

# Ecological site R053AE072MT Saline Overflow (Sov) (Legacy) RRU 53AE

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## General information

**Provisional.** A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

**Table 1. Dominant plant species**

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

## Physiographic features

This site occurs on overflow lands (topography that receives run-in moisture from upland areas) where salt and/or alkali accumulations are apparent. The site is found in small bands and patches associated with alkali basins, and at isolated alkali seeps. It is also found at the base of badlands erosional sideslopes (such as along the floodplain of the Missouri River—just southeast of the Fred Robinson bridge).

The site has a seasonal water table that is within 42" of the surface. Slopes usually vary from 0 to 2 percent. Elevations normally vary from 2000 to 3500 feet.

**Table 2. Representative physiographic features**

Landforms	(1) Terrace (2) Fan (3) Swale
Flooding frequency	None to rare
Ponding frequency	None
Elevation	580 – 1,370 m
Slope	0 – 10 %

Water table depth	110 – 180 cm
Aspect	Aspect is not a significant factor

### Climatic features

A semi-arid, temperate climate characterizes the Glaciated Plains. The predominance of cool season species has evolved to take advantage of the precipitation regime that peaks in late spring-early summer (June). Seventy-five percent of the annual precipitation usually falls as steady, soaking, frontal system rains. Summer rains usually come with thunderstorms. Precipitation is the most important factor influencing production (Heitschmidt et al 2005). Severe drought occurs on average in two out of every ten years (Cooper, et al., 2001).

**Table 3 Representative climatic features**

Frost-free period (average)	130 days
Freeze-free period (average)	100 days
Precipitation total (average)	310 mm

### Influencing water features

This site receives additional “run in” moisture from adjacent upland sites during snowmelt or precipitation events. It is not influenced by water from wetlands or perennial streams.

### Soil features

The soils on this site are moderately to strongly saline, medium- to fine-textured, moderately deep to deep, but poorly developed. This site has a seasonal high water table that is deeper than 48 inches. Soils tend to be saline or sodic. Soluble salt accumulations are often apparent at or near the surface. Most herbaceous roots extend less than 20 inches below the soil surface. Surface textures are mainly silty clay, silt loam, silty clay loam, clay loam and loam. Permeability varies with surface texture and the amount of salt and/or sodium present. Soil ph varies from 7.9 – 9.0.

**Table 4. Representative soil features**

Surface texture	(1) Clay loam (2) Loam (3) Silty clay loam
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Slow

Soil depth	50 – 180 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	7.62 – 15.24 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 20 %
Electrical conductivity (0-101.6cm)	0 – 30 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	10 – 30
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 10
Subsurface fragment volume <=3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

### Ecological dynamics

This site developed through time under the influence of climate, herbivory, geological materials, fire, plants and animals. The plant communities associated with the site tend to have low species diversity.

The historic climax plant community (HCPC) is the basis for plant community interpretations. The HCPC has been determined by evaluating rangeland relic areas, and other areas protected from excessive disturbance.

Departures from the HCPC generally result from management actions, drought, and/or a change in the natural fire regime, or from hydrological changes. Because the site is influenced by the receipt of "overflow" (run-in) moisture and by saline or sodic conditions, the plant communities in State #1 are not highly resistant to disturbance. The site is considered fragile in the sense that vegetative vigor and composition will rapidly decline with continued adverse impacts. Once regression to a lower state occurs, salts and/or sodium are more likely to accumulate on the soil surface. This makes it unlikely that the use of prescribed grazing and/or favorable precipitation will induce and facilitate succession to the HCPC (State #1). In comparison to the other ecological sites that encompass large acreages in the Glaciated Plains, this Saline Overflow 10-14" p.z. site occupies rather small portions of the landscape. The limited acreage may explain why very little research has been published on the site.

## State and Transition Diagram

Successional pathways of the Saline Overflow 10-14" p.z. ecological site cannot be satisfactorily described using traditional theories of plant succession leading to a single climax community (Stringham et al. 2003). A threshold, lying somewhere between the mid and early seral stages is crossed as the HCPC regresses toward the early seral stage. The plant communities occurring below this threshold are in a steady state. Succession back to the HCPC does not occur within a reasonable length of time, and/or without a large input of energy.

Two common plant communities within the reference state (State #1) with associated successional pathways, and transitions from State #1 to States #2 and #3 are illustrated below for this ecological site. Ecological processes are discussed further in the plant community descriptions following the diagram.

