Ecological site R072XY110KS
Choppy Sands

Accessed: 04/26/2024

General information

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

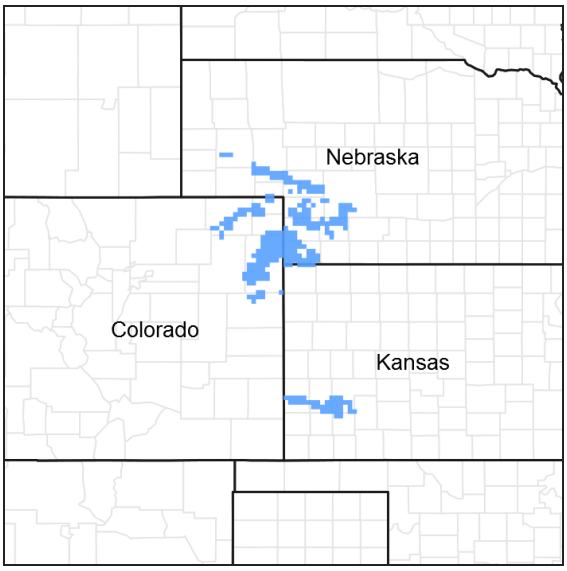


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 072X–Central High Tableland

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

Classification relationships

Major land resource area (MLRA): 072-Central High Tableland

Ecological site concept

This site is characterized by sandy soils, generally with greater than 52 percent sand. Sandy eolian sediments make up the parent material of this ecological site. This site occurs on hummocky dunes of the dune fields in MLRA 72. The slopes are generally greater than 24 percent giving a short, steep, hummocky appearance.

Associated sites

R072XY109KS	**Rolling Sands** The Rolling Sands ESD occurs on rolling dune lands and can be found adjacent to this site.
R072XY111KS	**Sandy Plains** The Sandy Plains ESD occurs on plains and can be found adjacent to this site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Andropogon hallii* (2) *Calamovilfa longifolia*

Physiographic features

This ecological site occurs as dunes in dune fields. The short, steep, hummocky landform can be unstable and include "blowouts". The blowouts are generally small and are a saucer, cup or trough-shaped depression formed by wind erosion. The existing vegetation has been disturbed or destroyed.

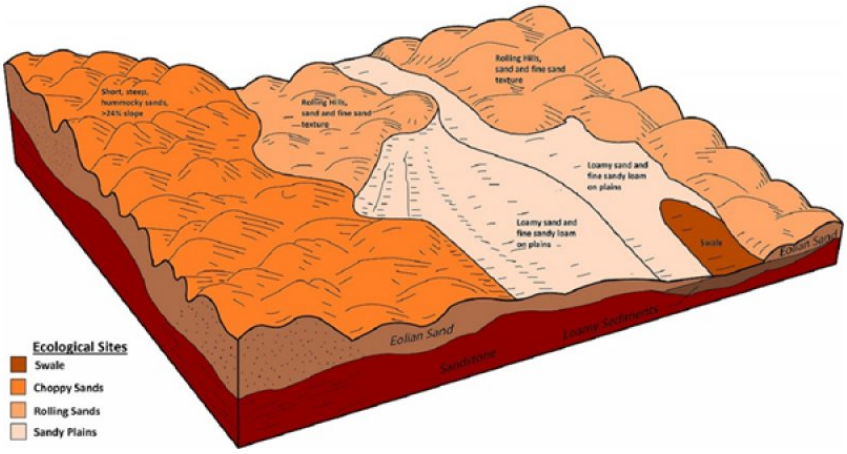


Figure 2. Sandy Soils MLRA 72 ESD block diagram

Table 2. Representative physiographic features

Landforms	(1) Dune (2) Hill
Flooding frequency	None
Ponding frequency	None
Elevation	3,600–5,000 ft
Slope	24–60%
Water table depth	60 in

Climatic features

The average annual precipitation in this area is 14 to 25 inches (355 to 635 millimeters). It fluctuates widely from year to year. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. The maximum precipitation occurs from late spring through early autumn. Precipitation in winter occurs as snow. The annual snowfall ranges from about 16 inches (40 centimeters) in the southern part of the area, to 35 inches (90 centimeters) in the northern part. The average annual temperature is 46 to 57 degrees F (8 to 14 degrees C). The freeze-free period averages 158 days and ranges from 135 to 210 days, increasing in length from northwest to southeast. Climate data comes from the Natural Resources Conservation Service (NRCS) National Water and

Climate Center. The data set is from 1981-2010.

