USDA Natural Resources Conservation Service

Ecological site R061XY142WY
Saline Subirrigated (SS) 15-19" Precipitation Zone, Black Hills

Accessed: 04/30/2024

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.

Associated sites

R061XY128WY	**Lowland (LL) 15-19" Precipitation Zone, Black Hills**
R061XY130WY	**Overflow (Ov) 15-19" Precipitation Zone, Black Hills**

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site normally occurs on nearly level bottomlands and adjacent to streams, springs and ponds.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Drainageway (3) Stream terrace
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Occasional to frequent
Ponding frequency	None
Elevation	1,067–1,524 m
Slope	0–6%
Ponding depth	0 cm
Water table depth	0–76 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

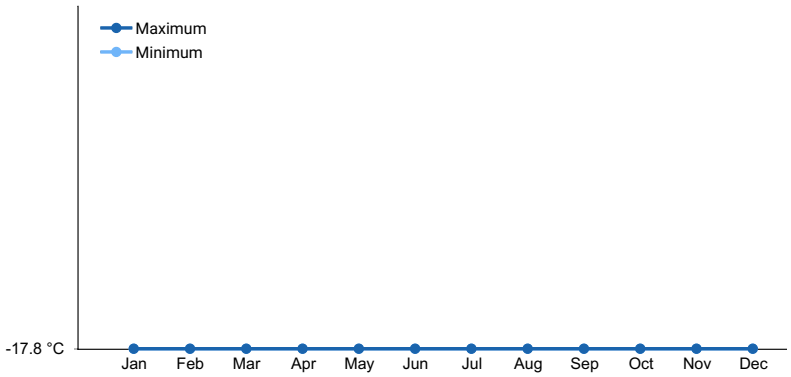

Figure 1. Monthly average minimum and maximum temperature

Influencing water features

Stream Type: C (Rosgen)

Soil features

The soils of this site have a strong saline and/or alkaline water table within reach of plant species during most of the growing season. Salt crusts are commonly found on ridges and mounds during the dry periods. Moisture is not usually the factor limiting plant production. 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) Loam (2) Very fine sandy loam (3) Clay loam

Family particle size	(1) Loamy
Drainage class	Poorly drained to moderately well drained
Permeability class	Moderately slow to moderately rapid
Soil depth	51–152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	7.11–15.75 cm
Calcium carbonate equivalent (0-101.6cm)	0–10%
Electrical conductivity (0-101.6cm)	4–16 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	10–25
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%

Ecological dynamics

Ecological Dynamics of the Site:

As this site deteriorates, species such as inland saltgrass, and greasewood increase. Grasses such as alkali sacaton and alkali cordgrass 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-tem 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
Alkali Sacaton/ Alkali cordgrass

Community 1.1
Alkali Sacaton/ Alkali cordgrass

Alkali sacaton/Alkali cordgrass 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 alkali cordgrass, rhizomatous wheatgrass, and alkali sacaton. Grasses of lesser importance are alkali bluegrass, inland saltgrass and mat muhly. Woody plants are greasewood and rubber rabbitbrush. Pursh seepweed is the most common forb. The total annual production (air-dry weight) of this state is about 4000 pounds per acre, but it can range from about 2500 lbs/acre in unfavorable years to about 5000 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 this plant community to the Inland saltgrass/Greasewood Plant Community. • Frequent and Severe grazing will convert this plant community to the Salt cedar/Leafy spurge Plant Community.

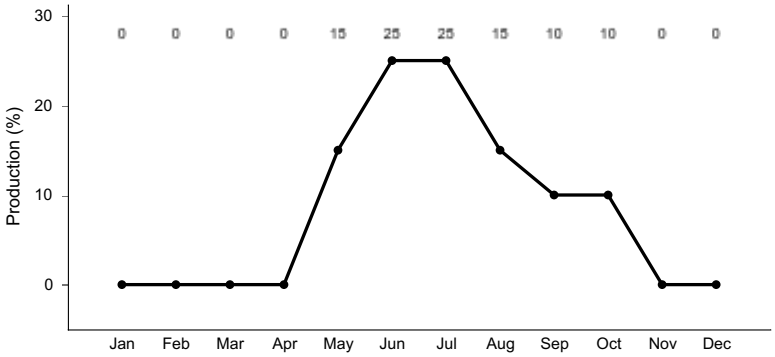

Figure 3. Plant community growth curve (percent production by month). WY1603, 15-19BL Free water sites - WL, Sb, SS.

State 2
Inland Saltgrass/ Greasewood

Community 2.1
Inland Saltgrass/ Greasewood

Inland saltgrass/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 inland saltgrass, alkali bluegrass, alkali sacaton, mat muhly, rhizomatous wheatgrass, and cheatgrass. Forbs, commonly found in this plant community, include Pursh seepweed, Louisiana sagewort (cudweed), plains wallflower, hairy goldaster, and scarlet globemallow. Greasewood and rubber rabbitbrush canopy cover may be 20-40%. When compared to the Historic Climax Plant Community, alkali sacaton has decreased. Greasewood and rubber rabbitbrush have increased. The overstory of greasewood and understory of grass and forbs provide a diverse plant community, which 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 2350 pounds per acre, but it can range from about 2000 lbs/acre in unfavorable years to about 2700 lbs/acre in above average years. The 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 will convert this plant community to the Salt cedar/Leafy spurge Plant Community.

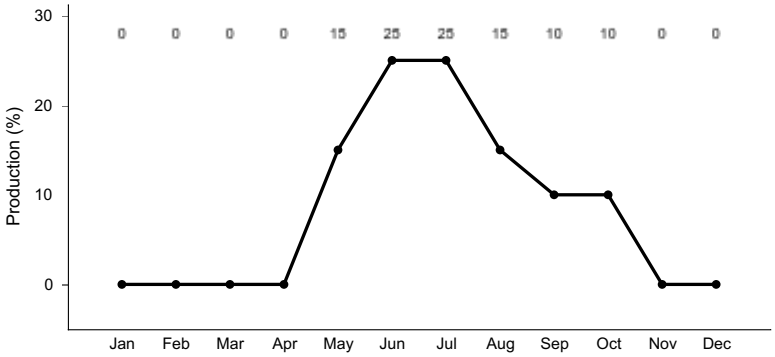

Figure 4. Plant community growth curve (percent production by month). WY1603, 15-19BL Free water sites - WL, Sb, SS.

State 3
Saltceder/ Leafy spurge

Community 3.1
Saltceder/ Leafy spurge

Salt cedar/Leafy spurge Plant Community This plant community is the result of long-term improper grazing use. Salt cedar and Russian olive dominate this state. Understory grasses are inland saltgrass, cheatgrass, foxtail barley, alkali muhly, and alkali bluegrass. Leafy spurge may invade. The total annual production (air-dry weight) of this state is about 1250 pounds per acre, but it can range from about 1100 lbs/acre in unfavorable years to about 1400 lbs/acre in above average years. Bare ground has increased. The soil of this state is not well protected. The watershed is functioning but may produce excessive runoff. Transitional pathways leading to other plant communities are as follows: • Prescribed Grazing along with weed control over the long-term will return this state to near Historic climax plant community, except that salt cedar and Russian olive will persist.

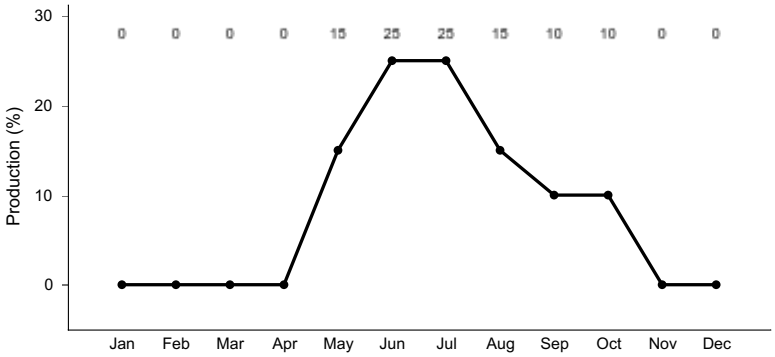

Figure 5. Plant community growth curve (percent production by month). WY1603, 15-19BL Free water sites - WL, Sb, SS.

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				1121–1793	
	alkali cordgrass	SPGR	*Spartina gracilis*	1121–1793	–
2				897–1569	
	alkali sacaton	SPAI	*Sporobolus airoides*	897–1569	–
3				448–897	
	western wheatgrass	PASM	*Pascopyrum smithii*	448–897	–
4				224–448	
	saltgrass	DISP	*Distichlis spicata*	224–448	–
5				224–448	
	Sandberg bluegrass	POSE	*Poa secunda*	224–448	–
6				0–224	
	mat muhly	MURI	*Muhlenbergia richardsonis*	0–224	–
7				0–224	
	spike sedge	CANA2	*Carex nardina*	0–224	–
8				0–224	
	Grass, perennial	2GP	*Grass, perennial*	0–224	–
Forb					
9				0–224	
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0–224	–
10				0–224	
	Forb, perennial	2FP	*Forb, perennial*	0–224	–
Shrub/Vine					
11				0–448	
	greasewood	SAVE4	*Sarcobatus vermiculatus*	0–448	–
12				0–224	
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–224	–
13				0–224	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–224	–

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.

Inland saltgrass/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.

Salt cedar/Leafy spurge: This plant community exhibits a low level of plant species diversity. It may provide thermal and escape cover for deer and antelope. In most cases it is not a desirable plant community to select as a wildlife

habitat management objective.

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 (Lbs/acre)	Carrying Capacity* (AUM/ac)
Historic Climax Plant Community	2850-3650	1.5
Inland saltgrass/Greasewood	2000-2700	1.2
Salt cedar/Leafy spurge	1100-1400	.4

* - 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

Salinity/alkalinity is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group C and D. Infiltration ranges from moderately slow to moderately well. 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 are 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 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

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

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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 slow to moderate.

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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 is present. Some surface crusting of salts due to fluctuation of water table.

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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:

    Sub-dominant:

    Other:

    Additional: Mid stature Warm Season Grasses > Short and Mid stature Cool Season Grasses/Grasslike >Shrubs > Forbs

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

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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):** 4000 lbs/ac

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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:** Inland saltgrass, Greasewood, Rubber rabbitbrush, Cheatgrass, Foxtail barley, 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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