USDA Natural Resources Conservation Service

Ecological site R058BY142WY
Saline Subirrigated (SS) 10-14” PZ

Last updated: 9/15/2024
Accessed: 05/11/2025

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.

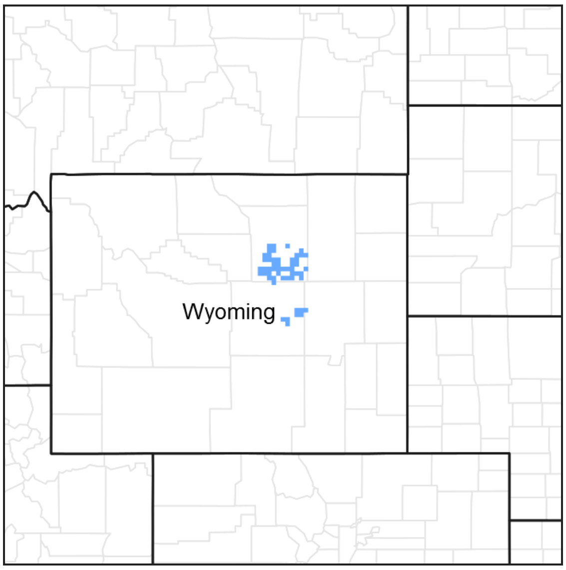


Figure 1. Mapped extent

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): 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

The Saline Subirrigated 10-14” Precipitation Zone (PZ) ecological site occurs on sedimentary plains or lowlands, adjacent to streams, springs, and ponds. It is a cool- and warm-season mixed-grass prairie (bunch- and rhizomatous) midgrasses, with secondary cool- and warm-season (bunch- and rhizomatous) shortgrasses, followed by a minor component of forbs and shrubs.

Associated sites

R058BY128WY	**Lowland (LL) 10-14” PZ** The Lowland site will be found on adjacent terraces or flood plain steps, above the active water zone of the drainages or on drier more ephemeral drains. Lower production, lower in wetland species. Salt free zones.
R058BY138WY	**Saline Lowland (SL) 10-14” PZ** The Saline Lowland site will be found on adjacent terraces or flood plain steps, above the active water zone of the drainages or on drier more ephemeral drains. Lower production, lower in wetland species. Salt burdened zones.

Similar sites

R058BY138WY	**Saline Lowland (SL) 10-14” PZ** The Saline Lowland site is similar in locations, being slightly higher in the landscape, with lower productivity and fewer wetland species present.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Sarcobatus vermiculatus*
Herbaceous	(1) *Sporobolus airoides* (2) *Puccinellia nuttalliana*

Physiographic features

This site occurs on nearly level drainageways, flood plains, and stream terraces; on sedimentary plains or lowlands, adjacent to streams, springs, and ponds.

Table 2. Representative physiographic features

Landforms	(1) Drainageway (2) Flood plain (3) Stream terrace
Runoff class	Negligible to very high
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to occasional
Ponding frequency	None
Elevation	3,500–6,500 ft
Slope	0–6%
Water table depth	12–40 in
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 CO2 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)	92-103 days
Freeze-free period (characteristic range)	121-128 days
Precipitation total (characteristic range)	12-13 in

Frost-free period (actual range)	86-107 days
Freeze-free period (actual range)	116-129 days
Precipitation total (actual range)	10-14 in
Frost-free period (average)	101 days
Freeze-free period (average)	125 days
Precipitation total (average)	13 in

Climate stations used

- (1) SHERIDAN CO AP [USW00024029], Sheridan, WY
- (2) CASPER NATRONA CO AP [USW00024089], Casper, WY
- (3) DULL CTR 1SE [USC00482725], Douglas, WY
- (4) KAYCEE [USC00485055], Kaycee, WY
- (5) MIDWEST [USC00486195], Midwest, WY
- (6) WESTON 1 E [USC00489580], Weston, WY
- (7) BUFFALO [USC00481165], Buffalo, WY
- (8) WRIGHT 12W [USC00489805], Gillette, WY
- (9) GLENROCK 5 ESE [USC00483950], Glenrock, WY

Influencing water features

This ecological site is associated with perennial streams and adjacent upslope sites. During intense precipitation events, this site receives additional moisture from overflow of streams and surface runoff moisture from adjacent upslope sites resulting in increased vegetative production. Due to the semi-arid climate in which it occurs, the water budget is normally contained within the soil profile. This site has a permanent water table. One map unit in this ESD has a 50 percent hydric component for flood plains, drainageways, or swales that have a water table.

Wetland description

Wetland Description (Cowardin System)

System - Palustrine
Subsystem - N/A
Class - Emergent Wetland

Soil features

The soils on this site are deep to very deep, somewhat poorly drained soils that formed from alluvium. They typically are in the moderate to moderately slow permeability class, but range to rapid or impermeable in some soils. The available water capacity is typically moderate but may range to very low or high in some soils. The surface layer of the soils in this site are typically loam, but may include sandy loam, silt loam, or silty clay. The surface layer ranges from a depth of 3 to 8 inches thick. The subsoil is stratified with thin, highly variable textural strata that when averaged is typically loam, clay loam, silty clay loam, silty clay, clay, sandy loam, fine sandy loam, or loamy sand. Rock fragments typically make up 0 to 5 percent in the subsoil but may range up to 15 percent in some soils. Soils in this site are typically calcareous to the surface, but some pedons are leached as deep as 2 to 8 inches, depending upon the source material of the most recent deposition. These soils are slightly to strongly saline and moderately to very strongly alkaline. The high levels of salinity and alkalinity adversely affect plant species composition and growth. These soils may be susceptible to erosion by water and wind, however soil loss is modified due to the wetness of the soil profile by the seasonal water table. The soil moisture regime is typically ustic aridic. The soil temperature regime is mesic.

