Ecological site R072XY107KS
Sandy Lowland

Accessed: 09/13/2026

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): 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 occurs on nearly level to moderately sloping floodplains and low terraces. The Sandy Lowland site is characterized by soils with greater than 55 percent sand in the surface. The soils characteristic of this site formed in sandy alluvium from mixed sources.

Associated sites

R072XY109KS	**Rolling Sands** This site is made up of sandy soils located on rolling hills that can be adjacent to the Sandy Lowland ecological site.
R072XY111KS	**Sandy Plains** This site is made up of sandy soils located on plains that can occur adjacent to the Sandy Lowland ecological site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Andropogon hallii* (2) *Schizachyrium scoparium*

Physiographic features

This site occurs on nearly level to moderately sloping floodplains, upland drainageways, alluvial fans, and terraces. This site receives runoff from areas higher on the landscape. Flooding frequency ranges from none to frequent and flooding duration is very brief to brief. Sedimentation is usually rare, but is common on alluvial fans and terraces.

Figure 1. MLRA72 block diagram

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Terrace
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to frequent
Ponding frequency	None
Elevation	680 – 1,570 m
Slope	0 %
Ponding depth	0 cm
Water table depth	190 cm

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 159 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)	140 days
Freeze-free period (average)	160 days
Precipitation total (average)	510 mm

- (1) HOLYOKE [USC00054082], Holyoke, CO
- (2) RICHFIELD [USC00146808], Richfield, KS
- (3) WINONA [USC00148988], Winona, KS
- (4) KIMBALL 2NE [USC00254440], Kimball, NE
- (5) WALLACE 2W [USC00258920], Wallace, NE
- (6) OAKLEY 4W [USC00145888], Oakley, KS
- (7) HERSHEY 5 SSE [USC00253810], Hershey, NE
- (8) MADRID [USC00255090], Madrid, NE
- (9) YUMA [USC00059295], Yuma, CO
- (10) GARDEN CITY RGNL AP [USW00023064], Garden City, KS
- (11) SYRACUSE 1NE [USC00148038], Syracuse, KS
- (12) HAIGLER [USC00253515], Haigler, NE
- (13) LODGEPOLE [USC00254900], Lodgepole, NE

Influencing water features

This site is made up of alluvial soils that have a water table greater than 6 feet from the surface. Fluctuations with this water table occur and there could be times throughout the year that it is less than 6 feet from the surface. Water influences this site due to landform position. This site is adjacent to streams and is in a water receiving position.

