USDA Natural Resources Conservation Service

Ecological site R067AY126WY
Loamy Overflow (LyO)

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

Ecological site concept

The Loamy Overflow Ecological Site is a run-on site that is not saline or alkaline. The depth to the water table is a minimum of 80 inches and the site is not in a closed depression.

Associated sites

R067AY122WY	**Loamy (Ly)** This ecological site is commonly adjacent.

Similar sites

R067AY106WY	**Closed Depression (Cd)** This ecological site is in a closed upland depression.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia cana* (2) *Atriplex canescens*
Herbaceous	(1) *Pascopyrum smithii* (2) *Andropogon gerardii*

Physiographic features

This site occurs on the floodplains of ephemeral or intermittent streams, but may also occur on drainageways or draws that may or may not have a channel. These sites receive water from channel flooding or from runoff from adjacent slopes during precipitation events.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Drainageway (3) Draw
Runoff class	Low to medium
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to frequent
Ponding frequency	None
Elevation	3,000–6,500 ft

Slope	0–3%
Water table depth	80–200 in
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)	16-17 in
Frost-free period (actual range)	84-123 days
Freeze-free period (actual range)	116-137 days
Precipitation total (actual range)	14-18 in
Frost-free period (average)	103 days
Freeze-free period (average)	128 days
Precipitation total (average)	16 in

Climate stations used

- (1) KIMBALL 2NE [USC00254440], Kimball, NE
- (2) OSHKOSH [USC00256385], Oshkosh, NE
- (3) BRIDGEPORT [USC00251145], Bridgeport, NE
- (4) CHEYENNE [USW00024018], Cheyenne, WY
- (5) HARRISBURG 12WNW [USC00253605], Harrisburg, NE
- (6) CHUGWATER [USC00481730], Chugwater, WY
- (7) OLD FT LARAMIE [USC00486852], Yoder, WY
- (8) PHILLIPS [USC00487200], LaGrange, WY
- (9) WHEATLAND 4 N [USC00489615], Wheatland, WY
- (10) SCOTTSBLUFF HEILIG AP [USW00024028], Scottsbluff, NE

Influencing water features

There are no water features associated with the ecological site.

Soil features

The soils on this site are typically very deep, well drained soils that formed from alluvium. They typically have a

moderately rapid to moderately slow permeability class. The available water capacity is moderate to high. 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 loam but may include silt loam. The surface layer ranges from a depth of 2 to 20 inches thick. The subsoil is typically loam but may include silt loam or clay loam. Soils in this site that are typically leached of free carbonates to a depth of 15 to 40 inches or more; soils that have carbonates at the surface or within 40 inches of the surface correspond to the Haverson soils. These soils are very 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.

Surface soil structure is typically granular, and structure below the surface is subangular blocky or prismatic. 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: Duroc, Goshen, Haverson, and Tripp.

Other soil series that have been correlated to this site: None.

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

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

Figure 8. Duroc loam (depth in feet), Cheyenne County, NE

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Loam (2) Silt loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderately rapid
Soil depth	80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	6–12 in
Calcium carbonate equivalent (0-40in)	0–10%

Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	6.6–8.4
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/time controlled grazing strategies, and historical accounts.

The Loamy Overflow ecological site is characterized by three states: Reference, Sod-bound, and Increased *Bare Ground*. The Reference State is characterized by cool-season rhizomatous midgrasses (western wheatgrass), cool-season bunch midgrasses (needle and thread and green needlegrass), and warm-season bunch tallgrass (big bluestem). Secondary grasses include little bluestem, blue grama, sideoats grama, prairie Junegrass, slender wheatgrass, and alkali (Sandberg) bluegrass. Note: Big bluestem and green needlegrass are found in greater abundance in the 15-17 inch precipitation zone. A minor component of forbs and shrubs are also present, as shown in the species composition list, below. The Sod-bound State is characterized by warm-season shortgrass (blue grama), stoloniferous grass (buffalograss), and grass-likes (threadleaf sedge). The Increased *Bare Ground* State is characterized by remnant blue grama and buffalograss, early successional warm-season and cool-season bunch shortgrass (Fendler threeawn), annual grasses (sixweeks fescue), and forbs (hairy false goldenaster). Annual invasive species include burningbush, Russian thistle, and cheatgrass. Perennial invasive species include Kentucky bluegrass and bindweed.

