

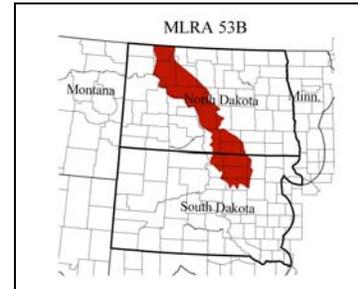
FORAGE SUITABILITY GROUP CLAYEY SUBSOIL

FSG No.: G053BY210ND

Major Land Resource Area: 53B - Central Dark Brown Glaciated Plains

Physiographic Features

The soils in this group are found on glacial till and outwash plains, stream terraces, and flood plains.



	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	1640	1970
Slope (percent):	0	9
Flooding:		
Frequency:	None	Rare
Duration:	None	Brief
Ponding:		
Depth (inches):		
Frequency:	None	None
Duration:	None	None
Runoff Class:	Low	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 53B. Average annual precipitation for all climate stations listed below is about 17 inches. About 79 percent of that occurs 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 frame. 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 21 inches at Turtle Lake, ND to 38 inches at Eureka, SD. Snow cover at depths greater than 1 inch, range from 22 days at Garrison, ND to 100 days at Max, ND.

Average July temperatures are about 70 degrees F., and average January temperatures are about 8 degrees F. Recorded temperature extremes in the MLRA during the years 1961 to 1990 are a low of -48 degrees F. at Powers Lake, ND, and a high of 111 degrees F. recorded at Linton, ND. The MLRA lies in USDA Plant Hardiness Zones 3b and 4a.

At Bismarck 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>.

	<u>From</u>	<u>To</u>
Freeze-free period (28 deg)(days): (9 years in 10 at least)	100	134
Last Killing Freeze in Spring (28 deg): (1 year in 10 later than)	Jun 06	May 16
Last Frost in Spring (32 deg): (1 year in 10 later than)	Jun 18	May 26
First Frost in Fall (32 deg): (1 year in 10 earlier than)	Aug 23	Sep 12
First Killing Freeze in Fall (28 deg): (1 year in 10 earlier than)	Sep 02	Sep 19
Length of Growing Season (32 deg)(days): (9 years in 10 at least)	78	116
Growing Degree Days (40 deg):	3317	4367
Growing Degree Days (50 deg):	1793	2441
Annual Minimum Temperature:	-35	-25
Mean annual precipitation (inches):	15	19

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	0.17	0.14	0.26	0.37	0.95	1.79	0.86	0.65	0.65	0.22	0.13	0.23
Precip. More Than	0.63	0.80	1.96	3.53	3.81	4.82	3.82	2.89	2.63	1.66	1.07	0.70
Monthly Average:	0.42	0.42	0.82	1.80	2.30	3.21	2.49	1.96	1.69	0.98	0.46	0.43
Temp. Min.	-1.5	4.9	18.8	31.6	43.3	53.4	58.8	55.4	44.1	32.5	18.7	4.1
Temp. Max.	30.6	36.4	47.0	62.4	73.4	83.0	90.4	88.6	78.2	65.5	46.7	33.4
Temp. Avg.	8.0	14.3	26.6	42.2	54.8	64.3	70.2	68.2	56.8	45.2	27.8	13.1

<u>Climate Station</u>	<u>Location</u>	<u>From</u>	<u>To</u>
ND0961	Bowbells, ND	1961	1990
ND7281	Powers Lake, ND	1961	1990
ND1225	Butte, ND	1961	1990
ND3376	Garrison, ND	1961	1990
ND5638	Max, ND	1961	1990
ND8804	Turtle Lake, ND	1961	1990
ND8872	Underwood, ND	1961	1990
ND0382	Ashley, ND	1961	1990
ND9515	Wishek, ND	1961	1990
ND5210	Linton, ND	1961	1990
SD2797	Eureka, SD	1961	1990
SD4891	Leola, SD	1961	1990
SD4206	Ipswich, SD	1961	1990

Soil Interpretations

This group consists of moderately well and well drained, medium to fine textured soils formed in glacial till or alluvium. Some of these soils are loamy on the surface, but all have clayey subsoils. Permeability is moderately slow to slow.

