USDA Natural Resources
Conservation Service

Ecological site R052XN171MT
Saline Overflow (SOv) 10-14" p.z.

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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.

MLRA notes

Major Land Resource Area (MLRA): 052X–Brown Glaciated Plains

The Brown Glaciated Plains, MLRA 52, is an expansive and agriculturally and ecologically significant area. It consists of approximately 14.5 million acres and stretches across 350 miles from east to west, encompassing portions of 15 counties in north-central Montana. This region represents the southwestern limit of the Laurentide Ice Sheet and is considered to be the driest and westernmost area within the vast network of glacially derived prairie pothole landforms of the northern Great Plains. Elevation ranges from 2,000 feet (610 meters) to 4,600 feet (1,400 meters).

Soils are primarily Mollisols, but Entisols, Inceptisols, Alfisols, and Vertisols are also common. Till from continental glaciation is the predominant parent material, but alluvium and bedrock are also common. Till deposits are typically less than 50 feet thick, and in some areas glacially deformed bedrock occurs at or near the soil surface (Soller, 2001). Underlying the till is sedimentary bedrock largely consisting of Cretaceous shale, sandstone, and mudstone (Vuke et al., 2007). The bedrock is commonly exposed on hillslopes, particularly along drainageways. Significant alluvial deposits occur along glacial outwash channels and major drainages, including portions of the Missouri, Teton, Marias, Milk, and Frenchman Rivers. Large glacial lakes, particularly in the western half of the MLRA, deposited clayey and silty lacustrine sediments (Fullerton et al., 2013).

Much of the western portion of this MLRA was glaciated towards the end of the Wisconsin age, and the maximum glacial extent occurred approximately 20,000 years ago (Fullerton et al., 2004). The result is a geologically young landscape that is predominantly a level till plain interspersed with lake plains and dominated by soils in the Mollisol and Vertisol orders. These soils are very productive and generally are well suited to dryland farming. Much of this area is aridic-ustic. Crop-fallow dryland wheat farming is the predominant land use. Areas of rangeland typically are on steep hillslopes along drainages.

The rangeland, much of which is native mixedgrass prairie, increases in abundance in the eastern half of the MLRA. The Wisconsin-age till in the north-central part of this area typically formed large disintegration moraines with steep slopes and numerous poorly drained potholes. A large portion of Wisconsin-age till occurring on the type of level terrain that would typically be optimal for farming has large amounts of less-suitable sodium-affected Natrustalfs. Significant portions of Blaine, Phillips, and Valley Counties were glaciated approximately 150,000 years ago during the Illinoisan age. Due to erosion and dissection of the landscape, many of these areas have steeper slopes and more exposed bedrock than areas glaciated during the Wisconsin age (Fullerton and Colton, 1986).

While much of the rangeland in the aridic-ustic portion of MLRA 52 is classified as belonging to the “dry grassland” climatic zone, sites in portions of southern MLRA 52 may belong to the “dry shrubland” climatic zone. The Dry Shrubland climatic zone represents the northernmost extent of the big sagebrush (Artemisia tridentata) steppe on the Great Plains. Because similar soils occur in both southern and northern portions of the MLRA, it is currently hypothesized that climate is the primary driving factor affecting big sagebrush distribution in this area. However, the precise factors are not fully understood at this time.

Sizeable tracts of largely unbroken rangeland in the eastern half of the MLRA and adjacent southern Saskatchewan are home to the Northern Montana population of greater sage-grouse (Centrocercus urophasianus), and large portions of this area are considered to be a Priority Area for Conservation (PAC) by the U.S. Fish and Wildlife Service (U.S. Fish and Wildlife Service, 2013). This population is unique among sage grouse populations because many individuals overwinter in the big sagebrush steppe (dry shrubland) in the southern portion of the MLRA and then migrate to the northern portion of the MLRA, which lacks big sagebrush (dry grassland), to live the rest of the year (Smith, 2013).

Areas of the till plain near the Bearpaw and Highwood Mountains as well as the Sweetgrass Hills and Rocky Mountain foothills are at higher elevations, receive higher amounts of precipitation, and have a typic-ustic moisture regime. These areas have significantly more rangeland production than the drier aridic-ustic portions of the MLRA and have enough moisture to produce crops annually rather than just bi-annually, as in the drier areas. Ecological sites in this higher precipitation area are classified as the Moist Grassland climatic zone.

