USDA Natural Resources Conservation Service

Ecological site R062XA032SD
Channery Loam - North

Accessed: 05/19/2024

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.

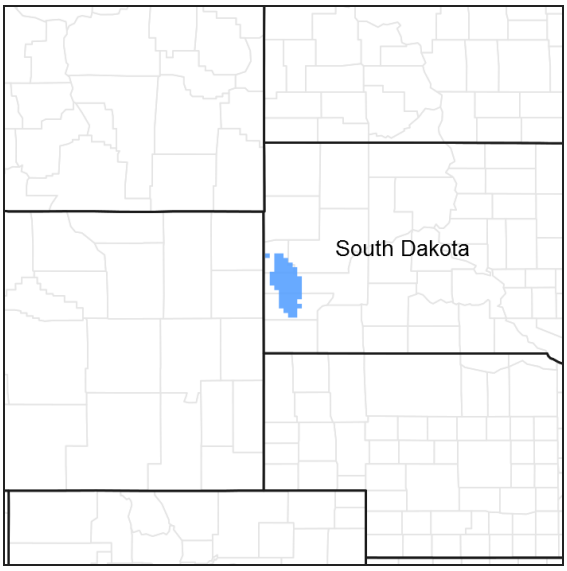

Figure 1. Mapped extent

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): 062X–Black Hills

The Black Hills, MLRA 62, is a unique, low-lying mountain range situated in the midst of a mixed short- to mid-grass prairie. It has geophysical and biological attributes that are unlike the surrounding area. The Black Hills Foothills, MLRA 61, is a transition zone that essentially rings the Black Hills. MLRA 62 is approximately 3,040 square miles in size, 74 percent of which is located in South Dakota and 26 percent in Wyoming.

Classification relationships

Land Resource Region (LRR): G - Western Great Plains Range and Irrigated Region, MLRA: 62 - Black Hills, LRU: A (North) - 22-30 PZ, Central Crystalline, Low Limestone and Siltstone Plateau and Bear Lodge Mountains. The elevation range in LRU-A is 3,800 to 6,200 feet above sea level.
Level IV Ecoregions of Conterminous United States, 2013: 17b Black Hills Plateau.

Ecological site concept

The Channery Loam site, previously referred to as Mountain Prairie range site, is located on upland landscapes in the northern Black Hills Land Resource Unit (LRU) -A. Flat coarse rock fragments (>35%) occur at or near the soil surface, and are mixed throughout the soil profile. The soil is moderately deep, noncalcareous, channery loam that is derived from flat, fragmented schist. The amount of rock in the soil profile tends to make the site droughty. The

typical slope range is 2 to 30 percent. The plant community in Reference, is a mixed grass prairie of warm and cool-season grasses. Little bluestem, sideoats grama, and big bluestem are dominant warm-season species. Western wheatgrass, needleandthread, and Junegrass are the dominant cool-season species. Forbs are diverse and shrubs are common, but never dominant.
Ponderosa pine occurs on adjacent sites, but encroachment does not appear to be a significant problem. Heavy use over time can result in dense clubmoss becoming established and dominating this site.

Associated sites

R062XA010SD	**Loamy - North** The Loamy 62A site can be located adjacent to the Channery Loam site. Loamy sites have deep soils with little or no rock in the soil profile and is more productive.
R062XC010SD	**Loamy - South** The Loamy 62C site can be located adjacent to the Channery Loam site. Loamy sites have deep soils with little or no rock in the soil profile and is more productive.
R062XY043SD	**Valley Loam** The Valley Loam site is commonly associated with the Channery Loam site but has deeper soil, more over flow moisture and greater productivity.