As this site begins to deteriorate from a combination of frequent and severe grazing during the growing season, bunchgrasses such as needle and thread, green needlegrass, and big bluestem decrease in both frequency and production. Grasses such as blue grama, buffalograss, and threadleaf sedge increase. Under continued frequent and severe defoliation, rhizomatous wheatgrasses also begin to decrease. Key shrubs such as fourwing saltbush and winterfat decrease in frequency and production. American vetch and other highly palatable forbs also decrease. 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 and Kentucky bluegrass 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.

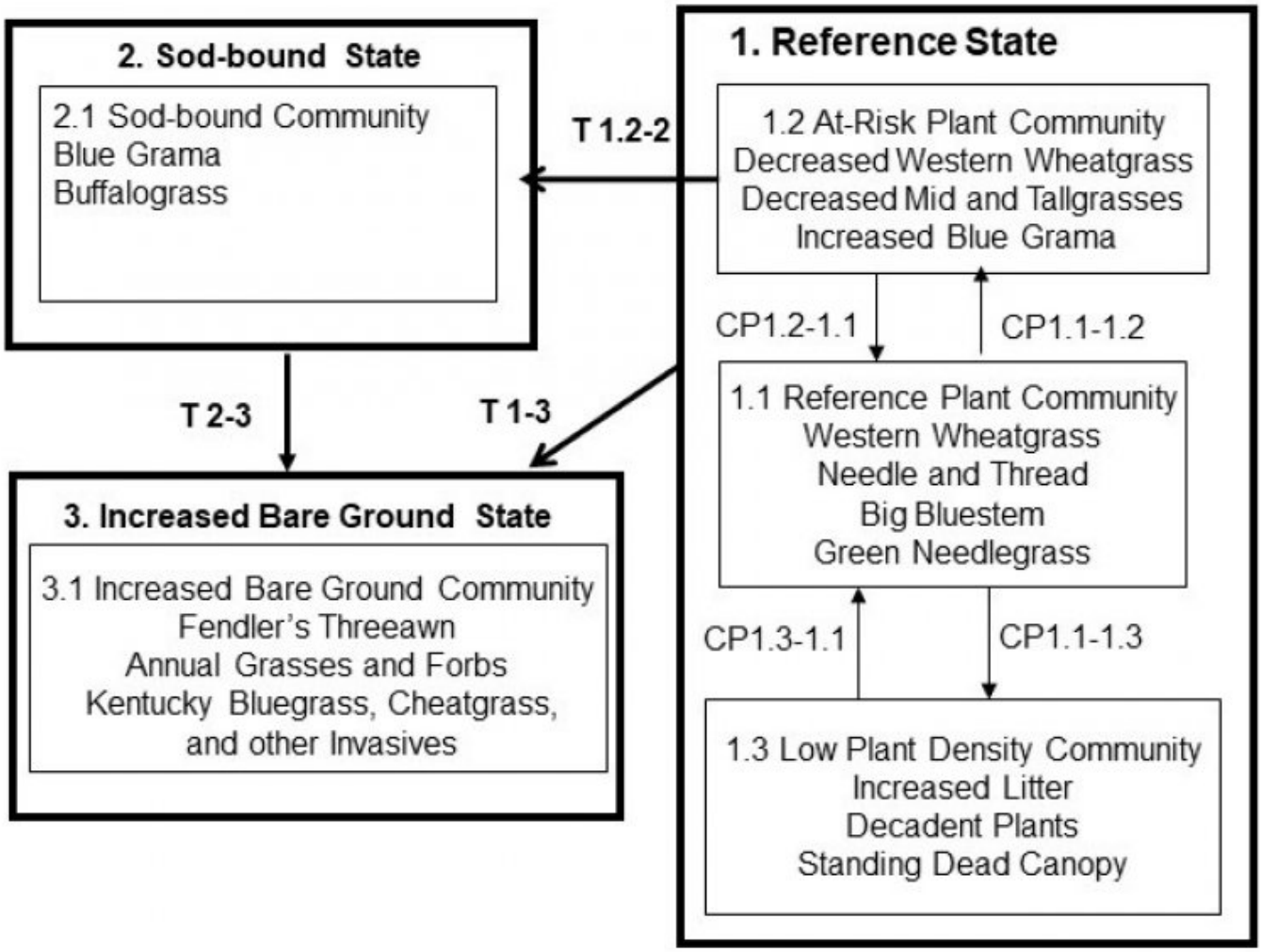
Grazing management, coupled with the effects of annual climatic variations, largely dictates the plant communities for the site.

