USDA Natural Resources Conservation Service

Ecological site R058BY178WY
Wetland (WL) 10-17” PZ

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Accessed: 05/09/2024

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.

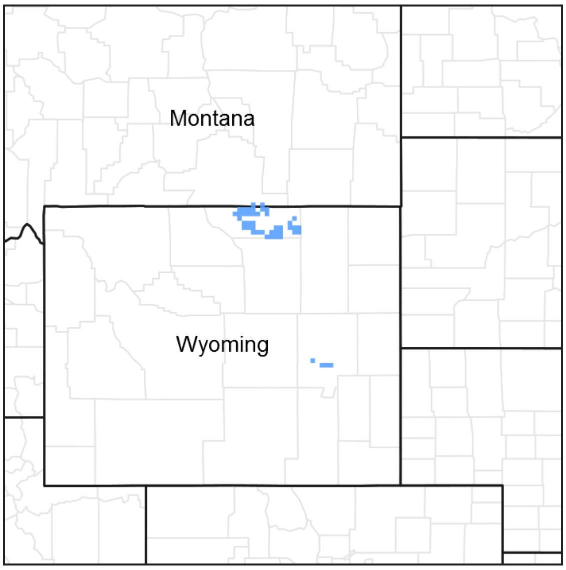


Figure 1. Mapped extent

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 Wetland 10-17" Precipitation Zone (PZ) site occurs where a seasonal or perennial water table exists of sedimentary plains or lowlands; on stream terraces, drainageways, and oxbows; adjacent to streams, springs, seeps and sloughs. It is a mixed-grass prairie, with warm- and cool season rhizomatous grasses, and cool-season grass-likes, and (sedges, rushes, and bulrushes), and cool-season bunchgrasses, followed by a minor component of forbs and shrubs.

Associated sites

R058BY130WY	**Overflow (Ov) 10-14" PZ** Overflow is the highest on the landform/landscape of this complex. Overflow is generally drier with less water influence than any other site.
R058BY142WY	**Saline Subirrigated (SS) 10-14" PZ** Saline Subirrigated occurs generally in close partnership with wetland sites, as the initial ring or next step in the transition of the water table depth and influence on salt burdened sites.
R058BY174WY	**Subirrigated (Sb) 10-17" PZ** Subirrigated occurs generally in close partnership with wetland sites, as the initial ring or next step in the transition of the water table depth and influence on the site.
R058BY128WY	**Lowland (LL) 10-14" PZ** Lowland occurs more closely to subirrigate or overflow, and is generally slightly above wetlands and subirrigated sites in the landform/landscape.

Similar sites

R058BY178WY	**Wetland (WL) 10-17" PZ** Subirrigated (Sb) is less productive.
R058BY142WY	**Saline Subirrigated (SS) 10-14" PZ** Saline Subirrigated (SS) has more salt-tolerant species and is less productive.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs on nearly level stream terraces, drainageways, and oxbows; on sedimentary plains or lowlands, adjacent to springs, seeps, and sloughs.

Table 2. Representative physiographic features

Landforms	(1) Stream terrace (2) Drainageway (3) Oxbow (4) Flood plain (5) Playa
Runoff class	Negligible to high
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Occasional to frequent
Ponding frequency	None
Elevation	1,067–1,646 m
Slope	0–6%
Water table depth	0–46 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)	88-105 days
Freeze-free period (characteristic range)	122-129 days
Precipitation total (characteristic range)	330-381 mm
Frost-free period (actual range)	84-110 days
Freeze-free period (actual range)	118-130 days
Precipitation total (actual range)	254-432 mm
Frost-free period (average)	101 days
Freeze-free period (average)	125 days
Precipitation total (average)	356 mm

