USDA Natural Resources Conservation Service

Ecological site R078CY091OK
Slickspot

Last updated: 9/15/2023
Accessed: 05/04/2024

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

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): 078C–Central Rolling Red Plains, Eastern Part

MLRA 78C is characterized by moderately dissected, rolling plains with prominent ridges and valleys and numerous terraces adjacent to dissecting streams. Loamy and clayey soils are generally deep, well drained, and developed in soft, calcareous sandstones, siltstones, and shales in red beds of Permian age. Characteristic red soils have formed in most of the area because of the underlying Permian red-bed sedimentary rocks.

LRU notes

NA

Classification relationships

This ecological site is correlated to soil components at the Major Land Resource Area (MLRA) level which is further described in USDA Ag Handbook 296.

Ecological site concept

The Slickspot ecosite occurs on depressed areas of lighter colored surface soils over

compact clay layers. Salinity is often high and surface crusting is common. These sites are commonly mapped as complexes within other soils/sites. Salt tolerant vegetation dominates these areas. Due to the nature of the soils, these areas may be particularly sensitive to erosion following soil disturbances.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Sporobolus airoides* (2) *Bouteloua gracilis*

Physiographic features

These are small areas, generally less than one acre in size, but can be larger, located on nearly level to moderately sloping plains.

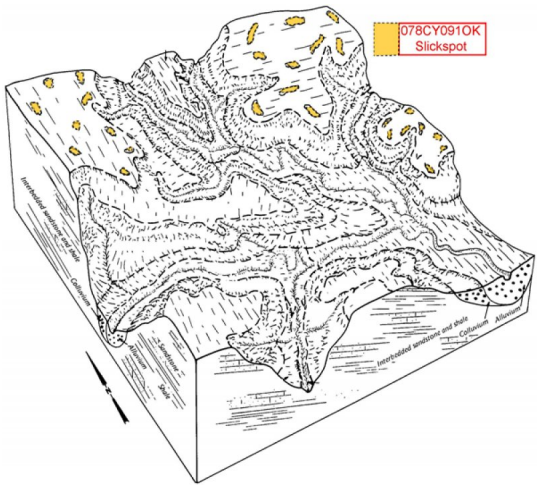


Figure 2. Slickspot

Table 2. Representative physiographic features

Landforms	(1) Alluvial plain > Terrace
Runoff class	High to very high
Flooding frequency	None
Ponding frequency	None
Elevation	274–610 m
Slope	0–3%
Ponding depth	0 cm
Water table depth	152–203 cm
Aspect	Aspect is not a significant factor

Climatic features

MLRA 78C lies within the subtropical sub-humid climate regime. This regime is characterized by rapid changes in temperature; marked extremes, both daily and annual; and rather erratic rainfall. The weather is alternately influenced by cold dry air from the Arctic Circle, and warm moist air from the Gulf of Mexico.

Seasonal changes are gradual. Spring is a season of variable weather and relatively high precipitation with prevailing winds from the southwest. Summers are generally hot with low humidity. Fall has long periods of pleasant weather interspersed with moderate to heavy rains. Winter is open and moderate to cold with winds from the north

and infrequent snows.

Wind speeds average more than eleven miles an hour with prevailing southern winds. Rather strong winds can occur in all months of the year. While strong gusty winds occur, severe dust storms are rare.

Approximately 75 percent of the rainfall occurs during the warm season, and much of it comes in storms of high intensity and short duration in May and June. These rains can be particularly erosive on sites where vegetation is sparse. Occasional droughts are to be expected. Lack of rainfall and hot, dry winds often curtail forage production during July and August.

Table 3. Representative climatic features

Frost-free period (characteristic range)	178-186 days
Freeze-free period (characteristic range)	199-203 days
Precipitation total (characteristic range)	737-813 mm
Frost-free period (actual range)	176-186 days
Freeze-free period (actual range)	198-205 days
Precipitation total (actual range)	711-889 mm
Frost-free period (average)	182 days
Freeze-free period (average)	202 days
Precipitation total (average)	787 mm

Climate stations used

- (1) ALTUS IRIG RSCH STN [USC00340179], Elmer, OK
- (2) WICHITA MTN WR [USC00349629], N Central Comanche Cnty, OK
- (3) ALTUS DAM [USC00340184], Lone Wolf, OK
- (4) HOBART MUNI AP [USW00093986], Hobart, OK
- (5) CHATTANOOGA [USC00341706], Chattanooga, OK

