

## FORAGE SUITABILITY GROUP (FSG)

### Claypan

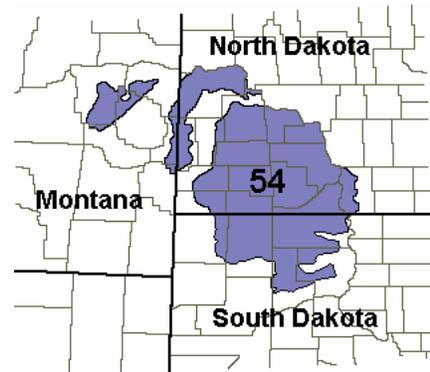
FSG No.: G054XY800ND

Major Land Resource Area (MLRA): 54 - Rolling Soft Shale Plain

#### Physiographic Features

These soils are found on uplands, fans, and terraces.

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	1600	3600
Slope (percent):	0	15
<b>Flooding:</b>		
Frequency:	None	None
Duration:	None	None
<b>Ponding:</b>		
Depth (inches):		
Frequency:	None	None
Duration:	None	None
Runoff Class:	Negligible	Very high



#### Climatic Features

This group occurs in a mid-continental climate characterized by wide seasonal temperature and precipitation fluctuations and extremes.

Annual precipitation varies widely from year to year in MLRA 54. Average annual precipitation for all climate stations listed below is about 17 inches. About 78 percent of that occurs during the months of April through September. On average, there are about 25 days with greater than .1 inches of precipitation during the same time period.

Average annual snowfall ranges from 23 inches at McLaughlin, South Dakota (SD), to 48 inches at Glad Valley, SD. Snow cover at depths greater than 1 inch range from 20 days at Bison, SD, to 92 days at Hebron, North Dakota (ND).

Average July temperatures are about 71°F and average January temperatures are about 13°F. Recorded temperature extremes in the MLRA during the years 1961 to 1990 are a low of -49°F at Breien, ND, and a high of 111 recorded at Hettinger, ND. The MLRA lies in USDA Plant Hardiness Zones 3b, 4a, and 4B.

At Bismarck, the closest station with such records, the average morning relative humidity in June is about 84 percent and average afternoon humidity is 55 percent. It is cloudy an average of 165 days a year.

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)	108	140
<b>Last Killing Freeze in Spring (28 deg):</b> (1 year in 10 later than)	May 31	May 12
<b>Last Frost in Spring (32 deg):</b> (1 year in 10 later than)	Jun 07	May 23

	<b>From</b>	<b>To</b>
<b>First Frost in Fall (32 deg):</b> (1 year in 10 earlier than)	Aug 29	Sep 11
<b>First Killing Freeze in Fall (28 deg):</b> (1 year in 10 earlier than)	Sep 07	Sep 23
<b>Length of Growing Season (32 deg)(days):</b> (9 years in 10 at least)	93	122
<b>Growing Degree Days (40 deg):</b>	3774	4647
<b>Growing Degree Days (50 deg):</b>	2033	2700
<b>Annual Minimum Temperature:</b>	-35	-20
<b>Mean annual precipitation (inches):</b>	16	18

**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>	0.12	0.10	0.32	0.56	1.08	1.75	0.92	0.76	0.37	0.22	0.13	0.16
<b>Precip. More Than</b>	0.80	0.80	1.61	3.17	4.32	4.95	3.48	2.76	2.29	1.72	0.91	0.96
<b>Monthly Average:</b>	0.33	0.36	0.81	1.90	2.66	3.22	2.19	1.68	1.45	1.00	0.74	0.41
<b>Temp. Min.</b>	-2.0	4.4	16.0	28.7	40.2	50.1	54.6	52.2	41.4	31.0	16.8	3.0
<b>Temp. Max.</b>	27.2	32.9	43.3	58.9	70.8	80.7	89.2	88.1	76.2	63.4	44.0	29.9
<b>Temp. Avg.</b>	12.7	18.5	29.2	43.4	55.1	64.9	71.3	69.5	57.9	46.4	30.1	16.5

