USDA Natural Resources Conservation Service

Ecological site R072XY100KS
Loamy Tableland

Last updated: 5/25/2021
Accessed: 05/02/2024

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.

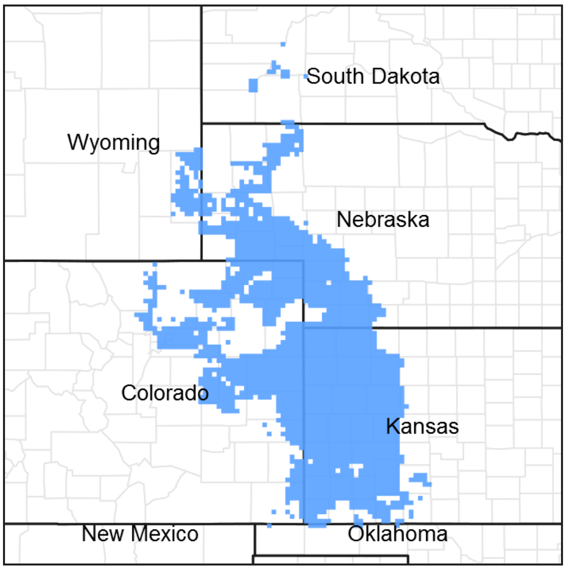


Figure 1. Mapped extent

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 southeast corner of the MLRA.

Classification relationships

Major Land Resource Area (MLRA) 72--Central High Tableland.

Ecological site concept

The Loamy Tableland ecological site is located on plains, rises and hillslopes on tablelands. Soils correlated with this site are moderately deep to very deep and have a surface that is >7 (18cm)inches mollic color. Soil surface texture ranges are: silt loam, silty clay loam, loam, very fine sandy loam to clay loam. The majority of the site will texture silt loam and silty clay loam. Soils that are correlated to Loamy Tableland have free carbonates below 4 inches (10cm). This site is dominated by loess parent material.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Bouteloua gracilis* (2) *Pascopyrum smithii*

Physiographic features

This site occurs on nearly level to sloping hillslopes, rises and plains on tablelands. This site is dominated by Quaternary Period loess deposits and eolian deposits of Tertiary Period material from the local rivers and streams. This site consists of very deep upland soils with silty or loamy surface layers and subsoil. This site produces runoff to areas lower on the landscape. This site is subject to erosion by wind and water if the vegetative cover is reduced or absent by such things as overgrazing and fire events. Elevation for this site ranges from 2200 to 5400 feet.

The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up MLRA 72 is as follows: Republican (1025), 38 percent; Middle Arkansas (1103), 20 percent; Smoky Hill (1026), 15 percent; South Platte (1019), 13 percent; Upper Cimarron (1104), 11 percent; North Platte (1018), 2 percent; and Upper Arkansas (1102), 1 percent. The North Platte River forms the northern boundary of this MLRA. The South Platte River joins the North Platte River at the town of North Platte, Nebraska. The Arkansas River bisects the southern part of the MLRA. Other large rivers between the North Platte and Arkansas Rivers in the area include the Republican, Sappa, Prairie Dog, Solomon, Saline, and Smoky Hill Rivers. The Cimarron River is the southern boundary of MLRA 72 in the western part of this area.

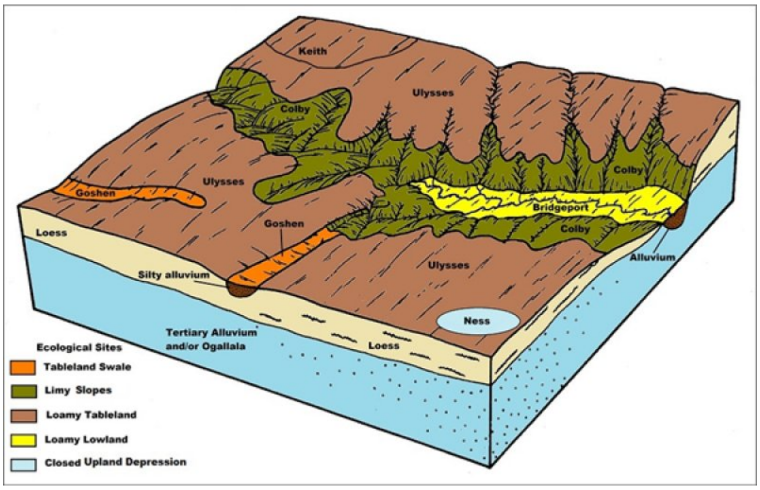


Figure 2. MLRA72 ESD block diagram

Table 2. Representative physiographic features

Landforms	(1) Plain (2) Hill (3) Rise
Flooding frequency	None
Ponding frequency	None
Elevation	671–1,646 m
Slope	0–15%
Water table depth	201 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)	142 days
Freeze-free period (average)	159 days
Precipitation total (average)	508 mm

Climate stations used

- (1) TRENTON DAM [USC00258628], Trenton, NE
- (2) JULESBURG [USC00054413], Julesburg, CO
- (3) YUMA [USC00059295], Yuma, CO
- (4) ULYSSES 3NE [USC00148287], Ulysses, KS
- (5) KIMBALL 2NE [USC00254440], Kimball, NE
- (6) BREWSTER 4W [USC00141029], Brewster, KS
- (7) TRIBUNE 1W [USC00148235], Tribune, KS
- (8) SCOTT CITY [USC00147271], Scott City, KS
- (9) WALLACE 2W [USC00258920], Wallace, NE

Influencing water features

There are no water features of the ecological site or adjacent wetland/riparian regimes that influence the vegetation and/or management of the site that make it distinctive from other ecological sites. Many of the mapunits in this ESD have a 1-3% hydric component for closed upland depressions (playas).

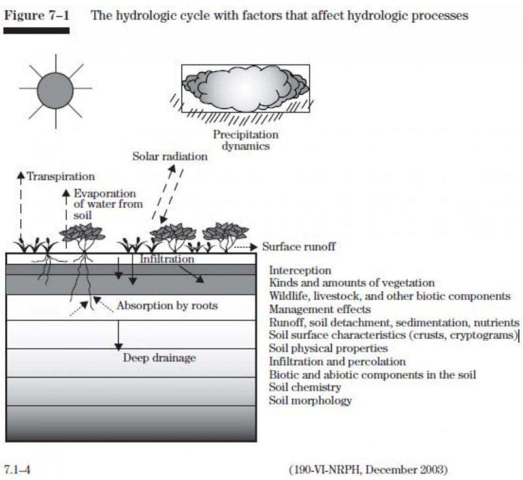


Figure 7. Fig. 7-1 is from the National Range and Pasture Ha

Soil features

The soils on this site are well drained and are deep to very deep on slopes ranging from nearly level to gently sloping. Most of the soils on this site have loess as parent material and are dominated by silt loam and silty clay loam textures. The geology is made up by river valley deposits of material from the Tertiary Period that have been wind deposited on the adjacent tableland or by Peoria Loess, which is glacial debris from the glacial retreat to the north during the Quaternary period.

The surface layer of the soils in this site is primarily moderately-fine textured to medium textured (but the range includes fine-textured). The surface layer ranges from a depth of 4 to 12 inches thick and permeability is moderately slow to moderate. The subsoil and underlying material have a similar range in texture as the surface layer. Contrasting sandy (gravelly) or very clayey layers may occur at depths below 40 inches in several of the listed soil series. Soils in this site are generally high in fertility and can have free carbonates below 6 inches. These soils are susceptible to erosion by water and wind. The potential for water erosion accelerates with increasing slope.

Surface soil structure is granular to subangular blocky, and structure below the surface is prismatic or subangular blocky. Soil structure describes the manner in which soil particles are aggregated and defines the nature of the system of pores and channels in a soil. Together, soil texture and structure help determine the ability of the soil to hold and conduct the water and air necessary for sustaining life.

Available water holding capacity (AWC) ranges from 1.9 to 2.7 inches of water per foot of soil depth. Available water is the portion of water in a soil that can be readily absorbed by plant roots. This is the amount of water released between the field capacity and the permanent wilting point. As fineness of texture increases, there is a general increase in available moisture storage from sands to loams and silt loams.

Major soil series correlated to this ecological site include: Ulysses, Richfield, Keith, Kuma, Rosebud, Blackwood, Dawes, Mace, McConaughy, Norka, Satanta and Weld.

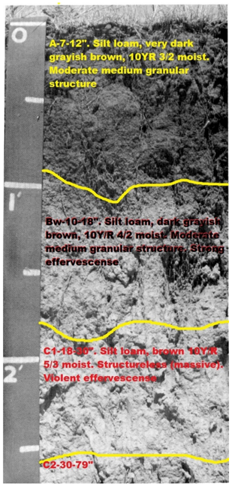


Figure 8. Ulysses, 2 to 7 percent slope

Table 4. Representative soil features

Surface texture	(1) Silt loam (2) Loam (3) Very fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	51–305 cm
Surface fragment cover <=3"	0–15%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	4.83–6.86 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%

Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	5–35%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The plant communities for this site are dynamic due to the complex interaction of many ecological processes. The interpretive plant community for this site is the Reference Plant Community. The reference community has been determined by the study of rangeland relic areas, areas protected from excessive disturbance, areas under long term rotational grazing strategies, literature of plant communities from the early 1900's and local expertise. 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 sod-bound 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 sod-bound state is characterized by a warm season, shortgrass plant community made up of primarily buffalograss and blue grama with few remnant western wheatgrass motts and very few forbs. 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 on the site's geographical location inside Major Land Resource Area 72 (MLRA). 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 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).

This site developed with occasional fires being 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 prairie dogs, 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.

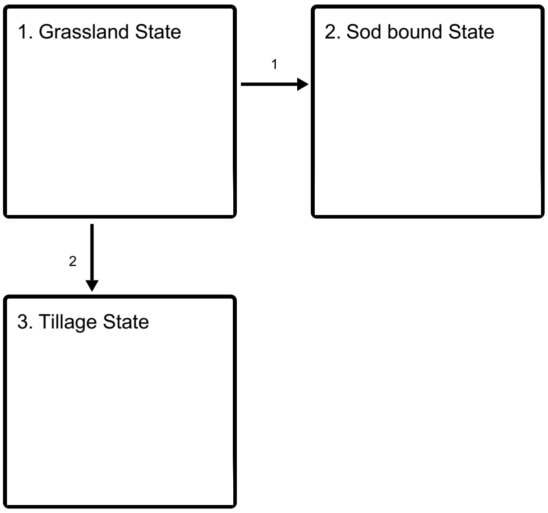
Drought cycles were part of the natural range of variability within the site and have historically had a major impact upon the vegetation. The species composition changes according to the duration and severity of the drought cycle (Albertson, F. W., Weaver, J. E.).

This site occurs on exposed interfluves. Due to the landform position, these level areas are preferred by livestock, which can lead to grazing distribution problems.

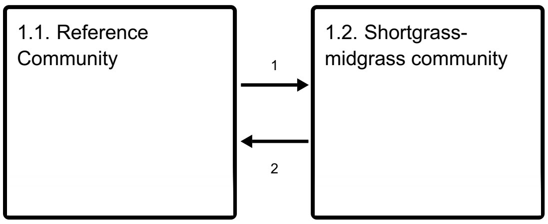
Historically, mechanical treatment of this site was practiced. The theory of mechanical treatment was that it improves production and plant composition on rangeland. These mechanical treatments include such things as contour furrowing, contour pitting, terracing, chiseling, disking and inter-seeding. Many of these treatments were implemented during the 1930’s through the 1960’s and have shown to have no significant long-term benefits for improving production. Many of these practices result in a permanently rough ground surface. Inter-seeding may be beneficial depending upon stand achieved and management used after seeding.

State and transition model

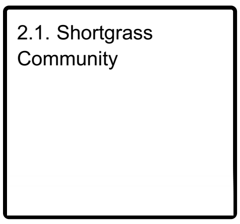
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities

State 1
Grassland State

The grassland state is supported by empirical data, historical data, local expertise and photographs. This state is defined by two native plant communities that are a result of periodic fire, drought and grazing. These events are part of the natural disturbance regime and climatic process. The reference plant community consist of cool season sod and bunchgrasses, warm season sod forming grasses, forbs and shrubs. The shortgrass-midgrass plant community is the other plant community within the grassland state. This plant community is made up of mostly warm season short grasses with decreasing amounts of sideoats grama and forbs. Western wheatgrass dominates the cool season midgrasses.

