USDA Natural Resources Conservation Service

Ecological site R064XY037NE
Thin Upland

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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.

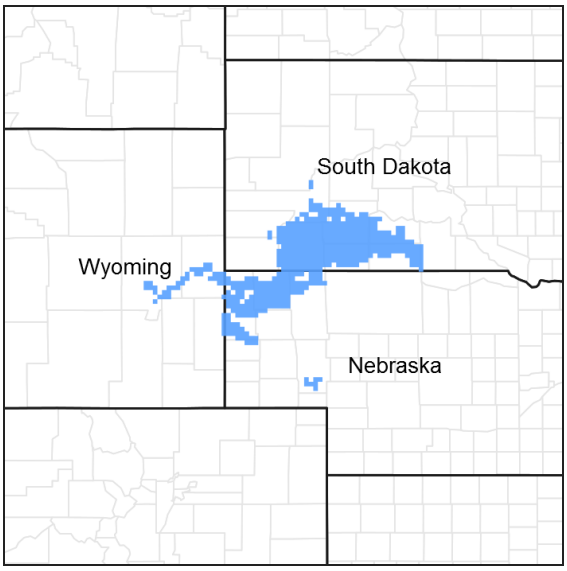


Figure 1. Mapped extent

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.

Classification relationships

Level IV Ecoregions of the Conterminous United States: 25a – Pine Ridge Escarpment, 43h – White River Badlands, and 43i – Keya Paha Tablelands.

Associated sites

R064XY011NE	**Sandy 14-17" PZ**
R064XY014NE	**Clayey 14-17" PZ**
GX064X01X015	**Loamy 14-17" PZ**
R064XY032NE	**Sandy 17-20" PZ**
R064XY035NE	**Clayey 17-20 PZ**
GX064X01X036	**Loamy 17-20" PZ**
R064XY040NE	**Shallow**

Similar sites

R064XY040NE	**Shallow** [Less little bluestem; slightly lower production; soils shallow to rock, gravel or other root restrictive layer (20 inches or less).]

Table 1. Dominant plant species

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

Physiographic features

This site generally occurs on steep shoulders or backslopes of hills and plains.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Plain (3) Knoll
Flooding frequency	None
Ponding frequency	None
Elevation	884–1,219 m
Slope	0–40%
Aspect	Aspect is not a significant factor

Climatic features

MLRA 64 is considered to have a continental climate – cold winters and hot summers, low humidity, light rainfall, and much sunshine. Extremes in temperature may also abound. The climate is the result of this MLRA's location near the geographic center of North America. There are few natural barriers on the northern Great Plains and air masses move freely across the plains and account for rapid changes in temperature.

Annual precipitation ranges from 14 to 20 inches per year. The normal average annual temperature is about 47° F. January is the coldest month with average temperatures ranging from about 21° F (Wood, SD) to about 25° F (Hemingford, NE). July is the warmest month with temperatures averaging from about 70° F (Keeline 3 W, WY) to about 76° F (Wood, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 55° F. This large annual range attests to the continental nature of this area's climate. Hourly winds average about 11 miles per hour annually, ranging from about 13 miles per hour during the spring to about 10 miles per hour during the summer. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 miles per hour.

Growth of cool season plants begins in early to mid March, slowing or ceasing in late June. Warm season plants begin growth about mid May and continue to early or mid September. Green up of cool season plants may occur in September and October when adequate soil moisture is present.

Table 3. Representative climatic features

Frost-free period (average)	143 days
Freeze-free period (average)	163 days
Precipitation total (average)	508 mm

Influencing water features

No riparian areas or wetland features are directly associated with this site.