Major soil series correlated to this ecological site include: None
The attributes listed below represent 0-40 inches in depth or to the first restrictive layer.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Loam (2) Sandy loam (3) Silt loam (4) Silty clay
Drainage class	Somewhat poorly drained
Permeability class	Moderate to moderately slow
Soil depth	80 in
Surface fragment cover <=3"	0–5%
Available water capacity (Depth not specified)	3.6–8.4 in
Calcium carbonate equivalent (Depth not specified)	0–10%
Electrical conductivity (Depth not specified)	4–16 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0–25
Soil reaction (1:1 water) (Depth not specified)	6.6–9
Subsurface fragment volume <=3" (Depth not specified)	0–15%

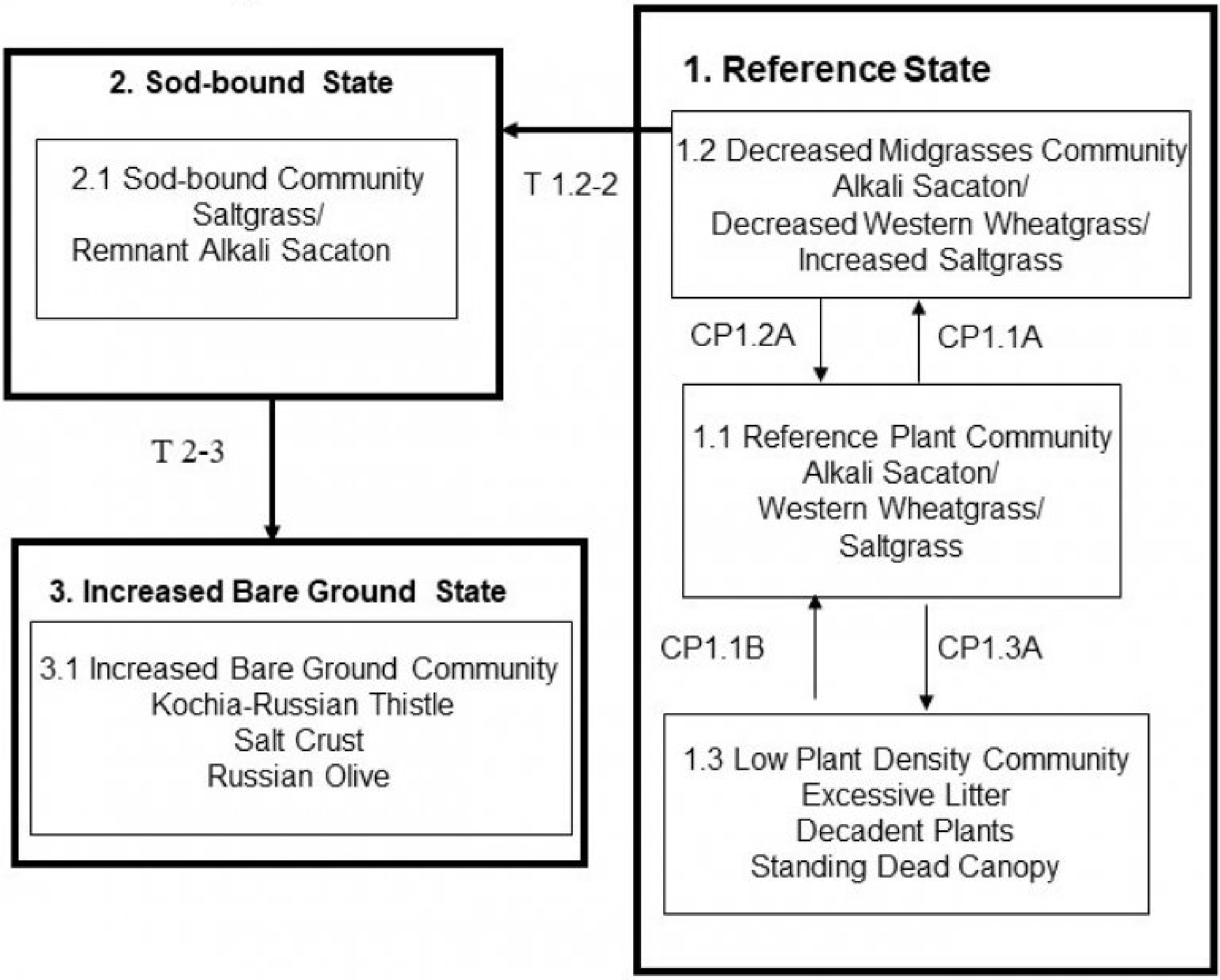
Ecological dynamics

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 such as multiple fires in close succession. The Reference state is characterized by warm-season bunch midgrass, cool-season rhizomatous grasses and warm-season rhizomatous. Other grasses include cool-season bunch midgrasses, and warm-season shortgrass. 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 alkali sacaton, alkali cordgrass, western wheatgrass, and slender wheatgrass decreasing in frequency and production. Grasses such as saltgrass will increase. Under continued frequent and severe defoliation with no rest periods, alkali sacaton will eventually be removed from the plant community. The plant community will become sod-bound, and all midgrasses can eventually be removed. Over the long-term, this continuous use, in combination with high stock densities, will result in a broken sod, with areas of bare ground developing. Species such as kochia and Russian thistle invade. As bare ground increases, this allows salts or alkali to build up on the soil surface. Once these events have occurred, it is difficult for native perennial plants to reestablish. 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

Saline Subirrigated 10-14" PZ



CP- Community Pathway
T-Transition
R-Restoration
CP-1.1A Continuous grazing and/or frequent defoliation without adequate recovery, extended drought
CP-1.2A Prescribed grazing with adequate recovery and proper stocking, drought followed by normal precipitation
CP-1.1B Non-use, no fire
CP-1.3A Prescribed grazing with adequate recovery, fire
T-1.2-2 Continuous grazing and/or frequent defoliation without adequate recovery
T-2-3 Long-term continuous grazing with overstocking

State 1
Reference

The Reference state is characterized by three distinct plant communities. The plant communities, and various successional stages between them, represent the natural range of variability within the Reference state.

Dominant plant species

- alkali sacaton (*Sporobolus airoides*), grass
- western wheatgrass (*Pascopyrum smithii*), grass
- saltgrass (*Distichlis spicata*), grass

Community 1.1
Alkali Sacaton and Western Wheatgrass

This is the interpretive plant community for the Saline Subirrigated 10 to 14 inch Precipitation Zone (PZ) ecological site. This community developed with grazing by large herbivores and is suited to grazing by domestic livestock. Historically, fires likely occurred infrequently, and were randomly distributed. This plant community can be found on areas where grazed plants receive adequate periods of recovery during the growing season. The potential vegetation is about 85 percent grasses and grass-likes, 5 to 10 percent forbs, and 5 to 10 percent woody plants. The major grasses include alkali sacaton, western wheatgrass, and saltgrass. Secondary species include alkali cordgrass; and cool-season mid- bunchgrasses such as slender wheatgrass, Canada wildrye, and Sandberg bluegrass (also known as alkali bluegrass). Other minor grasses include foxtail barley, alkali muhly, Nuttall’s alkaligrass, and little bluestem. A minor component of grass-likes such as rush , spikerush and bulrush species; forbs such as scouringrush horsetail, Pursh seepweed, arrowgrass, and showy milkweed; white sagebrush (also known as cudweed sagewort), Cuman ragweed, milkvetch; and a minor component of shrubs which may include black greasewood, fourwing saltbush, or rubber rabbitbrush are also present. In the Saline Subirrigated 10 to 14 inch precipitation zone ecological site, the total annual production (air-dry weight) is about 3,000 pounds per acre during an average year, but it can range from about 2,500 pounds per acre in unfavorable years to about 3,500 pounds per acre in above-average years. Defoliation levels should be determined as part of a grazing management plan based on objectives. Community dynamics (nutrient and water cycles, and energy flow) are functioning properly. Infiltration rates are moderate, and soil erosion is low. Litter is properly distributed where vegetative cover is continuous. Decadence and natural plant mortality are low. This community is resistant to many disturbances except excessive grazing or development into urban or other uses.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	2500	3000	3500
Shrub/Vine	625	750	875
Tree	125	150	175
Forb	125	150	175
Total	**3375**	**4050**	**4725**

Figure 7. Plant community growth curve (percent production by month). WY1403, 10-14NP free water sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	15	30	25	10	15	0	0	0

Community 1.2
Alkali Sacaton and Inland Saltgrass

This plant community developed with excessive grazing without adequate opportunity for recovery during the growing season. Saltgrass (also known as inland saltgrass) has increased in abundance. Most of the palatable plants such as alkali sacaton, western wheatgrass, and slender wheatgrass are present but occur in lesser amounts. Recognition of this plant community will enable the land user to implement key management decisions before a significant ecological threshold is crossed. Plant diversity is moderate. In the Saline Subirrigated 10 to 14“ Precipitation Zone ecological site, the total annual production (air-dry weight) is about 2,000 pounds per acre during an average year, but it can range from about 1,650 pounds per acre in unfavorable years to about 2,300 pounds per acre in above-average years. Total aboveground biomass has been reduced. Reduction of rhizomatous wheatgrasses and nitrogen-fixing forbs, and increased warm-season shortgrasses have begun to alter the biotic integrity of this community. Water and nutrient cycles may be impaired. Nearly all plant species typically found in community 1.1 are present and will respond to changes in grazing management.

Figure 8. Plant community growth curve (percent production by month). WY1403, 10-14NP free water sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	15	30	25	10	15	0	0	0

Community 1.3
Low Plant Density, Excessive Litter, Decadent Plants, and Standing Dead Canopy

This plant community developed under the absence of grazing, fire, or haying. Plant species resemble community 1.1 however, frequency and production will be reduced. Standing dead canopy may prevent sunlight from reaching plant crowns. Much of the available nutrients are tied up in standing dead plant material and litter. Eventually, litter levels can become high enough to cause decadence and/or mortality of the stand. Bunchgrasses, such as alkali sacaton, slender wheatgrass, and Sandberg bluegrass, typically develop dead centers and rhizomatous grasses can form small decadent communities due to a lack of impact by grazing animals. The semiarid environment and the absence of animal traffic to break down litter will slow nutrient recycling. Water flow patterns and pedestalling can become apparent. Infiltration is reduced and runoff is increased. In advanced states of non-use (rest) or lack of fire, bare areas will increase, causing an erosion concern. In the Saline Subirrigated 10 to 14 inch Precipitation Zone ecological site, the total annual production (air-dry weight) is about 2,700 pounds per acre during an average year, but it can range from about 2,200 pounds per acre in unfavorable years to about 3,150 pounds per acre in above average years. Nearly all plant species typically found in community 1.1 are present and will respond to changes in grazing management.

