USDA Natural Resources Conservation Service

Ecological site R058BY106WY
Clayey Overflow (CyO) 10-17” PZ

Last updated: 9/15/2024
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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.

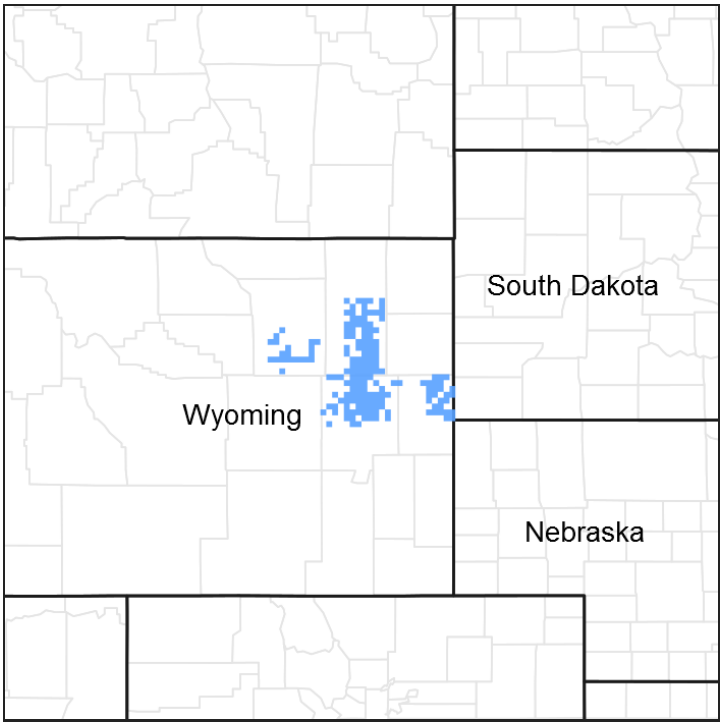


Figure 1. Mapped extent

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

This ecological site occurs in swales and drainageways and on stream terraces where it receives additional moisture from flooding or run-in from adjacent areas. The streams associated with this site are ephemeral, meaning they flow only in direct response to a precipitation event or snow melt. This site occurs at elevations ranging from 2,900 to

5,900 feet and on slopes ranging from 0 to 5 percent. This site occurs on all aspects, although aspect is not a significant factor. The soils of this ecological site are deep to very deep and are well drained. The soil surface textures on this site typically range from fine sandy loam to silty clay loam but can have a wide variation since these soils typically result from water deposition.

Associated sites

R058BY104WY	**Clayey (Cy) 10-14" PZ** The Clayey 10-14 ecological site occurs on slopes of 0 to 15 percent, has soils with greater than 35 percent clay content, and has lower total annual production. The Clayey 10-14 ecological site is positioned above the Clayey Overflow 10-14 ecological site. The Clayey 10-14 ecological site does not receive additional moisture from flooding or run-in from adjacent areas.
R058BY122WY	**Loamy (Ly) 10-14" PZ** The Loamy 10-14 ecological site occurs on slopes of 0 to 15 percent and has lower total annual production. The Loamy 10-14 ecological site is positioned above the Clayey Overflow 10-14 ecological site. The Loamy 10-14 ecological site does not receive additional moisture from flooding or run-in from adjacent areas.
R058BY128WY	**Lowland (LL) 10-14" PZ** Lowland 10-14 ecological site occurs on slopes of 0 to 6 percent and has higher total annual production. The Lowland 10-14 ecological site occurs on similar landform positions as the Clayey Overflow 10-14 ecological site.
R058BY130WY	**Overflow (Ov) 10-14" PZ** Overflow 10-14 ecological site occurs on slopes of 0 to 6 percent and has similar overall production to the Clayey Overflow 10-14 ecological site. The Overflow 10-14 ecological site occurs on similar landform positions as the Clayey Overflow 10-14 ecological site.