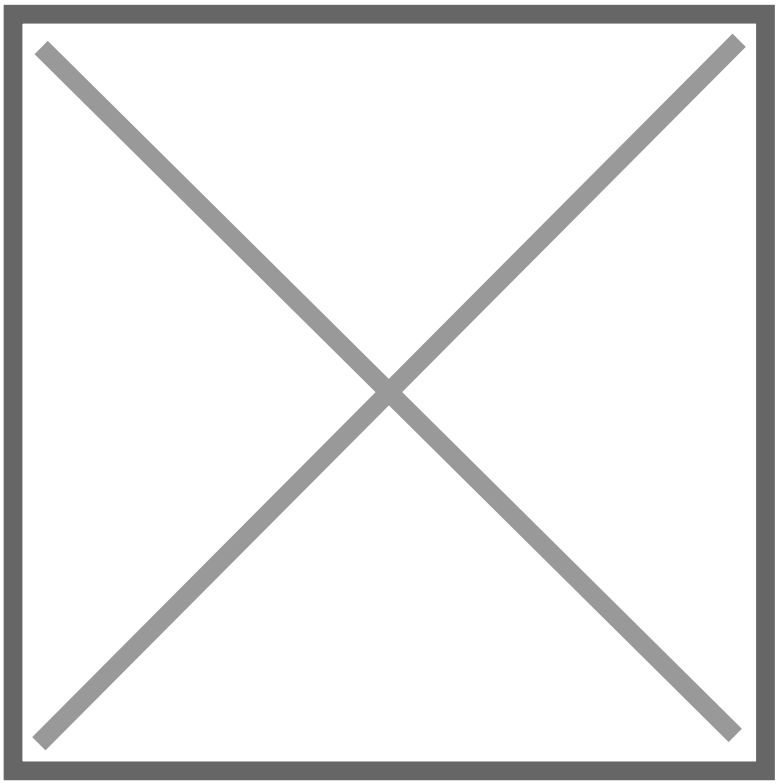

Figure 6. Fig. 7-1 from National Range and Pasture Handbook

Soil features

The soils on this site are very deep and range from moderately well drained to somewhat excessively drained. The parent material is local alluvium derived from mixed origins. The surface soil is from 3 to 20 inches thick, generally is light colored, and ranges widely from very sandy to loamy textures. The underlying material is light colored and also ranges widely in texture. Carbonates are often leached from the upper soil profile, but may occur throughout in some soils. The content of organic matter is generally low to moderately low. Available water capacity ranges from very low to moderate. Flooding is rare to frequent, depending on landform, and normally is very brief.

The Reference Plant Community should display slight to no evidence of rills. Water flow paths, if present, are broken, irregular in appearance, or discontinuous with numerous debris dams or vegetative barriers. Moving sand is inherent to this site. Wind-scoured areas may exist in areas. Pedestaled plants caused by wind erosion would be minor. The soil surface is stable and intact. Sub-surface soil layers are non-restrictive to water movement and root penetration. These soils can be susceptible to erosion hazards where vegetative cover is inadequate.

Major soil series correlated to this ecological site include Bankard, Calamus, Cass, Craft, Glenberg, Happyditch, and Haverson. Other soil

series that have been correlated to this site include Broadwater (very gravelly surfaces, on drainageways and alluvial fans).

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

Figure 7. Glenberg and Bankard soil profiles

Table 4. Representative soil features

Surface texture	(1) Fine sandy loam (2) Loamy sand (3) Sandy loam
Family particle size	(1) Sandy
Drainage class	Very poorly drained
Permeability class	Moderate to very rapid
Soil depth	150 – 200 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	5.08 – 20.32 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 20 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	5.6 – 10

Subsurface fragment volume <=3" (Depth not specified)	0 – 50 %
Subsurface fragment volume >3" (Depth not specified)	0 – 10 %

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. The Reference Plant Community 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.

This ecological site is made up of a Grassland State, a Woody State, and a Tillage State. The Grassland State is characterized by non-broken land (no tillage), both warm and cool season bunchgrasses, sod-forming grasses, forbs, and shrubs. The woody state is dominated by sand sagebrush with a canopy cover greater than 30 percent. The tillage state has been mechanically disturbed (broken) by equipment, and includes either a variety of reseeded warm season bunch and sod forming grasses or early successional plants to include the latter as well as annual grasses and forbs.

Vegetation changes are expected within this ecological site, and will be dependent upon the site's geographical location inside Major Land Resource Area 72 (MLRA). Variation in precipitation east and west is not as affected as are 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, F. W., Weaver, J. E.).

This site occurs on nearly-level bottomland adjacent to streams. It is seldom found in extensive areas, but rather in isolated pockets. Management of this range site by itself can generate challenges. The Sandy Lowland site is preferred by livestock, which can lead to grazing distribution concerns. Water locations, salt placement, and other aids help to distribute grazing on this site. Other management techniques such as concentrated grazing and/or grazing systems also to help distribute grazing more evenly. The general response of this site to heavy, long term continuous grazing pressure without adequate rest and recovery is to gradually lose the vigor and reproductive potential of the tall and mid-grass species and shift the plant community toward less palatable species, cool season dominant species, shrubs and or short-grass species.

