

Ecological site R079XY121KS

Sand Plains

Last updated: 9/21/2018
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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 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

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% 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.

Associated sites

R079XY103KS	<p>Choppy Sands</p> <p>The Choppy Sands site is located adjacent to and in conjunction with the Sand Plains ecological site. This site is characterized by sandy soils, generally with greater than 70 percent sand. Sandy eolian sediments make up the parent material of this ecological site. The slopes are generally greater than 15 percent giving a short, steep, hummocky appearance.</p>
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<p>R079XY122KS</p>	<p>Sandy Loam</p> <p>The Sandy Loam site is known to be found adjacent to and in conjunction with Sand Plains ecological site. This ecological site was formerly known as Sandy R079XY022KS. The Sandy Loam ecological site is made up of well drained and very deep (60 inches) soils. These soils have greater than 70% and less than 52% sand in the surface. Soils that make up the Sandy Loam ecological site have a sandy loam surface texture. Generally this site is located on paleoterraces (erosional remnant of a terrace) with a slope range of 0 to 15 percent.</p>
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Table 1. Dominant plant species

<p>Tree</p>	<p>Not specified</p>
<p>Shrub</p>	<p>Not specified</p>
<p>Herbaceous</p>	<p>Not specified</p>

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. 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 Sand Plains ecological site consists of very deep, well drained sand or loamy sand-textured soils. These soils formed in sandy eolian deposits over alluvium on nearly level to moderately sloping dunes on paleoterraces on river valleys. Runoff is low or very low.

Figure 1. MLRA 79 Ecological Site block diagram.

Table 2. Representative physiographic features

<p>Landforms</p>	<p>(1) Paleoterrace (2) Dune</p>
<p>Flooding frequency</p>	<p>None</p>
<p>Ponding frequency</p>	<p>None</p>
<p>Elevation</p>	<p>500 – 790 m</p>
<p>Slope</p>	<p>0 – 20 %</p>
<p>Ponding depth</p>	<p>0 cm</p>

Water table depth	0 cm
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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)	180 days
Freeze-free period (average)	200 days
Precipitation total (average)	790 mm

- (1) GREENSBURG [USC00143239], Greensburg, KS
- (2) HUTCHINSON [USC00143929], Hutchinson, KS
- (3) STERLING [USC00147796], Sterling, KS
- (4) WELLINGTON [USC00148670], Wellington, KS
- (5) KINGMAN [USC00144313], Kingman, KS
- (6) PRATT [USC00146549], Pratt, KS
- (7) HUDSON [USC00143847], Hudson, KS
- (8) HUTCHINSON 10 SW [USC00143930], Hutchinson, KS
- (9) WICHITA [USW00003928], Wichita, KS
- (10) KINSLEY 2E [USC00144333], Kinsley, KS
- (11) NORWICH [USC00145870], Norwich, KS

Influencing water features

These soils are well drained. Available soil moisture is highly variable because of the texture of the subsoil. 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.