Classification relationships

NRCS Soil Geography Hierarchy
• Land Resource Region: Northern Great Plains
• Major Land Resource Area (MLRA): 052 Brown Glaciated Plains
• Climate Zone: N/A

National Hierarchical Framework of Ecological Units (Cleland et al., 1997; McNab et al., 2007)
• Domain: Dry
• Division: Temperate Steppe
• Province: Great Plains-Palouse Dry Steppe Province 331
• Section: Northwestern Glaciated Plains 331D
• Subsection: Montana Glaciated Plains 331Dh
• Landtype association/Landtype phase: N/A

National Vegetation Classification Standard (Federal Geographic Data Committee, 2008)
• Class: Mesomorphic Shrub and Herb Vegetation Class (2)
• Subclass: Shrub and Herb Wetland Subclass (2.C)
• Formation: Salt Marsh Formation (2.C.5)
• Division: Distichlis spicata - Hordeum jubatum Great Plains Saline Marsh Division (2.C.5.Na)
• Macrogroup: Great Plains Saline Wet Meadow and Marsh Macrogroup (2.C.5.Na.1)
• Group: Western Great Plains Saline Wet Meadow Group (2.C.5.Na.1.b)
• Alliance: Sarcobatus vermiculatus Great Plains Wet Shrubland Alliance
• Association: Sarcobatus vermiculatus / Pascopyrum smithii - (Elymus lanceolatus) Shrub Wet Meadow

EPA Ecoregions
• Level 1: Great Plains (9)
• Level 2: West-Central Semi-Arid Prairies (9.3)
• Level 3: Northwestern Glaciated Plains (42)
• Level 4: North Central Brown Glaciated Plains (42o) and Glaciated Northern Grasslands (42j)

Ecological site concept

This provisional ecological site occurs on floodplains, alluvial fans, and stream terraces where seasonal flooding occurs and salts have accumulated. Sometimes, but not always, a seasonal water table is present at a depth of more than 42 inches below the soil surface, especially during peak runoff periods.

The distinguishing characteristics of this site are that it receives additional moisture from surface water and that saline, sodic, or saline-sodic conditions are evident in the upper 20 inches of soil. Soils for this ecological site are typically very deep (more than 60 inches) and derived from clayey alluvium. Soil textures in the upper 4 inches are typically clay or silty clay. Characteristic vegetation is mostly western wheatgrass (Pascopyrum smithii), alkali sacaton (Sporobolus airoides) and alkali cordgrass (Spartina gracilis). The principal shrub is greasewood (Sarcobatus vermiculatus). Another shrub that may occur is Nuttall saltbush (Atriplex nuttallii). Total shrub cover is approximately 5 percent.

Associated sites

R052XN161MT	**Silty (Si) 10-14" p.z.** soils >20 inches in depth, and slopes < 15%, no salt tolerant plants.
R052XN170MT	**Saline Upland (SU) 10-14" p.z.** soils with saline-sodic conditions limiting moisture for plant growth
R052XN179MT	**Shallow Clay (SwC) 10-14" p.z.** soils are clayey over clayey shale, different vegetation

Similar sites

R052XC209MT	**Saline Overflow (SOv) 10-14" p.z.** (formerly “Saline Lowland 10-14” p.z.) Same concept shift in plants and production.
R053AE072MT	**Saline Overflow (Sov) (Legacy) RRU 53AE** (formerly “Saline Lowland 10-14” p.z.) Same concept shift in plants and production.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Sarcobatus vermiculatus* (2) *Atriplex nuttallii*
Herbaceous	(1) *Sporobolus airoides* (2) *Spartina gracilis*

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
Runoff class	Medium
Flooding frequency	None to rare
Ponding frequency	None
Elevation	610–1,067 m
Slope	0–2%
Water table depth	107–183 cm
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding frequency	Not specified
Ponding frequency	Not specified
Elevation	579–1,372 m

Slope	0–5%
Water table depth	Not specified

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 4. Representative climatic features

Frost-free period (characteristic range)	85-123 days
Freeze-free period (characteristic range)	116-142 days
Precipitation total (characteristic range)	254-356 mm
Frost-free period (average)	94 days
Freeze-free period (average)	125 days
Precipitation total (average)	305 mm

