

## **FORAGE SUITABILITY GROUP**

### **DEEP SUBIRRIGATED, LIMY, 15-19" ppt/ 90-120 Freeze Free Days**

**FSG No.:** G046XK012MT

**Major Land Resource Area:** 046X - Northern Rocky Mountain Foothills

#### **Physiographic Features**

MLRA 46, Northern Rocky Mountain Foothills, is characterized by rugged hills and low mountains cut by many narrow valleys that have steep gradients. A few of the major rivers are bordered by broad flood plains and fans. Elevation ranges from 3600 to 5900 feet in the north and gradually increases to 5900 to 7800 feet in the south. About one-fifth of this area is federally owned and the remainder of it is in farms or ranches. Many of the valleys are irrigated, but they make up only 1 or 2 percent of the total area. Grain and livestock forage are the main crops, but potatoes, sugar beets, peas, and other crops are grown in the warmer valleys.

The Deep Subirrigated Loamy FSG contains usually fertile loams associated with flood plains, glacial outwash plains, low stream terraces and alluvial fans.

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	3600	7800
<b>Slope (percent):</b>	0	4
<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>	Very low	Low

#### **Climatic Features**

MLRA 46 lies in a semi-arid temperate climate. Annual precipitation ranges from 11 to 20 inches, but can be as much as 29 inches in the highest elevations and as little as 9 inches in some basins. In the north minimum precipitation is in spring, and in the south it is early in summer. Winter precipitation is snow. Precipitation is too low for good growth of crops in some parts of the area, but in others it is adequate for growing small grains and forage. Most of the water for irrigation is supplied by the major rivers, with some small streams providing local supplies.

Average annual snowfall ranges from 23" at Babb to 96" at Nye. Snow cover depths greater than 1 inch range from 0 days at Judith Gap to 93 days at Lewistown FAA airport.

Average July temperatures are about 65 degrees F., and average January temperatures are about 24 degrees F. Recorded temperature extremes in the MLRA during the data years are a low of -50 at Denton, and a high of 107 at Yellowtail Dam.

MLRA 46 lies in USDA Plant Hardiness Zones 3b, 4a, and 4b.

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 46X 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>.

Numerous 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):** 90 120  
(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):** 54 131  
(9 years in 10 at least)

**Growing Degree Days (40 deg):**

**Growing Degree Days (50 deg):**

**Mean annual precipitation (inches):** 15 19

**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>
<b>Monthly Average:</b>	0.69	0.52	1.05	1.63	2.92	2.74	1.84	1.59	1.49	1.17	0.71	0.68
<b>Temp. Min.</b>												
<b>Temp. Max.</b>												
<b>Temp. Avg.</b>	23.7	27.9	34.1	42.7	51.4	59.3	65.4	65.1	55.3	45.6	32.7	25.4

<u>Climate Station</u>	<u>Location</u>	<u>From</u>	<u>To</u>
MT1552	Cascade 5 S, MT	1971	2000
MT0392	Babb 6 NE, MT	1971	2000
MT2347	Denton 1 NNE, MT	1948	2005
MT7864	Stanford, MT	1971	2000
MT7159	Rogers Pass 9 NNE, MT	1964	2005
MT6190	Nye 2, MT	1971	2000
MT5603	Melville 4 W, MT	1971	2000
MT0780	Big Timber, MT	1971	2000
MT4545	Judith Gap 13 E, MT	1971	2000
MT5761	Moccasin Experiment Station, MT	1971	2000
MT9240	Yellowtail Dam, MT	1971	2000
MT3727	Grass Range, MT	1971	2000

MT4985	Lewistown FAA AP, MT	1971	2000
MT6747	Pryor, MT	1971	2000

### Soil Interpretations

This FSG is characterized by deep to very deep (>40 inches), somewhat poorly to well-drained, moderately slow permeable soils formed in stratified alluvium and calcareous alluvium. A "beneficial" water table can positively affect some deep rooted forage species, such as alfalfa. Electrical conductivity is <4 mmhos/cm, and sodium absorption ratio is <13. Calcium carbonate equivalent is >=15 percent.

