

Ecological site R102BY040SD

Loamy Floodplain

Last updated: 2/01/2024
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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): 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

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 Loamy Floodplain ecological site occurs in high floodplain areas. Soils are moderately well drained which have water flow into and over or through the site and have occasional to frequent flooding. Vegetation in the Reference State is dominated by warm-season grasses including big bluestem, Indiangrass, and switchgrass. Trees may be common on this site, including green ash and plains cottonwood. The site may become invaded by non-native grasses including Kentucky bluegrass and smooth brome grass.

Associated sites

R102BY002SD	Linear Meadow These sites occur on lower floodplain area. Soil are poorly to very poorly drained which have a water table within 2 feet of the soil surface that persists longer than the wettest part of the growing season, typically until the month of August. The central concept soil series are Arlo and Clamo, but other series are included.
R102BY003SD	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. The central concept soil series is Lamo, but other series are included.

Similar sites

R102BY020SD	Loamy Overflow The Loamy Overflow site occurs in upland swales. Soils are moderately well drained which have water flow into and over and through the site. The Loamy Overflow site will have less shrubs and trees compared to the Loamy Floodplain site.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Andropogon gerardii</i> (2) <i>Sorghastrum nutans</i>

Physiographic features

Figure 1. Site Distribution Map for the Loamy Floodplain site in MLRA 102B.

Table 2. Representative physiographic features

Landforms	(1) Plains > Flood plain
Flooding duration	Brief (2 to 7 days)
Flooding frequency	Rare to frequent
Elevation	350 – 570 m
Slope	0 %
Water table depth	80 – 200 cm

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

This site receives additional water as overflow from rivers or streams and can be rarely to frequently flooded.

Soil features

The common soil features of soils in this site are the loam subsoil and slopes 0 to 2 percent. The soils in this site are moderately drained and formed in alluvium. The loam surface layer is eight to 20 inches thick. The soils have a moderate infiltration rate. The central concept soil series is Bon, but others are included. The soils show no evidence of rills, wind scoured areas, or pedestalled plants. The soil surface is stable and intact. Subsurface soil layers are nonrestrictive to water movement and root penetration. These soils are not susceptible to water erosion. Flooding frequency strongly influences the soil-water-plant relationship.

Table 4. Representative soil features

Surface texture	(1) Loam
Family particle size	(1) Fine-loamy

Drainage class	Moderately well drained
Permeability class	Moderate
Soil depth	0 – 200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	0.46 – 0.56 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 10 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	6.6 – 7.8
Subsurface fragment volume <=3" (0-101.6cm)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

State and Community Phases

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 Loamy Overflow site which is located in the Till Plains developed under Northern Great Plains climatic conditions and included

natural influence of large herding herbivores and occasional fire. Changes 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 Big Bluestem-Switchgrass-Indiangrass 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 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. The removal of fire, the introduction of invasive species, the introduction of domestic livestock, and the use of fencing and reliable water sources have changed the ecological dynamics of this site. Continuous grazing without adequate recovery periods following each grazing occurrence over several years and lack of frequent fire caused this site to depart from the interpretive plant community. Trees and shrubs are a minor but consistent component in the Reference State occurring as scattered individuals or patches. Plains Cottonwood (*Populus deltoides*) establishment results from severe flooding events where scouring and sediment deposition allow for seed germination and establishment. This is not a frequently occurring plant community, but rather unique and dependent upon a rare combination of flooding, bare soils, seed dispersal, and germination. Other shrub and tree species often establish as a result of high litter levels, bare ground, and the lack of fire, all of which favor woody plant establishment. Species such as green ash (*Fraxinus pennsylvanica*), and plains cottonwood will initially increase. Big bluestem and switchgrass will decrease in frequency and production. Increased woody species and heavy continuous grazing causes shade tolerant species like Kentucky bluegrass (*Poa pratensis*) to increase and eventually develop into a sod condition. The significant increase in invasive cool-season grasses, specifically Kentucky bluegrass and smooth brome (*Bromus inermis*), on this site is the result of several factors including typically cold wet springs coupled with spring grazing deferment, high tolerance of grazing, shade tolerance, severe defoliation of native grasses in the growing season, and the elimination of fire from the system. Due to the spread of these species, the interpretive plant community no longer exist. Extended periods of non-use and no fire will result in a plant community of mature green ash or plains cottonwood with a shaded understory of Kentucky bluegrass, creating a park like appearance.

Mechanical removal, catastrophic fire, or inundation of woody species due to flooding with very long duration (greater than 30 days) beyond normal ponding and drying patterns will create a community dominated by big bluestem, switchgrass, and Indiangrass. This community will be invaded with lesser amounts of non-native species such as Kentucky bluegrass and smooth brome.

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 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 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 for the Loamy Floodplain site in MLRA 102B.

Figure 9. Legend for the Loamy Floodplain site in MLRA 102B.

Figure 10. Matrix for the Loamy Floodplain site in MLRA 102B.

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 2.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 13. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 14. Community 4.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 15. Community 4.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 16. Community 5.1 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: • SD127 Union County, SD did not use the (EpD) Ethan-Bon, channeled, loams, 0 to 20 percent slopes (national symbol gyno) as used in the adjoining SD027 Clay County, SD. • 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; Jason Hermann, Area Rangeland Management Specialist, USDA-NRCS, Redfield, SD. Data Source Sample Period State County None

Other references

Cleland, D.T., J.A. Freeouf, J.E. Keys, G.J. Nowacki, C. Carpenter, and W.H. McNab. 2007. Ecological Subregions: sections and subsections of the coterminous United States. USDA Forest Service, General Technical Report WO-76. Washington, DC.

Gilbert, M.C., Whited, P.M., Clairain Jr, E.J., & Smith, R.D. 2006. A Regional Guidebook for Applying the Hydrogeomorphic Approach to Assessing Wetland Functions of Prairie Potholes. Washington, DC.

Samson, F.B., & Knopf, F.L. 1996. Prairie Conservation Preserving North America's Most Endangered Ecosystem. Washington, DC: Island Press.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Official Soil Series Descriptions. Available online. Accessed March 2018.

United States Department of Agriculture Natural Resource Conservation Service (USDA-NRCS). 2003. National Range and Pasture Handbook, Revision 1. Grazing Lands Technology Institute. 214.

United States Department of Agriculture – Natural Resource Conservation Service (USDA-NRCS). 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

USDA, NRCS. 2018. The PLANTS Database (<http://plants.usda.gov>, accessed 27 March 2018). National Plant Data Team.

U.S. Environmental Protection Agency [EPA]. 2013. Level III and Level IV Ecoregions of the Continental United States. Corvallis, OR, U.S. EPA, National Health and Environmental Effects Research Laboratory, map scale 1:3,000,000. Available at <http://www.epa.gov/ecoresearch/level-iii-and-iv-ecoregions-continental-united-states>. (Accessed 1 March 2018).

High Plains Regional Climate Center, University of Nebraska, Lincoln, NE. <http://www.hprcc.unl.edu/>

USDA, NRCS. National Water and Climate Center, Portland, OR. <http://wcc.nrcs.usda.gov>

USDA, NRCS. National Soil Information System, Information Technology Center, Fort Collins, CO. <http://nasis.nrcs.usda.gov>

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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	08/28/2026

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:
