USDA Natural Resources Conservation Service

Ecological site R067AY178WY
Wetland (WL)

Last updated: 9/07/2023
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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.

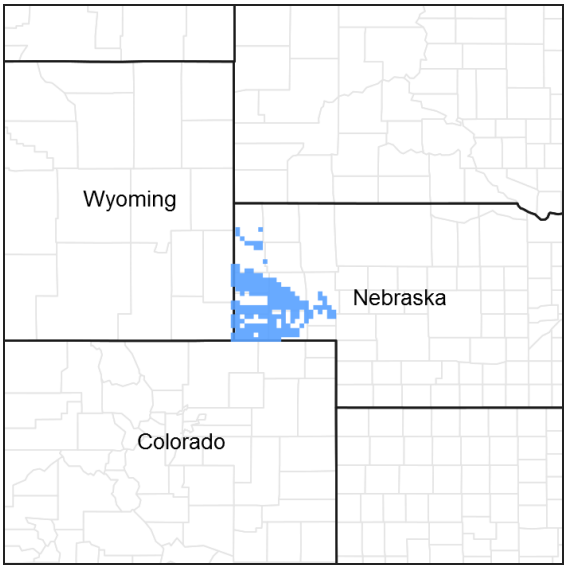


Figure 1. Mapped extent

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): 067A–Central High Plains, Northern Part

MLRA 67A-Central High Plains, Northern Part is located in southeastern Wyoming (58 percent), the southwestern portion of the Nebraska panhandle (38 percent), and extreme northeastern Colorado (4 percent). It is comprised of rolling plains, upland breaks, and river valleys. The major rivers are the North Platte and Laramie. The headwaters of these systems are in the Rocky Mountains. Other tributaries include Crow, Horse, and Lodgepole Creeks. This MLRA is traversed by Interstate 25 and Interstate 80, and by U.S. Highways 26, 30 and 85. Major land uses include rangeland (71 percent), cropland (21 percent), pasture and hayland (1 percent), urban (3 percent), and miscellaneous (4 percent). Cities in this area include Cheyenne, Torrington, and Wheatland, WY; and Kimball, Oshkosh, and Scottsbluff, NE. Land ownership is mostly private. Areas of interest include Scotts Bluff National Monument, Chimney Rock and Fort Laramie National Historic Sites; Hawk Springs, Lake Minatare, and Wildcat Hills State Recreation Areas; Ash Hollow and Guernsey State Parks.

The elevations in MLRA 67A range from approximately 3,300 to 6,200 feet. The average annual precipitation in this area ranges from 13 to17 inches per year, but may increase up to 18 inches per year, in localized areas. Precipitation occurs mostly during the growing season from rapidly developing thunderstorms. Mean annual air temperature ranges from 47 degrees Fahrenheit in the western part to 52 degrees Fahrenheit in the eastern part. Summer temperatures may exceed 100 degrees Fahrenheit. Winter temperatures may drop to sub-zero, and snowfall varies from 20 to 50 inches per year.

Classification relationships

MLRA 67A is in the Western Great Plains Range and Irrigation Land Resource Region. It is in the High Plains Section, of the Great Plains Province, of the Interior Plains (USDA, 2006). MLRAs can be defined by climate, landscapes, geology, and annual precipitation zones (PZ). Other features such as landforms, soil properties, and key vegetation further refine these concepts, and are described at the Ecological Site Description (ESD) level.

Revision Notes
The Wetland (WL) 12-17 inch PZ ecological site was developed by an earlier version of the Wetland (WL) ESD (2005, updated 2008). The earlier version of the Wetland (WL) 12-17 inch Precipitation Zone ESD was based on input from NRCS (formerly Soil Conservation Service) and historical information obtained from the Wetland (WL) Range Site Description (1988) and earlier (1970). This ESD meets the Provisional requirements of the National Ecological Site Handbook (NESH). This ESD will continue refinement towards an Approved status according to the NESH.

Ecological site concept

The Wetland site is a run-on site that is not saline or alkaline and has the water table from 0 to 18 inches below the soil surface for part of the growing season.

Associated sites

R067AY106WY	**Closed Depression (Cd)** This ecological site is commonly adjacent.
R067AY124WY	**Loamy Lowland (LyL)** This ecological site is commonly adjacent.
R067AY126WY	**Loamy Overflow (LyO)** This ecological site is commonly adjacent.
R067AY152WY	**Sandy Lowland (SyL)** This ecological site is commonly adjacent.
R067AY174WY	**Subirrigated (Sb)** This ecological site is commonly adjacent.