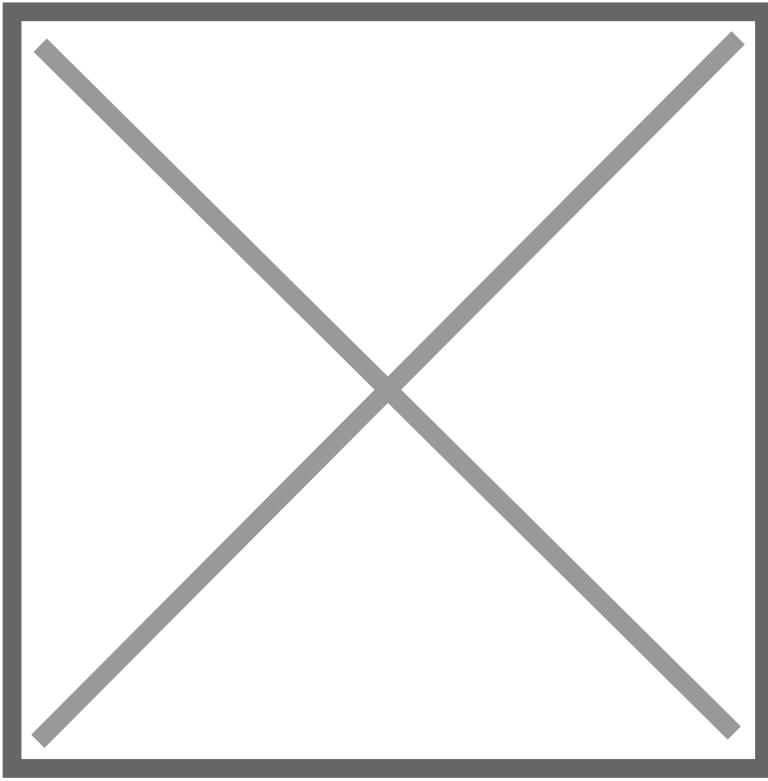


Figure 6. Fig.7-1 from National Range and Pasture Handbook.

Soil features

The soils representing the Sand Plains ecological site are well drained and very deep. The surface layer of the soils in this site consists primarily of fine sand or loamy sand. The depth of the surface layer ranges from 3 to 20 inches thick. The subsoil and underlying material have a similar texture as the surface layer, but have thin layers of higher clay content (lamellae) occurring within the subsoil. Sometimes these soils have contrasting loamy or clayey layers that may occur below 40 inches. The permeability drops to moderately slow in these contrasting layers. Soils in this site usually have low to moderate available water capacity. These soils are susceptible to erosion, primarily by wind. The potential for wind erosion increases with sandier surface textures and drier climates.

The major soils that characterize this site include Pratt and Turon.

Figure 7. Official soils description for Pratt series.

Table 4. Representative soil features

Surface texture	(1) Sand (2) Loamy sand
Family particle size	(1) Sandy
Drainage class	Well drained
Permeability class	Rapid
Soil depth	200 cm

Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	8.38 – 22.35 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)	5.6 – 7.8
Subsurface fragment volume <=3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

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.

Although the deep, sandy soils characteristic of this site absorb water rapidly, their water-holding capacity is low and moisture tends to slowly percolate through the profile. As such, the taller grasses that evolved and dominated the original plant community have deep, efficient root systems capable of utilizing moisture throughout most of the profile. There is almost no runoff from this site and most precipitation that occurs enters the soil profile. Seed heads of the major grasses often reach six to seven feet in height. The subsoil has thin layers of higher clay content called lamella. These lamella help contribute to a productive ecological site.

The Sand Plains ecological site developed with occasional fires as an important part of ecological processes. Historically, fires were infrequent and were usually started by lightning during spring and early summer thunderstorms. It is also recognized that early Native Americans often used fire to attract herds of migratory herbivores, especially bison. These intentional fires probably occurred more 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 in the plant community. In 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 usually a substantial, but temporary, increase in the abundance of annual forbs that 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, especially drought cycles, also had a major impact upon the plant community's development. 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 dry period, 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 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 site for domestic livestock production replaced that of roaming bison herds, its ecological dynamics were altered and the plant community changed from its original composition. These changes were usually in proportion to grazing intensity and when the grazing season occurred. A combination of drought and overgrazing accelerated these changes because the taller grasses and forbs palatable to bison were equally relished and selected by cattle. When repeatedly grazed, 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 small blowouts.

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 shrub species in many areas. In some locales 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.

