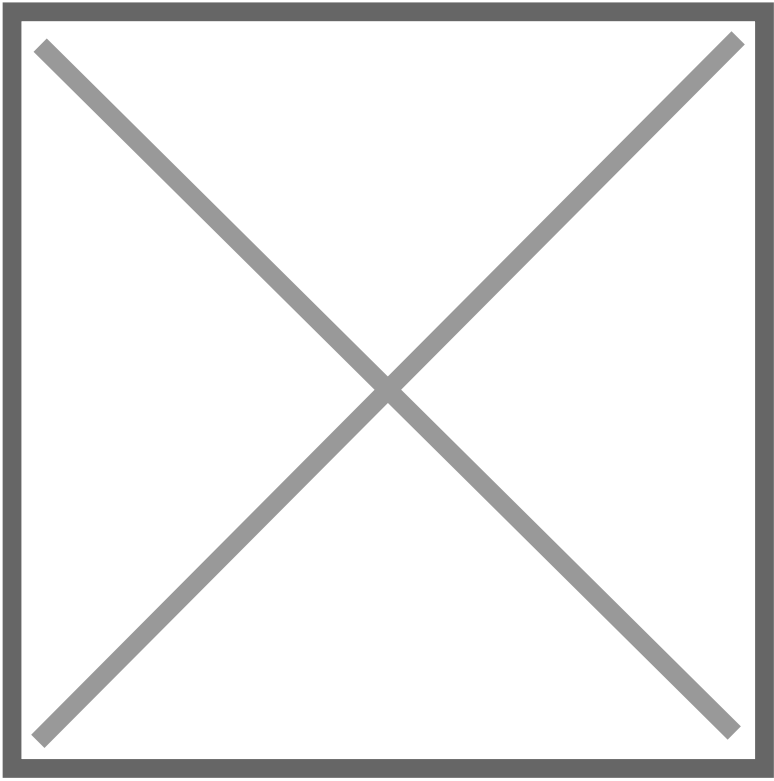


Figure 8.

Soil features

Langdon, Tivin, and Tivoli soils are found on this site. These soils are deep with a fine sand and loamy fine sand surface layer and sandy subsoils. They are excessively drained and the available water capacity is low to very low. These soils are highly susceptible to wind erosion if unprotected.

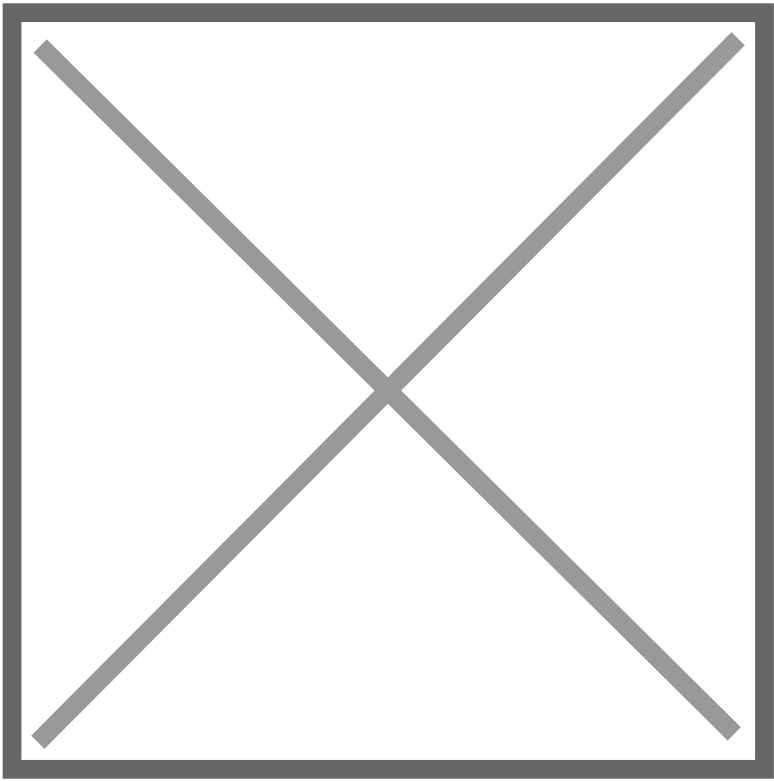


Figure 9.

