USDA Natural Resources Conservation Service

Ecological site R067AY138WY
Saline Lowland (SL)

Last updated: 9/07/2023
Accessed: 05/18/2024

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.

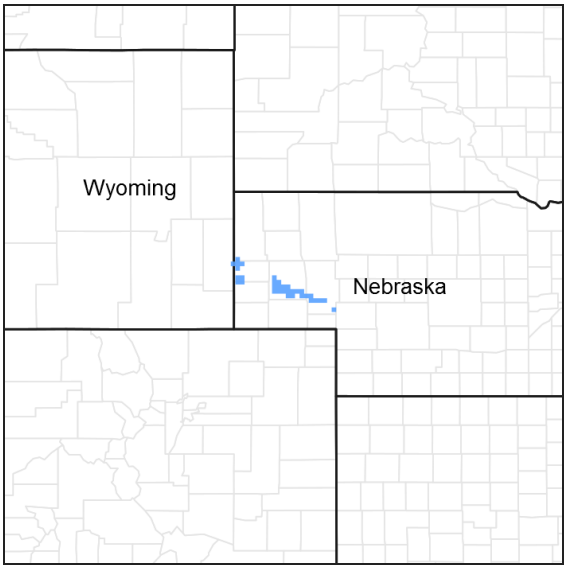


Figure 1. Mapped extent

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): 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 Saline Lowland (SL) 12 to 17 Precipitation Zone (PZ) Ecological Site was developed by an earlier version of the Saline Lowland (SL) ESD (2005, updated 2008). The earlier version of the Saline Lowland (SL) 12 to 17 inch Precipitation Zone ESD was based on input from NRCS (formerly Soil Conservation Service) and historical information obtained from the Saline Lowland (SL) 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 Saline Lowland Ecological Site is a run-on site that has salts on the surface or in the top six inches of the soil profile. The water table is deeper than 36 inches.

Associated sites

R067AY144WY	**Saline Upland (SU)** This ecological site is commonly adjacent.
R067AY150WY	**Sandy (Sy)** This ecological site is commonly adjacent.
R067AY152WY	**Sandy Lowland (SyL)** This ecological site is commonly adjacent.

Similar sites

R067AY144WY	**Saline Upland (SU)** The Saline Upland Ecological Site is a run-off site.
R067AY124WY	**Loamy Lowland (LyL)** The Loamy Lowland Ecological Site does not have salts on the soil surface or in the top six inches of the profile.
R067AY152WY	**Sandy Lowland (SyL)** The Sandy Lowland Ecological Site does not have salts on the soil surface or in the top six inches of the profile.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Sarcobatus vermiculatus* (2) *Atriplex canescens*
Herbaceous	(1) *Sporobolus airoides* (2) *Pascopyrum smithii*

Physiographic features

This site typically occurs on the floodplains, drainageways, or floodplain-steps of the river valleys; but may also occur on low stream terraces that have very rare to no flooding.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Flood-plain step (3) Drainageway
Runoff class	Negligible to low
Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	None to rare
Ponding frequency	None
Elevation	914–1,676 m
Slope	0–3%
Water table depth	203–610 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) CHEYENNE [USW00024018], Cheyenne, WY
- (2) SCOTTSBLUFF HEILIG AP [USW00024028], Scottsbluff, NE
- (3) WHEATLAND 4 N [USC00489615], Wheatland, WY
- (4) KIMBALL 2NE [USC00254440], Kimball, NE
- (5) OLD FT LARAMIE [USC00486852], Yoder, WY
- (6) PHILLIPS [USC00487200], LaGrange, WY
- (7) OSHKOSH [USC00256385], Oshkosh, NE

- (8) BRIDGEPORT [USC00251145], Bridgeport, NE
- (9) HARRISBURG 12WNW [USC00253605], Harrisburg, NE
- (10) CHUGWATER [USC00481730], Chugwater, WY

Influencing water features

There are no water features associated with the ecological site.

