

Ecological site R102BY019SD

Closed Depression

Last updated: 2/01/2024
Accessed: 08/30/2026

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): 102B–Till Plains

The Till Plains (102B) is located within the Western Lake Section of the Central Lowland Province of the Interior Plains. It is entirely in South Dakota, encompassing 2,215 square miles (Figure 1). The elevation ranges from 1,140 to 1,880 feet. The MLRA is characterized by glaciated, nearly level to hilly plains populated by stagnation and end moraines, glacial outwash terraces, and floodplains as the major landforms. The dominant parent materials are silty drift, glacial till, glacial outwash, and alluvium. (USDA-NRCS, 2006) The dominant soil order in this MLRA is Mollisols. The soils in the area dominantly have a mesic temperature regime, a udic ustic moisture regime and mixed or smectitic mineralogy. They generally are very deep, well drained to poorly drained, and clayey or loamy. This area is in the western area of the tall grass prairie and supports big bluestem (*Andropogon gerardi*), little bluestem (*Schizachyrium scoparium*), Indiangrass (*Sorghastrum nutans*), porcupine grass (*Hesperostipa spartea*), and green needlegrass (*Nassella viridula*) as the dominant native species. Cattails (*Typha*), prairie cordgrass (*Spartina pectinate*), bulrush (*Cyperaceae*) and reed canarygrass (*Phalaris arundinacea*) are commonly found on the poorly drained soils. (USDA-NRCS, 2006).

Classification relationships

Hierarchical Framework Relationships: Major Land Resource Area (MLRA): Till Plains (102B) (USDA-NRCS, 2006) USFS Subregions: North Central Glaciated Plains Section (251B); Outer Coteau des Prairies (251Bb); Yankton Hills and Valleys (251Bf); Northwest Iowa Plains (251Bd); (Cleland et al., 2007). US EPA Level IV Ecoregion: Prairie Coteau (46k); James River Lowland (46n); Loess Prairies (47a); Big Sioux Basin (46m) - (USEPA, 2013)

Ecological site concept

The Closed Depression ecological site typically occurs in slight depressions on nearly level slopes in the upland areas. Soils are poorly drained and may have a claypan (columnar structure) within six inches of the soil surface or an abrupt texture change within 12 inches of the soil surface. Permeability is very slow due to the claypan (columnar structure) or the clayey subsoil and the site may pond water four to eight weeks in the spring of the year. Ponded water conditions, very slow permeability and/or a natric horizon strongly influences the soil-water-plant relationship. The natric horizon in the subsoil typically has a Sodium Absorption Ratio (SAR) greater than 13 or an Exchangeable Sodium Percentage (ESP) greater than 15. Vegetation in the Reference State includes western wheatgrass and common spikerush. 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

R102BY010SD	Loamy These sites occur on upland areas. The soils are well drained and have less than 40 percent clay in the surface and subsoil. The central concept soil series are Egan and Wentworth, but other series are included.
R102BY020SD	Loamy Overflow These sites occur in upland swales. The Soils are moderately well drained, which have water flow into and over or through the site. The central concept soil series are Trent and Viborg, but other series are included.

Similar sites

R102BY004SD	Wet Meadow The Wet Meadow site occurs in a similar landscape position and does not have a claypan (columnar structure) within 6 inches of the soil surface. The Wet Meadow site will have more wetland species and more cordgrass than the Closed Depression site.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Pascopyrum smithii</i> (2) <i>Eleocharis palustris</i>

Physiographic features

This site typically occurs on nearly level depressions on upland areas.

Figure 1. Site Distribution Map for the Closed Depression site in MLRA 102B.

Table 2. Representative physiographic features

Climatic features

Major Land Resource Area 102B is considered to have a continental climate with cold winters and relatively hot summers, low to moderate humidity, light rainfall, and much sunshine. Extremes in temperature may also abound. The climate is the result of the location of this MLRA near the geographic center of North America. There are few natural barriers on the Northern Great Plains and air masses move freely across the plains and account for rapid changes in temperature.

Annual precipitation typically ranges from 24 to 26 inches per year. The average annual temperature is about 46°F. January is the coldest month with average temperatures ranging from about 14°F (Wentworth 2 WNW, South Dakota, to about 18°F (Canton 4 WNW, SD). July is the warmest month with temperatures averaging from about 72°F (Wentworth 2 WNW, SD), to about 73°F (Canton 4 WNW, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 57°F. This large annual range attests to the continental nature of the climate of this area. Hourly winds are estimated to average about 11 miles per hour (mph) annually, ranging from about 13 mph during the spring to about 10 mph during the summer. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 mph.