Similar sites

R067AY174WY	**Subirrigated (Sb)** The Subirrigated Ecological Site has a water table ranging from 6 to 36 inches below the soil surface for part of the growing season.
R067AY142WY	**Saline Subirrigated (SS)** The Saline Subirrigated Ecological Site is saline or alkaline and has the water table 6 to 36 inches below the soil surface for part of the growing season.

Table 1. Dominant plant species

Tree	(1) *Salix*
Shrub	Not specified
Herbaceous	(1) *Spartina pectinata* (2) *Carex nebrascensis*

Physiographic features

This site typically occurs on the floodplains or floodplain-steps of the river valleys.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Flood-plain step
Runoff class	Negligible to low
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Occasional to frequent
Ponding frequency	None
Elevation	1,067–1,981 m
Slope	0–3%
Water table depth	0–46 cm
Aspect	Aspect is not a significant factor

Climatic features

Wide fluctuations in precipitation may occur from year to year, as well as occasional periods of drought (longer than one year in duration). Two-thirds of the annual precipitation occurs during the growing season from April to September. The mean annual air temperature (MAAT) ranges from 47 degrees Fahrenheit in the western part to 52 degrees Fahrenheit in the eastern part. 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 ranch operations during the late winter and spring months. High-intensity afternoon thunderstorms may arise in summer. Wind speed averages about 8 miles per hour, ranging from 10 during the spring to 7 during late summer. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 75 mph. The average length of the freeze-free period (28 degrees Fahrenheit) is 150 days from May 4 to October 1. The average frost-free period (32 degrees Fahrenheit) is 128 days from May 16 to September 21. Growing season increases from west to east (Wyoming to Nebraska). Growth of native cool-season plants begins about April 1 and continues to mid-June. Native warm-season plants begin growth about May 15 and continue to about August 15. Regrowth of cool-season plants occur in September in most years, depending upon moisture.

Table 3. Representative climatic features

Frost-free period (characteristic range)	85-117 days
Freeze-free period (characteristic range)	119-135 days
Precipitation total (characteristic range)	406-432 mm
Frost-free period (actual range)	84-123 days
Freeze-free period (actual range)	116-137 days
Precipitation total (actual range)	356-457 mm
Frost-free period (average)	103 days
Freeze-free period (average)	128 days
Precipitation total (average)	406 mm

Climate stations used

- (1) CHUGWATER [USC00481730], Chugwater, WY
- (2) OLD FT LARAMIE [USC00486852], Yoder, WY
- (3) PHILLIPS [USC00487200], LaGrange, WY
- (4) WHEATLAND 4 N [USC00489615], Wheatland, WY
- (5) CHEYENNE [USW00024018], Cheyenne, WY
- (6) SCOTTSBLUFF HEILIG AP [USW00024028], Scottsbluff, NE
- (7) BRIDGEPORT [USC00251145], Bridgeport, NE
- (8) HARRISBURG 12WNW [USC00253605], Harrisburg, NE

- (9) KIMBALL 2NE [USC00254440], Kimball, NE
- (10) OSHKOSH [USC00256385], Oshkosh, NE

Influencing water features

There is a seasonal water table that influences the kinds and amounts of vegetation on this site. All of the soils in this ESD are hydric soils.
Note: The water table in some areas is artificially induced, caused by seepage from nearby irrigation ditches, canals, and reservoirs.

Wetland Description (Cowardin System)
System Subsystem Class
Palustrine N/A Emergent Wetland
Note: This is a general overview for the site concept and is not a wetland determination.

Soil features

The soils on this site are typically very deep, poorly to somewhat poorly drained soils that formed from alluvium. They typically have a moderate to very rapid permeability class. The available water capacity is very low to moderate. Available water is the portion of water in a soil that can be readily absorbed by plant roots. The soil moisture regime is typically aquic. The soil temperature regime is mesic.