Similar sites

R062XA024SD	**Shallow Loamy - North** The Shallow Loamy 62A has shallow soils. The plant community can look similar but will have lower production and very little if any ground juniper.
R062XC024SD	**Shallow Loamy - South** The Shallow Loamy 62C has shallow soils. The plant community can look very similar but will have lower production and very little if any ground juniper.
R062XY012SD	**Thin Upland** The Thin Upland site has soils that are calcareous to the surface. The plant community can look very similar but with more warm-season grasses, obvious pine encroachment and less production.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Schizachyrium scoparium* (2) *Bouteloua curtipendula*

Physiographic features

This site occurs on gently sloping to steep backslopes, shoulders, and summits in the Black Hills. It can occur on all aspects.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope (2) Ridge
Flooding frequency	None
Ponding frequency	None
Elevation	1,280–1,890 m
Slope	2–40%
Water table depth	203 cm
Aspect	N, E, SW

Climatic features

MLRA 62 is in a microclimate caused by the influence of increased elevation which leads to increased precipitation, moderate air temperature, and lower wind velocities as compared to the surrounding Great Plains. In general, the Black Hills climate is a continental type, cold in the winter and hot in the summer. Annual precipitation in MLRA 62 typically increases with elevation, and decreases from west to east and from north to south. The average annual precipitation range for LRU-A (North) is 22 to 30 inches. Most of the rainfall occurs as frontal storms early in the growing season, in May and June. Some high-intensity, convective thunderstorms occur in July and August. Precipitation in the winter occurs mostly as snow. The annual average snowfall ranges from 23 inches at the lower elevations in the south, to 54 inches at the higher elevations in the central part of MLRA 62. The average annual temperature ranges from 36 to 48 degrees F. January is the coldest month, with an average temperature of 22°F in the central part, and 25°F in the southern part of MLRA 62. July is the warmest month, with an average daily temperature of 67°F in the central part, and 73°F in the southern part of this MLRA. The frost-free period ranges from 129 to 168 days. It is shortest at higher elevations and in the northwestern part of the MLRA. Hourly winds are estimated to average about 11 miles per hour (mph) annually. Growth of cool-season plants begins in April, slowing or ceasing growth by mid-August. Warm-season plants begin growth in May and continue to mid-September. Regrowth of cool-season plants may occur in September and October, depending upon soil moisture availability.

Table 3. Representative climatic features

Frost-free period (average)	107 days
Freeze-free period (average)	130 days
Precipitation total (average)	635 mm

Climate stations used

- (1) MT RUSHMORE NATL MEM [USC00395870], Keystone, SD
- (2) LEAD [USC00394834], Lead, SD
- (3) PACTOLA DAM [USC00396427], Rapid City, SD

Influencing water features

This site occurs on upland or terrace landscapes and is not influenced by extra water from streams or wetlands.

Soil features

The soils on this site are moderately deep and well drained. The surface layer ranges from 6 to 9 inches thick. The surface textures typically are channery loam; in a few areas, they may be very channery loam. Course rock fragments make up 15 to 35 percent of the surface layer and >35 percent below the surface layer. These soils are formed in residuum from schist and are noncalcareous throughout. The slopes range from 2 to 30 percent.

Water erosion is the primary hazard on this site. Erosion normally is minimal on slopes of less than 6 percent, and occurs in the form of sheet and rill erosion when present. On steeper areas, rill erosion is the dominant erosion type. Rills generally are narrow and shallow due to the high content of schist fragments in the soil. On areas of significant disturbance, rills can morph into small, localized gullies that may be up to 2 feet in depth. The high content of schist fragments in the soil act as a retardant to gully erosion. Loss of 50 percent or more of the surface layer of the soils on this site can result in a shift in species composition and/or production. There is a restrictive layer of bedrock (schist) at 20 to 40 inches, which impedes water movement and root penetration.

The only soil currently correlated to this ecological site is Heely.

