

## Ecological Site Description—Rangeland

Saline Upland (SU), 11–14" MAP

MLRA: 58AC – Sedimentary Plains, Central  
R058AC050MT



**1. Physiographic features:** This ecological site occurs on nearly level to moderately steep sedimentary plains, hills, fans, and terraces where salt and/or alkali accumulations are apparent and salt-tolerant species dominate the plant community.

- Landform:** sedimentary plain, hill, terrace, fan
- Elevation (feet):** 2250 - 4500
- Slope (percent):** mainly 20 or less, can be up to 35–40
- Depth to Water Table (inches):** greater than 60
- Flooding:** none
- Ponding:** none
- Runoff Class:** medium to high
- Aspect:** All, not significant

**2. Soils:** The soils associated with this ecological site are moderately to strongly saline, derived from shale and other sedimentary rock. Surface textures are variable, typically loam, silt loam, silty clay loam. Soils are greater than 20 inches deep. Bare ground areas are significant, resulting from the salinity. The soil surface is typically crusted, and hard or very hard when dry. Salt crystals are often observable with a low power (i.e., 10 X) lens.

- Available Water Holding Capacity to 40" (inches):** 3–6
- Drainage Class:** well
- Salinity/Electrical Conductivity (mmhos/cm):** moderately to strongly saline (8–30)
- Sodium Absorption Ratio (SAR):** 10–40
- Reaction (pH) (1:1 water):** moderately alkaline to very strongly alkaline (7.9–9.6)

**3. Associated sites:** Clayey, Silty, Silty-Saline, ClayPan, and Dense Clay.

**4. Similar sites:** Saline Lowland, Dense Clay.

The Saline Lowland site is also dominated by salt tolerant plants, but will have much greater production due to the extra water either from overflow or subirrigation.

The Dense Clay site will have a hard restrictive layer in the soil at or near the surface. Salt tolerant plants may be present, but are rarely dominant.

**5. Major Plant Community Types:** The physical aspect of this site in the Historical Climax (HCPC) or Potential Plant Community (PPC) is that of a sparse grassland/ shrubland dominated by salt tolerant plants. Approximately 45–50% of the annual production is from grasses and sedges, 1–5% from forbs, and 35–45% is from shrubs and half-shrubs. The canopy cover of shrubs is 1 – 10%.

**Plant Community 1: Tall and Medium Grasses/ Forbs/ Shrubs:** The physical aspect of this site is that of a moderately sparse grassland and shrub land that is dominated by cool and warm season grasses with shrubs distributed throughout. Approximately 70–80% of the annual production is from grasses and sedges, 1–5% from forbs, and 2–10% is from shrubs and half-shrubs. The canopy cover of shrubs is 2 to 10%.

This is the interpretive plant community and is considered to be the Historic Climax Plant Community (HCPC) for this site. This plant community contains a diversity of cool and warm season grasses (**alkali sacaton, Nuttall's alkaligrass, and western wheatgrass**), and short grasses (**alkali bluegrass, Sandberg bluegrass**). There are few forbs occurring in small percentages. Shrubs and half-shrubs such as **Nuttall's saltbush and winterfat** are abundant. **Black greasewood** is a common component of this community.

This plant community is well adapted to the Northern Great Plains climatic conditions. The diversity in plant species

## Ecological Site Description—Rangeland

Saline Upland (SU), 11–14" MAP

**MLRA: 58AC – Sedimentary Plains, Central  
R058AC050MT**

and presence of tall, deep-rooted perennial grasses allows for drought tolerance. Plants on this site have strong, healthy root systems that allow production to increase significantly with favorable moisture conditions. Abundant plant litter is available for soil building and moisture retention. Plant litter is properly distributed with very little movement off-site and natural plant mortality is very low. This plant community provides for soil stability and a functioning hydrologic cycle.

**Plant Community 2: Medium and Short Grasses/ Shrubs:** Slight degradation in the historic climax plant community, including a beginning response to non-prescribed grazing, will tend to change the HCPC/PPC to a community represented by an increase in grasses such as **Sandberg bluegrass, and inland saltgrass**. Grasses such as **alkali sacaton, Nuttall’s alkaligrass, and western wheatgrass** will still be present, sometimes in relatively large amounts. The desirable shrubs/ half-shrubs such as **Nuttall’s saltbush and winterfat** will be present, along with increasing amounts of **black greasewood**.

