Ecological site R102DY001SD
Shallow Marsh

Last updated: 8/14/2024
Accessed: 09/19/2026

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 Shallow Marsh ecological site typically occurs in a basin or closed depression, and receives water directly from precipitation, surface overland flow, and groundwater discharge. Soils are formed in local alluvium and are very poorly drained, which have a water table within 1 foot of the soil surface. Permeability is very slow due to the clayey subsoil and the site will pond water until early summer in most years. Ponded water conditions and very slow permeability strongly influences the soil-water-plant relationship. Vegetation in the Reference State is typically dominated by cool-season grass and grass-like species including Scolochloa festucacea (Common rivergrass), Carex atherodes (slough sedge), Carex pellita (woolly sedge), Glyceria grandis (American mannagrass), Spartina pectinata (prairie cordgrass), and Eleocharis species (spikerush). Forb species may include Polygonum species (smartweeds), Rumex aquaticus (western dock), and Symphyotrichum lanceolatum (white panicle aster). Nonnative species such as Elymus repens (quackgrass), Alopecurus arundinaceus (creeping meadow foxtail), and Poa pratensis (Kentucky bluegrass) may invade the site due to change in disturbance regime.

Associated sites

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.
R102DY020SD	**Loamy Overflow** These sites occur in upland swales. Soils are moderately well drained which have water flow into and over/through the site.

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.
R102DY003SD	**Subirrigated** These sites occur in drainageways. 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.

Similar sites

R102DY004SD	**Wet Meadow** Wet Meadow is similar in landscape position, but the site ponds water only for 4 to 8 weeks in the spring of the year or after a heavy rain. A Wet Meadow site will have more prairie cordgrass and lower production than a Shallow Marsh.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Scolochloa festucacea* (2) *Carex atherodes*

Physiographic features

This site occurs on potholes and depressions on uplands. Depressions frequently occur on till plains and moraines.

Table 2. Representative physiographic features

Landforms	(1) Pothole (2) Depression (3) Till plain > Closed depression (4) Moraine > Closed depression
Runoff class	Negligible
Flooding frequency	None
Ponding duration	Very long (more than 30 days)

Ponding frequency	Occasional to frequent
Elevation	300 – 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 152 days.

Table 3 Representative climatic features

Frost-free period (characteristic range)	110-130 days
Freeze-free period (characteristic range)	140-150 days
Precipitation total (characteristic range)	610-690 mm
Frost-free period (actual range)	100-130 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)	660 mm

- (1) ROY LAKE [USC00397326], Lake City, SD
- (2) WAUBAY NWR [USC00398980], Waubay, SD
- (3) WEBSTER [USC00399004], Webster, SD
- (4) SUMMIT 1 W [USC00398116], Summit, SD
- (5) WATERTOWN RGNL AP [USW00014946], Watertown, SD

- (6) CLARK [USC00391739], Clark, SD
- (7) ARLINGTON 1 W [USC00390281], Arlington, SD
- (8) BROOKINGS 2 NE [USC00391076], Brookings, SD
- (9) ASTORIA 4S [USC00390422], White, SD
- (10) TYLER [USC00218429], Tyler, MN
- (11) CLEAR LAKE [USC00391777], Clear Lake, SD
- (12) CASTLEWOOD [USC00391519], Castlewood, SD
- (13) WATERTOWN 1W [USC00398930], Watertown, SD
- (14) LAKE WILSON [USC00214534], Lake Wilson, MN
- (15) PIPESTONE [USC00216565], Pipestone, MN
- (16) CANBY [USC00211263], Canby, MN
- (17) DE SMET [USC00392302], De Smet, SD

Influencing water features

This site can be classified as a Seasonally Flooded to Semipermanently Flooded Palustrine Emergent Wetland (Cowardin et al., 1979). Ponded conditions drive reference state vegetative communities.

