

Ecological site R061XY150WY

Sandy (Sy) 15-19" Precipitation Zone, Black Hills

Accessed: 05/18/2024

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.

Associated sites

R061XY166WY	Shallow Sandy-West (16-20" PZ)
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Similar sites

R058BY250WY	Sandy (Sy) 15-17" PZ Sandy 15-17" Northern Plains P.Z. has lower production.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs on nearly level to 50% slopes.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Hill (3) Plateau
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

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:

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

The soils of this site are moderately deep (greater than 20” to bedrock) to very deep, well-drained soils that formed in alluvium or alluvium over residuum. These soils have moderate, moderately rapid, or rapid permeability. The surface soil will vary from 3 to 6 inches deep and have one of the following textures: fine sandy loam, sandy loam, or loamy very fine sand. Coarser topsoils may be included if underlain by finer textured subsoils. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick.

Table 4. Representative soil features

Surface texture	(1) Fine sandy loam (2) Sandy loam
Family particle size	(1) Sandy
Drainage class	Well drained to excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	51–152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	5.08–12.95 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
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, needleandthread, and silver sagebrush will increase. Broom snakeweed may invade. Grasses such as prairie sandreed and Indian ricegrass will decrease in frequency and production.

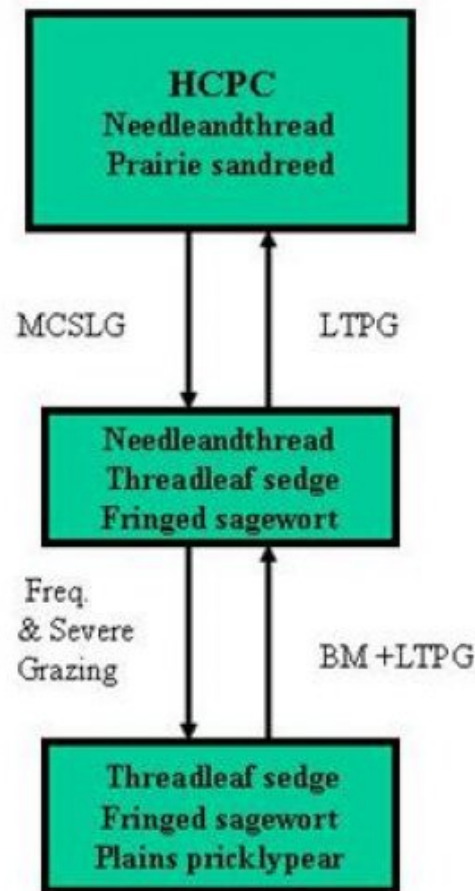
The Historic Climax Plant Community (description follows the plant community diagram) has been determined by study of rangeland relic areas, or areas protected from excessive disturbance. Trends in plant communities going from heavily grazed areas to lightly grazed areas, seasonal use pastures, and historical 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 80% grasses or grass-like plants, 10% forbs, and 10% woody plants. The state is a mix of warm and cool season midgrasses. The major grasses include needleandthread, prairie sandreed, little bluestem, and Indian ricegrass. Other grasses occurring on the state include rhizomatous wheatgrasses, blue grama, and threadleaf sedge. Silver sagebrush is a conspicuous element of this state and occurs in a mosaic pattern. The total annual production (air-dry weight) of this state is about 2200 pounds per acre, but it can range from about 1500 lbs/acre in unfavorable years to about 3000 lbs/acre in above average years. The state is stable and well adapted to the Black Hills Foot Slopes climatic conditions. The diversity in plant species allows for high drought resistance. 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/ Fringed sagewort Plant Community. • Frequent and Severe grazing will convert the plant community to the Threadleaf sedge/ Fringed sagewort/Plains Pricklypear 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/ Fringed sagewort

Community 2.1
Needleandthread/Threadleaf sedge/ Fringed sagewort

Needleandthread/Threadleaf sedge/Fringed sagewort Plant Community This plant community is the result of moderate season long grazing. The understory of grass includes needleandthread, threadleaf sedge, and prairie junegrass. When compared to the Historic Climax Plant Community, prairie sandreed and Indian ricegrass have decreased. Threadleaf sedge, needleandthread and fringed sagewort have increased. Broom snakeweed has invaded. This community is well suited to grazing by both domestic livestock and wildlife, during the spring, summer and fall. The total annual production (air-dry weight) of this state is about 1000 pounds per acre, but it can range from about 800 lbs/acre in unfavorable years to about 1200 lbs/acre in above average years. The communities' soil, biotic integrity and watershed is intact, although more than normal runoff may occur due to the sod forming vegetation. Transitional pathways leading to other plant communities are as follows: • Long-Term Prescribed grazing will return this state to near Historic Climax Plant Community condition. 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 the Threadleaf sedge/Fringed sagewort/Plains Pricklypear 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
Threadleaf/Fringed sagewort/Plains prickly pear

Community 3.1

Threadleaf/Fringed sagewort/Plains prickly pear

Threadleaf sedge/ Fringed sagewort/ Plains Pricklypear Plant Community This plant community is the result of frequent and severe grazing. It is dominated by a sod of threadleaf sedge and needleandthread. Pricklypear cactus can become dense enough so that livestock cannot graze forage growing within the cactus clumps. When the historic climax plant community is replaced by sod forming communities, grass production is reduced. The total annual production (air-dry weight) of this state is about 800 pounds per acre, but it can range from about 600 lbs/acre in unfavorable years to about 1000 lbs/acre in above average years. The soil is generally well protected on this state. The biotic integrity may be reduced due to low vegetative production. The sod formed by these grasses is resistant to water infiltration. While this sod protects the state, off-site areas are affected by excessive runoff that may cause gully erosion. This sod is resistant to change and may require practices such as long-term proper grazing use to return to a mid grass community. Transitional pathways leading to other plant communities are as follows: • Long-term Prescribed grazing with fringed sagewort control will return this plant community to near Historic Climax Plant Community.

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				370–740	
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	370–740	–
2				247–493	
	needle and thread	HECO26	<i>Hesperostipa comata</i>	247–493	–
3				123–247	
	sand bluestem	ANHA	<i>Andropogon hallii</i>	123–247	–
4				123–247	
	blue wildrye	ELGL	<i>Elymus glaucus</i>	123–247	–
5				123–247	
	Columbia needlegress	ACNE9	<i>Achnatherum nelsonii</i>	123–247	–
6				123–247	
	Richardson's needlegress	ACRI8	<i>Achnatherum richardsonii</i>	123–247	–
7				123–247	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	123–247	–
8				123–247	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	123–247	–
9				247–493	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–123	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0–123	–
	Pumpelly's brome	BRINP5	<i>Bromus inermis</i> ssp. <i>pumpellianus</i> var. <i>pumpellianus</i>	0–123	–
	needleleaf sedge	CADU6	<i>Carex duriuscula</i>	0–123	–
	threadleaf sedge	CAFI	<i>Carex filifolia</i>	0–123	–

	onespike danthonia	DAUN	<i>Danthonia unispicata</i>	0–123	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–123	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	0–123	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–123	–
Forb					
10				123–370	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–123	–
	yarrow	ACHIL	<i>Achillea</i>	0–123	–
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	0–123	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	0–123	–
	prairie clover	DALEA	<i>Dalea</i>	0–123	–
	silverleaf Indian breadroot	PEAR6	<i>Pediomelum argophyllum</i>	0–123	–
	beardtongue	PENST	<i>Penstemon</i>	0–123	–
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	0–123	–
	American vetch	VIAM	<i>Vicia americana</i>	0–123	–
	yucca	YUCCA	<i>Yucca</i>	0–123	–
Shrub/Vine					
11				0–247	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0–123	–
	silver sagebrush	ARCAC5	<i>Artemisia cana ssp. cana</i>	0–123	–
	Woods' rose	ROWOW	<i>Rosa woodsii var. woodsii</i>	0–123	–
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	0–123	–

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/Fringed sagewort: These communities provide foraging for antelope and other grazers. They may be used as a foraging site by sage grouse if proximal to woody cover.

Threadleaf sedge/Fringed sagewort/Plains Pricklypear: These communities provide limited grazing to antelope and other herbivores due to low production. They may be used as a foraging site by sage grouse if proximal to woody cover.

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 1500-3000 .5

Needleandthread/Threadleaf sedge/Fringed sagewort 800-1200 .4

Threadleaf sedge/Fringed sagewort/Plains Pricklypear 600-1000 .25

* - 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 B, with localized areas in hydrologic group C. Infiltration potential for this site varies from moderately rapid to rapid depending on soil hydrologic group and ground cover. Runoff varies from low to moderate. 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 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

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:** None

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 Rapid.
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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):** 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: Mid stature Cool Season Grasses > Mid Stature Warm Season Grasses > Short stature Grasses/Grasslike = Forbs > Shrubs
-
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
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 2200 lbs/acre
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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:** Threadleaf sedge, Fringed sagewort, Prickly Pear, Broom Snakeweed, Silver sagebrush, and Species found on Noxious Weed List
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17. **Perennial plant reproductive capability:** All species are capable of reproducing
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