Figure 9. Plant community growth curve (percent production by month). WY1403, 10-14NP free water sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	15	30	25	10	15	0	0	0

Pathway 1.1A
Community 1.1 to 1.2

Excessive grazing without adequate recovery between grazing events, or frequent and severe defoliation, and extended drought, can shift this plant community toward community 1.2. Over a period of years, plant species less tolerant to frequent and severe defoliation will begin to decrease, and those more tolerant will begin to increase. Biotic integrity and the water and nutrient cycles may become impaired because of this community pathway.

Pathway 1.1B
Community 1.1 to 1.3

Non-use or lack of fire will cause community 1.1 to shift toward community 1.3. Plant decadence and standing dead plant material will impede energy flow. Initially, excess litter will increase. Eventually, native plant density begins to decrease and weeds and introduced species may begin to invade. The water and nutrient cycles will be impaired as a result of this community pathway.

Pathway 1.2A
Community 1.2 to 1.1

Grazing that allows for adequate recovery between grazing events, along with proper stocking rates, will shift community 1.2 back toward community 1.1. Natural disturbances, such as return to normal precipitation, will contribute to this shift.

Pathway 1.3A
Community 1.3 to 1.1

The return of grazing with adequate recovery or normal fire frequency can shift this plant community toward community 1.1. This change can occur in a relatively short time frame with the return of these disturbances.

State 2
Sod Bound

An ecological threshold has been crossed and significant amounts of production and diversity have been lost when compared to the Reference state. Significant biotic and soil changes have negatively impacted energy flow, and nutrient and hydrologic cycles. This is a very stable state, resistant to change due to the high tolerance of inland saltgrass to grazing, the development of a shallow root system (root pan), and subsequent changes in hydrology and nutrient cycling. The loss of other functional/structural groups such as cool-season bunch and rhizomatous grasses, forbs, and shrubs reduces the biodiversity productivity of this site.

Dominant plant species

- saltgrass (*Distichlis spicata*), grass
- Nuttall's alkaligrass (*Puccinellia nuttalliana*), grass

Community 2.1
Inland Saltgrass and Nuttall Alkaligrass

This plant community develops under long-term frequent and severe defoliation. This typically occurs when the community has been excessively grazed with heavy stocking rates throughout the growing season over a period of many years. The midgrasses and palatable forbs have been eliminated. The dominant species are saltgrass (also known as inland saltgrass) with remnant stands of alkali sacaton. The saltgrass has developed into a sod-bound condition occurring in localized colonies and exhibiting a mosaic appearance. Annual weeds such as kochia and Russian thistle have invaded. The plant community lacks diversity and is resistant to change. Evaporation has increased, resulting in salts on the soil surface. Energy flow, and the water and mineral cycles have been negatively affected. Litter levels are very low and unevenly distributed. In the Saline Subirrigated 10 to 14 inch Precipitation Zone ecological site, the total annual production (air-dry weight) is about 1,700 pounds per acre during an average year, but it can range from about 1,250 pounds per acre in unfavorable years to about 2,000 pounds per acre in above-average years.

Figure 10. Plant community growth curve (percent production by month). WY1403, 10-14NP free water sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	15	30	25	10	15	0	0	0

State 3
Increased Bare Ground

The Increased *Bare Ground* state develops with heavy excessive grazing or excessive defoliation. An ecological threshold has been crossed. The Increased *Bare Ground* state denotes changes in infiltration, runoff, aggregate stability and species composition. The changes in water movement and the plant community affect changes in hydrologic functionality, biotic integrity, and soil and site stability. Infiltration, runoff, and soil erosion vary depending on the vegetation present. Erosion and loss of organic matter and carbon reserves are resource concerns. Desertification is advanced. This alternative state should be tested and refined in future updates through long-term observation of ecosystem behavior, and repeated application of conservation and restoration practices.

Community 3.1
Increased Bare Ground, Annuals, and Salt Crust

This plant community occurs where the rangeland is grazed year-round at high stock densities. Physical impact such as trampling, soil compaction, and trailing typically contribute to this transition. The plant composition is made up of introduced annuals, noxious weeds, and remnant grasses such as saltgrass, that are very tolerant to frequent and severe defoliation. Annual invasive forbs include kochia and Russian thistle. Noxious weeds, such as Russian knapweed and Canada thistle may invade. Forage palatability for livestock is low. The total annual production (air-dry weight) is about 1,050 pounds per acre during an average year but may be as low as 700 pounds per acre in unfavorable years, to 1,100 lbs. per acre in favorable years. This plant community is highly variable, in both species composition and production. Average annual production should be determined on-site. This plant community is very resistant to change because of the lack of native species, the increase of salt-affected soils, and the amount of invasive species present. The changes in water movement and the plant community affect changes in hydrologic functionality, biotic integrity, and soil and site stability. Litter levels are extremely low due to reduced production. Runoff and evaporation are high because of soil crusting and the lack of cover.