Influencing water features

None

Wetland description

NA

Soil features

Soils are mapped for each county within the MLRA. Mapunits are representations of the major soil series component(s) and named accordingly. Each Mapunit is spatially represented on a digital soils map as polygons of different shapes and sizes. Within these Mapunits, there are often minor soil series components included. These minor components are soils that occur within a Mapunit polygon but are of small extent (15% or less of the Mapunit area). However, it is difficult to separate these minor soils spatially due to the scale of soil mapping.

Ecological sites are correlated at the component level of the soil survey. Therefore, a single Mapunit may contain multiple Ecological Sites just as it may contain multiple soil components. This is important to understand when investigating soils and Ecological Sites. A soil survey Mapunit may be correlated to a single Ecological Site based on the major component; however, there may be inclusional areas of additional Ecological Sites which are correlated to the minor components of that particular soil Mapunit.

Representative soil components for this site include:
Hinkle

Slickspot soils occur in Hinkle Series complexes. These sites are small depressed areas and usually light colored on the surface. Slickspots are easily recognized because they are inclusions within larger ecological sites and appear to be "out of place" or unusually different in appearance and vegetation from surrounding sites. Normally, the surface soil is 2 to 4 inches thick over compacted clay. Infiltration is very slow and soil aeration is unfavorable for plant growth. Crusting restricts vegetative yields.

Table 4. Representative soil features

Parent material	(1) Alluvium–granite
Surface texture	(1) Loam (2) Silt loam
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Very slow to moderate
Soil depth	152–203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	6.35–13.46 cm
Calcium carbonate equivalent (0-101.6cm)	0–3%
Electrical conductivity (0-101.6cm)	0–6 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	5–15
Soil reaction (1:1 water) (0-101.6cm)	6.1–8.6
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The information contained in the State and Transition Diagram (STD) and the Ecological Site Description was developed using archeological and historical data, professional experience, and scientific studies. The information presented is representative of a very complex set of plant communities. Not all scenarios or plants are included. Key indicator plants, animals and ecological processes are described to inform land management decisions.

Vegetation on this site can vary due to differences in salt content and the degree of compaction of clay loam subsoils. Vegetation is primarily alkali sacaton (*Sporobolus airoides*), blue grama (*Bouteloua gracilis*), and buffalograss (Buchloe dactyloides) with various combinations and amounts of sideoats grama (*Bouteloua curtipendula*), windmill grass (*Chloris verticillata*), silver bluestem (*Bothriochloa laguroides* var. torreyana), tumblegrass (*Schedonnardus paniculatus*), fall witchgrass (*Digitaria cognata*), gummy lovegrass (*Eragrostis curtipedicellata*), and Texas grama (*Bouteloua rigidiseta*). During extremely cool, wet spring years, prairie threeawn (*Aristida purpurea*) and western ragweed (*Ambrosia psilostachya*) may increase to more than normal levels. Some Slickspots are so salty and droughty that vegetation will not grow, while conversely, other low-salinity Slickspot sites support diverse plant communities relatively well.

Slickspots are often small inclusions within larger Claypan and Loamy Prairie ecological sites, so it is difficult to separate these small ecological sites into individual management units. On this site, grazing abuse tends to decrease alkali sacaton, sideoats grama, and blue grama while increasing buffalograss, gummy lovegrass,

mourning lovegrass, whorled dropseed, inland saltgrass, tumblegrass, windmillgrass, and Texas grama. Also, under continuous abuse, reference community plants will eventually be replaced by prairie threeawn and other annuals. This rate of replacement depends upon several factors including, but not limited to, stocking rate, time of grazing, and available moisture.

The significant plant communities are:
1. Midgrass/Shortgrass alkali sacaton dominant
2. Shortgrass blue grama dominant
3. Shortgrass prairie threeawn dominant

State and Transition Diagram:
A State and Transition Diagram for the Slickspot (R078CY091OK) site is depicted below. Thorough descriptions of each state, transition, and pathway follow the model. Experts base this model on available experimental research, field observations, professional consensus, and interpretations. It is likely to change as knowledge increases. Plant communities will differ across the MLRA because of the natural variability in weather, soils, and aspect. The Reference Plant Community is not necessarily the management goal; other vegetative states may be desired plant communities as long as the Range Health assessments are in the moderate and above category.

