

FORAGE SUITABILITY GROUP

DEEP SUBIRRIGATED, MODERATELY SALINE, 12-16" ppt/ >90 Freeze Free Days

FSG No.: G053AY014MT

Major Land Resource Area: 053A -Northern Dark Brown Glaciated Plains

Physiographic Features

MLRA 53A is characterized by gently undulating to rolling till plains including areas of prairie pot holes, kames, and moraines. Adjacent to major stream valleys are strongly rolling and steep slopes. Elevation ranges from 1600 to 3600 feet, increasing gradually from southeast to northwest. The Missouri River is the largest river flowing through MLRA 53A.

The Deep Subirrigated, Moderately Saline FSG is found on hills, alluvial fans, stream terraces, sedimentary, till, lake, and flood plains.

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	1600	3600
Slope (percent):	0	2
Flooding:		
Frequency:	None	Rare
Duration:	None	Brief
Ponding:		
Depth (inches):		
Frequency:	None	None
Duration:	None	None
Runoff Class:	Negligible	Medium

Climatic Features

This FSG 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 53A. Average annual precipitation for all climate stations listed below is about 13 inches. About 80 percent of that occurs during the months of April through September. Precipitation in the winter falls as snow.

Average annual snowfall ranges from 9 inches at Redstone to 42 inches at Opheim 16 SE. Snow depths greater than 1 inch range from 16 days at Opheim 10 N to 97 days at Bredette.

Average July temperatures are about 68 degrees F., and average January temperatures are about 9 degrees F. Recorded temperature extremes in the MLRA during the years 1971 to 2000 are a low of -52 at Redstone, and a high of 110 at three Montana locations. The MLRA lies in USDA Plant Hardiness Zones 3b and 4a.

In most years, moisture is inadequate for maximum crop production. The Missouri River is the only dependable source of water for irrigation; therefore, only a small acreage is irrigated. Ground water is in limited supply.

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 53A 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>.

With such wide variations in climate information, the user should access the station closest to the site being evaluated.

Freeze-free period (28 deg)(days): (9 years in 10 at least)	96	113
Last Killing Freeze in Spring (28 deg): (1 year in 10 later than)		
Last Frost in Spring (32 deg): (1 year in 10 later than)		
First Frost in Fall (32 deg): (1 year in 10 earlier than)		
First Killing Freeze in Fall (28 deg): (1 year in 10 earlier than)		
Length of Growing Season (32 deg)(days): (9 years in 10 at least)	55	124
Growing Degree Days (40 deg):		
Growing Degree Days (50 deg):		
Annual Minimum Temperature:	-41	-33
Mean annual precipitation (inches):	12	16

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												
Precip. More Than												
Monthly Average:	0.36	0.27	0.48	0.88	1.90	2.80	2.10	1.48	1.24	0.68	0.36	0.36
Temp. Min.												
Temp. Max.												
Temp. Avg.	8.8	16.1	27.1	42.2	54.0	62.8	68.4	67.3	55.8	44.1	26.8	14.2

<u>Climate Station</u>	<u>Location</u>	<u>From</u>	<u>To</u>
MT6236	Opheim 10 N, MT	1971	2000
MT6238	Opheim 16 SE, MT	1971	2000
MT2122	Culbertson, MT	1971	2000
MT6927	Redstone, MT	1971	2000
MT5572	Medicine Lake 3 SE, MT	1971	2000
MT6660	Poplar 2 E, MT	1971	2000
MT6893	Raymond Border Stn, MT	1971	2000
MT7424	Scobey, MT	1971	2000
MT8777	Westby, MT	1971	2000
MT5285	Lustre 4 NNW, MT	1971	2000
MT1088	Bredette, MT	1971	2000

Soil Interpretations

This FSG consists mainly of very deep (>60 inches), moderately well drained soils formed in alluvium, or glaciofluvial or glaciolacustrine deposits. Depth of water table from 48 to 72 inches and elevated salinity can negatively impact these soils. Sodium absorption ration is <13, and calcium carbonate equivalent is <15 percent.

