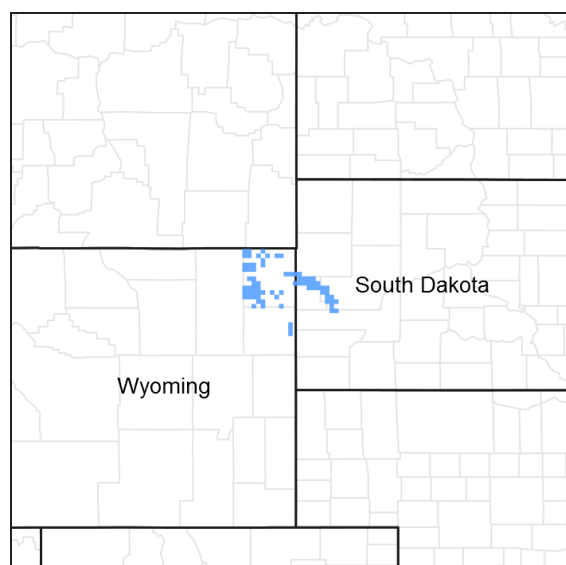


# **Ecological site R061XY138WY** **Saline Lowland (SL) 15-19" Precipitation Zone, Black Hills**

Accessed: 05/19/2024

## 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

R061XY128WY	<b>Lowland (LL) 15-19" Precipitation Zone, Black Hills</b>
R061XY130WY	<b>Overflow (Ov) 15-19" Precipitation Zone, Black Hills</b>

**Table 1. Dominant plant species**

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

## Physiographic features

This site normally occurs on land that receives overflow from intermittent streams or runoff from adjacent slopes.

**Table 2. Representative physiographic features**

Landforms	(1) Alluvial fan (2) Drainageway (3) Stream terrace
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Flooding frequency	None
Ponding frequency	None
Elevation	1,067–1,524 m
Slope	0–6%
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:

Minimum Maximum 5 yrs. out of 10 between  
 Frost-free period (days) (32°F): 58 93 June 6 – September 7  
 Freeze-free period (days) (28°F): 95 125 May 18 – September 20  
 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

Influencing Water Features

Wetland Description: System Subsystem Class Sub-class  
 None None None None None

Stream Type: C  
 (Rosgen Type)

## Soil features

The soils of this site are deep and very deep well-drained soils formed in alluvium. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick. These soils have moderate to slow permeability and are moderately to strongly saline and/or alkaline. Higher soluble salt concentrations may be found in the subsoil. The surface soil will be highly variable and vary from 2 to 8 inches in thickness.

Parent Material Kind: alluvium

Parent Material Origin: sandstone, shale

Surface Texture: loam, clay loam, silt loam, clay

Surface Texture Modifier: none

Subsurface Texture Group: loam

Surface Fragments < 3" (% Cover): 0

Surface Fragments > 3" (%Cover): 0

Subsurface Fragments < 3" (% Volume): 0

Subsurface Fragments > 3" (% Volume): 0

Minimum Maximum

Drainage Class: poorly excessive

Permeability Class: moderate rapid

Depth (inches): 20 >60

Electrical Conductivity (mmhos/cm) <20": 4 16

Sodium Absorption Ratio <20": 5 13

Soil Reaction (1:1 Water) <20": 6.6 9.0

Soil Reaction (0.1M CaCl<sub>2</sub>) <20": NA NA

Available Water Capacity (inches) <30": 1 6.2

Calcium Carbonate Equivalent (percent) <20": 0 10

**Table 4. Representative soil features**

Surface texture	(1) Loam (2) Clay loam (3) Silt loam
Family particle size	(1) Loamy
Drainage class	Poorly drained to excessively drained
Permeability class	Moderate to rapid
Soil depth	51–152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	2.54–15.75 cm
Calcium carbonate equivalent (0-101.6cm)	0–10%
Electrical conductivity (0-101.6cm)	4–16 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	5–13
Soil reaction (1:1 water) (0-101.6cm)	6.6–9
Subsurface fragment volume <=3" (Depth not specified)	0%

Subsurface fragment volume >3" (Depth not specified)	0%
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## Ecological dynamics

### Ecological Dynamics of the Site:

As this site deteriorates, species such as inland saltgrass and greasewood increase, and cheatgrass invades the site. Grasses such as alkali sacaton, rhizomatous wheatgrasses, and Nuttall's alkaligrass will decrease in frequency and production.

