

## Ecological Site Description—Rangeland

Saline Overflow (SOv), 11–14" MAP

MLRA: 58AC – Sedimentary Plains, Central  
R058AC618MT



**1. Physiographic features:** This ecological site occurs on overflow lands where salt and/or alkali accumulations are apparent and salt-tolerant species dominate the plant community. It is associated mainly with ephemeral streams (those that flow only in response to a precipitation event or snow melt, and the water table is lower than the channel bottom). This site can also occur around pond margins, particularly if the water recedes (e.g., drawdown zone).

- Landform:** swale, depression, drainageway
- Elevation (feet):** 2250 - 4500
- Slope (percent):** 0–4
- Depth to Water Table (inches):** greater than 60
- Flooding:** none to rare
- Ponding:** none
- Aspect:** not significant

**2. Soils:** The soils associated with this ecological site are moderately to very strongly saline or sodic. Salt and/or sodium accumulations are apparent on the surface. Depth and texture are typically not determining factors. However, these soils are mainly over 20 inches deep. Surface textures are mainly silty clay loam and loam, but can also be silty clay, silt loam, sandy loam, clay loam, and clay. Permeability is variable, depending on surface texture and the amount of salt and/or sodium present. These sites are affected by additional moisture, mainly the result of surface run-in.

- Available Water Holding Capacity to 40" (inches):** 8
- Drainage Class:** well drained
- Salinity/Electrical Conductivity (mmhos/cm):** moderately to strongly saline ( $\geq 8$ )
- Sodium Absorption Ratio (SAR):**  $\geq 13$
- Reaction (pH) (1:1 water):** moderately to very strongly alkaline (7.9 – 9.6)

**3. Associated sites:** This ecological site typically occurs as a single taxa unit.

**4. Similar sites:** Saline Upland, Silty-Saline, Dense Clay.

The Saline Upland site may have similar plants, but is much sparser and low producing.

The Silty-Saline site will have more non-salt tolerant plants present.

The Dense Clay site will be more similar to a Saline Upland in that the production is much lower and the plant community is very sparse.

**5. Major Plant Community Types:** The following are descriptions of several plant communities that may occupy this site:

**Plant Community 1: Tall and Medium Grasses/ Forbs/ Shrubs:** The physical aspect of this site in the Historical Climax (HCPC) is that of a swale or depression grassland dominated by cool and warm-season grasses with scattered shrub cover. Approximately 70–80% of the annual production is from grasses and sedges, 5–10% from forbs, and 15–20% is from shrubs and half-shrubs. The canopy cover of shrubs is 1 to 10%. Dominant species include **basin wildrye, alkali cordgrass, alkali sacaton, Nuttall's alkaligrass, and alkali bluegrass**. There are a few forbs that occur in smaller percentages. Shrubs such as **Nuttall's saltbush, winterfat, and black greasewood** can be common.

This plant community is well adapted to the Northern Great Plains climatic conditions. The diversity in plant species and the presence of tall, deep-rooted perennial grasses allows for moderately high drought tolerance. Individual species can vary greatly in production depending on growing conditions (timing and amount of precipitation and

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temperature). Plants on this site have strong, healthy root systems that allow production to increase significantly with favorable precipitation. 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 site, because of the additional water typically available, provides a very good soil-water-plant relationship. This plant community provides for soil stability and a functioning hydrologic cycle.

**Plant Community 2: Medium and Short Grasses/ Shrubs and Half-shrubs:** This community is the result of shifts in climate and disturbances such as grazing, and is represented by an increase in **black greasewood** and short grasses such as **inland saltgrass, western wheatgrass, Sandberg bluegrass and mat muhly**. The medium and tall grasses such as **basin wildrye, alkali cordgrass, alkali sacaton and Nuttall’s alkaligrass** will still be present, sometimes in relatively large amounts. The desirable shrubs such as Nuttall’s saltbush and winterfat will be somewhat less prevalent. There may be an increase in some forbs such as **poverty sumpweed and seepweed**.

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. This plant community provides for moderate soil stability.

**Plant Community 3: Short and Medium Grasses/ Half-shrubs and Shrubs:** This is a disturbance induced community, with dominants including **inland saltgrass, Sandberg bluegrass and mat muhly**. Mid-seral species such as western wheatgrass will still be relatively abundant. The taller grasses (basin wildrye, alkali sacaton and alkali cordgrass) will still be present, but in much smaller amounts. Palatable forbs will be mostly absent. **Bottlebrush squirreltail and foxtail barley** often tend to become more abundant. **Greasewood** can become dominant in some situations, depending on factors such as fire history, historical use and management, and kinds and amount of salts present.

Plant Community 3 is much less productive than Plant Communities 1 or 2, and has 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.

**Plant Community 4: Shrubs/ Short Grasses/ Weedy Forbs:** This community is the result of continual adverse disturbances, and the community may deteriorate to one primarily composed of shrubs (**greasewood**) and short grasses (**inland saltgrass, bottlebrush squirreltail**). 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. Weedy forbs (e.g., **kochia**) are likely to invade. **Foxtail barley** can be a common invader on this site.

Plant community 4 has extremely reduced production of native plants (< 600 lbs./acre). The lack of litter and short plant heights result in higher soil temperatures, poor water infiltration rates, and increased evaporation, which gives short sod grasses and annual invaders a competitive advantage over the cool season tall and medium grasses. This community has lost many of the attributes of a healthy rangeland, including good infiltration, minimal erosion and runoff, nutrient cycling and energy flow. Significant economic inputs and time would be required to move this plant community towards a higher successional stage and a more productive plant community.

### 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	10–15	60–80	30
Forbs	1–4	1–5	12
Shrubs	1–5	1–10	24
Litter	40–60		
Coarse fragments	0–5		
Bare ground	5–15		

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## 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>70-85%</b>	<b>1190-1445</b>	<b>1260-1530</b>	<b>1330-1615</b>	<b>1400-1700</b>
Alkali cordgrass	SPGR	5	15-30		255-510	270-540	285-570	300-600	
Alkali sacaton	SPAI	1	15-30		255-510	270-540	285-570	300-600	
Basin wildrye	LECI	2	10-30		170-510	180-540	190-570	200-600	
Alkali bluegrass	POJU	4	0-10		0-170	0-180	0-190	0-200	
Nuttall's alkaligrass	PUAI	2	0-5		0-85	0-90	0-95	0-100	
Western wheatgrass	PASM	14	0-10	10	0-170	0-180	0-190	0-200	
Sandberg bluegrass	POSE	12	T-5		0-170	0-180	0-190	0-200	
Inland saltgrass	DISP	15	1-5	10	0-170 No more than 85 for any one	0-180 No more than 90 for any one	0-190 No more than 95 for any one	0-200 No more than 100 for any one	
Mat muhly	MURI	12	0-5						
Bottlebrush squirreltail	ELEL5	10	0-5						
Other native grasses	2GP		5-10						
Foxtail barley *	HOJU	10	0-T	T	0-T	0-T	0-T	0-T	
<b>Forbs</b>					<b>5-10%</b>	<b>85-170</b>	<b>90-180</b>	<b>95-190</b>	<b>100-200</b>
Seepweed spp.	SUAEDA	23	0-5	10	0-170 No more than 85 for any one	0-180 No more than 90 for any one	0-190 No more than 95 for any one	0-200 No more than 100 for any one	
Poverty sumpweed	IVAX	23	0-5						
Aster spp.	ASTER	19	0-5						
Blue lettuce	LAPU	20	0-5						
American licorice	GLLE	20	0-5						
Silverweed cinquefoil	POAN	20	0-5						
Goosefoot spp.	CHENO	24**	0-5						
Other native forbs	2FP		0-5						
<b>Shrubs and Half-shrubs</b>					<b>5-20%</b>	<b>85-340</b>	<b>90-360</b>	<b>95-380</b>	<b>100-400</b>
Winterfat	KRLA2	35	T-10	10	T-170	T-180	T-190	T-200	
Nuttall's saltbush	ATNU2	34	1-5	5	17-85	18-90	19-95	20-100	
Silver buffaloberry	SHAR	36	0-5	5	0-85	0-90	0-95	0-100	
Black greasewood	SAVE4	37	0-10	10	0-170 No more than 85 for any one	0-180 No more than 90 for any one	0-190 No more than 95 for any one	0-200 No more than 100 for any one	
Prairie rose	ROAR3	38	0-5						
Other native shrubs	2SB		0-5						
Broom snakeweed	GUSA2	37	0-T	0-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>1700</b>	<b>1800</b>	<b>1900</b>	<b>2000</b>	

