

Ecological site R058BY130WY Overflow (Ov) 10-14" PZ

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General information

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

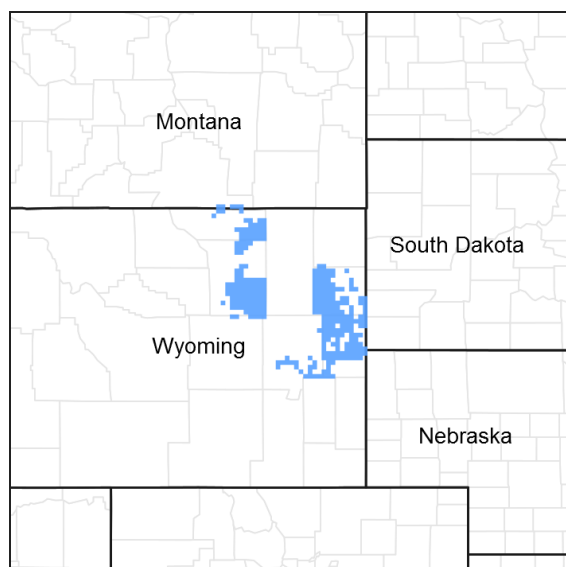


Figure 1. Mapped extent

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 along floodplains, drainageways, stream terraces, and alluvial fans where it receives additional moisture from overflow of intermittent streams or runoff from adjacent slopes. This 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. The soils of this ecological site are typically very deep and are well drained. The soil surface textures on this site typically loam, sandy loam, fine sandy loam, or very fine sandy 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 Overflow 10-14 ecological site. The Clayey 10-14 ecological site does not receive additional moisture from flooding or run-in from adjacent areas.
R058BY106WY	Clayey Overflow (CyO) 10-17" PZ The Clayey Overflow 10-14 ecological site occurs on slopes of 0 to 6 percent, has soils with greater than 35 percent clay content, and has very similar total annual production. The Clayey Overflow 10-14 ecological site is located on similar landform positions as the Overflow 10-14 ecological site. The Clayey Overflow 10-14 ecological site receives additional moisture from flooding or run-in from adjacent areas similar to the Overflow 10-14 ecological site.
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 Overflow 10-14 ecological site. The Loamy 10-14 ecological site does not receive additional moisture from flooding or run-in from adjacent areas.

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 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.
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R058BY142WY	Saline Subirrigated (SS) 10-14" PZ The Saline Sub-Irrigated 10-14 ecological site occurs on similar slopes and landform positions but has higher total annual production than the Overflow 10-14 ecological site. The Saline Sub-Irrigated 10-14 ecological site is dominated by salt tolerant species.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia cana</i>
Herbaceous	(1) <i>Leymus cinereus</i> (2) <i>Nassella viridula</i>

Physiographic features

This ecological site occurs along floodplains, drainageways, stream terraces, and alluvial fans where it receives additional moisture from overflow of intermittent streams or runoff from adjacent slopes. This ecological 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) Stream terrace (4) Alluvial fan
Runoff class	Low to high
Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	Rare to frequent
Ponding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
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 (PZs). The 10-14" PZ 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 15-17" PZ 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/or 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 10-14 inch PZ:

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)	279-356 mm
Frost-free period (average)	98 days
Freeze-free period (average)	124 days
Precipitation total (average)	330 mm

Climate stations used

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

Influencing water features

This ecological site is associated with ephemeral streams and adjacent upslope sites. During intense precipitation events, this site receives additional moisture from overflow of ephemeral 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. Soil moisture rarely exceeds field capacity in the upper 40 inches before being depleted by evapotranspiration. This site has no permanent water table.

Soil features

The soils associated with this ecological site are typically very deep, well drained, and formed from alluvium. The depth to a soil restrictive layer is greater than 60 inches from the soil surface. The surface layer ranges from a

depth of 2 to 10 inches in thickness. The soil surface horizon textures are typically loam, sandy loam, fine sandy loam, or very fine sandy loam. The subsoil horizon textures are typically loam, clay loam, silty clay loam, silt loam, sandy loam, fine sandy loam, or loamy sand. Soils on this ecological site are typically calcareous to the surface, but some pedons are leached as deep as 8 to 20 inches, depending upon the source material of the most recent deposition. The soil moisture regime is typically ustic aridic and the soil temperature regime is mesic.

Major soil series correlated to this ecological site include the Clarkelen and Haverdad 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
Surface texture	(1) Loam (2) Sandy loam (3) Fine sandy loam (4) Very fine sandy loam
Drainage class	Well drained
Permeability class	Moderate to moderately slow
Depth to restrictive layer	152 cm
Soil depth	152–203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	7.11–21.34 cm
Calcium carbonate equivalent (0-101.6cm)	0–10%
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)	0–15%
Subsurface fragment volume >3" (0-101.6cm)	0%

Ecological dynamics

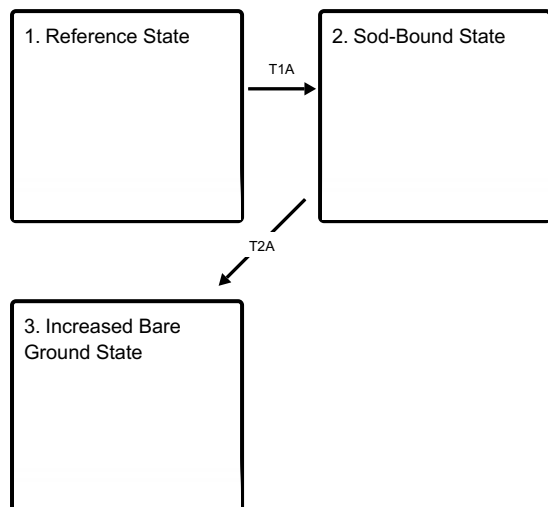
The Reference State is the plant community in which interpretations are primarily based and is used as a reference in order to understand the original potential of the site. The Reference State evolved under the combined influences of climatic conditions, periodic fire activity, grazing by large herbivores, and impacts from small mammals and insects. Changes may occur to the Reference State due to management actions such as improper grazing management, climatic conditions such as drought, and natural events such as multiple fires in close succession. The reference plant community 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 Plant Community 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. Long term overgrazing 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.

State and transition model

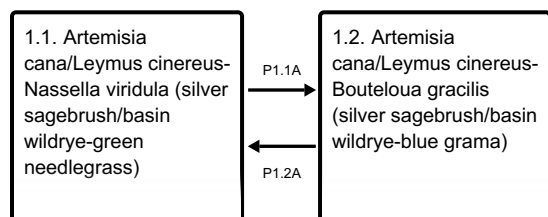
Ecosystem states



T1A - Introduction of non-native, invasive, sod-forming grasses such as smooth brome and Kentucky bluegrass

T2A - Introduction of non-native grasses, noxious weeds, and other invasive plant species

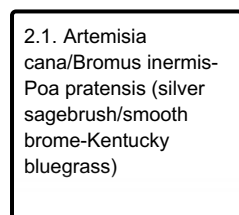
State 1 submodel, plant communities



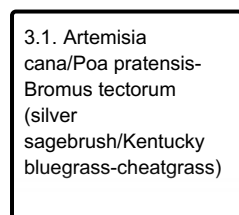
P1.1A - Drought, heavier stocking rates

P1.2A - Grazing management that allows for adequate plant recovery, lighter stocking rates, normal or above average precipitation

State 2 submodel, plant communities



State 3 submodel, plant communities



State 1 Reference State

The Reference State (1) 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 (1) 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 plant communities and various successional stages represent the natural range of variability. The Reference State (1) for this ecological site consists of 2 community phases.

Community 1.1

Artemisia cana/Leymus cinereus-Nassella viridula (silver sagebrush/basin wildrye-green needlegrass)

Community Phase 1.1 is characterized by cool-season bunchgrasses and silver sagebrush. The predominant grass species include basin wildrye and green needlegrass. Other mid-statured grasses include species such as western wheatgrass, thickspike wheatgrass, Canada wildrye, needle and thread, and plains reedgrass. Shortgrasses and sedges include species such as Cusick's bluegrass, prairie junegrass, Sandberg bluegrass, mat muhly, blue grama, and threadleaf sedge. Forbs such as western yarrow, two-grooved milkvetch, scarlet beeblossom, American licorice, large Indian breadroot, upright prairie coneflower, purple prairie clover, white prairie clover, scarlet globemallow, tapertip hawksbeard, and American vetch are common. Common shrubs and subshrubs include silver sagebrush, snowberry, Wood's rose, winterfat, and prairie sagewort. The potential vegetation is approximately 71 percent grasses, 9 percent forbs, and 20 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 2,400 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	955	1432	1910
Shrub/Vine	269	404	538
Forb	121	182	242
Total	1345	2018	2690