Table 3. Representative climatic features

Frost-free period (average)	148 days
Freeze-free period (average)	165 days
Precipitation total (average)	20 in

Climate stations used

- (1) GARDEN CITY EXP STN [USC00142980], Garden City, KS
- (2) SYRACUSE 1NE [USC00148038], Syracuse, KS
- (3) BENKELMAN [USC00250760], Benkelman, NE
- (4) GARDEN CITY RGNL AP [USW00023064], Garden City, KS
- (5) LAKIN [USC00144464], Lakin, KS
- (6) MADRID [USC00255090], Madrid, NE
- (7) HAYES CENTER 1NW [USW00024020], Hayes Center, NE
- (8) CROOK [USC00051996], Crook, CO
- (9) HOLYOKE [USC00054082], Holyoke, CO
- (10) YUMA [USC00059295], Yuma, CO
- (11) ULYSSES 3NE [USC00148287], Ulysses, KS

Influencing water features

This ecological site is characterized by very deep sandy soils that are excessively drained.

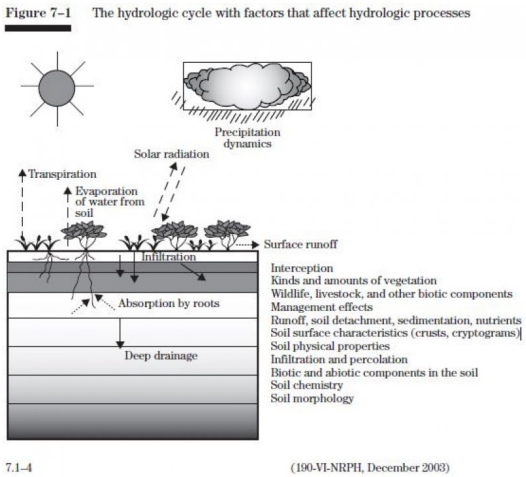


Figure 7. The Hydrologic Cycle NRPH

Soil features

These very deep soils have sandy surface layers and subsoils. The content of organic matter is very low to low throughout the soil profile. Soil structure is often loose and single-grained below the surface layer. These soils are excessively drained to well drained and the available water capacity is low. Carbonates are typically leached from these soils. If the vegetative cover on this site is disturbed, leaving the soil unprotected, it is highly susceptible to wind erosion and the formation of deep, concave blown-out areas. The slopes on this site dominantly range from 24 to 60 percent.

The Reference Plant Community should show slight to no evidence of rills. Water flow paths, if any, are broken, irregular in appearance, or discontinuous. Wind-scoured areas are inherent to this site, and some soil movement may be noticeable on various landscape positions. Minor plant pedestalling may occur in these areas also. Subsurface soil layers are non-restrictive to water movement and root penetration.

Major soil series correlated to this ecological site include Dwyer and Valent.

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

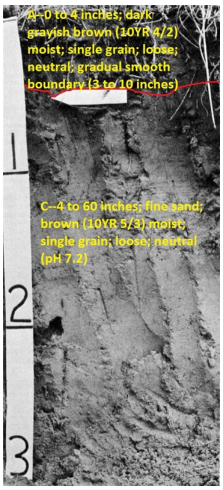


Figure 8. Valent soil profile image Lincoln County, NE

Table 4. Representative soil features

Surface texture	(1) Fine sand (2) Loamy fine sand (3) Sand
Family particle size	(1) Sandy
Drainage class	Excessively drained to well drained
Permeability class	Rapid
Soil depth	60–120 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	2.9–6.1 in
Calcium carbonate equivalent (0-40in)	0–5%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	6.3–7.5
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

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

The Choppy Sands ecological site is made up of a Grassland State. The Grassland State is characterized by non-broken land (no tillage), both warm and cool season, tall and mid bunchgrasses, sod-forming grasses, forbs, and shrubs.