Similar sites

R058BY138WY	**Saline Lowland (SL) 10-14" PZ** The Saline Lowland 10-14 ecological site occurs on similar slopes and landform positions and has similar total annual production as the Clayey Overflow 10-14 ecological site, but the Saline Lowland 10-14 ecological site is dominated by salt tolerant species. The Saline Lowland 10-14 ecological site does not receive additional moisture from flooding or run-in from adjacent areas.
R058BY130WY	**Overflow (Ov) 10-14" PZ** Overflow 10-14 ecological site occurs on slopes of 0 to 6 percent and has similar overall production to the Clayey Overflow 10-14 ecological site. The Overflow 10-14 ecological site occurs on similar landform positions as the Clayey Overflow 10-14 ecological site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. wyomingensis*
Herbaceous	(1) *Leymus cinereus* (2) *Pascopyrum smithii*

Physiographic features

This ecological site occurs on nearly level areas that receive additional moisture from overflow of intermittent streams or runoff from adjacent slopes. The streams associated with this site are intermittent, meaning the streams have a well-defined channel that contains water for only part of the year, typically during winter and spring when the aquatic bed is below the water table. The flow may be heavily supplemented by stormwater runoff. The site occurs at elevations ranging from 2,900 to 5,900 feet and on slopes ranging from 0 to 6 percent. This site occurs on all aspects, although aspect is not a significant factor.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Drainageway (3) Draw
Runoff class	Medium to very high
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to frequent
Ponding frequency	None
Elevation	884–1,798 m
Slope	0–6%
Ponding depth	0 cm
Water table depth	203 cm
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)	305-330 mm
Frost-free period (actual range)	86-107 days
Freeze-free period (actual range)	116-129 days
Precipitation total (actual range)	254-356 mm

Frost-free period (average)	101 days
Freeze-free period (average)	125 days
Precipitation total (average)	330 mm

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 receives additional moisture through surface runoff and from stream overflow. Hydrology is typical of upper stream terraces in that the site contributes recharge to the stream reach during peak precipitation cycles (May through June). The site receives additional moisture from surrounding uplands that saturates the soil profile then enters the stream as either surface flow or subsurface flow. During major flood events, the site may be flooded for brief durations. Sometimes, a seasonal groundwater table deeper than 40 inches below the soil surface is present, particularly during spring runoff.

Wetland description

N/A

Soil features

The soils associated with this ecological site are typically very deep, well drained, that formed from alluvium derived from shale. The depth to a soil restrictive layer is greater than 60 inches from the soil surface. The soil surface layer ranges from a depth of 2 to 5 inches in thickness. The soil surface horizon textures are typically clay, clay loam, silty clay loam, or silty clay. The subsoil horizons are typically clay, clay loam, silty clay loam, or silty clay. Soils on this ecological site typically have carbonates within 10 inches of the soil surface. The soil moisture regime is typically ustic aridic. The soil temperature regime is mesic.

The major soil series correlated to this ecological site is the Lohmiller series.

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

Table 4. Representative soil features

Parent material	(1) Alluvium–shale
Surface texture	(1) Clay loam (2) Silty clay loam (3) Silty clay (4) Clay
Drainage class	Well drained
Permeability class	Slow to moderately slow
Depth to restrictive layer	152–203 cm
Soil depth	152–203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	13.21–21.34 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Clay content (0-101.6cm)	35–60%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (0-101.6cm)	0%
Subsurface fragment volume >3" (0-101.6cm)	0%

