

## **FORAGE SUITABILITY GROUP**

### **CLAYEY, 15-19" ppt/ 90-120 Freeze Free Days**

**FSG No.:** G052XK001MT

**Major Land Resource Area:** 052X -Brown Glaciated Plain

#### **Physiographic Features**

MLRA 52 is characterized by gentle to rolling glaciated plains, with steep slopes bordering the larger rivers. Elevation ranges from 1900 to 4600 feet, with an increase from east to west. The Milk River has extensive flood plains, but other streams usually have narrow, discontinuous flood plains.

The Clayey FSGs occur on nearly level to strongly rolling glacial till plains.

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	1900	4600
<b>Slope (percent):</b>	0	15
<b>Flooding:</b>		
<b>Frequency:</b>	None	Rare
<b>Duration:</b>	None	Brief
<b>Ponding:</b>		
<b>Depth (inches):</b>		
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Runoff Class:</b>	Low	Medium

#### **Climatic Features**

MLRA 52 lies in a semi-arid, temperate climate. Annual precipitation ranges from 10 to 14 inches, but 15 to 19 inches in some areas, with most rainfall occurring in spring to early summer. Summer thunderstorms are common and can bring added precipitation. Precipitation in the winter falls as snow.

Average annual snowfall ranges from 27.1" at Hinsdale to 58.9" at Great Falls WSCMO AP. Snow cover depths greater than 1 inch range from 9 days at Hinsdale to 60 days at Great Falls WSCMO AP.

Average July temperatures are about 69 degrees F., and average January temperatures are about 19 degrees F. Recorded temperature extremes in the MLRA during the years 1971 to 2000 are a low of -42 at Geraldine, and a high of 108 at Geraldine.

Irrigation occurs out of the Milk River, but most of the area depends on precipitation for water. Precipitation is the main limiting factor in production for this area, with extreme temperatures being the second most limiting factor. MLRA 52 lies in USDA Plant Hardiness Zones 3a and 3b. Growth of native cool season plants begins in early April and continues to about the first of July depending on the year. Native warm season plants begin growth about mid-May and continue to mid-August. Adapted introduced grass and legume species can expand on native vegetation growing season windows to some degree. Some "green up" of cool season plants may occur in September and October of most years when moisture is present.

Detailed information, which describes the physiography, groundwater, soils drainage and climate is available by referring to

the local USDA-NRCS County Soil Survey. Site specific climatic data within MLRA 52 can be found at the following web site; <http://www.wrcc.sage.dri.edu/> OR <http://www.wcc.nrcs.usda.gov/cgibin/state.pl?state=mt>.

More than 50 climate stations are located within this MLRA. With such wide variations in climate information, the user should access the station closest to the site being evaluated.

<b>Freeze-free period (28 deg)(days):</b> (9 years in 10 at least)	90	138
<b>Last Killing Freeze in Spring (28 deg):</b> (1 year in 10 later than)		
<b>Last Frost in Spring (32 deg):</b> (1 year in 10 later than)		
<b>First Frost in Fall (32 deg):</b> (1 year in 10 earlier than)		
<b>First Killing Freeze in Fall (28 deg):</b> (1 year in 10 earlier than)		
<b>Length of Growing Season (32 deg)(days):</b> (9 years in 10 at least)	94	123
<b>Growing Degree Days (40 deg):</b>		
<b>Growing Degree Days (50 deg):</b>		
<b>Annual Minimum Temperature:</b>	-38	-28
<b>Mean annual precipitation (inches):</b>	15	19

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

<b>2 years in 10:</b>	<b><u>Jan</u></b>	<b><u>Feb</u></b>	<b><u>Mar</u></b>	<b><u>Apr</u></b>	<b><u>May</u></b>	<b><u>Jun</u></b>	<b><u>Jul</u></b>	<b><u>Aug</u></b>	<b><u>Sep</u></b>	<b><u>Oct</u></b>	<b><u>Nov</u></b>	<b><u>Dec</u></b>
<b>Precip. Less Than</b>												
<b>Precip. More Than</b>												
<b>Monthly Average:</b>	0.64	0.48	0.87	1.36	2.75	2.90	1.59	1.48	1.30	0.87	0.62	0.60
<b>Temp. Min.</b>												
<b>Temp. Max.</b>												
<b>Temp. Avg.</b>	19.6	25.5	33.5	44.3	54.1	62.4	68.8	68.1	57.4	46.6	32.1	23.0

<b><u>Climate Station</u></b>	<b><u>Location</u></b>	<b><u>From</u></b>	<b><u>To</u></b>
MT4180	Hinsdale 4 SW, MT	1971	2000
MT3751	Great Falls WSCMO Airport, MT	1971	2000
MT3445	Geraldine, MT	1971	2000
MT8455	Ulm 8 SE Truly, MT	1971	2000

**Soil Interpretations**

This FSG consists mostly of deep to very deep, well-drained, usually fertile soils formed in clayey alluvium. Soil depth is from 40 to greater than 60 inches. Electrical conductivity ranges from 0 to <4 mmhos/cm. Sodium absorption ratio is <13. Available water holding capacity is 6 to >9 inches. Calcium carbonate equivalent is <15 percent.