Grass biomass production and litter become reduced on Community 2 as the taller grasses become less prevalent, increasing evaporation and reducing moisture retention. Additional open space in the community can result in undesirable invader species. These plant communities provide for moderate soil stability.

**Plant Community 3: Shrubs & Half-Shrubs/ Short Grasses/ Cactus:** This is a disturbance induced community, with dominants including **black greasewood, inland saltgrass, and plains pricklypear**. Species such as **western wheatgrass and Sandberg bluegrass** may still be relatively common. The taller grasses (alkali sacaton) may still be present, but in much smaller amounts and often under shrubs or mixed in with cactus. **Nuttall’s saltbush** will often still be present. **Bottlebrush squirreltail** will tend to become more abundant. The amount of bare ground between plants also tends to increase.

**Plant Community 4: Shrubs/ Half-Shrubs/ Annual Grasses and Forbs/ Cactus/ Short Grasses:** If heavy disturbance continues, plant community 3 can deteriorate to one primarily composed of **greasewood, inland saltgrass, bottlebrush squirreltail, and broom snakeweed, annual grasses (cheatgrass or Japanese brome, six-weeks fescue), annual forbs (such as pepperweed or fanweed), and plains pricklypear**. There will still be some of the mid-seral species such as western wheatgrass present. The taller grasses will occur only rarely, often underneath the shrub canopy or mixed in with cactus.

Some sites may retain a large amount of Nuttall’s saltbush, even in what appears to be a deteriorated condition. The plants have a prostrate growth form, apparently protecting them from further heavy use. This appears to be a stable and common community and is probably a result of the grazing history of the site. Often, bottlebrush squirreltail, Sandberg bluegrass, one of the wheatgrasses, and a few forbs are the main associated species.

Plant Communities 3 and 4 are much less productive than Plant Communities 1 or 2, and have lost many of the attributes of a healthy rangeland. The loss of deep perennial root systems reduces total available moisture for plant growth. Reduction of plant litter will result in higher surface soil temperatures and increased evaporation losses. Annual species are often aggressive and competitive with seedlings of perennial plants. This community can respond positively to improved grazing management but it will take additional inputs to move it towards a community similar in production and composition to that of Plant Community 1 or 2. The landscape features often associated with this ecological site as well as the droughty nature of the soils severely limits the use of most common structural improvement practices.

### 5a. Cover and structure (Historic Climax Plant Community)

COVER TYPE	BASAL COVER (%)	CANOPY COVER (%)	AVERAGE HEIGHT (inches)
Cryptogams	0-T	0-T	0.25
Grasses/ sedges	2-7	5-20	18
Forbs	1-2	1-5	6
Shrubs	1-3	1-10	18
Litter	15-25		
Coarse fragments	0-10		
Bare ground	60-80		