Figure 11. Plant community growth curve (percent production by month). WY1403, 10-14NP free water sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	15	30	25	10	15	0	0	0

Transition T1A
State 1 to 2

Excessive grazing without adequate recovery periods, or frequent and severe defoliation, will shift this plant community across an ecological threshold toward the Sod Bound state. Biotic integrity and hydrologic function will be impaired as because of this transition.

Transition T2A
State 2 to 3

Long-term excessive grazing, or frequent and severe defoliation without adequate recovery between grazing events, or heavy, excessive grazing with overstocking will cause a shift across an ecological threshold to the Increased *Bare Ground* state.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Rhizomatous Grasses**			125–175	
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	125–175	0–5
	western wheatgrass	PASM	*Pascopyrum smithii*	125–175	0–5
2	**Warm-Season Midgrass**			1750–2450	
	alkali sacaton	SPAI	*Sporobolus airoides*	1250–1750	10–50
	saltgrass	DISP	*Distichlis spicata*	250–350	5–10
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	250–350	5–10
3	**Miscellaneous**			625–875	
	prairie cordgrass	SPPE	*Spartina pectinata*	125–175	1–5
	Grass, perennial	2GP	*Grass, perennial*	125–175	1–5
	alkali cordgrass	SPGR	*Spartina gracilis*	125–175	1–5
	Sandberg bluegrass	POSE	*Poa secunda*	125–175	1–5
	squirreltail	ELEL5	*Elymus elymoides*	125–175	1–5
	bearded wheatgrass	ELCA11	*Elymus caninus*	125–175	1–5
	mat muhly	MURI	*Muhlenbergia richardsonis*	125–175	1–5
Forb					
4	**Forbs**			125–175	
	American licorice	GLLE3	*Glycyrrhiza lepidota*	125–175	1–5
	milkvetch	ASTRA	*Astragalus*	125–175	1–5
	aster	ASTER	*Aster*	125–175	1–5
	white sagebrush	ARLU	*Artemisia ludoviciana*	125–175	1–5
	scouringrush horsetail	EQHY	*Equisetum hyemale*	125–175	1–5
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	125–175	1–5
	white prairie clover	DACA7	*Dalea candida*	125–175	1–5
	upright prairie coneflower	RACO3	*Ratibida columnifera*	125–175	1–5
	American vetch	VIAM	*Vicia americana*	125–175	1–5
	purple prairie clover	DAPU5	*Dalea purpurea*	125–175	1–5
	scarlet beeblossom	GACO5	*Gaura coccinea*	125–175	1–5
	Forb, perennial	2FP	*Forb, perennial*	125–175	1–5
Shrub/Vine					
5	**Shrubs**			625–875	
	greasewood	SAVE4	*Sarcobatus vermiculatus*	250–350	5–10
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	125–175	1–5
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	125–175	1–5
	Subshrub (<.5m)	2SUBS	*Subshrub (<.5m)*	125–175	1–5
Tree					
6	**Trees**			125–175	
	eastern cottonwood	PODE3	*Populus deltoides*	125–175	1–5

Animal community

Animal Community – Wildlife Interpretations (from 2001 ESD; will be revised in future updates)

Alkali Sacaton/ Nuttals alkaligrass (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.

Inland saltgrass/Greasewood: This plant community exhibits a low level of plant species diversity due to the accumulation of salts in the soil. It may provide some thermal and escape cover for deer and antelope if no other woody community is nearby, but in most cases it is not a desirable plant community to select as a wildlife habitat management objective.

Saltcedar/Russian knapweed: This plant community exhibits a low level of plant species diversity. It may provide thermal and escape cover for deer and antelope. In most cases it is not a desirable plant community to select as a wildlife habitat management objective.

Animal Community – Grazing Interpretations (updated in the 2019 Provisional revision)

The following table is a guide to stocking rates for the plant communities described in the Saline Subirrigated 10 to 14 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.

3,000 lbs. per acre X 25% Harvest Efficiency = 750 lbs. forage demand for one month. 750 lbs. per acre/912 demand per AUM =.82

Plant Community (PC) Production (total lbs./acre in a normal year) and Stocking Rate (AUM/acre) are listed below:

Reference Plant Community 2500-3500 1.5
Inland saltgrass/Greasewood 1800-2500 1.2
Salt cedar/Russian knapweed 900-1200 .4

* Highly variable stocking rates must 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

Salinity and alkalinity are the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic groups C and D. Infiltration ranges from moderately slow to moderate. 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 Part 630, NRCS

National Engineering Handbook for detailed hydrology information).

Rills and gullies should not typically be present. Water flow patterns should be barely distinguishable, if at all present. Pedestals should not be present. Erosional pedestals and terracettes are not expected on this site. Alkali sacaton tends to have a hummocky growth form that may appear pedestalled. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are present. Cryptogamic crusts are present, but only cover 1-2 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: 0
Sample Period: 2004-2016
Counties:

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

Other references

Anderson, R.C. 2006. Evolution and origin of the central grassland of North America: Climate, fire, and mammalian grazers. Journal of the Torrey Botanical Society 133:626–647.

Bragg, T.B. 1995. The physical environment of the Great Plains grasslands. In: A. Joern and K.H. Keeler (eds) The changing prairie. Oxford University Press, Oxford, UK, pages 49–81.

Branson, D.H. and G.A. Sword. 2010. An experimental analysis of grasshopper community responses to fire and livestock grazing in a northern mixed-grass prairie. Environmental Entomology 39:1441–1446.