Soil features

The soils on Saline Lowland site are typically very deep, well to somewhat excessively drained soils that formed from alluvium. They typically have a moderate to moderately rapid permeability class. The available water capacity is low to moderate. The soil moisture regime is typically aridic ustic. The soil temperature regime is mesic.

The surface layer of the soils in this site are typically fine sandy loam, loamy fine sand, or very fine sandy loam, but may include loamy very fine sand or fine sand. The surface layer ranges from a depth of 3 to 11 inches thick. The subsoil is typically fine sandy loam, very fine sandy loam, loamy fine sand, or fine sand, and typically include strata of each of these textures. Soils in this site have carbonates at the surface but may be leached to 5 inches in some soils. These soils are slightly to moderately saline. The higher levels of salinity adversely affect plant species composition and growth. These soils are susceptible to erosion by water and wind if not covered. The potential for erosion increases where vegetative cover is inadequate. Channel cutting, deposition, and removals may occur adjacent to ephemeral or intermittent streams. These areas are subject to occasional overflow.

Surface soil structure is typically granular, and structure below the surface is single grain or massive but may include weak 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.

Major soil series correlated to this ecological site include: Craft and Pathfinder.

Other soil series that have been correlated to this site include: Laird.

The attributes listed below 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) Fine sandy loam (2) Loamy fine sand (3) Very fine sandy loam
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderate to moderately rapid
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	7.62–15.24 cm
Calcium carbonate equivalent (Depth not specified)	0–15%
Electrical conductivity (Depth not specified)	4–16 mmhos/cm
Sodium adsorption ratio (Depth not specified)	5–13

Soil reaction (1:1 water) (Depth not specified)	7.4–9
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The information in this ESD, including the State-and-Transition Model (STM) diagram, 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 and/or time-controlled grazing strategies, and historical accounts.

The Saline Lowland ecological site is characterized by three states: Reference, Sod-bound, and Increased *Bare Ground*. The Reference State is characterized by warm-season midgrass (alkali sacaton) and cool-season rhizomatous midgrass (western wheatgrass). Secondary grasses include slender wheatgrass, Canada wildrye, alkali bluegrass (also known as Sandberg bluegrass), and shortgrasses including inland saltgrass and blue grama. A minor component of forbs and shrubs (black greasewood, fourwing saltbush, and silver buffaloberry), are also present. See the species composition list in this ESD. The Sod-bound State is characterized by warm-season shortgrass (inland saltgrass and blue grama), and greasewood. The Increased *Bare Ground* State is characterized by remnant inland saltgrass, warm-season bunchgrass (Fendler threeawn), annual grass (sixweeks fescue), and forbs such as curlycup gumweed, and annuals. Shrubs such as greasewood, broom snakeweed, and pricklypear have increased. Annual invasive species include burningbush, Russian thistle, and cheatgrass. Other noxious weeds that may invade include knapweeds and whitetop (also known as hoary cress).

As this site begins to deteriorate from a combination of frequent and severe grazing during the growing season, grasses such as alkali sacaton and western wheatgrass decrease in both frequency and production. Grasses such as inland saltgrass and blue grama increase. Under continued frequent and severe defoliation, alkali sacaton may eventually be removed from the plant community. Key shrubs such as fourwing saltbush are removed and black greasewood significantly increases. If continued, the plant community becomes sod-bound, and all midgrasses may eventually be removed from the plant community. Over the long-term, this continuous use in combination with high stock densities, results in a broken sod, with areas of bare ground developing, and species such as cheatgrass invading.

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).

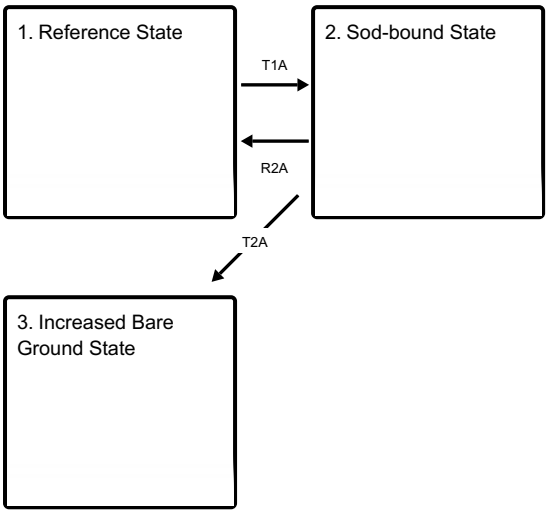
Today, livestock grazing, especially beef cattle has been a major influence on the ecological dynamics of the site. Grazing management, coupled with the effects of annual climatic variations, largely dictates the plant communities for the site.