Community 1.1
Reference Community

Figure 9. photographer-Tecklenburg, Ulysses series, Dundy Co. NE

Figure 10. photographer-Nadine Bishop, Kuma soil series, Chase Co. NE

The reference community is supported by empirical data, historical data, local expertise and photographs. The potential vegetation is a mixed grass prairie consisting of approximately 85 percent grasses and grass-like plants, 10 percent forbs, and 5 percent woody plants. Blue grama, buffalograss, western wheatgrass, green needlegrass, needle and thread, and sideoats grama are the primary grasses in this community. This community has a diverse forb population, most of which occur in small amounts. Shrubs include fourwing saltbush, winterfat, small soapweed and pricklypear cactus. Western wheatgrass is considered a primary cool season grass in this plant community. It is a valuable forage plant in late spring and/or early summer and heavily relied upon for early season grazing. Needle and thread appears to be more prevalent in the northern part of MLRA 72 as well as along the eastern reaches. This plant community is diverse and productive. Litter is uniformly distributed with very little movement off-site and natural plant mortality is very low. This community is resistant to many disturbances with the exception of extreme, long term continuous grazing, tillage and/or development into urban or other uses. Total annual production ranges from 900 to 2200 pounds of air-dried vegetation per acre per year and will average 1700 pounds. These production figures are the fluctuations expected during favorable, normal and unfavorable years due to the timing and amount of precipitation and temperature. Total annual production should not be confused with species productivity, which is annual production and variability by species throughout the extent of the community phase.

Dominant plant species

- blue grama (*Bouteloua gracilis*), grass

- buffalograss (*Bouteloua dactyloides*), grass

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	857	1620	2096
Forb	101	191	247
Shrub/Vine	50	95	123
Total	**1008**	**1906**	**2466**

Figure 12. Plant community growth curve (percent production by month). KS7307, Western Wheatgrass, Buffalograss, Blue Grama. Reference community phase growth curve is generalized in order to capture both warm and cool season species. .

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	2	10	23	25	25	10	5	0	0	0

Community 1.2
Shortgrass-midgrass community

Figure 13. photographer-Tecklenburg, Ulysses soil, Wallace Co. Ks

Figure 14. photographer-Tecklenburg, Norka soil, Kit Carson C

Figure 15. photographer-Tecklenburg, Ulysses soil, Sherman co

The potential vegetation is a warm season shortgrass dominant prairie with both warm and cool season midgrasses as a sub-dominant species. Total production is approximately 95 percent grasses and 5% forbs. Blue grama and buffalograss are the primary short grasses in this community. Western wheatgrass, sideoats and needle and thread are the primary mid-grasses. Forb diversity has declined. This plant community evolved with long-term continuous grazing, moderate stocking, and in some instances heavy winter stocking. Recognition of this plant community will enable the land user to implement key management decisions before a significant economic/ecological threshold is crossed. Blue grama and buffalograss are the dominant species and are in the early stages of forming a sod bound appearance. Western wheatgrass, green needlegrass, and needle and thread are reduced. Once the remnant cool season grass species are completely removed and other plants have increased, it will take a long time to bring them back by management alone. Substantial increases in money and other resources will be required to replace the lost species in a shorter period of time. Reduction of western wheatgrass, nitrogen fixing forbs, climax dominant shrubs, and increased warm season short grasses has begun to alter the biotic integrity of this community. Water infiltration is reduced due to the sod nature of the buffalograss and blue grama. Runoff is increased. Total annual production ranges from 700 to 2000 pounds of air-dried vegetation per acre per year and will average 1500 pounds.

Pathway 1
Community 1.1 to 1.2

Reference Community

Shortgrass-midgrass community

Long term management without a forage and animal balance and continuous grazing without adequate recovery periods between grazing events will convert the reference plant community to a community of more blue grama and buffalograss and less amounts of both cool and warm season midgrasses as well as lesser amounts of forbs. Drought, in combination with this type of management will quicken the rate at which the reference community pathways to the shortgrass-midgrass community.