Climate stations used

- (1) GLENROCK 5 ESE [USC00483950], Glenrock, WY
- (2) BUFFALO [USC00481165], Buffalo, WY
- (3) WRIGHT 12W [USC00489805], Gillette, WY
- (4) DULL CTR 1SE [USC00482725], Douglas, WY
- (5) MIDWEST [USC00486195], Midwest, WY
- (6) SHERIDAN CO AP [USW00024029], Sheridan, WY
- (7) LEITER 9N [USC00485506], Clearmont, WY
- (8) DOUGLAS 1 SE [USC00482685], Douglas, WY
- (9) GILLETTE 4SE [USC00483855], Gillette, WY
- (10) DILLINGER [USC00482580], Gillette, WY

Influencing water features

Wetland 10-14” PZ ecological site: Map units in this ESD typically have hydric components for stream terraces, drainageways, and oxbows that have a water table.

Note: The water table in some areas is artificially induced, caused by seepage from nearby irrigation ditches, canals, or reservoirs.

Wetland description

System - Palustrine
Subsystem - None
Class - Emergent Wetland
Subclass - Persistent

Stream Type: C (Rosgen)

Note: This is a general overview for the site concept and is not a wetland determination.

Soil features

The soils on Wetland 10 to 17 inch Precipitation Zone ecological site are deep to very deep, poorly drained and formed in alluvium derived from shale and interbedded siltstone. The permeability class ranges from slow to moderate for the soils on this site. The available water capacity is typically high but may range to very high in some soils. The surface layer of the soils in this site are typically clay loam or loam but may include silt loam, silty clay loam, silty clay, or clay. The surface layer ranges from a depth of 4 to 10 inches thick. The subsoil is typically clay loam, silty clay loam, or clay. There are typically 0 to 5 percent rock fragments in the subsoil. Soils in this site are typically calcareous to the surface, but some pedons are leached as deep as 13 to 24 inches. These soils are susceptible to erosion by water and wind. The hazard for water erosion accelerates with increasing slope. The soil moisture regime is aquic. The soil temperature regime is mesic.

Major soil series correlated to this ecological site include: None listed.

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

Table 4. Representative soil features

Parent material	(1) Alluvium–shale (2) Alluvium–siltstone
Surface texture	(1) Clay loam (2) Loam (3) Silt loam (4) Silty clay loam (5) Silty clay (6) Clay
Drainage class	Very poorly drained to poorly drained
Permeability class	Slow to moderate
Soil depth	51–203 cm
Available water capacity (Depth not specified)	7.11–22.35 cm
Calcium carbonate equivalent (Depth not specified)	0–5%
Electrical conductivity (Depth not specified)	0–4 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0–5
Soil reaction (1:1 water) (Depth not specified)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–5%