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

Loamy Overflow 12-17" PZ



CP- Community Pathway
T-Transition
CP1.1-1.2 Continuous grazing and/or frequent defoliation without adequate recovery, extended drought
CP1.2-1.1 Prescribed grazing with adequate recovery and proper stocking
CP1.1-1.3 Non-use, no fire
CP 1.3-1.1 Prescribed grazing with adequate recovery, fire
T1.2-2 Continuous Grazing and/or frequent defoliation without adequate recovery
T1-3 Long-term heavy continuous grazing, and/or excessive defoliation
T2-3 Long-term continuous grazing with over-stocking, and/or excessive defoliation

State 1
Reference

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

- silver sagebrush (*Artemisia cana*), shrub
- fourwing saltbush (*Atriplex canescens*), shrub
- western wheatgrass (*Pascopyrum smithii*), grass
- big bluestem (*Andropogon gerardii*), grass

Community 1.1
Western Wheatgrass and Big Bluestem

This is the interpretive plant community for the Loamy Overflow Ecological Site. This community developed with grazing by large herbivores and is suited to grazing by domestic livestock. Historically, fires likely occurred infrequently, and were randomly distributed. This plant community can be found on areas where grazed plants receive adequate periods of recovery during the growing season. The potential vegetation is about 80 to 95 percent grasses and grass-likes, 5 to 10 percent forbs, and 0 to10 percent woody plants. The plant community is predominately cool-season midgrasses, with a significant component of warm-season midgrasses. A variety of forbs and half-shrubs also occur, as shown in the Species Composition List. Shrubs are not abundant. Plant diversity is high. In the 12 to 14 inch precipitation zone (PZ), the total annual production (air-dry weight) is about 1,800 pounds per acre during an average year, but ranges from about 900 pounds per acre in unfavorable years to about 2,700 pounds per acre in above-average years. In the 15 to 17 inch PZ, the total annual production (air-dry weight) is about 2,000 pounds per acre during an average year, but it can range from about 1,000 pounds per acre in unfavorable years to about 3,000 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

- silver sagebrush (*Artemisia cana*), shrub
- fourwing saltbush (*Atriplex canescens*), shrub
- western wheatgrass (*Pascopyrum smithii*), grass
- big bluestem (*Andropogon gerardii*), grass

Figure 10. 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
Western Wheatgrass and Blue Grama

Western wheatgrass, green needlegrass, and fourwing saltbush have decreased. Big bluestem, switchgrass, Indiangrass, Canada wildrye, and American vetch have been reduced and may be missing from the plant community. Grazing-tolerant species such as blue grama, buffalograss, and threadleaf sedge have increased. Prairie clover species and other palatable forbs such as dotted gayfeather and penstemon are present in reduced amounts. Hairy false goldenaster, scarlet globemallow, Cuman ragweed, and plains pricklypear have increased. In the 12 to 14 inch PZ, the total annual production (air-dry weight) is about 1,400 pounds per acre during an average year, but ranges from about 800 pounds per acre in unfavorable years to about 2,000 pounds per acre in above-

average years. In the 15 to 17 inch PZ, the total annual production (air-dry weight) is about 1,500 pounds per acre during an average year, but ranges from about 900 pounds per acre in unfavorable years to about 2,100 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 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

- silver sagebrush (*Artemisia cana*), shrub
- fourwing saltbush (*Atriplex canescens*), shrub
- western wheatgrass (*Pascopyrum smithii*), grass
- blue grama (*Bouteloua gracilis*), 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

