

Ecological site R066XY062NE

Shallow To Gravel

Accessed: 05/06/2024

General information

Approved. An approved ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model, enough information to identify the ecological site, and full documentation for all ecosystem states contained in the state and transition model.

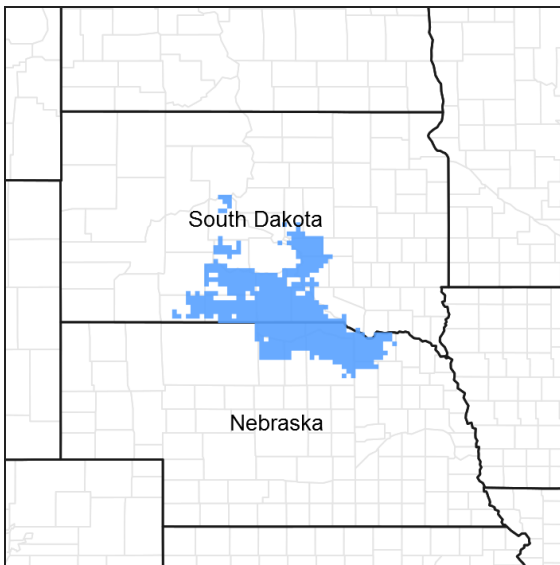


Figure 1. Mapped extent

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; 44a - Nebraska Sand Hills.

Associated sites

R066XY032NE	Sandy 18-22" P.Z. Sandy 18-22" P.Z.
R066XY033NE	Sands 18-22 P.Z. Sands 18-22" P.Z.
R066XY036NE	Loamy 18-22 P.Z. Loamy 18-22" P.Z.
R066XY054NE	Sandy 22-25 P.Z. Sandy 22-26" P.Z.
R066XY055NE	Sands 22-25 P.Z. Sands 22-26" P.Z.

Similar sites

R066XY032NE	Sandy 18-22" P.Z. Sandy 18-22" P.Z. (higher production; sand bluestem dominant; less blue grama)
-------------	--

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Andropogon hallii</i> (2) <i>Hesperostipa comata ssp. comata</i>

Physiographic features

This site occurs on stream terraces and uplands where gravelly sediments are deposited.

Table 2. Representative physiographic features

Landforms	(1) Ridge (2) Terrace (3) Alluvial fan
Elevation	579–914 m
Slope	0–30%
Ponding depth	0 cm
Water table depth	0 cm
Aspect	Aspect is not a significant factor

Climatic features

MLRA 66 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 the winds move freely across the plains and account for rapid changes in temperature.

Annual precipitation ranges from 18 to 25 inches per year. The normal average annual temperature is about 48° F. January is the coldest month with average temperatures ranging from about 19° F (Bonesteel, SD) to about 23° F (Ainsworth, NE). July is the warmest month with temperatures averaging from about 73° F (Harrington, SD) to about 75° F (Gregory, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 54° F. This large annual range attests to the continental nature of this area's climate. Hourly winds average about 10 miles per hour annually, ranging from about 11 miles per hour during the spring to about 9 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 native cool season plants begins mid to late March and continues to late June. Native warm season plants begin growth in early May and continue to late August. 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)	145 days
Freeze-free period (average)	165 days
Precipitation total (average)	635 mm

Influencing water features

No significant water features influence this site.

Soil features

The features common to all soils in this site are the sand to sandy loam textured surface soils and slopes of 0 to 30 percent. The soils in this site are from somewhat excessively to excessively drained and formed in alluvium. The surface layer is 4 to 16 inches thick. The texture of the subsurface generally ranges from sand to gravelly coarse sand. Runoff as evidenced by patterns of rill, gully, or other water flow is negligible to low, in spite of the steep slopes, due to the very high intake rate of these soils. Cryptobiotic crusts are present, but their function is not well understood. Some pedestalling of plants occurs, but it is not very evident on casual observation and occurs on less than 5% of the plants.

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) Fine sandy loam (2) Loamy sand (3) Sandy loam
Family particle size	(1) Sandy
Drainage class	Excessively drained
Permeability class	Rapid to very rapid
Soil depth	203 cm
Surface fragment cover <=3"	0–40%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	5.08–12.7 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	5.1–7.8
Subsurface fragment volume <=3" (Depth not specified)	0–55%
Subsurface fragment volume >3" (Depth not specified)	0–10%