Ecological dynamics

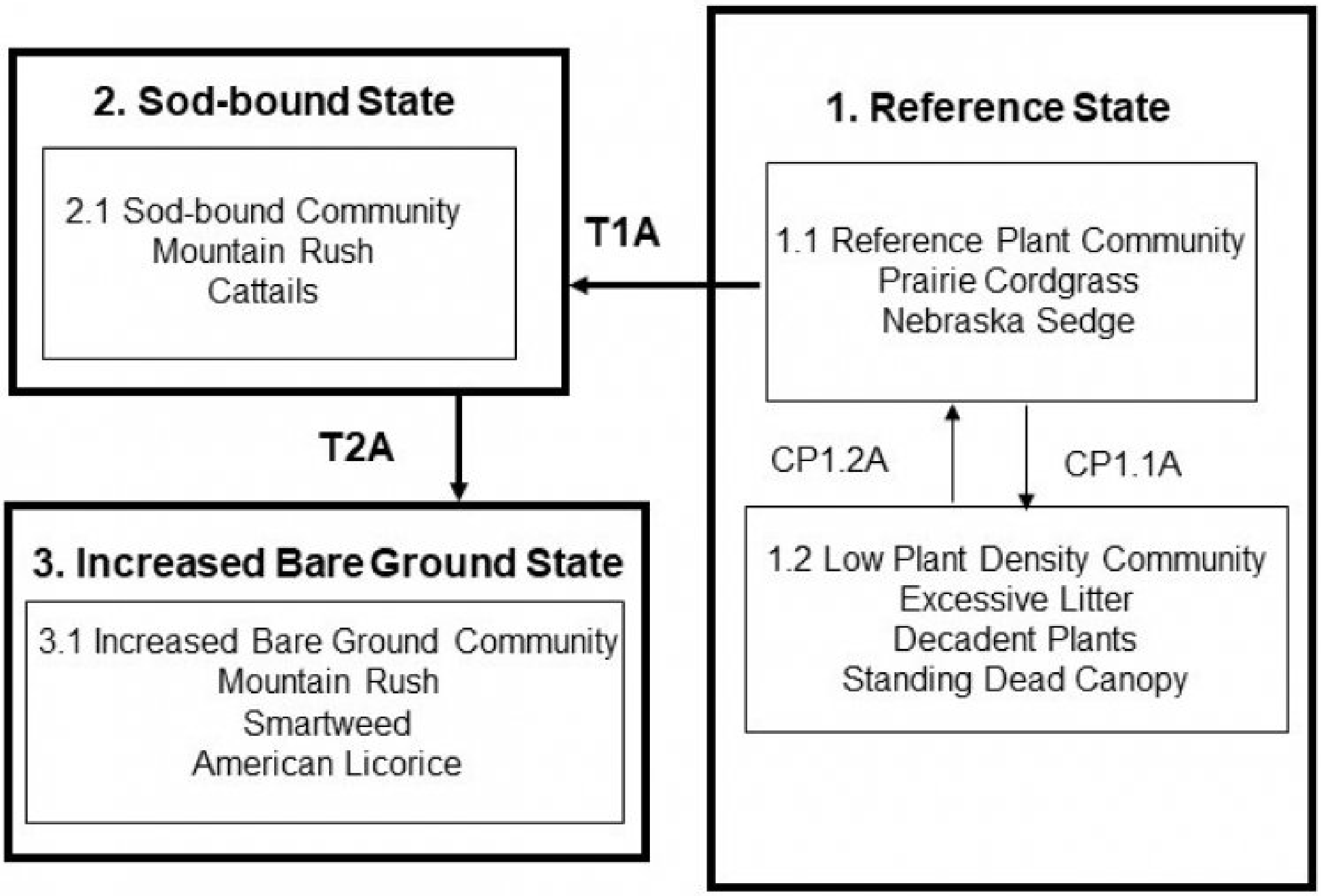
The Reference State is the plant community in which interpretations are primarily based and is used as a reference in order to understand the original potential of the site. The Reference State evolved under the combined influences of climatic conditions, periodic fire activity, grazing by large herbivores, and impacts from small mammals and insects. Changes may occur to the Reference State due to management actions such as continuous season-long or year-long grazing, increased stocking rates, climatic conditions such as drought, and natural events.The Reference State is characterized by warm-season rhizomatous tallgrass, cool-season rhizomatous grass, and grass-like plants. A minor component of grass-likes such as mountain rush (also known as Baltic rush) and other rush, spikerush, and bulrush species; forbs and shrubs are also present. Noxious weeds such as purple loosestrife may invade. 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.

Recurrent drought has historically impacted the vegetation of this region. Changes in species composition and production will vary, depending upon the duration and severity of the drought cycle, and prior grazing management. Long-term water table alteration or drainage may cause a complete disruption of the hydrologic function and biotic integrity resulting in the crossing of an ecological threshold and the replacement of the natural states and plant communities applicable to the site. Likewise, artificially-induced water tables, (i.e. reservoirs, irrigation canals, etc.), are not considered the central concept of the wetland ecological site but occur on the landscape.