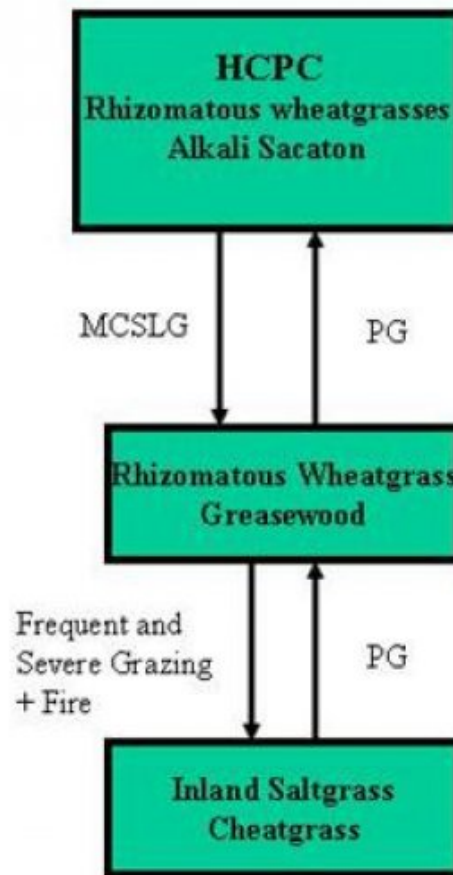
The Historic Climax Plant Community (description follows the plant community diagram) has been determined by study of rangeland relic areas, or areas protected from excessive disturbance. Trends in plant communities going from heavily grazed areas to lightly grazed areas, seasonal use pastures, and historical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

State 1  
Rhizomatous wheatgrasses/Alkali Sacaton

Community 1.1  
Rhizomatous wheatgrasses/Alkali Sacaton

Rhizomatous wheatgrasses/ Alkali sacaton 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, 5% forbs and 15% woody plants. Saline tolerant grasses dominate the state. The major grasses include rhizomatous wheatgrasses, alkali sacaton, Nuttall's alkaligrass, and inland saltgrass. Woody plants are greasewood, rubber rabbitbrush, and cottonwoods. The total annual production (air-dry weight) of this state is about 2900 pounds per acre, but it can range from about 1900 lbs/acre in unfavorable years to about 3500 lbs/acre in above average years. The following is the growth curve of this plant community expected during a normal year: Growth curve number: WY1602 Growth curve name: 15-19BL, Extra Water Sites Growth curve description: Extra Water Sites JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC 0 0 0 5 20 25 20 10 15 5 0 0 (Monthly percentages of total annual growth) This 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 this plant community to the Rhizomatous wheatgrasses/Greasewood Plant Community. • Frequent and Severe grazing and fire will convert this plant community to the Inland saltgrass/Cheatgrass Plant Community.

Figure 4. Plant community growth curve (percent production by month).  
WY1602, 15-19BL Extra water sites - LL, Ov, CyO, SL.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	20	25	20	10	15	5	0	0

State 2  
Rhizomatous wheatgrass/Greasewood

Community 2.1  
Rhizomatous wheatgrass/Greasewood

Rhizomatous wheatgrasses/Greasewood Plant Community This plant community evolved under moderate grazing by domestic livestock. Saline resistant grasses make up the majority of the understory. Greasewood and rubber rabbitbrush have increased on the state. Dominant grasses include rhizomatous wheatgrasses, inland saltgrass, and alkali sacaton. Forbs, commonly found in this plant community, include Louisiana sagewort (cudweed), plains wallflower, hairy goldaster, and Pursh seepweed. Greasewood canopy cover may be 20-40%. When compared to the Historical Climax Plant Community, rhizomatous wheatgrasses and alkali sacaton have decreased, inland saltgrass, greasewood, and rubber rabbitbrush have increased. The overstory of greasewood and understory of grass and forbs provide a diverse plant community that will support domestic livestock and wildlife such as birds, mule deer and antelope. The total annual production (air-dry weight) of this state is about 1500 pounds per acre, but it can range from about 1000 lbs/acre in unfavorable years to about 2000 lbs/acre in above average years. This state is stable and protected from excessive erosion. The biotic integrity of this plant community is usually intact. The watershed is usually functioning. Transitional pathways leading to other plant communities are as follows: • Prescribed grazing over the long-term will result in a plant community very similar to the Historic Climax Plant Community, except that greasewood will persist. • Frequent and Severe grazing with Fire will convert this plant community to the Inland saltgrass/Cheatgrass Plant Community.

Figure 5. Plant community growth curve (percent production by month).  
WY1602, 15-19BL Extra water sites - LL, Ov, CyO, SL.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	20	25	20	10	15	5	0	0

State 3  
Inland Saltgrass/ Cheatgrass

Community 3.1  
Inland Saltgrass/ Cheatgrass

Inland Saltgrass/Cheatgrass Plant Community This plant community is the result of long-term improper grazing and fire. Inland saltgrass, cheatgrass, and alkali bluegrass dominate this state. Bare ground has increased, and production has decreased. The total annual production (air-dry weight) of this state is about 1200 pounds per acre, but it can range from about 800 lbs/acre in unfavorable years to about 1600 lbs/acre in above average years. The following is the growth curve expected during a normal year: Growth curve number: WY1602 Growth curve name: 15-19BL, Extra Water Sites Growth curve description: Extra Water Sites JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC 0 0 0 5 20 25 20 10 15 5 0 0 (Monthly percentages of total annual growth) The soil of this state is not well protected. The biotic integrity is compromised by cheatgrass and bare ground. The watershed is functioning but may produce excessive runoff. Transitional pathways leading to other plant communities are as follows: • Prescribed grazing over the long-term will return this state to near Historic Climax Plant Community.

Figure 6. Plant community growth curve (percent production by month).  
WY1602, 15-19BL Extra water sites - LL, Ov, CyO, SL.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	20	25	20	10	15	5	0	0

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1				841–1300	
	alkali sacaton	SPAI	<i>Sporobolus airoides</i>	841–1300	–
2				488–813	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	488–813	–
3				163–325	
	saltgrass	DISP	<i>Distichlis spicata</i>	163–325	–
4				0–325	
	Nuttall's alkaligrass	PUNU2	<i>Puccinellia nuttalliana</i>	0–325	–
5				0–163	
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0–163	–
6				0–163	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–163	–
<b>Forb</b>					
7				0–163	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–163	–
	twogrooved milkvetch	ASBI2	<i>Astragalus bisulcatus</i>	0–163	–
<b>Shrub/Vine</b>					
8				163–325	
	greasewood	SAVE4	<i>Sarcobatus vermiculatus</i>	163–325	–
9				0–163	
	narrowleaf cottonwood	POAN3	<i>Populus angustifolia</i>	0–163	–
	narrowleaf cottonwood	POAN3	<i>Populus angustifolia</i>	0–163	–
10				0–163	
	rabbitbrush	CHRY9	<i>Chrysothamnus</i>	0–163	–
11				0–163	
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0–163	–

## 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.

Rhizomatous wheatgrasses/greasewood: This plant community exhibits a low level of plant species diversity due to the accumulation of salts in the soil. It may provide some thermal and escape cover for deer and antelope if no other woody community is nearby, but in most cases it is not a desirable plant community to select as a wildlife habitat management objective.

Inland saltgrass/Cheatgrass: This plant community may be useful for the same large grazers that would use the Historic Climax Plant Community. However, the plant community composition is less diverse, and thus, less apt to meet the seasonal needs of these animals. It may provide some foraging opportunities for sage grouse when it occurs 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 1900-3500 0.6

Rhizomatous wheatgrasses/greasewood 1000-2000 0.5

Inland saltgrass/Cheatgrass 800-1600 0.25

\* - 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 and C, with localized areas in hydrologic group D. Infiltration ranges from moderate to rapid. Runoff potential for this site varies from moderate to high depending on soil hydrologic group 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 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 may be present. 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

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

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

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is 10-20% occurring in small areas throughout site

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5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present

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

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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.

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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 80% or greater of soil surface and maintains soil surface integrity. Soil Stability class

is anticipated to be 4 or greater.

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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 Moderate.
- 
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 Grasses > Shrubs > Short stature Grasses > 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):** 2900 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:** Greasewood, Inland saltgrass Cheatgrass, Rubber rabbitbrush and Species found on Noxious Weed List
- 
17. **Perennial plant reproductive capability:** All species are capable of reproducing

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