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

	<u>Minimum</u>	<u>Maximum</u>
Depth:	60	72
Surface Fragments >3" (% Cover):		
Organic Matter (percent): (surface layer)	2.0	5.0
Electrical Conductivity (mmhos/cm): (0 - 24 inches)	4	16
Sodium Absorption Ratio: (0 - 12 inches)	0	13
Soil Reaction (1:1) Water (pH): (0 - 12 inches)	5.5	9
Available Water Capacity (inches): (0 - 60 inches)	3	10
Calcium Carbonate Equivalent (percent): (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) 1/ 2/	LEAN3	YES	NO
Basin wildrye (N)	LECI4	YES	NO
Crested wheatgrass (I)	AGCR	YES	NO
Hybrid wheatgrass (I) 1/ 2/	ELHO3	YES	NO
Intermediate wheatgrass (I) 1/ 2/	THIN6	YES	YES**
Pubescent wheatgrass (I) 1/ 2/	THIN6	YES	YES**
Russian wildrye (I) 2/	PSJU3	YES	NO
Slender wheatgrass (N) 2/	ELTR7	YES	YES**
Streambank wheatgrass (N) 2/	ELLA3	YES	NO
Tall wheatgrass (I) 2/	THPO7	YES	YES**

Thickspike wheatgrass (N) 2/	ELLAL	YES	NO
Western wheatgrass (N) 2/	PASM	YES	YES**
<u>Warm Season Grasses</u>	<u>Scientific Symbol</u>	<u>Dryland</u>	<u>Irrigated</u>
Little bluestem (N)	SCSC	YES	NO

<u>Other Perennial Forbs</u>	<u>Scientific Symbol</u>	<u>Dryland</u>	<u>Irrigated</u>
Maximilian sunflower (N)*	HEMA2	YES	NO
Winterfat (N)* 2/	KRLA2	YES	NO

<u>Annual Species</u>	<u>Scientific Symbol</u>	<u>Dryland</u>	<u>Irrigated</u>
Hay/feed barley	HORDE	YES	YES**
Hay/feed oats	AVENA	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 only recommended for components of native mixtures.

**Site is deeply subirrigated (water table within 48 to 72 inches of soil surface), which implies irrigation may not be necessary, or if so, in limited amounts.

- 1/ Recommended only for upper end of 10-14" precipitation zone
- 2/ Recommended for higher EC levels (8-16 mmhos/cm)

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.

Forage Crop	<u>Dryland</u>		<u>Irrigated</u>	
	<u>Low</u> (lbs/ac/yr)	<u>High</u> (lbs/ac/yr)	<u>Low</u> (lbs/ac/yr)	<u>High</u> (lbs/ac/yr)
Introduced cool season grasses	1400	3500		
Native cool season grasses	900	1400		
Warm season grasses	800	950		

Pasture

Dryland

Irrigated

	<u>Low</u> (AUMs/ac)	<u>High</u> (AUMs/ac)	<u>Low</u> (AUMs/ac)	<u>High</u> (AUMs/ac)
Introduced cool season grasses	0.3	0.3		
Native cool season grasses	0.5	1.1		
Warm season grasses	0.3	0.5		

1 AUM = 915 lbs air-dry

Forage Growth Curves

Growth Curve Number: MT53AY08

Growth Curve Name: 12-15" 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	45	10	5	10	0	0	0

Growth Curve Number: MT53AY09

Growth Curve Name: 12-15" 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: MT53AY10

Growth Curve Name: 12-15" dryland crested and Siberian wheatgrasses

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	40	35	0	0	5	5	0	0

Growth Curve Number: MT53AY01

Growth Curve Name: 12-15" subirrigated

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	15	35	25	15	10	0	0	0

Soil Limitations

The Deep Subirrigated, Moderately Saline FSG is mainly limited by elevated salinity levels, which affect plant species selection and production potential. Another possible limitation includes moderately slow permeability.

Management Interpretations

Soils in this group are prone to flooding, which can negatively impact plant growth if it occurs in the spring or during growing season. Flooding duration, or how long the plant is under water, will have a greater impact on the plant than flooding frequency. Machinery and livestock also need to be excluded during these times to prevent wheel ruts, soil compaction, and trampling. 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.

The solution to salinity problems lies in the prevention of upward salt movement, which includes utilizing existing moisture, preventing additional water moving into the system, and/or site drainage. Using deep-rooted perennial crops will also slow or prevent moisture movement into affected areas. Irrigation water management is critical on irrigated sites. Timing, duration, and wastewater disposal all influence the movement of salts.

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:

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: Loretta Metz, Sarah Stevens, Greg Snell, Jeff Printz
Original Date: 1/30/2006
Approval by: Loretta J. Metz
Approval Date: 8/10/2006