Vegetation changes are expected within this ecological site and will be dependent upon the site's geographical location inside Major Land Resource Area (MLRA) 72 the Central High Tablelands. Variation in precipitation east and west is not as affected as is temperature north and south. The northern part of MLRA 72 is characterized by cooler temperatures and a shorter growing season in respect to the southern end. As a result, cool season bunchgrasses and sod formers proliferate. Growth of native cool season plants begins about April 15, and continues to about June 15. Native warm season plants begin growth about May 15, and continue to about August 15. Green up of cool season plants may occur in September and October if adequate moisture is available (weather data from National Climate Data Center 1980-2010).

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

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

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

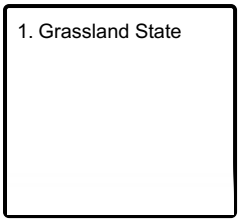
Drought cycles were part of the natural disturbance regime and contribute to the range of variability of the vegetation within the site. Droughts have historically had a major impact upon the vegetation of this MLRA as well as this site. The species composition changes according to the duration and severity of the drought cycle (Albertson and Weaver, 1946). The species composition changes with the duration and severity of drought: initially, shallow-rooted species (blue grama) will die out and the deeper-rooted species (prairie sandreed, sand bluestem) persist. Sustained drought can result in a reduction of deeper-rooted species. Loss of plant cover and increased bare ground creates the probability of wind erosion. Drought-induced wind scouring coupled with disturbance (fire, continuous grazing, rodents, vehicle traffic) can lead to blow outs.

As a higher precipitation cycle returns, annuals like Texas croton, sunflower, and early successional perennial plants such as blowout grass, lemon scufpea, sandhill muhly, sand dropseed, and needle and thread that can better tolerate the movement of sand and drought conditions will establish. As these plants begin to stabilize the site, other perennial plants such as prairie sandreed, sand bluestem, and blue grama reestablish.

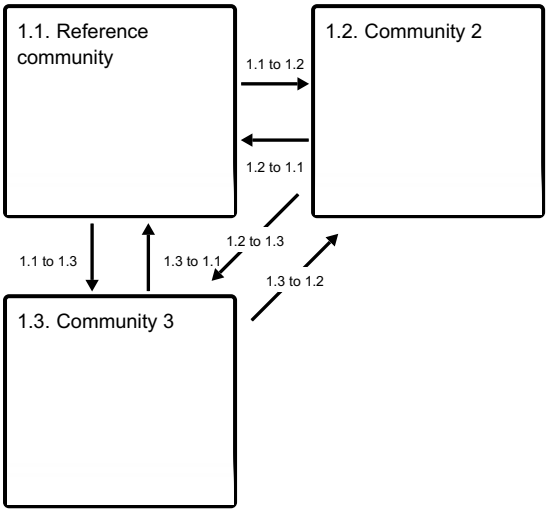
Due to steepness of the slope and soil texture, this site is more susceptible to erosion from disturbances such as drought, overstocking, and heavy, continuous grazing compared to associated sites. Long term heavy continuous grazing results in a shift from tall grass species to mid and short-grass species. Sand dropseed, sandhill muhly, needle and thread, and hairy grama will increase while species such as prairie sandreed, sand bluestem, little bluestem, switchgrass, and Indiangrass will decrease in frequency and production. The use of grazing management that includes a forage and animal balance and adequate rest and recovery periods following each grazing event during the growing season will favor the Reference Plant Community species.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1
Grassland State

The Grassland State is supported by empirical data and is defined by three native plant communities that are a result of periodic fire, drought, herbivore, and ungulate grazers. These events are part of the natural disturbance regime and climatic process that contribute to the development of the site. The Reference Plant Community consists of tall and mid, warm season grasses, forbs, and shrubs. Plant Community 1.2 is dominated by sandhill muhly, prairie sandreed, and combined with a minor component (2-10 percent composition by weight) of Reference Community plant species. Plant Community 1.3 is most vulnerable to exceeding the resilience limits of the grassland state. This plant community is dominated (40-100 percent composition by weight) by sand dropseed, annual grasses, and forbs. Blowouts are sandy depressions caused by the removal of sediments by wind. Blowouts can occur in all plant communities within the Grassland State, but are most frequent to occur in community 1.3 and 1.2. A blowout forms when a patch of protective vegetation is lost, allowing strong winds to “blow out” sand and form a depression. The areas of blowing sand result in movement and possible enlargement of the dune system. The blowout site is in a primary successional stage due to steep slopes and poor soil development. These extremely sandy sites are very dynamic and result in a soil surface that resists revegetation. Protection of the blowout areas from disturbance will result in a plant community dominated by annuals. Areas of blowouts will start to revegetate with annual forbs and grasses with proper periods of recovery and protection from disturbance. These areas are still very susceptible to erosion and can regress rapidly. As blowout areas become more stable with annuals, perennials will start to reestablish. Giant sandreed, prairie sandreed, sand dropseed, sandhill muhly, and perennial forbs will start to increase if it is protected from disturbance. The Choppy Sands ecological site will only return to a productive state after many years of proper management. Range seeding may be the only practical method of returning this state to a stable condition. Shaping the site prior to seeding may be required. Application of surface mulch is necessary for grass establishment. Reseeding these sites has proven to be quite difficult and expensive with limited results. The following paragraphs are narratives for each of the described plant communities in the Grassland State. These plant communities may not represent every possibility, but they probably are the most prevalent and repeatable plant communities that exist on this ecological site. The plant composition table shown below has been developed from the best available knowledge at the time of this revision. As more data is collected, some of these plant communities may be adjusted or removed and new ones may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities." According to the USDA NRCS National Range and Pasture Handbook, Desired Plant Communities will be determined by the decision-makers and will meet minimum quality criteria established by NRCS. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

Community 1.1
Reference community

The Reference Plant Community serves as the basis for all other interpretations. The potential vegetation of this community is a mixed grass prairie and consists chiefly of tall and mid warm and cool season grasses. Approximately 75-85 percent of annual production consists of grass and grass-like plants, 5-10 percent forbs, and 5-10 percent shrubs. Sand bluestem, prairie sandreed, and little bluestem are the primary species in this community. Secondary species include hairy grama, needle and thread, blue grama, sideoats grama, and a diverse population of forbs. This plant community is diverse and productive. The overall health of the rangeland is excellent and the water cycle is functioning properly. The plant litter is distributed evenly and provides protection from soil erosion, reduces evaporation from the soil surface and promotes good water infiltration. This plant community is well suited to drought conditions due to the species diversity. See the Grassland State narrative for management of “blow out” areas. Total annual production for the Choppy Sands ecological site ranges from 800 to 2,500 pounds of air-dry vegetation per acre per year. An average rainfall for the year will yield a relative value of 1,900 pounds of air dry vegetation per acre.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	680	1615	2125
Forb	80	190	250
Shrub/Vine	40	95	125
Total	**800**	**1900**	**2500**

Figure 10. Plant community growth curve (percent production by month). KS0012, Sand Bluestem, Little Bluestem, Prairie Sandreed Plant Community.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	25	30	25	10	5			

Community 1.2
Community 2

This plant community develops under heavy continuous grazing without adequate recovery periods during the growing season. Sand bluestem, little bluestem, leadplant, and other desirable species rapidly lose productive capacity through loss of vigor and reproductive potential. Prairie sandreed and sandhill muhly are the dominant species, and increase to fill the voids left by the decrease of desirable species. Shrubs such as sand sagebrush and small soapweed can also increase in this plant community. Reference species diversity is reduced due to grazing pressures. With heavy, continuous grazing this plant community is at risk of losing its tall warm season grasses and crossing into Plant Community 1.3. If this occurs, it will require considerable time to return this community back to 1.1 or 1.2. Desirable species have been replaced by less desirable species, maintaining the plant cover, and as a result the potential for erosion remains the same. See the Grassland State narrative for management of “blow out” areas.