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	**Tall and mid warm season**			897-1480	
	sand bluestem	ANHA	*Andropogon hallii*	448-695	–
	little bluestem	SCSC	*Schizachyrium scoparium*	224-370	–
	switchgrass	PAVI2	*Panicum virgatum*	224-336	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	0-202	–
2	**Tall warm season**			123-269	
	Indiangrass	SONU2	*Sorghastrum nutans*	123-224	–
	prairie sandreed	CALO	*Calamovilfa longifolia*	0-112	–
	giant sandreed	CAGI3	*Calamovilfa gigantea*	0-78	–
	sand lovegrass	ERTR3	*Eragrostis trichodes*	0-56	–
3	**Cool and warm season**			84-269	
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	84-112	–
	vine mesquite	PAOB	*Panicum obtusum*	0-78	–
	western wheatgrass	PASM	*Pascopyrum smithii*	0-78	–
4	**Short and tall warm season**			0-135	
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0-112	–
	blue grama	BOGR2	*Bouteloua gracilis*	0-56	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	0-56	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	0-28	–
5	**Cool and warm season**			0-135	
	Canada wildrye	ELCA4	*Elymus canadensis*	0-84	–
	sedge	CAREX	*Carex*	0-56	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	0-45	–
	thin paspalum	PASE5	*Paspalum setaceum*	0-45	–
	purple threeawn	ARPU9	*Aristida purpurea*	0-17	–
Forb					
6				56-269	
	lemon scurfpea	PSLA3	*Psoralidium lanceolatum*	11-28	–
	white heath aster	SYERE	*Symphyotrichum ericoides var. ericoides*	11-28	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	11-28	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	11-28	–
	Texas croton	CRTE4	*Croton texensis*	11-28	–
	purple prairie clover	DAPU5	*Dalea purpurea*	0-11	–
	silky prairie clover	DAVI	*Dalea villosa*	0-11	–
	Carolina larkspur	DECAV2	*Delphinium carolinianum ssp. virescens*	0-11	–
	Illinois bundleflower	DEIL	*Desmanthus illinoensis*	0-11	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	0-11	–
	annual buckwheat	ERAN4	*Eriogonum annuum*	0-11	–
	common sunflower	HEAN3	*Helianthus annuus*	0-11	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	0-11	–
	stiff sunflower	HEPA19	*Helianthus pauciflorus*	0-11	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	0-11	–
	bush morning-glory	IPLE	*Ipomoea leptophylla*	0-11	–
	manystem pea	LAPO2	*Lathyrus polymorphus*	0-11	–

	common starlily	LEMO4	*Leucocrinum montanum*	0-11	–
	dotted blazing star	LIPU	*Liatris punctata*	0-11	–
	rush skeletonplant	LYJU	*Lygodesmia juncea*	0-11	–
	tenpetal blazingstar	MEDE2	*Mentzelia decapetala*	0-11	–
	chickenthief	MEOL	*Mentzelia oligosperma*	0-11	–
	Nuttall's sensitive-briar	MINU6	*Mimosa nuttallii*	0-11	–
	evening primrose	OENOT	*Oenothera*	0-11	–
	othake	PASP	*Palafoxia sphacelata*	0-11	–
	longbract spiderwort	TRBR	*Tradescantia bracteata*	0-11	–
	meadow deathcamas	ZIVE	*Zigadenus venenosus*	0-11	–
	slimflower scurfpea	PSTE5	*Psoralidium tenuiflorum*	0-11	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0-11	–
	snowball sand verbena	ABFR2	*Abronia fragrans*	0-11	–
Shrub/Vine					
7	**Shrub and trees**			45-135	
	sand sagebrush	ARFI2	*Artemisia filifolia*	45-129	–
	western sandcherry	PRPUB	*Prunus pumila var. besseyi*	0-28	–
	soapweed yucca	YUGL	*Yucca glauca*	0-28	–
	leadplant	AMCA6	*Amorpha canescens*	0-22	–
	devil's-tongue	OPHU	*Opuntia humifusa*	0-22	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0-22	–
	eastern cottonwood	PODE3	*Populus deltoides*	0-17	–
	American plum	PRAM	*Prunus americana*	0-17	–
	Chickasaw plum	PRAN3	*Prunus angustifolia*	0-17	–
	prairie rose	ROAR3	*Rosa arkansana*	0-11	–
	willow	SALIX	*Salix*	0-11	–