# Ecological Site Description—Rangeland

Saline Upland (SU), 11–14" MAP

MLRA: 58AC – Sedimentary Plains, Central  
R058AC050MT

## 5b. Major Plant Species Composition - Historical Climax Plant Community

Common Name	Plant Symbol	Plant Group	Percent Comp.	Group Max. %	Mean Annual Precipitation (inches)			
					11	12	13	14
					(lbs./acre)	(lbs./acre)	(lbs./acre)	(lbs./acre)
<b>Grasses and Sedges</b>				<b>75-85</b>	<b>470-530</b>	<b>525-595</b>	<b>580-660</b>	<b>640-725</b>
Alkali sacaton	SPAI	1	20-40		125-250	140-280	155-310	170-340
Western or Thickspike wheatgrass	PASM ELLAL	14	15-30		95-190	105-210	115-235	125-255
Inland saltgrass	DISP	15	5-10		30-65	35-70	40-75	45-85
Nuttall's alkaligrass	PUNU	2	0-5		0-30	0-35	0-40	0-45
Alkali bluegrass	POJU	4	0-5		0-30	0-35	0-40	0-45
Montana wheatgrass	ELLAA	14	0-5		0-30	0-35	0-40	0-45
Sandberg bluegrass	POSE	12	0-5)					
Plains reedgrass	CAMO	16	0-5)					
Bottlebrush squirreltail	ELEL5	10	0-5)					
Sedge spp.	CAREX	12	0-5)	5	0-30	0-35	0-40	0-45
Prairie junegrass	KOMA	12	0-5)					
Blue grama	BOGR2	15	0-5)					
Other native grasses	2GP		0-5)					
Foxtail barley	HOJU	12	0-T	T	0-T	0-T	0-T	0-T
Tumblegrass	SCPA	11	0-T					
<b>Forbs</b>				<b>1-5</b>	<b>T-30</b>	<b>T-35</b>	<b>T-40</b>	<b>T-45</b>
Poverty sumpweed	IVAX	19	0-5					
Buckwheat spp.	ERIOG	23	0-5					
American vetch	VIAM	18	0-5					
Biscuitroot spp.	LOMAT	24	0-5	5	0-30	0-35	0-40	0-45
Wild parsley	MUDI	24	0-5					
Scarlet globemallow	SPCO	20	0-5					
Aster spp.	ASTER	19	0-5					
Other native forbs	2FP		0-5					
Two grooved poisonvetch *	ASBI2	24	0-T	T	T	T	T	T
<b>Shrubs and Half-shrubs</b>				<b>10-20</b>	<b>65-125</b>	<b>70-140</b>	<b>75-155</b>	<b>85-170</b>
Winterfat	KRLA2	35	0-5		0-95	0-105	0-115	0-125
Fourwing saltbush	ATCA2	33	0-15		30-95	65-105	40-115	45-125
Nuttall's saltbush	ATNU2	34	0-5	15	0-30	0-35	0-40	0-45
Greasewood	SAVE4	37	0-5		0-30	0-35	0-40	0-45
Shadscale	ATCO	34	0-5		0-65	0-70	0-75	0-85
Fringed sagewort	ARFR4	38	1-5					
Rabbitbrush	ERNAN5	32	0-5	5	0-30	0-35	0-40	0-45
Other native shrubs	2SB		0-5					
Broom snakeweed	GUSA2	37	0-T	T	0-T	0-T	0-T	0-T
Plains pricklypear	OPPO	38	0-T					
<b>Total Annual Production (lbs./ac):</b>			<b>100%</b>		<b>625</b>	<b>700</b>	<b>775</b>	<b>850</b>

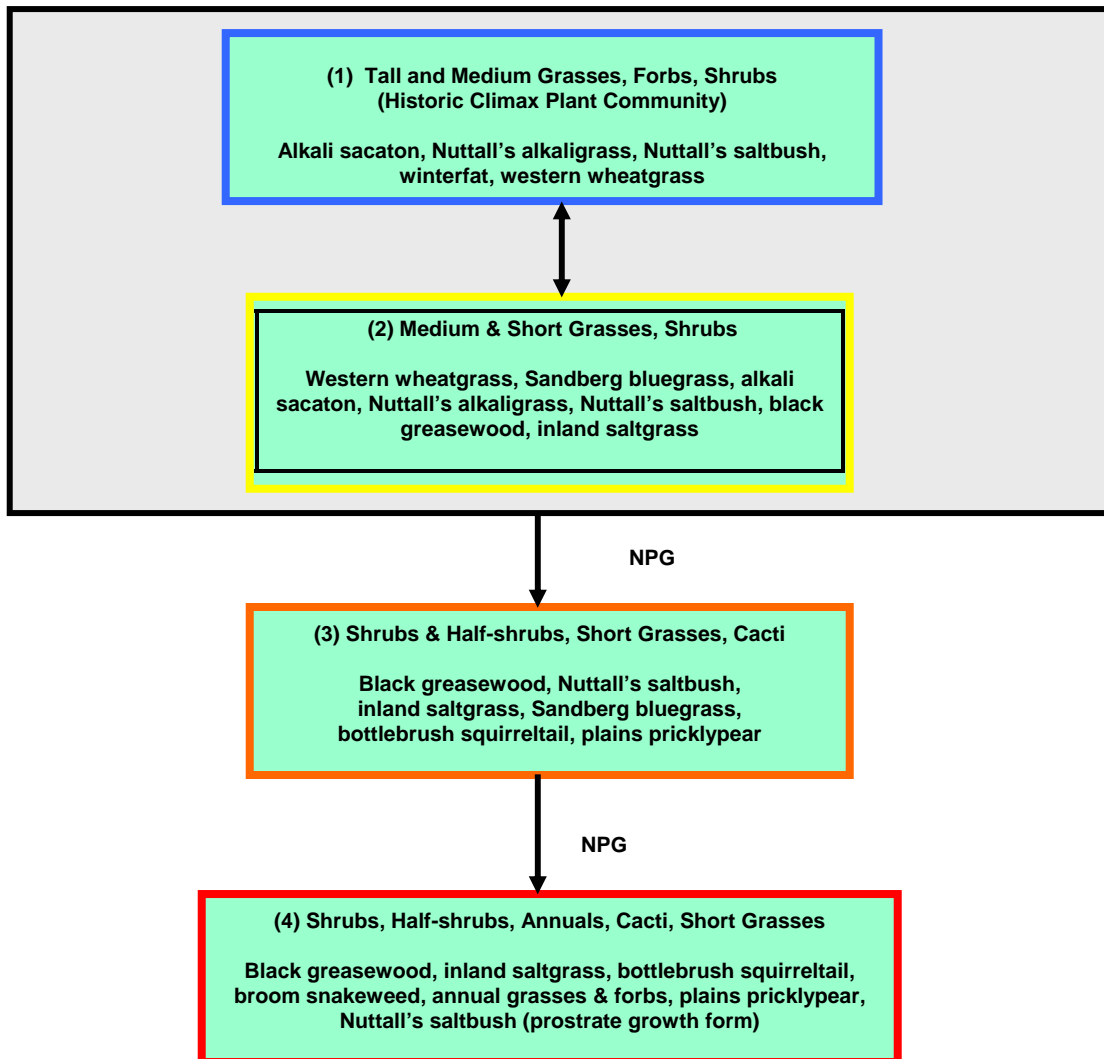
\* This plant species is poisonous to some grazing animals, during at least some portion of its life cycle.