Ecological dynamics

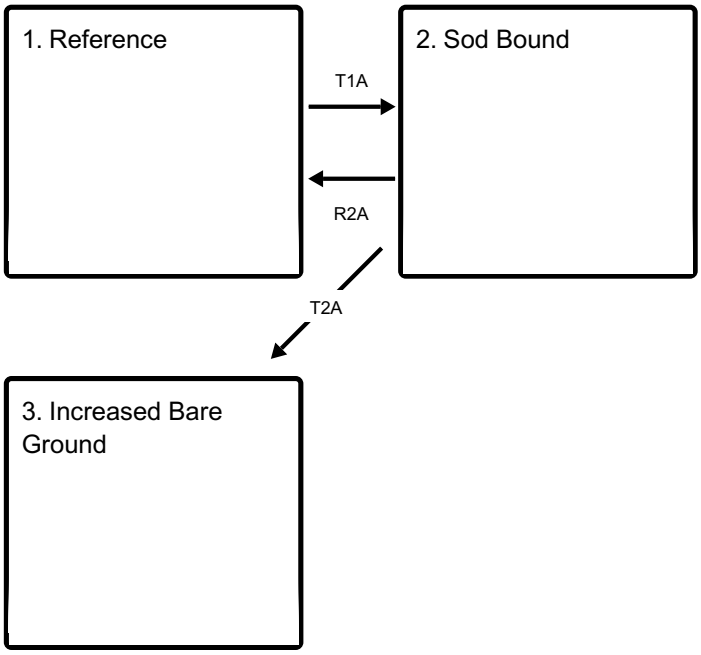
The Reference state is the plant community in which interpretations are primarily based and is used as a reference in order to understand the original potential of the site. The Reference state evolved under the combined influences of climatic conditions, periodic fire activity, grazing by large herbivores, and impacts from small mammals and insects. Changes may occur to the Reference state due to climatic conditions such as drought, natural events such as multiple fires in close succession, grazing management such as continuous season-long or year-long grazing, heavier stocking rates, or a combination of

these
factors. The reference state for this ecological site is dominated by a diversity of tall and medium height, cool-season and warm-season grasses which are tightly intermixed and well distributed over the site. Various forbs, half-shrubs, and shrubs are common on this site. 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 a decrease of tallgrasses, mid-grasses, and more palatable forbs and in an increase of shortgrasses, sedges, and less palatable forbs. Half-shrubs and shrubs increase in the absence of prescribed fire and wildfire. More frequent fire intervals decreases the shrub component resulting in a site dominated by herbaceous species. 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

Ecosystem states

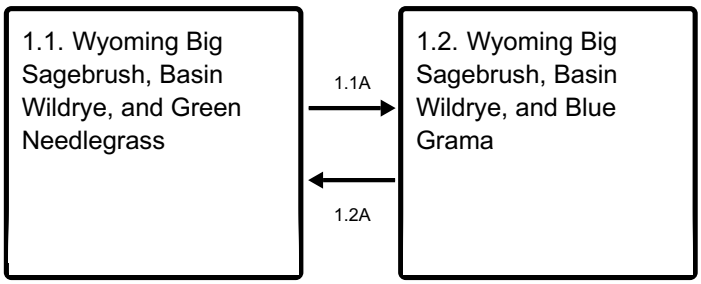


T1A - Prolonged drought, heavier stocking rates, or a combination of these factors

R2A - Lighter stocking rates in combination with rangeland seeding, grazing land mechanical treatment, and timely moisture (management intensive and costly)

T2A - Introduction of non-native, invasive species (annual bromes, noxious weeds, other invasive plant species)

State 1 submodel, plant communities

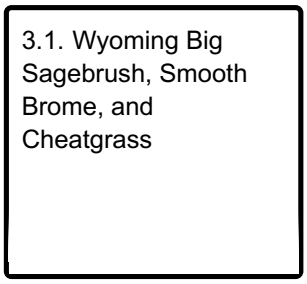


1.1A - Prolonged drought, heavier stocking rates

1.2A - Normal or above-normal precipitation, lighter stocking rates

State 2 submodel, plant communities

State 3 submodel, plant communities



State 1
Reference

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. 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 for this ecological site consists of two communities.

