

Ecological site R102DY007SD

Saline Lowland

Last updated: 8/14/2024
Accessed: 09/01/2026

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): 102D–Prairie Coteau

This area makes up about 7,867 square miles (20,375 square kilometers), consisting mostly of nearly level to undulating till plains with potholes and moraines. Elevation ranges from 1,150 to 2,130 feet (350 to 650 meters). The average annual precipitation is 22 to 29 inches (559 to 734 millimeters). The average annual temperature is 42 to 45 degrees F (6 to 7 degrees C). The dominant soil order in this MLRA is Mollisols. The soils in this area dominantly have a frigid temperature regime, and an aquic or udic moisture regime. They are generally very deep and loamy. Soils range from well drained to very poorly drained. Parent materials are dominantly fine-loamy till to clayey material, with smaller amounts of outwash, glaciofluvial deposits, eolian deposits, alluvium, and, to a lesser extent, loess and organic materials.

Classification relationships

Fenneman (1916) Physiographic Regions Division - Interior Plains East: Province - Central Lowland Section - Western Lake / Dissected Till Plains (12b/12e) *USFS (2007) Ecoregions* Domain - Humid Temperate Division - Prairie Province - Prairie Parkland (Temperate) Section - North-Central Glaciated Plains (251B) *EPA Ecoregions (Omernik 1997)* I - Great Plains (9) II - Temperate Prairies (9.2) III - Aspen Parkland/Northern Glaciated Plains (9.2.1)

Ecological site concept

The Saline Lowland ecological site typically occurs in drainageways but can occur along the edges of larger closed depressions. Soils are poorly and very poorly drained which have a water table within 0 to 2 feet of the soil surface that persists longer than the wettest part of the growing season typically until the month of August. The soils will have visible salts within 16 inches of the soil surface. Dominant vegetation is adapted to high salinity and excessive wetness, which include species such as Prairie Cordgrass and Alkali cordgrass, Nuttall's alkaligrass, and switchgrass. Salt tolerant forbs present may include alkali plantain, western dock, and Pursh seepweed. The site may become degraded due to change in disturbance regime, and vegetation may shift to community dominated by foxtail barley, inland saltgrass, and bareground.

Associated sites

R102DY001SD	Shallow Marsh These sites occur in a basin or closed depression. Soils are very poorly drained and the site will pond water until early summer in most years.
R102DY004SD	Wet Meadow These sites occur in a basin or closed depression. Soils are poorly drained and the site ponds water for 4 to 8 weeks in the spring of the year or after a heavy rain.

R102DY002SD	Linear Meadow These sites occur in drainageways. Soils are poorly and very poorly drained which have a water table within 0 to 2 feet of the soil surface that persists longer than the wettest part of the growing season typically until the month of August.
R102DY036SD	Saline Subirrigated These sites occur along the edges of drainageways or closed depressions. Soils are somewhat poorly drained which have a water table within 2 to 5 feet of the soil surface that persists longer than the wettest part of the growing season typically until the month of August. Soils will effervesce with acid at or near the surface and have visible salts within 16 inches of the soil surface.

Similar sites

R102DY036SD	Saline Subirrigated The Saline Subirrigated site occurs along the edges of drainageways or closed depressions. Soils are somewhat poorly drained which have a water table within 2 to 5 feet of the soil surface that persists longer than the wettest part of the growing season typically until the month of August. Soils will effervesce with acid at or near the surface and have visible salts within 16 inches of the soil surface. A Saline Subirrigated site will have less prairie cordgrass, more big bluestem and Indiangrass than a Saline Lowland site.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Spartina pectinata</i> (2) <i>Spartina gracilis</i>

Physiographic features

This site typically occurs in flood plains.