## State and transition model

### Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Native perennial grasses</b>			280-560	
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp. lanceolatus</i>	140-280	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	140-280	–
2	<b>Native perennial grasses and grasslikes</b>			140-2522	
	alkali sacaton	SPAI	<i>Sporobolus airoides</i>	560-1121	–
	Nuttall's alkaligrass	PUNU2	<i>Puccinellia nuttalliana</i>	560-1121	–
	alkali cordgrass	SPGR	<i>Spartina gracilis</i>	280-560	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	140-280	–
	sedge	CAREX	<i>Carex</i>	140-280	–
	slimstem reedgrass	CASTS5	<i>Calamagrostis stricta ssp. stricta</i>	140-280	–
	saltgrass	DISP	<i>Distichlis spicata</i>	140-280	–
	spikerush	ELEOC	<i>Eleocharis</i>	140-280	–
	bulrush	SCIRP	<i>Scirpus</i>	140-280	–
<b>Forb</b>					
3	<b>Native perennial forbs</b>			1-140	
	Forb, perennial	2FP	<i>Forb, perennial</i>	1-28	–
	common yarrow	ACMI2	<i>Achillea millefolium</i>	1-28	–
	pussytoes	ANTEN	<i>Antennaria</i>	1-28	–
	slimleaf goosefoot	CHPA5	<i>Chenopodium pallescens</i>	1-28	–
	povertyweed	IVAX	<i>Iva axillaris</i>	1-28	–
	knotweed	POLYG4	<i>Polygonum</i>	1-28	–
	herbaceous seepweed	SUMA	<i>Suaeda maritima</i>	1-28	–
	white prairie aster	SYFA	<i>Symphotrichum falcatum</i>	1-28	–
	sea clover	TRSQ	<i>Trifolium squamosum</i>	1-28	–
<b>Shrub/Vine</b>					
4	<b>Native shrubs and half-shrubs</b>			28-140	
	Shrub, broadleaf	2SB	<i>Shrub, broadleaf</i>	28-56	–
	Nuttall's saltbush	ATNU2	<i>Atriplex nuttallii</i>	28-56	–
	rubber rabbitbrush	ERNAN5	<i>Ericameria nauseosa ssp. nauseosa var. nauseosa</i>	28-56	–
	greasewood	SAVE4	<i>Sarcobatus vermiculatus</i>	28-56	–

**Table 6. Community 1.2 plant community composition**

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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**Table 7. Community 2.1 plant community composition**

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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**Table 8. Community 3.1 plant community composition**

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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## Animal community

Livestock Management The Saline Overflow 10-14" p.z. ecological site is suited for livestock grazing. The HCPC (or reference state) is highly productive and has a high carrying capacity. Livestock are often attracted to the site because of the level terrain and the high potential for livestock water developments within the adjacent areas. Species composition and soils are susceptible to heavy stocking and season long grazing. Therefore, prescribed grazing is needed to maintain the high seral state and/or to prevent further deterioration. This site may also be attractive to livestock and wildlife because of the increase salt accumulations in the plants. It is important to understand site limitations. A site in an early seral state is not likely to successionaly respond solely to the implementation of a prescribed grazing management system. Furthermore, seeding and/or mechanical treatment are usually not recommended on the Saline Overflow 10-14" p.z. ecological site. Landowners may have to learn to live with a site that is in an early seral state. Wildlife Interpretations The HCPC associated with the Saline Overflow 10-14" p.z. ecological site provides diverse and valuable wildlife habitat. This site often occurs as a minor component of a large, dry landscape. The uniqueness of the site makes it extremely critical habit for many species of wildlife. This ecological site becomes less valuable for wildlife when plant diversity is loss. For example, the disappearance of either the tall warm season grasses or cool season grasses reduces the amount of cover available for wildlife. Plant Preferences by Animal Kind Refer to NRCS Field Office Technical Guide, Section IIE, General Information, for tables displaying plant preferences by livestock and wildlife.

## Hydrological functions

Soils characterizing this ecological site have a moderately high runoff potential, with hydrologic runoff curves of 74 to 86. These soils fall into Hydrologic Group C. Field investigations are needed to adjust the runoff curves when plant communities deteriorate from the HCPC. Areas where ground cover is less than 50% have the greatest potential to have reduced infiltration and higher runoff.

