

## **FORAGE SUITABILITY GROUP**

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

**FSG No.:** G058AK001MT

**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 Clayey FSGs occur on a variety of landforms, but occur predominantly on stream terraces, fans, drainageways, "bottomlands" or till and sedimentary plains.

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	1600	5000
<b>Slope (percent):</b>	0	15
<b>Flooding:</b>		
<b>Frequency:</b>	None	Occasional
<b>Duration:</b>	None	Brief
<b>Ponding:</b>		
<b>Depth (inches):</b>		
<b>Frequency:</b>	None	Occasional
<b>Duration:</b>	None	Brief
<b>Runoff Class:</b>	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):** 90 138  
 (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):** 95 116  
 (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

**Monthly Average:** 0.64 0.48 0.90 1.56 2.71 2.58 1.77 1.36 1.43 1.17 0.68 0.62

**Temp. Min.**

**Temp. Max.**

**Temp. Avg.** 21.3 27.1 35.0 44.7 54.2 63.2 69.5 68.9 58.0 46.6 32.2 23.6

<u>Climate Station</u>	<u>Location</u>	<u>From</u>	<u>To</u>
MT9033	Winifred, MT	1971	2000
MT6862	Rapelje 4 S, MT	1971	2000
MT2689	Ekalaka, MT	1971	2000
MT5596	Melstone, MT	1971	2000

**Soil Interpretations**

This FSG consists mostly of moderately deep to very deep, well-drained, usually fertile soils formed in clayey alluvium. Electrical conductivity ranges from 0 to <4 mmhos/cm. Sodium absorption ratio is <13. Available water holding capacity is 3 to >9 inches. Calcium carbonate equivalent is <15 percent.

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

	<u>Minimum</u>	<u>Maximum</u>
<b>Depth:</b>	20	72
<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> (0 - 12 inches)	5.5	8.5
<b>Available Water Capacity (inches):</b> (0 - 60 inches)	3	11
<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. 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)	LEAN3	YES	NO
Basin wildrye (N)	LECI4	YES	NO
Beardless wheatgrass (N)	PSSPI	YES	YES
Beardless wildrye (N)	LETR5	YES	NO
Big bluegrass (N)	POSE	YES	YES
Creeping meadow foxtail (I)	ALAR	YES	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

**Warm Season Grasses**

	<b><u>Scientific Symbol</u></b>	<b><u>Dryland</u></b>	<b><u>Irrigated</u></b>
Big bluestem (N)	ANGE	YES	NO
Switchgrass (N)	PAVI2	YES	NO

**Legumes**

	<b><u>Scientific Symbol</u></b>	<b><u>Dryland</u></b>	<b><u>Irrigated</u></b>
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

**Other Perennial Forbs**

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

**Annual Species**

	<b><u>Scientific Symbol</u></b>	<b><u>Dryland</u></b>	<b><u>Irrigated</u></b>
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.

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/ 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	1100	3500	3600	7500
Alfalfa/ cool season grass	1800	4000	4550	8000
Cool season natives grown on former cropland	2100	2800		
Crested wheatgrass	1000	2200		
Dryland sorghum-sudan hybrids	1000	4000		
Field peas/ oats, barley, millet	2040	4080		
Intermediate/ pubescent wheatgrass	1400	2000	3850	5500
Lentils	1000	3400		
Newhy hybrid wheatgrass	1200	2500		
Regar meadow brome/ orchard grass	1400	2500	3150	4500
Russian wildrye	1050	2500		
Warm season natives grown on former cropland	2250	3000		

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	0.4	1.1	1.2	2.5
Alfalfa/ cool season grass	0.6	1.3	1.5	2.6
Cool season natives grown on former cropland	0.7	0.9		
Crested wheatgrass	0.3	0.7		
Dryland sorghum-sudan hybrids	0.3	1.3		
Field peas/ oats, barley, millet	0.7	1.3		
Intermediate/ pubescent wheatgrass	0.5	0.7	1.3	1.8
Lentils	0.3	1.1		
Newhy hybrid wheatgrass	0.4	0.8		
Regar meadow brome/ orchard grass	0.5	0.8	1.0	1.5
Russian wildrye	0.3	0.8		
Warm season natives grown on former cropland	0.7	1.0		

**1 AUM = 915 lbs air-dry**

### Forage Growth Curves

**Growth Curve Number:** MT58AK02  
**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	15	30	25	5	10	15	0	0	0

**Growth Curve Number:** MT58AK03  
**Growth Curve Name:** 15-19" 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	15	25	20	10	15	15	0	0	0

**Growth Curve Number:** MT58AK04  
**Growth Curve Name:** 15-19" 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	15	30	25	10	5	15	0	0	0

**Growth Curve Number:** MT58AK05  
**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	15	30	25	10	5	15	0	0	0

**Growth Curve Number:** MT58AK06  
**Growth Curve Name:** 15-19" ponderosa pine/ aspen 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	0	35	40	15	5	5	0	0	0

**Growth Curve Number:** MT58AK08  
**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	40	40	10	0	5	0	0	0

**Growth Curve Number:** MT58AK09  
**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	5	25	25	25	5	0	15	0	0	0

**Growth Curve Number:** MT58AK10  
**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	5	30	40	20	0	0	5	0	0	0

**Soil Limitations**

The Clayey FSG is limited by permeability (very slow to moderately slow). This creates more potential for runoff and water erosion. 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%. Also, moderately deep soils within this FSG are not recommended for irrigation or for use as pasture, but may be limited to use for reclaimed natives.

**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.

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**

G058AK009MT

##### **FSG Narrative**

Clayey, saline soils have elevated saline levels, which limit plant species selection and production.

### **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:

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