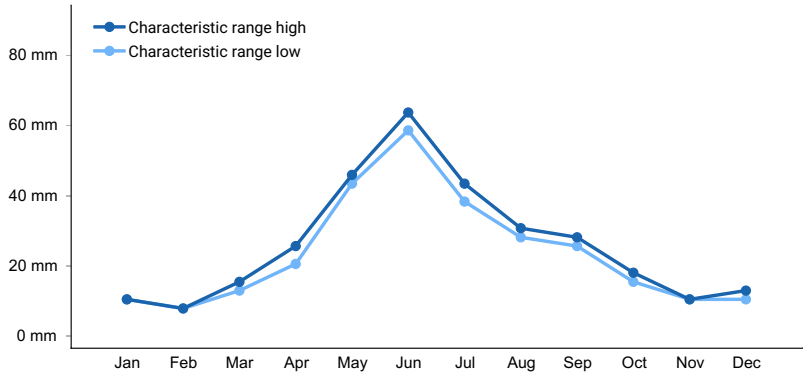


Figure 1. Monthly precipitation range

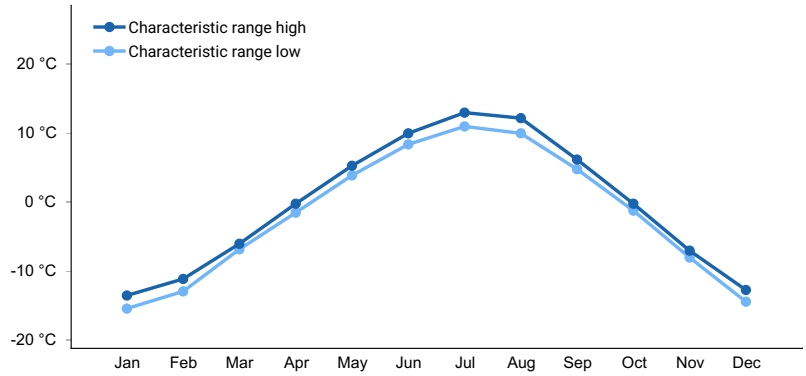


Figure 2. Monthly minimum temperature range

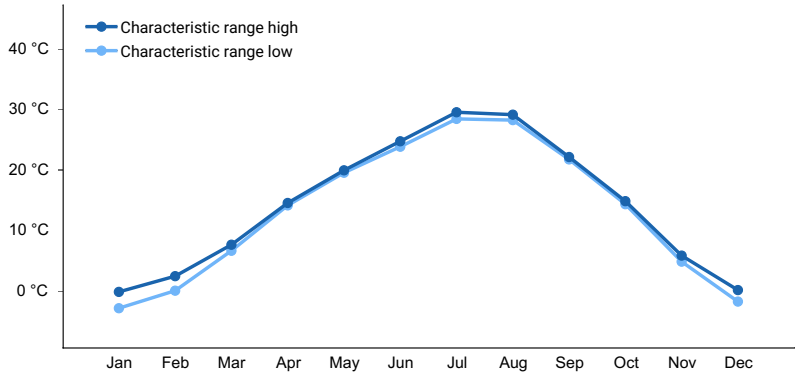


Figure 3. Monthly maximum temperature range

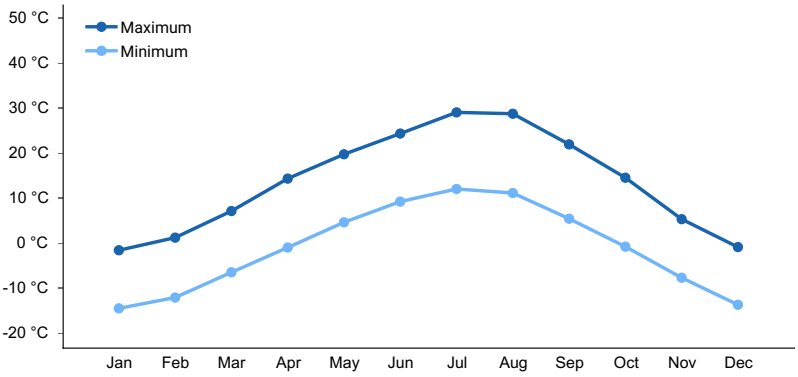


Figure 4. Monthly average minimum and maximum temperature

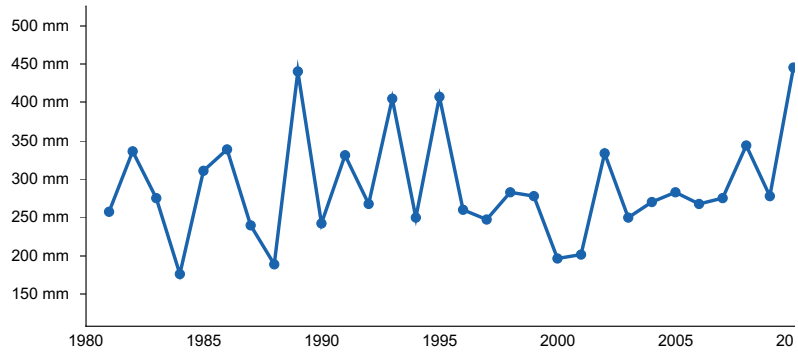


Figure 5. Annual precipitation pattern

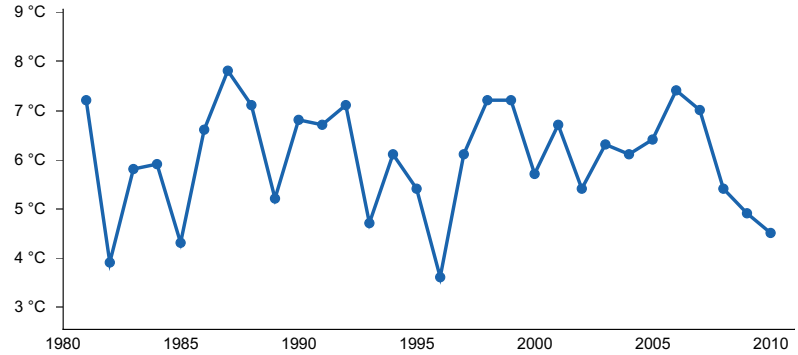


Figure 6. Annual average temperature pattern

Climate stations used

- (1) CHESTER [USC00241692], Chester, MT
- (2) GLASGOW [USW00094008], Glasgow, MT
- (3) HAVRE CITY CO AP [USW00094012], Havre, MT

- (4) SHELBY [USC00247500], Shelby, MT

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 perennial streams.

Wetland description

It is not influenced by water from wetlands.

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 5. Representative soil features

Parent material	(1) Alluvium–interbedded sedimentary rock
Surface texture	(1) Clay loam (2) Loam (3) Silty clay loam
Family particle size	(1) Fine
Drainage class	Moderately well drained to well drained
Permeability class	Slow
Soil depth	51–198 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	7.62–15.24 cm
Calcium carbonate equivalent (Depth not specified)	0–15%
Electrical conductivity (Depth not specified)	4–30 mmhos/cm
Sodium adsorption ratio (Depth not specified)	8–30
Soil reaction (1:1 water) (Depth not specified)	7.9–9
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Table 6. Representative soil features (actual values)

Drainage class	Not specified
Permeability class	Not specified
Soil depth	Not specified
Surface fragment cover <=3"	Not specified