Pathway 2
Community 1.2 to 1.1

Shortgrass-midgrass community

Reference Community

Management that incorporates long-term prescribed grazing, a forage and animal balance, and adequate rest and recovery periods will favor this plant community to move from a blue grama and buffalograss dominant community to a midgrass-shortgrass community found in the reference phase.

State 2
Sod bound State

With continuous grazing, buffalograss and blue grama will become the dominant species and have a sod bound appearance. Unable to withstand the grazing pressure, only a remnant population of western wheatgrass remains. Species diversity has been reduced further. Water infiltration is reduced due to the sod nature of the buffalograss and blue grama. Runoff is increased. Specific dynamic soil property changes between the grassland state and the sod-bound state has been documented. As plant community cover decreases from bunchgrasses to more of the sod grasses there is a decrease in infiltration and interception and an increase in surface runoff (Thurow T. L. 2003). The total average annual production of this site is approximately 1200 pounds per acre (air-dry weight).

Community 2.1
Shortgrass Community

Figure 16. 4-8-2013, photographer-Tecklenburg, right half Ulysses soil, Logan co. KS

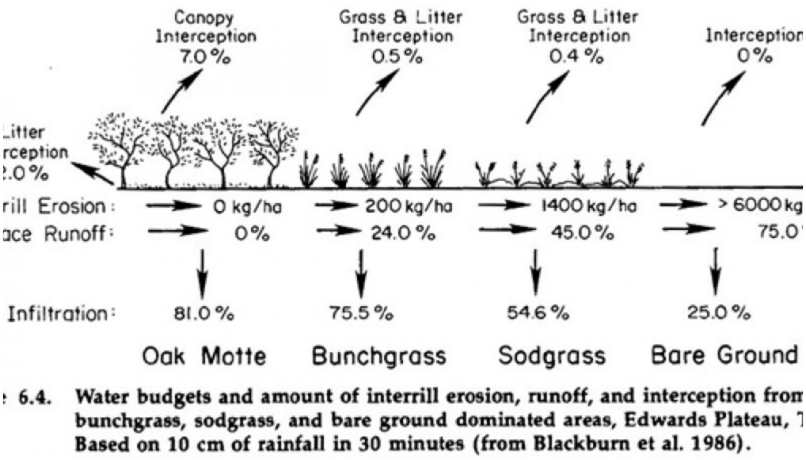


Figure 17. Water budget and amount of erosion, runoff and interception in relation to veg. type

The potential vegetation is a short grass prairie consisting of approximately 90 percent grasses and grass-like plants, 7 percent forbs, and 3 percent woody plants. Blue grama and buffalograss are the primary grasses in this community. A slight increase in red threeawn, fringed sage and pricklypear cactus could potentially be observed. Forb diversity has declined. This plant community is resistant to change due to grazing and drought tolerance of both buffalograss and blue grama. A significant amount of production and diversity has been lost when compared to the reference community. Loss of cool season grasses, shrub component and nitrogen fixing forbs have impacted the energy flow and nutrient cycling. Water infiltration is reduced due to the massive shallow root system, “root pan”, characteristic of sodbound blue grama and buffalograss. Soil loss from water may be noticeable where flow paths are connected. Buffalograss and blue grama have developed a dense sod. Sideoats grama and western wheatgrass have been almost entirely removed from the plant community. An increase of yucca, pricklypear cactus, and perennial threeawns has occurred. During years of drought, western wheatgrass makes little or no growth and the whole site may appear to be just buffalograss and blue grama. Blue grama provides this site with a unique feature in that the leaves on blue grama remain semi-dormant during drought periods but resume growing each time adequate moisture is available during the growing season. Reseeding of blue grama is unlikely because young seedlings seldom survive the extended drought periods that are common on this site. Blue grama does maintain itself by tillering. This also provides blue grama with another unique feature of being able to withstand drought and heavy grazing use. Typically blue grama is a bunchgrass but quickly forms a sodbound condition when heavily grazed.