As the Wetland 10-17” PZ ecological site begins to shift from a combination of frequent and severe defoliation during the growing season, species such as spike sedge and mountain rush (Baltic rush), will increase forming a cool-season-dominated plant community. Cattails will increase. Mountain rush will eventually become sod-bound. Noxious weeds will also invade. 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

Wetland 10-17" PZ



CP-Community Pathway
T-Transition
CP1.1A- Non-use, no fire
CP 1.2A- Prescribed grazing with adequate recovery, fire
T1A- Continuous grazing and/or frequent defoliation without adequate recovery
T2A- Long-term continuous grazing with overstocking, and/or excessive defoliation

State 1
Reference State

The Reference State is characterized by two distinct plant community phases: the Reference and Low plant Density Plant Communities. The plant communities, and various successional stages between them, represent the natural range of variability within the Reference State.

Community 1.1
Salix exigua/Spartina pectinata-Carex nebrascensis (narrowleaf willow/prairie cordgrass-Nebraska sedge)

This is the interpretive plant community for the Wetland 10 to 17 inch Precipitation Zone 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 80 percent grasses and grass-likes, 5 to 10 percent forbs, and 5 to 10 percent woody plants. The major grasses and grass-likes include prairie cordgrass, bluejoint and northern reedgrasses, and Nebraska sedge. Minor species include slender and western wheatgrasses, basin wildrye, and switchgrass; other minor species are tufted hairgrass, foxtail barley, reed canarygrass, and native bluegrasses. A minor component of grass-likes such as mountain rush (also known as Baltic rush), inland and spike sedges, and spikerush and bulrush species. Forbs such as horsetail, arrowgrass, iris, blue-eyed grass, and American licorice. Other species include water hemlock and a minor component of shrubs such as willows are present. In the Wetland 10 to 17 inch Precipitation Zone (PZ) ecological site, the total annual production (air-dry weight) is about 5,300 pounds per acre during an average year, but it can range from about 4,500 pounds per acre in unfavorable years to about 6,000 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, tillage, or development into urban or other uses.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	6837	8462	10088
Forb	448	560	673
Shrub/Vine	560	616	673
Total	**7845**	**9638**	**11434**

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

Community 1.2
Salix exigua/Spartina pectinata-Calamagrostis canadensis (narrowleaf willow/prairie cordgrass-bluejoint reedgrass)

This plant community developed under the absence of grazing and/or fire. Plant species resemble the Reference Plant Community; 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 or mortality of the stand. Bunchgrasses, such as slender wheatgrass, typically develop dead centers and rhizomatous grasses can form small decadent communities due to a lack of impact by grazing animals. 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. Total annual production can vary substantially.

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

Pathway 1.1A
Community 1.1 to 1.2

Non-use or lack of fire will cause the Reference Plant Community to shift toward the Low Plant Density Plant Community. 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. Water and nutrient cycles will be impaired as a result of this community pathway.

Pathway 1.2A
Community 1.2 to 1.1

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

State 2
Sod-Bound State

This state is characterized by the Sod-bound Plant Community. An ecological threshold has been crossed and a significant amount of production and diversity has 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. This alternative state should be tested through long-term observation of ecosystem behavior and repeated application of conservation and restoration practices. This state should be reevaluated and refined.

Community 2.1
Phalaris arundinacea-Juncus arcticus/Typha latifolia (reed canarygrass-mountain rush/broadleaf cattail)

This plant community develops under long-term frequent and severe defoliation, without adequate recovery between grazing events. Prairie cordgrass, northern reedgrass, and Nebraska sedge have been removed. Low-growing unpalatable sedges and cattails have increased. Mountain rush (also known as Baltic rush) persists in a sod-bound condition. Willows are present near the drier edges of the plant community. The plant community lacks diversity and is resistant to change. Energy flow and the water and mineral cycles have been impaired due to the loss of tallgrass species and deep-rooted forbs and shrubs. Soil compaction can be a concern if continuously grazed during wet cycles. Litter levels are very low and unevenly distributed. The total annual production (air-dry weight) is about 3,000 pounds per acre during an average year, but it can range from about 2,000 pounds per acre in unfavorable years to about 4,000 pounds per acre in above-average years.