<b><u>Climate Station</u></b>	<b><u>Location</u></b>	<b><u>From</u></b>	<b><u>To</u></b>
ND0766	Beulah, ND	1961	1990
ND1052	Breien, ND	1961	1990
ND1370	Carson, ND	1961	1990
ND2183	Dickinson, ND	1961	1990
ND2365	Dunn Center, ND	1961	1990
ND4102	Hebron, ND	1964	1990
ND4178	Hettinger, ND	1961	1990
ND5479	Mandan Exp Station, ND	1961	1990
SD0701	Bison, SD	1961	1990
SD2429	Dupree, SD	1961	1990
SD2852	Faith, SD	1961	1990
SD3316	Glad Valley, SD	1961	1990
SD4864	Lemmon, SD	1961	1990
SD5046	McLaughlin, SD	1961	1990
SD5381	McIntosh, SD	1961	1990
SD8528	Usta, SD	1961	1990

**Soil Interpretations**

This group consists of moderately well and well drained, moderately coarse to moderately fine textured soils formed from alluvium and residuum. They have claypan subsoils with slow permeability. The underlying material and lower part of the subsoil typically have high amounts of soluble salts and are alkaline.

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

	<u>Minimum</u>	<u>Maximum</u>
<b>Depth:</b>	72	
<b>Surface Fragments &gt;3" (% Cover):</b>	0	3
<b>Organic Matter (percent):</b>	1.0	6.0
<b>Electrical Conductivity (mmhos/cm):</b> (0 - 24 inches)	8	16
<b>Sodium Absorption Ratio:</b> (0 - 12 inches)	0	25
<b>Soil Reaction (1:1) Water (pH):</b> (0 - 12 inches)	5.1	8.4
<b>Available Water Capacity (inches):</b> (0 - 60 inches)	2	8
<b>Calcium Carbonate Equivalent (percent):</b> (0 - 12 inches)	0	20

### 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 at <http://plants.usda.gov/>

<u>Cool Season Grasses</u>	<u>Symbol</u>	<u>Adapted</u>	<u>Warm Season Grasses</u>	<u>Symbol</u>	<u>Adapted</u>
Beardless wildrye	LETR5	F	Blue grama	BOGR2	F
Crested wheatgrass	AGCR	F	<u>Legumes</u>		
Dahurian wildrye	ELDA3	F	Alfalfa	MESA	F
Green needlegrass	NAVI4	F	Hairy Vetch	VIVI	F
Newhy hybrid wheatgrass		F	Sweetclover	MELIL	F
Russian wildrye	PSJU3	F			
Slender wheatgrass	ELTR7	G			
Tall wheatgrass	THPO7	F			
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 a 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**

**Management Intensity**

	<b>High (lbs/ac)</b>	<b>Low (lbs/ac)</b>
Alfalfa	4200	1900
Alfalfa/Crested wheatgrass	3000	1500
Alfalfa/Intermediate wheatgrass	3500	1600
Alfalfa/Pubescent wheatgrass	3500	1600
Crested wheatgrass	3000	1400
Intermediate wheatgrass	3200	1400
Pubescent wheatgrass	3200	1400
Western wheatgrass	2200	1000

**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:** ND0003

**Growth Curve Name:** Warm season grass

**Growth Curve Description:** Warm season grass

**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	40	35	15	0	0	0	0

**Growth Curve Number:** ND0001

**Growth Curve Name:** Alfalfa

**Growth Curve Description:** Alfalfa

**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	25	30	20	15	5	0	0	0

**Growth Curve Number:** ND0002

**Growth Curve Name:** Cool season grass

**Growth Curve Description:** Cool season grass

**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

**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.

Pasture and hayland can include considerations for wildlife. Delaying grazing on portions of the pasture or rotating pastures will allow nest initiation of grassland nesting birds or species of concern. Nest initiation of most grassland nesting birds occurs from April 15 to June 1. Delaying haying until after July 15 allows for most species to fledge their young. Consider planting species with later maturity to allow for harvesting after nests have fledged. Avoid mowing around the field. Mow back and forth or from the inside to the outside of the field. Consider using flushing bars on swathers and mowers.

## **FSG Documentation**

### **Similar FSG's:**

#### **FSG ID**

G054XY210SD

#### **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 North Dakota, South Dakota, and Montana counties in MLRA 54

NRCS North Dakota and Montana 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: Montana, North Dakota, and South Dakota

### **Forage Suitability Group Approval:**

Original Author: Tim Nordquist

Original Date: 2/25/03

Approval by: Dave Schmidt

Approval Date: 9/15/04