Community 1.3
Community 3

With further heavy, continuous grazing the tall grass species will be reduced to remnant plants in protected areas. Sand dropseed, annual forbs, and grasses will fill the void left by these species. Ground cover will be dependent upon the population of the annual species as they respond to climatic conditions. Sand sagebrush can also increase but will not dominate the site. This community phase can become vulnerable and unstable. It is at-risk of losing most all the tall grass species and crossing ecological resilience of the grassland state. Further field investigations and research is needed to document an alternative state. The potential for wind erosion is significantly increased due to grazing disturbance, low plant vigor, and low litter amounts. Small blowouts can readily enlarge during periods of drought. Organic matter has been greatly reduced. Further research, field visits,

and documentation are necessary to determine potential alternative states. See the Grassland State narrative for management of “blow out” areas. The total annual production of this site is approximately 1,000 pounds per acre (air-dry weight).

Pathway 1.1 to 1.2
Community 1.1 to 1.2

Heavy, continuous grazing without adequate recovery periods will convert this plant community to a sandhill muhly, prairie sandreed, hairy grama, small soapweed, and/or sand sagebrush plant community. Vigor and production of tall warm season grasses and desirable shrubs are declining. Heavy grazing will result in a decrease in plant diversity, ground cover, and an increase in annual grasses and forbs.

Pathway 1.1 to 1.3
Community 1.1 to 1.3

Long term (>20 years) of heavy, continuous grazing without adequate recovery periods will convert this plant community to a sand dropseed, annual forbs, and annual grasses plant community. Vigor and production of tall warm season grasses and desirable shrubs are declining. Heavy grazing will result in a decrease in plant diversity, ground cover, and an increase in annual grasses and forbs.

Pathway 1.2 to 1.1
Community 1.2 to 1.1

Prescription grazing to include adequate recovery periods between grazing events and a forage and animal balance will move this plant community to the Reference Plant Community.

Pathway 1.2 to 1.3
Community 1.2 to 1.3

Heavy, continuous grazing will move this plant community to a plant community dominated by sand dropseed and a variety of annual forbs and grasses.

Pathway 1.3 to 1.1
Community 1.3 to 1.1

Long term (>30 years) of adequate rest and recovery of key forage species. This will be dependent upon the quantity of key native remnant grasses present.

Conservation practices

Prescribed Grazing

Pathway 1.3 to 1.2
Community 1.3 to 1.2

Long term prescription grazing to include rest and recovery of key forage species during the growing season will assist in moving this plant community back to the 1.2 Plant Community.

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	**Tall-midgrass warm season 70%**			970–1330	
	sand bluestem	ANHA	*Andropogon hallii*	300–600	–