Community 1.1
Wyoming Big Sagebrush, Basin Wildrye, and Green Needlegrass

Community 1.1 is characterized by rhizomatous wheatgrasses, bunchgrasses, and Wyoming big sagebrush. The predominant grass species include western wheatgrass, green needlegrass, and basin wildrye. Other grasses and sedge species include thickspike wheatgrass, Cusick's bluegrass, Canada wildrye, needle and thread, mat muhly, prairie Junegrass, Sandberg bluegrass, plains reedgrass, blue grama, and threadleaf sedge.

Forbs such as American vetch, upright prairie coneflower, desertparsley, large Indian breadroot, two-grooved milkvetch, American licorice, scarlet beeblossom, purple prairie clover, white prairie clover, tapertip hawksbeard, and scarlet globemallow are present. The dominant shrub species is Wyoming big sagebrush. Other shrub and subshrub species which occur at lower canopy cover may include western snowberry, winterfat, and prairie sagewort. The potential vegetation is approximately 72 percent grasses, 9 percent forbs, and 19 percent shrubs. The total annual production (air-dry weight) is approximately 1,800 pounds per acre during an average year but can range from approximately 1,200 pounds per acre in below average years to approximately 2,200 pounds per acre in above average years.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	968	1453	1775
Shrub/Vine	256	383	469
Forb	121	182	222
Total	**1345**	**2018**	**2466**

Figure 9. Plant community growth curve (percent production by month). WY1402, 10-14NP extra water sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	20	30	15	10	15	5	0	0

Community 1.2
Wyoming Big Sagebrush, Basin Wildrye, and Blue Grama

Community 1.2 is characterized by an increasing dominance of shortgrasses such as blue grama, prairie Junegrass, and Sandberg bluegrass and a decrease in cool-season, rhizomatous wheatgrasses and mid-statured bunchgrasses such as western wheatgrass, thickspike wheatgrass, green needlegrass, and Canada wildrye. Shrub and subshrub species such as Wyoming big sagebrush, western snowberry, and prairie sagewort are present.

Pathway 1.1A
Community 1.1 to 1.2

Prolonged drought, grazing management such as continuous season-long or year-long grazing, heavier stocking rates, or a combination of these factors can shift community 1.1 to community 1.2.

Pathway 1.2A

Community 1.2 to 1.1

Normal or above-normal precipitation and lighter stocking rates transitions community 1.2 back to community 1.1.

State 2
Sod Bound

The dynamics of the Sod Bound state are driven by long-term drought, grazing management such as continuous season-long or year-long grazing, heavier stocking rates, or a combination of these factors. The Sod Bound state for this ecological site consists of one community.

Dominant plant species

- Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*), shrub
- smooth brome (*Bromus inermis*), grass
- Kentucky bluegrass (*Poa pratensis*), grass

Community 2.1
Wyoming Big Sagebrush, Smooth Brome, and Kentucky Bluegrass

Community 2.1 is characterized by a dominance of introduced, invasive, perennial grasses such smooth brome and Kentucky bluegrass. Native, cool-season bunchgrasses such as basin wildrye, green needlegrass, and Canada wildrye and rhizomatous wheatgrasses such as western wheatgrass and thickspike wheatgrass are rare or absent. This plant community occurs when site conditions decline due to long-term drought, grazing management such as continuous season-long or year-long grazing, heavier stocking rates, or a combination of these factors. Shrub and subshrub species such as Wyoming big sagebrush, western snowberry, and prairie sagewort are present.

State 3
Increased Bare Ground

The dynamics of the Increased *Bare Ground* state are driven by long-term drought, grazing management such as continuous season-long or year-long grazing, heavier stocking rates, or a combination of these factors. The Increased *Bare Ground* state for this ecological site consists of one community.

Dominant plant species

- Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*), shrub
- smooth brome (*Bromus inermis*), grass
- cheatgrass (*Bromus tectorum*), grass

Community 3.1

Wyoming Big Sagebrush, Smooth Brome, and Cheatgrass

Community 3.1 is characterized by a dominance of introduced, invasive, perennial grasses such smooth brome and introduced, annual grasses such as cheatgrass. Cool-season rhizomatous wheatgrasses and mid-statured bunchgrasses such as western wheatgrass, thickspike wheatgrass, green needlegrass, and Canada wildrye are rare or absent. Shrub and subshrub species such as Wyoming big sagebrush, western snowberry, and prairie sagewort are present.