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

State 3
Increased Bare Ground State

The Increased *Bare Ground* State develops with heavy, excessive grazing and/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
Juncus arcticus-Echinochloa/Polygonum (mountain rush-barnyardgrass/smartweed)

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. Mountain rush still dominates the plant community. However increased bare ground results in a broken, sod-bound appearance. Bare ground may continue to increase if water table levels are low. Baltic rush, smartweed, American licorice, and cattails dominate this plant community. Noxious weeds such as purple loosestrife may invade. Forage palatability for livestock is low. NOTE: 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 and the amount of invasive species present. Wind and water erosion may occur if bare ground has increased. Litter amounts are greatly reduced. Continued heavy use will cause severe compaction problems.

Figure 12. 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 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. Erosion and loss of organic matter, along with invasion of introduced plants and noxious weeds, are resource concerns.

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 Tallgrasses**			829–1950	
	bluejoint	CACA4	*Calamagrostis canadensis*	1121–1681	5–25
	northern reedgrass	CASTI3	*Calamagrostis stricta ssp. inexpansa*	1121–1681	5–25
	tufted hairgrass	DECE	*Deschampsia cespitosa*	1121–1681	5–25
	basin wildrye	LECI4	*Leymus cinereus*	448–673	5–10
2	**Warm-Season Tallgrass**			560–1681	
	prairie cordgrass	SPPE	*Spartina pectinata*	448–673	1–10
3	**Grass-likes**			560–1121	
	Nebraska sedge	CANE2	*Carex nebrascensis*	1121–1681	5–25
	inland sedge	CAIN11	*Carex interior*	448–673	1–10
	spike sedge	CANA2	*Carex nardina*	448–673	1–10
	sedge	CAREX	*Carex*	448–673	1–10
	rush	JUNCU	*Juncus*	448–673	1–10
	bulrush	SCHOE6	*Schoenoplectus*	448–673	1–10
	spikerush	ELEOC	*Eleocharis*	448–673	1–10
	mountain rush	JUARL	*Juncus arcticus ssp. littoralis*	448–673	1–10
Forb					
5	**Forbs**			258–538	
	broadleaf cattail	TYLA	*Typha latifolia*	224–336	1–5
	Forb, perennial	2FP	*Forb, perennial*	224–336	1–5
	aster	ASTER	*Aster*	224–336	1–5
	water hemlock	CICUT	*Cicuta*	224–336	1–5
	horsetail	EQUIS	*Equisetum*	224–336	1–5
	American licorice	GLLE3	*Glycyrrhiza lepidota*	224–336	1–5
	wild mint	MEAR4	*Mentha arvensis*	224–336	1–5
	Rocky Mountain iris	IRMI	*Iris missouriensis*	224–336	1–5
	Pennsylvania smartweed	POPE2	*Polygonum pensylvanicum*	224–336	1–5
	poison hemlock	COMA2	*Conium maculatum*	224–336	1–5
	blue-eyed grass	SISYR	*Sisyrinchium*	224–336	1–5
	dock	RUMEX	*Rumex*	224–336	1–5
	seaside arrowgrass	TRMA20	*Triglochin maritima*	224–336	1–5
	narrowleaf cattail	TYAN	*Typha angustifolia*	224–336	1–5
Shrub/Vine					
6	**Shrubs**			280–560	
	willow	SALIX	*Salix*	560–673	1–5
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	560–673	1–5
	Subshrub (<.5m)	2SUBS	*Subshrub (<.5m)*	560–673	1–5

Animal community

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

Nebraska Sedge/ Northern Reedgrass (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. This plant community may provide brood-rearing and foraging areas for sage grouse. Other birds that would frequent this plant community include red-wing blackbirds, sandhill cranes, Wilson snipe, western meadowlarks, and golden eagles. Many small mammals would occur here.

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

Baltic rush/Smartweed Plant Community: This plant community may be useful for the same large grazers that would use the Reference Plant Community. However, the plant community composition is less diverse, and thus less apt to meet the seasonal needs of these animals. It may provide some foraging opportunities for sage grouse when it occurs proximal to woody cover. Grasshopper habitat provides good foraging for birds.