Growth of cool-season plants begins in early to mid-March, slowing or ceasing in late June. Warm-season plants begin growth about mid-May and continue to early or mid-September. Green-up of cool-season plants may occur in September and October when adequate soil moisture is present.

Table 3 Representative climatic features

Frost-free period (characteristic range)	120-130 days
Freeze-free period (characteristic range)	140-140 days
Precipitation total (characteristic range)	660 mm

Frost-free period (actual range)	120-130 days
Freeze-free period (actual range)	140-140 days
Precipitation total (actual range)	660-690 mm
Frost-free period (average)	130 days
Freeze-free period (average)	140 days
Precipitation total (average)	660 mm

- (1) WENTWORTH 2.5 WNW [USC00399042], Wentworth, SD
- (2) MADISON 2SE [USC00395090], Madison, SD
- (3) MONTROSE 8N [USC00395738], Montrose, SD
- (4) CANTON [USC00391392], Canton, SD
- (5) CENTERVILLE 6 SE [USC00391579], Beresford, SD

Influencing water features

No riparian features are directly associated with this site.

Soil features

The Closed Depression site typically occurs in slight depressions on nearly level slopes in the upland areas. Soils are poorly drained and may have a claypan (columnar structure) within six inches of the soil surface. The central concept soil series is Hoven. Note: This ecological site description will only be used for minor soil components in MLRA 102B.

Ecological dynamics

The information in this Ecological Site Description, including the state-and-transition model (STM), was developed based on historical data, current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. Key indicator plant species, disturbances, and ecological processes are described to inform land management decisions.

The site which is located in the Till Plains 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 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 Reference 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. Plant community phases, states, transitional pathways, and thresholds have been determined through similar studies and experience.

This site is very sensitive to precipitation fluctuations from year to year. With above average precipitation the site becomes very wet, leading to a much different plant community than what would be present with average to below average precipitation. In dry years, plant density becomes very low. The two plant communities influenced strongly by precipitation alone, Western Wheatgrass-Common Spikerush Plant Community Subphase and Common Spikerush-Pale Dock Plant Community Subphase make up the natural fluctuation of what could be considered the 1.1 Reference Plant Community Phase.

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 and community phases. The associated plant composition tables 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 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

Figure 8. State-And-Transition Model and Legend for the Closed Depression site in MLRA 102B.

Figure 9. Matrix for the Closed Depression site in MLRA 102B.

Additional community tables

Table 4. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 5. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 2.2 plant community composition

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

Ecological Site Correlation Issues and Questions: • Note: the R102BY019SD Closed Depression ecological site description was established to be used for minor components only in MLRA 102B. • Note: Worthing silty clay loam, 0 to 1 percent slopes (national symbol 2tlch) is currently a MLRA 55C map unit and has a minor component of Hoven (Closed Depression ESD). This MLRA map unit is currently used in MLRA 53C, 55C, 102B and 102C. The Hoven soil does not exist and should not be used in MLRA 102B and 102C. A future project will be needed to split correlate and designate the correct MLRA map unit for each MLRA. • Note: Worthing silty clay loam, ponded, 0 to 1 percent slopes (national symbol 2tlcj) is currently a MLRA 55C map unit and has a minor component of Hoven (Closed Depression ESD). This MLRA map unit is currently used in MLRA 53C, 55C and 102B. The Hoven soil does not exist and should not be used in MLRA 102B A future project will be needed to split correlate and designate the correct MLRA map unit for each MLRA. • Reference and alternative states within the state and transition model are may not be fully documented and may require additional field sampling for refinement.

Inventory data references

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. Data Source Sample Period State County None

Other references

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Approval

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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)	
Contact for lead author	

Date	08/30/2026
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. Number and extent of rills:

2. Presence of water flow patterns:

3. Number and height of erosional pedestals or terracettes:

4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):

5. Number of gullies and erosion associated with gullies:

6. Extent of wind scoured, blowouts and/or depositional areas:

7. Amount of litter movement (describe size and distance expected to travel):

8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):

10. Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:

11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):

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:

13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):

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

15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):

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:

17. Perennial plant reproductive capability:
