

Ecological site R061XY146WY

Sands (Sa) 15-19" Precipitation Zone, Black Hills

Accessed: 05/21/2025

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.

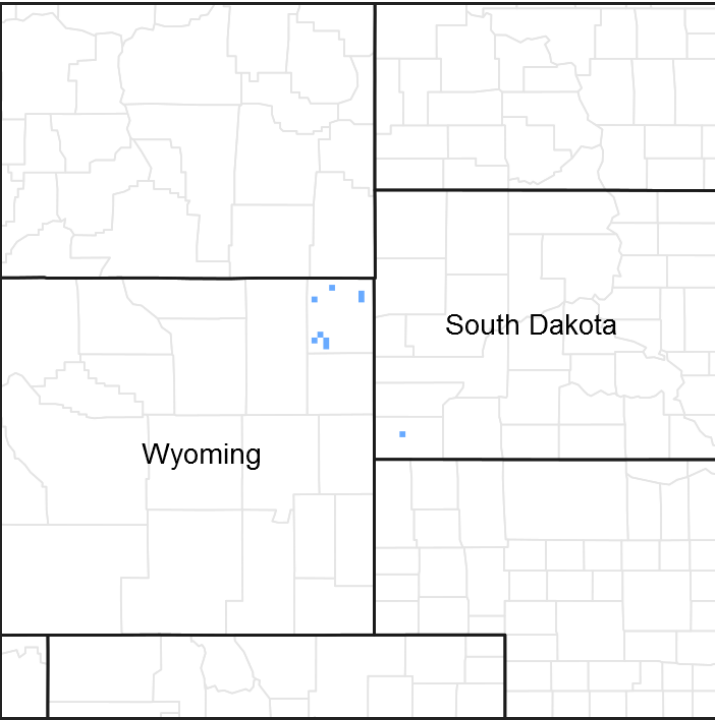


Figure 1. Mapped extent

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.

Associated sites

R061XY150WY	Sandy (Sy) 15-19" Precipitation Zone, Black Hills
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Table 1. Dominant plant species

Tree	Not specified
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Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs on gently undulating rolling land.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge
Flooding frequency	None
Ponding frequency	None
Elevation	1,067–1,524 m
Slope	0–30%
Ponding depth	0 cm
Water table depth	152 cm
Aspect	Aspect is not a significant factor

Climatic features

Climatic features

Annual precipitation ranges from 15-19 inches per year. Wide fluctuations may occur in yearly precipitation and result in more dry years than those with more than normal precipitation. Temperatures show a wide range between summer and winter and between daily maximums and minimums. This is predominantly due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air outbreaks in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring.

Strong winds are less frequent than over other areas of Wyoming. Occasional storms, however, can bring brief periods of high winds with gusts exceeding 50 mph.

Growth of native cool season plants begins about April 1 and continues to about July 1. Native warm season plants begin about May 15 and continue to about August 15. Fall green-up may occur in September and last through October.

The following information is from the “Devils Tower 2” climate station:
Annual Precipitation (inches): 14.81 20.17

Mean annual precipitation: 17.66 inches

Mean annual air temperature: 44.4 F (28.6 F Avg. Min. to 60.1 F Avg. Max.)
For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at <http://www.wcc.nrcs.usda.gov/> website. Other climate station(s) representative of this precipitation zone include "Hulett" and "Sundance".

Table 3. Representative climatic features

Frost-free period (average)	93 days
Freeze-free period (average)	125 days
Precipitation total (average)	508 mm

Influencing water features

Stream type: None

Soil features

Representative Soil Features

The soils of this site are moderately deep (greater than 20" to bedrock) to very deep well-drained soils formed in eolian deposits or alluvium. These soils have rapid permeability. The surface soil will be one or more of the following textures: loamy very fine sand, loamy fine sand, loamy sand, or sand. The soil will develop into active sand dunes, with the deterioration of cover.

Table 4. Representative soil features

Surface texture	(1) Loamy fine sand (2) Loamy sand (3) Fine sand
Family particle size	(1) Loamy
Drainage class	Well drained to excessively drained
Permeability class	Moderately rapid to very rapid
Soil depth	51–152 cm
Surface fragment cover ≤3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	2.54–9.91 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%

Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–3
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

Ecological Dynamics of the Site:

As this site deteriorates, species such as threadleaf sedge and sand dropseed will increase. Mid grasses such as sand bluestem, prairie sandreed and Indian ricegrass will decrease in frequency and production.