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

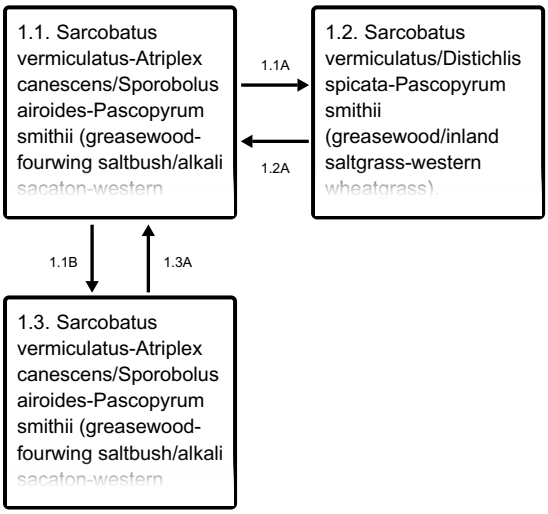


T1A - Excessive grazing. Lack of fire.

R2A - Prescribed grazing. Prescribed fire. Mechanical brush control.

T2A - Excessive grazing. Lack of fire.

State 1 submodel, plant communities



1.1A - Excessive grazing. Lack of fire.

1.1B - Lack of grazing. Lack of fire.

1.2A - Prescribed grazing. Prescribed fire.

1.3A - Prescribed grazing. Prescribed fire.

State 2 submodel, plant communities

2.1. Sarcobatus vermiculatus/Distichlis spicata-Bouteloua gracilis (greasewood/saltgrass-blue grama).

State 3 submodel, plant communities

3.1. Sarcobatus vermiculatus/Distichlis spicata-Aristida purpurea (greasewood/saltgrass-blue grama).

State 1
Reference State

The Reference State is characterized by three distinct plant community phases. These plant communities and the various successional stages between them represent the natural range of variability within the Reference State.

Dominant plant species

- greasewood (*Sarcobatus vermiculatus*), shrub
- fourwing saltbush (*Atriplex canescens*), shrub
- alkali sacaton (*Sporobolus airoides*), grass
- western wheatgrass (*Pascopyrum smithii*), grass

Community 1.1
Sarcobatus vermiculatus-Atriplex canescens/Sporobolus airoides-Pascopyrum smithii (greasewood-fourwing saltbush/alkali sacaton-western wheatgrass).

The Reference Plant Community is the interpretive plant community for the Saline Lowland 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 75 to 90 percent grasses and grass-likes, 0 to 5 percent forbs, and 0 to 20 percent woody plants. The major grasses include alkali sacaton and western wheatgrass. Secondary species include cool-season bunchgrasses such as Canada wildrye, alkali bluegrass (also known as Sandberg bluegrass), Nuttall's alkaligrass, and slender wheatgrass; warm-season bunchgrass such as switchgrass; and warm-season rhizomatous grasses including inland saltgrass, alkali cordgrass, and blue grama. Forbs include scarlet globemallow, silverscale saltbush, scarlet beeblossom (also known as scarlet gaura), and white heath aster. Shrubs include black greasewood, fourwing saltbush, and silver buffaloberry. Plant diversity is very high. The total annual production (air-dry weight) is about 1,500 pounds per acre during an average year, but ranges from about 1,100 pounds per acre in unfavorable years to about 1,900 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 heavy, continuous grazing, tillage, or development into urban or other uses.