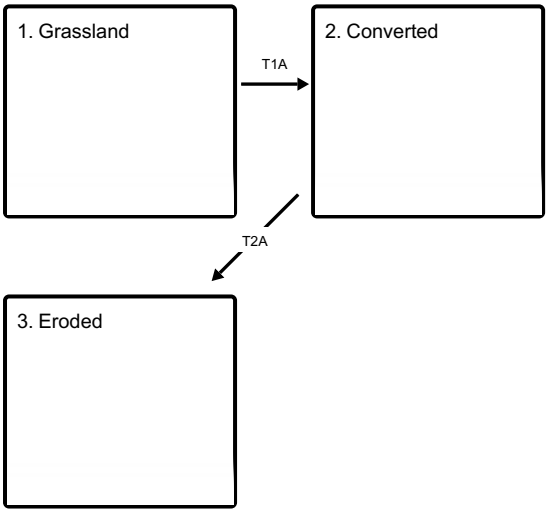
The biological processes on this site are complex. Therefore, representative values are presented in a land management context. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every situation or the full range of conditions, species, and responses for the site.

Composition by dry weight and percent canopy cover are provided to describing the functional groups. Most observers find it easier to visualize or estimate percent canopy for woody species (trees and shrubs).

The following diagram suggests some pathways that the vegetation on this site might take. There may be other states not shown on the diagram. This information is intended to show what might happen in a given set of circumstances. It does not mean that this would happen the same way in every instance. Local professional guidance should always be sought before pursuing a treatment scenario.

State and transition model

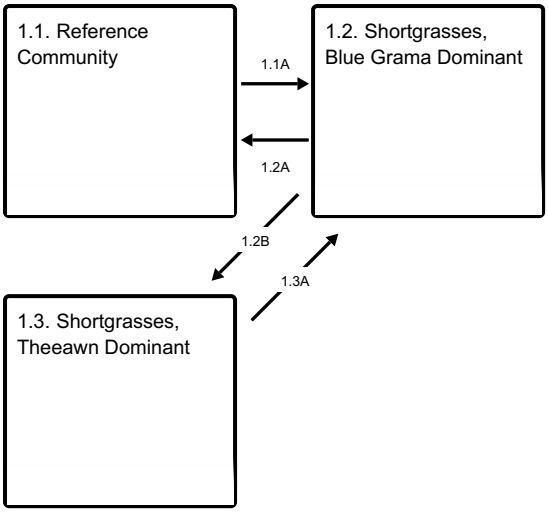
Ecosystem states



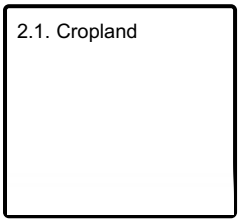
T1A - Extensive soil disturbance followed by seeding

T2A - Loss of soil and site stability

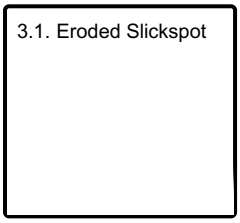
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Grassland

This is the reference or diagnostic community for the site. The description is based on early range site descriptions, clipping data, professional consensus of experienced range specialists, and analysis of field work.

Community 1.1
Reference Community

The Slickspot ecological site is a small area of open midgrass/shortgrass prairie with alkali sacaton being the dominant grass species and approximately 10% sideoats grama usually on site. The major shortgrasses are sideoats grama along with lesser amounts of blue grama and buffalograss. Slickspots can also support a variety of other grasses and forbs including sedges, common yarrow, windmillgrass, scribner's panicum, Texas grama, mourning lovegrass, silver bluestem, whorled dropseed, inland saltgrass, gummy lovegrass, fall witchgrass, meadow dropseed, heath aster, tumblegrass, and fringeleaf paspalum. Prairie threeawn and western ragweed are common cyclic invaders. There can also be, especially in the southernmost counties of the state, a scattering of honey mesquite found on this site. This plant community evolved via the influence of extremes in temperature, precipitation, wind, drought, fire, and herbivory, especially bison herbivory. Range management plans should include prescribed grazing and burning to restore, maintain the plant community. Short-term, early, heavy grazing on prairie threeawn to prevent seed production will aid in both the restoration and maintenance of the plant community. Prescribed burning on heavy infestations of prairie threeawn and other targeted species will also aid in their control.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	744	1209	1675
Forb	126	204	282
Shrub/Vine	27	44	61
Total	**897**	**1457**	**2018**