Table 2. Representative physiographic features

Landforms	(1) Flood plain
Runoff class	Negligible to low
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Frequent
Ponding frequency	None

Elevation	310 – 610 m
Slope	0 %
Water table depth	0 – 50 cm
Aspect	Aspect is not a significant factor

Climatic features

The average annual precipitation is 22 to 28 inches. Half or more of the precipitation falls during the growing season. Rainfall typically occurs during high-intensity, convective thunderstorms in summer. In the western part of the MLRA, rainfall is less abundant and not always adequate for full maturation of crops. Precipitation in winter is typically snow. The average annual temperature is 42 to 45 degrees F. The freeze-free period averages 143 days and ranges from 131 to 151 days.

Table 3 Representative climatic features

Frost-free period (characteristic range)	120-130 days
Freeze-free period (characteristic range)	140-150 days
Precipitation total (characteristic range)	610-690 mm
Frost-free period (actual range)	110-130 days
Freeze-free period (actual range)	130-150 days
Precipitation total (actual range)	560-710 mm
Frost-free period (average)	120 days
Freeze-free period (average)	140 days
Precipitation total (average)	640 mm

- (1) WEBSTER [USC00399004], Webster, SD
- (2) WAUBAY NWR [USC00398980], Waubay, SD
- (3) WATERTOWN RGNL AP [USW00014946], Watertown, SD
- (4) WATERTOWN 1W [USC00398930], Watertown, SD
- (5) CASTLEWOOD [USC00391519], Castlewood, SD
- (6) ARLINGTON 1 W [USC00390281], Arlington, SD
- (7) CLEAR LAKE [USC00391777], Clear Lake, SD
- (8) ASTORIA 4S [USC00390422], White, SD
- (9) TYLER [USC00218429], Tyler, MN

Influencing water features

Soils have a water table within 0 to 2 feet of the soil surface that persists longer than the wettest part of the growing season, typically until August.

Soil features

Soils are formed in alluvium. Surface textures are loam, silty clay loam, and silty clay. Soils are poorly drained.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Loam (2) Silty clay loam (3) Silty clay
Drainage class	Poorly drained
Permeability class	Moderately slow to moderately rapid
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	12.95 – 17.27 cm
Soil reaction (1:1 water) (0-25.4cm)	7.4 – 10
Subsurface fragment volume <=3" (0-152.4cm)	Not specified
Subsurface fragment volume >3" (0-152.4cm)	Not specified

Ecological dynamics

The site which is located in the Prairie Pothole Region developed under Northern Great Plains climatic conditions and included natural influence of large herding herbivores and occasional fire. Changes will occur in the plant communities due to weather fluctuations and/or management actions. Under adverse impacts, a relatively rapid decline in vegetative vigor and composition can occur. Under favorable conditions the site has the potential to resemble the Reference State. Interpretations for this site are based primarily on the 1.1 Prairie Cordgrass-Alkali Cordgrass-Nuttall's Alkaligrass Plant Community Phase. This community phase and the Reference State have been determined by study of rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts also have been considered.

This ecological site (ES) has been grazed by domestic livestock since they have been introduced into the area. As this site deteriorates, species such as inland saltgrass (*Distichlis spicata*) and foxtail barley (*Hordeum jubatum*) increase and annual species may invade the site. Grasses such as alkali sacaton (*Sporobolus airoides*), Prairie Cordgrass, Alkali Cordgrass, and Nuttall's alkaligrass will decrease in frequency and production. The salinity of the soils greatly influences the plant species present. Plant vigor can vary on a year-to-year basis in relation to current precipitation amounts, which influences the translocation of salts in the soil profile. Typically, only salt tolerant plants are found on this site.

Following the state and transition diagram are narratives for each of the described states and community phases. These may not represent every possibility, but they are the most prevalent and repeatable states/community phases. The plant composition tables shown below have been developed from the best available knowledge at the time of this revision. As more data are collected, some of these community phases and/or states may be revised or removed, and new ones may be added. The main purpose for including the descriptions here is to capture the current knowledge and experience at the time of this revision.