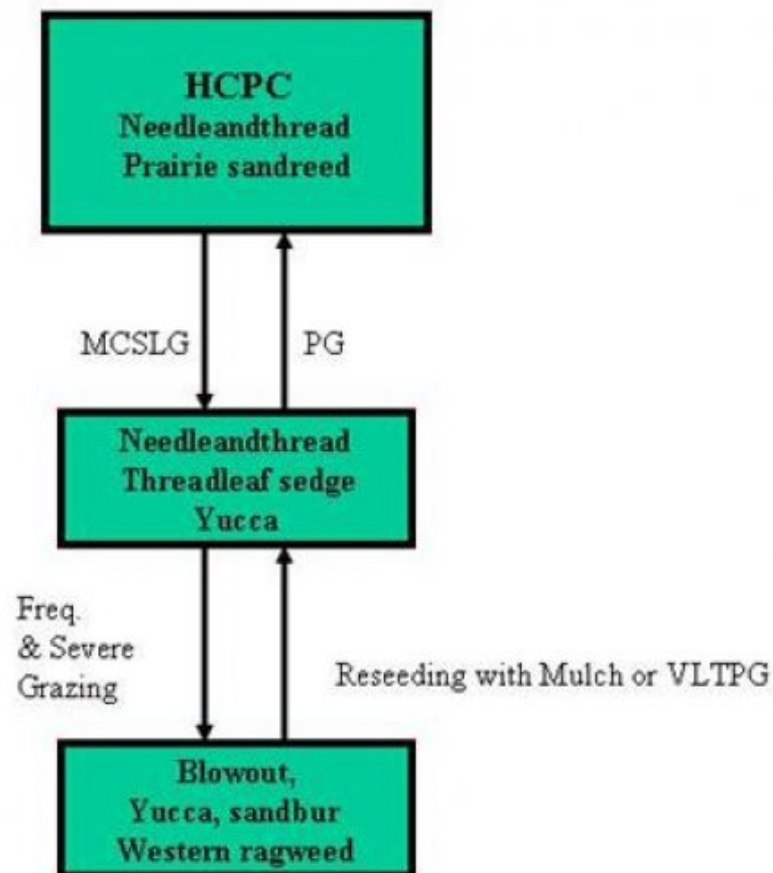
The Historic Climax Plant Community (description follows the plant community diagram) has been determined by study of rangeland relic areas, or areas protected from excessive disturbance. Trends in plant communities going from heavily grazed areas to lightly grazed areas, seasonal use pastures, and historical accounts have also been used.

The following is a State and Transition Model Diagram that illustrates the common plant communities (states) that can occur on the site and the transitions between these communities. The ecological processes will be discussed in more detail in the plant community narratives following the diagram.

Plant Community Narratives

Following are the narratives for each of the described plant communities. These plant communities may not represent every possibility, but they probably are the most prevalent and repeatable plant communities. The plant composition tables shown above have been developed from the best available knowledge at the time of this revision. As more data is collected, some of these plant communities may be revised or removed, and new ones may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities”. According to the USDA NRCS National Range and Pasture Handbook, Desired Plant Communities (DPC’s) will be determined by the decision-makers and will meet minimum quality criteria established by the NRCS. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

State and transition model



BM - Brush Management (fire, chemical, mechanical)

Freq. & Severe Grazing - Frequent and Severe Utilization of the Cool-season Mid-grasses during the Growing Season

GLMT - Grazing Land Mechanical Treatment

LTPG - Long-term Prescribed Grazing

MCSLG - Moderate, Continuous Season-long Grazing

NU, NF - No Use and No Fire

PG - Prescribed Grazing (proper stocking rates with adequate recovery periods during the growing season)

VLTPG - Very Long-term Prescribed Grazing (could possibly take generations)

