FORAGE SUITABILITY GROUP (FSG)

Limy Upland

FSG No.: G061XY400SD
Major Land Resource Area (MLRA): 061X - Black Hills Foot Slopes

Physiographic Features

The soils in this group are found on upland slopes, fans, and terraces.

	Minimum	Maximum
Elevation (feet):	3000	5500
Slope (percent):	1	15
Flooding:		
Frequency:	None	Rare
Duration:	None	Very Brief
Ponding:		
Depth (inches):		
Frequency:	None	None
Duration:	None	None
Runoff Class:	Low	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

	From	To
First Frost in Fall (32 deg): (1 year in 10 earlier than)	Aug 30	Sep 13
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:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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

Climate Station	Location	From	To
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

These are moderately deep to very deep, well to excessively drained, medium to moderately fine textured soils with elevated calcium carbonate levels near the soil surface. Permeability ranges from moderately slow to moderately rapid, and available water capacities range from low to high.

Drainage Class:	Well drained	To	Somewhat excessively drained
Permeability Class: (0 - 40 inches)	Moderately slow	To	Moderately rapid
Frost Action Class:	Low	To	Moderate

	Minimum	Maximum
Depth:	20	
Surface Fragments >3" (% Cover):	0	3
Organic Matter (percent): (surface layer)	0.5	3.0
Electrical Conductivity (mmhos/cm): (0 - 24 inches)	0	8
Sodium Absorption Ratio: (0 - 12 inches)	0	13
Soil Reaction (1:1) Water (pH): (0 - 12 inches)	7.4	8.4
Available Water Capacity (inches): (0 - 60 inches)	4	12
Calcium Carbonate Equivalent (0 - 12 inches)	0	28

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

Colby	Manvel	Suglo
Gypnevee	Minnequa	Winetti
Gystrum	Nevee	Zigweid

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.

Cool Season Grasses	Symbol		Warm Season Grasses	Symbol	
Altai wildrye	LEAN3	F	Big bluestem	ANGE	G
Crested wheatgrass	AGCR	G	Little bluestem	SCSC	G
Green needlegrass	NAVI4	F	Prairie sandreed	CALO	F
Intermediate wheatgrass	THIN6	F	Sideoats grama	BOCU	G
Newhy hybrid wheatgrass		F	**Legumes**		
Pubescent wheatgrass	THIN6	G	Alfalfa	MEDIC	G
Russian wildrye	PSJU3	G	Cicer milkvetch	ASCI4	G
Streambank wheatgrass	ELLAL	G	Purple prairieclover	DAPUP	F
Thickspike wheatgrass	ELMA7	G	Sainfoin	ONVI	F
Western wheatgrass	PASM	G	White prairieclover	DACAC	F

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	Dryland Management Intensity	
	Low (lbs/ac)	High (lbs/ac)
Alfalfa/Crested wheatgrass	2000	4600
Alfalfa/Intermediate	2300	4600
Crested wheatgrass	2100	4200
Green needlegrass	1400	2900
Intermediate wheatgrass	2100	4000
Little bluestem	2100	4000
Western wheatgrass	1200	2900

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

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	40	30	10	5	5	0	0	0

Growth Curve Number: SD0005
Growth Curve Name: Warm season grass
Growth Curve Description: Warm season grass, statewide

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	10	40	35	15	0	0	0	0

Soil Limitations

The primary limitation to the soils in this group is the high lime content close to the soil surface. The lime reduces the availability of some plant nutrients. This reduces species choices and yield potential. Also, because most of these are sloping soils, they are subject to water and wind erosion, especially when establishing or renovating stands. They also tend to be droughty, especially those with lower available water capacity.

Management Interpretations

The impact on yields can be reduced by selecting forage species that are tolerant of the high lime levels inherent to these soils and also to droughty conditions. Including sod forming grass species in stands, especially on steeper slopes will reduce the potential for sheet and rill erosion. Incorporate both wind and water erosion control practices during the establishment period. Properly locating facilitating practices such as fences, lanes, and water developments can help control livestock movement, reduce trailing perpendicular to steeper slopes, and evenly distribute grazing pressure.

FSG Documentation

Similar FSG's:

FSG ID	FSG Narrative
G061XY100SD	Loamy soils do not have as high a lime content near the surface and are more productive.

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