Ecological dynamics

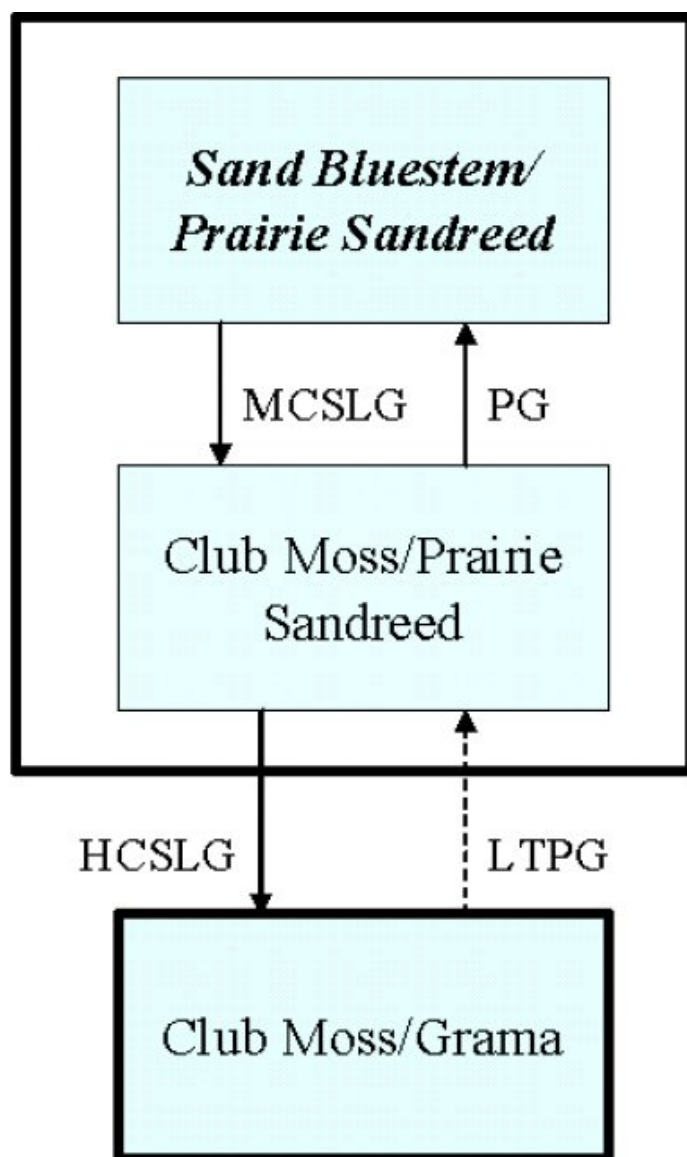
As this site deteriorates, species such as hairy grama, blue grama, and club moss will increase. Grasses such as sand bluestem, little bluestem, needleandthread, and sideoats grama will decrease in frequency and production. Perennial forbs increase under poor management, and if management persists, annual forbs and shrubs will also increase as grasses decrease.

This site is extremely responsive to high moisture years when additional moisture is received during the growing season. The associated coarse textured soils have low moisture holding capability, which generally limits plant growth. With additional moisture, the interpretive plant community can significantly increase its production when compared to the production of a normal year.

Interpretations are primarily based on the Sand Bluestem/Prairie Sandreed 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. Subclimax 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



HCSLG – Heavy continuous season-long grazing; **LTPG** – Long-term prescribed grazing; **MCSLG** – Moderate continuous season-long grazing; **PG** - Prescribed grazing.

State 1
Sand Bluestem/Prairie Sandreed Plant Community

Community 1.1

Sand Bluestem/Prairie Sandreed Plant Community

Interpretations are primarily based on the Sand Bluestem/Prairie Sandreed Plant Community (this is also considered climax). This plant community evolved with grazing by large herbivores and is moderately suited for grazing by domestic livestock. 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 70% grasses or grass-like plants, 5% forbs, 15% shrubs, and 10% cryptogams. The major grasses include blue grama, sand bluestem, prairie sandreed, and needleandthread. Other grasses occurring on this plant community include sand dropseed, prairie junegrass, little bluestem, and sideoats grama. This plant community is well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allows for high drought tolerance. This is a healthy and sustainable plant community (site/soil stability, watershed function, and biologic integrity). The following growth curve shows the estimated monthly percentages of total annual growth of the dominant species expected during a normal year: Growth curve number: NE6534 Growth curve name: Nebraska/South Dakota Sandhills, Native Grasslands Growth curve description: Warm-season dominant, cool-season subdominant, mid & tall grasses. Transitional pathways and/or community pathways leading to other plant communities are as follows: Moderate, continuous season-long grazing will convert the plant community to the Club Moss/Prairie Sandreed Plant Community.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1020	1471	1905
Shrub/Vine	84	179	280
Moss	–	90	185
Forb	17	54	95
Total	1121	1794	2465

Figure 5. Plant community growth curve (percent production by month). NE6637, Eroded Tableland, warm-season dominant, cool-season subdominant.