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 (%)
Grass/Grasslike					
1	Warm-season Grasses			740-2219	
	alkali cordgrass	SPGR	<i>Spartina gracilis</i>	247-1480	–
	prairie cordgrass	SPPE	<i>Spartina pectinata</i>	247-1480	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	0-493	–
2	Wheatgrass			493-986	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	247-740	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	247-493	–
3	Cool-season Grasses			493-1233	
	Nuttall's alkaligrass	PUNU2	<i>Puccinellia nuttalliana</i>	493-1233	–
	foxtail barley	HOJU	<i>Hordeum jubatum</i>	49-247	–
	plains bluegrass	POAR3	<i>Poa arida</i>	49-247	–
4	Short Warm-season Grasses			148-493	
	saltgrass	DISP	<i>Distichlis spicata</i>	99-493	–
	scratchgrass	MUAS	<i>Muhlenbergia asperifolia</i>	49-148	–
5	Grass-likes			247-740	
	sedge	CAREX	<i>Carex</i>	99-493	–
	spikerush	ELEOC	<i>Eleocharis</i>	49-247	–
	rush	JUNCU	<i>Juncus</i>	49-247	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0-148	–
Forb					
6	Forbs			247-740	
	Forb, native	2FN	<i>Forb, native</i>	49-197	–
	aster	ASTER	<i>Aster</i>	49-148	–
	annual marsh elder	IVAN2	<i>Iva annua</i>	0-148	–

	povertyweed	IVAX	<i>Iva axillaris</i>	0-99	–
	Pursh seepweed	SUCA2	<i>Suaeda calceoliformis</i>	49-99	–
	redwool plantain	PLER	<i>Plantago eriopoda</i>	49-99	–
	silver cinquefoil	POAR8	<i>Potentilla argentea</i>	49-99	–
	western dock	RUAQ	<i>Rumex aquaticus</i>	49-99	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	49-99	–
	lambsquarters	CHAL7	<i>Chenopodium album</i>	49-99	–
	mealy goosefoot	CHIN2	<i>Chenopodium incanum</i>	49-99	–
	Flodman's thistle	CIFL	<i>Cirsium flodmanii</i>	0-99	–
	scouringrush horsetail	EQHY	<i>Equisetum hyemale</i>	0-49	–
	silverscale saltbush	ATAR2	<i>Atriplex argentea</i>	0-49	–
	red swampfire	SARU	<i>Salicornia rubra</i>	0-49	–
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	0-49	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Warm-season Grasses			0-370	
	alkali cordgrass	SPGR	<i>Spartina gracilis</i>	0-370	–
	prairie cordgrass	SPPE	<i>Spartina pectinata</i>	0-370	–
2	Wheatgrass			555-1110	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	370-925	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	74-370	–
3	Cool-season Grasses			185-925	
	foxtail barley	HOJU	<i>Hordeum jubatum</i>	185-740	–
	Nuttall's alkaligrass	PUNU2	<i>Puccinellia nuttalliana</i>	0-370	–
	plains bluegrass	POAR3	<i>Poa arida</i>	37-185	–
4	Short Warm-season Grasses			185-740	
	saltgrass	DISP	<i>Distichlis spicata</i>	185-740	–
	scratchgrass	MUAS	<i>Muhlenbergia asperifolia</i>	37-222	–
5	Grass-likes			185-555	
	spikerush	ELEOC	<i>Eleocharis</i>	37-296	–
	sedge	CAREX	<i>Carex</i>	37-259	–
	rush	JUNCU	<i>Juncus</i>	37-185	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0-111	–
Forb					
6	Forbs			185-740	
	Forb, introduced	2FI	<i>Forb, introduced</i>	0-185	–
	Forb, native	2FN	<i>Forb, native</i>	37-185	–
	lambsquarters	CHAL7	<i>Chenopodium album</i>	37-111	–
	aster	ASTER	<i>Aster</i>	37-111	–
	Pursh seepweed	SUCA2	<i>Suaeda calceoliformis</i>	37-111	–
	cocklebur	XANTH2	<i>Xanthium</i>	0-74	–
	curly dock	RUCR	<i>Rumex crispus</i>	0-74	–
	burningbush	BASC5	<i>Bassia scoparia</i>	0-74	–
	scouringrush horsetail	EQHY	<i>Equisetum hyemale</i>	0-74	–