Transition T1A
State 1 to 2

Prolonged drought, grazing practices such as continuous season-long or year-long grazing, heavier stocking rates, or a combination of these factors weaken the resilience of the Reference state and drive its transition to the Sod Bound state. The Reference state transitions to the Sod Bound state when mid-statured grasses are greatly reduced and sod-forming species such as smooth brome and Kentucky bluegrass dominate the plant community.

Restoration pathway R2A
State 2 to 1

Sod-forming species such as smooth brome and Kentucky bluegrass can resist displacement by other species. A reduction in livestock grazing pressure alone may not be sufficient to reduce the cover of these species in the Sod Bound state and mechanical treatments may be necessary. Therefore, returning the Sod Bound state to the Reference state can require considerable cost, energy, and time.

Transition T2A
State 2 to 3

The Sod Bound state transitions to the Increased *Bare Ground* state when non-native grasses such as cheatgrass, noxious weeds, and other invasive plants invade the Sod Bound state. Exotic plant species increase substantially on the site in terms of cover and production. Site resilience has been significantly reduced.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Cool-Season Rhizomatous Grasses**			202–370	
	western wheatgrass	PASM	*Pascopyrum smithii*	202–370	10–15

	wheatgrass				
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	202–370	10–15
2	**Cool-Season Bunchgrasses**			1211–2219	
	basin wildrye	LECI4	*Leymus cinereus*	673–1233	40–50
	green needlegrass	NAVI4	*Nassella viridula*	269–493	15–20
	Cusick's bluegrass	POCU3	*Poa cusickii*	135–247	5–10
	Canada wildrye	ELCA4	*Elymus canadensis*	135–247	5–10
3	**Miscellaneous Grasses**			135–247	
	Grass, perennial	2GP	*Grass, perennial*	67–123	1–5
	blue grama	BOGR2	*Bouteloua gracilis*	67–123	1–5
	buffalograss	BODA2	*Bouteloua dactyloides*	67–123	1–5
	threadleaf sedge	CAFI	*Carex filifolia*	67–123	1–5
	plains reedgrass	CAMO	*Calamagrostis montanensis*	67–123	1–5
	needle and thread	HECO26	*Hesperostipa comata*	67–123	1–5
	mat muhly	MURI	*Muhlenbergia richardsonis*	67–123	1–5
	prairie Junegrass	KOMA	*Koeleria macrantha*	67–123	1–5
	Sandberg bluegrass	POSE	*Poa secunda*	67–123	1–5
	sedge	CAREX	*Carex*	67–123	1–5
Forb					
4	**Forbs**			202–370	
	aster	ASTER	*Aster*	67–123	1–5
	yarrow	ACHIL	*Achillea*	67–123	1–5
	twogrooved milkvetch	ASBI2	*Astragalus bisulcatus*	67–123	1–5
	milkvetch	ASTRA	*Astragalus*	67–123	1–5
	scarlet beeblossom	GACO5	*Gaura coccinea*	67–123	1–5
	American licorice	GLLE3	*Glycyrrhiza lepidota*	67–123	1–5
	desertparsley	LOMAT	*Lomatium*	67–123	1–5
	large Indian breadroot	PEES	*Pediomelum esculentum*	67–123	1–5
	upright prairie	RACO3	*Ratibida columnifera*	67–123	1–5