Community 1.3
Western Wheatgrass and Big Bluestem, Low Plant Density

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 such as Canada thistle and leafy spurge, and Dalmatian toadflax 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. Infiltration is reduced and runoff is increased. In advanced stages of non-use or lack of fire, bare areas will increase causing an erosion concern. In the 12 to 14 inch PZ, the total annual production (air-dry weight) is about 1,600 pounds per acre during an average year, but ranges from about 1,000 pounds per acre in unfavorable years to about 2,200 pounds per acre in above-average years. In the 15 to 17 inch PZ, the total annual production (air-dry weight) is about 1,800 pounds per acre during an average year, but ranges from about 1,100 pounds per acre in unfavorable years to about 2,500 pounds per acre in above-average years. 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. Water flow patterns and pedestalling may occur, especially on steeper slopes. Infiltration is reduced and runoff is increased.

Dominant plant species

- silver sagebrush (*Artemisia cana*), shrub
- fourwing saltbush (*Atriplex canescens*), shrub
- western wheatgrass (*Pascopyrum smithii*), grass
- big bluestem (*Andropogon gerardii*), 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

Pathway 1.1A

Community 1.1 to 1.2

Frequent and severe defoliation without adequate recovery between grazing events and lack of fire shift this plant community to the 1.2 Community. 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 to the 1.2 Community. Plant decadence and standing dead plant material impede energy flow. Initially, excess litter increases. 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

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

Conservation practices

Prescribed Burning
Prescribed Grazing

Pathway 1.3A
Community 1.3 to 1.1

The return of grazing with adequate recovery periods and normal fire frequency shift this plant community toward 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

An ecological threshold has been crossed and a significant amount of production and diversity has been lost when compared to the Reference State. Significant biotic and soil changes have negatively impacted energy flow, and nutrient and hydrologic cycles. This is a very stable state, resistant to change due to the high tolerance of blue grama and buffalograss 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

- silver sagebrush (*Artemisia cana*), shrub
- plains pricklypear (*Opuntia polyacantha*), shrub
- blue grama (*Bouteloua gracilis*), grass
- threadleaf sedge (*Carex filifolia*), grass

Community 2.1
Blue Grama and Threadleaf Sedge

The mid and tallgrasses and palatable forbs have been eliminated. The dominant species are blue grama, threadleaf sedge, and buffalograss. These species have developed into a sod-bound condition occurring in localized colonies and exhibiting a mosaic appearance. Purple threeawn has increased. Forbs and shrubs that continue to increase are Cuman ragweed (also known as western ragweed), hairy false goldenaster, scarlet globemallow, and pricklypear. Kentucky bluegrass can invade and become dominant and contribute to the sod-bound condition. Plant diversity is very low. Energy flow and the water and mineral cycles have been negatively affected. Litter levels are very low and unevenly distributed. In the 12 to 14 inch PZ, 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. In the 15 to 17 inch PZ, the total annual production (air-dry weight) is about 1,000 pounds per acre during an average year, but ranges from about 700 pounds per acre in unfavorable years to about 1,300 pounds per acre in above-average years. This plant community is extremely resistant to change. Many plant species are missing and a seed source is not readily available. Also, sod-forming grasses tend to maintain themselves due to their resistance to any further overgrazing. Infiltration rates have greatly decreased. Subsequent increase in runoff typically causes off-site gully erosion.

Dominant plant species

- silver sagebrush (*Artemisia cana*), shrub
- plains pricklypear (*Opuntia polyacantha*), shrub
- blue grama (*Bouteloua gracilis*), grass
- threadleaf sedge (*Carex filifolia*), grass

Figure 13. 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

State 3
Increased Bare Ground

Litter levels are extremely low due to reduced production. Increased bare ground can cause erosion, and off-site runoff and deposition when rainfall events are intense. The nutrient cycle, water cycle, and overall energy flow are greatly impaired. Organic matter and carbon reserves are greatly reduced. An ecological threshold has been crossed.