The surface layer of the soils in this site are typically loam or fine sandy loam. The surface layer ranges from a depth of 3 to 10 inches thick. The subsoil is variable, but may include fine sandy loam, loam, sand, sandy clay loam, fine sand, sand, or coarse sand. Rock fragments are typically less than 5 percent, but some soils may have up to 15 percent rock fragments. Soils in this site have carbonates at the surface, but usually are noncalcareous below the surface. These soils are typically not susceptible to erosion by water and wind due to the wetness of the soil profile by the seasonal water table. However, these areas may be a hazard of wind erosion if these areas are drained and the surface is not protected by vegetation.

Surface soil structure is typically granular, and structure below the surface ranges from massive and single grain but may include subangular blocky. Soil structure describes the manner in which soil particles are aggregated and defines the nature of the system of pores and channels in a soil.

The major soil series correlated to this ecological site include: Barney.

Other soil series that have been correlated to this site include: Almeria, Fluvaquentic Endoaquolls, and Typic Calciaquolls.

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

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

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Loam (2) Fine sandy loam
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Moderate to very rapid
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	5.08–16.26 cm

Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–10
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–15%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The information in this ESD, including the State-and-Transition Diagram (STM)model, was developed using archeological and historical data, professional experience, and scientific studies. The information is representative of a dynamic set of plant communities that represent the complex interaction of several ecological processes. The plant composition has been determined by study of rangeland relic areas, areas protected from excessive disturbance, seasonal use pastures, short duration/time controlled grazing strategies, and historical accounts.

The Wetland ecological site is characterized by three states: Reference, Sod-bound, and Increased *Bare Ground*. The Reference State is characterized by warm-season rhizomatous tallgrass (prairie cordgrass), and cool-season grass-like (Nebraska sedge). Secondary grasses include cool-season rhizomatous midgrass (northern reedgrass), and cool-season bunchgrasses (reed canarygrass and slender wheatgrass) A minor component of grass-likes such as mountain rush (also known as Baltic rush), and other rush, spikerush, and bulrush species, and forbs and shrubs, are also present. (See the species composition list in this ESD). The Sod-bound State is characterized by mountain rush, increased cattails, and unpalatable grass-likes. The Increased *Bare Ground* State is characterized by remnant mountain rush, forbs such as smartweed and American licorice. Noxious weeds such as purple loosestrife may invade.

As this site deteriorates from a combination of frequent and severe grazing, species such as spike sedge and mountain rush increase, forming a cool season dominated plant community. Cattails increase. Mountain rush eventually become sod-bound. Grasses such as prairie cordgrass, northern reedgrass, and slender wheatgrass decrease in frequency and production and are eventually be removed from the site. Grasses such as reed canarygrass may increase. As the site continues to deteriorate, bare ground may increase depending on water table depth. Grasses such as foxtail barley, common reed (Phragmites spp.) and annual rabbitsfoot grass increase or invade. Forbs such as smartweed and American licorice increase. Noxious weeds also invade. Once these events have occurred, it is difficult for native perennial plants to reestablish.

The degree of grazing has a significant impact on the ecological dynamics of the site. This region was historically occupied by large grazing animals, such as bison, elk, pronghorn, and mule deer. Grazing by these large herbivores, along with climatic and seasonal weather fluctuations, had a major influence on the ecological dynamics of the site. Deer and pronghorn are widely distributed throughout the MLRA. Secondary influences of herbivory by species such as prairie dogs and other small rodents, insects, and root-feeding organisms continues to impact the vegetation.

Historically, grazing patterns by herds of large ungulates were driven by water distribution, precipitation events, drought events, and fire. It is believed that grazing periods would have been shorter, followed by longer recovery periods. These large migrating herds impacted the ecological processes of nutrient and hydrologic cycles, by urination, trampling (incorporation of litter into the soil surface), and breaking of surface crust, (which increases water infiltration).

Today, livestock grazing, especially beef cattle has been a major influence on the ecological dynamics of the site.

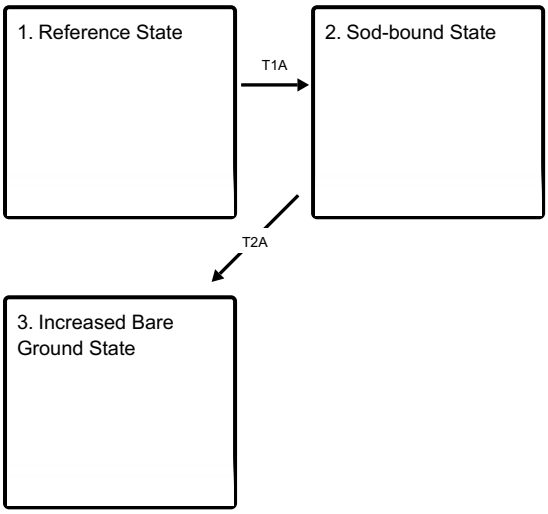
Grazing management, coupled with the effects of annual climatic variations, largely dictates the plant communities for the site.