Dominant plant species

- greasewood (*Sarcobatus vermiculatus*), shrub
- fourwing saltbush (*Atriplex canescens*), shrub
- alkali sacaton (*Sporobolus airoides*), grass
- western wheatgrass (*Pascopyrum smithii*), grass

Figure 9. Plant community growth curve (percent production by month). WY1105, 12-14SP Extra water w/warm - LL, Ov, CyO, SL. 12-14" Precipitation

Zone, Southern Plains (SP), with warm-season (grasses); sites which receive additional water (run-on position, from adjacent sites)..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	20	25	30	15	5	0	0	0

Community 1.2
Sarcobatus vermiculatus/Distichlis spicata-Pascopyrum smithii (greasewood/inland saltgrass-western wheatgrass).

The dominant grasses include inland saltgrass and western wheatgrass. Remnant amounts of alkali sacaton are still present in scattered clumps. Palatable shrubs such as fourwing saltbush have been reduced, while less palatable shrubs such as greasewood are becoming more vigorous. Plant diversity is moderate. Management changes can move this plant community towards the Reference Plant Community since all plant species are still present. This transition can be slowed or made more difficult if greasewood has increased significantly. Soil erosion is low because of slope. Infiltration is moderate and slightly reduced. Total annual production (air-dry weight) is about 1,300 pounds per acre during an average year, but ranges from about 1,000 pounds per acre in unfavorable years to about 1,600 pounds per acre in above-average years. Total aboveground biomass has been reduced. Reduction of rhizomatous wheatgrasses, nitrogen-fixing forbs, and increased warm-season shortgrasses, and the reduction of palatable shrubs have begun to alter the biotic integrity of this community. Water and nutrient cycles may be impaired. Nearly all plant species typically found in the Reference Plant Community are present and will respond to changes in grazing management.

Dominant plant species

- greasewood (*Sarcobatus vermiculatus*), shrub
- saltgrass (*Distichlis spicata*), grass
- western wheatgrass (*Pascopyrum smithii*), grass

Figure 10. Plant community growth curve (percent production by month). WY1002, 15-19SE extra water sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	10	35	30	15	5	0	0	0

Community 1.3
Sarcobatus vermiculatus-Atriplex canescens/Sporobolus airoides-Pascopyrum smithii (greasewood-fourwing saltbush/alkali sacaton-western wheatgrass) Low Plant Density Community.

This plant community developed under many years of non-use and lack of fire. Plant species resemble the Reference Plant Community however, frequency and production are reduced. Eventually, litter levels can become high enough to cause decadence and mortality of the stand. Bunchgrasses typically develop dead centers and rhizomatous grasses can form small decadent communities due to a lack of impact by grazing animals. Much of the available nutrients are tied up in standing dead plant material and increased amounts of litter. The semiarid environment and the absence of animal traffic to break down litter slows nutrient recycling. Cool-season grasses and pricklypear have typically increased. Blue grama is reduced. Noxious weeds may invade if a seed source is readily available. Invasive grasses such as cheatgrass tend to encroach under these conditions. Water flow patterns and pedestalling can become apparent. Total annual production (air-dry weight) can vary from 100 to 1,400 pounds per acre depending upon weather conditions and the plants that are present. The introduction of grazing or fire quickly changes the plant community. It is more vulnerable to severe disturbance than the Reference Plant Community. Soil erosion accelerates if bare ground increases. Infiltration is reduced and runoff is increased.

Dominant plant species

- greasewood (*Sarcobatus vermiculatus*), shrub
- fourwing saltbush (*Atriplex canescens*), shrub
- alkali sacaton (*Sporobolus airoides*), grass
- western wheatgrass (*Pascopyrum smithii*), grass

Figure 11. Plant community growth curve (percent production by month). WY1102, 12-14SP Extra water w/o warm - LL, Ov, CyO, SL. 12-14" Precipitation Zone, Southern Plains (SP), without warm-season (grasses); sites which receive additional water (run-on position), from adjacent sites..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	25	30	20	15	5	0	0	0

Pathway 1.1A
Community 1.1 to 1.2

Frequent and severe defoliation without adequate recovery between grazing events and lack of fire shifts this plant community to the 1.2 Community. Drought accelerates this process. A single-age class of cottonwood develops. Biotic integrity, and water and nutrient cycles may become impaired as a result of this community pathway.

