

Ecological site R064XY047NE Very Shallow

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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.

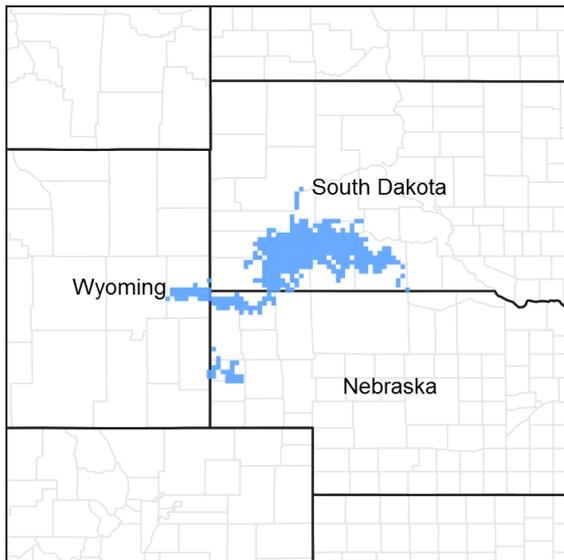


Figure 1. Mapped extent

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

R064XY014NE	Clayey 14-17" PZ
R064XY035NE	Clayey 17-20 PZ
R064XY039NE	Shallow Clay
R064XY040NE	Shallow

Similar sites

R064XY040NE	Shallow [Less needleandthread; more big and little bluestem; higher production.]
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Table 1. Dominant plant species

Tree	Not specified
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Shrub	Not specified
Herbaceous	(1) <i>Bouteloua curtipendula</i>

Physiographic features

This site typically occurs on gently to steeply sloping uplands.

Table 2. Representative physiographic features

Landforms	(1) Stream terrace (2) Knoll (3) Ridge
Flooding frequency	None
Ponding frequency	None
Elevation	2,900–4,000 ft
Slope	2–40%
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)	20 in

Influencing water features

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

Soil features

The common features of soils in this site are the gravelly sand to gravelly clay loam textured subsoils and slopes of 2 to 40 percent. The soils in this site are well drained and formed in soft siltstone, sandstone, porcelanite or alluvium. The gravelly loam surface layer is 4 to 8 inches thick. The soils have a moderate infiltration rate. 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. Sub-surface soil layers are restrictive to water movement and root penetration.

These soils are mainly susceptible to water erosion. The hazard of water erosion increases on slopes greater than about 15 percent. Low available water capacity caused by the shallow rooting depth strongly influences the soil-water-plant relationship.

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) Gravelly loam (2) Very gravelly
Family particle size	(1) Loamy
Drainage class	Well drained to excessively drained
Permeability class	Moderate to moderately rapid
Soil depth	5–10 in
Surface fragment cover <=3"	0–25%
Surface fragment cover >3"	0–10%
Available water capacity (0-40in)	1–3 in
Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	6.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	20–70%
Subsurface fragment volume >3" (Depth not specified)	6–65%

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.

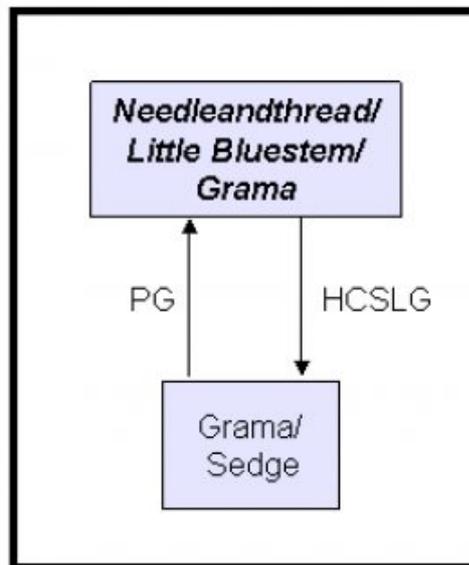
Continuous season-long grazing (during the typical growing season of May through October) and/or repeated seasonal grazing (e.g., every spring, every summer) without adequate recovery periods following each grazing occurrence causes this site to depart from the Needleandthread/Little Bluestem/Grama Plant Community. Species such as threadleaf sedge and blue grama will initially increase. Plains muhly, western wheatgrass, bluebunch wheatgrass, little bluestem and sideoats grama will decrease in frequency and production and later disappear. Heavy continuous grazing causes blue grama and/or threadleaf sedge to dominate.

Interpretations are primarily based on the Needleandthread/Little Bluestem/Grama 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 diagram illustrates the common plant communities and vegetation states commonly occurring on the site and the transition pathways between communities and states. The ecological processes will be discussed in more detail in the plant community descriptions following the diagram.

State and transition model



HCSLG - Heavy, continuous season-long grazing (grazing a unit for an entire growing season well above recommended stocking rates);
PG - Prescribed grazing (planned, controlled harvest of vegetation with grazing or browsing animals – see FOTG, Section IV, 528).

Community 1.1 Needleandthread/Little Bluestem/Grama

Interpretations are based primarily on the Needleandthread/Little Bluestem/Grama Plant Community (this is also considered to be climax). This community evolved with grazing by large herbivores and occasional prairie fire, and can be found on areas that are properly managed with prescribed grazing that allows for proper utilization, changes in season of use and adequate recovery periods following each grazing event. The potential vegetation is about 75% grasses or grass-like plants, 15% forbs and 10% shrubs. An even mix of both warm and cool-season grasses or grass-likes dominates this plant community. The major grasses or grass-likes include needleandthread, western wheatgrass, threadleaf sedge, little bluestem and both sideoats and blue grama. Other grasses occurring on the site include thickspike wheatgrass, bluebunch wheatgrass, plains muhly and prairie junegrass. The significant forbs include gayfeather, purple coneflower, prairie clover and cutleaf ironplant. Significant shrubs are fringed sagewort, rose, skunkbush sumac and yucca. Refer to the plant community composition and group annual production table for species composition and production. This plant community is well adapted to the Northern Great Plains climatic conditions. Individual species can vary greatly in production depending on growing conditions (timing and amount of precipitation and temperature). Community dynamics, nutrient cycle, water cycle and energy flow are functioning at the sites potential. Plant litter is properly distributed with some movement off-site and natural plant mortality is low. The diversity in plant species allows for high drought tolerance.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	420	742	965
Forb	40	90	140
Shrub/Vine	40	68	95
Total	500	900	1200

Figure 5. Plant community growth curve (percent production by month).
NE6403, Pine Ridge/Badlands, cool-season/warm-season co-dominant.
Cool-season, warm-season co-dominant.

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

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	Needleandthread			90–180	
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	90–180	–
2	Mid Warm-Season Grasses			90–180	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	90–135	–
	plains muhly	MUCU3	<i>Muhlenbergia cuspidata</i>	18–45	–
3	Grama			180–360	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	90–225	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	45–180	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	45–90	–
4	Wheatgrass			45–90	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	45–90	–
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp.</i>	0–45	–

			<i>lanceolatus</i>		
5	Other Native Grasses			9–45	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–45	–
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	0–45	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	9–45	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	0–45	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–18	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	9–18	–
	threeawn	ARIST	<i>Aristida</i>	0–9	–
6	Grass-Likes			45–135	
	threadleaf sedge	CAFI	<i>Carex filifolia</i>	45–135	–
	sedge	CAREX	<i>Carex</i>	0–18	–
Forb					
7	Forbs			45–135	
	dotted blazing star	LIPU	<i>Liatris punctata</i>	9–45	–
	hairy false goldenaster	HEVI4	<i>Heterotheca villosa</i>	9–36	–
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	9–27	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–27	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	0–27	–
	purple prairie clover	DAPU5	<i>Dalea purpurea</i>	9–27	–
	blacksamson echinacea	ECAN2	<i>Echinacea angustifolia</i>	9–27	–
	white heath aster	SYER	<i>Symphyotrichum ericoides</i>	9–27	–
	stemless four-nerve daisy	TEAC	<i>Tetaneuris acaulis</i>	0–18	–
	pussytoes	ANTEN	<i>Antennaria</i>	9–18	–
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	0–18	–
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	0–18	–
	scarlet beeblossom	GACO5	<i>Gaura coccinea</i>	0–18	–
	old man's whiskers	GETR	<i>Geum triflorum</i>	0–18	–
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	0–18	–
	lacy tansyaster	MAPI	<i>Machaeranthera pinnatifida</i>	0–18	–
	large Indian breadroot	PEES	<i>Pediomelum esculentum</i>	0–18	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	9–18	–
	eastern pasqueflower	PUPA5	<i>Pulsatilla patens</i>	0–18	–
	onion	ALLIU	<i>Allium</i>	0–9	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0–9	–
	milkvetch	ASTRA	<i>Astragalus</i>	0–9	–
Shrub/Vine					
8	Shrubs			45–90	
	Subshrub (<.5m)	2SUBS	<i>Subshrub (<.5m)</i>	0–27	–
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	9–27	–
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	0–27	–
	rose	ROSA5	<i>Rosa</i>	9–27	–
	soapweed yucca	YUGL	<i>Yucca glauca</i>	0–27	–

	pricklypear	OPUNT	<i>Opuntia</i>	0–18	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0–9	–

Hydrological functions

Water is the principal factor limiting herbage production on this site. The site is dominated by soils in hydrologic group B. Infiltration varies from rapid to very rapid and runoff varies from very low to medium 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 exception would be where short grasses form a dense 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 Section 4, NRCS National Engineering Handbook for runoff quantities and hydrologic curves).

Recreational uses

This site provides hunting opportunities for upland game species. The wide varieties 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

Selected seed harvest of certain unique native plant species can provide additional income.

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.

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:** None on slopes of about 15% or less, slight to none and discontinuous on slopes greater than 15%.

- 2. Presence of water flow patterns:** None on slopes of about 15% or less; barely visible and discontinuous with numerous debris dams on slopes greater than 15%.

- 3. Number and height of erosional pedestals or terracettes:** Few pedestalled 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):** 5 to 25 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 3 or greater. Surface organic matter adheres to the soil surface. Soil surface fragments will typically retain structure for 1 minute or longer 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 1 to 3 inches thick with light to dark brownish gray colors, but not typically mollic. Structure should typically be weak fine granular at least in the upper A-horizon.

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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 rhizomatous and tufted perennial cool- and warm-season grasses) with fine and coarse roots positively influences infiltration. Infiltration is typically high due to gravelly nature of soils.
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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 – very shallow to gravel, but no platy structure will be present.
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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: Mid warm-season grasses > Short warm-season grasses >
- Sub-dominant: Mid cool-season bunchgrasses > Grass-likes = Forbs >
- Other: Mid cool-season rhizomatous grasses = shrubs
- Additional:
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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 and shrubs are vigorous.
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14. **Average percent litter cover (%) and depth (in):** Litter cover is typically 20 to 40 percent, with the depth roughly 0.25 inches or less.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Total annual production ranges from 500 to 1,200 pounds/acre, with the reference value being 900 pounds/acre (air-dry basis).
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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:** State and local noxious weeds.
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17. **Perennial plant reproductive capability:** Species exhibit somewhat lower vigor than what would normally be expected for these species on other ecological sites. The droughty nature of the soils of this site causes plant stress even in typical precipitation patterns. Do not rate based solely on seed production.
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