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

	<u>Minimum</u>	<u>Maximum</u>
Depth:	20	
Surface Fragments >3" (% Cover):	0	3
Organic Matter (percent): (surface layer)	1.0	6.0
Electrical Conductivity (mmhos/cm): (0 - 24 inches)	0	16
Sodium Absorption Ratio: (0 - 12 inches)	0	20
Soil Reaction (1:1) Water (pH): (0 - 12 inches)	5.6	7.8
Available Water Capacity (inches): (0 - 60 inches)	5	11
Calcium Carbonate Equivalent (percent): (0 - 12 inches)	0	9

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>
Altai wildrye	LEAN3	G	Big bluestem	ANGE	F
Bluebunch/Quackgrass Hybrid		G	Blue grama	BOGR2	G
Crested wheatgrass	AGCR	G	Little bluestem	SCSC	F
Dahurian wildrye	ELDA3	G	Sideoats grama	BOCU	F
Green needlegrass	NAVI4	G	Switchgrass	PAVIV	F
Intermediate wheatgrass	THIN6	G			
Meadow bromegrass	BRBI2	G	<u>Legumes</u>	<u>Symbol</u>	<u>Adapted</u>
Pubescent wheatgrass	THIN6	G	Alfalfa	MESA	G
Russian wildrye	PSJU3	G	American vetch	VIAM	F
Slender wheatgrass	ELTR7	G	Canada milkvetch	ASCAC6	F
Smooth bromegrass	BRINI2	G	Cicer milkvetch	ASCI4	F
Tall wheatgrass	THPO7	G	Purple prairieclover	DAPUP	F
Western wheatgrass	PASM	G	Sweetclover	MELIL	G
			White clover	TRRE3	F
			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. On site 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	
	High (lbs/ac)	Low (lbs/ac)
Alfalfa	6600	3000
Alfalfa/Intermediate wheatgrass	5400	2800
Alfalfa/Smooth brome grass	5400	2800
Big bluestem	5100	2400
Crested wheatgrass	4600	2300
Green needlegrass	3400	1600
Intermediate wheatgrass	4900	2000
Smooth brome grass	4900	2000
Switchgrass	5700	2700
Western wheatgrass	3300	1300

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.

<u>Growth Curve Number:</u>	ND001										
<u>Growth Curve Name:</u>	Alfalfa										
<u>Growth Curve Description:</u>	Alfalfa										
<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	25	30	20	15	5	0	0	0

<u>Growth Curve Number:</u>	ND0002										
<u>Growth Curve Name:</u>	Cool season grass										
<u>Growth Curve Description:</u>	Cool season grass										
<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	40	35	10	5	5	0	0	0

<u>Growth Curve Number:</u>	ND0003										
<u>Growth Curve Name:</u>	Warm season grass										
<u>Growth Curve Description:</u>	Warm season grass										
<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	0	10	40	35	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 somewhat droughty. Water holding capacity ranges from moderate to high. Forage production on soils of moderate water holding capacity will be noticeably affected during dry growing seasons. 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, and moderate salinity in some of their subsoils 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.

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 FSGs:

FSG ID	FSG Narrative
G053BY800ND	Saline/Sodic - Dry soils have elevated salinity, sodicity, and/or alkalinity and are less 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 (NASIS) for soil surveys in North Dakota and South Dakota counties in MLRA 53B
- North Dakota and South Dakota NRCS Field Office Technical Guides
- 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: North Dakota and South Dakota

Forage Suitability Group Approval

<u>Original Author:</u>	Tim Nordquist
<u>Original Date:</u>	April 5, 2004
<u>Approval By:</u>	Jeff Printz
<u>Approval Date:</u>	March 2005