Recurrent drought has historically impacted the vegetation of this region. Changes in species composition vary depending upon the duration and severity of the drought cycle and prior grazing management. Drought events since 2002 have significantly increased mortality of blue grama and buffalograss in some locales.

This site developed with occasional fire as part of the ecological processes. Historic fire frequency (pre-industrial) is estimated at 10 to14 years (Guyette, 2012), randomly distributed, and started by lightning at various times throughout the growing season. Early human inhabitants also were likely to start fires for various reasons (deliberate or accidental). It is believed that fires were set as a management tool for attracting herds of large migratory herbivores (Stewart, 2002). The impact of fire over the past 100 years has been relatively insignificant due to the human control of wildfires and the lack of acceptance of prescribed fire as a management tool.

State and transition model

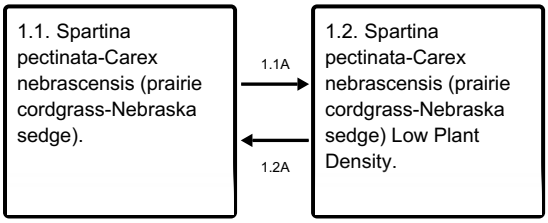
Ecosystem states



T1A - Excessive grazing. Lack of fire.

T2A - Excessive grazing. Lack of fire.

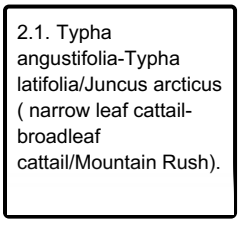
State 1 submodel, plant communities



1.1A - Non-use. Lack of fire.

1.2A - Prescribed grazing. Prescribed fire.

State 2 submodel, plant communities



State 3 submodel, plant communities

3.1. Glycyrrhiza lepidota-Polygonum pensylvanicum/Juncus arcticus (American licorice-Pennsylvania smartweed/mountain rush).

State 1
Reference State

The Reference State is characterized by two distinct plant community phases: 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.

Dominant plant species

- willow (*Salix*), tree
- prairie cordgrass (*Spartina pectinata*), grass
- Nebraska sedge (*Carex nebrascensis*), grass
- bluejoint (*Calamagrostis canadensis*), grass

Community 1.1
Spartina pectinata-Carex nebrascensis (prairie cordgrass-Nebraska sedge).

This is the interpretive plant community for the Wetland 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 consists of about 45 to 75 percent grasses, 20 to 35 percent grass-likes, 5 to 10 percent forbs, and 0 to 10 percent woody plants. The major grasses and grass-likes include prairie cordgrass, Nebraska sedge, and Northern reedgrass. Minor grasses include slender wheatgrass, reed canarygrass, native bluegrasses, American sloughgrass, and foxtail barley. A minor component of grass-likes such as mountain rush, sedge, flatsedge, spikerush, and bulrush species. Forbs such as spotted water hemlock, Virginia strawberry, horsetail, iris, and seaside arrowgrass; Pennsylvania smartweed, showy prairie gentian, cinquefoil, blue-eyed grass, narrowleaf- and broadleaf cattails. Woody species such as peachleaf and sandbar willow, are also present. In the 12 to 17 inch precipitation zone (PZ), the total annual production (air-dry weight) is about 5,500 pounds per acre during an average year, but ranges from about 5,000 pounds per acre in unfavorable years to about 6,000 pounds per acre in above-average years. 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 continuous grazing, tillage or development into urban or other uses.

Dominant plant species

- willow (*Salix*), tree
- prairie cordgrass (*Spartina pectinata*), grass
- Nebraska sedge (*Carex nebrascensis*), grass
- bluejoint (*Calamagrostis canadensis*), grass

Figure 9. Plant community growth curve (percent production by month). WY1106, 12-14SP Free water sites w/warm - WL, Sb, SS.