# Ecological Site Description—Rangeland

Saline Upland (SU), 11–14" MAP

MLRA: 58AC – Sedimentary Plains, Central  
R058AC050MT

## 5c. Plant Communities and Transitional Pathways (diagram)



Smaller boxes within a larger box indicate that these communities will normally shift among themselves with slight variations in precipitation and other disturbances. Moving outside the larger box indicates the community has crossed a threshold (heavier line) and will require intensive treatment to return to Community 1 or 2. Dotted lines indicate a reduced probability for success. Yellow boxes indicate caution that the community may be in danger of crossing a threshold. Orange boxes represent communities that have crossed over thresholds from the HCPC and may be difficult to restore with grazing management alone. Red boxes represent communities that have severely shifted away from the HCPC and probably cannot be restored without mechanical inputs.

NOTE: Not all species present in the community are listed in this table. Species listed are representative of the plant functional groups that occur in the community.

PG = Prescribed Grazing: Use of a planned grazing strategy to balance animal forage demand with available forage resources. Timing, duration, and frequency of grazing are controlled and some type of grazing rotation is applied to allow for plant recovery following grazing.

NPG = Non-Prescribed Grazing: Grazing which has taken place that does not control the factors as listed above, or animal forage demand is higher than the available forage supply.

## Ecological Site Description—Rangeland

Saline Upland (SU), 11–14" MAP

MLRA: 58AC – Sedimentary Plains, Central  
R058AC050MT

**6. Livestock Grazing Interpretations:** Managed livestock grazing is suitable on this site as it has the potential to produce high quality forage. However, forage production can be severely limited by the soil properties. Management objectives should include maintenance or improvement of the plant community. Shorter grazing periods and adequate re-growth after grazing are recommended for plant maintenance and recovery. Heavy stocking and season-long use of this site can be detrimental and will alter the plant community composition and production over time.

Whenever Plant Community 2 (medium and short grasses and shrubs) occurs, grazing management strategies need to be implemented to avoid further deterioration. This community is still stable, productive, and healthy provided it receives proper management. This community will respond fairly quickly to improved grazing management, including increased growing season rest of key forage plants. Grazing management alone can usually move this community back towards the potential community.

Plant Communities 3 and 4 have substantially reduced forage production, and a high percentage of aggressive, non-palatable species. Once these plant communities become established, it will be much more difficult to restore the site to a community that resembles the potential with grazing management alone. Additional growing season rest is often necessary for re-establishment of the desired species and to restore the stability and health of the site. Practices such as range seeding or mechanical treatment are generally not recommended on this site.