State 3
Tillage State

The tillage state consist of abandoned cropland that has been naturally revegetated (go-back) or planted/seeded to grassland. Many reseeded plant communities were planted with a local seeding mix under the Conservation Reserve Program (CRP) or were planted to a monoculture of sideoats grama. Go-back communities are difficult to define due to the variability of plant communities that exist. Many of these communities are represented by the genus Aristida (three-awns). This is an alternative state because the ecological functions i.e. dynamic soil properties and plant communities are not fully restored to that of the reference state. Tillage can destroy soil aggregation. Soil aggregates are an example of dynamic soil property change. Aggregate stability is critical for infiltration, root growth, and resistance to water and wind erosion (Brady, Weil, 14th ed. pp 132-148)

Community 3.1
Local seeding mix

This plant community is created when the soil is tilled or farmed (sodbusted), and abandoned. All of the native plants are killed, soil organic matter and carbon reserves are reduced, soil structure is changed, and a plowpan or compacted layer can be formed decreasing water infiltration. Synthetic chemicals may remain as a residual in the soil from farming operations. In early successional stages, this community is not stable. Wind and water erosion is a concern. This plant community can vary considerably depending on how eroded the soil was, the species seeded, the stand that was established, how long ago the stand was established and the management of the stand since establishment. Prescribed grazing with adequate recovery periods will be needed to maintain productivity and desirable species. Selection of grass species by grazing animals on seeded rangeland sites can be significantly different from native range sites. Typically there is a reduced production level on seeded sites compared to native sites with similar species composition. Species diversity is lower and forb species generally take longer to re-establish. Seeded rangeland should be managed separately due to the natural ecological differences.

Community 3.2
Go-back

Figure 18. photographer-Tecklenburg, Kuma soil, Yuma co. CO, 70 yrs rest

Figure 19. photographer-Tecklenburg, Kuma series, Yuma co. CO, 70 yrs rest

This plant community is created when the soil is tilled or farmed (sodbusted), and abandoned. Generally land that has been used for purposes other than rangeland or hayland will start to revegetate when left undisturbed. Due to tillage activity there are no native plants, soil organic matter and carbon reserves are reduced, soil structure is changed and a plowpan or compacted layer can be formed decreasing water infiltration. Many times, synthetic chemicals remain as a residual from farming operations. Erosion is a concern. The initial ground cover will primarily consist of kochia, annual bromes, pigweed, foxtail (bristlegrass), Russian thistle, witchgrass, tumblegrass as well as other annuals. These plants give some protection from erosion and start to rebuild organic matter. The next succession of plants will be grasses such as sand dropseed, threeawn, silver bluestem and annuals. Eventually blue grama, sideoats grama and buffalograss will come back. These species will not regain in proportions to that of the reference state. Soil structure, aggregate stability and organic matter will not recover to levels of the reference community. Range seeding can accelerate the process of species composition and possibly production, but will be at a high cost.

Transition 1
State 1 to 2

Long term management without a forage and animal balance and continuous grazing without adequate recovery periods between grazing events will convert the reference plant community to a community of blue grama and buffalograss sod. Drought, in combination with this type of management will quicken the rate at which the reference community pathways to the shortgrass community. Ecological processes effected are the hydrologic cycle. Soil dynamic property changes include an increase bulk density and a decrease in aggregate stability.

Transition 2
State 1 to 3

This transition is triggered by a management action as opposed to a natural event. Tillage or breaking the ground with machinery for crop production will move the grassland state to a tillage state.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Shortgrass warm season Dominant 40%**			336–762	
	blue grama	BOGR2	*Bouteloua gracilis*	252–493	–
	buffalograss	BODA2	*Bouteloua dactyloides*	84–269	–
2	**Tall/Midgrass warm season co-subdominant 21%**			67–404	
	sideoats grama	BOCU	*Bouteloua curtipendula*	22–168	–
	little bluestem	SCSC	*Schizachyrium scoparium*	22–112	