	upright prairie coneflower	RACO3	*Ratibida columnifera*	67–123	1–5
	purple prairie clover	DAPU5	*Dalea purpurea*	67–123	1–5
	white prairie clover	DACA7	*Dalea candida*	67–123	1–5
	bluebells	MERTE	*Mertensia*	67–123	1–5
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	67–123	1–5
	textile onion	ALTE	*Allium textile*	67–123	1–5
	American vetch	VIAM	*Vicia americana*	67–123	1–5
	scurfpea	PSORA2	*Psoralidium*	67–123	1–5
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	67–123	1–5
	larkspur	DELPH	*Delphinium*	67–123	1–5
	white sagebrush	ARLU	*Artemisia ludoviciana*	67–123	1–5
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	67–123	1–5
	field sagewort	ARCA12	*Artemisia campestris*	67–123	1–5
	Forb, perennial	2FP	*Forb, perennial*	67–123	1–5
Shrub/Vine					
5	**Shrubs**			135–247	
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	135–247	5–10
6	**Miscellaneous Shrubs**			269–493	
	prairie sagewort	ARFR4	*Artemisia frigida*	67–123	1–5
	western snowberry	SYOC	*Symphoricarpos occidentalis*	67–123	1–5
	winterfat	KRLA2	*Krascheninnikovia lanata*	67–123	1–5
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	67–123	1–5
	Subshrub (<.5m)	2SUBS	*Subshrub (<.5m)*	67–123	1–5

Animal community

Rhizomatous wheatgrass/ basin wildrye: 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/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.

Western wheatgrass/Green needlegrass: 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/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.

Mixed Sagebrush/Grass: The combination of an overstory of sagebrush and an understory of grasses and forbs provide a very diverse plant community for wildlife. The crowns of sagebrush tend to break up hard crusted snow on winter ranges, so mule deer and antelope may use this state for foraging and cover year-round, as would cottontail and jack rabbits. It provides important winter, nesting, brood-rearing, and foraging habitat for sage grouse. Brewer's sparrows' nest in big sagebrush plants, and hosts of other nesting birds utilize stands in the 20-30% cover range.

Animal Community – Grazing Interpretations

The following table lists suggested stocking rates for cattle under continuous season-long grazing under normal growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this, a field visit is recommended, in all cases, to document plant composition and production. More precise carrying capacity estimates should eventually be calculated using this information along with animal preference data, particularly when grazers other than cattle are involved. Under more intensive grazing management, improved harvest efficiencies can result in an increased carrying capacity. If distribution problems occur, stocking rates must be reduced to maintain plant health and vigor.

Plant Community	Production (lb./ac)	Carrying Capacity* (AUM/ac)
Reference Plant Community	1200-2200	.6
Western wheatgrass/Green needlegrass	1000-2200	.5
Mixed Sagebrush/Grass	800-1500	.4

* - Continuous, season-long grazing by cattle under average growing conditions.

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage for cattle, sheep, or horses. During the dormant period, the forage for livestock use needs to be supplemented with protein

because the quality does not meet minimum livestock requirements.

Hydrological functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group B and C, with localized areas in hydrologic group D. Infiltration rate is moderately slow to slow. 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% 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% 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 are only slightly present in association with increased flow or flooding events. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent. Cryptogamic crusts are present, but only cover 1-2% 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 needed 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 information has been derived from data collection 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)

USDA - Agricultural Research Service (ARS)
Thunder Basin National Grassland
Plant Community Responses to Historical Wildfire in a Shrubland/Grassland Ecotone
• Number of Records: 140
• Sample Period: 2014-2021
• State: Wyoming
• Counties: Campbell, Converse, Crook, Niobrara, and Weston

Additional reconnaissance data collection includes ocular estimates and other inventory data; vegetative clipping data 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	09/04/2024
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

   _____

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

   _____

3. **Number and height of erosional pedestals or terracettes:**

   _____

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

   _____

5. **Number of gullies and erosion associated with gullies:**

   _____

6. **Extent of wind scoured, blowouts and/or depositional areas:**

   _____

7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

---

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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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):**

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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:

    Sub-dominant:

    Other:

    Additional:

---

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

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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):**

---

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:**

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17. **Perennial plant reproductive capability:**