Table 4. Representative soil features

Parent material	(1) Eolian sands
Surface texture	(1) Fine sand (2) Loamy fine sand
Drainage class	Somewhat excessively drained to excessively drained
Permeability class	Rapid
Soil depth	200 cm
Available water capacity (0-101.6cm)	3.81 – 15.75 cm
Calcium carbonate equivalent (0-101.6cm)	Not specified
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	5.1 – 7.8

Ecological dynamics

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

Although the deep, sandy soils characteristic of the Choppy Sands ecological site absorb water rapidly, their water-holding capacity is low and moisture slowly percolates through the profile. The taller grasses that evolved and dominated the original plant community had deep, efficient root systems capable of utilizing moisture throughout most of the profile. Because there is almost no runoff from this site, most precipitation enters the root profile. The site has the potential to be productive. Seed heads of the major grasses often reach five to six feet in height.

This site developed with occasional fires as an important part of the ecological processes. Historically fires were infrequent and were usually started by lightning that may occur at any time during the year. They usually occurred in spring and early summer months when thunderstorms were most prevalent. It is also recognized that pre-European inhabitants often used fire to attract herds of migratory herbivores, especially bison. These intentional fires probably occurred more frequently than the natural disturbance frequency. All of the dominate tallgrasses were rhizomatous. This enabled them to survive the ravages of even intense wildfires and gave them a competitive advantage in the plant community. 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 usually a substantial increase in the abundance of annual forbs. This increase was temporary, but may last 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 could be intense, but usually of short duration. Typically, as herds moved 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, especially drought cycles, also had a major impact upon the development of the plant community. Species composition fluctuated according to the duration and severity of droughts. During prolonged dry cycles many of the shallow-rooted plants died out and the production of deeper-rooted plants significantly decreased. When sufficient rainfall occurred following an extended period of dry years, annual forbs and annual grasses would temporarily occur in great abundance. As precipitation returned to normal or above normal, the deeper-rooted grasses responded quickly to production potentials.

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 on 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 site for production of domestic livestock replaced that of roaming bison herds, the ecological dynamics were altered and the plant community changed from the original composition. These changes were usually in proportion to the season and intensity of grazing livestock. A combination of drought and overgrazing accelerated these changes. The taller grasses and forbs palatable to bison were equally relished and selected by cattle. When repeatedly grazed by cattle, these grasses were weakened and gradually 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, lower-producing plants. In some areas plant cover was reduced to the point that the scouring action of wind erosion created blowouts of various sizes.

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, as did the use of prescribed fire as a management tool. In the absence of fire there has been a gradual increase of shrub species in many areas. In some areas shrubs and trees have spread to the point they have become the dominant influence in the plant community.

Blowouts can occur within any plant community on the Choppy Sands ecological site. It begins on areas where continuous overgrazing and/or trailing has reduced the protective plant cover to the point that the soil becomes subjected to wind erosion. Continued wind action will gradually result in scoured out areas, locally referred to as blowouts. These areas may range in size from a few square feet to several acres. The blowouts commonly begin on dune crests or on steeper side slopes.

A vegetative cover can often be established on smaller blowouts by management that provides adequate periods of grazing deferment during the growing season. Larger blowouts generally need more drastic measures to include long-term grazing deferment. This may entail fencing the entire blowout. Applying surface mulch may hasten recovery on larger, more severely impacted sites. Pioneer plants that occur in the initial stages of secondary plant succession include blowout grass, sand dropseed, giant sandreed, prairie threeawn, mat sandbur, purple sandgrass, winged pigweed, Drummond's snakecotton, and sleepingplant. As these plants begin to stabilize the movement of sand particles other perennial plants become established. As plant succession progresses, tall- and midgrasses eventually return to the site.