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

	<u>Minimum</u>	<u>Maximum</u>
<b>Depth:</b>	40	72
<b>Surface Fragments &gt;3" (% Cover):</b>		
<b>Organic Matter (percent):</b> (surface layer)	2.0	5.0
<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> (0 - 12 inches)	7.4	8.4
<b>Available Water Capacity (inches):</b> (0 - 60 inches)	3	0
<b>Calcium Carbonate Equivalent (percent):</b> (0 - 12 inches)	15	0

### 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	NO
Beardless Wildrye (N)	LETR5	YES	NO
Big bluegrass (N)	POSE	YES	NO
Blue wildrye (N) 2/	ELGL	YES	NO
Bluebunch Wheatgrass (N)	PSSPS	YES	NO

Canada Wildrye (N)	ELCA4	YES	NO
Creeping Meadow Foxtail (I) 2/	ALAR	YES	NO
Green Needlegrass (N)	NAVI4	YES	NO
Hybrid Wheatgrass (I)	ELHO3	YES	NO
Idaho fescue (N)	FEID	YES	NO
Intermediate Wheatgrass (I)	THIN6	YES	NO
Orchardgrass (I)	DAGL	YES	NO
Pubescent Wheatgrass (I)	THIN6	YES	NO
Russian Wildrye (I)	PSJU3	YES	NO
Streambank Wheatgrass (N)	ELLA3	YES	NO
Tall Fescue (I) 1/	LOAR10	YES	NO
Tall Wheatgrass (I)	THPO7	YES	NO
Western Wheatgrass (N)	PASM	YES	NO

<b><u>Warm Season Grasses</u></b>	<b><u>Scientific Symbol</u></b>	<b><u>Dryland</u></b>	<b><u>Irrigated</u></b>
Prairie sandreed (N)	CALO	YES	NO
Sideoats grama (N)	BOCU	YES	NO

<b><u>Legumes</u></b>	<b><u>Scientific Symbol</u></b>	<b><u>Dryland</u></b>	<b><u>Irrigated</u></b>
Sainfoin (I)	ONVI	YES	NO

<b><u>Other Perennial Forbs</u></b>	<b><u>Scientific Symbol</u></b>	<b><u>Dryland</u></b>	<b><u>Irrigated</u></b>
Lewis flax (N)	LILE3	YES	NO
Winterfat (N)	KRLA2	YES	NO

<b><u>Annual Species</u></b>	<b><u>Scientific Symbol</u></b>	<b><u>Dryland</u></b>	<b><u>Irrigated</u></b>
Austrian Winter Pea	PISUM	YES	NO
Field Peas	PISAA2	YES	NO
Hay/Feed Barley	HORDE	YES	NO
Lentils	LENS	YES	NO
Peas/Small grains	LATHY	YES	NO
Rye, Winter Wheat, Spelts, 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.

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

1/ Endophyte-free

2/ Recommended upper end of 15-19" precipitation zone

## **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)
Introduced cool season grasses	2400	5200	0	0
Lentils	1250	1800	0	0
Native cool season grasses	2500	4700	0	0
Oats	2000	2900	0	0
Pea grain	1400	2900	0	0
Warm season grasses	1600	2200	0	0

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)
Introduced cool season grasses	0.8	1.7	0.0	0.0
Lentils	0.4	0.6	0.0	0.0
Native cool season grasses	0.8	1.5	0.0	0.0
Oats	0.7	1.0	0.0	0.0
Pea grain	0.5	1.0	0.0	0.0
Warm season grasses	0.5	0.7	0.0	0.0

1 AUM = 915 lbs air-dry

### Forage Growth Curves

Growth Curve Number: MT46XY01

Growth Curve Name: 10-19" subirrigated

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	5	20	40	20	10	5	0	0	0

**Growth Curve Number:** MT46XK08  
**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:** MT46XK03  
**Growth Curve Name:** 15-19" 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:** MT46XK05  
**Growth Curve Name:** 15-19" dryland legume, 1 cutting with cool season grass  
**Growth Curve Description:** (treefoil, 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:** MT46XK09  
**Growth Curve Name:** 15-19" 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

**Soil Limitations**

The Deep Subirrigated, Limy FSG is limited by the high lime content close to the soil surface. The calcium carbonate causes the soil to have high wind erosion hazard when calcium carbonate is exposed at the surface. The lime reduces the availability of some plant nutrients. This limits species selection and production potential.

**Management Interpretations**

The impact on yields can be reduced by selecting species adapted to the high lime 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.

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 Table xyz.1, Hayland Management Guidelines, and Table xyz.2, Pasture Management Guidelines.

## **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
- Central Agri. Research Center, Moccasin MT Production and Yield Trials
- "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:**

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<u>Approval Date:</u>	9/1/2006