Table 6. Community 1.2 plant community composition

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

Table 7. Community 1.3 plant community composition

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

Table 8. Community 2.1 plant community composition

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

Table 9. Community 3.1 plant community composition

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

Table 10. Community 3.2 plant community composition

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

Animal community

Wildlife Interpretations: The Sandy Lowland ecological site can be found on nearly level to moderately sloping floodplains, upland drainageways, alluvial fans, and terraces along major streams. Much of this site occurs in narrow bands. The majority of this site has been converted to crop production, resulting in fragmentation and loss of habitat. Historically, the predominance of grasses and forbs on this site supported grazers and mixed feeders such as bison, elk and mule deer, and pronghorn and a variety of grassland-associated birds and small mammals. Due to the heterogeneity inherent in all landscapes, some areas were not uniformly grazed by these historic large herds of grazing animals. This type of grazing enhanced habitat for wildlife by creating a mosaic pattern, or patchiness, of

vegetative structural diversity throughout the landscape. Wildlife native to the site depend upon a plant community diverse in species and structure. This need is evident in the variability of known habitat requirements of grassland-associated wildlife. Sand sagebrush may be present and locally abundant on this site. Sagebrush offers escape and thermal cover for several species of wildlife, and a source of winter browse for other species. Since this site is located next to major streams where trees have either historically existed or recently encroached along the drainages, the presence of trees makes this site generally unsuitable for prairie chickens and other ground-nesting birds that require large expanses of non-woody habitat. Woody species, such as those commonly established in tree plantings, provide habitat for mid-sized mammals such as raccoons, opossums, and striped skunks, and can also be detrimental to ground-nesting birds native to grassland habitats. Trees also can increase the potential for nest parasitism by brown-headed cowbirds when adjacent to grasslands. Trees of sufficient size adjacent to drainages do offer roosting habitat for wild turkeys, and nesting and perching habitat for raptors. The site's close proximity to permanent or seasonal water in streams generally meets the needs of wildlife requiring open water for drinking. Seasonal pools present during the spring offer breeding habitat for amphibians. Periodic events such as prolonged drought, wildfire, disease, or large number of insects will alter plant community diversity and structure, and associated wildlife species. Sand bluestem, little bluestem, switchgrass, and sideoats grama Plant Community The high diversity of grasses and forbs in this community provides habitat for a diverse group of insects. Areas with high forb diversity generally will support more insects such as the leaf-hoppers important to young grassland nesting birds. Grasshoppers, associated with grasses, are a critical food source for birds in later stages of development. Plains garter snakes, western hognose snakes, and six-lined racerunners are common reptiles on the site. Areas with high forb diversity, and large insect populations, coupled with nearby roost trees, offer suitable brood habitat for wild turkeys. Burrowing mammals such as thirteen-lined ground squirrels and kangaroo rats are common. Several species of pocket mice are common, and provide prey for raptors such as red-tailed hawks and great-horned owls throughout the year, and prey for northern harriers and rough-legged hawks during the winter. Small mammals provide prey for coyotes and other predators. Sand sagebrush, blue grama Plant Community With reduced cover of the taller native bunch grasses and a decrease in residual plant cover that is usually associated with the degradation of the Reference Plant Community, quail and other ground-nesting bird habitat begins to decline. Areas with scattered growths of sand sagebrush offer nesting habitat for Cassin’s sparrow and lark buntings, and winter habitat for bob-white quail. Areas with a canopy cover of 20-30 percent sand sagebrush with an understory of grasses and forbs offer nesting, winter, brood-rearing, and foraging habitat for greater prairie chickens. Sand sagebrush offers a winter food source for mule deer and pronghorn. Species composition of small mammals can shift rapidly in response to changes in the plant community structure that occur due to overgrazing or other disturbances such as wildfire. Go-back and Seeded Rangeland: The wildlife species expected on seeded rangeland and go-back communities are those listed for the plant community the seeding most resembles. 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 on 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

Progressive work on this section continues.

Recreational uses

None noted

Wood products

No appreciable wood products are present on the site

Other products

None noted

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 are 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 spatial extent of the site as well as personal knowledge of the site. Activities 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 extensively used to develop this ecological site description. Those NRCS individuals involved in developing the sandy lowland ecological sites North and South in the early 2000s include Carol Eakins, Chuck Markley, Jeff Nichols, and Mary Schrader from Nebraska; Joan Gienger, Ted Houser, Tim Watson, Amanda Shaw, Susan Francis, Jon Deege, and Robert Schiffner from Kansas. Josh Saunders and Harvey Sprock from Colorado. Range Condition Guides and Technical Range Site Descriptions for Kansas, Sandy Lowland, USDA, Soil Conservation Service, August, 1967 Range Site Description for Kansas, Sandy Lowland, USDA-Soil Conservation Service, September, 1983 Range Site Description for Colorado, Sandy Meadow, USDA-Soil Conservation Service, December 1975 Guide for determining range condition and suggestive initial stocking rates for Nebraska, Sandy Lowland, Vegetative Zone 1 and II, USDA-Soil Conservation Service, April 1983 Range Site Description for Nebraska, Sandy Lowland, USDA-Soil Conservation Service, August, 1981 Schacht, Walter H., Larsen, Dana. Section III Range Sites, Sandy Lowland Range Site, The Board of Regents of the University of Nebraska, publication Ecological Site Description for Kansas, Sandy Lowland North (R072XA023KS) and South (R072XB023KS), located in Ecological Site Information System (ESIS), 2007 Ecological Site Description for Colorado, Sandy Bottomland (R072XY031CO), located in Ecological Site Information System (ESIS)

Other references

Albertson, F. W. and Weaver, J. E., "Reduction of Un-Grazed Mixed Prairie to Short Grass as a Result of Drought and Dust" (1946). Agronomy & Horticulture -- Faculty Publications. Paper 496.

Andrews, R. and R. Righter. 1992. Colorado Birds. Denver Museum Nat. Hist., Denver, CO. 442 pp.

Eddleman, L.E. 1983. Some ecological attributes of western juniper. pp. 32-34. IN: Research in rangeland management, USDA, Agricultural Research Service, Special Report 682.

High Plains Regional Climate Center, University of Nebraska,(http://hpcc.unl.edu)

Thurow, T. L.; Hester, J. W. 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, NRCS. National Water and Climate Center, (http://wcc.nrcs.usda.gov)

USDA, NRCS. National Range and Pasture Handbook, September 1997

USDA, NRCS. National Soil Information System, Information Technology Center, (http://nasis.nrcs.usda.gov)

USDA, NRCS. 2002. The PLANTS Database, Version 3.5 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

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

Quality assurance review: David Kraft (acting QA for region 5 and 9)

Contributors

Chris Tecklenburg

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 early 2000s in regard to this ESD. I thank all those who contributed to the development of this site. In advance, I thank those who would provide insight, comments, and questions about this ESD in the future.

Rangeland health reference sheet

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

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Date	05/16/2016
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** **There are no rills or active headcutting present on the site.**

2. **Presence of water flow patterns:** **There is no evidence of water flow patterns, soil deposition or erosion on the site.**

3. **Number and height of erosional pedestals or terracettes:** **There is no evidence of pedestaled plants or terracettes on the site.**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** **Less than 5% bare ground is found on this site. Cover can be defined as live plants, litter, rocks, moss, lichens, etc.**

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

6. **Extent of wind scoured, blowouts and/or depositional areas:** There is no evidence of wind erosion creating bare areas or denuding vegetation.

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7. **Amount of litter movement (describe size and distance expected to travel):** Plant litter is distributed evenly throughout the site.

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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. Soil stability scores will range from 4-6.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** OSD from Glenberg series; 0-6 inches sandy loam, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; soft, very friable; moderately alkaline (ph 8.0); gradual smooth boundary. OSD from Bankard; 0 to 2 inches, sand, brown (10YR 4/3) moist, weak fine granular structure.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** There is no negative effect on water infiltration and/or runoff due to plant community composition or distribution. Plant composition and spatial distribution are adequate to prevent any rill formation and/or pedastalling. Plant rooting patterns, litter production, decomposition processes, spatial distribution are adequate to establish good infiltration and prevent all runoff.

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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 warm season grasses 55%: sand bluestem >> little bluestem = switchgrass >> sideoats grama

    Sub-dominant: Tall warm season grasses 10%: indiangrass > prairie sandreed > ginat sandreed > sand lovegrass Cool and warm season mix 10%: needle and thread = vine mesquite = western wheatgrass Forbs 10%

    Other: Group 4 (short and tall warm season) 5 (cool and warm season mix) and group 7 shrub and trees all minor components at 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):** Plant litter is distributed evenly throughout the site. There is no restriction to plant regeneration due to depth of litter. Plant litter at 45-55% cover, at a depth of .25 of an inch.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1300 pounds of production per ac/yr for a below average year, 3000 pounds of production per ac/yr for an above average year. Relative value is 2400 pounds of production per ac/yr.

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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.