Figure 9. Plant community growth curve (percent production by month).
WY0302, 10-14W, Extra Water Sites - LL, Ov, CyO, SL. LL, OV, CYO, SL
Extra Water Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	15	35	35	10				

Community 1.2

Artemisia cana/Leymus cinereus-Bouteloua gracilis (silver sagebrush/basin wildrye-blue grama)

Community Phase 1.2 is characterized by an increase in shortgrass species and sedges such as blue grama, prairie junegrass, Cusick's bluegrass, Sandberg bluegrass, threadleaf sedge, and needleleaf sedge and a decrease in mid-statured grasses such as green needlegrass, western wheatgrass, thickspike wheatgrass, needle and thread, and Canada wildrye. Silver sagebrush is common. This plant community occurs when site conditions decline due to long-term drought, improper grazing management such as continuous season-long or year-long grazing, or a combination of these factors.

Pathway P1.1A

Community 1.1 to 1.2

Drought, grazing practices such as continuous season-long or year-long grazing, heavier stocking rates, or a combination of these factors can shift Community Phase 1.1 to Community Phase 1.2. These factors favor an increase in shortgrasses such as blue grama and a decrease in cool-season mid-statured grasses such as green needlegrass. Silver sagebrush cover will be similar to Community Phase 1.1.

Pathway P1.2A

Community 1.2 to 1.1

Grazing management that allows for adequate recovery between grazing periods, lighter stocking rates, and normal or above average precipitation transitions Community Phase 1.2 to Community Phase 1.1.

State 2

Sod-Bound State

The dynamics of the Sod-Bound State (2) are driven by long-term drought, improper grazing management such as continuous season-long or year-long grazing, or a combination of these factors. The Sod-Bound State (2) for this ecological site consists of 1 community phase.

Community 2.1

Artemisia cana/Bromus inermis-Poa pratensis (silver sagebrush/smooth brome-Kentucky bluegrass)

Community Phase 2.1 is characterized by an increase in non-native, cool-season, sod-forming species such as smooth brome and Kentucky bluegrass and a decrease in native, cool-season, tall and mid-statured grasses such as basin wildrye and green needlegrass. Silver sagebrush is common. This plant community occurs when site conditions decline due to long-term drought, improper grazing management such as continuous season-long or year-long grazing, or a combination of these factors.

State 3

Increased Bare Ground State

The dynamics of the Increased *Bare Ground* State (3) are driven by long-term drought, improper grazing management, or a combination of these factors. The Increased *Bare Ground* State (3) for this ecological site consists of 1 community phase.

Community 3.1

Artemisia cana/Poa pratensis-Bromus tectorum (silver sagebrush/Kentucky bluegrass-cheatgrass)

Observations suggest that native species diversity declines significantly when invasive or noxious species exceed approximately 30 percent of the plant community. Non-native, perennial, cool-season grasses such as Kentucky bluegrass and non-native, annual, invasive species such, and noxious weed species can eventually dominate the seedbank of this site and displace native species. Reduced plant species diversity, simplified structural complexity, and altered ecological processes result in a state that is substantially departed from the Reference State (1). The dominance of annual, invasive grasses such as cheatgrass increases the fire cycle frequency.

Transition T1A

State 1 to 2

The Reference State (1) transitions to the Sod-Bound State (2) when non-native, invasive, sod-forming grasses such as smooth brome and Kentucky bluegrass invade and dominate the plant community. Exotic plant species dominate the site in terms of cover and production and site resilience has been substantially reduced. In addition, other rangeland health attributes, such as reproductive capacity of native grasses and soil quality, have been substantially altered from the Reference State (1).