Na - found adjacent to a saline site

State 1
Needleandthread/ Prairie sandreed

Community 1.1
Needleandthread/ Prairie sandreed

Needleandthread/Prairie sandreed Plant Community The interpretive plant community for this site is the Historic Climax Plant Community (HCPC). This state evolved with grazing by large herbivores and is well suited for grazing by domestic livestock. Potential vegetation is about 85% grasses or grass-like plants, 10% forbs, and 5% woody plants. This state is a mix of warm and cool season midgrasses. The major grasses include needleandthread, prairie sandreed, sand bluestem, and Indian ricegrass. Other grasses occurring in this state include Sandberg bluegrass, sand dropseed, blue grama, and threadleaf sedge. Snowberry and wild rose are conspicuous elements of this state, occurring in a mosaic pattern, and make up 5 to 10% of the annual production. The total annual production (air-dry weight) of this state is about 2600 pounds per acre, but it can range from about 1800 lbs/acre in unfavorable years to about 3400 lbs/acre in above average years. This plant community is extremely stable and well adapted to the Black Hills Foot Slopes climatic conditions. The diversity in plant species allows for high drought tolerance. This is a sustainable plant community (site/soil stability, watershed function, and biologic integrity). Transitions or pathways leading to other plant communities are as follows: • Moderate Continuous Season-Long grazing will convert the plant community to the Needleandthread/ Threadleaf sedge/ Yucca Plant Community. • Frequent and Severe grazing will convert the plant community to a blowout with a Yucca/ Sandbur/ Western ragweed Plant Community.

Figure 4. Plant community growth curve (percent production by month).
WY1601, 15-19BL Upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	20	40	15	5	10	5		

State 2
Needleandthread/ Threadleaf sedge/ Yucca

Community 2.1
Needleandthread/ Threadleaf sedge/ Yucca

Needleandthread/Threadleaf sedge/Yucca plant community This plant community is the result of moderate season long grazing. The understory of grass includes needleandthread, threadleaf sedge, and sand dropseed. Threadleaf sedge and needleandthread have increased. Yucca and broom snakeweed have increased. When compared to the Historic Climax Plant Community, prairie sandreed, sand bluestem and Indian ricegrass have decreased. This community is well suited to grazing by both domestic livestock and wildlife, during the spring summer and fall. Care must be taken not

to create bare areas which will result in blowouts. The total annual production (air-dry weight) of this state is about 1200 pounds per acre, but it can range from about 900 lbs/acre in unfavorable years to about 1500 lbs/acre in above average years. The communities' soil biotic integrity and watershed is intact, although more than normal runoff may occur. Transitional pathways leading to other plant communities are as follows: • Prescribed grazing use over a long-term will return this state to near Historic Climax Plant Community. The sod forming nature of threadleaf sedge and needleandthread will make the transition to Historic Climax Plant Community difficult. • Frequent and Severe grazing will convert this state to a blowout with the Yucca/ Sandbur/ Western ragweed Plant Community.

**Figure 5. Plant community growth curve (percent production by month).
WY1601, 15-19BL Upland sites.**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	20	40	15	5	10	5		

State 3

Blowout with Yucca, Sandbur, Western ragweed

Community 3.1

Blowout with Yucca, Sandbur, Western ragweed

Blowout with Yucca, Sandbur, and Western ragweed Plant Community This plant community is the result of long-term, heavy, continuous, improper grazing. It is dominated by bare sand with yucca, western ragweed, broom snakeweed and sandbur. The total annual production (air-dry weight) of this state is about 750 pounds per acre, but it can range from about 600 lbs/acre in unfavorable years to about 900 lbs/acre in above average years. The soil is not protected and the blowout will increase in area if management is not changed. The biotic integrity may be reduced due to low vegetative production and blowing sand. Transitional pathways leading to other plant communities are as follows: • Reseeding with mulch is necessary to return a protective vegetation cover to this state, Although Very Long Term Prescribed Grazing, that may take generations, may also return protective vegetation cover to this state. The grazing prescription most commonly used is complete deferment during the growing season, with limited use in the winter, so as to maintain as much plant litter on the soil surface as possible.

**Figure 6. Plant community growth curve (percent production by month).
WY1601, 15-19BL Upland sites.**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	20	40	15	5	10	5		

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				729–1457	
	sand bluestem	ANHA	<i>Andropogon hallii</i>	729–1457	—
2				583–874	
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	583–874	—
3				146–437	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	146–437	—
4				146–291	
	needle and thread	HECO26	<i>Hesperostipa comata</i>	146–291	—
5				291–583	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–146	—
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0–146	—
	needleleaf sedge	CADU6	<i>Carex duriuscula</i>	0–146	—
	threadleaf sedge	CAFI	<i>Carex filifolia</i>	0–146	—
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	0–146	—
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	0–146	—
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0–146	—
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–146	—
Forb					
6				146–291	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–146	—
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	0–146	—
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	0–146	—
	prairie clover	DALEA	<i>Dalea</i>	0–146	—
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	0–146	—
Shrub/Vine					