**Drainage Class:** Moderately well drained To Well drained

**Permeability Class:** Slow To Very slow  
 (0 - 40 inches)  
**Frost Action Class:** Low To Moderate

	<u>Minimum</u>	<u>Maximum</u>
<b>Depth:</b>	40	60
<b>Surface Fragments &gt;3" (% Cover):</b>		
<b>Organic Matter (percent):</b> (surface layer)	0.5	4.0
<b>Electrical Conductivity (mmhos/cm):</b> (0 - 24 inches)	0	4
<b>Sodium Absorption Ratio:</b> (0 - 12 inches)	0	13
<b>Soil Reaction (1:1) Water (pH):</b>	5.5	8.5
<b>Available Water Capacity (inches):</b> (0 - 60 inches)	6	10
<b>Calcium Carbonate Equivalent (percent):</b> (0 - 12 inches)	0	15

### Adapted Species List

The following forage species have been separated by common grouping methods which relate to principle growth period or taxonomic differences. Within these categories a further subdivision has been provided denoting whether the plant is native (N) or introduced (I) and recommended for dryland or irrigated conditions. Since some forages can be valuable when grown under dryland conditions but provide enhanced yield or additional cuttings when irrigated they may appear under both categories. Some species are more or less exclusive to only one management system and are represented as such.

<u>Cool Season Grasses</u>	<u>Scientific Symbol</u>	<u>Dryland</u>	<u>Irrigated</u>
Altai wildrye (I)	LEAN3	YES	NO
Basin wildrye (N)	LECI4	YES	NO
Beardless wheatgrass (N)	PSSPI	YES	YES
Beardless wildrye (I)	LETR5	YES	NO
Big bluegrass (N)	POSE	YES	YES
Creeping meadow foxtail (I)	ALAR	NO	YES
Crested wheatgrass (I)	AGCR	YES	NO
Green needlegrass (N)	NAVI4	YES	NO
Hybrid wheatgrass (I)	ELHO3	YES	NO
Indian ricegrass (N)	ACHY	YES	NO
Intermediate wheatgrass (I)	THIN6	YES	YES
Meadow bromegrass (I)	BRBI2	YES	YES
Orchardgrass (I)	DAGL	YES	YES
Pubescent wheatgrass (I)	THIN6	YES	YES
Russian wildrye (I)	PSJU3	YES	NO
Slender wheatgrass (N)	ELTR7	YES	YES

Streambank wheatgrass (N)	ELLA3	YES	NO
Tall fescue (I) 1/	LOAR10	YES	YES
Tall wheatgrass (I)	THPO7	YES	YES
Western wheatgrass (N)	PASM	YES	YES

<u>Warm Season Grasses</u>	<u>Scientific Symbol</u>	<u>Dryland</u>	<u>Irrigated</u>
Switchgrass (N)	PAVI2	YES	YES

<u>Legumes</u>	<u>Scientific Symbol</u>	<u>Dryland</u>	<u>Irrigated</u>
Alfalfa (I)	MESA	YES	YES
Alsike clover (I)	TRHY	YES	YES
Birdsfoot trefoil (I)	LOCO6	YES	YES
Cicer milkvetch (I)	ASCI4	YES	YES
Red clover (I)	TRPR2	YES	YES

<u>Other Perennial Forbs</u>	<u>Scientific Symbol</u>	<u>Dryland</u>	<u>Irrigated</u>
Maximilian sunflower (N)*	HEMA2	YES	NO
Purple/white prairieclover (N)*	DAPU5	YES	NO
Winterfat (N)*	KRLA2	YES	NO

<u>Annual Species</u>	<u>Scientific Symbol</u>	<u>Dryland</u>	<u>Irrigated</u>
Field peas (I)	PISAA2	YES	NO
Hay/feed barley (I)	HORDE	YES	YES
Hay/feed oats (I)	AVENA	YES	YES
Lentils (I)	LENS	YES	NO
Peas/small grain (I)	LATHY	YES	YES
Rye, wheat, spelt, triticale	TRITI	YES	YES

Adaptation of forages to this Forage Suitability Group (FSG) covers a relatively wide range of potentials from highly adapted to moderately well adapted. Since various cultivars within a specie can be more or less productive on a particular site within this FSG the species in general will be listed if it will thrive on one or more of these sites. It is up to the FSG (user) to determine the appropriate scope of adaptation the listed species (or their cultivars) have which will lead to their successful establishment and acceptable yields.

\*These species recommended only for components of native mixtures.

1/ Endophyte-free

## Production Estimates

The following data represents "best available estimates" from many sources on representative species adapted to this FSG. In time and as documented data acquisition allows, specific plot, field trial or field clipping information will be incorporated into this document.

All pasture production estimates are determined as initial stocking rates and developed by multiplying a predicted forage yield times an expected harvest efficiency of 30%, then dividing that value by 1 animal unit month's "consumption" (915 lbs air dry).

Production estimates represent total annual production.

<b>Forage Crop</b>	<b><u>Dryland</u></b>		<b><u>Irrigated</u></b>	
	<b><u>Low</u></b> (lbs/ac/yr)	<b><u>High</u></b> (lbs/ac/yr)	<b><u>Low</u></b> (lbs/ac/yr)	<b><u>High</u></b> (lbs/ac/yr)
Alfalfa	2000	2800	2700	4200
Alfalfa/ cool season grass mix	2000	2800	2700	4200
Introduced cool season grasses	1500	2300	2000	2700
Native cool season grasses	880	2100		
Warm season grasses	1000	1500		

<b>Pasture</b>	<b><u>Dryland</u></b>		<b><u>Irrigated</u></b>	
	<b><u>Low</u></b> (AUMs/ac)	<b><u>High</u></b> (AUMs/ac)	<b><u>Low</u></b> (AUMs/ac)	<b><u>High</u></b> (AUMs/ac)
Alfalfa	0.7	0.9	0.9	1.4
Alfalfa/ cool season grass mix	0.7	0.9	0.9	1.4
Introduced cool season grasses	0.5	0.8	0.7	0.9
Native cool season grasses	0.3	0.7		
Warm season grasses	0.3	0.5		

1 AUM = 915 lbs air-dry

**Forage Growth Curves**

**Growth Curve Number:** MT52XK02

**Growth Curve Name:** 15-19" dryland alfalfa, 1 cutting

**Growth Curve Description:**

**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	30	30	15	10	15	0	0	0

**Growth Curve Number:** MT52XY03

**Growth Curve Name:** 10-19" dryland legumes, 1 cutting

**Growth Curve Description:** (trefoil, sainfoin, clover)

**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	20	30	20	10	20	0	0	0

**Growth Curve Number:** MT52XY04  
**Growth Curve Name:** 10-19" dryland alfalfa (0-25) with cool season grass (>75%)  
**Growth Curve Description:**

**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	35	25	15	5	15	0	0	0

**Growth Curve Number:** MT52XK05  
**Growth Curve Name:** 15-19" dryland legume, 1 cutting with cool season grass  
**Growth Curve Description:** (trefoil, sainfoin, clover + cool season grasses)

**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	25	20	5	15	0	0	0

**Growth Curve Number:** MT52XK08  
**Growth Curve Name:** 15-19" dryland intermediate/ pubescent wheatgrass/Altai wildrye  
**Growth Curve Description:**

**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	40	15	5	10	0	0	0

**Growth Curve Number:** MT52XY09  
**Growth Curve Name:** 10-19" dryland Russian wildrye  
**Growth Curve Description:**

**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	10	25	40	5	5	15	0	0	0

**Growth Curve Number:** MT52XK10  
**Growth Curve Name:** 15-19" dryland crested and Siberian wheatgrass  
**Growth Curve Description:**

**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	15	35	35	5	0	10	0	0	0

**Soil Limitations**

The Clayey FSG is limited by permeability (moderately slow to very slow). This creates more potential for runoff and water erosion.

## **Management Interpretations**

The impact on yields can be reduced by selecting species adapted to the tight, slowly permeable conditions of these soils when establishing new stands or renovating stands. To reduce the potential for sheet and rill erosion, especially on steeper slopes, include sod forming grass species in stands. Integrate both wind and water erosion control practices during the establishment period. Facilitating practices such as salting, water developments, fencing, trails, and herding can often be used effectively to change livestock behavior and use patterns.

Management can include considerations for wildlife. Timing of haying and livestock grazing can avoid peak nesting and fawning periods. Consider planting species with later maturity to allow nests to fledge before harvesting. Avoid mowing around the field; mow back and forth or from the inside to the outside of the field.

For detailed descriptions of management guidelines, refer to the NRCS Prescribed Grazing (528), and Pasture and Hay Planting (512) specifications.

## **Site Documentation**

### **Similar Sites:**

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

#### **FSG ID**

#### **FSG Narrative**

### **Inventory Data References:**

#### **Inventory Data References:**

- Agriculture Handbook 296 - Land Resource Regions and Major Land Resource Areas
- Natural Resources Conservation Service (NRCS) National Water and Climate Center
- National Soil Survey Information System (NASIS) for soil surveys in Montana
- NRCS National Range and Pasture Handbook
- NRCS Field Office Technical Guides
- Various Agricultural Research Service, Cooperative Extension Service, and NRCS research trials for plant adaptation and production
- "Dryland Pastures in Montana and Wyoming" Species and Cultivars, Seeding Techniques and Grazing Management, Montana State University, EB19
- "Salinity and Sodicity and North Dakota Soils", North Dakota State University, EB57
- USDA Plant Hardiness Zone Maps

### **State Correlation:**

This site has been correlated with the following states:

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

Original Author: Sarah Stevens, Jon Siddoway, Loretta Metz, Rick Bandy,  
Greg Snell

Original Date: 1/30/2006

G052XK001MT  
CLAYEY, 15-19" ppt/ 90-120 Freeze Free Days

Section II - FOTG  
Pastureland and Hayland Interpretations  
Page 8 of 8

Approval by: Loretta J. Metz  
Approval Date: 8/16/2006