Ecological site R058BY176WY
Very Shallow (VS) 10-17" PZ

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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): 058B–Northern Rolling High Plains, Southern Part

MLRA 58B is located in northeastern Wyoming (95 percent) and extreme southeastern Montana (5 percent). It is comprised of sedimentary plains, scoria hills, and river valleys. The major rivers include the Powder, Tongue, Belle Fourche, Cheyenne, and North Platte. Tributaries include the Little Powder River, Little Missouri River, Clear Creek, Crazy Woman Creek, and others. This MLRA is traversed by Interstates 25 and 90, and U.S. Highways 14 and 16. The extent of MLRA 58B covers approximately 12.3 million acres. Major land uses include rangeland (approximately 93 percent), cropland, pasture, and hayland (approximately 2 percent), and forest, urban, and miscellaneous uses (approximately 5 percent). Cities include Buffalo, Casper, Sheridan, and Gillette, WY. Land ownership is mostly private. Federal lands include the Thunder Basin National Grassland (U.S. Forest Service) and lands administered by the Bureau of Land Management. Areas of interest in MLRA 58B in Wyoming include Fort Phil Kearny State Historic Site, Glendo State Park, and Lake DeSmet. The elevations in MLRA 58B increase gradually from north to south and range from approximately 2,900 to 5,900 feet. A few buttes are higher than 6,800 feet. The average annual precipitation in this area ranges from 10 to 17 inches per year. Precipitation occurs mostly during the growing season, often during rapidly developing thunderstorms. Mean annual air temperature is 46 degrees Fahrenheit. Summer temperatures may exceed 100 degrees Fahrenheit. Winter temperatures may drop to below zero. Snowfall averages 45 inches per year, but varies from 25 to over 70 inches in some locales.

Classification relationships

USDA Natural Resources Conservation Service (NRCS): Land Resource Region?G Western Great Plains Range and Irrigation; Major Land Resource Area (MLRA)?58B Northern Rolling High Plains, Southern Part (USDA, 2006) Relationship to Other Classifications: USDA Forest Service (FS) Classification Hierarchy: Province?331 Great Plains-Palouse Dry Steppe; Section?331G-Powder River Basin; Subsections?331Gb Montana Shale Plains, 331Ge Powder River Basin, 331Gf South Powder River Basin-Scoria Hills (Cleland et al, 1997) Environmental Protection Agency (EPA) Classification Hierarchy: Level III Ecoregion?43 Northwestern Great Plains; Level IV Ecoregion?43p Scoria Hills, 43q Mesic-Dissected Plains, 43w Powder River Basin (EPA, 2013) https://www.epa.gov/eco-research/ecoregions

Ecological site concept

This site occurs on nearly level to steeply sloping hills and ridges, on sedimentary plains or uplands. Primary production is from cool-season midgrasses (bunch and rhizomatous), and secondary warm-season mid- and shortgrasses (bunch and rhizomatous). There is a lesser component of shrubs, trees, forbs. Soils are very shallow (less than 10 inches) to a restrictive layer.

Associated sites

R058BY158WY	**Shallow Clayey (SwCy) 10-14” PZ** Shallow Clayey occurs below or just above the shale rock outcrop or badlands where the very shallow is associated, is more productive and vegetated.

R058BY162WY	**Shallow Loamy (SwLy) 10-14" PZ** Shallow loamy occurs below or just above the interbedded rock outcrop where the very shallow is associated, is more productive and vegetated.
R058BY166WY	**Shallow Sandy (SwSy) 10-14" PZ** Shallow Sandy occurs below or just above the sandstone rock outcrop where the very shallow is associated, is more productive and vegetated.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. wyomingensis* (2) *Rhus trilobata*
Herbaceous	(1) *Pseudoroegneria spicata* (2) *Hesperostipa comata*

Physiographic features

This site occurs on nearly level to steeply sloping hills and ridges, on sedimentary plains or uplands.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge
Runoff class	Negligible to very high
Flooding frequency	None
Ponding frequency	None
Elevation	1,070 – 1,770 m
Slope	0 – 60 %
Aspect	Aspect is not a significant factor

Climatic features

The average annual precipitation ranges from 10 to 17 inches per year across MLRA 58B. There are two precipitation zones (PZ). The 10 to 14 inch precipitation zone is predominant across the MLRA, including portions of Sheridan, Johnson, and Natrona Counties; portions of Campbell and Converse Counties; and smaller portions of Weston and Niobrara Counties. The 15 to 17 inch precipitation zone occurs in northern and eastern portions of the MLRA, including portions of Sheridan, Campbell, and western Crook Counties. Wide fluctuations in precipitation may occur from year to year, and occasional periods of extended drought (longer than one year in duration) can be expected. Two-thirds of the annual precipitation occurs during the growing season from May through September. Mean Annual Air Temperature (MAAT) is 46 degrees Fahrenheit. Cold air outbreaks from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Chinook winds may also occur in winter and bring rapid rises in temperature. Extreme storms may occur during the winter, but most severely affect ranching operations during late winter and spring. High-intensity afternoon thunderstorms may occur during the summer. Annual wind speeds average about 5 mph. Daytime winds are generally stronger than nighttime winds. Occasional strong storms may bring brief periods of high winds with gusts of more than 75 mph. The average length of the freeze-free period (28 degrees Fahrenheit) is 125 days and generally occurs from May 16 to September 19. The average frost-free period (32 degrees Fahrenheit) is 101 days and generally occurs from June 1 to September 9.

The growth of native cool-season plants begins in late April to early May with peak growth occurring in mid to late June. Native warm-season plants begin growth in late May to early June and continue into August. Regrowth of cool-season plants occurs in September in most years, depending upon moisture.

Note: The climate described here is based on historic climate station data and is averaged to provide an overview of the annual precipitation, temperatures, and growing season. Future climate is beyond the scope of this document. However, research to determine the effects of elevated CO_2 and heating on mixed-grass prairie ecosystems, and how it may relate to future plant communities, is ongoing.

For detailed information, or to find a specific climate station, visit the Western Regional Climate Center (WRCC) website: Western Regional Climate Center, Historical Data, Western U.S. Climate summaries, NOAA Coop Stations, Wyoming (Note: Montana climate stations are also listed under the Wyoming link).
https://wrcc.dri.edu/summary/Climsmwy.html

Wind speed averages can be found at the WRCC home page, under the Specialty Climate tab: https://wrcc.dri.edu/

The following tables represent area-wide climate data for the 10 to 14 inch precipitation zone:

Table 3 Representative climatic features

Frost-free period (characteristic range)	90-110 days
Freeze-free period (characteristic range)	120-130 days
Precipitation total (characteristic range)	330-380 mm
Frost-free period (actual range)	80-110 days
Freeze-free period (actual range)	120-130 days
Precipitation total (actual range)	250-430 mm
Frost-free period (average)	100 days
Freeze-free period (average)	130 days
Precipitation total (average)	360 mm

- (1) BUFFALO [USC00481165], Buffalo, WY

- (2) WRIGHT 12W [USC00489805], Gillette, WY
- (3) DULL CTR 1SE [USC00482725], Douglas, WY
- (4) MIDWEST [USC00486195], Midwest, WY
- (5) SHERIDAN CO AP [USW00024029], Sheridan, WY
- (6) GLENROCK 5 ESE [USC00483950], Glenrock, WY
- (7) LEITER 9N [USC00485506], Clearmont, WY
- (8) DOUGLAS 1 SE [USC00482685], Douglas, WY
- (9) GILLETTE 4SE [USC00483855], Gillette, WY
- (10) DILLINGER [USC00482580], Gillette, WY

Influencing water features

This upland ecological site is not influenced by a water table or run in from adjacent sites. Due to the semi-arid climate in which it occurs, the water budget is normally contained within the soil pedon. Soil moisture is recharged by spring rains, but it rarely exceeds field capacity before being depleted by evapotranspiration. During intense precipitation events, precipitation rates frequently exceed infiltration rates and the site delivers moisture to downslope sites through surface runoff. Moisture loss through evapotranspiration exceeds precipitation for a majority of the growing season. Soil moisture is the primary limiting factor for vegetative production on this ecological site.