Access Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/) for specific local soils information

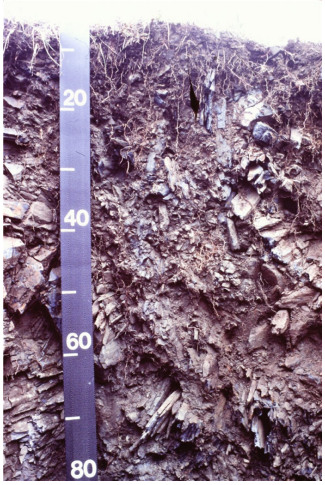

Figure 6. Heely Soil Profile (cm)

Table 4. Representative soil features

Parent material	(1) Residuum–schist
Surface texture	(1) Channery loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Soil depth	51–102 cm
Surface fragment cover <=3"	2–15%
Surface fragment cover >3"	0–2%
Available water capacity (0-101.6cm)	7.62–15.24 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–1
Soil reaction (1:1 water) (0-101.6cm)	5.6–7.3
Subsurface fragment volume <=3" (Depth not specified)	35–75%
Subsurface fragment volume >3" (Depth not specified)	0–25%

Ecological dynamics

Black Hills vegetation types consist of a mixture of forest and grasslands resulting from the varied topography, geology, soils, climate and natural disturbances. Frequent fires, periodic drought, and episodic infestations of mountain pine beetles all contribute to the maintenance of
large, open grasslands scattered throughout the Black Hills. Ponderosa pine is the dominant tree species in the Black Hills. It is a fire-adapted species that coexists with frequent, low-intensity fires that consume small seedlings, prune lower branches from larger trees, and reduce fuel loads.
This site developed under Black Hills climatic conditions with short-term weather variations, light to severe grazing by bison, elk, and small mammals, sporadic natural or man-caused wildfire (often of light intensities), and other biotic and abiotic factors that typically influence soil/site development. The natural fire regime is thought to have helped to maintain this site as a grassland, and the plant communities were free of non-native cool-season grasses.

Grazing, drought and the introduction of non-native cool-season grasses are major drivers that shape this site as well as adjacent ecological sites. It is unclear how critical fire is in maintaining this site as a grassland, but in the absence of fire, some encroachment of ponderosa pine is likely to occur on this site and little bluestem will increase and may become wolfy.

Changes will occur in the plant communities due to short-term weather variations, impacts of native and/or exotic plant and animal species, severe disturbances such as periods of well-below average precipitation, severe defoliation, soil erosion, and no fire and no use. The Channery Loam site can also occur on a wide range of slopes and aspects. The steeper slopes, greater than 20 percent, will tend to have lower total annual production than the slopes of less than 20 percent. The plant communities on the shallower slopes may have slightly more cool-season grasses than those on the steeper slopes. Northern and eastern aspects also may produce a slightly higher percentage of cool-season grasses than south- and west-facing slopes.

The following diagram illustrates the common plant community phases that can occur on the site and the transition pathways between communities. These are the most common plant community phases based on current knowledge and experience, and changes will be made as more data is collected. Narratives following the diagram contain more detail pertaining to the ecological processes.