7				0–146	
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	0–146	–
8				0–146	
	Woods' rose	ROWOW	<i>Rosa woodsii</i> var. <i>woodsii</i>	0–146	–
9				0–146	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0–146	–

Animal community

Animal Community – Wildlife Interpretations

Historic Climax Plant Community: The predominance of grasses in this plant community favors grazers and mixed-feeders, such as bison, elk, and antelope. Suitable thermal and escape cover for deer may be limited due to the low quantities of woody plants. However, topographical variations could provide some escape cover. When found adjacent to sagebrush dominated states, this plant community may provide brood rearing/foraging areas for sage grouse, as well as lek sites. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles. Many grassland obligate small mammals would occur here.

Needleandthread/ Threadleaf sedge/ Yucca: These communities provide limited foraging for antelope and other grazers. They may be used as a foraging site by sage grouse if proximal to woody cover. Generally, these are not target plant communities for wildlife habitat management.

Blowout: Yucca/Sandbur/ Western ragweed: These communities are unstable due to moving sand dunes. They provide a unique temporary habitat for some small mammals and birds.

Animal Community – Grazing Interpretations

The following table lists suggested stocking rates for cattle under continuous season-long grazing under normal growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this, a field visit is recommended, in all cases, to document plant composition and production. More precise carrying capacity estimates should eventually be calculated using this information along with animal preference data, particularly when grazers other than cattle are involved. Under more intensive grazing management, improved harvest efficiencies can result in an increased carrying capacity. If distribution problems occur, stocking rates must be reduced to maintain plant health and vigor.

Plant Community Production Carrying Capacity*

(Lbs/acre) (AUM/ac)

Historic Climax Plant Community 1800-3400 .5

Threadleaf sedge/Needleandthread/ Yucca 900-1500 .4

Blowout /Yucca /Western ragweed/Sand bur 600-900 .1

* - Continuous, season-long grazing by cattle under average growing conditions.

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage for cattle, sheep, or horses. During the dormant period, the forage for livestock use needs to be supplemented with protein because the quality does not meet minimum livestock requirements.

Hydrological functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group A and B. Infiltration potential for this site varies from moderately rapid to very rapid depending on soil hydrologic group and ground cover. Runoff is from low to moderate. 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 for detailed hydrology information).

Rills and gullies should not typically be present. Water flow patterns should be barely distinguishable if at all present. Pedestals are only slightly present in association with bunchgrasses. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent. Cryptogamic crusts are present, but only cover 1-2% of the soil surface.

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. Other sources used as references include: USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, and USDA NRCS Soil Surveys from various counties.

Contributors

G. Mitchell

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	04/01/2005
Approved by	E. Bainter
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills should not be present

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

3. **Number and height of erosional pedestals or terracettes:** Essentially non-existent

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is 15-25% occurring in small areas throughout site
-
5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present
-
6. **Extent of wind scoured, blowouts and/or depositional areas:** Active blowouts should not be present
-
7. **Amount of litter movement (describe size and distance expected to travel):** Little to no plant litter movement. Plant litter remains in place and is not moved by erosional forces.
-
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Plant cover and litter is at 75% or greater of soil surface and maintains soil surface integrity. Soil Stability class is anticipated to be 4 or greater.
-
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Use Soil Series description for depth and color of A-horizon
-
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Grass canopy and basal cover should reduce raindrop impact and slow overland flow providing increased time for infiltration to occur. Healthy deep rooted native grasses enhance infiltration and reduce runoff. Infiltration is Moderately rapid to Very Rapid.
-
11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction layer or soil surface crusting should 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:

Sub-dominant:

Other:

Additional: Tall and Mid stature Warm Season Grasses > Mid Stature Cool Season Grasses
> Short Grasses/grasslikes = Shrubs = Forbs

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

14. **Average percent litter cover (%) and depth (in):** Average litter cover is 30-40% with depths of 0.25 to 1.0 inches
-

15. **Expected annual annual-production** (this is TOTAL above-ground annual-production, not just forage annual-production): 2600 lbs/ac
-

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: Threadleaf sedge, Sand dropseed, Broom snakeweed, Sandbur, Western ragweed, Yucca, and Species found on Noxious Weed List
-

17. **Perennial plant reproductive capability:** All species are capable of reproducing
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