\* This is a highly aggressive native species. The awns can be hazardous to grazing animals.

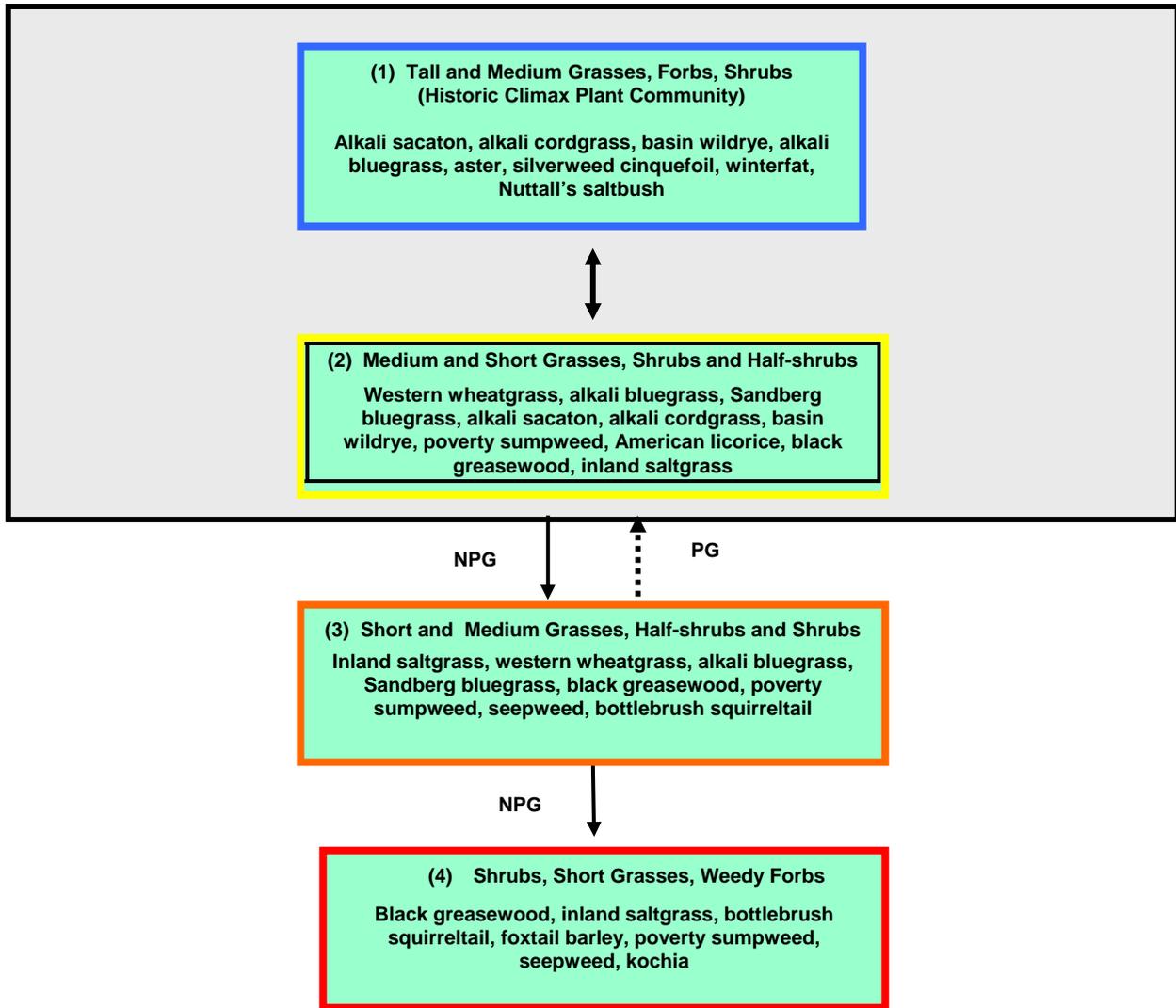
\*\* Annual species.