Pathway 1.1B
Community 1.1 to 1.3

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 increases. Eventually, native plant density begins to decrease and weeds 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

Grazing that allows for adequate recovery between grazing events, proper stocking rates, and prescribed fire shift the 1.2 Community back to the Reference Plant Community.

Conservation practices

Prescribed Burning
Prescribed Grazing

Pathway 1.3A
Community 1.3 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 timeframe 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 when 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 inland saltgrass and blue grama to grazing, the development of a shallow root system (root pan), and subsequent changes in hydrology and nutrient cycling. The loss of other functional/structural groups such as cool-season bunch and rhizomatous grasses, forbs, and shrubs, reduces the biodiversity productivity of this site.

Dominant plant species

- greasewood (*Sarcobatus vermiculatus*), shrub
- saltgrass (*Distichlis spicata*), grass
- blue grama (*Bouteloua gracilis*), grass

Community 2.1
Sarcobatus vermiculatus/Distichlis spicata-Bouteloua gracilis (greasewood/saltgrass-blue grama).

The midgrasses, and palatable forbs have been eliminated. The dominant species are inland saltgrass and blue grama. These species have developed into a sod-bound condition occurring in localized colonies exhibiting a mosaic appearance. Fendler threeawn has increased. Forbs and shrubs that continue to increase are Cuman ragweed (also known as western ragweed), curlycup gumweed, scarlet globemallow, pricklypear, broom snakeweed, and greasewood. Plant diversity is very low. Energy flow, water cycle, and mineral cycle have been negatively affected. Litter levels are very low and unevenly distributed. The total annual production (air-dry weight) is about 900 pounds per acre during an average year, but ranges from about 600 pounds per acre in unfavorable years to about 1,200 pounds per acre in above-average years.

Dominant plant species

- greasewood (*Sarcobatus vermiculatus*), shrub
- saltgrass (*Distichlis spicata*), grass
- blue grama (*Bouteloua gracilis*), grass

Figure 12. Plant community growth curve (percent production by month). WY1102, 12-14SP Extra water w/o warm - LL, Ov, CyO, SL. 12-14" Precipitation Zone, Southern Plains (SP), without warm-season (grasses); sites which receive additional water (run-on position), from adjacent sites..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	25	30	20	15	5	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 resource concerns.

Dominant plant species

- greasewood (*Sarcobatus vermiculatus*), shrub
- saltgrass (*Distichlis spicata*), grass
- Fendler threeawn (*Aristida purpurea var. longiseta*), grass

Community 3.1
Sarcobatus vermiculatus/Distichlis spicata-Aristida purpurea (greasewood/saltgrass-blue grama).

The plant composition is made up introduced grasses, annuals, noxious weeds, and a few species of native forbs and grasses that are very tolerant to frequent and severe defoliation. The site may also be invaded with introduced trees. The dominant grasses typically include inland saltgrass and Fendler’s threeawn. Annual grasses such as sixweeks fescue, foxtail barley, and cheatgrass have increased or invaded. The dominant perennial forbs include curlycup gumweed and Cuman ragweed. Other forbs that increase or invade the site include burningbush, Russian thistle, and pigweed. Shrubs include pricklypear, broom snakeweed, and black greasewood. Noxious weeds such as whitetop and knapweeds may have invaded the site. Introduced trees such as Russian olive and tamarisk may invade the site. This plant community is highly variable, in both species composition and production. This plant community is very resistant to change because of the lack of native species and the amount of introduced plants

and weeds present. It is nearly impossible to change the plant composition in a reasonable management timeframe. Litter levels are extremely low due to reduced production. 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.