Soil features

The features common to soils in this site are the very fine sandy loam to silty clay loam textured surface layers and slopes of 0 to 40 percent. The soils in this site are well to somewhat excessively drained and formed in soft siltstone or loamy alluvium and residuum. The surface layer is 2 to 11 inches thick. The texture of the subsurface layers ranges from very fine sandy loam to silty clay loam. The soils have a moderate infiltration rate. These soils are typically calcareous at or near the surface; however, carbonates are not always distinguishable in the upper layers. The soil profile should show evidence of weak development (i.e., thin A horizon, pale colors, lack of argillic horizon). This site should show slight to no evidence of rills, wind scoured areas or pedestalled plants. Water flow paths are broken, irregular in appearance or discontinuous with numerous debris dams or vegetative barriers. The soil surface is stable and intact.

These soils are susceptible to wind and water erosion. The hazard of water erosion increases on slopes greater than about 15 percent. 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.

More information can be found in the various soil survey reports. Contact the local USDA Service Center for soil survey reports that include more detail specific to your location.

Table 4. Representative soil features

Surface texture	(1) Silt loam (2) Silty clay loam (3) Very fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderately slow to moderate
Soil depth	51–203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	12.7–20.32 cm
Calcium carbonate equivalent (0-101.6cm)	0–45%
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–13
Soil reaction (1:1 water) (0-101.6cm)	7.4–9
Subsurface fragment volume <=3" (Depth not specified)	0–20%
Subsurface fragment volume >3" (Depth not specified)	0–10%

Ecological dynamics

This site developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfire (often of light intensities), and other biotic and abiotic factors that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts of native and/or exotic plant and animal species, and management actions. While the following

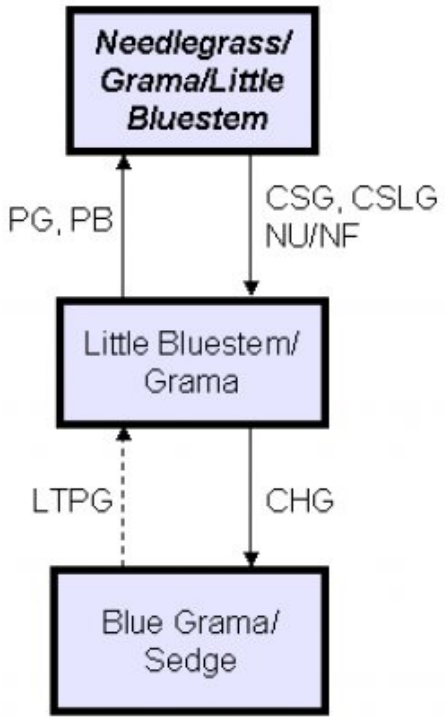
plant community descriptions describe more typical transitions between communities that will occur, severe disturbances, such as periods of well-below average precipitation, can cause significant shifts in plant communities and/or species composition. Encroachment of ponderosa pine, Rocky Mountain juniper and eastern redcedar may occur from associated sites, and can shift site characteristics. These shifts can alter the site dynamics and potential. These species may occur in small amounts on several plant communities.

Continuous season-long grazing (during the typical growing season of May through October) and/or repeated seasonal grazing (e.g., every spring, every summer) without adequate recovery periods following each grazing occurrence causes this site to depart from the Needlegrass/Grama/Little Bluestem Plant Community.

Interpretations are primarily based on the Needlegrass/Grama/Little Bluestem Plant Community. It has been determined by study of rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts also have been used. Plant communities, states, transitional pathways, and thresholds have been determined through similar studies and experience.

The following is a diagram that illustrates the common plant communities that can occur on the site and the transition pathways between communities. The ecological processes will be discussed in more detail in the plant community descriptions following the diagram.

State and transition model



CSG - Continuous seasonal grazing (grazing a unit for an entire portion of a growing season, and the same season every year); **CSLG** - Continuous season-long grazing (grazing a unit for an entire growing season); **CHG** – Continuous heavy grazing (heavy levels of grazing of a unit during most or all of the growing season); **LTPG** - Long-term prescribed grazing; **NU/NF** - Extended period of non-use & no fire; **PB** - Prescribed burning followed by prescribed grazing; **PG** - Prescribed grazing (planned, controlled harvest of vegetation with grazing or browsing animals – see FOTG, Section IV, 528).

