

Ecological site R060AY016SD

Very Shallow

Last updated: 6/25/2024

Accessed: 09/24/2026

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.

MLRA notes

Major Land Resource Area (MLRA): 060A–Pierre Shale Plains

The Pierre Shale Plains (MLRA 60A) consists of approximately 10,150 square miles, the majority of which is in South Dakota (70 percent) and small portions are in Montana (2 percent), Nebraska (8 percent), and Wyoming (20 percent). It encircles the Black Hills (MLRA 62) and the Dakota Hogback (MLRA 61). MLRA 60A includes portions of the Oglala, Buffalo Gap, and Thunder Basin National Grasslands. It also includes small sections of the Pine Ridge Indian Reservation, Badlands National Park, and Black Hills National Forest. The Cheyenne and Belle Fourche Rivers flow through the MLRA. MLRA 60A is in the unglaciated section of the Missouri Plateau, of the Great Plains Province of the Interior Plains. It is an area of old plateaus and terraces that have been deeply eroded. Cretaceous Pierre Shale underlies almost all of this MLRA. This is a marine sediment with layers of volcanic ash that has been altered to smectitic clay. These clays shrink as they dry and swell as they receive moisture. Soils are shallow to very deep and generally are well drained and clayey. Elevations generally range from 2,620 to 3,610 feet throughout the MLRA, but can range up to 4,260 feet. The average annual precipitation for the western side of the MLRA is 13 to 16 inches, whereas the eastern side receives 16 to 18 inches. A suite of ecological sites has been written specifically for these two precipitation zones. The Locator Map shows the break between the two precipitation zones. This area supports a mixed natural prairie vegetation consisting of both cool- and warm-season grasses and forbs. Wyoming big sagebrush occurs primarily in the drier western portion of the MLRA, however, small remnant stands can be found in the eastern portion. Dominant land uses of the area are primarily ranching and, to a lesser extent, farming. Major resource concerns to this MLRA are wind erosion and surface water quality.

Classification relationships

USDA - Land Resource Region G – Western Great Plains Range and Irrigated Region, Major Land Resource Area (MLRA) 60A – Pierre Shale Plains. EPA - Level IV Ecoregions of the Continental United States: 43e – Sagebrush Steppe, 43g Semi-arid Pierre Shale Plains, and 43k – Dense Clay Prairie.

Ecological site concept

The Very Shallow site occurs throughout MLRA 60A. It is located on level to steep, terrace remnants, knolls, and ridges on upper slopes of undulating or rolling uplands. Slopes range from 0 to 50 percent and the soil surface texture is loam. The soil formed in 3 to 10 inches of gravelly alluvium. The site is considered a run-off site and does not receive additional moisture from run-in or overflow. Vegetation in the Reference State consists primarily of warm-season shortgrasses, upland sedges, cool-season needlegrasses, and a wide variety of perennial forbs and several shrub and half-shrub species.

Associated sites

R060AY009SD	Sandy
R060AY017SD	Shallow Clay

R060AY024SD	Shallow Loamy
R060AY044SD	Shallow Sandy

Similar sites

R060AY024SD	Shallow Loamy Less needleandthread, porcupine grass, western wheatgrass, & sideoats grama; higher production.
R060AY044SD	Shallow Sandy More sandreed/bluestem; less plains muhly/sideoats grama; higher production

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Hesperostipa comata</i> (2) <i>Schizachyrium scoparium</i>

Physiographic features

This site typically occurs on gently to steeply sloping uplands.

Table 2. Representative physiographic features

Landforms	(1) Terrace (2) Knoll (3) Ridge
Flooding frequency	None
Ponding frequency	None
Elevation	760 – 1,310 m
Slope	10 – 50 %
Aspect	Aspect is not a significant factor

Climatic features

The climate in this MLRA is typical of the drier portions of the Northern Great Plains, where sagebrush steppes to the west yield to grassland steppes to the east. Annual precipitation, for the entire MLRA, ranges from 13 to 18 inches per year, with most occurring during the growing season. Temperatures show a wide range between summer and winter and between daily maximums and minimums, due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air masses from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Chinook winds may occur in winter and bring rapid rises in temperature. Extreme storms may occur during the winter, but the more severe occur during late fall, late winter, and spring.