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 Wetland 10 to 17 inch Precipitation Zone ecological site. These are conservative estimates for initial planning. On-site conditions will vary, and stocking rates should be adjusted based on range inventories, animal kind and class, forage availability (adjusted for slope, 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.

Example:
5,000 lbs. per acre X 25% Harvest Efficiency = 1,250 lbs. forage demand for one month. 1,250 lbs. per acre/912 demand per AUM = 1.4

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

Reference Plant Community 4000-6000 3.0
Baltic rush/Cattail 2000-4000 2.0
Baltic rush/Smartweed 1200-2500 1.0

Increased *Bare Ground* PC (*) (*)

* 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

Climate is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic groups B and C, with localized areas in hydrologic group D. Infiltration and runoff potential for this site varies from moderate to high depending upon soil hydrologic group and water table. Runoff will be high on this site because the soil may be saturated. (Refer to Part 630, NRCS National Engineering Handbook for detailed hydraulic information.

Rills and gullies should not typically be present. Water flow patterns should be barely distinguishable if at all present.

Litter should fall in place. Fine litter will move after average to high rainfall events. Litter does not travel far typically being trapped in small bunches by the extensive vegetative cover. Litter movement may be extensive after major runoff or flooding events. Chemical and physical crusts are rare to non-existent. Cryptogamic crusts are present, but only cover 1 to 2 percent of the soil surface.

Recreational uses

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

Wood products

No appreciable wood products are present on the site.

Other products

None noted.

Other information

Site Development & Testing Plan

General Data (MLRA and Revision Notes, Hierarchical Classification, Ecological Site Concept, Physiographic, Climate, and Water Features, and Soils Data):

Updated. All “Required” items complete to Provisional level.

Community Phase Data (Ecological Dynamics, STM, Transition & Recovery Pathways, Reference Plant Community, Species Composition List, Annual Production Table):

Updated. All “Required” items complete to Provisional level.

Annual Production Table is from the “Previously Approved” ESD (2001).

The Annual Production Table and Species Composition List will be reviewed for future updates at the Approved level.

Each Alternative State/Community:

Complete to Provisional level.

Supporting Information (Site Interpretations, Assoc. & Similar Sites, Inventory Data References, Agency/State Correlation, References):

Updated. All “Required” items complete to Provisional level.

Wildlife Interpretations: Narrative is from “Previously Approved” ESD (2001). Wildlife species will need to be updated at the next Approved level.

Livestock Interpretations: Plant community names and stocking rates updated.

Hydrology, Recreational Uses, Wood Products, and Other Products carried over from previously “Approved” ESD (2001).

Existing NRI Inventory Data References updated. More field data collection is 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 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: 2005-2017
Counties:

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 data collection includes ESI data collection in conjunction with Soil Surveys conducted within MLRA 58B; ocular estimates; rangeland vegetative clipping for NRCS program support; field observations from experienced rangeland personnel

Data collection for this ecological site was done in conjunction with the progressive soil surveys within MLRA 58B Northern Rolling High Plains (Southern Part)

Note: Revisions to soil surveys are on-going. For the most recent updates, visit the Web Soil Survey, the official site for soils information: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

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Rangeland health reference sheet

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

Author(s)/participant(s)	
Contact for lead author	
Date	04/05/2005
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 less than 5%

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.

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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):** Plant cover and litter is at 95% or greater of soil surface and maintains soil surface integrity. Soil Stability class is anticipated to be 5 or greater.

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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

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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 varies from moderate to low and runoff is high since the soil is usually saturated.

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

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

    Dominant: Tall Grasses and Grasslike > Mid stature Grasses/Grass-like Forbs
    Shrubs/Trees

    Sub-dominant:

    Other:

    Additional:

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

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14. **Average percent litter cover (%) and depth (in):** Average litter cover is 50-55% with depths of 0.75 to 1.5 inches

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 5000 lbs./ac

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that**

become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site: Smooth Brome, Kentucky Bluegrass, Russian Olive, and Species found on Noxious Weed List.

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