Transition T2A

State 2 to 3

The Sod-Bound State (2) transitions to the Invaded State (3) when non-native grasses such as cheatgrass, noxious weeds, and other invasive plants invade the Sod-Bound State (2). Exotic plant species dominate the site in terms of cover and production. Site resilience has been substantially 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			336–673	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	336–673	5–25
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	336–673	5–25
2	Cool-Season Bunchgrasses			1211–2421	
	basin wildrye	LECI4	<i>Leymus cinereus</i>	673–1345	10–50
	green needlegrass	NAVI4	<i>Nassella viridula</i>	336–673	10–25
	Cusick's bluegrass	POCU3	<i>Poa cusickii</i>	135–269	5–10
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	67–135	1–5
3	Miscellaneous Grasses			135–269	
	Grass, perennial	2GP	<i>Grass, perennial</i>	67–135	1–5
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	67–135	1–5
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	67–135	1–5
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	67–135	1–5
	mat muhly	MURI	<i>Muhlenbergia richardsonis</i>	67–135	1–5
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	67–135	1–5
	plains reedgrass	CAMO	<i>Calamagrostis montanensis</i>	67–135	1–5
	needle and thread	HECO26	<i>Hesperostipa comata</i>	67–135	1–5
	needleleaf sedge	CADU6	<i>Carex duriuscula</i>	67–135	1–5
	threadleaf sedge	CAFI	<i>Carex filifolia</i>	67–135	1–5
Forb					
4	Forbs			202–404	
	Forb, perennial	2FP	<i>Forb, perennial</i>	67–135	1–5
	American vetch	VIAM	<i>Vicia americana</i>	67–135	1–5
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	67–135	1–5
	aster	ASTER	<i>Aster</i>	67–135	1–5
	desertparsley	LOMAT	<i>Lomatium</i>	67–135	1–5
	large Indian breadroot	PEES	<i>Pedimelum esculentum</i>	67–135	1–5
	milkvetch	ASTRA	<i>Astragalus</i>	67–135	1–5
	scarlet beeblossom	GACO5	<i>Gaura coccinea</i>	67–135	1–5
	purple prairie clover	DAPU5	<i>Dalea purpurea</i>	67–135	1–5
	white prairie clover	DACA7	<i>Dalea candida</i>	67–135	1–5
	American licorice	GLLE3	<i>Glycyrrhiza lepidota</i>	67–135	1–5
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	67–135	1–5
	twogrooved milkvetch	ASBI2	<i>Astragalus bisulcatus</i>	67–135	1–5
	bluebells	MERTE	<i>Mertensia</i>	67–135	1–5
	textile onion	ALTE	<i>Allium textile</i>	67–135	1–5
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	67–135	1–5
	common yarrow	ACMI2	<i>Achillea millefolium</i>	67–135	1–5
Shrub/Vine					

5	Shrubs			471–942	
	silver sagebrush	ARCA13	<i>Artemisia cana</i>	135–269	1–10
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	67–135	1–5
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	67–135	1–5
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	67–135	1–5
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	67–135	1–5
	Subshrub (<.5m)	2SUBS	<i>Subshrub (<.5m)</i>	67–135	1–5

Animal community

Rhizomatous wheatgrass/ Basin wildrye (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/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.

Silver sagebrush/cheatgrass: This plant community may be useful for the same large grazers that would use the Historic Climax Plant Community. However, the plant community composition is less diverse, and thus, less apt to meet the seasonal needs of these animals. It may provide some foraging opportunities for sage grouse when it occurs proximal to woody cover. Good grasshopper habitat equals good foraging for birds.

Rhizomatous wheatgrass/Green needlegrass: This plant community may be useful for the same large grazers that would use the Historic Climax Plant Community. However, the plant community composition is less diverse, and thus, less apt to meet the seasonal needs of these animals. It may provide some foraging opportunities for sage grouse when it occurs proximal to woody cover. Good grasshopper habitat equals good foraging for birds.

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 Carrying Capacity*
(lb./ac) (AUM/ac)

Reference Plant Community 1200-2400 .6

Mixed Sagebrush/Grass 800-1500 .5

Silver sagebrush/cheatgrass 600-1200 .25

Rhizomatous wheatgrass/Green needlegrass 1000-2200 .5

* - 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. Infiltration ranges from moderately slow to rapid. 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 should not be present. 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)

National Resources Inventory (NRI) Data

- Number of Records: 6
- Sample Period: 2005-2017
- State: Wyoming
- Counties: Johnson, Niobrara, Sheridan

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>

Other references

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Approval

Kirt Walstad, 10/05/2023

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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	05/18/2024
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):**
-
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):**
-
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**
-
11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**
-
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):**
-
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:

17. **Perennial plant reproductive capability:**