	prairie sandreed	CALO	*Calamovilfa longifolia*	200–400	–
	sand lovegrass	ERTR3	*Eragrostis trichodes*	90–160	–
	switchgrass	PAVI2	*Panicum virgatum*	90–160	–
	little bluestem	SCSC	*Schizachyrium scoparium*	90–160	–
	Indiangrass	SONU2	*Sorghastrum nutans*	0–90	–
2	**Mid-shortgrasses warm-cool, rhizome-bunchgrass 10%**			0–190	
	sideoats grama	BOCU	*Bouteloua curtipendula*	0–50	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–50	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	0–50	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–50	–
3	**Other grasses 5%**			0–95	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–15	–
	sedge	CAREX	*Carex*	0–15	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	0–15	–
	sandhill muhly	MUPU2	*Muhlenbergia pungens*	0–15	–
	thin paspalum	PASE5	*Paspalum setaceum*	0–15	–
	blowout grass	REFL	*Redfieldia flexuosa*	0–15	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–15	–
	giant dropseed	SPGI	*Sporobolus giganteus*	0–15	–
Forb					
4	**Forbs-Legumes 10%**			50–190	
	prairie sagewort	ARFR4	*Artemisia frigida*	10–25	–
	silky prairie clover	DAVI	*Dalea villosa*	10–25	–
	tenpetal blazingstar	MEDE2	*Mentzelia decapetala*	10–25	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	10–25	–
	lemon scurfpea	PSLA3	*Psoralidium lanceolatum*	10–25	–
	fourpoint evening primrose	OERH	*Oenothera rhombipetala*	0–10	–
	othake	PASP	*Palafoxia sphacelata*	0–5	–
	beardtongue	PENST	*Penstemon*	0–5	–
	longbract spiderwort	TRBR	*Tradescantia bracteata*	0–5	–
	tarragon	ARDR4	*Artemisia dracunculus*	0–5	–
	annual buckwheat	ERAN4	*Eriogonum annuum*	0–5	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	0–5	–
	bush morning-glory	IPLE	*Ipomoea leptophylla*	0–5	–
	spiked ipomopsis	IPSP	*Ipomopsis spicata*	0–5	–
	manystem pea	LAPO2	*Lathyrus polymorphus*	0–5	–
	sand milkweed	ASAR	*Asclepias arenaria*	0–5	–
	whorled milkweed	ASVE	*Asclepias verticillata*	0–5	–
	Texas croton	CRTE4	*Croton texensis*	0–5	–
	nineanther prairie clover	DAEN	*Dalea enneandra*	0–5	–
	purple prairie clover	DAPUP	*Dalea purpurea var. purpurea*	0–5	–
	snowball sand verbena	ABFR2	*Abronia fragrans*	0–5	–

Shrub/Vine					
5	**Shrubs and Cacti 5%**			0–95	
	soapweed yucca	YUGL	*Yucca glauca*	0–20	–
	sand sagebrush	ARFI2	*Artemisia filifolia*	0–20	–
	brittle pricklypear	OPFR	*Opuntia fragilis*	0–20	–
	American plum	PRAM	*Prunus americana*	0–20	–
	Chickasaw plum	PRAN3	*Prunus angustifolia*	0–20	–
	western sandcherry	PRPUB	*Prunus pumila var. besseyi*	0–10	–
	leadplant	AMCA6	*Amorpha canescens*	0–5	–

Animal community

Grazing Interpretations

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

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

Often the current plant community does not entirely match any particular Community Phase as described in this Ecological Site Description. Because of this, a 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 upon 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 principal factor limiting forage production on this site. Infiltration and runoff potential for this site ranges from high to moderate. Water transmission through group A soils is normally greater than 0.30 inches per hour. Runoff is expected to occur only during the most intense storms.

Recreational uses

This site provides hunting, hiking, photography, bird watching, and other opportunities. The wide varieties of plants that bloom from spring until fall have an aesthetic value that appeals to visitors.

Wood products

No appreciable wood products are present on the site.

Other products

Collection of berries, cherries, and seed.

Other information

Site Development and Testing Plan

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

Inventory data references

Information presented here has been derived from NRCS clipping data, numerous ocular estimates, and other inventory data. Field observations from experienced range trained personnel were used extensively to develop this ecological site description. Specific data information is contained in individual landowner/user case files and other files located in county NRCS field offices.

Those NRCS individuals involved in developing the Choppy Sands ecological sites North and South in the early 2000s include from Nebraska: Carol Eakins, Chuck Markley, Jeff Nichols, and Mary Schrader; from Kansas: Joan Gienger, Ted Houser, Tim Watson, Amanda Shaw, Susan Francis, Jon Deege, and Robert Schiffner; and from Colorado: Josh Saunders and Harvey Sprock.