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

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Grasses Dominant 75%			1121-2102	
	sand bluestem	ANHA	<i>Andropogon hallii</i>	560-1401	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	168-420	–
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	112-280	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	112-280	–
	giant sandreed	CAGI3	<i>Calamovilfa gigantea</i>	168-280	–

	sand lovegrass	ERTR3	<i>Eragrostis trichodes</i>	56-140	–
2	Grasses Minor 10%			34-280	
	Scribner's rosette grass	DIOLS	<i>Dichanthelium oligosanthos var. scribnerianum</i>	6-22	–
	witchgrass	PACA6	<i>Panicum capillare</i>	0-22	–
	thin paspalum	PASE5	<i>Paspalum setaceum</i>	6-22	–
	blowout grass	REFL	<i>Redfieldia flexuosa</i>	0-22	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0-22	–
	giant dropseed	SPGI	<i>Sporobolus giganteus</i>	0-22	–
Forb					
3	Forbs Minor 10%			84-280	
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	0-22	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	0-22	–
	curlycup gumweed	GRSQ	<i>Grindelia squarrosa</i>	0-22	–
	prairie sunflower	HEPE	<i>Helianthus petiolaris</i>	0-22	–
	camphorweed	HESU3	<i>Heterotheca subaxillaris</i>	0-22	–
	Virginia tephrosia	TEVI	<i>Tephrosia virginiana</i>	0-22	–
	James' prairie clover	DAJA	<i>Dalea jamesii</i>	0-22	–
	silky prairie clover	DAVIV	<i>Dalea villosa var. villosa</i>	0-22	–
	bractless blazingstar	MENUN	<i>Mentzelia nuda var. nuda</i>	0-22	–
	lemon scurpea	PSLA3	<i>Psoraleidium lanceolatum</i>	0-22	–
	queen's-delight	STSY	<i>Stillingia sylvatica</i>	0-11	–
	annual buckwheat	ERAN4	<i>Eriogonum annuum</i>	0-11	–
	prairie spiderwort	TROC	<i>Tradescantia occidentalis</i>	0-11	–
	flaxflowered ipomopsis	IPLOL	<i>Ipomopsis longiflora ssp. longiflora</i>	0-11	–
	roundhead lespedeza	LECA8	<i>Lespedeza capitata</i>	0-11	–
	tenpetal blazingstar	MEDE2	<i>Mentzelia decapetala</i>	0-11	–
	plains milkweed	ASPU	<i>Asclepias pumila</i>	0-11	–
	Texas croton	CRTE4	<i>Croton texensis</i>	0-11	–
Shrub/Vine					
4	Shrubs and Cacti Minor 5%			28-140	
	sand sagebrush	ARFI2	<i>Artemisia filifolia</i>	0-28	–
	pricklypear	OPUNT	<i>Opuntia</i>	0-28	–
	American plum	PRAM	<i>Prunus americana</i>	0-28	–
	Chickasaw plum	PRAN3	<i>Prunus angustifolia</i>	0-28	–
	soapweed yucca	YUGL	<i>Yucca glauca</i>	0-28	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 3.2 plant community composition

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

Where good vegetative cover exists, upland game birds such as bobwhite quail and greater prairie chicken find this site to be suitable habitat. Big game animals such as white-tailed deer and wild turkey also utilize this rangeland habitat. Small birds like the western kingbird, grasshopper sparrow, and western meadowlark are commonly found. Small mammals such as the skunk, opossum, and cottontail are present. Soil properties on this site make it a preferred habitat for burrowing mammals such as the plains pocket gopher and badger, along with other small animals that might use the underground burrows as habitat. Predators such as foxes and coyotes are commonly found on this site, as are avian predators (e.g., hawks and owls). A variety of snakes including the bull snake and prairie rattlesnake, as well as lizards and the box turtle, frequent this site. Maintaining good to excellent vegetative cover on this site is the key to providing good wildlife habitat. In some cases, development of wildlife watering facilities in areas that are remote to natural water sources is also necessary. 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 <http://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 ESD. 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