Figure 10. Plant community growth curve (percent production by month). OK0002, Native Warm Season - North Oklahoma. This is the estimated growth curve for the northern half of Oklahoma where mean annual air temperatures are less than 60 degrees F. Plant growth can vary from year to year dependening on air temperature and timing and amount of precipitation. These figures are merely a representative example for warm season native plants in the geographic area..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	15	20	30	10	6	10	6	0	0

Community 1.2
Shortgrasses, Blue Grama Dominant

This site is predominantly blue grama. Blue grama contributes 50% to 80% of the total non-woody annual vegetative production in this Slickspot stage. The balance of this site's vegetation is usually small percentages of other perennial grasses such as alkali sacaton, buffalograss, sideoats grama, meadow dropseed and gummy lovegrass. Abusive grazing is usually the prime contributor to the predominance of blue grama on this site. Blue grama proliferation will quicken as stocking rate increases. In years of dry summers followed by cool, mild, wet winters, prairie threeawn and western ragweed usually increase. Range management practices, including the use of prescribed grazing and burning, will help restore, maintain, and manipulate the plant community over time. Restoration to the reference community may take 10 years or more depending upon the condition of the site at the onset of restoration.

Figure 11. Plant community growth curve (percent production by month). OK0002, Native Warm Season - North Oklahoma. This is the estimated growth curve for the northern half of Oklahoma where mean annual air temperatures are less than 60 degrees F. Plant growth can vary from year to year dependening on air temperature and timing and amount of precipitation. These figures are merely a representative example for warm season native plants in the geographic area..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	15	20	30	10	6	10	6	0	0

Community 1.3
Shortgrasses, Theeawn Dominant

Figure 12. Slickspot 1.3 Disturbed

This site plant community is predominately prairie threeawn interspersed in remnants of perennial grasses such as alkali sacaton, blue grama, sideoats grama and buffalograss. This plant community is the result of long-term grazing abuse, a history of cultivation, or both. Numerous annuals are usually found on this site. In the southernmost areas of the state, honey mesquite may be found scattered about the site. Remnant perennial grasses will eventually respond to proper stocking rates, but it may take 15 years or more to do so depending upon site condition, seed bank, moisture availability, stocking rate, and other range management practices. In some cases, very few remnant grasses remain. When this occurs, the best management practice may be to reseed the site, however, overall benefits should probably be considered before any outside energy input is implemented.

Figure 13. Plant community growth curve (percent production by month). OK0002, Native Warm Season - North Oklahoma. This is the estimated growth curve for the northern half of Oklahoma where mean annual air temperatures are less than 60 degrees F. Plant growth can vary from year to year dependening on air temperature and timing and amount of precipitation. These figures are merely a representative example for warm season native plants in the geographic area..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	15	20	30	10	6	10	6	0	0

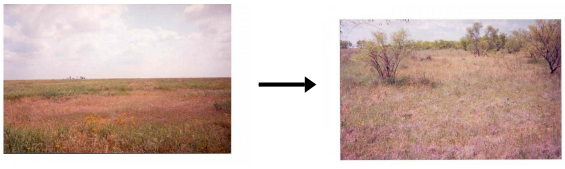
Pathway 1.1A
Community 1.1 to 1.2

Through continuous heavy grazing that exceeds carrying capacity, this plant community may shift to community phase 1.2.

Pathway 1.2A
Community 1.2 to 1.1

Through an established prescribed grazing program with proper stocking rates, periodic rest, and adequate soil moisture, this community phase may be restored to the reference community 1.1.

Pathway 1.2B
Community 1.2 to 1.3



Shortgrasses, Blue Grama Dominant

Shortgrasses, Theeawn Dominant

Through continuous heavy grazing that exceeds carrying capacity, this plant community may shift to community phase 1.3.