Soil features

Soils are very deep and formed in alluvium, till, and occasionally in lacustrine deposits. Surface textures are silty clay loam to silty clay. These soils are poorly to very poorly drained and are characterized by slow permeability.

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Till (3) Lacustrine deposits
Surface texture	(1) Silty clay loam (2) Silty clay
Family particle size	(1) Fine (2) Fine-silty
Drainage class	Very poorly drained to poorly drained
Permeability class	Very slow to slow
Depth to restrictive layer	200 cm
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified

Available water capacity (0-101.6cm)	14.99 – 20.32 cm
Soil reaction (1:1 water) (0-25.4cm)	6.1 – 7.8
Subsurface fragment volume <=3" (0-152.4cm)	Not specified
Subsurface fragment volume >3" (0-152.4cm)	Not specified

Ecological dynamics

The site 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 Common Rivergrass/Slough Sedge Plant Community Phase (1.1). This community phase and the Reference State has 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. Community phases, community pathways, states, transitions, thresholds and restoration pathways have been determined through similar studies and experience.

This ecological site (ES) has been grazed by domestic livestock since introduced into the area. The introduction of domestic livestock and the use of fencing and reliable water sources have changed the disturbance regime of this site. Heavy continuous grazing without adequate recovery periods following each grazing occurrence causes this site to depart from the Reference State. Species such as fowl bluegrass, spikerush, and Baltic rush will initially increase. Common Rivergrass and slough sedge will decrease in frequency and production. Continued heavy grazing eventually causes a dominance by spikerush, rushes, and unpalatable forbs such as curly dock.

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.

The following is a diagram that illustrates the common plant community phases that can occur on the site and the transition and community pathways between them. The ecological processes will be discussed in more detail 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 (%)
Grass/Grasslike					
1	**Tall Cool-season Grasses**			0-493	
	common rivergrass	SCFE	*Scolochloa festucacea*	0-308	–
	American mannagrass	GLGR	*Glyceria grandis*	0-185	–
2	**Grass-likes**			2466-4624	

	wheat sedge	CAAT2	*Carex atherodes*	925-2466	–
	spikerush	ELEOC	*Eleocharis*	616-1849	–
	mountain rush	JUARL	*Juncus arcticus ssp. littoralis*	308-925	–
	woolly sedge	CAPE42	*Carex pellita*	308-925	–
	flatsedge	CYPER	*Cyperus*	0-616	–
	bottlebrush sedge	CAHY4	*Carex hystericina*	0-616	–
	smoothcone sedge	CALA12	*Carex laeviconica*	0-616	–
	rush	JUNCU	*Juncus*	0-616	–
	green bulrush	SCAT2	*Scirpus atrovirens*	0-616	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0-493	–
3	**Tall Warm-season Grasses**			0-308	
	prairie cordgrass	SPPE	*Spartina pectinata*	0-308	–
4	**Reedgrasses**			0-123	
	northern reedgrass	CASTI3	*Calamagrostis stricta ssp. inexpansa*	0-123	–
	slimstem reedgrass	CASTS5	*Calamagrostis stricta ssp. stricta*	0-123	–
5	**Other Native Grasses**			0-308	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0-308	–
	American sloughgrass	BESY	*Beckmannia syzigachne*	0-308	–
6	**Non-Native Grasses**			62-308	
	barnyardgrass	ECCR	*Echinochloa crus-galli*	62-308	–
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0-185	–
Forb					
7	**Forbs**			308-1233	
	broadleaf cattail	TYLA	*Typha latifolia*	62-247	–
	Forb, introduced	2FI	*Forb, introduced*	0-247	–
	Forb, native	2FN	*Forb, native*	62-247	–
	Pennsylvania smartweed	POPE2	*Polygonum pensylvanicum*	62-247	–
	giant goldenrod	SOGI	*Solidago gigantea*	62-185	–
	bur-reed	SPARG	*Sparganium*	0-185	–
	curly dock	RUCR	*Rumex crispus*	62-185	–
	knotweed	POLYG4	*Polygonum*	62-185	–
	narrowleaf cattail	TYAN	*Typha angustifolia*	62-185	–
	hemlock waterparsnip	SISU2	*Sium suave*	0-123	–
	white panicle aster	SYLA6	*Symphyotrichum lanceolatum*	0-123	–
	New England aster	SYNO2	*Symphyotrichum novae-angliae*	0-123	–
	pale dock	RUAL4	*Rumex altissimus*	0-123	–
	Indianhemp	APCA	*Apocynum cannabinum*	0-123	–
	Flodman's thistle	CIFL	*Cirsium flodmanii*	0-123	–
	splitlip hempnettle	GABI3	*Galeopsis bifida*	0-123	–
	Rydberg's sunflower	HENUR	*Helianthus nuttallii ssp. rydbergii*	0-62	–
	smooth horsetail	EQLA	*Equisetum laevigatum*	0-62	–
	northern water plantain	ALTR7	*Alisma triviale*	0-62	–
	Canadian anemone	ANCA8	*Anemone canadensis*	0-62	–
	western dock	RUAQ	*Rumex aquaticus*	0-62	–
	cinquefoil	POTEN	*Potentilla*	0-62	–
	marsh arrowgrass	TRPA28	*Triglochin palustris*	0-62	–