State 1
Needlegrass/Grama/Little Bluestem

Community 1.1
Needlegrass/Grama/Little Bluestem

Interpretations are based primarily on the Needlegrass/Grama/Little Bluestem Plant Community (this is also considered to be climax). This plant community can be found on areas that are properly managed with grazing and/or prescribed burning, and sometimes on areas receiving occasional short periods of rest. The potential vegetation is about 75% grasses or grass-like plants, 15% forbs, and 10% shrubs. The plant community is dominated by a mixture of cool and warm season grasses. The major grasses include little bluestem, needleandthread, sideoats grama and blue grama. Other grasses and grass-likes occurring include sedge, western wheatgrass, green needlegrass and prairie junegrass. Significant forbs include purple coneflower, dotted gayfeather and prairie clover. Significant shrubs found in this plant community include fringed sagewort, rose and yucca. Refer to the plant community composition and group annual production table for species composition and production. This plant community is extremely resilient and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allows for high drought tolerance. Community dynamics, nutrient cycle, water cycle and energy flow are functioning properly. Plant litter is properly distributed with very little movement off-site and natural plant mortality is very low. The diversity in plant species allows for high drought tolerance.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1154	1664	2146
Forb	95	202	336
Shrub/Vine	95	151	207
Total	**1344**	**2017**	**2689**

Figure 5. Plant community growth curve (percent production by month). NE6404, Pine Ridge/Badlands, warm-season dominant, cool-season sub-dominant. Warm-season dominant, cool-season sub-dominant.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		5	8	15	24	23	15	5	5		

State 2
Little Bluestem/ Grama

State 3
Blue Grama/ Sedge

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Little Bluestem**			202–605	
	little bluestem	SCSC	*Schizachyrium scoparium*	202–605	–
2	**Sideoats Grama**			101–404	
	sideoats grama	BOCU	*Bouteloua curtipendula*	101–404	–
3	**Needlegrass**			202–303	
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	202–303	–
	porcupinegrass	HESP11	*Hesperostipa spartea*	0–101	–
	green needlegrass	NAVI4	*Nassella viridula*	0–101	–

4	**Short Warm-Season**			202–404	
	blue grama	BOGR2	*Bouteloua gracilis*	202–404	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	0–101	–
5	**Native Grasses and Grass-likes**			202–504	
	western wheatgrass	PASM	*Pascopyrum smithii*	101–303	–
	big bluestem	ANGE	*Andropogon gerardii*	0–202	–
	sedge	CAREX	*Carex*	101–202	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	20–101	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–61	–
	Grass, perennial	2GP	*Grass, perennial*	0–61	–
Forb					
6	**Forbs**			101–303	
	blacksamson echinacea	ECAN2	*Echinacea angustifolia*	40–202	–
	dotted blazing star	LIPU	*Liatris punctata*	40–101	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	20–101	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	20–101	–
	tarragon	ARDR4	*Artemisia dracunculus*	0–101	–
	milkvetch	ASTRA	*Astragalus*	20–101	–
	false boneset	BREU	*Brickellia eupatorioides*	0–101	–
	prairie clover	DALEA	*Dalea*	20–101	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	20–81	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	20–61	–
	spiny phlox	PHHO	*Phlox hoodii*	0–40	–
	white heath aster	SYER	*Symphyotrichum ericoides*	0–40	–
	pussytoes	ANTEN	*Antennaria*	0–40	–
	Forb, perennial	2FP	*Forb, perennial*	0–40	–
	buttecandle	CRCE	*Cryptantha celosioides*	0–40	–
Shrub/Vine					
7	**Shrubs**			101–202	
	leadplant	AMCA6	*Amorpha canescens*	0–101	–
	prairie sagewort	ARFR4	*Artemisia frigida*	40–101	–
	rose	ROSA5	*Rosa*	0–101	–
	soapweed yucca	YUGL	*Yucca glauca*	0–101	–
	Subshrub (<.5m)	2SUBS	*Subshrub (<.5m)*	0–61	–
	dwarf false indigo	AMNA	*Amorpha nana*	0–40	–
	Nuttall's sensitive-briar	MINU6	*Mimosa nuttallii*	20–40	–
	skunkbush sumac	RHTR	*Rhus trilobata*	0–40	–