State and transition model

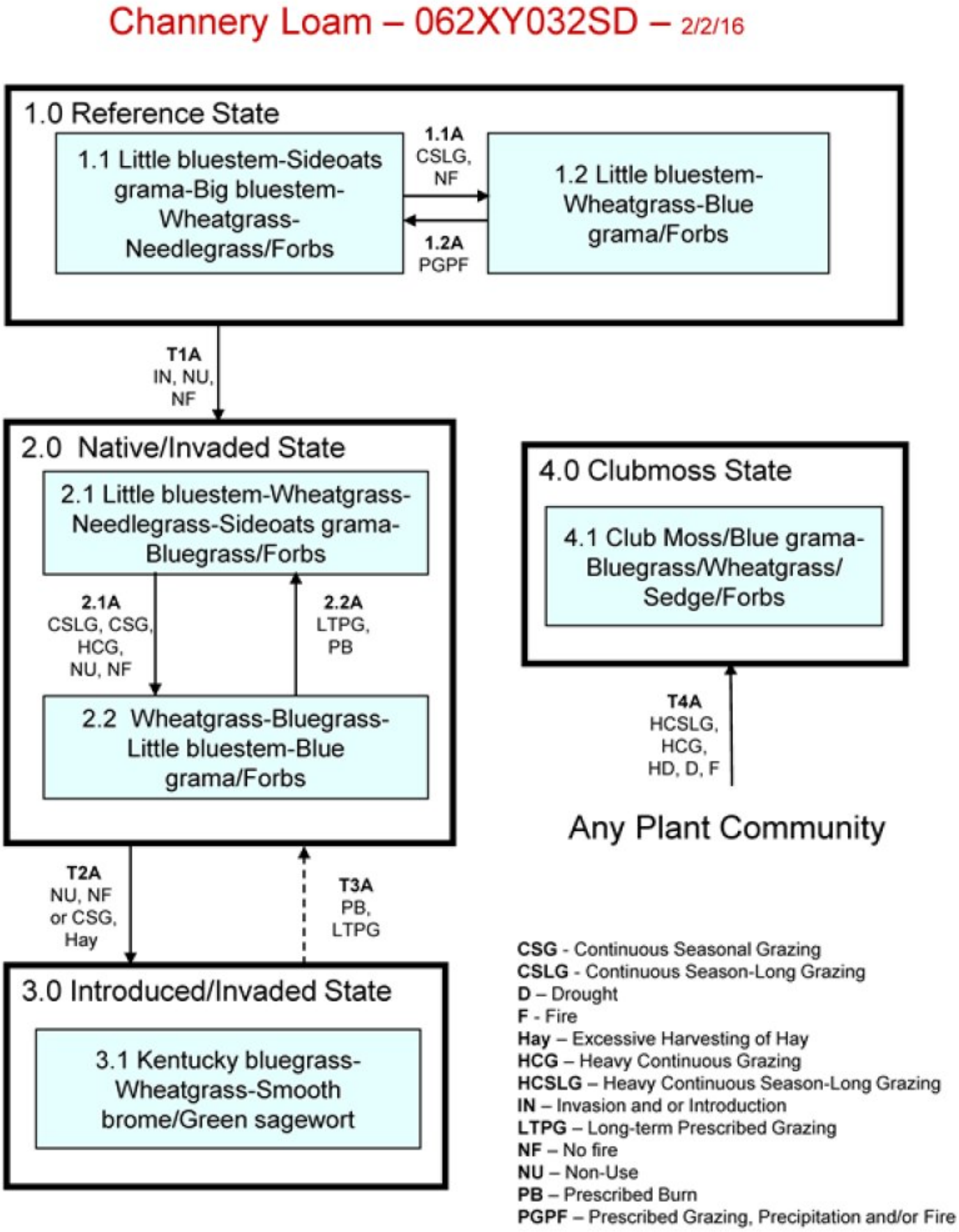

Figure 7. Channery Loam - 062XY032SD

Diagram Legend - Channery Loam - 062XY032SD

T1A	Introduction or invasion of non-native cool-season grasses, no use, no fire
T2A	No use, no fire, or continuous early season grazing, and/or excessive haying
T3A	Prescribed burning, long-term prescribed grazing. May take an extended period of time and may not meet management objectives
T4A	Heavy continuous season-long grazing, heavy continuous grazing, heavy disturbance, drought, fire

CP 1.1A	1.1 - 1.2	Continuous season-long grazing, no fire
CP 1.2A	1.2 - 1.1	Prescribed grazing, normal precipitation following drought and/or fire
CP 2.1A	2.1 - 2.2	Continuous season-long grazing, continuous seasonal grazing, heavy continuous grazing, or no use, no fire
CP 2.2A	2.2 - 2.1	Long-term prescribed grazing, and possibly prescribed burn followed by prescribed grazing

Figure 8. Channery Loam - 062XY032SD

State 1
Reference State

This state represents what is believed to represent the natural range of variability that dominated the dynamics in this ecological site prior to European settlement. This site is dominated by warm-season grasses. Cool-season grasses are sub-dominant. In pre-European times the primary disturbances included fire, insects and grazing by large ungulates and small mammals. Favorable growing conditions occurred during the spring, and warm months of June through August. Routine and/or occasional fires, remove tree cover and contributed to the ecological processes that maintained the reference plant community. Today a similar state can be found in areas where proper livestock use has occurred and where non-native cool-season grasses have not become well established in the plant communities.

Community 1.1
Little bluestem-Sideoats grama-Big bluestem-Wheatgrass-Needlegrass

Figure 9. Channery Loam - PCP 1.1

Interpretations are based primarily on the Little bluestem-Sideoats grama-Big bluestem-Wheatgrass-Needlegrass/Forb plant community phase. This is also considered to be the Reference or historic plant community. The potential vegetation is about 80 percent grass and grass- like plants, 15 percent forbs, 5 percent shrubs, and 0 to 1 percent trees. Total annual production for a normal growing year is approximately 2,100 lbs./Ac. The community is dominated by warm-season grasses including little bluestem, sideoats grama, big bluestem, and blue and hairy grama. Cool-season grasses and grass-like plants include western and bearded wheatgrass, needleandthread, prairie junegrass, and threadleaf sedge. Forbs are common and diverse. Shrub include prairie rose, leadplant, and fringed sagewort. Conifers may be present, but in very small amounts. This plant community is

productive and resilient to disturbances such as drought and fire. It is a sustainable plant community in regard to soil/site stability, watershed function, and biological integrity.

Community 1.2
Little bluestem-Wheatgrass-Blue grama

This plant community phase is the result of continuous season-long grazing without adequate recovery period and no fire. The potential vegetation is about 80 percent grass and grass-like plants, 15 percent forbs, 5 percent shrubs, and 0 to 1 percent trees. Total annual production for a normal growing year is approximately 1,800 lbs./Ac. The community is dominated by little bluestem, blue and hairy grama, and plains muhly. Cool-season grasses and grass-like plants include western and bearded wheatgrass, prairie junegrass, and threadleaf sedge. Forbs are common and diverse, and shrubs include prairie rose and fringed sagewort. This plant community is productive and resilient to disturbances such as drought and fire. It is a sustainable plant community in regard to soil/site stability, watershed function, and biological integrity.

Pathway 1.1A
Community 1.1 to 1.2

Continuous season-long grazing without adequate recovery periods and no fire will cause an increase in little bluestem and short-grass species and upland sedge. Sideoats grama, big bluestem, and needle grasses will decrease but little bluestem and wheatgrasses will persist in the plant community. Lack of fire may also allow conifers to become established, but in relatively small amounts.

Pathway 1.2A
Community 1.2 to 1.1

Prescribed grazing that provides recovery periods after grazing, along with normal precipitation and periodic fire, will allow this plant community to return to the Reference plant community.

State 2
Native/Invaded State

This state represents what is most typically found on this site. It is the result of either the introduction or invasion of Kentucky bluegrass or smooth brome, or no use, or no fire. The natural range of variability is influenced by the presence of non-native cool-season grasses, especially Kentucky bluegrass that can dominate the dynamics of this ecological site. Proper grazing management and periodic burning will maintain the productivity of this state, and it can look very similar to the Reference State. Heavy grazing without adequate recovery, extended periods of drought, or non-use and no fire can put this state at risk of crossing a threshold.

Community 2.1
Little bluestem-Wheatgrass-Needlegrass-Sideoats grama-Bluegrass/Forbs

This plant community phase closely resembles the PCP 1.1; however, non-native cool-season grasses have invaded the site and will persist in the plant community under the current Black Hills climatic conditions. The potential vegetation is about 80 percent grass and grass-like plants, 15 percent forbs, 5 percent shrubs, and 0 to 1 percent trees. Total annual production for a normal growing year is approximately 2,000 lbs./Ac. The community is a mix of warm- and cool-season grasses. The dominant warm-season grasses include little bluestem, sideoats grama, and blue grama. The dominant cool-season grasses include western and bearded wheatgrass, and needleandthread. Kentucky bluegrass and/or other non-native cool-season grasses can make up 2 to 5 percent of the plant community. Forbs are common and diverse. Shrubs include wild rose, leadplant, and fringed sagewort. This plant community is productive and resilient to disturbances such as drought and fire. It is a sustainable plant community in regard to soil/site stability, watershed function, and biological integrity. Management strategies must include techniques that will not cause Kentucky bluegrass and other non-native cool-season grasses to increase significantly, as this could put the plant community at risk of transition to the Introduced/Invaded State (3.0).

Community 2.2
Wheatgrass-Bluegrass-Little bluestem-Blue grama/Forbs

Figure 10. Channery Loam - PCP 2.2

This plant community developed under continuous season-long grazing, continuous seasonal grazing with no change in season of use, heavy continuous grazing, or no use and no fire. This plant community phase is made up of approximately 85 percent grass and grass-like plants, 10 percent forbs, 5 percent shrubs, and 0 to 1 percent trees. The community is dominated by cool-season grasses, with most of the warm-season grass components replaced by Kentucky bluegrass and other non-native cool-season grasses. The dominant cool-season grasses include western and bearded wheatgrass. Kentucky bluegrass or other non-native cool-season grasses can make up 10 to 25 percent of the plant community. Production can be variable, but will typically be less than the PCP 2.1. The period when palatability is high is relatively shorter, as Kentucky bluegrass matures rapidly. This plant community is at risk of crossing a threshold to the Introduced State.

Pathway 2.1A
Community 2.1 to 2.2

Continuous season-long grazing or continuous seasonal grazing occurring at the same time every year, or heavy continuous grazing, and/or no use will cause an increase in non-native cool-season grasses moving this plant community to PCP 2.2.

Pathway 2.2A
Community 2.2 to 2.1

Long-term prescribed grazing that provided adequate recovery and change in season of use, along with normal precipitation regime and prescribed burning may reduce the percentage of non-native cool-season grasses in PCP 2.2 and restore the warm-season grass component typical of PCP 2.1.

State 3
Introduced/Invaded State

This state is the result no use, no fire, or heavy continuous grazing and/or excessive haying, which has allowed Kentucky bluegrass and other non-native cool-season grasses to dominate the site. No use and no fire has caused an excessive thatch layer to develop. Plant litter accumulation tends to favor the more shade-tolerant introduced grass species. The nutrient cycle also is impaired, and the result typically is a higher level of nitrogen which also favors the introduced species. Hydrological function also is impaired as the dense root mats created by Kentucky bluegrass reduces water infiltration. Kentucky bluegrass is very resistant to overgrazing and will expand under heavy continuous grazing and out-compete other native species that are not as adapted to overgrazing.

Community 3.1
Kentucky bluegrass-Wheatgrass-Smooth brome/Green sagewort

Figure 11. Channery Loam - PCP 3.1

This plant community is dominated by Kentucky bluegrass and/or other non-native cool-season grasses (30 percent or more of the PC). This plant community developed under no use and no fire or with heavy continuous grazing. This plant community is made up of approximately 85 percent grasses and grass-like species, 15 percent forbs, and 0-1 percent shrubs. Dominant grasses include Kentucky bluegrass, and smooth brome. Western wheatgrass some needlegrass and blue grama may still be found in the plant community. Forbs commonly found in this plant community include green sagewort and fringed sagewort. Production will be significantly reduced when compared to the interpretive plant community. The period when palatability is high is relatively short, as Kentucky bluegrass matures rapidly. Runoff is high and biological activity in the soil is likely reduced significantly in this phase.

State 4
Clubmoss State

A dense sod of clubmoss dominates this plant community. Clubmoss occupies bare soil areas within deteriorated or disturbed plant communities due to long-term repeated disturbances: its cover is often 25% or greater. Clubmoss alters the normal hydrologic function of this site and creates a more arid microclimate, resulting in extreme competition for available moisture. Vigor and productivity of other native grass species are dramatically reduced. A restoration or transition pathway from this State to another is unlikely, except on small areas where channers are deeper in the profile. Most areas contain exposed schist channers, and the use of mechanical treatment to break up the clubmoss may not be practical or economical. Herbicides and/or intense short-term hoof action may be effective in reducing clubmoss in the plant community, but the results may be mixed and not meet management goals in the end.

Community 4.1
Club Moss/Blue grama- Bluegrass/Wheatgrass/Sedge/Forbs

Figure 12. Channery Loam - PCP 4.1

Figure 13. Channery Loam - PCP 4.1 - Clubmoss Roots

This plant community is the results of heavy continuous season-long grazing, heavy continuous grazing and/or extended periods of drought. It can transition from any state. The plant community is dominated by dense clubmoss and blue grama however some cool-season grasses and grass-like species, forbs and shrubs will still exist in the plant community. Because of the infiltration is greatly reduced grasses and forbs will lack vigor and production. Cool-season grasses including western wheatgrass, needleandthread, prairie junegrass, bottle-brush squirreltail, threadleaf sedge and bluegrass. Forbs will be common and diverse and include green sagewort and fringed sagewort. This plant community is very resistant to change. The competitive advantage of both the clubmoss and the blue grama prevents other species from expanding and establishing. Initially runoff rates are low but then increase as clubmoss becomes saturated.

Transition 1A
State 1 to 2

Introduction or invasion of non-native cool-season species, or no use and/or no fire will cause a transition from the Reference State to the Native/Invaded State (2.0).

Transition 4A
State 1 to 4

Heavy, continuous, season-long grazing, heavy continuous grazing, heavy disturbance, and/or extended periods of drought can cause this plant community to transition to a Clubmoss State (4.0). This transition can occur from any state.

Transition 2A
State 2 to 3

No use, no fire or heavy continuous grazing and/or excessive haying will cause the Kentucky bluegrass or other non-native cool-season grasses to become dominant in the plant community. Preliminary studies indicate this threshold may exist when Kentucky bluegrass exceeds 30% of the plant community, and native grasses represent less than 40% of the plant community composition. Plant communities dominated by Kentucky bluegrass have significantly less cover and diversity of native grasses and forb species. (Toledo, D. et al., 2014). This transition is most likely going to occur from PCP 2.2.

Transition 4A
State 2 to 4

Heavy continuous season-long grazing, heavy continuous grazing, heavy disturbance, and/or extended periods of drought can cause this plant community to transition to a Clubmoss State (4.0). This transition can occur from any State.

Transition 3A

State 3 to 2

Early-season prescribed burning followed by long term prescribed grazing to promote establishment of native species may be effective in moving this plant community to the Native/Invaded State (2.0), but it could take years and may not meet management goals. Chemical and/or mechanical treatment followed by seeding of native species may be possible in some areas where channers are deeper in the soil profile. This could accelerate the reestablishment of structural functional groups similar to those in State 2.0; however, the resulting plant community may not achieve management goals. Both of these pathway can take many years and may not be successful in the end.

Transition 4A
State 3 to 4

Heavy, continuous season-long grazing, heavy continuous grazing, heavy disturbance, and/or extended periods of drought can cause this plant community to transition to a Clubmoss State (4.0). This transition can occur from any state.

Additional community tables

Other information

Revision Notes:
This PROVISIONAL ecological site concept has been QCd to ensure that the site meets the NESH standards for a provisional ecological site that provides basic compiled information in one location. This site should not be considered an Approved ESD, as it is only the foundational site concepts and requires further data collection—specifically high-intensity data characterizations and full 232 soil descriptions—and further site investigations and final STM reviews before it can be used as an Approved ESD meeting NESH standards. This site was previously referred to as Mountain Prairie in MLRA 62.

Site Development and Testing Plan:
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-, medium-, and high-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.
Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

Inventory data references

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range-trained personnel were also used. Those involved in developing this site include: Stan Boltz, Range Management Specialist, NRCS; Lakhdar Benkobi, ESI/SRIC, NRCS; Dan Brady, Soil Scientist, NRCS; Rick Peterson, Ecological Site Specialist, NRCS; Jim Westerman, Soil Scientist, NRCS.

Other references

High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-072. (http://www.hprcc.unl.edu/)

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Contributors

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Rangeland health reference sheet

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

Author(s)/participant(s)	
Contact for lead author	
Date	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

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

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

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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

14. **Average percent litter cover (%) and depth (in):**

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

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

17. **Perennial plant reproductive capability:**