Dominant plant species

- greasewood (*Sarcobatus vermiculatus*), shrub
- saltgrass (*Distichlis spicata*), grass
- Fendler threeawn (*Aristida purpurea var. longiseta*), grass

Figure 13. Plant community growth curve (percent production by month). WY1102, 12-14SP Extra water w/o warm - LL, Ov, CyO, SL. 12-14" Precipitation Zone, Southern Plains (SP), without warm-season (grasses); sites which receive additional water (run-on position), from adjacent sites..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	25	30	20	15	5	0	0	0

Transition T1A
State 1 to 2

Frequent and severe defoliation, and lack of fire shift this plant community across an ecological threshold toward the Sod-bound State. Biotic integrity and hydrologic function is impaired as a result of this transition.

Restoration pathway R2A
State 2 to 1

Very long-term prescribed grazing moves this plant community to the Reference State. This transition, however, could take generations. Prescribed fire and mechanical brush control accelerate this process.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

Transition T2A
State 2 to 3

Long-term frequent and severe defoliation 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**			420–504	
	alkali sacaton	SPAI	*Sporobolus airoides*	420–504	–
2	**12**			252–336	
	western wheatgrass	PASM	*Pascopyrum smithii*	252–336	–
3	**12**			168–252	
	saltgrass	DISP	*Distichlis spicata*	168–252	–
4	**12**			420–588	
	Grass, perennial	2GP	*Grass, perennial*	0–84	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–84	–
	sedge	CAREX	*Carex*	0–84	–
	Canada wildrye	ELCA4	*Elymus canadensis*	0–84	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0–84	–
	switchgrass	PAVI2	*Panicum virgatum*	0–84	–
	bluegrass	POA	*Poa*	0–84	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–84	–
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	0–84	–
	alkali cordgrass	SPGR	*Spartina gracilis*	0–84	–
Forb					
5	**12**			17–84	
	Forb, perennial	2FP	*Forb, perennial*	17–84	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–34	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–34	–
	milkvetch	ASTRA	*Astragalus*	0–34	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	0–34	–
	rush skeletonplant	LYJU	*Lygodesmia juncea*	0–34	–
	white heath aster	SYERE	*Symphyotrichum ericoides var. ericoides*	0–34	–
Shrub/Vine					
6	**12**			17–336	
	greasewood	SAVE4	*Sarcobatus vermiculatus*	17–336	–
	silver buffaloberry	SHAR	*Shepherdia argentea*	0–84	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	17–84	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–84	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–34	–

Animal community

Wildlife Interpretations:

Reference Plant Community— Alkali Sacaton, Western Wheatgrass:

The predominance of grasses in this community favors large grazers such as bison, elk, and pronghorn 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. Other birds that frequent this plant community include western meadowlarks, horned larks, and golden eagles. Many grassland-obligate small mammals live here.

1.2 Community—Decreased Midgrasses, Increased Inland Saltgrass, Increased Greasewood:
This plant community may be useful for the same large grazers that 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.

1.3 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—Inland Saltgrass and Blue Grama, Greasewood:
This community may still be useful for the same large grazers that 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.

3.1 Community—Inland Saltgrass, Annuals, Cheatgrass, Greasewood:
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 Saline Lowland site. These are conservative estimates for initial planning. On-site conditions will vary, and stocking rates should be adjusted based on range inventories, animal kind and class, forage availability (adjusted for slope and distance to water), and the type of grazing system (number of pastures, planned moves, etc.), all of which is determined in the conservation planning process.

The following stocking rates are based on the total annual forage production in a normal year multiplied by 25 percent harvest efficiency of preferred and desirable forage species, divided by 912 pounds of ingested air-dry vegetation for an animal unit per month (Natl. Range and Pasture Handbook, 1997). An animal unit month (AUM) is defined as the amount of forage required by one mature cow, with or without a calf, 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 – (1500) (.41)
1,500 lbs. per acre X 25% Harvest Efficiency = 375 lbs. forage demand for one month. Then, 375 lbs. per acre/912 demand per AUM =.41

Plant Community (PC) Production (lbs./ac), and Stocking Rate (AUM/Acre):
Reference PC - (1500) (0.41)
1.2 PC - (1300) (0.36)
2.1 PC - (900) (0.25)

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 developing a grazing plan.

