

Ecological site R103XY035MN

Organic Floodplain Marsh

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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): 103X–Central Iowa and Minnesota Till Prairies

MLRA 103 is in Minnesota (56 percent) and Iowa (44 percent) and consists of approximately 18 million acres. It is in the Western Lake Section of the Central Lowland Province of the Interior Plains in an area known as the "Des Moines Lobe" of the Wisconsin-age ice sheet. The MLRA is mostly on a young, nearly level to gently rolling, glaciated till plain that has moraines and glacial lake plains in some areas. The plain is covered with glacial till, outwash, and glacial lake deposits. Recent alluvium consisting of clay, silt, sand, and gravel fill the bottoms of most of the major river valleys. Paleozoic bedrock sediments, primarily shale and limestone, underlie the glacial deposits in most of the area. The annual precipitation increases from northwest to southeast. Most of the rainfall occurs as high-intensity, convective thunderstorms during the summer. Two-thirds or more of the precipitation falls during the freeze-free period. Snowfall is common in winter. Ground water supplies are adequate for the domestic, livestock, municipal, and industrial needs. Nearly all of this area is farmland, and about four-fifths is cropland.

Classification relationships

Major Land Resource Area (MLRA): Central Iowa and Minnesota Till Prairies (103) (USDA Handbook 296, 2006) USFS Subregions: North Central Glaciated Plains Section (251B); Upper Minnesota River-Des Moines Lobe (251BA) and Southern Des Moines Lobe (251Be) Subsections (Cleland et al. 2007) Relationship to Other Established Classifications: The reference state shares similarities with the Minnesota Department of Natural Resources MRp93 Prairie Bulrush – Arrowhead Marsh

Ecological site concept

The Organic Floodplain Marsh ecological site is located on floodplains and depressions primarily in the northern portion of MLRA 103. This site is influenced by its hydrologic relationship with the adjacent river or stream and is located in back swamps. Depth to saturation mostly fluctuates with the level of the river or stream. Dominant vegetation in the reference state includes softstem bulrush (*Schoenoplectus tabernaemontani*) and multiple species of sedge (*Carex* spp.).

Associated sites

F103XY032MN	Loamy Floodplains The Loamy Floodplains ecological site is located on medium textured alluvium throughout MRLA 103. Soils textures include loam, silt loam, sandy loam and fine sandy loam. Some areas within this ecological site will exhibit long-term flooding (7-30 days).
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Similar sites

R103XY034MN	Floodplain Marsh The Floodplain Marsh ecological site is located on floodplains and depressions. Soils are fine or medium textured and very poorly drained. Flooding on this site ranges from none to frequent with some areas flooding up to 30 days. Ponding is also variable (none to frequent) with areas inundated longer than 30 days. Herbaceous plant communities usually dominate.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Schoenoplectus tabernaemontani</i> (2) <i>Carex</i>

Physiographic features

The Organic Floodplain Marsh ecological site is influenced by its hydrologic relationship with the adjacent river or stream, as the depth to saturation mostly fluctuates with the level of the waterbody. This site is often located away from the highly active river channel, such as back swamps. Flooding and ponding can be frequent and long term.

Figure 1. Block diagrams of the representative Organic Floodplain Marsh and associated ecological sites.

Figure 2. Distribution of the Organic Floodplain Marsh ecological site within MLRA 103. In many cases, the data set is not spatially consistent across political boundaries due to the method by which soils were mapped; e.g. due to county subsets.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Depression
Runoff class	Negligible to very low
Flooding duration	Long (7 to 30 days)
Flooding frequency	Frequent
Ponding duration	Long (7 to 30 days) to very long (more than 30 days)
Ponding frequency	Frequent
Elevation	210 – 560 m

Slope	0 %
Water table depth	0 – 90 cm
Aspect	Aspect is not a significant factor

Climatic features

The soil temperature regime of MLRA 103 is classified as “mesic” (i.e., mean annual soil temperature between 46 and 59°F). The average freeze-free period of this site is 150 days, while the frost-free period is 131days. Average mean annual precipitation is 32 inches, which includes rainfall plus the water equivalent from snowfall. Cold air drainage from above and the fact that wet soils are generally colder than dry soils make this site colder than adjacent, upslope sites. As a result, snow and frost remain longer in the spring, thus resulting in shorter growing seasons than the adjacent uplands.

Table 3 Representative climatic features

Frost-free period (characteristic range)	130-130 days
Freeze-free period (characteristic range)	150-150 days
Precipitation total (characteristic range)	760-840 mm
Frost-free period (actual range)	120-140 days
Freeze-free period (actual range)	150-150 days
Precipitation total (actual range)	760-890 mm
Frost-free period (average)	130 days
Freeze-free period (average)	150 days
Precipitation total (average)	810 mm

- (1) DASSEL [USC00212023], Dassel, MN
- (2) DELANO [USC00212088], Delano, MN
- (3) WASECA EXP STN [USC00218692], Waseca, MN
- (4) WELLS [USC00218808], Wells, MN
- (5) BUFFALO 2NE [USC00211107], Buffalo, MN

Influencing water features

The Organic Floodplain Marsh ecological site is hydrologically related to a stream or river. With natural hydrology intact, the depth to saturation is influenced by the water level of the waterbody. During most months, especially the warmer ones, this site receives precipitation and runoff, even though this is a minor water source compared to the adjacent river or stream. During the spring months

these soils are frequently flooded and ponded.