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 moderately slow to moderate. Runoff potential for this site varies from medium to very high depending on soil hydrologic group, slope and ground cover. In many cases, areas with greater than 75% ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where short grasses form a strong sod and dominate the site. Areas where ground cover is less than 50% have the

greatest potential to have reduced infiltration and higher runoff (refer to Part 630, NRCS National Engineering Handbook).

Recreational uses

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

Wood products

No appreciable wood products are present on the site.

Other products

Seed harvest of native plant species can provide additional income on this site.

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; Jill Epley, Range Management Specialist, NRCS; Rick Peterson, Range Management Specialist, NRCS; David Steffen, Range Management Specialist, NRCS; Jeff Vander Wilt; Range Management Specialist, NRCS; Phil Young, Soil Scientist, NRCS.
Data Source Number of Records Sample Period State County
SCS-RANGE-417 5 1968 – 1974 NE, SD Dawes, Mellette, Sheridan

Other references

High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-0728. (http://hpccsun.unl.edu)
USDA, NRCS. National Water and Climate Center, 101 SW Main, Suite 1600, Portland, OR 97204-3224. (http://wcc.nrcs.usda.gov)
USDA, NRCS. National Range and Pasture Handbook, September 1997
USDA, NRCS. National Soil Information System, Information Technology Center, 2150 Centre Avenue, Building A, Fort Collins, CO 80526. (http://nasis.nrcs.usda.gov)
USDA, NRCS. 2001. The PLANTS Database, Version 3.1 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
USDA, NRCS, Various Published Soil Surveys.

Contributors

SCB

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.

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Date	01/05/2010
Approved by	Stan Boltz

Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Slight to none, typically on steeper slopes and discontinuous.

2. **Presence of water flow patterns:** None, or barely visible and discontinuous with numerous debris dams when present.

3. **Number and height of erosional pedestals or terracettes:** Few pedastalled plants typically on steeper slopes.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 0 to 10 percent is typical.

5. **Number of gullies and erosion associated with gullies:** None should be present.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None.

7. **Amount of litter movement (describe size and distance expected to travel):** Small size litter classes will generally move short distances, some medium size class litter will move very short distances. Litter debris dams are occasionally present.

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 fragments will typically retain structure indefinitely when dipped in distilled water.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A-horizon should be 2 to 6 inches thick with light to dark brownish gray colors. Structure should typically be fine granular at least in the upper A-horizon. Some soils have subangular blocky structure parting to weak fine granular.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Combination of shallow and deep rooted species (mid & tall rhizomatous and tufted perennial cool- and warm-season grasses) with fine and coarse roots positively influences infiltration.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None – when dry, subsoil can be hard and appear to be compacted, but no platy structure will be present.

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: Mid warm-season grasses >>

    Sub-dominant: Short warm-season grasses > Mid/tall cool-season bunchgrasses = Mid cool-season rhizomatous = Forbs >

    Other: Shrubs = Tall warm-season rhizomatous grasses = Grass-likes > Short cool-season grasses

    Additional:

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 and shrubs are vigorous.

14. **Average percent litter cover (%) and depth (in):** Litter cover typically 50 to 70 percent, with depth about 0.25 inches.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Total annual production ranges from 1,200 to 2,900 pounds/acre, with the reference value being 1,800 pounds/acre (air-dry basis).

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:** State and local noxious weeds.

17. **Perennial plant reproductive capability:** All species exhibit high vigor relative to climatic conditions. Do not rate based solely on seed production. Perennial grasses should have vigorous rhizomes or tillers.