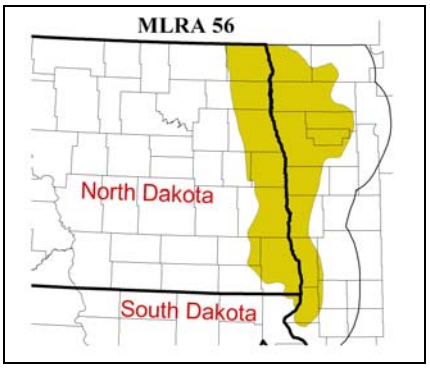
FORAGE SUITABILITY GROUP
CLAYEY SUBSOIL

FSG No.: **G056XY210ND**
Major Land Resource Area: 056X - Red River Valley of the North



Physiographic Features

Most of the soils in this group are located on nearly level to gently sloping positions of stream levees and terraces, and lake plains. A few occur in strongly sloping upland positions.

	Minimum	Maximum
Elevation (feet):	660	1000
Slope (percent):	0	15
Flooding:		
Frequency:	None	Occasional
Duration:	None	Brief
Ponding:		
Depth (inches):		
Frequency:	None	None
Duration:	None	None
Runoff Class:	Very 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 56. Average annual precipitation for all climate stations listed below is about 20 inches. About 70 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 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 21 inches at Grafton, ND to 47 inches at Fargo, ND. Snow cover at depths greater than 1 inch range from 33 days at Grafton, ND to 124 days at Cavalier, ND.

Average July temperatures are about 70 degrees F., and average January temperatures are about 6 degrees F. Recorded temperature extremes in the MLRA during the years 1971 to 2000 are a low of -41 at McLeod, and a high of 107 recorded at both Colgate and Wapheton. The MLRA lies in USDA Plant Hardiness Zones 3b and 4a.

At Fargo, ND the average annual wind speed is about 12 MPH. The highest wind speeds occur during early spring and the lowest occur during the summer. It is cloudy about 165 days a year. Average morning relative humidity in June is about 82 percent and average afternoon humidity is about 59 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)**	126	141
Last Killing Freeze in Spring (28 deg): **(1 year in 10 later than)**	May 24	May 14
Last Frost in Spring (32 deg): **(1 year in 10 later than)**	Jun 05	May 21
First Frost in Fall (32 deg): **(1 year in 10 earlier than)**	Aug 27	Sep 18
First Killing Freeze in Fall (28 deg): **(1 year in 10 earlier than)**	Sep 11	Sep 25
Length of Growing Season (32 deg)(days): **(9 years in 10 at least)**	104	129
Growing Degree Days (40 deg):	3550	4444
Growing Degree Days (50 deg):	1968	2524
Annual Minimum Temperature:	-35	-25
Mean annual precipitation (inches):	18	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	0.20	0.20	0.40	0.40	1.20	1.60	1.50	1.40	0.80	0.30	0.20	0.10
Precip. More Than	0.90	0.80	1.40	2.20	3.60	4.80	4.70	3.70	3.20	2.90	1.50	0.70
Monthly Average:	0.60	0.50	0.90	1.30	2.40	3.30	3.20	2.60	2.00	1.70	0.90	0.40
Temp. Min.	-3.5	3.9	17.3	31.0	44.1	53.4	57.6	55.4	45.2	33.7	18.0	3.4
Temp. Max.	15.4	22.8	34.9	54.2	70.1	77.8	82.0	81.1	70.3	56.1	34.8	20.7
Temp. Avg.	6.0	13.3	26.1	42.6	57.1	65.6	69.8	68.3	57.8	44.9	26.4	12.0

Climate Station	**Location**	**From**	**To**
ND5754	MC LEOD, ND	1971	2000
ND9100	WAHPETON, ND	1971	1999
ND1686	COLGATE, ND	1971	2000
ND2859	FARGO, ND	1971	2000
ND4203	HILLSBORO, ND	1971	2000
ND3616	GRAND FORKS, ND	1971	2000
ND5013	LARIMORE, ND	1971	2000
ND3594	GRAFTON, ND	1971	2000
ND1435	CAVALIER, ND	1971	2000

Soil Interpretations

This group consists of mostly well and moderately well drained, medium to fine textured soils formed in glacial till or sediments. Permeability is very slow to moderately slow. Some of these soils have moderate salinity in the subsoils.

Drainage Class:	Somewhat poorly drained	To	Well drained
Permeability Class: **(0 - 40 inches)**	Slow	To	Moderate
Frost Action Class:	Moderate	To	High

	Minimum	Maximum
Depth:	72	
Surface Fragments >3" (% Cover):	0	3
Organic Matter (percent): (surface layer)	2.0	10.0
Electrical Conductivity (mmhos/cm): (0 - 24 inches)	0	4
Sodium Absorption Ratio: (0 - 12 inches)	0	10
Soil Reaction (1:1) Water (pH): (0 - 12 inches)	5.6	8.4
Available Water Capacity (inches): (0 - 60 inches)	5	11
Calcium Carbonate Equivalent (percent): (0 - 12 inches)	0	8

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	
Altai wildrye	LEAN3	F
Bluebunch/Quackgrass Hybrid		G
Crested wheatgrass	AGCR	G
Dahurian wildrye	ELDA3	G
Green needlegrass	NAVI4	G
Intermediate wheatgrass	THIN6	G
Meadow bromegrass	BRBI2	G
Pubescent wheatgrass	THIN6	G
Russian wildrye	PSJU3	G
Slender wheatgrass	ELTR7	G
Smooth bromegrass	BRINI2	G
Tall wheatgrass	THPO7	G
Timothy	PHLEU	G
Western wheatgrass	PASM	G

Warm Season Grasses	Symbol	
Big bluestem	ANGE	G
Blue grama	BOGR2	G
Indiangrass	SONU2	F
Little bluestem	SCSC	F
Sideoats grama	BOCU	F
Switchgrass	PAVIV	G

Legumes	Symbol	
Alfalfa	MESA	G
American vetch	VIAM	F
Birdsfoot trefoil	LOCO6	F
Canada milkvetch	ASCAC6	F
Cicer milkvetch	ASCI4	F
Hairy vetch	VIVI	F
Red clover	TRPR2	G
Sweet clover	MELIL	G
White clover	TRRE3	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. 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	Dryland Management Intensity	
	Low (lbs/ac)	High (lbs/ac)
Alfalfa	4000	8500
Alfalfa/Intermediate wheatgrass	3800	7900
Alfalfa/Smooth bromegrass	3800	7900
Big bluestem	3100	7500
Crested wheatgrass	3000	6000
Green needlegrass	1900	4000
Intermediate wheatgrass	2700	6800
Smooth bromegrass	2700	6800
Switchgrass	3500	8200
Western wheatgrass	2300	4800

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: ND0001
Growth Curve Name: Alfalfa
Growth Curve Description: Alfalfa

Percent Production by Month											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	40	35	10	5	5	0	0	0

Growth Curve Number: ND0003
Growth Curve Name: Warm season grass
Growth Curve Description: Warm season grass

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 limiting factors to these soils are there tight, slowly permeable nature, and moderate salinity of the subsoils of some soils. The less than ideal rooting zone and slow permeability reduce species choices and production potential. 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. Moderately well drained soils will be more prone to compaction and plant damage if grazed during wet periods. 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. To reduce compaction, exclude livestock and machinery during extended wet periods. 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
G056XY800ND	Claypan 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, South Dakota and Minnesota counties in MLRA 56
- North Dakota NRCS Field Office Technical Guide, South Dakota NRCS Field Office Technical Guide and Minnesota NRCS Field Office 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: ND, SD, MN

Forage Suitability Group Approval:

Original Author:	Tim Nordquist
Original Date:	3/19/2000
Approval by:	Jeff Printz
Approval Date:	March 2005