Dominant plant species

- silver sagebrush (*Artemisia cana*), shrub
- plains pricklypear (*Opuntia polyacantha*), shrub
- Fendler threeawn (*Aristida purpurea var. longiseta*), grass
- sand dropseed (*Sporobolus cryptandrus*), grass

Community 3.1
Purple Threeawn and Sand Dropseed

The plant composition is made of annuals with a few species of perennial forbs and grasses that are very tolerant to frequent and severe defoliation. Purple threeawn is the dominant species with sand dropseed present in lesser amounts. Blue grama and buffalograss may persist in localized areas. Annuals such as sixweeks fescue and cheatgrass have increased or invaded. Introduced annuals such as burningbush, Russian thistle, cocklebur, and sunflower are present. Field bindweed can also be present, especially on prairie dog towns. In the 12 to 14 inch PZ, 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. In the 15 to 17 inch PZ, the total annual production (air-dry weight) is about 1,000 pounds per acre during an average year, but ranges from about 700 pounds per acre in unfavorable years to about 1,300 pounds per acre in above average years.

Dominant plant species

- silver sagebrush (*Artemisia cana*), shrub
- plains pricklypear (*Opuntia polyacantha*), shrub
- Fendler threeawn (*Aristida purpurea var. longiseta*), grass
- sand dropseed (*Sporobolus cryptandrus*), grass

Figure 14. 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

Transition T1A
State 1 to 2

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

Transition T1B
State 1 to 3

Long-term heavy, continuous, grazing and lack of fire shift this plant community across an ecological threshold toward the Increased *Bare Ground* State. Erosion and loss of organic matter and carbon reserves are concerns. Non-native exotic plants are likely to invade.

Transition T2A
State 2 to 3

Long-term, frequent, and severe defoliation without adequate recovery periods, and lack of fire cause a shift across an ecological threshold to the Increased *Bare Ground* State. Erosion and loss of organic matter and carbon reserves are concerns. Annual plants are likely to increase or invade as a result of this transition.

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**12"-14"**			1170–1260	
	western wheatgrass	PASM	*Pascopyrum smithii*	630–720	–
	needle and thread	HECO26	*Hesperostipa comata*	180–270	–
	green needlegrass	NAVI4	*Nassella viridula*	90–270	–
2	**12"-14"**			270–450	
	big bluestem	ANGE	*Andropogon gerardii*	180–270	–
	little bluestem	SCSC	*Schizachyrium scoparium*	90–180	–
3	**12"-14"**			90–180	
	blue grama	BOGR2	*Bouteloua gracilis*	90–180	–
4	**12"-14"**			270–360	
	sideoats grama	BOCU	*Bouteloua curtipendula*	0–100	–
	Indiangrass	SONU2	*Sorghastrum nutans*	0–100	–
	threadleaf sedge	CAFI	*Carex filifolia*	0–90	–

	prairie sandreed	CALO	*Calamovilfa longifolia*	0–90	–
	Canada wildrye	ELCA4	*Elymus canadensis*	0–90	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0–90	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–90	–
	basin wildrye	LECI4	*Leymus cinereus*	0–90	–
	switchgrass	PAVI2	*Panicum virgatum*	0–90	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–90	–
	Grass, perennial	2GP	*Grass, perennial*	0–90	–
	threeawn	ARIST	*Aristida*	0–36	–
7	**15"-17"**			1300–1400	
	western wheatgrass	PASM	*Pascopyrum smithii*	700–800	–
	needle and thread	HECO26	*Hesperostipa comata*	200–300	–
	green needlegrass	NAVI4	*Nassella viridula*	100–300	–
8	**15"-17"**			300–500	
	big bluestem	ANGE	*Andropogon gerardii*	200–300	–
	little bluestem	SCSC	*Schizachyrium scoparium*	100–200	–
9	**15"-17"**			100–200	
	blue grama	BOGR2	*Bouteloua gracilis*	100–200	–
10	**15"-17"**			300–400	
	Grass, perennial	2GP	*Grass, perennial*	0–100	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	0–100	–
	threadleaf sedge	CAFI	*Carex filifolia*	0–100	–
	prairie sandreed	CALO	*Calamovilfa longifolia*	0–100	–
	Canada wildrye	ELCA4	*Elymus canadensis*	0–100	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0–100	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–100	–
	basin wildrye	LECI4	*Leymus cinereus*	0–100	–
	switchgrass	PAVI2	*Panicum virgatum*	0–100	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–100	–
	Indiangrass	SONU2	*Sorghastrum nutans*	0–100	–
	threeawn	ARIST	*Aristida*	0–40	–
Forb					
5	**12"-14"**			90–180	
	Forb, perennial	2FP	*Forb, perennial*	0–90	–
	prairie sagewort	ARFR4	*Artemisia frigida*	0–90	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–36	–
	milkvetch	ASTRA	*Astragalus*	0–36	–
	white prairie clover	DACA7	*Dalea candida*	0–36	–
	purple prairie clover	DAPU5	*Dalea purpurea*	0–36	–
	larkspur	DELPH	*Delphinium*	0–36	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	0–36	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	0–36	–
	dotted blazing star	LIPU	*Liatris punctata*	0–36	–