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

Community 1.2
Spartina pectinata-Carex nebrascensis (prairie cordgrass-Nebraska sedge) Low Plant Density.

This plant community developed under the absence of grazing and/ fire. Plant species resemble the Reference Plant Community; however, frequency and production are reduced. A standing dead canopy may prevent sunlight from reaching plant crowns. Many of the available nutrients are tied up in standing dead plant material and litter. Eventually, litter levels can become high enough to cause decadence and 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 slows nutrient recycling. Water flow patterns and pedestalling become apparent. Infiltration is reduced and runoff is increased. In advanced states of non-use or lack of fire, bare areas increase causing an erosion concern. Total annual production can vary substantially.

Dominant plant species

- willow (*Salix*), tree
- prairie cordgrass (*Spartina pectinata*), grass
- Nebraska sedge (*Carex nebrascensis*), grass
- bluejoint (*Calamagrostis canadensis*), grass

Figure 10. Plant community growth curve (percent production by month). WY1103, 12-14SP Free water w/o warm - WL, Sb, SS.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	20	25	25	15	10	0	0	0

Pathway 1.1A
Community 1.1 to 1.2

Non-use and lack of fire cause the Reference Plant Community to shift toward the Low Plant Density Community. Plant decadence and standing dead plant material impede energy flow. Initially, excess litter increase. Eventually, native plant density begins to decrease and annuals and introduced species may begin to invade. Water and nutrient cycles are impaired as a result of this community pathway.

Pathway 1.2A
Community 1.2 to 1.1

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

Conservation practices

Prescribed Burning
Prescribed Grazing

State 2
Sod-bound State

An ecological threshold has been crossed and a significant amount of production and diversity has been lost, compared to the Reference State. Significant biotic and soil changes have negatively impacted energy flow, and the nutrient and hydrologic cycles. This is a very stable state, resistant to change due to the high tolerance of Kentucky bluegrass 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 warm and cool-season bunch and rhizomatous grasses, forbs, and shrubs, reduces the biodiversity productivity of this site.

Dominant plant species

- willow (*Salix*), tree
- mountain rush (*Juncus arcticus ssp. littoralis*), grass
- narrowleaf cattail (*Typha angustifolia*), other herbaceous
- broadleaf cattail (*Typha latifolia*), other herbaceous

Community 2.1
Typha angustifolia-Typha latifolia/Juncus arcticus (narrow leaf cattail-broadleaf cattail/Mountain Rush).

Prairie cordgrass, northern reedgrass, and Nebraska sedge have been removed. Low-growing unpalatable sedges and cattails have increased. Mountain 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, 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. In the 12 to 17 inch PZ, the total annual production (air-dry weight) of this plant community is about 3,000 pounds per acre, but ranges from about 2,000 lbs. /acre in unfavorable years to about 4,000 lbs. /acre in above average-years.

Dominant plant species

- willow (*Salix*), tree
- mountain rush (*Juncus arcticus ssp. littoralis*), grass
- narrowleaf cattail (*Typha angustifolia*), other herbaceous
- broadleaf cattail (*Typha latifolia*), other herbaceous

Figure 11. Plant community growth curve (percent production by month). WY1103, 12-14SP Free water w/o warm - WL, Sb, SS.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	20	25	25	15	10	0	0	0

State 3
Increased Bare Ground State

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 upon the vegetation present. Erosion and loss of organic matter and carbon reserves are concerns.

Dominant plant species

- mountain rush (*Juncus arcticus ssp. littoralis*), grass
- American licorice (*Glycyrrhiza lepidota*), other herbaceous
- Pennsylvania smartweed (*Polygonum pensylvanicum*), other herbaceous

Community 3.1
Glycyrrhiza lepidota-Polygonum pensylvanicum/Juncus arcticus (American licorice-Pennsylvania smartweed/mountain rush).

Mountain rush still dominates the community; however, areas of sod have been removed, resulting in a broken sod-bound appearance. Bare ground may be a concern 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. Continued heavy use causes soil compaction. Wind and water erosion may occur if bare ground has increased. Litter amounts are greatly reduced. Mineral crusting caused by raindrop impact disrupts surface soil aggregates, increasing ponding and slowing infiltration.