Range Condition Guides and Technical Range Site Descriptions for Kansas, Choppy Sands, USDA, Soil Conservation Service, August, 1967

Range Site Description for Kansas, Choppy Sands, USDA-Soil Conservation Service, September, 1983

Range Site Description for Colorado, Choppy Sands, USDA-Soil Conservation Service, December 1975

Range Site Description for Colorado, Choppy Sands, USDA-Soil Conservation Service, December 1988

Guide for determining range condition and suggestive initial stocking rates for Nebraska, Choppy Sands, Vegetative Zone 1 and II, USDA-Soil Conservation Service, April 1983

Range Site Description for Nebraska, Choppy Sands, USDA-Soil Conservation Service, August, 1981 Schacht, Walter H., Larsen, Dana. Section III

Range Sites, Choppy Sands Range Site, The Board of Regents of the University of Nebraska, publication

Ecological Site Description for Kansas, Choppy Sands North (R072XY003KS) and South (R072XY003KS), located in Ecological Site Information System (ESIS), 2007

Ecological Site Description for Colorado, Choppy Sands (R072XY020CO), located in Ecological Site Information System (ESIS)

Other references

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MLRA 72 Workshop: Quality control review, comments and field verification of ecological sites, Wray Colorado, April 26-27, 2016. Those individuals include: from Colorado: Julie Elliot, Kimberly Diller, Clark Harshbarger, Kristi Gay, Josh Saunders, Tom Nadgwick, and Mike Moore; from Nebraska: Chuck Markley, Jeff Nichols, Kristin Dickinson, and Dan Shurtliff; from Kansas: David Kraft, Michelle Bush, Tom Cochran, Roger Tacha, Ted Houser, and Chris Tecklenburg (current ESI specialist MLRA72).

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Contributors

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Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

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Date	06/27/2016
Approved by	David Kraft
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 no evidence of water flow patterns.

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3. **Number and height of erosional pedestals or terracettes:** None

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 5% or less bare ground, with bare patches ranging from 5-10 inches in diameter. Prolonged drought or wildfire events will cause bare ground to increase upwards to 10-15% with bare patches ranging from 15-20 inches in diameter.

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5. **Number of gullies and erosion associated with gullies:** There are no gullies on this site.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Minor wind scouring may occur on knolls. Wind erosion/small blowouts can occur with disturbances such as wildfire or extended drought.

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7. **Amount of litter movement (describe size and distance expected to travel):** Litter should be uniformly distributed with little movement. On steep slopes or knolls, litter may move from a few inches to 1-3 feet depending on intensity of wind/rainfall event.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Plant canopy is sufficient to intercept the majority of raindrops. Soil organic matter is incorporated into aggregates at the surface, and/or adhesion of decomposing organic matter is present, and/or biological crusts are present on the surface. Stability class rating anticipated to be 2-3 in interspace at soil surface.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Average SOM ranges from 1-3%. A horizon is 0 to 4 inches; dark grayish brown sand (10YR 4/2) moist; single grain; loose; neutral (pH 7.2); gradual smooth boundary (3 to 10 inches thick).

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Diverse grass, forb, shrub canopy and root structure reduces raindrop impact and slows overland flow providing increased time for infiltration to occur. Extended drought and/or wildfire may reduce canopy cover and litter amounts resulting in decreased infiltration and increased runoff on slopes of 24-40%.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** There is no evidence of compacted soil layers due to animal impact or cultural practices.

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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: Tall and Mid grass 70%. sand bluestem > prairie sandreed >> little bluestem = sand lovegrass = switchgrass > Indiangrass

    Sub-dominant: Short-mid-cool season grass 10%. blue grama = hairy grama = sideoats grama = needleandthread Forbs 10%

    Other: other grasses 5% and Shrubs and Cacti 5%

    Additional:

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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):** 30-55% litter cover at 0.25-0.50 inch depth. Litter cover during and following drought can range from 15-25% and 2-5% following wildfire.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 800 lbs./ac. low precip years, 1900 lbs./ac. average precip years, 2500 lbs./ac. high precip years. After extended drought or the first growing season following wildfire, production may be significantly reduced by 300 – 600 lbs./ac. or more.

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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:** Invasive plants should not occur in reference plant community. Following wildfire or extended drought, cheatgrass and Russian thistle will invade assuming a seed source is available. Sandhill muhly, lemon scurfpea and blowout grass are the major native (non-invasive) increasers on this site.

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17. **Perennial plant reproductive capability:** The only limitations are weather-related, wildfire, natural disease, and insects that may temporarily reduce reproductive capability.