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## 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.

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**6. Livestock Grazing Interpretations:** Managed livestock grazing is suitable on this site as it has the potential to produce an abundance of high quality forage. This is often a preferred site for grazing by livestock due to the succulent forage, and animals tend to congregate in these areas. In order to maintain the productivity of this site, stocking rates must be managed carefully on adjoining sites with less production to be sure livestock drift onto the Saline Overflow site is not excessive. 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.

Grazing this site early when the upper part of the soil may be wet can sometimes cause compaction. Hummocking (frost heaving) is often a common feature of this site. The hummocking can be exacerbated if grazing impact becomes excessive.

Whenever Plant Community 2 (Medium and short grasses and shrubs) occurs, grazing management strategies need to be implemented to avoid further deterioration. These communities are still stable, productive, and healthy provided they receive proper management. These communities will respond fairly quickly to improved grazing management, including increased growing season rest of key forage plants. Grazing management alone can usually move these communities 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. Black greasewood can be very difficult to remove or reduce. Additional growing season rest is often necessary for re-establishment of the desired species and to restore the stability and health of the site.

The potential for using seeding and/or mechanical treatment to improve site health may be limited, due mainly because of the landscape position and potential for increased soil erosion from streamflow events.

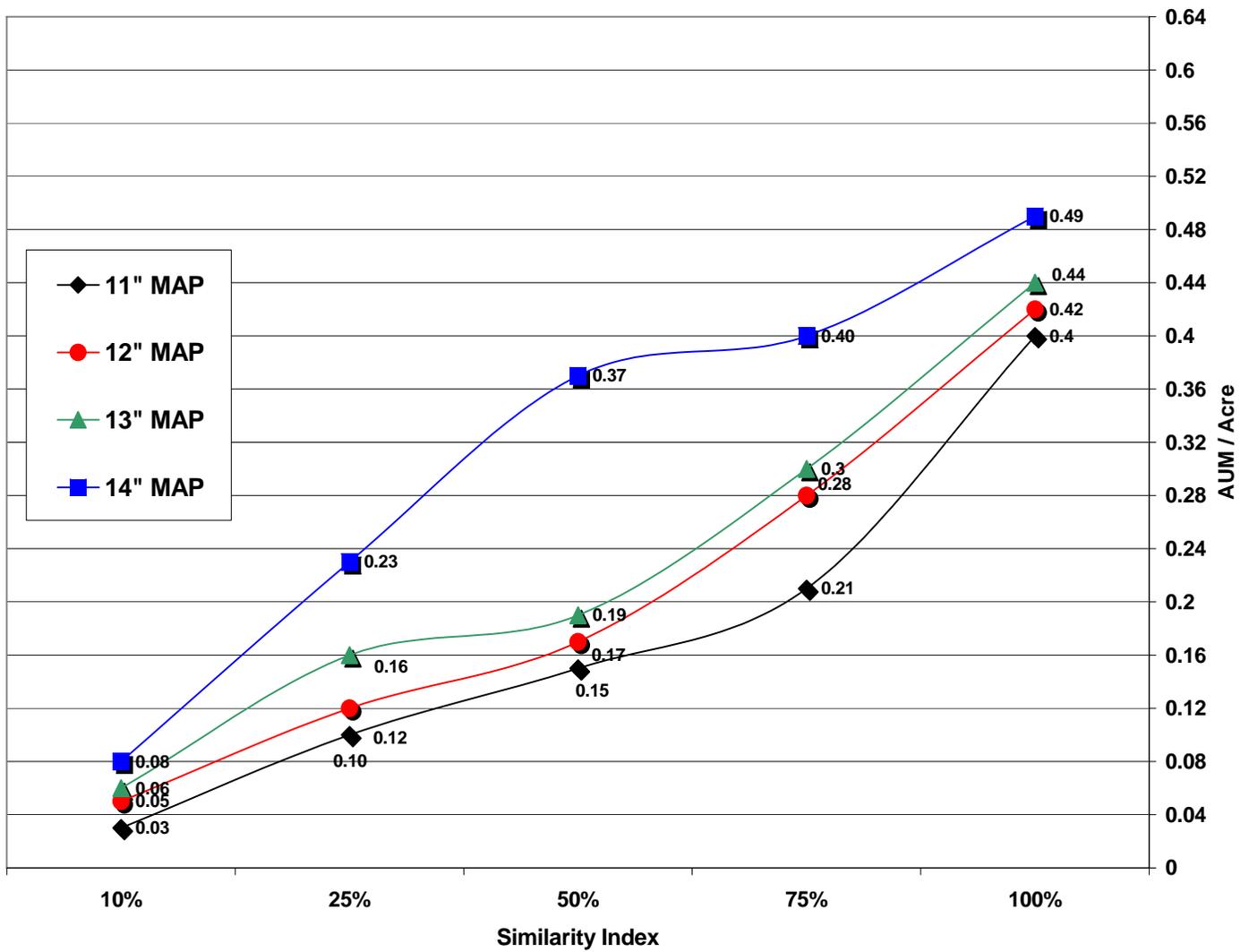
**6a. Guide to Safe Stocking Rates:** The following charts provide guidance for determining an initial safe stocking rate. Animal Unit Month (AUM) figures are based on averages of forage production from data collected for this site over several years. The characteristic plant communities and production 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