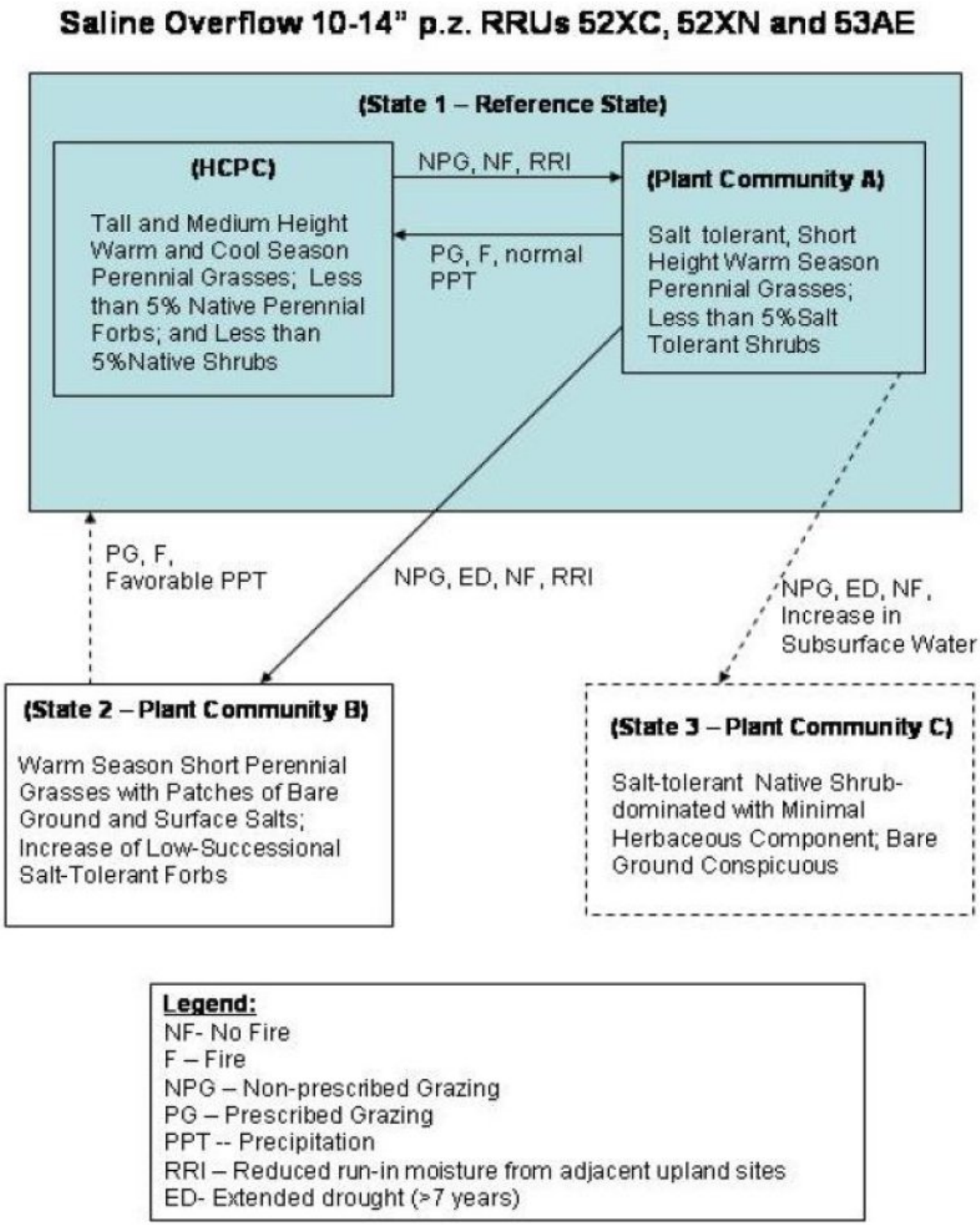
Surface fragment cover >3"	Not specified
Available water capacity (Depth not specified)	Not specified
Calcium carbonate equivalent (Depth not specified)	Not specified
Electrical conductivity (Depth not specified)	Not specified
Sodium adsorption ratio (Depth not specified)	Not specified
Soil reaction (1:1 water) (Depth not specified)	7.4–9
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



State 1
Reference State

Community 1.1
Historic Climax Plant Community (HCPC) Tall and medium-height warm- and cool-season

perennial grasses, less than 5 percent native perennial forbs, and less than 5 percent native shrubs

Tall and medium-height warm- and cool-season perennial grasses, less than 5 percent native perennial forbs, and less than 5 percent native shrubs The HCPC is comprised of a mixture of cool and warm season grasses, forbs and shrubs. About 90% of the annual production is from grasses and sedges, most of which is produced during the cool season. Forbs and shrubs each contribute about 5% to total annual production. Total vegetative production at HCPC averages 2500 lbs/ac in normal years, 3000 lbs/ac in favorable years, and 1750 lbs/ac in “unfavorable” years. The Saline Overflow 10-14” p.z. ecological site is not characterized by a precise assemblage of species that remains constant from place to place or from year to year. Variability is apparent in productivity and occurrence of individual species. Western/thickspike wheatgrasses, alkali sacaton, alkali cordgrass, Nuttall alkaligrass, inland saltgrass and sedges are the most common grasses and grasslike plants in this community. They account for about 90% percent of the total production. Prairie aster and slimleaf goosefoot are common forbs. Forbs usually make up about 5% of the total annual production. Greasewood and Nuttall saltbush are the most common shrubs. They should be present in the HCPC. However, all shrubs only account for about 5% of the total annual production. Plant basal cover is normally around 35%, while litter provides 65% cover. Therefore, plant cover and litter are adequate to efficiently utilize infiltration, minimize runoff and erosion, and provide good hydrologic conditions. Runoff and soil erosion normally increase as the HCPC regresses to earlier seral states. The HCPC is believed to have evolved with periodic fires occurring at intervals of 5-7 years. Fires temporarily reduce litter, thus allowing more runoff. However, fire favors the succession of grasses and forbs at the expense of half-shrubs and shrubs. The HCPC regresses to lower seral stages when subjected to grazing management strategies that do not allow adequate recovery periods between grazing events, drought, the disruption of the normal fire sequence, and or a change in the availability of run-in water. The above disturbances favor the replacement of alkali sacaton, alkali cordgrass, and western/thickspike wheatgrasses with blue grama, sandberg bluegrass, curlycup gumweed, western yarrow, and foxtail barley. The major plant species composition and production by dry weight are shown for the HCPC in the following table. Total annual production has been derived from several sources, and has been adjusted to represent a typical annual precipitation cycle.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1715	2522	3026
Forb	95	140	168
Shrub/Vine	95	140	168
Total	**1905**	**2802**	**3362**