Dominant plant species

- mountain rush (*Juncus arcticus ssp. littoralis*), grass
- American licorice (*Glycyrrhiza lepidota*), other herbaceous
- Pennsylvania smartweed (*Polygonum pensylvanicum*), other herbaceous

Figure 12. Plant community growth curve (percent production by month). WY1103, 12-14SP Free water w/o warm - WL, Sb, SS.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	20	25	25	15	10	0	0	0

Transition T1A
State 1 to 2

Frequent and severe defoliation without adequate recovery periods and lack of fire shifts this state across an ecological threshold to the Sod-bound State. Biotic integrity and hydrologic function are impaired as a result of this transition.

Transition T2A
State 2 to 3

Long-term, frequent, and severe defoliation without adequate recovery and lack of fire 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 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**12"-17"**			3391–4007	
	prairie cordgrass	SPPE	*Spartina pectinata*	2466–3391	–
	bluejoint	CACA4	*Calamagrostis canadensis*	616–1541	–
	northern reedgrass	CASTI3	*Calamagrostis stricta ssp. inexpansa*	308–925	–
2	**12"-17"**			308–616	
	Grass, perennial	2GP	*Grass, perennial*	0–308	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0–308	–
	foxtail barley	HOJU	*Hordeum jubatum*	0–308	–
	reed canarygrass	PHAR3	*Phalaris arundinacea*	0–308	–
	bluegrass	POA	*Poa*	0–308	–
3	**12"-17"**			1233–2158	
	Nebraska sedge	CANE2	*Carex nebrascensis*	616–1541	–
	sedge	CAREX	*Carex*	308–616	–
	bulrush	SCIRP	*Scirpus*	308–616	–
	spikerush	ELEOC	*Eleocharis*	0–308	–
	rush	JUNCU	*Juncus*	0–308	–
Forb					
4	**12"-17"**			308–616	
	Forb, perennial	2FP	*Forb, perennial*	0–308	–
	textile onion	ALTE	*Allium textile*	0–123	–
	aster	ASTER	*Aster*	0–123	–
	milkvetch	ASTRA	*Astragalus*	0–123	–
	water hemlock	CICUT	*Cicuta*	0–123	–
	poison hemlock	COMA2	*Conium maculatum*	0–123	–
	horsetail	EQUIS	*Equisetum*	0–123	–
	Virginia strawberry	FRVI	*Fragaria virginiana*	0–123	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–123	–
	iris	IRIS	*Iris*	0–123	–
	swamp smartweed	POHY2	*Polygonum hydropiperoides*	0–123	–
	Pennsylvania smartweed	POPE2	*Polygonum pensylvanicum*	0–123	–
	cinquefoil	POTEN	*Potentilla*	0–123	–
	blue-eyed grass	SISYR	*Sisyrinchium*	0–123	–
	arrowgrass	TRIGL	*Triglochin*	0–123	–
	narrowleaf cattail	TYAN	*Typha angustifolia*	0–123	–
	broadleaf cattail	TYLA	*Typha latifolia*	0–123	–
Tree					
5	**12"-17"**			0–616	
	willow	SALIX	*Salix*	0–616	–

Animal community

Wildlife Interpretations:

Reference Plant Community—Prairie Cordgrass, Nebraska Sedge:
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-winged blackbirds, sandhill cranes, Wilson snipe, western meadowlarks, and golden eagles. Many small mammals occur here.

Low Plant Density Community—Excessive Litter, Decadent Plants, and Standing Dead Canopy:
This community has reduced habitat value for most wildlife species found in the Reference Plant Community.

2.1 Community—Mountain Rush, Cattails:
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 therefore 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.

3.1 Community—Mountain Rush, Smartweed, American Licorice:
Due to the greatly reduced plant diversity of this site and impairment to the nutrient cycling and water infiltration processes, the wildlife community that uses this site is also greatly reduced. This community has low habitat value for most wildlife species.

Grazing Interpretations:

The following table is a guide to stocking rates for the plant communities described in the Wetland site. These are conservative estimates for initial planning. On-site conditions vary, and stocking rates should be adjusted based on range inventories, animal kind/class, forage availability (adjusted for slope and distance to water), and the type of grazing system (number of pastures, planned moves, etc.), all of which is determined in the conservation planning process.