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**Stocking Rate Guide (Cattle)**  
**Saline Overflow 11-14", 58AC**



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## 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>Alkali sacaton, alkali cordgrass, basin wildrye, alkali bluegrass, aster, silverweed cinquefoil, winterfat, Nuttall's saltbush</i> (S.I. >75%)	13–14"	1900-2000	1625-1800+	.44–.49+	2.0-2.3	1625-1800+	.44-.49+	2.0-2.3
	11–12"	1700-1800	1450-1625+	.40–.44+	2.3-2.5	1450-1625+	.40-.44+	2.3-2.5
<b>2. Medium &amp; Short Grasses, Shrubs &amp; Half-shrubs</b> <i>Western wheatgrass, alkali bluegrass, Sandberg bluegrass, alkali sacaton, alkali cordgrass, basin wildrye, poverty sumpweed, American licorice, black greasewood, inland saltgrass</i> (S.I. 40–75%)	13–14"	1140-1700	675-1350	.18 –.37	2.7-5.4	750-1450	.20 –.40	2.5-4.9
	11–12"	1020-1530	600-1225	.16 –.33	3.0-6.1	675-1300	.18–.36	2.8-5.4
<b>3. Short &amp; Medium Grasses, Forbs, Half-shrubs &amp; Shrubs</b> <i>Inland saltgrass, western wheatgrass, alkali bluegrass, Sandberg bluegrass, black greasewood, poverty sumpweed, seepweed, bottlebrush squirreltail</i> (S.I. 20–40%)	13–14"	855-1500	425-825	.12 –.23	4.4-8.6	475-900	.13 –.25	4.1-7.7
	11–12"	765-1350	375-750	.10 –.20	4.9-9.8	425-800	.12 –.22	4.6-8.6
<b>4. Shrubs, Short Grasses, Weedy Forbs</b> <i>Black greasewood, inland saltgrass, bottlebrush squirreltail, foxtail barley, poverty sumpweed, seepweed, kochia</i> (S.I. < 20%)	13–14"	340-800	75-275	.02 –.08	13.3-48.8	100-325	.03 –.09	11.1-36.6

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.