## Recreational uses

This site is aesthetically appealing for its natural beauty. Recreational potential is somewhat limited by the relatively small areas.

## Wood products

This site has no significant value for wood products.

## Other information

The Saline Overflow 10-14" p.z. ecological site is not highly resistant to disturbances in State #1. Species diversity is adversely affected by season long continuous grazing and by heavy stocking. Mid and tall cool season perennial grasses are replaced by short warm season perennial grasses, or by a shrub-dominated community in more extreme cases. The number of structural/ functional groups is reduced with retrogression, which adversely affects the amount of solar energy that is captured and converted to carbohydrates for plant growth. A reduction in total vegetative growth results in less potential vegetation that can be transformed into litter. Less soil water use by plants combined with reduced ground cover may cause salinity or alkalinity to increase.

## Inventory data references

SCS-Range-417 ECS-1 Modified Double Sampling 34 2001-2004 MT Blaine, Phillips, Valley, Roosevelt, Daniels, Sheridan USDA-SCS-MT 1981 Technical Range Site Description

## Other references

Stringham, Tamzen K., William C. Krueger, and Patrick L. Shaver. (2003). State and transition modeling: an ecological process approach. *J. Range Manage.* 56:2(106-113).

## Approval

## Rangeland health reference sheet

**Interpreting Indicators of Rangeland Health** is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

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Contact for lead author	
Date	03/30/2005
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

**1. Number and extent of rills: Rills should not be present in HCPC or in plant community A.**

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**2. Presence of water flow patterns: Water flow patterns should not be observable in HCPC or in plant community A.**

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**3. Number and height of erosional pedestals or terracettes: Pedestals or terracettes would essentially be nonexistent in HCPC and in plant community A.**

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**4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground): Bare ground would essentially be nonexistent in HCPC. Bare ground should be less than 2" in diameter. If in plant community A, less than 5% of the soil surface can be exposed.**

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**5. Number of gullies and erosion associated with gullies: Gullies are not associated with either of the State 1 reference plant communities.**

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Wind scoured, blowouts and/or depositional areas are not associated with either of the State 1 reference plant communities.

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7. **Amount of litter movement (describe size and distance expected to travel):** Litter movement is not expected with HCPC or plant community A.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Stability class anticipated to be 5 or 6 under plant canopy.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The surface layer is 0-7" deep. The color ranges from light brownish gray to gray. Surface textures include loam, silt loam, clay loam, silty clay loam or silty clay. Soil organic matter ranges from 2-4% with a high of 5% and a low of 1%.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** In HCPC, 90-95% plant canopy and 80-85% basal cover with small gaps between plants should reduce raindrop impact and slow overland flow, providing increased time for infiltration to occur. Healthy, deep rooted native grasses enhance infiltration and reduce runoff. Infiltration rate is moderate to very slow. If in plant community A, 90-95% plant canopy and 70-80% basal cover with small gaps between plants will still reduce raindrop impact and decrease overland flow.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction layer or soil surface crusting should be evident in either of the State 1 plant communities.

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

**Dominant:** HCPC: Tall, warm season bunch grasses = mid-stature, cool season bunch grasses > mid-stature cool season rhizomatous grasses > sedges and rushes > short, warm season rhizomatous grasses > forbs = shrubs. Plant community A: Short, warm season rhizomatous grasses > mid-stature, cool season rhizomatous grasses > sedges and rushes > mid-stature cool season bunch grasses > shrubs > forbs.

**Sub-dominant:**

**Other:**

**Additional:**

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Plant mortality and decadence very low in HCPC and Plant community A. In periods of drought, shrubs would exhibit decadence in the state 1 reference communities.

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**14. Average percent litter cover (%) and depth ( in):** Litter cover is in contact with soil surface. Litter decreases in Plant community A to 40-50% and depth is reduced to 0.5 inch.

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**15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1700 - 3000 #/acre from Plant community A to HCPC in the State 1 reference community.

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**16. Potential invasive (including noxious) species (native and non-native).** List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site: Foxtail barley, inland saltgrass, knotweeds, poverty weed, curly cup gumweed, and greasewood.

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**17. Perennial plant reproductive capability:** All species are capable of reproducing in HCPC. In Plant community A, plant seedlings will be weighed in favor of marginal and undesirable species. Replacement of desirable species will be very few.

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