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

State 2

Club Moss/Prairie Sandreed Plant Community

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	Warm-Season Grasses			359–897	
	sand bluestem	ANHA	<i>Andropogon hallii</i>	179–448	–
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	90–359	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	90–179	–
2	Grama			179–448	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	179–359	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	90–179	–
3	Needlgrass			179–359	
	needle and thread	HECOC8	<i>Hesperostipa comata</i> ssp. <i>comata</i>	179–359	–
	parrygrass	HEPD11	<i>Hesperostipa comata</i>	0–90	–

	porcupinegrass	NEGF11	<i>Hesperostipa spartea</i>	0-90	-
	green needlegrass	NAVI4	<i>Nassella viridula</i>	0-90	-
4	Other Native Grasses			90-269	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	90-179	-
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0-179	-
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0-90	-
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	0-90	-
	purple lovegrass	ERSP	<i>Eragrostis spectabilis</i>	0-54	-
	threeawn	ARIST	<i>Aristida</i>	0-54	-
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-36	-
5	Grass-Likes			0-90	
	sedge	CAREX	<i>Carex</i>	0-90	-
Forb					
7	Forbs			18-90	
	purple prairie clover	DAPU5	<i>Dalea purpurea</i>	0-36	-
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-36	-
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	0-36	-
	goldenrod	SOLID	<i>Solidago</i>	0-36	-
	white heath aster	SYER	<i>Symphyotrichum ericoides</i>	0-36	-
	spiderwort	TRADE	<i>Tradescantia</i>	0-18	-
	hoary verbena	VEST	<i>Verbena stricta</i>	0-18	-
	farragon	ARDR4	<i>Artemisia dracunculus</i>	0-18	-
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	0-18	-
	stiff sunflower	HEPA19	<i>Helianthus pauciflorus</i>	0-18	-
	hairy false goldenaster	HEVI4	<i>Heterotheca villosa</i>	0-18	-
	blazing star	LIATR	<i>Liatris</i>	0-18	-
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	0-18	-
	lacy tansyaster	MAPI	<i>Machaeranthera pinnatifida</i>	0-18	-
	scurfpea	PSORA2	<i>Psoraleidum</i>	0-18	-
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	0-18	-
Shrub/Vine					
8	Shrubs			90-269	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0-90	-
	leadplant	AMCA6	<i>Amorpha canescens</i>	0-90	-
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	0-90	-
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0-90	-
	brittle pricklypear	OPFR	<i>Opuntia fragilis</i>	0-90	-
	plains pricklypear	OPPO	<i>Opuntia polyacantha</i>	0-90	-
	rose	ROSA5	<i>Rosa</i>	0-90	-
Moss					
9	Cryptogams			0-179	
	lesser spikemoss	SEDE2	<i>Selaginella densa</i>	0-179	-

Animal community

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide year-long forage. During the dormant period, the forage for livestock will likely be lacking protein to meet livestock requirements, and added protein will allow ruminants to better utilize the energy stored in grazed plant materials. A forage quality test (either directly or through fecal sampling) should be used to determine the level of supplementation needed.

Hydrological functions

Water is the principal factor limiting forage production on this site. Meadin and Simeon soils on this site are in Hydrologic Soil Group A. Water transmission through Group A soils is normally greater than 0.30 inches per hour. Runoff is expected to occur only during the most intense storms (refer to Section 4, NRCS National Engineering Handbook for runoff quantities and hydrologic curves).

The high infiltration rate of these sands results in few rills and gullies or water flow patterns even though steep slopes may be included. Pedestals are only slightly present in association with bunchgrasses such as needleandthread. Litter typically falls in place on flat slopes. Chemical and physical crusts are rare to non-existent. Cryptogamic crusts are present but only cover 1-2% of the soil surface. This crusting is not significant for hydrologic considerations. Overall this site has the appearance of being stable and productive.

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

None noted.

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: Dave Cook, Rangeland Management Specialist, NRCS; Dwight Hale, Engineer, NRCS; Stanley Boltz, State Rangeland Management Specialist, NRCS, South Dakota; Dana Larsen, State Rangeland Management Specialist, NRCS, Nebraska; Dave Steffen, Rangeland Management Specialist, NRCS.

There are 5 SCS-RANGE-417 records from Boyd, Holt, Brown, and Knox counties in Nebraska. The sample period was from 1968 to 1982.

There are 4 Ocular estimates from Keya Paha county, Nebraska and Todd county South Dakota. The sample period was 2002.

Other references

Other references include: USDA NRCS Water & Climate Center, USDA NRCS National Range and Pasture Handbook, USDA NRCS Soil Surveys from various counties, Atlas of the Sandhills.

Contributors

Dana Larsen
Stan Boltz

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)	Stan Boltz
Contact for lead author	Stan Boltz, stanley.boltz@sd.usda.gov, 605-352-1236
Date	08/01/2006
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 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):** 0 to 15 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 5 inches thick with light to dark brownish gray colors. Structure should typically be fine granular at least in the upper A-horizon.

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.
-
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: Tall, warm-season rhizomatous grasses >
- Sub-dominant: Short, warm-season grasses > mid, cool-season bunchgrasses = mid, warm-season bunchgrasses > shrubs >
- Other: Mid, cool-season rhizomatous grasses = grass-like species = forbs
- Additional: Other grasses in other functional groups occur in minor amounts.
-
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 40 to 60 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 1,000 to 2,200 pounds/acre, with the reference value being 1,600 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.

