

Ecological site F103XY036MN

Depressional Wet Forests

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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) Subsections (Cleland et al. 2007) Relationship to Other Established Classifications: The reference state shares similarities to Minnesota Department of Natural Resources WFs57 Southern Wet Ash Swamp

Ecological site concept

The Depressional Wet Forests ecological site occurs in concave or linear and low slope gradient areas on end, lateral and ground moraines in in northeastern MLRA 103. This site is characterized by a water table that is typically above the soil surface (ponded) during the spring months and may drop to as low as three feet later in the growing season during dry periods. These soils developed under forest vegetation and have a thick accumulation of slope alluvium.

Associated sites

F103XY025MN	Loamy Upland Forests The Loamy Upland Forests ecological site occurs on uplands and on soils which are derived from loamy till and have a thin or moderately thick dark (mollic) surface layer. The drainage class ranges from somewhat poorly drained to well drained.
F103XY027MN	Loamy Wet Forests The Loamy Wet Forests ecological site occurs on loamy textured soils that have a seasonal depth to soil saturation of 0 to 30 cm. This site is located on concave or linear low-slope areas, but no flooding or ponding usually occurs. Landforms include lake plains and lateral end and ground moraines.

R103XY017MN	Organic Wet Meadow/Carr The Organic Wet Meadow/Carr ecological site occurs in low wetland areas. These sites are often ponded, have a high water table (i.e. endosaturated) and are classified as very poorly drained. Water-tolerant vegetation such as cattails, bulrushes, and sedges are common.
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Table 1. Dominant plant species

Tree	(1) <i>Fraxinus nigra</i>
Shrub	(1) <i>Prunus virginiana</i>
Herbaceous	(1) <i>Caltha palustris</i>

Physiographic features

The Depressional Wet Forests ecological site occurs primarily on end and lateral moraines in the northeastern part of MLRA 103 including the Big Woods ecoregion. The site also occurs on ground moraines and Glacial Lake Minnesota. The site is in depressions and on low gradient linear slopes. The slope shape is linear to concave both vertically and horizontally.

Figure 1. Block diagrams of the representative Depressional Wet Forests and associated ecological sites.

Figure 2. Distribution of the Depressional Wet Forests 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.

Figure 3. The Big Woods ecoregion shaded in dark green. (Minnesota Department of Natural Resources)

Table 2. Representative physiographic features

Landforms	(1) End moraine (2) Ground moraine (3) Lake plain (4) Depression (5) Lateral moraine
Runoff class	Negligible to low
Ponding duration	Long (7 to 30 days)
Ponding frequency	None to 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 frost-free period for this site is 151 days, while the frost-free period is 124 days. The average mean annual precipitation is 31 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 ecological 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)	120-130 days
Freeze-free period (characteristic range)	140-160 days
Precipitation total (characteristic range)	790-810 mm
Frost-free period (actual range)	110-130 days
Freeze-free period (actual range)	140-160 days
Precipitation total (actual range)	760-810 mm
Frost-free period (average)	120 days
Freeze-free period (average)	150 days
Precipitation total (average)	790 mm

- (1) WELLS [USC00218808], Wells, MN
- (2) GAYLORD [USC00213076], Gaylord, MN
- (3) BUFFALO 2NE [USC00211107], Buffalo, MN
- (4) JORDAN 1SSW [USC00214176], Jordan, MN
- (5) CHANHASSEN WSFO [USC00211448], Chanhassen, MN
- (6) FARIBAULT [USC00212721], Faribault, MN

Influencing water features

The Depressional Wet Forests ecological site receives water via precipitation, runoff, and lateral subsurface flow. During most months, especially the warmer ones, this site receives runoff, and it is ponded during the spring months. Soils are classified as endosaturated. The water table is typically above the soil surface (ponded) during the spring months and may drop to as low as three feet later in the growing season during dry periods. In the hydrogeomorphic (HGM) classification system, Depressional Wet Forests are considered a part of a depressional complex, receiving discharge from associated upslope ecological sites. (USDA-NRCS, 2008; Gilbert et al., 2006).