The following stocking rates are based on the total annual forage production in a normal year multiplied by 25 percent harvest efficiency of preferred and desirable forage species, divided by 912 pounds of ingested air-dry vegetation for an animal unit per month (Natl. Range and Pasture Handbook, 1997). An animal unit month (AUM) is defined as the amount of forage required by one mature cow, for one month.
Plant Community (PC) Production (total lbs. /acre in a normal year) and Stocking Rate (AUMs/acre) are listed below:

Example: Reference PC – (5500) (1.5)
5,500 lbs. per acre X 25% Harvest Efficiency = 1,375 lbs. forage demand for one month. Then, 1,375 lbs. per acre/912 demand per AUM =1.5
Plant Community (PC) Production (lbs.ac), and Stocking Rate (AUM/Acre)

12-17” PZ:
Reference PC - (5500) (1.5)
2.1 PC - (3000) (0.82)

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.

An on-site inventory is required prior to development of a grazing plan.

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 on soil hydrologic group and water table. Runoff will be high on this site since the soil may be saturated. (Refer to NRCS Section 4, National Engineering Handbook (USDA–NRCS, 1972–2012) for runoff quantities and hydrologic curves).

Rills and gullies should not typically be present. Water flow patterns should be barely distinguishable if at all 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 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 aesthetic 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 (2008).

Growth Curves are from the “Previously Approved” ESD (2008).

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

Each Alternative State/Community:

Complete to Provisional level The Plant Communities Section will need to be further developed at the next Approved 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: Plant community names updated. Narrative is from “Previously Approved” ESD (2008). Wildlife Interpretations should 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 (2008). The Hydrology Section will need to be updated at the next Approved level.

Plant Preferences tabled removed. Will be released as a technical guide notice by NE and WY State Offices in the future.

Existing NRI or 417 Inventory Data References updated. Very limited data from these sources. More field data collection is necessary to support this site concept.

Reference Sheet
Rangeland Health Reference Sheet carried over from previously “Approved” ESD (2008).
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

Date Source: 417s
Number of Records: 1
Sample Period: 1979
States: NE
Counties: Morrill

Information presented here has been derived from data collection on private and federal lands using:
• Double Sampling (clipped 2 of 5 plots)*
• Rangeland Health (Pellant et al., 2005)
• Soil Stability (Pellant et al., 2005)
• Line Point Intercept : Foliar canopy, basal cover (Forb, Graminoid, Shrub, subshrub, Lichen, Moss, Rock fragments, bare ground, % Litter) (Herrick et al., 2005)
• Soil pedon descriptions collected on site (Schoeneberger et al., 2012)

*NRCS double-sampling method, CO NRCS Similarity Index Worksheet 528(1).
Additional reconnaissance data collection using numerous ocular estimates and other inventory data; NRCS clipping data for USDA program support; Field observations from experienced range trained personnel. Specific data information is contained in individual landowner/user case files and other files located in county NRCS field offices.

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Contributors

Kimberly Diller, Ecological Site Specialist, NRCS MLRA SSO, Pueblo CO
Andy Steinert, MLRA 67B Soil Survey Leader, NRCS MLRA SSO, Fort Morgan, CO

Doug Whisenhunt, Ecological Site Specialist, NRCS MLRA SSO, Pueblo CO

Approval

Kirt Walstad, 9/07/2023

Acknowledgments

Partners/Contributors:

David Cook, Rangeland Management Specialist, NRCS, Oshkosh, NE
George Gamblin, Rangeland Management Specialist, NRCS, Wheatland, WY
Cameron Clark, Resource Soil Scientist, NRCS, Douglas, WY
Angie Elg, Resource Soil Scientist, NRCS, Scottsbluff, NE
Tim Becket, Area Resource Conservationist, Douglas, WY
Mitchell Stephenson, Ph.D. Rangeland Management Specialist, UNL-Panhandle Research Station, Scottsbluff, NE
Kristin Dickinson, District Conservationist, NRCS, Sidney, NE
Rick Peterson, Ecological Site Inventory Specialist, SD-NRCS-MLRA SSO, Rapid City, SD

Program Support:

Nadine Bishop, NE State Rangeland Management Specialist/ QC, NRCS, Imperial, NE
John Hartung WY State Rangeland Management Specialist/ QC, NRCS, Casper, WY
David Kraft, NRCS MLRA Ecological Site Specialist-QA, Emporia, KS
James Bauchert, WY State Soil Scientist, WY-NRCS, Casper, WY
Neil Dominy, NE State Soil Scientist, NRCS, Lincoln, NE
Britt Weiser, NE State Resource Conservationist, NRCS, Lincoln, NE
Clayton Schmitz, WY State Resource Conservationist, NRCS, Casper, WY
Carla Green Adams, Editor, NRCS-SSR5, Denver, CO
Chad Remley, Regional Director, N. Great Plains Soil Survey, Salina, KS