The normal average annual temperature is about 46°F. January is the coldest month with average temperatures ranging from about 19°F (Moorcroft CAA, WY) to about 22°F (Belle Fourche, South Dakota (SD)). July is the warmest month with temperatures averaging from about 70°F (Moorcroft CAA, WY) to about 72°F (Belle Fourche, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 51°F. Hourly winds are estimated to average about 11 miles per hour annually, ranging from about 13 miles per hour during the spring to about 10 miles per hour during the summer. Daytime winds generally are stronger than nighttime, and occasional strong storms may bring brief periods of high winds with gusts to more than 50 miles per hour.

Growth of cool-season plants begins in early to mid-March, slowing or ceasing in late June. Warm-season plants begin growth about mid-May and can continue to early or mid-September. Green-up of cool-season plants may occur in September and October when adequate soil moisture is present.

Table 3 Representative climatic features

Frost-free period (characteristic range)	100-110 days
Freeze-free period (characteristic range)	120-130 days
Precipitation total (characteristic range)	380-460 mm
Frost-free period (actual range)	80-110 days
Freeze-free period (actual range)	110-130 days
Precipitation total (actual range)	360-460 mm
Frost-free period (average)	100 days
Freeze-free period (average)	120 days
Precipitation total (average)	410 mm

- (1) WASTA [USC00398911], Owanka, SD
- (2) UPTON [USC00489205], Upton, WY
- (3) BELLE FOURCHE [USC00390559], Belle Fourche, SD
- (4) MOORCROFT 3S [USW00024088], Moorcroft, WY
- (5) REDBIRD [USC00487555], Lance Creek, WY
- (6) ARDMORE 1 NW [USC00390236], Edgemont, SD

Influencing water features

No significant water features influence this site.

Wetland description

Not Applicable.

Soil features

The soils in this site are well drained and formed in soft siltstone, sandstone, porcelanite, or alluvium. The loam surface layer is 3 to 6 inches thick. The soils have a moderate infiltration rate. This site should show slight to no evidence of rills, wind-scoured areas, or pedestalled plants. Water flow paths are broken, irregular in appearance, or discontinuous with numerous debris dams or vegetative barriers. The soil surface is stable and intact. Sub-surface soil layers are restrictive to water movement and root penetration.

Soil correlated to the Very Shallow ecological site: Nihill, Samsil, Schamber, Sunup, Vivian

These soils are mainly susceptible to water erosion. The hazard of water erosion increases on slopes greater than about 15 percent. Low available water capacity caused by the shallow rooting depth strongly influences the soil-water-plant relationship.

More information can be found in the various soil survey reports. Contact the local USDA Service Center for soil survey reports that include more detail specific to your location.

Table 4. Representative soil features

Surface texture	(1) Gravelly loam (2) Very gravelly
Family particle size	(1) Loamy
Drainage class	Well drained to excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	0 – 30 cm
Surface fragment cover <=3"	0 – 30 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	2.54 – 7.62 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 10 %
Electrical conductivity (0-101.6cm)	Not specified

Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	6.1 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	20 – 70 %
Subsurface fragment volume >3" (Depth not specified)	10 – 70 %

Ecological dynamics

This site developed under Northern Great Plains climatic conditions, natural influences of large herbivores, occasional fire, and other biotic and abiotic factors that typically influence soil/site development.

Changes will occur in the plant communities due to short-term weather variations, impacts of native and/or exotic plant and animal species, and management actions. While the following plant community descriptions describe more typical transitions between communities that will occur, severe disturbances, such as periods of well-below average precipitation, can cause significant shifts in plant communities and/or species composition.

Continuous grazing without adequate recovery periods following each grazing occurrence over several years causes this site to depart from the Needle and thread-Little Bluestem-Grama Plant Community Phase (1.1). Species such as threadleaf sedge and blue grama will initially increase. Plains muhly, western wheatgrass, bluebunch wheatgrass, little bluestem, and sideoats grama will decrease in frequency and production and later disappear. Heavy, continuous grazing causes blue grama and/or threadleaf sedge to dominate.

The plant community upon which interpretations are primarily based is the Reference Plant Community (1.1). The Reference Plant Community has been determined by studying rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts also have been used. Plant communities, states, transitional pathways, and thresholds have been determined through similar studies and experience.

The following diagram illustrates the common plant communities and vegetation states commonly occurring on the site and the transition pathways between communities and states. The ecological processes are discussed in more detail in the plant community descriptions following the diagram.

State and transition model

Figure 7. Very Shallow - R060AY016SD

Figure 8. Very Shallow - R060AY016SD

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Needleandthread			90-179	
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	90-179	–
2	Mid Warm-Season Grasses			90-179	

	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	90-135	–
	plains muhly	MUCU3	<i>Muhlenbergia cuspidata</i>	18-45	–
3	Grama			179-359	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	90-224	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	45-179	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	45-90	–
4	Wheatgrass			45-90	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	45-90	–
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp. lanceolatus</i>	0-45	–
5	Other Native Grasses			9-45	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-45	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	0-45	–
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	0-45	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	9-45	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	9-18	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0-18	–
	threeawn	ARIST	<i>Aristida</i>	0-9	–
6	Grass-likes			45-135	
	threadleaf sedge	CAFI	<i>Carex filifolia</i>	45-135	–
	sedge	CAREX	<i>Carex</i>	0-18	–
Forb					
8	Forbs			45-135	
	dotted blazing star	LIPU	<i>Liatris punctata</i>	9-45	–
	hairy false goldenaster	HEVI4	<i>Heterotheca villosa</i>	9-36	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	9-27	–
	white prairie clover	DACA7	<i>Dalea candida</i>	9-27	–
	purple prairie clover	DAPU5	<i>Dalea purpurea</i>	9-27	–
	blacksamson echinacea	ECAN2	<i>Echinacea angustifolia</i>	9-27	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-27	–
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	9-27	–
	white heath aster	SYER	<i>Symphotrichum ericoides</i>	9-27	–
	stemless four-nerve daisy	TEAC	<i>Tetrameuris acaulis</i>	0-18	–
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	0-18	–
	scarlet beeblossom	OESU3	<i>Oenothera suffrutescens</i>	0-18	–
	large Indian breadroot	PEES	<i>Pedimelum esculentum</i>	0-18	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	9-18	–
	eastern pasqueflower	PUPA5	<i>Pulsatilla patens</i>	0-18	–
	pussytoes	ANTEN	<i>Antennaria</i>	9-18	–
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	0-18	–
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	0-18	–
	lacy tansyaster	MAPI	<i>Machaeranthera pinnatifida</i>	0-18	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0-9	–
	milkvetch	ASTRA	<i>Astragalus</i>	0-9	–
	onion	ALLIU	<i>Allium</i>	0-9	–
Shrub/Vine					
9	Shrubs			45-90	

	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	0-27	–
	rose	ROSA5	<i>Rosa</i>	9-27	–
	soapweed yucca	YUGL	<i>Yucca glauca</i>	0-27	–
	Subshrub (<.5m)	2SUBS	<i>Subshrub (<.5m)</i>	0-27	–
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	9-27	–
	pricklypear	OPUNT	<i>Opuntia</i>	0-18	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0-9	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (t)	Foliar Cover (%)
Grass/Grasslike					
1	Needleandthread			4-22	
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	4-22	–
2	Mid Warm-Season Grasses			9-22	
	plains muhly	MUCU3	<i>Muhlenbergia cuspidata</i>	4-22	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	4-22	–
3	Grama			135-202	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	90-157	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	45-90	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	0-22	–
4	Wheatgrass			4-22	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	4-22	–
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp. lanceolatus</i>	0-4	–
5	Other Native Grasses			4-22	
	threeawn	ARIST	<i>Aristida</i>	4-22	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	4-22	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	4-13	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-13	–
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	0-9	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0-9	–
6	Grass-likes			90-157	
	threadleaf sedge	CAFI	<i>Carex filifolia</i>	90-157	–
	sedge	CAREX	<i>Carex</i>	4-22	–
7	Non-native Grasses			4-9	
	cheatgrass	BRTE	<i>Bromus tectorum</i>	4-9	–
Forb					
8	Forbs			45-90	
	white heath aster	SYER	<i>Symphotrichum ericoides</i>	4-22	–
	pussytoes	ANTEN	<i>Antennaria</i>	4-22	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	4-22	–
	hairy false goldenaster	HEVI4	<i>Heterotheca villosa</i>	4-22	–
	dotted blazing star	LIPU	<i>Liatris punctata</i>	4-22	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	9-22	–
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	4-22	–
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	0-18	–
	lacy tansyaster	MAPI	<i>Machaeranthera pinnatifida</i>	4-13	–

	onion	ALLIU	<i>Allium</i>	0-13	–
	blacksamson echinacea	ECAN2	<i>Echinacea angustifolia</i>	4-13	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0-13	–
	curlycup gumweed	GRSQ	<i>Grindelia squarrosa</i>	0-13	–
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	4-13	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	4-13	–
	milkvetch	ASTRA	<i>Astragalus</i>	4-13	–
	white prairie clover	DACA7	<i>Dalea candida</i>	0-9	–
	purple prairie clover	DAPU5	<i>Dalea purpurea</i>	0-9	–
	scarlet beeblissom	OESU3	<i>Oenothera suffrutescens</i>	0-9	–
	large Indian breadroot	PEES	<i>Pedimelum esculentum</i>	0-9	–
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	0-9	–
	stemless four-nerve daisy	TEAC	<i>Tetaneuris acaulis</i>	0-9	–
	eastern pasqueflower	PUPA5	<i>Pulsatilla patens</i>	0-4	–
Shrub/Vine					
9	Shrubs			22-67	
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	9-27	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	4-22	–
	pricklypear	OPUNT	<i>Opuntia</i>	0-22	–
	soapweed yucca	YUGL	<i>Yucca glauca</i>	0-22	–
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	0-13	–
	rose	ROSA5	<i>Rosa</i>	4-13	–
	Subshrub (<.5m)	2SUBS	<i>Subshrub (<.5m)</i>	0-13	–

Animal community

The following table lists annual, suggested initial stocking rates with average growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of conservation planning. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this a resource inventory is necessary to document plant composition and production. More accurate carrying capacity estimates should eventually be calculated using the following stocking rate information along with animal preference data and actual stocking records, particularly when grazers other than cattle are involved. With consultation of the land manager, more intensive grazing management may result in improved harvest efficiencies and increased carrying capacity. Plant Community = Needleandthread-Little Bluestem-Grama (1.1) Average Annual Production (lbs./ac, air-dry) = 800 Stocking Rate (AUM/ac) = 0.22 Plant Community = Grama/Sedge (1.2) Average Annual Production (lbs./ac, air-dry) = 400 Stocking Rate (AUM/ac) = 0.11 *Based on 912 lbs./acre (air-dry weight) per Animal Unit Month (AUM), and on 25 percent harvest efficiency of preferred and desirable forage species (refer to USDA NRCS, National Range and Pasture Handbook). Total annual production on-site may contain vegetation deemed undesirable or untargeted by the grazing animal. Therefore, AUM values may have been reduced to reflect only preferred or desirable forage species. Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage. During the dormant period, the forage for livestock will likely be lacking protein to meet livestock requirements, and added protein will allow ruminants to better utilize the energy stored in grazed plant materials. A forage quality test (either directly or through fecal sampling) should be used to determine the level of supplementation needed.

Hydrological functions

Water is the principal factor limiting herbage production on this site. The site is dominated by soils in hydrologic group A. Infiltration varies from rapid to very rapid and runoff varies from low to medium depending on slope 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 exception would be where shortgrasses form a dense sod and dominate the site. Normally, areas where ground cover is less than 50 percent have the greatest potential to have reduced infiltration and higher runoff (refer to Section 4, NRCS National Engineering Handbook for runoff quantities and hydrologic curves).

Recreational uses

This site provides hunting opportunities for upland game species. The wide varieties of plants, which bloom from spring until fall, have an esthetic value that appeals to visitors.

Other products

Selected seed harvest of certain unique native plant species can provide additional income.

