FORAGE SUITABILITY GROUP
SUBIRRIGATED, SALINE, 15-19" ppt/ >90 Freeze Free Days

FSG No.: **G058AK033MT**

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 bisected with naturally occuring 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 Subirrigated, Saline FSG occurs predominantly on depressions and lake basins or on flood plains which are nearly level and may tend to capture surrounding runoff. While slope is generally 0 to 2 percent, it can be as steep as 15 percent.

	Minimum	Maximum
Elevation (feet):	2000	3500
Slope (percent):	0	15
Flooding:		
Frequency:	None	Occasional
Duration:	None	Brief
Ponding:		
Depth (inches):		
Frequency:	None	Occasional
Duration:	None	Brief
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 dessicating 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): **(9 years in 10 at least)**	90	138
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)**	95	116
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:	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
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

Climate Station	**Location**	**From**	**To**
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 mainly of deep to very deep, somewhat poorly drained soils that formed in alluvium. Sodium absorption ratio can range from 0 to 35, and calcium carbonate equivalent is <15 percent.

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

	Minimum	Maximum
Depth:	40	72
Surface Fragments >3" (% Cover):		
Organic Matter (percent): (surface layer)	0.5	4.0
Electrical Conductivity (mmhos/cm): (0 - 24 inches)	4	16
Sodium Absorption Ratio: (0 - 12 inches)	0	35
Soil Reaction (1:1) Water (pH): (0 - 12 inches)	5.5	8.4
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. In the central area of MLRA 58A the adaptability of warm season native grasses diminishes.

Cool Season Grasses	Scientific Symbol	Dryland	Irrigated
Altai wildrye (I) 1/	LEAN3	YES	NO
Basin wildrye (N)	LECI4	YES	NO
Beardless wheatgrass (N)	PSSPI	YES	NO
Beardless wildrye (I) 1/	LETR5	YES	NO
Canada wildrye (N)	ELCA4	YES	NO
Hybrid wheatgrass (I) 1/	ELHO3	YES	NO
Intermediate wheatgrass (I) 1/	THIN6	YES	NO
Pubescent wheatgrass (I) 1/	THIN6	YES	NO
Russian wildrye (I) 1/	PSJU3	YES	NO
Slender wheatgrass (N) 1/	ELTR7	YES	NO
Streambank wheatgrass (N) 1/	ELLA3	YES	NO
Tall fescue (I) 2/	LOAR10	YES	NO
Tall wheatgrass (I) 1/	THPO7	YES	NO

Thickspike wheatgrass (N) 1/	ELMA7	YES	NO
Western wheatgrass (N) 1/	PASM	YES	NO

Warm Season Grasses	**Scientific Symbol**	**Dryland**	**Irrigated**
Little bluestem (N)	SCSC	YES	NO

Legumes	**Scientific Symbol**	**Dryland**	**Irrigated**
Cicer milkvetch (I)	ASCI4	YES	NO

Other Perennial Forbs	**Scientific Symbol**	**Dryland**	**Irrigated**
Maximilian sunflower (N)*	HEMA2	YES	NO
Winterfat (N)* 1/	KRLA2	YES	NO

Annual Species	**Scientific Symbol**	**Dryland**	**Irrigated**
Hay/ feed barley	HORDE	YES	NO
Hay/ feed oats	AVENA	YES	NO
Rye, wheat, spelt, 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/ Recommended for higher EC levels (8-16 mmhos/cm)
2/ 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	**Dryland**		**Irrigated**	
	Low (lbs/ac/yr)	**High (lbs/ac/yr)**	**Low (lbs/ac/yr)**	**High (lbs/ac/yr)**
Altai wildrye	1260	1800		
Barley	2325	4650		
Russian wildrye	800	1125		
Shoshone beardless wildrye, Newhy hybrid	2250	3000		

Pasture	Dryland		Irrigated	
	Low (AUMs/ac)	High (AUMs/ac)	Low (AUMs/ac)	High (AUMs/ac)
Altai wildrye	0.4	0.6		
Barley	0.8	1.5		
Russian wildrye	0.3	0.4		
Shoshone beardless wildrye, Newhy hybrid	0.7	1.0		

1 AUM = 915 lbs air-dry

Forage Growth Curves

Growth Curve Number: MT58AK08
Growth Curve Name: 15-19" 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	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

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

Soil Limitations

The Subirrigated, Saline FSG is limited primarily by higher levels of salts in the soils (electrical conductivity 4 to 16 mmhos/cm). This will reduce species selection and may cause difficulty in stand establishment. Potential production may also be affected. Limited available water holding capacity will also affect production. Sodic and sodic/saline properties may also exist in some 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.

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, saline tolerant 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:

Similar FSG's:

FSG ID	FSG Narrative
G058AK015MT	Deep subirrigated, saline soils have a lower water table.
G058AK031MT	Subirrigated, loamy/sandy soils have lower salinity levels in the soil profile.

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:

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