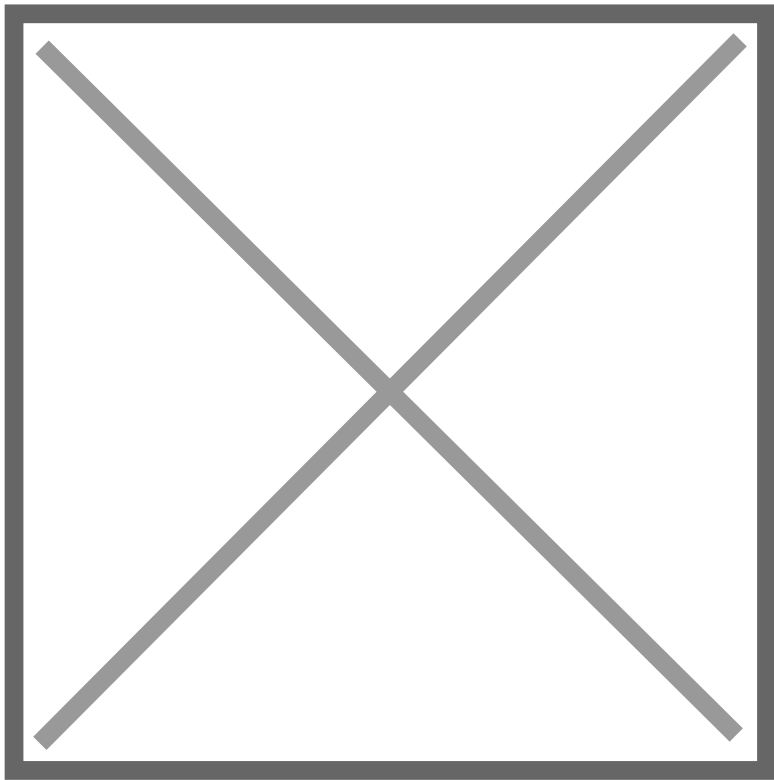


Figure 10. Representation of hydrological factors in a typical area of the Depressional Wet Forests and associated ecological sites on the Des Moines Lobe (MLRA 103).

Soil features

The Depressional Wet Forests ecological site is located on soils characterized by a high water table and seasonal ponding. The soils associated with this site formed under scattered trees or woodland vegetation and in low areas that accumulated slope alluvium. These soils also formed under saturated conditions that produced anaerobic conditions. These anaerobic conditions inhibit organic matter decomposition. Organic matter tends to mask the redoximorphic features (color patterns in the soil) that are used to determine seasonal high depth to saturation. The primary hydric soil indicator is Thick Dark Surface (A12; USDA-NRCS, 2010).

The soil series associated with this site are Glencoe, Shandep, and Lundlake. These soils are classified as Cumulic Endoaquolls. The parent material is slope alluvium or slope alluvium over loamy glacial till. Soils are very deep (>60 inches to bedrock). The drainage class is very poorly drained, and the water table is above the surface during the spring. The epipedon textures include silty clay loam, clay loam, loam, or their mucky analogues. The soil family particle size class is fine loamy. Coarse fragments are between 0 and 37 percent by volume. Soil pH classes are strongly acid to moderately alkaline throughout the series control section.

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Till (3) Colluvium
Surface texture	(1) Silty clay loam (2) Clay loam (3) Loam
Family particle size	(1) Fine-loamy

Drainage class	Very poorly drained
Permeability class	Slow to rapid
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-152.4cm)	22.61 – 33.27 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 30 %
Soil reaction (1:1 water) (0-101.6cm)	5.6 – 8.4
Subsurface fragment volume <=3" (0-101.6cm)	0 – 40 %
Subsurface fragment volume >3" (0-101.6cm)	0 – 10 %

Ecological dynamics

The Depressional Wet Forests ecological site has three states: the Reference State, the Disturbed Forest State, and the Tillage State which includes row crop production and seeded grasses. The Reference State is a wet depressional deciduous forest with a native, herbaceous ground layer. This ecological site can be affected by multiple natural triggers (disturbance processes) including ponding, insects, and windstorms. The Tillage State is characterized by tillage and hydrological modifications. Once a high-quality reference state has been drained and transitioned to a tillage field, the reversibility class is considered irreversible. The Disturbed Forest State is a wooded site that has undergone plant community changes due to human disturbance. Triggers include altered hydrology, logging/clearing, invasive plants, and unmanaged grazing. These wooded sites do not have the ecological stability or native plant diversity of a reference state.

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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Table 7. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 3.1 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

Suzanne Mayne-Kinney, 10/04/2023

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)	
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Contact for lead author	
Date	08/31/2026
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:
