FORAGE SUITABILITY GROUP

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

FSG No.: **G052XG027MT**

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 Sodic, Sodic/Saline FSG occurs on nearly level to moderately steep glacial till plains, hills, fans, and terraces. The sodic/saline properties limit species selection as well as productivity.

	Minimum	Maximum
Elevation (feet):	1900	4600
Slope (percent):	0	15
Flooding:		
Frequency:	None	Rare
Duration:	None	Brief
Ponding:		
Depth (inches):		
Frequency:	None	None
Duration:	None	None
Runoff Class:	Medium	High

Climatic Features

MLRA 52 lies in a semi-arid, temperate climate. Annual precipitation ranges from 10 to 14 inches, 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 4.5" at Chester to 49.7" at Fort Benton. Snow cover depths greater than 1 inch range from 1 day at Port of Morgan to 68 days at Simpson.

Average July temperatures are about 68 degrees F., and average January temperatures are about 17 degrees F. Recorded temperature extremes in the MLRA during the years 1971 to 2000 are a low of -52 at Chester, and a high of 109 at Malta 35 SE.

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.

Freeze-free period (28 deg)(days): **(9 years in 10 at least)**	90	120
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)**	75	101
Growing Degree Days (40 deg):		
Growing Degree Days (50 deg):		
Annual Minimum Temperature:	-36	-31
Mean annual precipitation (inches):	10	14

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												
Precip. More Than												
Monthly Average:	0.41	0.28	0.56	0.92	2.11	2.29	1.61	1.31	1.17	0.63	0.46	0.40
Temp. Min.												
Temp. Max.												
Temp. Avg.	17.1	23.5	33.4	44.6	54.4	62.4	67.8	67.1	56.3	45.3	29.8	20.2

Climate Station	Location	From	To
MT0770	Big Sandy, MT	1971	2000
MT3113	Fort Benton, MT	1971	2000
MT8021	Sun River 4 S, MT	1971	2000
MT1974	Conrad, MT	1971	2000
MT1692	Chester, MT	1971	2000
MT7620	Simpson 6 NW, MT	1971	2000
MT3929	Harlem 4 W, MT	1971	2000
MT5340	Malta 35 S, MT	1971	2000
MT6672	Port of Morgan, MT	1976	2000
MT1722	Chinook, MT	1971	2000

Soil Interpretations

This FSG consists of deep to very deep (>60 inches), moderately well-drained to well-drained soils formed in alluvium. Sodium absorption ratio is >13, and calcium carbonate equivalent is <15 percent.

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

	Minimum	Maximum
Depth:	60	72
Surface Fragments >3" (% Cover):		
Organic Matter (percent): (surface layer)	0.5	3.0
Electrical Conductivity (mmhos/cm): (0 - 24 inches)	8	16
Sodium Absorption Ratio: (0 - 12 inches)	13	
Soil Reaction (1:1) Water (pH): (0 - 12 inches)	5.5	8.5
Available Water Capacity (inches): (0 - 60 inches)	3	9
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.

Cool Season Grasses	Scientific Symbol	Dryland	Irrigated
Pubescent Wheatgrass (I)	THIN6	YES	NO
Russian wildrye (I)	PSJU3	YES	NO
Slender Wheatgrass (N)	ELTR7	YES	NO
Streambank Wheatgrass (N)	ELLA3	YES	NO
Tall wheatgrass (I)	THPO7	YES	NO
Thickspike wheatgrass (N)	ELLAL	YES	NO
Western wheatgrass (N)	PASM	YES	NO

Other Perennial Forbs	Scientific Symbol	Dryland	Irrigated
Winterfat (N)*	KRLA2	YES	NO

Annual Species	Scientific Symbol	Dryland	Irrigated
Hay/feed barley	HORDE	YES	NO
Hay/feed oats	AVENA	YES	NO
Rye/wheat/triticale	TRITI	YES	NO

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.

*This specie recommended only as component of native mixture.

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	Dryland		Irrigated	
	Low (lbs/ac/yr)	High (lbs/ac/yr)	Low (lbs/ac/yr)	High (lbs/ac/yr)
Introduced cool season grasses	1000	1600		
Native cool season grasses	400	1400		

Pasture	Dryland		Irrigated	
	Low (AUMs/ac)	High (AUMs/ac)	Low (AUMs/ac)	High (AUMs/ac)
Introduced cool season grasses	0.4	0.5		
Native cool season grasses	0.1	0.5		

1 AUM = 915 lbs air-dry

Forage Growth Curves

Growth Curve Number: MT52XG08
Growth Curve Name: 10-14" dryland intermediate/ pubescent wheatgrass/Altai wildrye
Growth Curve Description:

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	25	45	10	5	10	0	0	0

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

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	25	40	5	5	15	0	0	0

Soil Limitations

The Sodic, Sodic/Saline FSG is limited by the sodic or sodic/saline nature of the soils. Because of poor soil aggregation due to the presence of salts, wind and water erosion are a concern. When dry, the surface of these soils forms a hard crust that is a barrier to seedling emergence. Plant nutrient uptake can also be hindered in these soils. Species selection is limited, as well as production potential.

Management Interpretations

The impact on yields can be reduced by selecting species adapted to the sodic/saline levels inherent to 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.

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.

Sodic soils must be managed similarly to saline soils with respect to drainage and use of drought tolerant plant species. Chemical amendments and physical disruption of the claypan may help reduce the restrictive nature of these soils. Chemical amendments, such as gypsum ($CaSO4$) and calcium chloride ($CaCl2$), can replace exchangeable $Na+$ with $Ca++$. For amendments to be effective, the displace sodium needs to be leached out of the plant-rooting zone, which is not always possible due to water availability and/or poor site drainage. Also, these amendments may be cost prohibitive (calcium chloride), or not as cost prohibitive, but less effective (gypsum). Before chemical amendments are applied to sodic fields, it is recommended a qualified soil scientist do a soil inspection and analysis.

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:	Sarah Stevens, Jon Siddoway, Loretta Metz, Rick Bandy, Greg Snell
Original Date:	1/30/2006
Approval by:	Loretta J. Metz
Approval Date:	8/16/2006