Pathway 1.3A
Community 1.3 to 1.2

Shortgrasses, Theeawn Dominant

Shortgrasses, Blue Grama Dominant

Through an established prescribed grazing program with proper stocking rates, periodic rest, and adequate soil moisture, this community phase may be restored to the reference community 1.2.

State 2
Converted

Community 2.1
Cropland

Slickspots are commonly farmed because they are small inclusions within other ecological sites that are commonly farmed. Slickspot production is profoundly less than surrounding areas; this makes them easily recognizable.

State 3
Eroded

See Eclogical Site: Eroded Slickspot R078CY891OK

Community 3.1
Eroded Slickspot

Transition T1A
State 1 to 2

Through cultivation and planting, the site may be transitioned to state 2. Soil properties and hydrology will be altered significantly.

Transition T2A
State 2 to 3

Once in cultivation, the site may become very susceptible to water erosion. Once the "A" horizon has been displace through erosion, this site has transitioned to an Eroded Sate(3).

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				314–706	
	alkali sacaton	SPAI	*Sporobolus airoides*	224–504	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	90–202	–
	blue grama	BOGR2	*Bouteloua gracilis*	90–202	–
	switchgrass	PAVI2	*Panicum virgatum*	90–202	–
2				305–686	

	tumble windmill grass	CHVE2	*Chloris verticillata*	56–213	–
	fall witchgrass	DICO6	*Digitaria cognata*	56–213	–
	tumblegrass	SCPA	*Schedonnardus paniculatus*	56–213	–
	little bluestem	SCSC	*Schizachyrium scoparium*	56–213	–
	gummy lovegrass	ERCU	*Eragrostis curtipedicellata*	56–213	–
	field paspalum	PALA10	*Paspalum laeve*	56–213	–
	vine mesquite	PAOB	*Panicum obtusum*	11–43	–
	mourning lovegrass	ERLU	*Eragrostis lugens*	11–43	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	11–43	–
	puffsheath dropseed	SPNE2	*Sporobolus neglectus*	11–43	–
	white tridens	TRAL2	*Tridens albescens*	11–43	–
	saltgrass	DISP	*Distichlis spicata*	11–43	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	11–43	–
	Texas grama	BORI	*Bouteloua rigidiseta*	11–43	–
3				126–282	
	prairie threeawn	AROL	*Aristida oligantha*	45–170	–
	sedge	CAREX	*Carex*	45–170	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	11–43	–
	purple threeawn	ARPU9	*Aristida purpurea*	11–43	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	11–43	–
	field brome	BRAR5	*Bromus arvensis*	11–43	–
Forb					
4				126–282	
	common yarrow	ACMI2	*Achillea millefolium*	0–28	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–28	–
	green antelopehorn	ASVI2	*Asclepias viridis*	0–28	–
	Indian paintbrush	CASTI2	*Castilleja*	0–28	–
	yellowspine thistle	CIOC2	*Cirsium ochrocentrum*	0–28	–
	narrowleaf rhombopod	CLAN	*Cleomella angustifolia*	0–28	–
	Texas croton	CRTE4	*Croton texensis*	0–28	–
	prairie fleabane	ERST3	*Erigeron strigosus*	0–28	–
	Spanish gold	GRPA8	*Grindelia papposa*	0–28	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	0–28	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	0–28	–
	flax	LINUM	*Linum*	0–28	–
	dotted blazing star	LIPU	*Liatris punctata*	0–28	–
	bird's-foot trefoil	LOCO6	*Lotus corniculatus*	0–28	–
	yellow puff	NELU2	*Neptunia lutea*	0–28	–
	plantain	PLANT	*Plantago*	0–28	–
	prairie coneflower	RATIB	*Ratibida*	0–28	–
	curly dock	RUCR	*Rumex crispus*	0–28	–

	white heath aster	SYER	*Symphyotrichum ericoides*	0–28	–
Shrub/Vine					
5				27–61	
	pricklypear	OPUNT	*Opuntia*	13–30	–
	honey mesquite	PRGL2	*Prosopis glandulosa*	13–30	–

Animal community

Slickspots can be as large as 10 acres or more, but this is rare. They are usually less than one acre. As a result of their small size, Slickspots provide only a small portion of habitat and food for the animal community. Many animals move through and within Slickspot boundaries, but because Slickspots are small inclusions within other larger ecological sites, they should probably be considered as augmenting support sites for animals.