Brinson, M.M. 1993. A hydrogeomorphic classification for wetlands. Technical Report WRP–DE–4. U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS.

Cleland, D., P. Avers, W.H. McNab, M. Jensen, R. Bailey, T. King, and W. Russell. 1997. National hierarchical framework of ecological units. In: Ecosystem Management: Applications for Sustainable Forest and Wildlife Resources, Yale University Press.

Coupland, R.T. 1958. The effects of fluctuations in weather upon the grasslands of the Great Plains. Botanical Review 24:273–317.

Davis, S.K., R.J. Fisher, S.L. Skinner, T.L. Shaffer, and R.M. Brigham. 2013. Songbird abundance in native and planted grassland varies with type and amount of grassland in the surrounding landscape. Journal of Wildlife Management 77:908–919.

DeLuca, T.H. and P. Lesica. 1996. Long-term harmful effects of crested wheatgrass on Great Plains grassland ecosystems. Journal of Soil and Water Conservation 51:408–409.

Derner, J.D. and R.H. Hart. 2007. Grazing-induced modifications to peak standing crop in northern mixed-grass prairie. Rangeland Ecology and Management 60:270–276.

Derner, J.D. and A.J. Whitman. 2009. Plant interspaces resulting from contrasting grazing management in northern mixed-grass prairie: Implications for ecosystem function. Rangeland Ecology and Management 62:83–88.

Derner, J.D., W.K. Lauenroth, P. Stapp, and D.J. Augustine. 2009. Livestock as ecosystem engineers for grassland bird habitat in the western Great Plains of North America. Rangeland Ecology and Management 62:111–118.

Dillehay, T.D. 1974. Late Quaternary bison population changes on the southern Plains. Plains Anthropologist 19:180–196.

Dormaar, J.F., and S. Smoliak. 1985. Recovery of vegetative cover and soil organic matter during revegetation of abandoned farmland in a semiarid climate. Journal of Range Management 38:487–491.

Guyette, Richard P., M.C. Stambaugh, D.C. Dey, and R.M. Muzika. (2012). Predicting fire frequency with chemistry and climate. Ecosystems, 15: 322-335.

Harmoney, K.R. 2007. Grazing and burning Japanese brome (Bromus japonicus) on mixed grass rangelands. Rangeland Ecology and Management 60:479–486.

Heitschmidt, R.K. and L.T. Vermeire. 2005. An ecological and economic risk avoidance drought management decision support system. In: J.A. Milne (ed.) Pastoral systems in marginal environments, 20th International Grasslands Congress, July, 2005. Page 178.

Knopf, F.L. 1996. Prairie legacies—Birds. In: F.B. Samson and F.L. Knopf (eds.) Prairie conservation: Preserving North America's most endangered ecosystem. Island Press, Washington, DC. Pages 135–148.

Knopf, F.L. and F.B. Samson. 1997. Conservation of grassland vertebrates. In: F.B. Samson and F.L. Knopf (eds.) Ecology and conservation of Great Plains vertebrates: Ecological Studies 125. Springer-Verlag, New York, NY. Pages 273–289.

Lauenroth, W.K., O.E. Sala, D.P. Coffin, and T.B. Kirchner. 1994. The importance of soil water in recruitment of Bouteloua gracilis in the shortgrass steppe. Ecological Applications 4:741–749.

Laycock, W.A. 1988. History of grassland plowing and grass planting on the Great Plains. In: J.E. Mitchell (ed.) Impacts of the Conservation Reserve Program in the Great Plains—symposium proceedings, September 16–18, 1987. U.S. Dept. of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, General Technical Report RM-158.

Malloch, D.W., K.A. Pirozynski, and P.H. Raven. 1980. Ecological and evolutionary significance of mycorrhizal symbioses in vascular plants (a review). Proceedings of the National Academy of Sciences 77:2113–2118.

Ogle, S.M., W.A. Reiners, and K.G. Gerow. 2003. Impacts of exotic annual brome grasses (Bromus spp.) on ecosystem properties of the northern mixed grass prairie. American Midland Naturalist 149:46–58.

Roath, L.R. 1988. Implications of land conversions and management for the future. In: J.E. Mitchell (ed.) Impacts of the Conservation Reserve Program in the Great Plains—symposium proceedings, September 16–18, 1987. U.S. Dept. of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, General Technical Report RM-158.

Smoliak, S. and J.F. Dormaar. 1985. Productivity of Russian wildrye and crested wheatgrass and their effect on prairie soils. Journal of Range Management 38:403–405.

Smoliak, S., J.F. Dormaar, and A. Johnston. 1972. Long-term grazing effects on Stipa-Bouteloua prairie soils. Journal of Range Management 25:246–250.

Soil Survey Division Staff. 2017. Soil survey manual. U.S. Dept. of Agriculture Handbook 18.

Soil Survey Staff. Official Soil Series Descriptions. U.S. Dept. of Agriculture, Natural Resources Conservation Service. Available online. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053587 Accessed 15 November, 2017.

Soil Survey Staff. Soil Survey Geographic (SSURGO) database. U.S. Dept. of Agriculture, Natural Resources Conservation Service.

Soil Survey Staff. 2014. Keys to Soil Taxonomy, 12th edition. U.S. Dept. of Agriculture, Natural Resources Conservation Service.
Soil Survey Staff. 2018. Web Soil Survey. U.S. Dept. of Agriculture, Natural Resources Conservation Service. Available online. https://websoilsurvey.nrcs.usda.gov/app/. Accessed 15 February, 2018.