The soils are classified as endosaturated. The water table is typically above the soil surface during the spring months due to flooding and/or ponding and may drop to as low as three feet later in the growing season during dry periods. Because organic soil materials can hold water stronger than gravity can pull it out, these soils can often stay saturated for a delayed period after the flooding of the main river channel has subsided. In the hydrogeomorphic (HGM) classification system, this site is considered a part of a riverine complex. This site has a Temporarily Flooded Cowardin Hydrologic classification of Palustrine, Emergent Wetland, Persistent, Seasonally Flooded (Cowardin, 2013). The site is a United States Army Corps of Engineers Wetland Plant Community of A; Seasonally Flooded Basins.

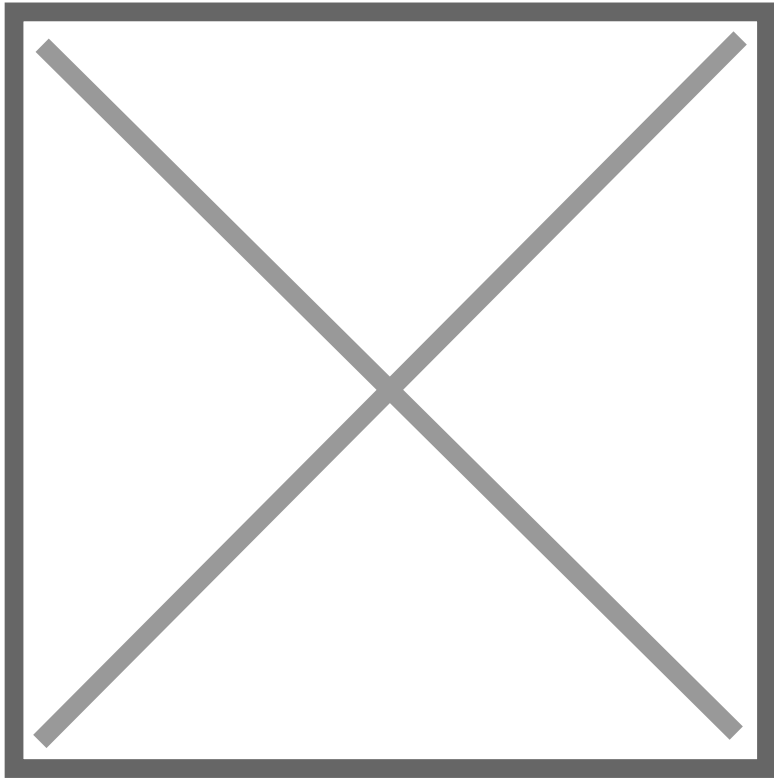


Figure 9. Representation of hydrological factors in a typical area of the Organic Floodplain Marshes and associated ecological sites on the Des Moines Lobe (MLRA 103).

Soil features

Organic Floodplain Marsh soils are rich in organic matter and developed under hydrophytic vegetation with flooded/ponded conditions. Organic soils have thick, dark histic horizons composed mainly of organic matter, mostly the remains of plants. A histic horizon consists of organic material that is saturated with water for 30 consecutive days or more in most years (unless artificially drained). Terric, Limnic, and Typic Histosols are central to the Organic Floodplain Marsh ecological site. Terric Histosols have a mineral substratum within the range of 16-51 inches and Typic/Limnic Histosols have a mineral substratum below 51 inches. Soil drainage class is very poorly drained. The surface texture is muck, and organic horizons above the mineral soil substratum have around 65 percent organic matter. The subsurface textural group below the organic material, when present within the series control section, is classified primarily as fine-loamy (with 18 to 35 percent clay) but also includes coarse-loamy (with less than 18 percent clay) and sometimes sandy (less than 15 percent clay and 30 percent silt). Klossner is the most extensive Terric Histosol in this ecological site, while Houghton and Muskego are the more extensive deeper Histosols. Houghton is a Typic Haplosaprist and Muskego is a Limnic Haplosaprist. Muskego has limnic materials (sedimentary, non-herbaceous peat) between 16 and 51 inches.

Organic soils, such as Muskego which have limnic material, often form in conditions that are prone to being ponded after flooding. The organic soils lacking limnic materials likely formed in a place that has been more prone to flooding without ponding.

All these soils were formed under saturated conditions that produced anaerobic conditions during much of the year. The anaerobic conditions inhibit the decomposition of the organic matter which accumulates to form organic soils.

Figure 10. A Muskego soil with limnic material at around 2'

Table 4. Representative soil features

Parent material	(1) Organic material (2) Alluvium
Surface texture	(1) Muck
Family particle size	(1) Fine-loamy (2) Coarse-loamy (3) Coarse-silty (4) Fine-silty (5) Sandy
Drainage class	Very poorly drained
Permeability class	Slow to very rapid
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-152.4cm)	17.78 – 68.58 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 80 %
Soil reaction (1:1 water) (0-101.6cm)	6.1 – 8.4
Subsurface fragment volume <=3" (0-101.6cm)	0 – 20 %
Subsurface fragment volume >3" (0-101.6cm)	0 – 10 %

Ecological dynamics

The Organic Floodplain Marsh ecological site is characterized by soils hydrologically related to an adjacent stream or river. Vegetation is native, wet-tolerant grasses. Today, many of these sites have been disturbed either by the establishment of invasive species or through changes to hydrology. The state and transition model (STM) consists of two states: Reference State and the Degraded Marsh State. State 1 describes a natural community with wet-tolerant native bulrushes and sedges. State 2 is the degraded marsh in which disturbances have altered the natural plant community composition and structure. Drainage, unmanaged grazing, and invasive species are common triggers.

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 (%)
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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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Inventory data references

No field plots were available for this site. A review of the scientific literature and professional experience were used to approximate the plant communities for this provisional ecological site. Information for the state-and-transition model was obtained from the same sources. All community phases are considered provisional based on these plots and the sources identified in ecological site description.

Other references

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Approval

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	10/04/2023
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:
