

FORAGE SUITABILITY GROUP

LOAMY, 10-14" ppt/ >90 Freeze Free Days

FSG No.: G058AG017MT

Major Land Resource Area: 058A - Northern Rolling High Plains, Northern Part

Physiographic Features

In general the Forage Suitability Group sites in MLRA 58A can occur on nearly level to 15% slopes. Site elevations range from approximately 1600 feet to over 5000 feet. Typical of the diversity of the rolling high plains terrain, physiographic features vary widely. Semi-arid steppe occupies vast areas of the MLRA but is often dissected with naturally occurring ephemeral gullies, creek beds and Yellowstone or Missouri river tributaries. Land breaks near these tributaries and southern areas of the MLRA can be intermittently wooded with pine and some hardwoods. Knobs, buttes and other land features of resistant materials generally mark the landscape.

The Loamy FSG occurs on a variety of landforms, but most predominantly on alluvial fans, stream terraces, drainageways, sedimentary plains and hills.

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	1600	5000
Slope (percent):	0	15
Flooding:		
Frequency:	None	Frequent
Duration:	None	Brief
Ponding:		
Depth (inches):		
Frequency:	None	None
Duration:		
Runoff Class:	Low	Very high

Climatic Features

This forage suitability group (FSG) lies amidst a semi-arid northern grass prairie environment. Typical continental climate conditions exist with extremes in both temperature and rainfall intensity expected. Vast daily temperature fluctuations and desiccating winds can create rigorous evapotranspiration conditions and a severe over-winter environment for all vegetation communities and agronomic crop species selected as forages.

The Rocky Mountains to the west are distant enough so true chinook conditions are rare but down slope winds, gulf moisture and Canadian storm fronts often collide causing severe summer thunder storms, intense short duration rain events and hail.

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. Growing conditions that significantly affect the choice and establishment of forage species in this FSG are temperature extremes and lack of dependable insulating winter snow cover. The MLRA lies in USDA Plant Hardiness Zones 3a, 3b, 4a, 4b, and 5a.

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 58A 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 100 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.

Freeze-free period (28 deg)(days): 90 148
 (9 years in 10 at least)

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): 79 130
 (9 years in 10 at least)

Growing Degree Days (40 deg):

Annual Minimum Temperature: -41 -24

Mean annual precipitation (inches): 10 14

Monthly precipitation (inches) and temperature (F):

2 years in 10: Precip. Less Than Precip. More Than	<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>
Monthly Average:	0.51	0.36	0.70	1.32	2.27	2.33	1.58	1.15	1.26	1.08	0.55	0.46
Temp. Min.												
Temp. Max.												
Temp. Avg.	19.3	25.9	34.9	45.3	55.2	64.4	70.6	69.6	58.3	46.7	31.7	22.0

<u>Climate Station</u>	<u>Location</u>	<u>From</u>	<u>To</u>
MT0466	Barber, MT	1971	2000
MT0802	Billings Water Plant, MT	1971	2000
MT0807	Billings WSO, MT	1971	2000
MT0819	Birney, MT	1971	1999
MT1084	Brandenberg, MT	1971	2000
MT1127	Broadus, MT	1971	2000
MT1169	Brockway 3 WSW, MT	1971	2000
MT1297	Busby, MT	1971	2000
MT1758	Circle, MT	1971	2000
MT1905	Colstrip, MT	1971	2000
MT3013	Flatwillow 4 ENE, MT	1971	2000

MT3581	Glendive, MT	1971	2000
MT3915	Hardin, MT	1971	2000
MT3939	Harlowton, MT	1971	2000
MT4345	Huntley Experiment Stn, MT	1971	2000
MT4358	Hysham, MT	1971	2000
MT4364	Hysham 25 SSE, MT	1971	2000
MT4522	Jordan, MT	1971	2000
MT4715	Knobs, MT	1971	2000
MT5303	MacKenzie, MT	1971	2000
MT5690	Miles City FAA Airport, MT	1971	2000
MT5754	Mizpah 4 NNW, MT	1971	2000
MT5870	Moorhead 9 NE, MT	1971	2000
MT5872	Mosby 2 ENE, MT	1971	2000
MT6601	Plevna, MT	1971	2000
MT6691	Powderville 8 NNE, MT	1971	2000
MT7136	Rock Springs, MT	1971	2000
MT7214	Roundup, MT	1971	2000
MT7234	Roy 24 NE Mobridge, MT	1971	1993
MT7263	Ryegate 18 NNW, MT	1971	2000
MT7728	Roy 8 NE, MT	1971	2000
MT7740	Sonnette 2 WNW, MT	1971	2000
MT8165	Terry, MT	1971	2000
MT8169	Terry 21 NNW, MT	1971	2000
MT8607	Volborg, MT	1971	2000

Soil Interpretations

This FSG consists of moderately deep to very deep, normally well-drained fertile soils formed in semiconsolidated loamy sedimentary beds and alluvium. These soils have properties that are generally very favorable for plant growth. Electrical conductivity is <4 mmhos/cm, and sodium absorption ratio is <13. Calcium carbonate equivalent is normally <15 percent, but some soils within this FSG can have CCEs ranging from 15 to 50 percent.

Drainage Class:	Somewhat poorly drained	To	Somewhat excessively drained
Permeability Class: (0 - 40 inches)	Slow	To	Moderately rapid
Frost Action Class:	Low	To	Moderate

	<u>Minimum</u>	<u>Maximum</u>
Depth:	20	72
Surface Fragments >3" (% Cover):		
Organic Matter (percent): (surface layer)	0.5	4.0
Electrical Conductivity (mmhos/cm): (0 - 24 inches)	0	4
Sodium Absorption Ratio:	0	13

(0 - 12 inches)		
Soil Reaction (1:1) Water (pH):	5.5	8.5
(0 - 12 inches)		
Available Water Capacity (inches):	3	12
(0 - 60 inches)		
Calcium Carbonate Equivalent (percent):	0	50
(0 - 12 inches)		

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. In the central area of MLRA 58A the adaptability of warm season native grasses diminishes.

<u>Cool Season Grasses</u>	<u>Scientific Symbol</u>	<u>Dryland</u>	<u>Irrigated</u>
Altai wildrye (I) 1/	LEAN3	YES	NO
Basin wildrye (N)	LECI4	YES	NO
Beardless wheatgrass (N)	PSSPI	YES	YES
Big bluegrass (N)	POSE	YES	YES
Bluebunch wheatgrass (N)	PSSPS	YES	NO
Canada wildrye (N) 1/	ELCA4	YES	NO
Creeping meadow foxtail (I) 2/	ALAR	NO	YES
Crested wheatgrass (I)	AGCR	YES	NO
Green needlegrass (N)	NAVI4	YES	NO
Hybrid wheatgrass (I) 1/	ELHO3	YES	NO
Indian ricegrass (N)	ACHY	YES	NO
Intermediate wheatgrass (I) 1/	THIN6	YES	YES
Meadow bromegrass (I)	BRBI2	NO	YES
Orchardgrass (I)	DAGL	NO	YES
Pubescent wheatgrass (I) 1/	THIN6	YES	YES
Russian wildrye (I)	PSJU3	YES	NO
Slender wheatgrass (N)	ELTR7	YES	YES
Streambank wheatgrass (N)	ELLA3	YES	NO
Tall fescue (I) 3/	LOAR10	NO	YES
Tall wheatgrass (I)	THPO7	YES	YES
Thickspike wheatgrass (N)	ELMA7	YES	NO
Western wheatgrass (N)	PASM	YES	YES
<u>Warm Season Grasses</u>	<u>Scientific Symbol</u>	<u>Dryland</u>	<u>Irrigated</u>
Little bluestem (N)	SCSC	YES	NO
Sideoats grama (N)	BOCU	YES	NO
Switchgrass (N)	PAVI2	YES	NO

<u>Legumes</u>	<u>Scientific Symbol</u>	<u>Dryland</u>	<u>Irrigated</u>
Alfalfa (I)	MESA	YES	YES
Alsike clover (I)	TRHY	NO	YES
Birdsfoot trefoil (I)	LOCO6	NO	YES
Cicer milkvetch (I)	ASCI4	NO	YES
Red clover (I)	TRPR2	NO	YES
Sainfoin (I)	ONVI	YES	YES
Small burnet (I)	SAMI3	YES	NO

<u>Other Perennial Forbs</u>	<u>Scientific Symbol</u>	<u>Dryland</u>	<u>Irrigated</u>
Lewis flax (N)*	LILE3	YES	NO
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	PISAA2	YES	NO
Hay/ feed barley	HORDE	YES	YES
Hay/feed oats	AVENA	YES	YES
Lentils	LENS	YES	NO
Peas/small grains	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.

If site is determined to be deeply subirrigated (water table within 48 to 72 inches of soil surface), then irrigation may not be necessary, or if so, in limited amounts.

*These species only recommended for components of native mixtures.

- 1/ Recommended only for upper end of 10-14" precipitation zone
- 2/ Can be grown on dryland if site is subirrigated
- 3/ 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.

Forage Crop	<u>Dryland</u>		<u>Irrigated</u>	
	<u>Low</u>	<u>High</u>	<u>Low</u>	<u>High</u>
	(lbs/ac/yr)	(lbs/ac/yr)	(lbs/ac/yr)	(lbs/ac/yr)
Alfalfa	1000	3300	3400	8800
Alfalfa / cool season grass mix	2600	3500	4800	6300
Crested wheatgrass	1000	2000		
Field peas / small grains	2200	3800		
Intermediate / pubescent wheatgrass	1200	1800	3600	5300
Meadow brome / orchardgrass	1200	1800	2900	4300
Native cool season mix	1800	2500		
Native warm season mix	1200	1800		
Russian wildrye	1000	2500		

Pasture	<u>Dryland</u>		<u>Irrigated</u>	
	<u>Low</u>	<u>High</u>	<u>Low</u>	<u>High</u>
	(AUMs/ac)	(AUMs/ac)	(AUMs/ac)	(AUMs/ac)
Alfalfa	0.3	1.1	1.6	2.1
Alfalfa / cool season grass mix	0.9	1.1	1.4	2.0
Crested wheatgrass	0.3	0.6		
Field peas / small grains	0.6	1.1		
Intermediate / pubescent wheatgrass	0.4	0.6	1.2	1.7
Meadow brome / orchardgrass	0.4	0.8	1.0	1.4
Native cool season mix	0.6	0.8		
Native warm season mix	0.4	0.6		
Russian wildrye	0.3	0.6		

1 AUM = 915 lbs air-dry

Forage Growth Curves

Growth Curve Number: MT58AG02

Growth Curve Name: 10-14" dryland alfalfa, 1 cutting

Growth Curve Description:

<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	20	30	20	0	10	20	0	0	0

Growth Curve Number: MT58AG03
Growth Curve Name: 10-14" dryland legumes, 1 cutting (trefoil, sainfoin, clover)
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	0	0	0	0	0	0	0	0

Growth Curve Number: MT58AG04
Growth Curve Name: 10-14" 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	20	30	15	10	5	20	0	0	0

Growth Curve Number: MT58AG06
Growth Curve Name: 10-14" logged ponderosa pine sites with cool season understory
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	35	40	10	0	5	0	0	0

Growth Curve Number: MT58AG05
Growth Curve Name: 10-14" 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	20	30	15	10	5	20	0	0	0

Growth Curve Number: MT58AG08
Growth Curve Name: 10-14" 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	10	45	35	5	0	5	0	0	0

Growth Curve Number: MT58AG09
Growth Curve Name: 10-14" 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	5	25	35	25	0	0	10	0	0	0

Growth Curve Number: MT58AG10
Growth Curve Name: 10-14" dryland crested and Siberian wheatgrass
Growth Curve Description:

<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	5	25	55	10	0	0	5	0	0	0

Soil Limitations

The Loamy FSG's have some of the more productive soils in the MLRA. Over the years however, soil organic matter reduction and loss from wind and water erosion have depleted their inherent fertility. Susceptibility to these erosive forces should be protected against during periods of tillage or forage stand establishment. Some soils within this FSG have a lower AWC (3-6"), which may decrease production of deep-rooted perennials, such as alfalfa, by approximately 25%.

Management Interpretations

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.

While flooding events on these sites are not common, they can negatively impact plant growth if they occur 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.

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

G058AG024MT

FSG Narrative

Loamy, saline soils have a higher content of salt in the soil profile, which will affect species selection.

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 Sodcity 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:

MT

Forage Suitability Group Approval:

Original Author: Loretta Metz, Walter Lujan, Steven VanFossen, Gregory Snell, Marshall Haferkamp, Roger Hybner, Robert Kilian, Sarah Stevens

Original Date: 10/26/2005

Approval by: Loretta J. Metz

Approval Date: 1/1/2006