Table 6. Community 1.2 plant community composition

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

Table 7. Community 2.1 plant community composition

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

Table 8. Community 2.2 plant community composition

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

Table 9. Community 3.1 plant community composition

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

Animal community

Animal Community – Grazing Interpretations 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. Common rivergrass/Slough Sedge (1.1) Average Anuual Production (lbs./acre, air-dry): 6800 Stocking Rate* (AUM/acre): 1.86 Slough Sedge/Spikerush (1.2) Average Annual Production (lbs./acre, air-dry): 5500 Stocking Rate* (AUM/acre): 1.51 Spikerush/Baltic Rush/Fowl Bluegrass/Forbs (2.1) Average Annual Production (lbs./acre, air-dry): 3200 Stocking Rate* (AUM/acre): 0.88 Annual/Pioneer, Non-Native Perennial (2.2) Average Annual Production (lbs./acre, air-dry): 1600 Stocking Rate* (AUM/acre): 0.44 *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 is negligible due to the concave shape of the landform that this site occupies.

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 asthetic 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. Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range-trained personnel were also used. Those involved in developing this site include: Stan Boltz, Range Management Specialist, NRCS; and Bruce Kunze, Soil Scientist, NRCS. Data Source Sample Period State County NP-ESC-1 (0150746039) 2007 SD Deuel NP-ESC-1 (0010846039) 2008 SD Deuel

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Contributors

Megan Baxter
Stan Boltz
Lance Howe
Steve Winter

Approval

Suzanne Mayne-Kinney, 8/14/2024

Acknowledgments

Contact for Lead Authors: Natural Resources Conservation Service (USDA-NRCS), Redfield Soil Survey Office Redfield, SD; Lance Howe (Lance.Howe@usda.gov), Soil Survey Office Leader, USDA-NRCS, Redfield, SD; and Steve Winter (Steven.Winter@usda.gov), Soil Scientist, USDA-NRCS, Redfield, SD Additional Information Acknowledgment: Jason Hermann (Jason.Hermann@sd.usda.gov), Area Rangeland Management Specialist, USDA-NRCS, Redfield, SD.

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 6. Typically high root content, and organic matter. Soil surface is very resistant to erosion.

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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.

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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.

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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 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 cool-season rhizomatous grass > mid & tall cool-season rhizomatous grass-like

    Sub-dominant: > tall warm-season rhizomatous grass > forb

    Other:

    Additional:

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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 1-2 inches. 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):** 6200 – 7400 lbs./acre air-dry weight, average 6,800 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, also reed canarygrass.

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17. **Perennial plant reproductive capability:** All species are capable of reproducing.