	little bluestem	SCSC	*Schizachyrium scoparium*	22–112	–
	composite dropseed	SPCO16	*Sporobolus compositus*	0–50	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–50	–
	big bluestem	ANGE	*Andropogon gerardii*	0–50	–
3	**Midgrass cool season co-subdominant 18%**			224–336	
	western wheatgrass	PASM	*Pascopyrum smithii*	224–303	–
	green needlegrass	NAVI4	*Nassella viridula*	0–135	–
	needle and thread	HECO26	*Hesperostipa comata*	0–90	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	0–17	–
	squirreltail	ELEL5	*Elymus elymoides*	0–17	–
4	**Sedges Minor component 6%**			0–118	
	threadleaf sedge	CAFI	*Carex filifolia*	0–56	–
	sun sedge	CAINH2	*Carex inops ssp. heliophila*	0–34	–
	sedge	CAREX	*Carex*	0–28	–
Forb					
5	**Forbs Minor Component 10%**			17–191	
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	6–28	–
	white heath aster	SYERE	*Symphyotrichum ericoides var. ericoides*	0–22	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	6–22	–
	dotted blazing star	LIPU	*Liatris punctata*	0–22	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	6–22	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	6–22	–
	purple prairie clover	DAPU5	*Dalea purpurea*	0–17	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	0–17	–
	lacy tansyaster	MAPIP4	*Machaeranthera pinnatifida ssp. pinnatifida var. pinnatifida*	0–17	–
	broadbeard beardtongue	PEAN4	*Penstemon angustifolius*	0–17	–
	slimflower scurfpea	PSTE5	*Psoralidium tenuiflorum*	6–17	–
	American vetch	VIAM	*Vicia americana*	0–17	–
	common sunflower	HEAN3	*Helianthus annuus*	0–11	–
	rush skeletonplant	LYJU	*Lygodesmia juncea*	0–11	–
	woolly locoweed	ASMO7	*Astragalus mollissimus*	0–11	–
	yellowspine thistle	CIOC2	*Cirsium ochrocentrum*	0–6	–
	Texas croton	CRTE4	*Croton texensis*	0–6	–
Shrub/Vine					
6	**Shrub Minor Component 5%**			17–95	
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–45	–
	prairie sagewort	ARFR4	*Artemisia frigida*	0–34	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–22	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–22	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	6–22	–
	soapweed yucca	YUGL	*Yucca glauca*	6–22	–
	leadplant	AMCA6	*Amorpha canescens*	6–17	–

Animal community

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.

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 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 though 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 principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group A and B. Infiltration and runoff potential for this site varies from moderate to high depending on soil hydrologic group and ground cover. In many cases, areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where short grasses form a strong sod and dominate the site. Areas where ground cover is less than 50 percent have the greatest potential to have reduced infiltration and higher runoff. (Refer to NRCS Section 4, National Engineering Handbook (NEH-4) for runoff quantities and hydrologic curves).

Recreational uses

Because of the deep fertile soils and gentle slopes of this site, it is continually in danger of development for cropland, home sites, roads, and urban uses. The site exhibits little visual contrast but does present a panoramic view of the wide-open spaces cherished by many in the Great Plains States. Hunting opportunities for upland game species abound.

Wood products

No appreciable wood products are present on the site.

Other products

None noted

Other information

Site development and testing plan. This ESD has gone through the approval process.

Inventory data references

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel was also used.

Those involved in developing the initial ESD in 2001 include: Tim Watson, Amanda Shaw, Susan Francis, Jon Deege, Harvey Sprock, Robert Schiffner, Josh Saunders, Paul Billig, Ted Houser, Rick Cantu, JoAnn Geinger, Chuck Markley, Jeff Nichols, Mary Schrader, and Carol Eakins.

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Quality control review: MLRA 72 Loamy Tableland Workshop, Goodland KS, September 21-22, 2015. David Kraft, Hutchinson, KS Area office 9-28-2015

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

Site Development and Testing Plan: This ESD went through the approval process.

Contributors

Chris Tecklenburg

Approval

Curtis Talbot, 5/25/2021

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 2000's 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.

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 Revision2 5-25-2021; Revision1 9-15-2015 David Kraft, John Henry, Doug Spencer and Dwayne Rice Original Authors 2-2005
Contact for lead author	Chris Tecklenburg (chris.tecklenburg@usda.gov)
Date	09/16/2015
Approved by	David J. Kraft, State Rangeland Management Specialist
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:** Typically none. If present (steeper slopes following intense storms) short and not connected.

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3. **Number and height of erosional pedestals or terracettes:** None, due to the slope percentage and amount of cover. Pedestals and terracettes are indicators of soil being moved by water and/or wind.

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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, with bare patches generally less than 2-3 inches in diameter. Extended drought can cause bare ground to increase. Bare ground is the remaining ground cover after accounting for ground surface covered by vegetation (basal and foliar canopy), litter, standing dead vegetation, gravel/rock, and visible biological crust (e.g., lichen, mosses, algae).

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5. **Number of gullies and erosion associated with gullies:** None. Gullies are not a natural feature of this landscape and site.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None. The vegetative cover in the reference state is sufficient to limit wind-scoured or blowout areas. This site is not a depositional area for offsite wind erosion.

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7. **Amount of litter movement (describe size and distance expected to travel):** None. No evidence of litter movement (i.e., dead plant material that is in contact with the soil surface). The inherent capacity for litter movement on a soil is a function of its slope and landscape position.

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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):** Stability class ratings from the soil stability test should be =5 overall, with ratings of 5 or greater in the interspaces and under perennial plant canopy. Plant canopy is large enough to intercept the majority of raindrops. No physical crusts apparent.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The surface horizon (A) should be a minimum 7” (roots growing throughout) with weak fine granular to moderate fine subangular blocky structure. The surface (A) horizon color is very dark grayish brown 10YR 3/2 (moist), and the subsurface (B) horizon color is dark grayish brown 10YR 4/2 (moist).

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Diverse grass, forb, and shrub canopy and root structure reduces raindrop impact and slows overland flow providing increased time for infiltration to occur. Warm season shortgrasses are dominant. Tall and mid grasses and mid grass cool seasons are co-subdominants. Sedges, forbs, and shrubs are all minor components. Infiltration will decrease if tall and migrasses and mid grass cool season groups become minor or trace. Spatial distribution of functional/structural groups varies from north to south. In the northern part of this MLRA expect more cool seasons and shrubs than in the southern end.

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.

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: Group 1 Shortgrass Dominant 40% 680 lbs. blue grama 225-440, buffalograss 75-240

    Sub-dominant: Group 2 Tall and mid warm season grasses co-subdominant 21% 360 lbs. sideoats grama 20-150, little bluestem 20-100, big bluestem 0-45, composite dropseed 0-45, sand dropseed 0-45
    Group 3 Midgrass cool season co-subdominant 18% 300 lbs. western wheatgrass 200-270, green needlegrass 0-120, needle and thread 0-80, Fendler threeawn 0-15, squirreltail 0-15

    Other: Group 4 Sedges minor component 6% 0-105 lbs. threadleaf sedge 0-50, sun sedge 0-30, sedge 0-25
    Group 5 Forbs minor component 10% 170 lbs. see ESD for species list minimum 5 species.
    Group 6 Shrubs minor component 5% 85 lbs. see ESD for species list minimum 3 species.

    Additional:

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 (<10%) 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 sub-dominant groups.

14. **Average percent litter cover (%) and depth (in):** Total litter cover is expected to be 60-80% and at an average depth of 0.25 inches. Litter may be reduced to 20-40% in cover and near zero depth for 1-2 years following wildfire or multiyear drought.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-**

production): Annual production is 1,700 pounds per acre in a year with normal precipitation and temperatures. Low and high production years should yield 900 and 2,200 pounds per acre, respectively. Annual production may be reduced by 40-60% the first year following a wildfire or following a multiyear drought.

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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:** Cheatgrass, Russian thistle, kochia, and other non-native annuals may occur in trace amounts in community 1.1 but they do not have the potential to increase to a subdominant or dominant in the absence of wildfire and act as an invasive on this site. The listed invasives are not expected to occur in the reference state.

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17. **Perennial plant reproductive capability:** Plants in all functional/structural groups should be capable of reproducing annually under normal weather conditions. The number and distribution of tillers or rhizomes is assessed on perennial plants occupying the evaluation area. Vigor and reproductive capability may be somewhat reduced during drought or for 1 year following a wildfire. At least 50% of plants should still have reproductive capability during droughts that last 1-2 years.
