

## FORAGE SUITABILITY GROUP Clayey Subsoil

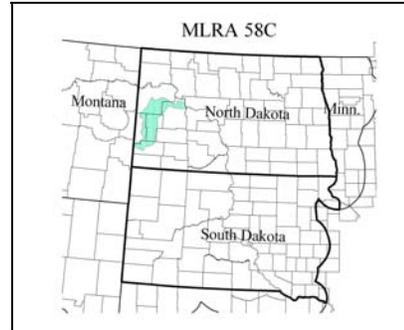
**FSG No.:** G058CY210ND

**Major Land Resource Area:** 058C - Northern Rolling High Plains, Northeastern Part

### Physiographic Features

The soils in the Clayey Subsoil group are on alluvial fans, stream terraces, drainageways, hills, sedimentary plains, lake plains, and till plains.

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	2000	3300
<b>Slope (percent):</b>	1	6
<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	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 58C. Average annual precipitation for all climate stations listed below is about 15 inches. About 77 percent of that occurs during the months of April through September. On average there are about 32 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 23 inches at Amidon, ND to 39 inches at Dunn Center, ND. Snow cover at depths greater than 1 inch range from 27 days at Amidon to 95 days at Trotters, ND.

Average July temperatures are about 70 degrees F., and average January temperatures are about 13 degrees F. Recorded temperature extremes in the MLRA during the years 1961 to 1990 are a low of -43 at Keene, and a high of 110 at Trotters. The average dates of last and first frost (32 deg) for the listed stations are May 16 and September 17 for an average frost free period of 125 days. The MLRA lies in USDA Plant Hardiness Zones 3b and 4a.

At Williston, ND, the closest station with records, the average annual wind speeds are about 10 MPH. The highest wind speeds occur during March through June, but average monthly wind speeds do not vary significantly throughout the year. It is cloudy about 160 days a year with the lowest incidence of cloudiness occurring during the summer months. Average morning relative humidity in June is about 81 percent and average afternoon humidity is 54 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>.

	<b>From</b>	<b>To</b>
<b>Freeze-free period (28 deg)(days):</b> (9 years in 10 at least)	116	130
<b>Last Killing Freeze in Spring (28 deg):</b> (1 year in 10 later than)	Jun 03	May 17
<b>Last Frost in Spring (32 deg):</b> (1 year in 10 later than)	Jun 16	May 29
<b>First Frost in Fall (32 deg):</b> (1 year in 10 earlier than)	Aug 20	Sep 07
<b>First Killing Freeze in Fall (28 deg):</b> (1 year in 10 earlier than)	Sep 02	Sep 18
<b>Length of Growing Season (32 deg)(days):</b> (9 years in 10 at least)	90	112
<b>Growing Degree Days (40 deg):</b>	3722	4311
<b>Growing Degree Days (50 deg):</b>	2004	2440
<b>Annual Minimum Temperature:</b>	-25	-35
<b>Mean annual precipitation (inches):</b>	15	16

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

<b>2 years in 10:</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>
<b>Precip. Less Than</b>	0.12	0.11	0.22	0.38	0.91	1.74	0.92	0.57	0.46	0.29	0.18	0.14
<b>Precip. More Than</b>	0.56	0.57	0.93	2.24	3.53	4.22	3.20	2.49	2.39	1.72	0.91	0.60
<b>Monthly Average:</b>	0.36	0.37	0.60	1.32	2.22	3.02	2.19	1.55	1.55	1.17	0.59	0.37
<b>Temp. Min.</b>	2.6	10.1	19.2	30.3	41.8	50.7	55.5	54.0	43.3	32.3	18.4	7.0
<b>Temp. Max.</b>	24.0	31.4	42.0	56.5	68.7	77.5	84.4	84.3	72.3	58.7	39.1	28.1
<b>Temp. Avg.</b>	13.3	20.7	30.6	43.4	55.3	64.1	69.9	69.2	57.8	45.5	28.7	17.5

<b><u>Climate Station</u></b>	<b><u>Location</u></b>	<b><u>From</u></b>	<b><u>To</u></b>
ND 4571	Keene, ND	1971	2000
ND9246	Watford City 14 S, ND	1971	2000
ND2365	Dunn Center 2 S, ND	1971	2000
ND2809	Fairfield, ND	1971	2000
ND5813	Medora, ND	1971	2000
ND8812	Trotters 3 SSE, ND	1971	2000
ND0209	Amidon, ND	1971	2000

**Soil Interpretations**

The this group consist of very deep, well drained soils with medium surface textures and clayey subsoils. They formed in alluvial and glaciofluvial deposits from mixed rock sources, and/or in till and lacustrine deposits. Permeability is slow, and available water capacity is high.

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

	<b><u>Minimum</u></b>	<b><u>Maximum</u></b>
<b>Depth:</b>	72	
<b>Surface Fragments &gt;3" (% Cover):</b>	0	3
<b>Organic Matter (percent):</b> (surface layer)	1.0	3.0
<b>Electrical Conductivity (mmhos/cm):</b> (0 - 24 inches)	0	0
<b>Sodium Absorption Ratio:</b> (0 - 12 inches)	0	0
<b>Soil Reaction (1:1) Water (pH):</b> (0 - 12 inches)	6.1	9

	<u>Minimum</u>	<u>Maximum</u>
<b>Available Water Capacity (inches):</b> (0 - 60 inches)	10	10
<b>Calcium Carbonate Equivalent (percent):</b> (0 - 12 inches)	0	10

### 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/>.

<b>Cool Season Grasses</b>		<b><u>Symbol</u></b>		<b>Warm Season Grasses</b>		<b><u>Symbol</u></b>	
Crested wheatgrass	AGCR	G		Blue grama	BOGR2	G	
Dahurian wildrye	ELDA3	G		Sideoats grama	BOCU	F	
Green needlegrass	NAVI4	G		Switchgrass	PAVIV	F	
Intermediate wheatgrass	THIN6	F					
Pubescent wheatgrass	THIN6	F		<b>Legumes</b>	<b><u>Symbol</u></b>		
Slender wheatgrass	ELTR7	G		Alfalfa	MESA	F	
Smooth brome grass	BRINI2	F		American vetch	VIAM	F	
Western wheatgrass	PASM	G		Canada milkvetch	ASCAC6	F	
				Cicer milkvetch	ASCI4	F	
				Purple prairieclover	DAPUP	F	
				Sweetclover	MELIL	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.

<b>Forage Crop</b>	<b><u>Dryland</u></b>	
	<b>Management Intensity</b>	
	<b><u>Low</u></b>	<b><u>High</u></b>
	(lbs/ac)	(lbs/ac)
Alfalfa	2000	4300
Alfalfa/Crested wheatgrass	1700	4000
Alfalfa/Intermediate wheatgrass	1700	4000
Alfalfa/Pubescent wheatgrass	1700	4000
Crested wheatgrass	1400	3100
Intermediate wheatgrass	1400	3100
Pubescent wheatgrass	1400	3100

**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

<b><u>Percent Production by Month</u></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>
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

<b><u>Percent Production by Month</u></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>
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

<b><u>Percent Production by Month</u></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>
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. 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**  
G058CY800ND

**FSG Narrative**

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 counties in MLRA 58C
- North 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

**Forage Suitability Group Approval:**

Original Author: Tim Nordquist  
Original Date: 10/9/200  
Approval by: Jeff Printz  
Approval Date: March 2005