Table 8. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	0%
Forb foliar cover	0%
Non-vascular plants	0-1%
Biological crusts	0-1%
Litter	60-65%
Surface fragments >0.25" and <=3"	0-1%
Surface fragments >3"	0-1%
Bedrock	0%
Water	0%
Bare ground	0-1%

Table 9. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	1-5%
Grass/grasslike basal cover	30-35%
Forb basal cover	1-5%
Non-vascular plants	0%
Biological crusts	0%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

Table 10. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	0-1%	0-30%	0-30%
>0.15 <= 0.3	–	0-25%	0-30%	0-40%
>0.3 <= 0.6	–	0-50%	0-30%	0-20%
>0.6 <= 1.4	–	0-25%	0-10%	0-10%
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Community 1.2
Plant Community A Salt-tolerant, short-height warm-season perennial grasses, less than 5 percent salt-tolerant shrubs

Salt-tolerant, short-height warm-season perennial grasses, less than 5 percent salt-tolerant shrubs In contrast to the HCPC, total vegetation production may be 1000 lbs/ac lower in Community A. Selective grazing and increasing salinity adversely affect the competitiveness of alkali sacaton, alkali cordgrass, wheatgrasses and Nuttall's alkaligrass. Thus, these taller warm and cool season grasses are replaced by inland saltgrass and other low-growing grasses and grasslike plants. The lower-stature plants tend to produce less forage than the mid- grasses that they replaced, use less ground water for total vegetative production, and produce less litter to protect the surface of the soil. As the groundwater rises to the surface during the summer and evaporates, salt crystals form on the surface. Thus the amount of bare ground increases, in comparison to the HCPC. Greasewood tends to increase and the total shrub production in Community A is >5%. Shrub composition also shifts, favoring chenopod species. Plant Community A is considered the pre-threshold community. It can be recognized because annual production is reduced by about 40% from the HCPC. The percentage of short, warm season perennial grasses and forbs has increased at the expense of the taller warm and cool season perennial grasses. Litter amount is moderately reduced from site potential and amount of bare ground is moderately to much higher than expected. This community remains resilient and succession can move the plant community toward the HCPC. However, Plant Community A is only moderately resistant to disturbance. Without proper management it can readily regress to a lower state.

Pathway 1.1A

Community 1.1 to 1.2

Non-prescribed grazing, no fire, reduced run-in moisture from adjacent upland sites. Non-prescribed grazing and reduced run-in moisture from adjacent upland sites will cause regression from HCPC to Community A.

Pathway 1.2A
Community 1.2 to 1.1

Prescribed grazing, fire, normal precipitation The implementation of prescribed grazing, or periodic fire will move Plant Community A to the HCPC. Under non-drought conditions, this succession can occur within a few years.

State 2
Short Grass Dominated

Community 2.1
Plant Community B Warm-season short perennial grasses with patches of bare ground and surface salts, increase of low-successional salt-tolerant forbs

Warm-season short perennial grasses with patches of bare ground and surface salts, increase of low-successional salt-tolerant forbs Inland saltgrass, sand dropseed, sandberg bluegrass, bottlebrush squirreltail, foxtail barley, and sedges dominate this community. In contrast to the HCPC, the mid and tall warm season perennial grasses (alkali sacaton, western/thickspike wheatgrasses, alkali cordgrass, etc.) are either significantly reduced or absent. Poverty weed, knotweed, seepweed, curlycup gumweed and other forbs account for about 10% of the annual production. Amount of bare ground is moderately higher than expected. Surface salts are quite extensive. Most of the study sites examined on the Saline Overflow 10-14” p.z site during the range inventory of the Fort Peck and Fort Belknap Reservations (2001-2004) had similarity indices of 0-25%. A lack of species diversity also characterizes the data. In most plots, fewer than 8-9 species were recorded. Shrubs were recorded at 3 of the 15 sampling locations. In these inventories, which took place during a prolonged drought, the annual production varied from 53 to 1043 lbs/ac, and averaged 600 lbs/ac. The amount of bare ground was much higher than expected for the site. This plant community is resistant to change. The short warm season perennial grasses are well-adapted to the salinity. It is believed that the seeds of native HCPC species are scarce or absent in the seedbank. Succession is not expected to occur within a reasonable length of time.