	povertyweed	IVAX	<i>Iva axillaris</i>	0-74	–
	prickly lettuce	LASE	<i>Lactuca serriola</i>	0-74	–
	redwool plantain	PLER	<i>Plantago eriopoda</i>	37-74	–
	mealy goosefoot	CHIN2	<i>Chenopodium incanum</i>	37-74	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	37-74	–
	redroot amaranth	AMRE	<i>Amaranthus retroflexus</i>	0-74	–
	Flodman's thistle	CIFL	<i>Cirsium flodmanii</i>	0-37	–
	silver cinquefoil	POAR8	<i>Potentilla argentea</i>	0-37	–
	western dock	RUAQ	<i>Rumex aquaticus</i>	0-37	–
	annual marsh elder	IVAN2	<i>Iva annua</i>	0-37	–
	silverscale saltbush	ATAR2	<i>Atriplex argentea</i>	0-37	–
	red swampfire	SARU	<i>Salicornia rubra</i>	0-37	–

Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Wheatgrass			0-247	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	0-247	–
2	Cool-season Grasses			370-1110	
	foxtail barley	HOJU	<i>Hordeum jubatum</i>	370-1110	–
	plains bluegrass	POAR3	<i>Poa arida</i>	0-123	–
	Nuttall's alkaligrass	PUNU2	<i>Puccinellia nuttalliana</i>	0-123	–
3	Short Warm-season Grasses			247-740	
	saltgrass	DISP	<i>Distichlis spicata</i>	247-740	–
	scratchgrass	MUAS	<i>Muhlenbergia asperifolia</i>	25-123	–
4	Grass-likes			25-123	
	spikerush	ELEOC	<i>Eleocharis</i>	25-123	–
	rush	JUNCU	<i>Juncus</i>	0-99	–
	sedge	CAREX	<i>Carex</i>	0-74	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0-49	–
Forb					
5	Forbs			247-740	
	burningbush	BASC5	<i>Bassia scoparia</i>	49-616	–
	Forb, introduced	2FI	<i>Forb, introduced</i>	0-247	–
	curly dock	RUCR	<i>Rumex crispus</i>	25-247	–
	cocklebur	XANTH2	<i>Xanthium</i>	0-247	–
	redroot amaranth	AMRE	<i>Amaranthus retroflexus</i>	0-197	–
	prickly lettuce	LASE	<i>Lactuca serriola</i>	0-123	–
	Pursh seepweed	SUCA2	<i>Suaeda calceoliformis</i>	25-123	–
	povertyweed	IVAX	<i>Iva axillaris</i>	0-74	–
	lambsquarters	CHAL7	<i>Chenopodium album</i>	25-74	–
	Forb, native	2FN	<i>Forb, native</i>	0-49	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	0-49	–
	aster	ASTER	<i>Aster</i>	0-49	–
	silverscale saltbush	ATAR2	<i>Atriplex argentea</i>	0-49	–
	mealy goosefoot	CHIN2	<i>Chenopodium incanum</i>	0-49	–

	red swampfire	SARU	<i>Salicornia rubra</i>	0-49	–
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Table 8. Community 2.2 plant community composition

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

The following table lists annual, suggested initial stocking rates with average growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of conservation planning. Often, the current plant composition does not entirely match any particular plant community (as described in this ES description). Because of this, a resource inventory is necessary to document plant composition and production. More accurate carrying capacity estimates should eventually be calculated using the following stocking rate information along with animal preference data and actual stocking records, particularly when grazers other than cattle are involved. With consultation of the land manager, more intensive grazing management may result in improved harvest efficiencies and increased carrying capacity. Prairie Cordgrass/Alkali Cordgrass/Alkaligrass (1.1) Average Annual Production (lbs./acre, air-dry): 4400 Stocking Rate* (AUM/acre): 1.21 Wheatgrass/Foxtail Barley/Inland Saltgrass (1.2) Average Annual Production (lbs./acre, air-dry): 3300 Stocking Rate* (AUM/acre): 0.90 Foxtail Barley/Inland Saltgrass, Bare Ground (2.2) Average Annual Production (lbs./acre, air-dry): 2200 Stocking Rate* (AUM/acre): 0.60 Annual/Pioneer, Non-Native Perennial, Bare Ground (2.2) Average Annual Production (lbs./acre, air-dry): 1200 Stocking Rate* (AUM/acre): 0.33 *Based on 912 lbs./acre (air-dry weight) per Animal Unit Month (AUM), and on 25 percent harvest efficiency (refer to United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), National Range and Pasture Handbook). Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage. During the dormant period, the forage for livestock will likely be lacking protein to meet livestock requirements and added protein will allow ruminants to better utilize the energy stored in grazed plant materials. A forage quality test (either directly or through fecal sampling) should be used to determine the level of supplementation needed.

Hydrological functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic groups C and D. Infiltration is typically slow to very slow and runoff potential for this site varies from negligible to low depending on soil hydrologic group, slope, and ground cover. In many cases, areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where shortgrasses form a strong sod and dominate the site. Dominance by inland saltgrass and/or foxtail barley will result in reduced infiltration and increased runoff. Areas where ground cover is less than 50 percent have the greatest potential to have reduced infiltration and higher runoff (refer to Section 4, NRCS National Engineering Handbook for runoff quantities and hydrologic curves).

Recreational uses

This site provides hunting, hiking, photography, bird watching, and other opportunities. The wide varieties of plants that bloom from spring until fall have an esthetic value that appeals to visitors.

Wood products

No appreciable wood products are typically present on this site.

Other products

Seed harvest of native plant species can provide additional income on this site.

Inventory data references

MLRA 102D was created in 2022 with Agricultural Handbook 296 updated. This area was MLRA 102A prior to this time. Information was copied from MLRA 102A ESDs to create the MLRA 102D ESDs. There is no NRCS clipping data and other inventory currently available for this site. Information presented here has been derived using field observations from range-trained personnel. Those involved in developing this site include: Stan Boltz, Range Management Specialist, NRCS; and Bruce Kunze, Soil Scientist, NRCS.

Other references

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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)	David Schmidt, Tim Nordquist, Stan Boltz
Contact for lead author	
Date	12/04/2007

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.

2. Presence of water flow patterns: Barely observable.

3. Number and height of erosional pedestals or terracettes: Essentially, non-existent.

4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):
Bare ground less than 5% and less than 2 inches in diameter.

5. Number of gullies and erosion associated with gullies: Active gullies should not be present.

6. Extent of wind scoured, blowouts and/or depositional areas: None.

7. Amount of litter movement (describe size and distance expected to travel): Little to no plant litter movement. Plant litter remains in place and is not moved by erosional forces.

8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):
Stability class typically 5-6. Typically high root content. Soil surface is very resistant to erosion.

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): Use soil series description for depth and color of A-horizon.

10. Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: Healthy, deep rooted native grasses enhance infiltration and reduce runoff.

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 should be evident.
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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: Tall warm-season rhizomatous grass >>> mid cool-season bunch grass

Sub-dominant: >> mid cool-season rhizomatous grass = short warm-season grass = short cool-season grass = forb

Other:

Additional:

13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence): Very little to no evidence of decadence or mortality.
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14. Average percent litter cover (%) and depth (in): 85-90%, roughly 0.5 inch thick or less. Litter cover is in contact with soil surface.
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15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production): 3800 – 5000 lbs./acre air-dry weight, average 4,400 lbs./acre air-dry weight.
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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: Refer to State and Local Noxious Weed List
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17. Perennial plant reproductive capability: All species are capable of reproducing.
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