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 70%			1233-2197	
	sand bluestem	ANHA	<i>Andropogon hallii</i>	785-1569	–
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	0-314	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	157-314	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	157-314	–
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	157-314	–
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	0-157	–
2	Grasses Minor Component 10%			157-314	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	78-157	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	78-157	–
	composite dropseed	SPCOC2	<i>Sporobolus compositus var. compositus</i>	78-157	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	78-157	–
3	Grasses Minor Component 5%			28-157	
	sedge	CAREX	<i>Carex</i>	11-34	–
	Scribner's rosette grass	DIOLS	<i>Dichanthelium oligosanthes var. scribnerianum</i>	11-34	–
	sand lovegrass	ERTR3	<i>Eragrostis trichodes</i>	11-34	–
	thin paspalum	PASE5	<i>Paspalum setaceum</i>	11-34	–

	purpletop tridens	TRFL2	<i>Tridens flavus</i>	11-34	-
Forb					
4	Forbs Minor Component 10%			73-314	
	Illinois bundleflower	DEIL	<i>Desmanthus illinoensis</i>	6-39	-
	Maximilian sunflower	HEMA2	<i>Helianthus maximiliani</i>	17-34	-
	Virginia tephrosia	TEVI	<i>Tephrosia virginiana</i>	6-28	-
	purple prairie clover	DAPUP	<i>Dalea purpurea var. purpurea</i>	6-28	-
	roundhead lespedeza	LECA8	<i>Lespedeza capitata</i>	6-22	-
	common yarrow	ACMI2	<i>Achillea millefolium</i>	6-17	-
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	6-17	-
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	6-17	-
	partridge pea	CHFA2	<i>Chamaecrista fasciculata</i>	6-17	-
	prairie spiderwort	TROC	<i>Tradescantia occidentalis</i>	6-17	-
	stiff goldenrod	OLRI	<i>Oligoneuron rigidum</i>	6-17	-
	woolly plantain	PLPA2	<i>Plantago patagonica</i>	0-11	-
	slimflower scurfpea	PSTE5	<i>Psoraleidium tenuiflorum</i>	0-11	-
	compassplant	SILA3	<i>Silphium laciniatum</i>	0-11	-
	Missouri goldenrod	SOMI2	<i>Solidago missouriensis</i>	0-11	-
	hoary verbena	VEST	<i>Verbena stricta</i>	0-11	-
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	0-11	-
	spotted beebalm	MOPU	<i>Monarda punctata</i>	0-11	-
	Illinois ticktrefoil	DEIL2	<i>Desmodium illinoense</i>	0-11	-
	annual buckwheat	ERAN4	<i>Eriogonum annuum</i>	0-11	-
Shrub/Vine					
5	Shrubs Minor Component 5%			0-157	
	sand sagebrush	ARFI2	<i>Artemisia filifolia</i>	0-34	-
	American plum	PRAM	<i>Prunus americana</i>	0-34	-
	Chickasaw plum	PRAN3	<i>Prunus angustifolia</i>	0-34	-
	climbing rose	ROSE2	<i>Rosa setigera</i>	0-34	-
	soapweed yucca	YUGL	<i>Yucca glauca</i>	0-34	-

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 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 4.2 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% is from ground water sources, and 10% 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

The Sand Plains ecological 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, that 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 (*Gleditsia triacanthos*) and northern catalpa (*Catalpa speciosa*) post lots that were planted on this site, it produces no wood products.

Other products

Two shrubs, 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 was 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, Sands, USDA, Soil Conservation Service, March, 1967. Range Site Description for Kansas, Sands, USDA-Soil Conservation Service, September, 1985. Ecological Site Description for Kansas, Sands (R079XY021KS) located in Ecological Site Information System (ESIS), 2007.

Other references

Brady, N. and R. Weil. 2008. The nature and properties of soils, 14th ed.

Bragg, T. and L. Hulbert. 1976. Woody plant invasion of unburned Kansas bluestem prairie. *J. Range Management.*, 29:19-23.

Dyksteruis, E.J. 1958. Range conservation as based on sites and condition classes. *J. Soil and Water Conserv.* 13: 151-155.