State 3
Shrub dominated

Community 3.1
Plant Community C Salt-tolerant native shrub-dominated with minimal herbaceous component, bare ground conspicuous.

Salt-tolerant native shrub-dominated with minimal herbaceous component, bare ground conspicuous. Greasewood is the dominant plant is this community, which is less than fully understood at this time (dash lines mark its boundary in the S&T diagram). Other shrubs include Nuttall saltbush, rabbitbrush, fringed sagewort and silver sagebrush. Inland saltgrass, foxtail barley, Nuttall alkali grass, and other herbaceous species usually produce less than 50% of the total annual production. Poverty weed, curlycup gumweed, arrowgrass, knotweed and other weedy forbs are usually present in small amounts. Total annual production is usually less than 500 lbs/ac. The amount of bare ground is much higher than expected for the site. In addition, litter cover averages about 30%, a significant reduction relative to site potential. This plant community is resistant to change. Greasewood is well adapted to the salinity. This community may not be resilient. Succession is not expected to occur within a reasonable length of time.

Transition T1A
State 1 to 2

Non-prescribed grazing, extended drought (greater than 7 years), no fire, reduced run-in moisture from adjacent upland sites The reference state (State 1) will regress to State 2 under non-prescribed grazing, prolonged drought, and an extended period of no fire. The rate of regression varies with the kind, intensity, frequency and duration of

the disturbances. The transition may end up as a warm season short grass dominated community (State 2).

Transition T1B
State 1 to 3

Non-prescribed grazing, extended drought (greater than 7 years), no fire, increase in subsurface water The reference state (State 1) will regress to State 3 under non-prescribed grazing, prolonged drought, and an extended period of no fire. The rate of regression varies with the kind, intensity, frequency and duration of the disturbances. The transition may end up as a salt-tolerant shrub-dominated community (State 3). The shrub dominated community is depicted within the dashed lines (in the state and transition diagram) because its ecological characteristics are not presently fully understood.

Restoration pathway R2A
State 2 to 1

Prescribed grazing, fire, favorable precipitation The implementation of prescribed grazing is not expected to move these plant communities toward a higher successional state. In comparison to the HCPC, annual production is about 25% of the site potential. It is theorized that the salinity of the site increased during the regression from the “Reference State” to early seral states. Thus, the lower-successional plants occurring on the site may be better-adapted than some of the original climax species. Because of the soil limitations, mechanical treatments and range seeding are not normally recommended.

Additional community tables

Table 11. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Warm-season Grasses**			841–1401	
	alkali sacaton	SPAI	*Sporobolus airoides*	560–1121	–
	alkali cordgrass	SPGR	*Spartina gracilis*	280–560	–
	saltgrass	DISP	*Distichlis spicata*	140–280	–
1	**Rhizomatous Wheatgrasses**			280–560	
	western wheatgrass	PASM	*Pascopyrum smithii*	140–280	–
	tufted wheatgrass	ELMA7	*Elymus macrourus*	140–280	–
3	**Cool-season Grasses**			701–1401	
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	560–1121	–
	slimstem reedgrass	CAST36	*Calamagrostis stricta*	140–280	–
4	**Miscellaneous Grasses**			140–560	
	Grass, native	2GN	*Grass, native*	140–280	–
	sedge	CAREX	*Carex*	140–280	–
	spikerush	ELEOC	*Eleocharis*	140–280	–
	bulrush	SCIRP	*Scirpus*	140–280	–
Forb					
5	**Forbs**			95–168	
	knotweed	POLYG4	*Polygonum*	28–140	–
	common yarrow	ACMI2	*Achillea millefolium*	28–140	–
	pussytoes	ANTEN	*Antennaria*	28–140	–
	herbaceous seepweed	SUMA	*Suaeda maritima*	28–140	–
	povertyweed	IVAX	*Iva axillaris*	28–140	–
	white prairie aster	SYFA	*Symphyotrichum falcatum*	28–140	–
	slimleaf goosefoot	CHPA5	*Chenopodium pallescens*	28–140	–
	seaside arrowgrass	TRMA20	*Triglochin maritima*	28–140	–
	Forb, native	2FN	*Forb, native*	28–140	–
Shrub/Vine					
6	**Shrubs**			95–168	
	Nuttall's saltbush	ATNU2	*Atriplex nuttallii*	28–140	–
	silver buffaloberry	SHAR	*Shepherdia argentea*	28–140	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	28–140	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	28–140	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	28–140	–

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 successionally 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

Data Source Number of Records Sample Period State County
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 (for saline lowland)

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).