Wetland description

N/A

Soil features

The soils on this site are well drained, very shallow to bedrock and formed in residuum, colluvium, and slope alluvium weathered from sedimentary rock and/or porcelanite. They typically have a moderate to moderately rapid permeability class but range from slow to very rapid. The available water capacity is typically very low. The surface layer of the soils in this site are typically clay loam or loam but may include fine sandy loam or very fine sandy loam. Texture modifiers may include very cobbly, channery, or very channery. The surface layer ranges from a depth of 1 to 6 inches thick. The subsoil is typically loam but may include fine sandy loam or clay. Surface texture modifiers may include very cobbly, channery, very channery, or extremely channery. Soils in this site typically have carbonates at the surface; but some soils may be leached as deep as 4 to 6 inches. Soils formed in material derived from porcelanite (scoria) are inconsistently calcareous. These soils are susceptible to erosion by water and wind. The potential for water erosion accelerates with increasing slope. The soil moisture regime is typically ustic aridic. The soil temperature regime is mesic.

Major soil series correlated to this ecological site include: Taluce, Wibaux, Ironbutte, and thin solum.

The attributes listed below represent 0-40 inches in depth or to the first restrictive layer.

Table 4. Representative soil features

Parent material	(1) Residuum (2) Slope alluvium (3) Colluvium
Surface texture	(1) Clay loam (2) Loam (3) Fine sandy loam (4) Very fine sandy loam
Drainage class	Well drained to excessively drained
Permeability class	Moderate to moderately rapid

Depth to restrictive layer	0 – 30 cm
Soil depth	0 – 30 cm
Surface fragment cover <=3"	0 – 20 %
Surface fragment cover >3"	0 – 20 %
Available water capacity (Depth not specified)	1.02 – 7.11 cm
Calcium carbonate equivalent (Depth not specified)	0 – 10 %
Electrical conductivity (Depth not specified)	Not specified
Sodium adsorption ratio (Depth not specified)	0 – 10
Soil reaction (1:1 water) (Depth not specified)	6.6 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	0 – 80 %
Subsurface fragment volume >3" (Depth not specified)	0 – 30 %

Table 5. Representative soil features (actual values)

Drainage class	Not specified
Permeability class	Slow to very rapid
Depth to restrictive layer	Not specified

Soil depth	Not specified
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (Depth not specified)	Not specified
Calcium carbonate equivalent (Depth not specified)	Not specified
Electrical conductivity (Depth not specified)	Not specified
Sodium adsorption ratio (Depth not specified)	Not specified
Soil reaction (1:1 water) (Depth not specified)	Not specified
Subsurface fragment volume <=3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

The Reference state is the plant community in which interpretations are primarily based and is used as a reference in order to understand the original potential of the site. The Reference state evolved under the combined influences of climatic conditions, periodic fire activity, grazing by large herbivores, and impacts from small mammals and insects. Changes may occur to the Reference State due to management actions such as continuous season-long or year-long grazing, increased stocking rates, climatic conditions such as drought, and natural events. The Reference state is characterized by cool and warm season bunchgrasses. Secondary grasses include cool-season rhizomatous midgrasses, and cool-season grasses and grass-likes, and warm-season shortgrasses. Forbs and shrubs are also present. Trees such as Rocky Mountain juniper and ponderosa pine occur in minor amounts. The Reference state is not necessarily the management goal, as other vegetative states may be considered desired plant communities as long as critical resource concerns are met.

In addition to the Reference state, other plant communities can occur on this site and are usually the result of historic management practices. Grazing practices such as continuous season-long or year-long grazing, heavier stocking rates, or a combination of these factors on this ecological site results in grasses such as bluebunch wheatgrass, little bluestem, and needle and thread decreasing in both frequency and production. Grasses such as blue grama and threadleaf sedge will increase. Under continued frequent and severe defoliation, with no rest periods, western wheatgrass will also begin to decrease. Forbs and shrubs such as prairie sagewort (also known as fringed sagewort), hairy false goldenaster, and broom snakeweed will increase. If continued, the plant community will become sod-bound, and all mid- to tallgrasses can eventually be removed from the plant community. Over the long-term, this continuous use, in combination with high stock densities, will result in broken sod, increased bare ground, and species such as broom snakeweed and cheatgrass increasing or invading. Rocky Mountain juniper is usually present in small amounts and may increase with continuous grazing disturbance and lack of fire. There are various transitional stages which may occur on this ecological site. The information presented is representative of a dynamic set of plant communities that illustrate the complex interaction of several ecological processes.

State and transition model

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Cool-Season Rhizomatous**			28-101	
	western wheatgrass	PASM	*Pascopyrum smithii*	28-101	1-10
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	28-101	1-10
2	**Cool-Season Bunchgrass**			267-611	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	140-252	10-50
	needle and thread	HECO26	*Hesperostipa comata*	28-101	1-10
	threadleaf sedge	CAFI	*Carex filifolia*	15-101	1-10
	green needlegrass	NAVI4	*Nassella viridula*	56-101	1-10
	Cusick's bluegrass	POCU3	*Poa cusickii*	28-56	1-10
3	**Warm-Season Bunchgrass**			85-252	
	little bluestem	SCSC	*Schizachyrium scoparium*	15-101	1-10
	sideoats grama	BOCU	*Bouteloua curtipendula*	56-101	1-10
	big bluestem	ANGE	*Andropogon gerardii*	15-50	1-5
4	**Warm-Season Shortgrasses**			29-101	
	blue grama	BOGR2	*Bouteloua gracilis*	15-50	1-5
	hairy grama	BOHI2	*Bouteloua hirsuta*	15-50	1-5
5	**Miscellaneous**			43-101	
	needleleaf sedge	CADU6	*Carex duriuscula*	15-50	1-5
	Grass, perennial	2GP	*Grass, perennial*	15-50	1-5
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	15-50	1-5
	prairie Junegrass	KOMA	*Koeleria macrantha*	15-50	1-5
	Sandberg bluegrass	POSE	*Poa secunda*	15-50	1-5
	prairie sandreed	CALO	*Calamovilfa longifolia*	15-50	1-5
	sand dropseed	SPCR	*Sporobolus cryptandrus*	15-50	1-5
	squirreltail	ELEL5	*Elymus elymoides*	15-50	1-5
	plains muhly	MUCU3	*Muhlenbergia cuspidata*	15-50	1-5
	Fendler's threeawn	ARPUF	*Aristida purpurea var. fendleriana*	15-50	1-5
Forb					
6	**Forbs**			67-101	
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	15-50	1-5
	prairie thermopsis	THRH	*Thermopsis rhombifolia*	15-50	1-5
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	15-50	1-5
	Forb, perennial	2FP	*Forb, perennial*	15-50	1-5

	aster	ASTER	*Aster*	15-50	1-5
	textile onion	ALTE	*Allium textile*	15-50	1-5
	common yarrow	ACMI2	*Achillea millefolium*	15-50	1-5
	beardtongue	PENST	*Penstemon*	15-50	1-5
	rosy pussytoes	ANRO2	*Antennaria rosea*	15-50	1-5
	American vetch	VIAM	*Vicia americana*	15-50	1-5
	spiny phlox	PHHO	*Phlox hoodii*	15-50	1-5
	ragwort	SENEC	*Senecio*	15-50	1-5
	stemless four-nerve daisy	TEAC	*Tetraneuris acaulis*	15-50	1-5
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	15-50	1-5
	sandwort	ARENA	*Arenaria*	15-50	1-5
	stemless mock goldenweed	STAC	*Stenotus acaulis*	15-50	1-5
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	15-50	1-5
	scarlet beeblossom	GACO5	*Gaura coccinea*	15-50	1-5
	buckwheat	ERIOG	*Eriogonum*	15-50	1-5
	purple prairie clover	DAPU5	*Dalea purpurea*	15-50	1-5
	white prairie clover	DACA7	*Dalea candida*	15-50	1-5
	milkvetch	ASTRA	*Astragalus*	15-50	1-5
Shrub/Vine					
7	**Shrubs**			34-73	
	skunkbush sumac	RHTR	*Rhus trilobata*	34-73	1-5
8	**Miscellaneous Shrubs**			29-78	
	prairie sagewort	ARFR4	*Artemisia frigida*	15-50	1-5
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	15-50	1-5
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	15-50	1-5
	Subshrub (<.5m)	2SUBS	*Subshrub (<.5m)*	15-50	1-5
Tree					
9	**Trees**			15-50	
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	15-50	1-5
	ponderosa pine	PIPO	*Pinus ponderosa*	15-50	1-5

Table 7. Community 1.2 plant community composition

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

Table 8. Community 2.1 plant community composition

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

Table 9. Community 3.1 plant community composition

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

Animal community

Wildlife Interpretations (from 2001 ESD, will be revised in future updates) Blubunch wheatgrass/ Rhizomatous wheatgrass/ Little bluestem (Reference): The predominance of grasses in this plant community favors grazers and mixed-feeders, such as bison, elk, and antelope. Suitable thermal and escape cover for deer may be limited due to the low quantities of woody plants. However, topographical variations could provide some escape cover. When found adjacent to sagebrush-dominated states, this plant community may provide brood-rearing and foraging areas for sage grouse, as well as lek sites. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles. Many grassland-obligate small mammals would occur here. Juniper/rhizomatous wheatgrass: This plant community may be useful for the same large grazers that would use the Reference Plant Community. However, the plant community composition is less diverse, and thus, less apt to meet the seasonal needs of these animals. It may provide some foraging opportunities for sage grouse when it occurs proximal to sagebrush states. The juniper provides good thermal cover and bird nesting habitat. Juniper/Cheatgrass: This plant community may be useful for the same large grazers that would use the Reference Plant Community. However, the plant community composition is less diverse, and production is low and less apt to meet the seasonal needs of these animals. It may provide some foraging opportunities for sage grouse when it occurs proximal to sagebrush states. The juniper provides good thermal cover and bird-nesting habitat. Grazing Interpretations (updated in 2019 Provisional revision) The following table is a guide to stocking rates for the plant communities described in the Very Shallow 10 to 17 inch Precipitation Zone ecological site. These are conservative estimates for initial planning. On-site conditions will vary, and stocking rates should be adjusted based on range inventories, animal kind and class, forage availability (adjusted for slope and distance to water), and the type of grazing system (number of pastures, planned moves, etc.), all of which is determined in the conservation planning process. The following stocking rates are based on the total annual forage production in a normal year multiplied by 25 percent harvest efficiency of preferred and desirable forage species, divided by 912 pounds of ingested air-dry vegetation for an animal unit per month (Natl. Range and Pasture Handbook, 1997). An animal unit month is defined as the amount of forage required by one livestock animal, with or without one calf, for one month, and is shortened to AUM. Plant Community (PC) Production (total lbs./acre in a normal year) and Stocking Rate (AUM/acre) are listed below: Example: 600 lbs. per acre X 25% Harvest Efficiency = 150 lbs. forage demand for one month. 150 lbs. per acre/912 demand per AUM =0.16 Reference Plant Community 250-500 .15 Juniper/rhizomatous wheatgrass 250-400 .12 Juniper/Cheatgrass 250-300 .05 Increased Bare Ground PC (*) (*) * Highly variable stocking rates need to be determined on site. Grazing by domestic livestock is one of the major income-producing industries in the area. Rangelands in this area provide year-long forage under prescribed grazing for cattle, sheep, horses, and other herbivores. During the dormant period, livestock may need supplementation based on reliable forage analysis.

Hydrological functions

Water is the principal factor limiting forage production on this site. This site is highly variable and is dominated by soils in hydrologic groups B and C, with localized areas in hydrologic group D. Infiltration ranges from slow to very rapid. Runoff potential for this site varies from moderate to high depending on soil hydrologic group, 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 example of an exception would be where shortgrasses 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 Part 630, NRCS National Engineering Handbook for detailed hydrology information.) Rills are not expected on slopes less than 15%. On slopes greater than 15%, if rills are present, they will be discontinuous. Gullies should not be present. Water flow patterns typically, none. Water flow patterns may be present on slopes of 15% or greater. When present, they will barely be visible and discontinuous with numerous debris dams. Pedestals and/or terracettes are not expected to occur on this site. Occasionally, bunch grasses may be pedestalled on steeper slopes (greater than 15%) with no exposed roots. Drought should not increase the incidence of pedestals except on the steepest slopes.): Fine litter will generally move short distances. Litter debris dams are occasionally present on slopes 9%. Litter movement does occur on slopes >15%. Chemical and physical crusts are rare to non-existent. Cryptogamic crusts are present, but only cover 1 to 2 percent of the soil surface.

Recreational uses

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

Wood products

No appreciable wood products are present on the site.

Other products

None noted.

Other information

Site Development & Testing Plan General Data (MLRA and Revision Notes, Hierarchical Classification, Ecological Site Concept, Physiographic, Climate, and Water Features, and Soils Data): Updated. All “Required” items complete to Provisional level. Community Phase Data (Ecological Dynamics, STM, Transition & Recovery Pathways, Reference Plant Community, Species Composition List, Annual Production Table): Updated. All “Required” items complete to Provisional level. Annual Production Table is from the “Previously Approved” ESD (2001). The Annual Production Table and Species Composition List will be reviewed for future updates at the Approved level. Each Alternative State/Community: Complete to Provisional level. Supporting Information (Site Interpretations, Assoc. & Similar Sites, Inventory Data References, Agency/State Correlation, References): Updated. All “Required” items complete to Provisional level. Wildlife Interpretations: Narrative is from “Previously Approved” ESD (2001). Wildlife species will need to be updated at the next Approved level. Livestock Interpretations: Plant community names and stocking rates updated. Hydrology, Recreational Uses, Wood Products, and Other Products carried over from previously “Approved” ESD (2001). Existing NRI Inventory Data References updated. More field data collection is necessary to support this site concept. Reference Sheet Rangeland Health Reference Sheet carried over from previously “Approved” ESD (2005). It will be updated at the next “Approved” level. “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 and medium 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." (NI 430_306 ESI and ESD, April 2015)

Inventory data references

Inventory data has been collected on private and federal lands by the following methods: • Double Sampling (Determining Vegetation Production and Stocking Rates, WY-ECS-1) • Rangeland Health (Interpreting Indicators of Rangeland Health, Version 4, 2005) • Soil Stability (Interpreting Indicators of Rangeland Health, Version 4, 2005) • Line Point Intercept (Monitoring Manual for Grassland, Shrubland, and Savanna Ecosystems, Volume II, 2005) • Soil Pedon Descriptions (Field Book for Describing and Sampling Soils, Version 3, 2012) • SCS-RANGE-417 (Production & Composition Record for Native Grazing Lands) National Resources Inventory (NRI) Number of Records: 7 Sample Period: 2007-2017 Counties: Campbell, Johnson, Niobrara, Sheridan, Weston Additional data collection includes ESI data collection in conjunction with Soil Surveys conducted within MLRA 58B; ocular estimates; rangeland vegetative clipping for NRCS program support; field observations from experienced rangeland personnel Data collection for this ecological site was done in conjunction with the progressive soil surveys within MLRA 58B Northern Rolling High Plains (Southern Part) Note: Revisions to soil surveys are on-going. For the most recent updates, visit the Web Soil Survey, the official site for soils information: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

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Rangeland health reference sheet

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

Author(s)/participant(s)	
Contact for lead author	

Date	04/01/2005
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Due to the wide slope range associated with this site, the number and extent of rills will vary from none on slope < 9% to common on slopes > 25%
2. **Presence of water flow patterns:** Due to the wide slope range associated with this site, water flow patterns vary from barely observable on slopes of < 9% from broken and irregular in appearance to continuous on slopes > 25%
3. **Number and height of erosional pedestals or terracettes:** Not evident on slopes < 9% present on slopes > 9%
4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is 40-50%
5. **Number of gullies and erosion associated with gullies:** Active restricted to concentrated water flow patterns on steeper slopes
6. **Extent of wind scoured, blowouts and/or depositional areas:** None
7. **Amount of litter movement (describe size and distance expected to travel):** Little to no plant litter movement on slopes < 9%. Litter movement does occur on slopes > 9%
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Plant cover and litter is at 50% or greater of soil surface and maintains soil surface integrity. Soil Stability class is anticipated to be 4 or greater.
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Use Soil Series description for depth and color of A-horizon

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** **Grass canopy and basal cover should reduce raindrop impact and slow overland flow providing increased time for infiltration to occur. Infiltration varies with soil texture from slow to very rapid.**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** **No compaction layer or soil surface crusting should be present.**

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: Mid stature Cool Season Grasses >> Mid stature Warm Season Grasses > Short stature Grasses/Grasslikes Shrubs/Trees Forbs

    Sub-dominant:

    Other:

    Additional:

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

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14. **Average percent litter cover (%) and depth (in):** **Average litter cover is 10-15% with depths of 0.10 to 0.25 inches**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** **350 lbs./acre**

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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:** **Broom Snakeweed, Threadleaf sedge, Threeawns, and Species found on Noxious Weed List.**

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17. **Perennial plant reproductive capability:** **May be limited due to effective moisture and seed to soil contact**