Those involved in developing the 2008 version: Chuck Ring, Rangeland Management Specialist, WY-NRCS, Everett Bainter, WY State Rangeland Management Specialist, WY-NRCS

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)	Dave Cook, Kristin Dickinson, George Gamblin, John Hartung, Andy Steinert, Nadine Bishop
Contact for lead author	
Date	11/19/2020
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None. Rills are not expected on the site.

2. **Presence of water flow patterns:** None. Water flow patterns are not expected on this site.

3. **Number and height of erosional pedestals or terracettes:** None. Erosional pedestals or terracettes are not expected on this site.

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 percent.

5. **Number of gullies and erosion associated with gullies:** None. Gullies should not be present on this site.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None. Wind-scoured and/or depositional areas are not present on the site.

7. **Amount of litter movement (describe size and distance expected to travel):** Litter should fall in place. Slight amount of movement of fine litter from water is possible, but not normal. Litter movement from wind is not expected.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil aggregate stability ratings typically 5 to 6, normally 6. Surface organic matter adheres to the soil surface. Soil surface peds will typically retain structure indefinitely when dipped in distilled water.

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

surface layer ranges from a depth of 3 to 10 inches (7.6-25.4 cm). Soil colors are gray (5/1) when dry and very dark gray (3/1) when moist. Soil surface structure is typically granular.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** The functional/structural groups provide a combination of rooting depths and structure which positively influences infiltration. Combination of shallow and deep rooted species (mid & tall rhizomatous and tufted perennial cool season grasses) with fine and coarse roots positively influences infiltration.

    The expected composition of the plant community is about 40 to 75 percent perennial grasses, 20 to 35 percent grass-likes, 5 to 10 percent forbs, and 0 to 10 percent shrubs.
    The grass and grass-like component is made up of warm-season, tall, rhizomatous grasses (40-55%); grass-likes (20-35%); cool-season grasses (15-40%).

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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):** None. A compaction layer is not expected 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: 1. C4, tall, rhizomatous grasses – 2200-3025 #/ac (40-55%), 1 species minimum

    Sub-dominant: 2. Grass-likes – 1100-1925 #/ac (20-35%), 3 species minimum
    3. Native, C3, grasses – 825-2200 #/ac (15-40%), 2 species minimum

    Other: Minor:
    4. Native, Perennial and Annual Forbs – 275-550#/ac (5-10%)
    5. Trees – 0-550 #/ac (0-10%)

    Additional: 12a. Relative Dominance:
    Community 1.1: Native, tall, rhizomatous grasses > Native, C3 grasses > Grass-likes > Native, Perennial and Annual Forbs > or = Trees
    12b. F/S Groups not expected for the site: Introduced annual grasses, perennial introduced and naturalized grasses, shrubs, coniferous trees.
    12c. Number of F/S Groups: 5
    12d. Species number in Dominant and Sub-dominant F/S Groups: 4

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very little evidence of decadence or mortality. Bunch grasses have strong, healthy centers with less than 3 percent mortality and shrubs have few dead stems.

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14. **Average percent litter cover (%) and depth (in):** Average litter cover is 80 to 90 percent. Litter depths are expected to be 0.75 to 1.5 inches (1.9-3.8 cm).

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Annual production ranges from 5,000 to 6,000 per acre on an air dry basis. Average annual production is

5,500 pounds per acre under normal precipitation and weather conditions.

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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:** Purple loosestrife, Reed canarygrass, Russian Olive and others as they become known.

    See:
    Department of Agriculture Invasive Species Website:
    https://www.colorado.gov/pacific/agconservation/noxious-weed-species
    Wyoming Weed and Pest Council Website: https://wyoweed.org/
    Nebraska Invasive Species website: https://neinvasives.com/plants.

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17. **Perennial plant reproductive capability:** All perennial species exhibit high vigor relative to recent weather conditions. Perennial grasses should have vigorous rhizomes or tillers; vegetative and reproductive structures are not stunted. All perennial species should be capable of reproducing annually.