Contributors

Kirt Walstad

Approval

Kirt Walstad, 1/24/2024

Acknowledgments

Site Revisions
This site was formerly called Saline Lowland 10-14” p.z. It was split into two sites, Saline Subirrigated 10-14” p.z., and Saline Overflow 10-14” p.z. in 2004.
The 2005 Saline Overflow 10-14” p.z. ecological site description replaces earlier dated versions of Saline Lowland 10-14” p.z. descriptions in Rangeland Resource Unit 52XN.
This 2005 revision incorporates the State and Transition Model theory, additional data on site productivity, and an improved understanding of many rangeland health indicators.
Site Description Approval
This ecological site description is approved with the understanding that it is no more than another step in our continual effort to update the NRCS technical guide. In order to facilitate the process, NRCS field personnel are encouraged to forward existing information and/or new data that can be used to improve the utility of this site description. Please forward the information and data to the State Rangeland Management Specialist.
Authors Date Approval Date
Dr. John Lacey 02/28/2005 Loretta J. Metz 03/19/2005
Maxine Rasmussen, Area RMS, Glasgow, MT
Jon Siddoway, Area RMS, Great Falls, MT
Rick Bandy, Area RSS, Great Falls, MT
Greg Snell, Area RSS, Glasgow, MT

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.

Author(s)/participant(s)	Siddoway/Bandy
Contact for lead author	Great Falls Area Office, Great Falls, MT Reference site used? No
Date	04/19/2005
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Slopes on this site are between 0 – 2% and bare ground is 5% or less, so rills will not be evident on this site.

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2. **Presence of water flow patterns:** Due to the soil surface being well covered and minimal slope there is no evidence of past or current soil deposition or erosion for this site.

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3. **Number and height of erosional pedestals or terracettes:** Wind and water erosion will not be evident on this site, so pedestals and terracettes will not be present.

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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 should be less than 5% on this site.

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5. **Number of gullies and erosion associated with gullies:** Gully erosion will not be evident on this site.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Appearance or evidence of these erosional features or the landscape would not be present on this site.

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7. **Amount of litter movement (describe size and distance expected to travel):** Because there is little bare ground, litter movement will be minimal at most. Because the site is dominated by the taller bunchgrasses and rhizomatous grasses, litter size will reflect the height and diameter of the reproductive culms and leaves of these grasses as well as the lesser dominate mid-size grasses.

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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):** Soil stability values of 4 – 6 under plant canopies; areas of bare soil on this site will generally have values between 1 and 4 if not under plant canopy.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil structure is granular; A horizon depth is 1 – 3".

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Dominance of taller, deep rooted bunchgrasses will maximize infiltration and minimize runoff throughout the site.

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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):** Will not be present generally, but there may be areas that have "healed" from former bison trails and wallows as well as more current livestock trails which could have a compaction layer below the soil surface.

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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:

    Sub-dominant:

    Other:

Additional: Cool season, taller bunchgrasses (Nuttall alkaligrass) = warm season taller bunchgrasses (alkali sacaton) > cool season rhizomatous grasses (Western wheatgrass) = warm season rhizomatous grasses (alkali cordgrass) > perennial forbs = shrubs.

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Will be low for all functional groups in a given year. Prolonged droughts which last more than 3 years may show increases in mortality and decadence for all plant groups.

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1700 - 3000 #/acre. This would be the expected production for the reference state during adequate moisture years. 2500 pounds would be the expected production in a 12 inch precipitation zone.

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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, poverty weed, sumpweed, knotweed, curlycup gumweed, a variety of annual or biennial weedy forbs.

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17. **Perennial plant reproductive capability:** During adequate moisture years bunchgrasses will generally produce seeds, however the cool season and warm season rhizomatous grasses may not necessarily produce seed even with adequate moisture.