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**7. Wildlife Interpretations:** The Saline Overflow ecological site provides important wildlife habitat diversity within a relatively uniform, semi-arid landscape. Supplemental ground water contributes additional wildlife habitat complexity to the landscape by allowing growth of taller shrubs and grasses than are available in adjacent ecological sites. These areas of taller, denser cover often allow many wildlife species to range farther into large blocks of upland habitat. Historically, large herds of bison and elk, along with mule deer and many species of breeding and migratory birds, small mammals and amphibians utilized this site. Today, the variety of shrubs and tall grasses serves as cover for many species and as nesting substrate for numerous birds. Invertebrate production on salt-affected soils feeds migratory and resident shorebirds including killdeer and solitary sandpipers. Continuous, season-long livestock grazing has replaced bison and often degrades habitat values on this site. The invasive Russian olive, a common invader, may encourage magpie nesting and result in increased predation on a wide variety of nesting birds.

**Plant Community 1: Tall and Medium Grasses/ Forbs/ Shrubs (HCPC):** This community is home to a variety of insects (i.e. dragonflies, damsel flies) and other invertebrates such as spiders and midges. These provide food for numerous birds, amphibians and reptiles. Tiger salamanders are a common amphibian species. Representative ground-nesting birds include the common snipe and a variety of waterfowl. Killdeers may nest on areas of salty, open ground. Tall grasses and shrubs, such as greasewood, provide cover and nest sites for many birds ranging from pheasants to lark buntings. Sage grouse broods find insects and succulent forbs in this community. Representative non-game mammals include the meadow vole and raccoon. Mule deer and, to some extent, white-tailed deer, find fawning cover and travel corridors in this community.

**Plant Community 2: Medium and Short Grasses/ Shrubs and Half-shrubs:** Insect populations are likely similar to the HCPC. Amphibian habitat is somewhat degraded by livestock trampling and a slight drying of the soil. Nesting bird habitat suffers from a decline in plant structural diversity and ground cover. Likewise, cover value declines as tall grasses are replaced by shorter species.

**Plant Community 3: Short and Medium Grasses/ Half-shrubs and Shrubs:** The dominance of greasewood and short grasses results in a considerably reduced structural habitat diversity. Insect populations are much less varied, although individual species may be abundant at certain times. Nesting bird habitat is much less diverse compared to the HCPC. Lark buntings may utilize greasewood for nesting. Big game species still find some cover in the tall shrubs but cover value is considerably reduced with the loss of the taller herbaceous layer.

**Plant Community 4: Shrubs/ Short Grasses/ Weedy Forbs:** Overall wildlife habitat value is very low in this community reflecting a greatly simplified plant community dominated by a few species. Insect populations are highly variable and amphibians find a drier, much less suitable site compared to higher successional communities. Ground-nesting birds suffer heavy losses from nest predation. Invading Russian olive trees encourage magpie nesting, which results in heavy nest mortality among other bird species. Cover and nutritional value for big game species is very low following loss of desirable browse plants, forbs and tall grasses. Greasewood and silver buffaloberry provide some hiding cover for big game species and nest habitat for songbirds, such as Eastern kingbirds, and raptors, such as Swainson's hawks.

**8. Hydrology Data:** The soils associated with this ecological site are generally in Hydrologic Soil Group C. The infiltration rates for these soils will generally be moderate. The runoff potential for this site is low. Runoff curve numbers generally range from 64 to 89.

### 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): 5

NRCS—Range/Soil Correlation Observations & Soil 232 notes: 5

Ecological Site Reference: NRCS 417 No.: Wheatland County 502

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**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

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Saline Overflow, 11–14" MAP  
Sedimentary Plains, Central  
Plant Community 2  
Western wheatgrass, alkali  
bluegrass, inland saltgrass



Saline Overflow, 11–14" MAP  
Sedimentary Plains, Central  
Plant Community 2  
Wheatland County



Saline Overflow, 11–14" MAP  
Sedimentary Plains, Central  
Plant Community 2

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Saline Overflow, 11–14" MAP  
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Plant Community 2