	desertparsley	LOMAT	*Lomatium*	0–36	–
	Indian breadroot	PEDIO2	*Pediomelum*	0–36	–
	beardtongue	PENST	*Penstemon*	0–36	–
	scurfpea	PSORA2	*Psoralidium*	0–36	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–36	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–36	–
	American vetch	VIAM	*Vicia americana*	0–36	–
	meadow deathcamas	ZIVE	*Zigadenus venenosus*	0–36	–
	textile onion	ALTE	*Allium textile*	0–36	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–36	–
	field sagewort	ARCA12	*Artemisia campestris*	0–36	–
11	**15"-17"**			100–200	
	Forb, perennial	2FP	*Forb, perennial*	0–100	–
	prairie sagewort	ARFR4	*Artemisia frigida*	0–100	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–40	–
	milkvetch	ASTRA	*Astragalus*	0–40	–
	white prairie clover	DACA7	*Dalea candida*	0–40	–
	purple prairie clover	DAPU5	*Dalea purpurea*	0–40	–
	larkspur	DELPH	*Delphinium*	0–40	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	0–40	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	0–40	–
	dotted blazing star	LIPU	*Liatris punctata*	0–40	–
	desertparsley	LOMAT	*Lomatium*	0–40	–
	Indian breadroot	PEDIO2	*Pediomelum*	0–40	–
	beardtongue	PENST	*Penstemon*	0–40	–
	scurfpea	PSORA2	*Psoralidium*	0–40	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–40	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–40	–
	American vetch	VIAM	*Vicia americana*	0–40	–
	meadow deathcamas	ZIVE	*Zigadenus venenosus*	0–40	–
	textile onion	ALTE	*Allium textile*	0–40	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–40	–
	field sagewort	ARCA12	*Artemisia campestris*	0–40	–
Shrub/Vine					
6	**12"-14"**			0–180	
	silver sagebrush	ARCA13	*Artemisia cana*	0–180	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–90	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–90	–
	leadplant	AMCA6	*Amorpha canescens*	0–36	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–36	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–36	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–36	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–36	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–36	–

	prairie rose	ROAR3	*Rosa arkansana*	0–36	–
12	**15"-17"**			0–200	
	silver sagebrush	ARCA13	*Artemisia cana*	0–200	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–100	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–100	–
	leadplant	AMCA6	*Amorpha canescens*	0–40	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–40	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–40	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–40	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–40	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–40	–
	prairie rose	ROAR3	*Rosa arkansana*	0–40	–

Animal community

Wildlife Interpretations:

Reference Plant Community—Western Wheatgrass, Needle and Thread, Big Bluestem, Green Needlegrass:
The predominance of grasses plus high forb diversity in this community favors large grazers such as pronghorn and elk. Suitable thermal and escape cover for mule deer is limited due to low shrub cover. White and black-tailed jackrabbit, badger, and coyote commonly use this community. This community also provides habitat for a wide array of smaller mammals, so diverse prey populations are available for raptors such as ferruginous and Swainson's hawks. Birds such as western kingbird, western meadowlark, lark bunting, and grasshopper sparrow utilize this community for nesting and foraging. This community is especially favorable for ground-nesting birds because of the abundant residual vegetation available in the spring for nesting, escape, and thermal cover.

1.2 Community—Decreased Western Wheatgrass, Decreased Mid and Tallgrasses, Increased Blue Grama:
The reduction in taller grasses in this community results in decreased use by lark buntings and western meadowlarks. Use by long-billed curlew increases, provided there is standing water within one-quarter mile. Killdeer, horned larks, and McCown's longspurs also make significant use of this community. Pronghorn may forage in this community.