Other information

Revision Notes: "Previously Approved" Provisional This Provisional ecological site concept has passed Quality Control (QC) and Quality Assurance (QA) to ensure that the site meets the 2014 NESH standards for a Provisional ecological site. This is an updated "Previously Approved" ESD which represents a first-generation tier of documentation that, prior to the release of the 2014 National Ecological Site Handbook (NESH), met all requirements as an "Approved" ESD as laid out in the 1997, rev.1, 2003 National Range and Pasture Handbook (NRPH). The document fully described the Reference State and Community Phase in the State-and-Transition model. All other alternative states are at least described in narrative form. The "Previously Approved" ESD has been field-tested for a minimum of five years and is a proven functional document for conservation planning. The "Previously Approved" ESD does not contain all tabular and narrative entries as required in the current "Approved" level of documentation but it is expected that the "Previously Approved" ESD will continue refinement towards an "Approved" status. Site Development and Testing Plan: Future work, as described in a Project Plan, is needed to validate the information in this Provisional Ecological Site Description. 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. The final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document. Non-discrimination Statement In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident. Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English. To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, available online and at any USDA office, or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632- 9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov.

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 this site description include: Stan Boltz, Range Management Specialist, NRCS; Darrel DuVall, Range Management Specialist, NRCS; Jill Epley, Range Management Specialist, NRCS; Cheryl Nielsen, Range Management Specialist, NRCS; Rick Peterson, Range Management Specialist, NRCS; Mike Stirling, Range Management Specialist, NRCS.

Other references

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Contributors

Stan Boltz

Approval

Suzanne Mayne-Kinney, 6/25/2024

Acknowledgments

ESD updated by Rick L. Peterson, 4/3/17 MLRA 60A Provisional Level Quality Control (QC) Process 9/28/17 Ecological Sites from MLRA 60A were Previously Approved ESDs and meet the requirements as stated in the 2003 National Range and Pasture Handbook. The Sites were updated to the Provisional Level by Rick L. Peterson, ESS, Rapid City, SSO in FY17. The sites were reviewed by George Gamblin, RMS, Wheatland, WY and Mitch Faulkner, RMS, Belle Fourche, SD. Mitch Faulkner acted as the Provisional QC. The Sites were then reviewed and approved at the Provisional Level by David Kraft, Regional ESS, Salina, KS. Worked closely with Kent Cooley, Area SS, with MLRA key development and soils narratives

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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Contact for lead author	stanley.boltz@sd.usda.gov, 605-352-1236
Date	06/27/2008
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None on slopes of about 15% or less, slight to none and discontinuous on slopes greater than 15%.

2. **Presence of water flow patterns:** None on slopes of about 15% or less; barely visible and discontinuous with numerous debris dams on slopes greater than 15%.

3. **Number and height of erosional pedestals or terracettes:** Few pedestalled plants typically on steeper slopes.

4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):
5 to 25 percent is typical.

5. Number of gullies and erosion associated with gullies: None should be present.

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

7. Amount of litter movement (describe size and distance expected to travel): Small size litter classes will generally move short distances, some medium size class litter will move very short distances. Litter debris dams are occasionally present.

8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values): Soil aggregate stability ratings should typically be 3 or greater. Surface organic matter adheres to the soil surface. Soil surface fragments will typically retain structure for 1 minute or longer when dipped in distilled water.

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): A-horizon should be 1 to 3 inches thick with light to dark brownish gray colors, but not typically mollic. Structure should typically be weak fine granular at least in the upper A-horizon.

10. Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: Combination of shallow and deep rooted species (mid rhizomatous and tufted perennial cool- and warm-season grasses) with fine and coarse roots positively influences infiltration. Infiltration is typically high due to gravelly nature of soils.

11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site): None – very shallow to gravel, but no platy structure will be present.

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: Short/mid warm-season rhizomatous grasses >

Sub-dominant: Short/mid cool-season bunchgrasses > mid warm-season bunchgrasses > grass-likes = forbs >

Other: Mid cool-season rhizomatous grasses = shrubs

Additional:

13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):

14. Average percent litter cover (%) and depth (in):

15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):
Production ranges from 450-1,100 lbs./acre (air-dry weight). Reference value production is 800 lbs./acre (air-dry weight).

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: State and local noxious weeds

17. Perennial plant reproductive capability: Species exhibit somewhat lower vigor than what would normally be expected for these species on other ecological sites. The droughty nature of the soils of this site causes plant stress even in typical precipitation patterns. Do not rate based solely on seed production.