Soller, D.R. 2001. Map showing the thickness and character of Quaternary sediments in the glaciated United States east of the Rocky Mountains. U.S. Geological Survey Miscellaneous Investigations Series I-1970-E, scale 1:3,500,000.

Stewart, Omer C. 2002. Forgotten Fires. Univ. of Oklahoma Press, Norman, OK.

United States Department of Agriculture, Natural Resources Conservation Service. Glossary of landform and geologic terms. National Soil Survey Handbook, Title 430-VI, Part 629.02c. Available online. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_054242. Accessed 16 January, 2018.

United States Army Corps of Engineers. 1987. Corps of Engineers wetlands delineation manual. Wetlands Research Program Technical Report Y-87-1. Available online. http://www.lrh.usace.army.mil/Portals/38/docs/USACE%2087%20Wetland%20Delineation%20Manual.pdf. Waterways Experiment Station, Vicksburg, MS.

United States Environmental Protection Agency, National Health and Environmental Effects Research Laboratory. 2013. Level III ecoregions of the continental United States. Available online. https://www.epa.gov/eco-research/ecoregions Accessed 30 January, 2019.

United States Department of Agriculture, Natural Resources Conservation Service. 2010a. Field indicators of hydric soils in the United States, version 7.0.

United States Department of Agriculture, Natural Resources Conservation Service. 2013a. Climate data. National Water and Climate Center. Available online. http://www.wcc.nrcs.usda.gov/climate. Accessed 13 October, 2017.

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. Agriculture Handbook 296.

United States Department of Agriculture, Natural Resources Conservation Service. 2013b. National Soil Information System. Available online. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/geo/?Cid=nrcs142p2_053552. Accessed 30 October, 2017.

United States Department of the Interior, Geological Survey. 2008. LANDFIRE 1.1.0 Vegetation Dynamics Models. http://landfire.cr.usgs.gov/viewer/.

United States Department of the Interior, Geological Survey. 2011. LANDFIRE 1.1.0 Existing Vegetation Types. http://landfire.cr.usgs.gov/viewer/.

Willeke, G.E. 1994. The national drought atlas [CD ROM]. U.S. Army Corps of Engineers, Water Resources Support Center, Institute for Water Resources Report 94-NDS-4.

Wilson, S.D., and J.M. Shay. 1990. Competition, fire, and nutrients in a mixed-grass prairie. Ecology 71:1959–1967.

With, K.A. 2010. McCown's longspur (Rhynchophanes mccownii). In: A. Poole (ed.) The birds of North America [online]. Cornell Lab of Ornithology, Ithaca, NY. https://birdsna.org/Species-Account/bna/home.

Augustine, D.J., J. Derner, D. Milchunas, D. Blumenthal, and L. Porensky. 2017. Grazing moderates increases in C3 grass abundance over seven decades across a soil texture gradient in shortgrass steppe. In: Journal of Vegetation Science, DOI:10.1111/jvs.12508.

Clark, J., E. Grimm, J. Donovan, S. Fritz, D. Engrstom, and J. Almendinger. 2002. Drought cycles and landscape responses to past aridity on prairies of the Northern Great Plains, USA. Ecology, 83(3), Pages 595-601.

Connell, L. C., J. D. Scasta, and L. M. Porensky. 2018. Prairie dogs and wildfires shape vegetation structure in a sagebrush grassland more than does rest from ungulate grazing. Ecosphere 9(8):e02390. 10.1002/ecs2.2390

Collins, S. and S. Barber. (1985). Effects of disturbance on diversity in mixed-grass prairie. In: Vegetatio, 64, pages 87-94.

Egan, Timothy. 2006. The Worst Hard Time. Houghton Mifflin Harcourt Publishing Company, New York, NY.

Guyette, R.P., M.C. Stambaugh, D.C. Dey, and R.M. Muzika. 2012. Predicting fire frequency with chemistry and climate. In: Ecosystems, 15: pages 322-335.

Hart, R. and J. Hart. 1997. Rangelands of the Great Plains before European settlement. In: Rangelands, 19(1), pages 4-11.

Hart, R. 2001. Plant biodiversity on shortgrass steppe after 55 years of zero, light, moderate, or heavy cattle grazing. In: Plant Ecology, 155, pages 111-118.

Pellant, M., P. Shaver, D.A. Pyke, and J.E. Herrick. 2005. Interpreting indicators of rangeland health, Version 4. United States Department of the Interior, Bureau of Land Management.

Porensky, L.M. and D.M. Blumenthal. 2016. Historical wildfires do not promote cheatgrass invasion in a western Great Plains steppe. In: Biological Invasions 18:3333-3349: DOI 10.1007/s10530-16-1225-z

Porensky, L.M., J.D. Derner, and D.W. Pellatz. 2018. Plant community responses to historical wildfire in a shrubland-grassland ecotone reveal hybrid disturbance response. In: Ecosphere. DOI: 9(8):e02363. 10.1002/ecs2.2363.

Mack, Richard N., and J.N. Thompson. 1982. Evolution in steppe with few large, hooved mammals. In: The American Naturalist. 119, No. 6, pages 757-773.

Reyes-Fox, M., H. Stelzer, M.J. Trlica, G.S. McMaster, A. A. Andales, D.R. LeCain, and J.A. Morgan. 2014. Elevated CO2 further lengthens growing season under warming conditions. In: Nature, April 23, 2014. Available online. http://www.nature.com/nature/journal/v510/n7504/full/nature13207.html. Accessed 1 March, 2017.

Schoeneberger, P.J., D.A. Wysockie, E.C. Benham, and Soil Survey Staff. 2012. Field book for describing and sampling soils, Version 3.0. U.S. Dept. of Agriculture, Natural Resources Conservation Service.

Stahl, David W., E.R. Cook, M.K. Cleaveland, M.D. Therrell, D.M. Meko, H.D. Grissino-Mayer, E. Watson, and B.H. Luckman. Tree-ring data document 16th century megadrought over North America. 2000. In: Eos, 81(12), pages 121-125.

Stubbendieck, James, S.L. Hatch, and L.M. Landholt. 2003. North American wildland plants. Univ. of Nebraska

Press, Lincoln and London.

Zelikova, T.J., D.M. Blumenthal, D.G. Williams, L. Souza, D.R. LeCain, and J. Morgan. 2014. Long-term exposure to elevated CO2 enhances plant community stability by suppressing dominant plant species in a mixed-grass prairie. In: Ecology, 2014. Available online. https://www.pnas.org/content/111/43/15456.

United States Department of Agriculture, Natural Resources Conservation Service. National Ecological Site Handbook, Title 190, Part 630, 1st Edition. Available online. https://directives.sc.egov.usda.gov/. Accessed 15 September, 2017.

United States Department of Agriculture, Natural Resources Conservation Service. 2009. Part 630, Hydrology, National Engineering Handbook.

United States Department of Agriculture, Natural Resources Conservation Service. 1972-2012. National Engineering Handbook Hydrology Chapters. http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/water/?&cid=stelprdb1043063 (Accessed August, 2015).

United States Department of Agriculture, Natural Resources Conservation Service. 1997, revised 2003. National Range and Pasture Handbook. Available online.
http://www.glti.nrcs.usda.gov/technical/publications/nrph.html
Accessed 26 February, 2018.

United States Department of Agriculture, Natural Resources Conservation Service. National Soil Survey Handbook title 430-VI. Available online. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_054242.

United States Department of Agriculture, Natural Resources Conservation Service. Web Soil Survey. Available online. http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. Accessed 15 November, 2017.

United States Department of Commerce, National Oceanic and Atmospheric Administration (NOAA). Cooperative climatological data summaries. NOAA Western Regional Climate Center, Reno, NV. Available online. http://www.wrcc.dri.edu/climatedata/climsum. Accessed 16 November, 2017.

Contributors

Everett Bainter
Glenn Mitchell

Approval

Kirt Walstad, 9/15/2024

Acknowledgments

Project Staff:
Kimberly Diller, Ecological Site Inventory Specialist, NRCS MLRA SSO, Pueblo CO
Mike Leno, Project Leader, NRCS MLRA SSO, Buffalo, WY

Partners/Contributors:
Joe Dyer, Soil Scientist, NRCS MLRA SSO, Buffalo, WY
Arnie Irwin, Soil Scientist, BLM, Buffalo, WY
Blaine Horn, Rangeland Extension Educator, UW Extension, Buffalo, WY
Isabelle Giuliani, Resource Soil Scientist, NRCS, Douglas, WY
Mary Jo Kimble, Project Leader, NRCS MLRA SSO, Miles City, MT
Ryan Murray, Rangeland Management Specialist, NRCS, Buffalo, WY
Lauren Porensky, Ph.D., Ecologist, ARS, Fort Collins, CO
Chadley Prosser, Rangeland Program Manager, USFS, Bismarck, ND
Bryan Christensen, Ecological Site Inventory Specialist, NRCS-MLRA SSO, Pinedale, WY
Marji Patz, Ecological Site Inventory Specialist, NRCS-MLRA SSO, Powell, WY

Rick Peterson, Ecological Site Inventory Specialist, NRCS-MLRA SSO, Rapid City, SD

Program Support:
John Hartung, WY State Rangeland Management Specialist-QC, NRCS, Casper, WY
David Kraft, NRCS MLRA Ecological Site Inventory Specialist-QA, Emporia, KS
Carla Green Adams, Editor, NRCS-SSR5, Denver, CO
Chad Remley, Regional Director, Northern Great Plains Soil Survey, Salina, KS

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	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills should not be present.

2. **Presence of water flow patterns:** Barely observable.

3. **Number and height of erosional pedestals or terracettes:** Essentially non-existent.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is 10-20% occurring in small areas throughout site.

5. **Number of gullies and erosion associated with gullies:** Active gullies should not 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):** Little to no plant litter movement. Plant litter
remains in place and is not moved by erosional forces.

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 80% 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. Healthy deep rooted native grasses enhance infiltration and reduce runoff. Infiltration is moderately slow to moderate.

---

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 is present. Some surface crusting of salts due to fluctuation of water table.

---

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 Warm Season Grasses = Short and Mid stature Grasses/Grass-like >Shrubs Forbs

    Sub-dominant:

    Other:

    Additional:

---

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

---

14. **Average percent litter cover (%) and depth (in):** Average litter cover is 30-40% with depths of 0.25 to 1.0 inches.

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 3,000 lbs./ac

---

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:** Inland saltgrass, Arrowgrass, Baltic Rush, Kochia, Russian thistle, and Species found on

Noxious
Weed List.

---

17. **Perennial plant reproductive capability:** All species are capable of reproducing.