1.3 Community – Increased Litter, Decadent Plants, and Standing Dead Canopy:
This community has low habitat value for most wildlife species. Horned larks may nest in this community. Prairie dogs and jackrabbits are frequent users of this community.

2.1 Community—Blue Grama and Buffalograss:
This community provides limited foraging for antelope and other grazers. Ground-nesting birds favoring sparse vegetation may use this community. Long-billed curlews use this community if standing water is present within one-quarter mile.

3.1 Community—Fendler Threeawn, Annual Grasses and Forbs, Kentucky Bluegrass, Cheatgrass, and Other Invasives:

Sparse vegetation and greater amounts of bare ground provide suitable habitat for prairie dogs, horned larks and McCown's longspurs. However, a lack of complex vegetation structure and residual cover makes this community poor habitat in general for most ground-nesting birds and big game species. Burrowing owl may occur here if the community is occupied by prairie dogs. Pronghorn may find limited forage in this community.

Grazing Interpretations:

The following table is a guide to stocking rates for the plant communities described in the Loamy Overflow 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, and a calf up to six months, 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 – (1800) (.49)
1,800 lbs. per acre X 25% Harvest Efficiency = 450 lbs. forage demand for one month. Then, 450 lbs. per acre/912 demand per AUM =.49
Plant Community (PC) Production (lbs.ac), and Stocking Rate (AUM/Acre)

12-14” PZ:
Reference PC - (1800) (0.49)
1.2 PC - (1400) (0.38)
2.1 PC - (900) (0.25)

15-17” PZ:
Reference PC - (2000) (0.55)
1.2 PC - (1500) (0.41)
2.1 PC - (1000) (0.27)

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

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group B and C. Infiltration ranges from 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 is 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 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, hiking, photography, bird watching, and other recreational 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 NRCS 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.

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

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.

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U.S. Dept. of Agriculture. 1997. Soil Survey of Cheyenne County, Nebraska.

U.S. Dept. of Agriculture. 1999. Soil Survey of Garden County, Nebraska.

U.S. Dept. of Agriculture. 2005. Soil Survey of Kimball County, Nebraska.

U.S. Dept. of Agriculture. 1985. Soil Survey of Morrill County, Nebraska.

U.S. Dept. of Agriculture. 1968 Soil Survey of Scotts Bluff County, Nebraska.

U.S. Dept. of Agriculture.2013. Soil Survey of Scotts Bluff National Monument, Nebraska.

U.S. Dept. of Agriculture. 1998. Soil Survey of Sioux County, Nebraska.

U.S. Dept. of Agriculture. 1981. Soil Survey of Goshen County, Northern Part, Wyoming.

U.S. Dept. of Agriculture. 1971. Soil Survey of Goshen County, Southern Part, Wyoming.

U.S. Dept. of Agriculture. 1983. Soil Survey of Laramie County, Eastern Part, Wyoming.

U.S. Dept. of Agriculture. 2001. Soil Survey of Laramie County, Western Part, Wyoming.

U.S. Dept. of Agriculture. 2003. Soil Survey of Platte County, Wyoming.

U.S. Dept. of Agriculture. 1982. Soil Survey of Weld County, Northern Part, Colorado.

For manuscripts of archived soil surveys, see: https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

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Approval

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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, Andy Steinert, Nadine Bishop
Contact for lead author	
Date	11/18/2020
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.

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2. **Presence of water flow patterns:** Typically, none or barely visible. Evidence of water flow may be present after high overland flow events or flooding from adjacent streams, but vegetation normally remains intact.

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3. **Number and height of erosional pedestals or terracettes:** Typically, none.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is typically less than 10 percent, and patches less than 2 inches (5.1 cm) in diameter.

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

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

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7. **Amount of litter movement (describe size and distance expected to travel):** Litter of small and medium size classes will move after above average to high rainfall events. Litter does not travel far, typically being trapped in small bunches by the extensive vegetative cover. Litter movement may be fairly excessive after major runoff or flooding events. Small woody debris may move up to 6 inches (15.25 cm). Fine litter may move up to 12 inches (30.5 cm). Numerous debris dams or vegetative barriers may be present.