Eddleman, L. 1983. Some ecological attributes of western juniper. P. 32-34 in *Research in rangeland management*. Agric. Exp. Stan. Oregon State Univ., Corvallis Spec. Rep. 682.

Hester, J.W. 1996. Influence of woody dominated rangelands on site hydrology and herbaceous production, Edwards Plateau, Texas. M.S. Thesis, Texas A&M University, College Station, TX.

Holechek, Jerry, Rex Pieper, Carlton Herbel, *Range Management: principles and practices.*—5th ed.

Kuchler, A. A New Vegetation Map of Kansas. *Ecology* (1974) 55: pp. 586-604.

Launchbaugh, John, Clenton Owensby. *Kansas Rangelands, Their Management Based on a Half Century of Research*, and Bull. 622 Kansas Agricultural Experiment Station, October 1978.

Moore, R., J. Frye, J. Jewett, W. Lee, and H. O'Connor. 1951. The Kansas rock column. *Univ. Kans. Pub., State Geol. Survey Kans. Bull.* 89. 132p.

National Climatic Data Center Weather data web site <http://www.ncdc.noaa.gov/>. Available online. Accessed 04/05/2017.

National Range and Pasture Handbook, USDA-NRCS, Chapter 7, Rangeland and Pastureland Hydrology and Erosion.

Rangeland Cover Types of the United States, Society for Range Management, 1994.

Sauer. Carl, Grassland climax, fire, and man. 1950, *J. Range Manage.* 3: 16-21.

Soil Series—Official Series Descriptions, <https://soilseries.sc.egov.usda.gov/osdname.asp>. Available online. Accessed 04-05-2017.

Thurrow, T. and J. Hester. 1997. How an increase or reduction in juniper cover alters rangeland hydrology, In: C.A. Taylor, Jr. (ed.). *Proc. 1997 Juniper Symposium*. Texas Agr. Exp. Sta. Tech. Rep. 97-1. San Angelo, TX: 4:9-22.

USDA-Natural Resources Conservation Service—Soil Surveys and Web Soil Survey. Available online. Accessed 04/05/2017.

USDA Handbook 296, LRR and MLRA of the U.S., the Caribbean, and the Pacific Basin.

Waller, S., Moser, L. Reece. P., and Gates, G. 1985. *Understanding Grass Growth*.

Weaver, J. and F. Albertson, *Deterioration of Midwestern Ranges*, *Ecology*, Vol. 21, No. 2, April 1940, pp. 216-236.

Contributors

Chris Tecklenburg

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 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 1-24-2018 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	01/24/2018
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** The sand and loamy sand 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):** Pratt OSD: Ap--0 to 8 inches (0 to 20 centimeters); light yellowish brown (10YR 6/4), interior, fine sand, yellowish brown (10YR 5/4), interior, moist; single grain; loose, loose, nonsticky and nonplastic; 5.0 percent clay; moderately acid; clear smooth boundary. (7 to 20 inches thick; 18 to 50 centimeters 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).

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: 70% 1960 lbs. sand bluestem 700-1400, switchgrass 140-280, Indiangrass 140-280, little bluestem 140-280, prairie sandreed 0-280, and Canada wildrye 0-140

Sub-dominant: Grasses-Minor: 10% 280 lbs. blue grama 70-140, sand dropseed 70-140, sideoats grama 70-140, and composite dropseed 70-140. **Grasses-Minor 5% 140 lbs.** purple tridens 10-30, sand lovegrass 10-30, thin paspalum 10-30, Scribner's rosette grass 10-30, and sedge 10-30

Other: Forbs-Minor: 10% 280 lbs. See functional/structural group sheet

Additional: Shrubs-Minor: 5% 140 lbs. All 0-30, Chickasaw plum, American plum, prairie rose, sand sagebrush, and yucca glauca

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 1,600 lbs in a below-average rainfall year and 4,200 lbs in an above-average rainfall year. The representative value for this site is 2,800 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.**

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.
