

## FORAGE SUITABILITY GROUP (FSG)

### Clayey Subsoil

FSG No.: G062XY210SD

Major Land Resource Area (MLRA): 062X - Black Hills

#### Physiographic Features

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

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	3600	6600
<b>Slope (percent):</b>	0	15
<b>Flooding:</b>		
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Ponding:</b>		
<b>Depth (inches):</b>		
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Runoff Class:</b>	Medium	Very high



#### Climatic Features

The climate of MLRA 62 is influenced by the mountainous Black Hills. Annual precipitation is generally higher and temperature is lower than the plains and foothills which surround it. Growing season length is considerably reduced with the potential for frost at the higher elevations occurring virtually every month of the year.

Annual precipitation varies widely from year to year in MLRA 62. Average annual precipitation for all climate stations listed below is about 24 inches, with about 73 percent of that occurring during the months of April through September. On average, there are about 34 days with greater than .1 inches of precipitation during the same time period. Precipitation is less than needed for optimum forage production and is the single largest factor limiting production from this group on non-irrigated lands.

Average annual snowfall ranges from 42 inches at Custer, South Dakota (SD), to 164 inches at Lead, SD. Days with snow cover at depths greater than 1 inch range from 18 days at Deadwood, SD, to 120 days at Alva, Wyoming (WY).

Average July temperatures across the MLRA are about 67°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 -43°F at Custer, and a high of 102 at both Alva and Deadwood. The MLRA lies in USDA Plant Hardiness Zones 4b and 5a.

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>.

	<b>From</b>	<b>To</b>
<b>Freeze-free period (28 deg)(days):</b> (9 years in 10 at least)	89	127
<b>Last Killing Freeze in Spring (28 deg):</b> (1 year in 10 later than)	Jun 08	May 23
<b>Last Frost in Spring (32 deg):</b> (1 year in 10 later than)	Jul 03	Jun 03

	<b>From</b>	<b>To</b>
<b>First Frost in Fall (32 deg):</b> (1 year in 10 earlier than)	Aug 20	Sep 10
<b>First Killing Freeze in Fall (28 deg):</b> (1 year in 10 earlier than)	Aug 30	Sep 20
<b>Length of Growing Season (32 deg)(days):</b> (9 years in 10 at least)	52	111
<b>Growing Degree Days (40 deg):</b>	2940	4191
<b>Growing Degree Days (50 deg):</b>	1375	2206
<b>Annual Minimum Temperature:</b>	-30	-20
<b>Mean annual precipitation (inches):</b>	19	29

**Monthly precipitation (inches) and temperature (F):**

<b>2 years in 10:</b>	<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>
<b>Precip. Less Than</b>	0.35	0.40	0.70	1.41	1.77	1.90	1.45	0.94	0.65	0.68	0.46	0.51
<b>Precip. More Than</b>	1.03	1.30	2.24	4.03	5.87	5.80	3.92	2.83	2.72	2.06	1.30	1.31
<b>Monthly Average:</b>	0.71	0.89	1.52	2.80	3.98	3.99	2.77	1.96	1.78	1.38	0.90	0.92
<b>Temp. Min.</b>	10.2	13.9	19.1	28.4	37.7	46.6	52.9	50.7	41.0	31.7	20.9	12.7
<b>Temp. Max.</b>	33.9	37.8	43.0	52.6	62.9	73.0	81.0	79.6	69.1	58.1	44.1	35.8
<b>Temp. Avg.</b>	22.1	25.8	31.1	40.5	50.3	59.8	66.9	65.2	55.1	44.9	32.5	24.3

<b><u>Climate Station</u></b>	<b><u>Location</u></b>	<b><u>From</u></b>	<b><u>To</u></b>
SD2207	Deadwood, SD	1961	1990
SD4834	Lead, SD	1961	1990
SD5870	Mt. Rushmore, SD	1961	1990
SD6427	Pactola Dam, SD	1961	1990
SD2087	Custer, SD	1961	1990
WY0200	Alva, WY	1961	1990

**Soil Interpretations**

The clayey subsoil group consists of well drained, moderately deep to very deep, medium to fine textured soils formed from fine textured alluvium and materials weathered from shale, mudstone, and other sedimentary rock formations. Available water capacity ranges from low to high, and permeability is moderately slow to very slow.

<b>Drainage Class:</b>	Well drained	To	Well drained
<b>Permeability Class:</b> (0 - 40 inches)	Moderately slow	To	Very Slow
<b>Frost Action Class:</b>	Low	To	Moderate

	<b><u>Minimum</u></b>	<b><u>Maximum</u></b>
<b>Depth:</b>	20	
<b>Surface Fragments &gt;3" (% Cover):</b>	0	3
<b>Organic Matter (percent):</b> (surface layer)	1.0	6.0
<b>Electrical Conductivity (mmhos/cm):</b> (0 - 24 inches)	0	2
<b>Sodium Absorption Ratio:</b> (0 - 12 inches)	0	0
<b>Soil Reaction (1:1) Water (pH):</b> (0 - 12 inches)	5.6	8.4
<b>Available Water Capacity (inches):</b> (0 - 60 inches)	3	11
<b>Calcium Carbonate Equivalent</b> (0 - 12 inches)	0	9

**Soil Map Unit Component List** (Some phases of these soils may also occur in other FSG's.)

Heath	Lail	Stovho
Judy	Metre	

**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://www.plants.gov>.

<u>Cool Season Grasses</u>	<u>Symbol</u>		<u>Legumes</u>	<u>Symbol</u>	
Crested wheatgrass	AGCR	G	Alsike clover	TRHY	G
Green needlegrass	NAVI4	G	Canada milkvetch	ASCAC6	G
Intermediate wheatgrass	THIN6	G	Cicer milkvetch	ASCI4	G
Meadow brome	BRBI2	F	Illinois bundleflower	DEIL	G
Mountain brome	BRMA4	G	Purple prairieclover	DAPUP	G
Pubescent wheatgrass	THIN6	G	Red clover	TRPR2	G
Smooth brome	BRINI2	G	Sainfoin	ONVI	G
Tall wheatgrass	THPO7	F	White prairieclover	DACAC	G
Timothy	PHLEU	G	<u>Other Perennial Forbs</u>	<u>Symbol</u>	
Western wheatgrass	PASM	G	Small burnet	SAMI3	G
<u>Warm Season Grasses</u>	<u>Symbol</u>				
Big bluestem	ANGE	F			
Little bluestem	SCSC	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	<u>Dryland</u>	
	Management Intensity	
	<u>Low</u> (lbs/ac)	<u>High</u> (lbs/ac)
Crested wheatgrass	2300	4600
Green needlegrass	1600	3400
Intermediate wheatgrass	2000	4900
Smooth brome	2000	4900
Switchgrass	2700	5700
Western wheatgrass	1300	3300

**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:** SD0006  
**Growth Curve Name:** Legumes  
**Growth Curve Description:** Alsike clover, Red Clover, Cicer Milk vetch, MLRA 62

**Percent Production by Month**

<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	0	35	40	15	5	5	0	0	0

**Growth Curve Number:** SD0007  
**Growth Curve Name:** Cool season grass  
**Growth Curve Description:** Cool season grass, MLRA 62

**Percent Production by Month**

<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	40	35	10	5	5	0	0	0

**Growth Curve Number:** SD0008  
**Growth Curve Name:** Warm season grass  
**Growth Curve Description:** Warm season grass, MLRA 62

**Percent Production by Month**

<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	0	10	35	40	15	0	0	0	0

**Soil Limitations**

The primary limiting factors to these soils are their tight, slowly permeable nature. Because of their slow water intake runoff is increased causing the soils to be droughty. This will be especially apparent on those soils with lower available water holding capacity. On steeper slopes, water erosion is a potential problem during establishment, when renovating stands, and in thin established stands. Livestock trail erosion is a potential problem in established stands.

**Management Interpretations**

The impact on yields due to the tight, slowly permeable nature of these soils can be reduced by selecting species adapted to those soil conditions when establishing new stands or renovating stands. Including sod forming grass species in stands, especially on steeper slopes will reduce the potential for sheet and rill erosion. Incorporate 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**

**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 62.  
 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:** 6/25/2003  
**Approval by:** Dave Schmidt  
**Approval Date:** 9/21/04