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

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The surface layer is 2 to 20 inches (5.1-50.8 cm) thick. Soil surface colors are typically grayish brown (5/2) when dry and very dark grayish brown (3/2) when moist. Haverson soils are pale brown (6/3) and dark brown (3/3) respectively. Soil surface structure is 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 80 to 95 percent perennial grasses and grass-likes, 5 to 10 percent forbs, and 0 to 10 percent shrubs.

    In the 12-14” Precipitation Zone, the grass and grass-like component is made up of cool-season rhizomatous grasses (35-40%), cool-season, bunch grasses (20-40%); warm-season tall grasses (10-15%); warm-season mid-grasses (5-15%); warm-season, short grasses (5-10%); and grass-likes (0-5%).

    In the 15-17” Precipitation Zone, the grass and grass-like component is made up of cool-season, rhizomatous grasses (35-40%), cool-season, bunch grasses (20-40%); warm-season tall grasses (10-20%); warm-season mid-grasses (5-15%); warm-season, short grasses (5-10%); and grass-likes (0-5%).

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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 should not be present 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: 12-14” PZ - Community 1.1:
    1. Native, C3, rhizomatous grasses – 630-720 (35-40%), 1 species minimum

15-17” PZ - Community 1.1:
1. Native, C3, rhizomatous grasses – 700-800 (35-40%), 1 species minimum

Sub-dominant: 12-14” PZ - Community 1.1:
2. Native, C3, bunch grasses – 360-720 #/ac (20-40%), 2 species minimum
3. Native, C4, tall, grasses – 180-270 #/ac (10-15%), 1 species minimum
4. Native, C4, mid-grasses – 90-270 (10-15%), 1 species minimum

15-17” PZ - Community 1.1:
2. Native, C3, bunch grasses – 400-800 #/ac (20-40%), 2 species minimum
3. Native, C4, tall, grasses – 200-400 #/ac (10-20%), 1 species minimum
4. Native, C4, mid-grasses – 100-300 (5-15%), 1 species minimum

Other: 12-14” PZ - Community 1.1:
5. Minor: Native, C4, short grasses – 90-180 (5-10%)
6. Minor: Native, Perennial and Annual Forbs – 90-180 #/ac (5-10%)
7. Minor: Shrubs, Vines, Cacti – 0-180 #/ac (0-10%)
8. Minor: Grass-likes – 0-90 #/ac (0-5%)

15-17” PZ - Community 1.1:
5. Minor: Native, C4, short grasses – 100-200 (5-10%)
6. Minor: Native, Perennial and Annual Forbs – 100-200 #/ac (5-10%)
7. Minor: Shrubs, Vines, Cacti – 0-200 #/ac (0-10%)
8. Minor: Grass-likes – 0-100 #/ac (0-5%)

Additional: 12-14” PZ:
12a. Relative Dominance:
Community 1.1: Native, C3, rhizomatous grasses > Native, C3 bunch grasses > Native, C4, tall grasses = Native, C4, mid-grasses > Native, C4, short grasses = Native, Annual or Perennial Forbs > Shrubs, Cacti, Vines > 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: 5

15-17” PZ:
12a. Relative Dominance:
Community 1.1: Native, C3, rhizomatous grasses > Native, C3 bunch grasses > Native, C4, tall grasses > Native, C4, mid-grasses > Native, C4, short grasses = Native, Annual or Perennial Forbs > Shrubs, Cacti, Vines > 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: 5

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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 60 to 80 percent. Litter depth is expected to be 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):** In the 12-14" precipitation zone, annual production ranges from 900 pounds per acre during unfavorable years to 2,700 pounds per acre in above average years on an air dry basis. Average annual production is 1,800 pounds per acre under normal precipitation and weather conditions.

    In the 15-17" annual production ranges from 1,000 pounds per acre during unfavorable years to 3,000 pounds per acre in above average years on an air dry basis. Average annual production is 2,000 pounds per acre under normal precipitation and weather conditions.

    No significant reduction is expected the growing season following wildfire.

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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:** Leafy spurge, Canada thistle, dalmatian toadflax, Kentucky bluegrass, smooth brome, annual bromes, Russian thistle. Under certain management strategies, curlycup gumweed, green sagewort, and hairy goldaster can dominate the site.

    See:
    Colorado 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.