Hydrological functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group B and C, with localized areas in hydrologic group D. Infiltration ranges from moderate 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 percent ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where shortgrasses form a strong sod and dominate the site. Areas where ground cover is less than 50 percent have the greatest potential to have reduced infiltration and higher runoff (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. Pedestals are only slightly present in association with bunchgrasses. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts may be present. Cryptogamic crusts are present, but only cover 1to 2 percent of the soil surface.

Recreational uses

This site provides hunting, hiking, photography, bird watching, and other opportunities. The wide varieties of plants that 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

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.

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 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 (2008).

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. More field data collection is needed to support this site

concept.

Inventory data references

NRI: references to Natural Resource Inventory data
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.

Data Source: NRI
Number of Records: 2
Sample Period: 2013
State:
County: Morrill

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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)	Dave Cook, Kristin Dickinson, George Gamblin, John Hartung, 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 and terracettes are not expected on this site. Alkali sacaton tends to have a hummocky growth form that may appear pedestalled.Essentially non-existent

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is 10-20 percent occurring in small areas throughout site. The areas of bare ground may have high amounts of salt crusting.

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 are typically 3 or greater. Surface organic matter adheres to the soil surface. Soil surface peds will typically retain structure for at least short periods when dipped in distilled water. Some peds will dissolve in less than 1 minute.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The surface layer ranges from 3 to 11 inches (7.6-27.9 cm) thick. Soil colors range from light brownish gray to grayish brown (values of 5 to 6) when dry and dark grayish brown to very dark grayish brown (values of 3 to 4). Soil surface structure is typically granular.

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 75 to 90 percent perennial grasses and grass-likes, 0 to 5 percent forbs, and 0 to 20 percent shrubs. The grass and grass-like component is made up of warm-season, tall, bunch grasses (25-30%); cool-season, rhizomatous grasses (15-20%); cool-season, bunch grasses (5-10%); warm-season, tall, rhizomatous grasses (5-10%); grass-likes (0-5%).

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. Native, C4, tall, bunch grasses – 375-450 #/ac (25-30%), 1 species minimum

    Sub-dominant: 2. Native, C3, rhizomatous grasses – 225-300 #/ac (15-20%), 1 species minimum
    3. Native, C4, short grasses – 225-300 #/ac (15-20%), 1 species minimum
    4. Shrubs, vines, cacti – 15-300 #/ac (1-20%), 1 species minimum **

    Other: Minor Groups:
    5. Native, C4, tall, rhizomatous grasses – 75-150 #/ac (5-10%)
    6. Native, C3, bunch grasses – 75-150 #/ac (5-10%)
    7. Native, Perennial and Annual Forbs – 15-75 #/ac (1-5%)
    8. Grass-likes – 0-75 #/ac (0-5%)

    Additional: 12a. Relative Dominance:
    Community 1.1: Native, C4, bunch grasses > Native, C3, rhizomatous grasses = Native, C4, short grasses > Shrubs, Cacti, Vine > Native, C4, rhizomatous, tall grasses = Native, C3, bunch grasses > Native, Annual or Perennial Forbs
    = Grass-likes

    12b. F/S Groups not expected for the site: Introduced annual grasses, perennial introduced and naturalized grasses, trees.
    12c. Number of F/S Groups: 8

    12d. Species number in Dominant and Sub-dominant F/S Groups: 4

    ** On some locations the shrub group may be at minor or trace levels. The plant community should be evaluated carefully before determining whether this is a departure.

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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):** Plant litter cover is evenly distributed throughout the site and is expected to be 50 to 70 percent. Litter depth ranges from of 0.25-0.50 inch (0.65-1.3 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 1,100 to 1,900 pounds per acres on an air dry basis. Average annual production is 1,500 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: Annual bromes, curlycup gumweed, kochia, Russian thistle, whitetop, knapweeds, Russian olive and salt cedar (tamarisk) 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.