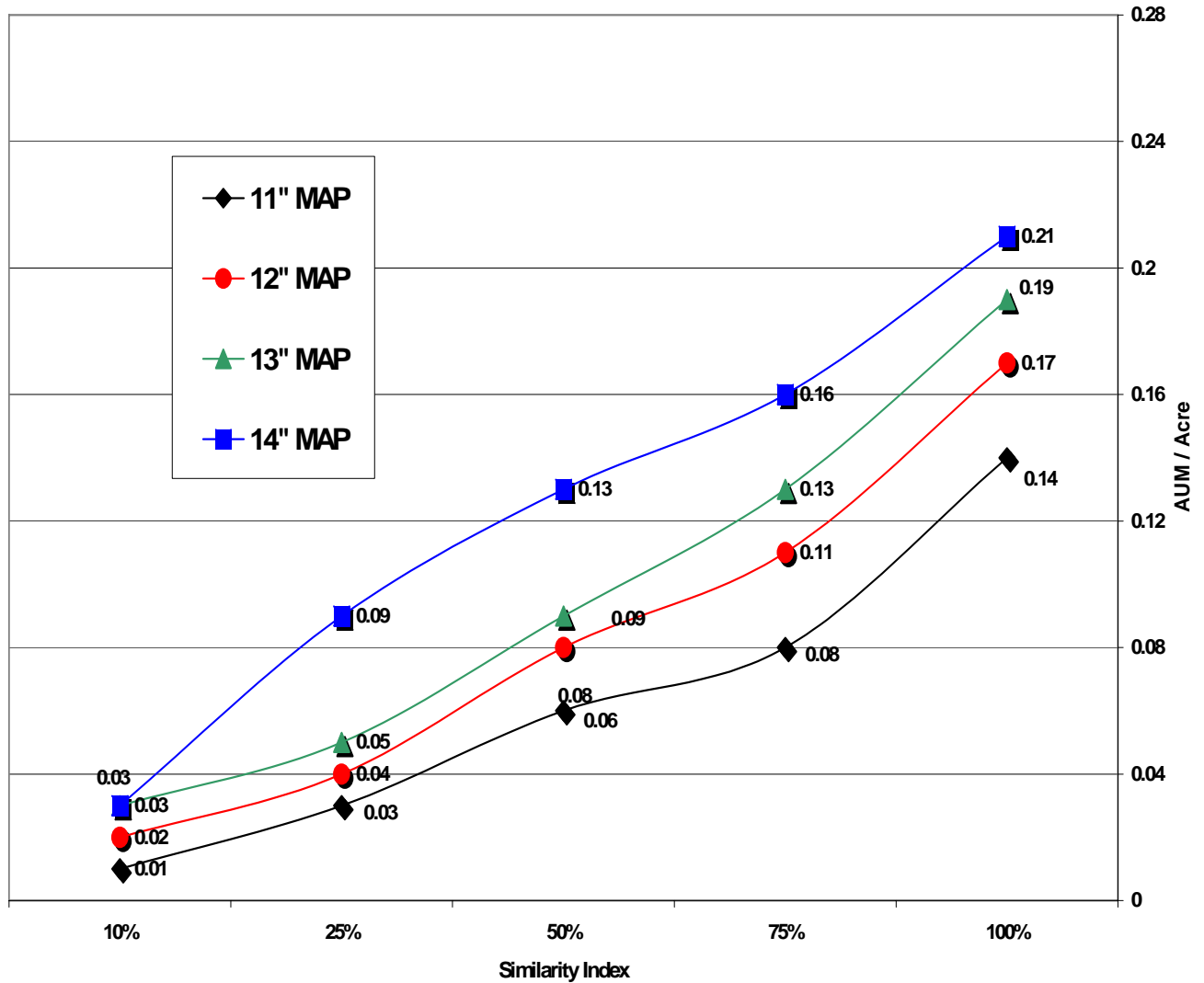
**6a. Guide to Safe Stocking Rates:** The following charts provide guidance for determining an initial safe stocking rate. Animal Unit Month (AUM) figures are based on averages of forage production from data collected for this site over several years. The characteristic plant communities and production values listed may not accurately reflect the productivity of a specific piece of land. These tables should not be used without on-site information collected to determine the average forage productivity of the site. Adjustments to stocking rates for each range unit must be made based on topography, slope, distance to livestock water, and other factors which effect livestock grazing behavior