Water is the primary factor limiting forage production on this site. Infiltration rates are high and runoff potential is low for this site. Following are the estimated withdrawals of freshwater by use in MLRA 79: Public supply—surface water, 6.8% and ground water, 4.0%; Livestock—surface water, 0.4% and ground water, 1.2%; Irrigation—surface water, 0.7% and ground water, 80.6%; Other—surface water, 2.0% and 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 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 or 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 provides opportunities for bird watching, hiking, outdoor/wildlife photography, hunting, and a variety of other outdoor activities. There are a wide variety of plants in bloom throughout the growing season, especially in those years with average and above-average rainfall, and they provide much aesthetic appeal to the landscape. This site is highly prized for use by recreational vehicles, especially dune buggies. While this can be a high value use, there are a number of site considerations because of the fragile nature of the soils and potential for severe wind erosion.

Wood products

Other than a few honeylocust and northern catalpa (*Catalpa speciosa*) post lots that were planted on this site, it produces no wood products.

Other products

Chickasaw plum and golden currant are highly prized for making jellies and jams.

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. Range Condition Guides and Technical Range Site Descriptions for Kansas, Choppy Sands, USDA, Soil Conservation Service, March, 1967. Range Site Description for Kansas, Choppy Sands, USDA-Soil Conservation Service, September, 1985. Ecological Site Description for Kansas, Choppy Sands (R079XY003KS) located in Ecological Site Information System (ESIS), 2007.

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Contributors

Chris Tecklenburg

Approval

David Kraft, 11/08/2018

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 regards 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.

Author(s)/participant(s)	Chris Tecklenburg Revision 3-27-2018 David Kraft, John Henry, Doug Spencer and Dwayne Rice Original Authors and date 2-15-2005
Contact for lead author	State Rangeland Management Specialist for Kansas located in Salina 785-823-4500.
Date	03/27/2018
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** The fine sand and loamy fine sand surface-textured soils that characterize this site have a low potential for rill formation, therefore no rills or active headcutting are present on the 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 10% 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 4-6.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Tivin OSD: A--0 to 20 centimeters (0 to 8 inches); yellowish brown (10YR 5/4), interior, fine sand, dark yellowish brown (10YR 4/4), interior, moist; single grain; loose, loose, nonsticky and nonplastic; common very fine and fine roots throughout; 1 percent clay; moderately acid; clear smooth boundary. (8 to 41 centimeters thick; 3 to 16 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 are that of the Reference Plant Community (see functional and structural group worksheet). Note changes to plant communities if different than that of the functional and structural group worksheet.

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 increased bulk density (measured by weighing a known volume of oven-dry soil).
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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**
- Dominant:** Grasses-Dominant: 75%, 1875 lbs. sand bluestem 500-1250, little bluestem 150-375, giant sandreed 150-250, switchgrass 100-250, Indiangrass 100-250, sand lovegrass 50-125.
- Sub-dominant:** Grasses-Minor: 5% 125 lbs. blue grama 10-40, hairy grama 10-40, sideoats grama 10-40 Grasses-Minor: 5% 125 lbs.
- Other:** Forbs-Minor: 10% 250 lbs. See functional/structural group sheet
- Additional:** Shrubs-Minor: 5% 125 lbs. All 0-25, Chickasaw plum, American plum, pricklypear, sand sagebrush, and yucca glauca
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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**
Recruitment of plants is occurring 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.
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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):**
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 1,700 lbs in a below-average rainfall year and 3,400 lbs in an above-average rainfall year. The representative value for this site is 2,500 lbs. production per year.
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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** There are no noxious weeds present. Invasive plants make up a small percentage of plant community, and invasive brush species are < 5% canopy.
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17. **Perennial plant reproductive capability:** Plants on-site exhibit the required vigor and growth to be able to reproduce vegetatively or by seed. Current management activities do not adversely effect the capability of plants to reproduce.
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