Hydrological functions

The Slickspot ecological site gets its name from the fact that it appears to be very dry on the surface, but because it has a compacted clay loam subsoil and permeability class of impermeable to slow, it is usually boggy (slick) just below the surface. Many farmers and ranchers have mistakenly rode, plowed, walked, or driven across one of these areas only to become stuck; hence the name, Slickspot.

Recreational uses

Because of the site small size, Slickspot recreational uses are usually included with companion sites such as Claypan and Loamy Prairie ecological sites.

Wood products

None

Other products

None

Inventory data references

SCS Range 417 clipping records.

The original information presented here was derived from field observations by Dr. Jack Eckroat, in the summers of 2007 and 2008, correlated to office files and Range Site Technical Descriptions (1961 USDA/SCS). Species compositions are as complete as possible. Production will vary by species from within years, from year to year, and from site to site. Production figures based on limited clipping data, but believed to be the best estimates to date. Production figures intended to show best estimates of the relationships between the total biomass and hierarchy of the different species.

Other references

This “Approved” site was included in an update project during 2013. The State&Transition model was re-formatted and the ESD was edited to fit the new ESIS format. The concepts and vegetative data contained therein was not altered. The entire ESD will be reviewed, updated, and subjected to the QC/QA processes as part of a future project. CW

Contributors

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PES Edits by Tyson Morley, MLRA Soil Scientist, Altus, Oklahoma

Approval

Bryan Christensen, 9/15/2023

Acknowledgments

Site Development and Testing Plan
Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document.
Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

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)	Harry Fritzler, Steve Glasgow, Jack Eckroat, Mark Moseley
Contact for lead author	
Date	07/01/2005
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Due to flatter slopes, there are usually few, if any, rills and there is no active headcutting and sides are covered with vegetation.

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2. **Presence of water flow patterns:** There is some distinct evidence of soil deposition or erosion, (typically around bunchgrasses); otherwise water generally flows evenly over the entire landscape.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are rare, usually not more than 1 inch deep (usually around rocks and bunchgrasses). Terracettes are absent or uncommon.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** These sites are complexes comprised of Loamy Prairie and Claypan Prairie soils with slickspots occupying 10-30% of the area. There should generally be ~10% bare ground. In the more saline portions, bare ground varies due to sodium content, but may be as much as 30%.

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5. **Number of gullies and erosion associated with gullies:** Rare, due to flatter slopes and sodium content.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None.

7. **Amount of litter movement (describe size and distance expected to travel):** Distribution of litter is variable due to sodium content. If the amount of bare ground is high, then litter movement will be greater. On the average, litter can move ~12-18 inches, then only during high intensity storms.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Surface soil is stabilized (Stability Score 5-6). Stability scores based on a minimum of 6 samples tested.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A horizon 0 to 6 inches; brown silt loam, weak fine granular structure. B horizon: 6 to 60 inches; dark brown to reddish brown to red clay, prismatic to blocky structure, very hard and firm. C horizon: > 60 inches; red clay.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Infiltration capacity of this soil is naturally low and runoff is very high. The plant community composition and distribution is a Midgrass and Shortgrass community randomly dispersed. Slowly permeable soils result in high runoff. Most changes in infiltration and runoff can usually be attributed to other factors (e.g. compaction).

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** There is usually no compaction layer. Fine texture and hard, firm structure can be mistaken for a compaction layer, but this is a natural characteristic.

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: Midgrasses>Shortgrasses

    Sub-dominant: Forbs

    Other: Shrubs, Annuals

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Plant mortality and decadence is highly variable on this site due to the droughty nature of the clayey soils, (especially after a severe drought), but will primarily average ~5-10%, especially in the absence of fire and herbivory.

14. **Average percent litter cover (%) and depth (in):** Litter should cover ~60% of the area between plants with accumulations of up to 1/2 inch deep.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Normal production is 800 – 1800 pounds per year.

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** No invasive species. Invasives might include: mesquite, prickly pear, annuals and non-natives.

17. **Perennial plant reproductive capability:** All plants capable of reproducing at least every 2 years. Seed stalks, stalk length, and seedheads are numerous and what would be expected. Overall health of plants is what would be expected.