# Ecological Site Description—Rangeland

Saline Upland (SU), 11–14" MAP

MLRA: 58AC – Sedimentary Plains, Central  
R058AC050MT

Stocking Rate Guide (Cattle)  
Saline Upland 11-14" MAP



# Ecological Site Description—Rangeland

Saline Upland (SU), 11–14" MAP

MLRA: 58AC – Sedimentary Plains, Central  
R058AC050MT

## 6b. Stocking Rate Guide:

Major Plant Community Dominant Plant Species	MAP	Total Production (pounds/ac)	Cattle			Sheep		
			Forage Production	AUM/ac	Ac/AUM	Forage Production	AUM/ac	Ac/AUM
<b>1. Tall and Medium Grasses, Forbs, Shrubs (HCPC)</b> <i>Western/ thickspike wheatgrass, green needlegrass, Nuttall's saltbush, winterfat, Wyoming big sagebrush</i> (S.I. > 75%)	13-14"	775-850	650-775+	.18 - .21 +	4.7 -5.6	700-800+	.19 -.22 +	4.6 -5.2
	11-12"	625-700	525-625+	.14 -.17 +	5.9 -7.0	575-675+	.16 -.18 +	5.4 -6.4
<b>2. Medium &amp; Short Grasses, Shrubs</b> <i>Western/ thickspike wheatgrass, blue grama, Sandberg bluegrass, Wyoming big sagebrush, green needlegrass, Nuttall's saltbush</i> (S.I. 40-75%)	13-14"	425-720	250-600	.07 -.16	6.1 -14.6	250-650	.07 -.18	5.6 -14.6
	11-12"	350-595	200-500	.05 -.14	7.3 -18.3	225-525	.06 -.14	7.0 -16.3
<b>3. Shrubs, Half-shrubs, Short Grasses, Cacti</b> <i>Wyoming big sagebrush/ greasewood, blue grama, Sandberg bluegrass, fringed sagewort, western/ thickspike wheatgrass, plains pricklypear</i> (S.I. 20-40%)	13-14"	275-550	150-325	.04 -.09	11.3-24.4	150-350	.04 -.10	10.5-24.4
	11-12"	220-455	100-275	.03 -.08	13.3-36.6	125-300	.03 -.08	12.2-29.3
<b>4. Shrubs, Half-shrubs, Annuals, Short Grasses, Cacti</b> <i>Wyoming big sagebrush/ greasewood, fringed sagewort, broom snakeweed, annual grasses &amp; forbs, plains pricklypear, blue grama, Sandberg bluegrass, western /thickspike wheatgrass</i> (S.I. < 20%)	11-14"	125-340	25-125	.01 -.03	29.3- 146.4	50-150	.01 -.04	24.4-73.2

Stocking rates are calculated from average forage production values using a 25% Harvest Efficiency factor for preferred and desirable plants, and 10% Harvest Efficiency for less desirable species. AUM calculations are based on 915 pounds per animal unit month (AUM) for a 1,000-pound cow with calf up to 6 months. No adjustments have been made for site grazability factors, such as steep slopes, site inaccessibility, or distance to drinking water.

## Ecological Site Description—Rangeland

Saline Upland (SU), 11–14" MAP

MLRA: 58AC – Sedimentary Plains, Central  
R058AC050MT

**7. Wildlife Interpretations:** The Saline Upland ecological site often adds structural habitat diversity to a relatively uniform grassland landscape. Historically, large herds of migratory bison and pronghorn, and significant numbers of mule deer and sage grouse were probably the predominant wildlife species using this site. Today, although cattle have replaced bison, the wildlife species composition is probably similar to historic conditions. The high percentage of half-shrubs and shrubs provides thermal cover and winter nutritional value for big game animals and a diverse nesting habitat structure for a variety of birds. The intrinsically high percentage of exposed soil limits habitat value for ground-nesters. Hard pan areas can supply ephemerally ponded habitat for invertebrates and amphibians.

**Plant Community 1: Tall and Medium Grasses/ Forbs/ Shrubs (HCPC):** A variety of plant life forms and seasonality provides flowers for pollinating insects. Temporarily ponded areas on hard pan spots serve as breeding habitat for amphibians such as Woodhouse's toad. Representative reptiles include the prairie rattlesnake and bull snake. The prevalence of bare ground limits ground-nesting bird habitat value although species such as Brewer's, vesper and grasshopper sparrows, lark buntings, and meadow larks use this plant community. Small mammal populations are dominated by seed-eaters like the deer mouse and harvest mouse. Voles are limited by low litter and residual vegetation cover. The high percentage of shrubs and half-shrubs in this community favors browsers and mixed feeders like pronghorn and mule deer. Thermal and escape cover is available for big game animals. The mix of warm and cool season grasses and shrubs provides nutritious forage for ungulates over most of the year.

**Plant Community 2: Medium and Short Grasses / Shrubs:** Habitat diversity for pollinating insects is somewhat reduced. An increasingly warmer, drier ground surface degrades amphibian habitat value to some extent. Ground-nesting birds lose even more ground cover for nest concealment and thermal cover. The loss of the warm season alkali sacaton shortens the period of high nutrition for big game species.

**Plant Community 3: Shrubs and Half-Shrubs/ Short Grasses/ Cacti:** Insect diversity is considerably reduced with the reduction in desirable grass, forb and shrub variety. A much drier soil surface reduces amphibian habitat value. Increased bare ground and further reductions in litter and residual grass cover degrade habitat value for ground-nesting birds and small mammals. Brewer's sparrows, lark buntings and meadowlarks are examples of songbird species which may use this community. General wildlife habitat value and forage for big game species are considerably reduced with the loss of vegetative structural diversity. Thermal and hiding cover and some browse are available for big game animals.

**Plant Community 4: Shrubs/ Half-Shrubs/ Annual Grasses and Forbs/ Cacti/ Short Grasses:** Insects may be very numerous during population outbreaks (i.e. grasshoppers) but species diversity is significantly reduced. Reptiles may be limited by cover and low prey populations. Nesting bird habitat value is very low because of the sparse ground cover. The adaptable deer mouse is the predominant small mammal. Pronghorn and mule deer may use the prostrate Nuttall's saltbush browse.

**8. Hydrology Data:** The runoff potential for this site is very high depending on slope and ground cover/health. Runoff curve numbers generally range from 84 to 93. The soils associated with this ecological site are generally in Hydrologic Soil Group D. The infiltration rates for these soils will normally be very slow.

### 9. Site Documentation:

**Authors:** Original: NRCS, 1983      Revised: MJR, REL, RSN, POH, 2003

#### Supporting Data for Site Development:

NRCS–Production & Composition Record for Native Grazing Lands (Range-417): 2  
BLM–Soil & Vegetation Inventory Method (SVIM) Data: 4  
NRCS–Range Condition Record (ECS-2): 10  
NRCS–Range/Soil Correlation Observations & Soil 232 notes: 13  
Ecological Site Reference: NRCS 417 No.: Musselshell 505



## Ecological Site Description—Rangeland

Saline Upland (SU), 11–14" MAP

---

MLRA: 58AC – Sedimentary Plains, Central  
R058AC050MT

**Field Offices where this site occurs within the state:**

Big Sandy	Columbus	Harlowton	Roundup
Big Timber	Crow Agency	Joliet	Stanford
Billings	Fort Belknap	Lewistown	White Sulphur Springs
Chinook	Hardin	Malta	Winnett

**Site Approval:** This site has been reviewed and approved for use:

Loretta J. Metz  
State Rangeland Management Specialist

10/22/2004  
Date

# Ecological Site Description—Rangeland

Saline Upland (SU), 11-14" MAP

MLRA: 58AC – Sedimentary Plains, Central  
R058AC050MT



Saline Upland, 11-14" MAP  
Sedimentary Plains, Central  
Plant Community 1  
HCPC



Saline Upland, 11-14" MAP  
Sedimentary Plains, Central  
Plant Community 1  
HCPC



Saline Upland, 11-14" MAP  
Sedimentary Plains, Central  
Plant Community 1  
HCPC

# Ecological Site Description—Rangeland

Saline Upland (SU), 11-14" MAP

MLRA: 58AC – Sedimentary Plains, Central  
R058AC050MT



Saline Upland, 11-14" MAP  
Sedimentary Plains, Central  
Plant Community 1  
HCPC



Saline Upland, 11-14" MAP  
Sedimentary Plains, Central  
Plant Community 1  
HCPC



Saline Upland, 11-14" MAP  
Sedimentary Plains, Central  
Plant Community 1  
HCPC