

FORAGE SUITABILITY GROUP (FSG)

Claypan

FSG No.: G061XY800SD

Major Land Resource Area (MLRA): 061X - Black Hills Foot Slopes

Physiographic Features

These soils are found on terraces.

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	3000	5500
Slope (percent):	0	4
Flooding:		
Frequency:	None	None
Duration:	None	None
Ponding:		
Depth (inches):		
Frequency:	None	None
Duration:	None	None
Runoff Class:	High	Very high



Climatic Features

The climate of MLRA 61 is influenced by the Black Hills. Annual precipitation is generally higher than the surrounding plains, and lower than the higher-elevation central Black Hills which it surrounds.

Annual precipitation varies widely from year to year in MLRA 61. Average annual precipitation for all climate stations listed below is about 18 inches, with about 74 percent of that occurring during the months of April through September. On average, there are about 27 days with greater than .1 inches of precipitation during the same time period.

Average annual snowfall ranges from 36 inches at Rapid City, South Dakota (SD), to 80 inches at Hulett, Wyoming (WY). Days with snow cover at depths greater than 1 inch range from 39 days at Belle Fourche and Rapid City in SD, to 70 days at Upton in WY.

Average July temperatures across the MLRA are about 72°F and average January temperatures are about 22°F. Recorded temperature extremes in the MLRA during the years 1961 to 1990 are a low of -44°F and a high of 110 both recorded at Belle Fourche. The MLRA lies mostly in USDA Plant Hardiness Zones 4a and 4b.

At Rapid City, SD, the closest station with records, it is cloudy about 139 days a year. Average morning relative humidity in June is about 78 percent and average afternoon humidity is 49 percent.

The climate data listed in the tables below represent high and low ranges and averages for the climate stations and dates listed. For additional climate data access the National Water and Climate Center at <http://www.wcc.nrcs.usda.gov>.

	From	To
Freeze-free period (28 deg)(days): (9 years in 10 at least)	111	146
Last Killing Freeze in Spring (28 deg): (1 year in 10 later than)	May 29	May 12
Last Frost in Spring (32 deg): (1 year in 10 later than)	Jun 21	May 22
First Frost in Fall (32 deg): (1 year in 10 earlier than)	Aug 30	Sep 13

	From	To
First Killing Freeze in Fall (28 deg): (1 year in 10 earlier than)	Sep 07	Sep 23
Length of Growing Season (32 deg)(days): (9 years in 10 at least)	81	123
Growing Degree Days (40 deg):	3934	4773
Growing Degree Days (50 deg):	2221	2664
Annual Minimum Temperature:	-30	-20
Mean annual precipitation (inches):	15	22

Monthly precipitation (inches) and temperature (F):

2 years in 10:	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
Precip. Less Than	0.19	0.26	0.43	0.87	1.49	1.52	0.93	0.68	0.41	0.50	0.26	0.28
Precip. More Than	0.68	0.84	1.50	3.04	4.25	4.71	2.95	2.38	2.16	1.88	0.95	0.90
Monthly Average:	0.49	0.59	1.06	2.16	3.09	3.33	2.04	1.61	1.42	1.26	0.68	0.67
Temp. Min.	10.2	14.7	21.8	32.0	42.0	51.3	57.5	55.1	44.6	34.3	22.5	12.6
Temp. Max.	34.1	39.1	46.5	58.4	68.8	78.9	87.1	85.8	74.7	62.9	46.5	36.1
Temp. Avg.	21.7	26.6	33.6	44.6	54.7	64.4	71.5	69.7	58.9	48.0	34.0	24.1

<u>Climate Station</u>	<u>Location</u>	<u>From</u>	<u>To</u>
SD3069	Ft. Meade, SD	1961	1990
SD0559	Belle Fourche	1961	1990
SD7882	Spearfish, SD	1961	1990
SD6947	Rapid City, SD	1961	1991
SD6937	Rapid City WSO AP, SD	1961	1990
WY4760	Hulett, WY	1961	1990
WY6660	Newcastle, WY	1961	1990
WY9205	Upton, WY	1961	1990

Soil Interpretations

This group consists of moderately well drained soils formed in alluvial deposits and other sediments. They have claypan subsoils with very slow permeability. The underlying material and lower part of the subsoil typically have high amounts of soluble salts and are sodic.

Drainage Class:	Moderately well drained	To	Moderately well drained
Permeability Class: (0 - 40 inches)	Very slow	To	Very slow
Frost Action Class:	Low	To	Low

	<u>Minimum</u>	<u>Maximum</u>
Depth:	40	
Surface Fragments >3" (% Cover):		
Organic Matter (percent): (surface layer)	0.5	1.0
Electrical Conductivity (mmhos/cm): (0 - 24 inches)	0	16
Sodium Absorption Ratio: (0 - 12 inches)	0	10
Soil Reaction (1:1) Water (pH): (0 - 12 inches)	5.1	7.3
Available Water Capacity (inches): (0 - 60 inches)	6	8
Calcium Carbonate Equivalent (0 - 12 inches)	0	0

Soil Map Unit Component List (Some phases of these soils may also occur in other groups)

Demar

Adapted Species List

The following forage species are considered adapted to grow on the soils in this group. Additional information concerning plant characteristics of a number of the listed species as well as individual cultivars of many of those species can be accessed on the web at <http://plants.usda.gov>.

<u>Cool Season Grasses</u>	<u>Symbol</u>		<u>Legumes</u>	<u>Symbol</u>	
Beardless wildrye	AGCR	F	Alfalfa	MEDIC	F
Crested wheatgrass	AGCR	F			
Green needlegrass	NAVI4	F			
Intermediate wheatgrass	THIN6	F			
Newhy hybrid wheatgrass		F			
Pubescent wheatgrass	THIN6	F			
Russian wildrye	PSJU3	F			
Slender wheatgrass	ELTR7	F			
Tall wheatgrass	THPO7	G			
Western wheatgrass	PASM	G			

G - Good adaptation for forage production on this group of soils in this MLRA

F - Fair adaptation but will not produce at its highest potential

Production Estimates

Production estimates listed here should only be used for making general management recommendations. Onsite production information should always be used for making detailed planning and management recommendations.

The high forage production estimates listed below are based on dense, vigorous stands of climatically adapted, superior performing cultivars. They are properly fertilized for high yields and pest infestations are kept below economic thresholds. Mechanical harvests are managed to maintain stand life by cutting at appropriate stages of maturity and harvest intervals. If grazed, optimum beginning and ending grazing heights are adhered to. Adequate time is allowed for plant recovery before entering winter dormancy under both uses.

The production estimates listed below represent total annual above ground plant production on an air-dry-matter basis. Estimates of hay and grazing yields can be calculated from these numbers by multiplying them by the expected harvest efficiency. A 70 percent harvest efficiency is commonly used when converting to hay yields. Pasture harvest efficiency is highly dependent on the grazing management system applied, ranging from 25 to 50 percent.

Forage Crop	<u>Dryland</u>	
	Management Intensity	
	<u>Low</u> (lbs/ac)	<u>High</u> (lbs/ac)
Alfalfa	1900	4200
Alfalfa/Crested wheatgrass	1500	3000
Alfalfa/Intermediate	1600	3500
Alfalfa/Pubescent wheatgrass	1600	3500
Crested wheatgrass	1400	3000
Intermediate wheatgrass	1400	3200
Pubescent wheatgrass	1400	3200
Western wheatgrass	1000	2200

Forage Growth Curves

Growth curves estimate the seasonal distribution of growth of the various forage crops. They indicate when the forages may be available for grazing or mechanical harvest.

Growth Curve Number: SD0002
Growth Curve Name: Alfalfa
Growth Curve Description: MLRA 65, 64, 60A

<u>Percent Production by Month</u>											
<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
0	0	0	5	35	35	15	5	5	0	0	0

Growth Curve Number: SD0004
Growth Curve Name: Cool season grass
Growth Curve Description: Cool season grass, statewide

<u>Percent Production by Month</u>											
<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
0	0	0	10	40	30	10	5	5	0	0	0

Soil Limitations

These soils have severe limitations to the production of climatically adapted forage species. The claypan and the soluble salts and sodicity in the subsoil produce an unfavorable rooting environment, limiting species selection, and production potential.

Management Interpretations

The impact on yields can be reduced by selecting forage species that are tolerant of salinity and sodicity and can root in dense, clayey subsoils.

FSG Documentation

Similar FSG's:

FSG ID
G061XY210SD

FSG Narrative

Clayey subsoils are less saline and/or sodic and have a more favorable rooting zone.

Inventory Data References:

Agriculture Handbook 296-Land Resource Regions and Major Land Resource Areas
 Natural Resources Conservation Service (NRCS) National Water and Climate Center data
 USDA Plant Hardiness Zone Maps
 National Soil Survey Information System for soil surveys in South Dakota and Wyoming counties in MLRA 61.
 NRCS Wyoming Field Office Technical Guide and South Dakota Technical Guide
 NRCS National Range and Pasture Handbook
 Various Agricultural Research Service, Cooperative Extension Service, and NRCS research trials for plant adaptation and production.

State Correlation:

This site has been correlated with the following states: South Dakota and Wyoming

Forage Suitability Group Approval:

Original Author: Tim Nordquist
Original Date: 4/29/2003
Approval by: Dave Schmidt
Approval Date: 9/21/04