

Ecological site F103XY027MN

Loamy Wet Forests

Last updated: 10/04/2023
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): 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

U.S. Department of Agriculture (USDA) Land Resource Regions and Major Land Resource Areas (USDA_NRCS, 2006) Major Land Resource Area (MLRA): Central Iowa and Minnesota Till Prairies (103) U.S. Forest Service (USFS) National Hierarchical Framework of Ecological Units (Cleland et al., 2007) Section: North central Glaciated Plains (251B) Subsections: Upper Minnesota River-Des Moines Lobe (251BA) and Southern Des Moines Lobe (251Be) International Vegetation Classification Hierarchy Class: 1 Forest & Woodland Subclass: 1.B Temperate & Boreal Forest & Woodland Formation: 1.B.2 Cool Temperate Forest & Woodland The reference state shares similarities to the Minnesota Department of Natural Resources MHs49 Southern Wet-Mesic Hardwood Forest

Ecological site concept

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 end and lateral moraines in the Northeastern portion of MLRA 103. No flooding or ponding usually occurs. Landforms include lake plains and lateral end and ground moraines.

Associated sites

R103XY018MN	Shallow Lakes The Shallow Lakes ecological site is ponded in the natural state. Soils are poorly drained Histosols that are high in organic matter content and developed in shallow lakes.
F103XY025MN	Loamy Upland Forests The Loamy Upland Forests ecological site occurs on upland 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.

R103XY017MN	Organic Wet Meadow/Carr The Organic Wet Meadow/Carr ecological site occurs in low wetland areas. These sites are usually 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 dominant.
F103XY036MN	Depressional Wet Forests The Depressional Wet Forests ecological 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 during dry periods. The included soils are classified as Cumulic Endoaquolls that developed under forest vegetation and have a thick accumulation of slope alluvium.
F103XY024MN	Sandy Upland Forests The Sandy Upland Forests ecological site is located on soils that have a surface texture of loam, sandy loam, or sand and have a layer of sandy or gravelly material below the surface horizon. These soils were formed predominantly under forest vegetation.

Similar sites

F103XY030MN	Wet Foothlope/Drainageway Forests The Wet Foothslope/Drainageway Forests ecological site is located on lower foothslopes or in wet drainageways. The soils are derived from loamy or clayey colluvium, slope alluvium, alluvium, or a combination of these parent materials. Soil drainage class is somewhat poorly drained to poorly drained.
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Table 1. Dominant plant species

Tree	(1) <i>Acer saccharum</i> (2) <i>Fraxinus nigra</i>
Shrub	(1) <i>Celtis occidentalis</i>
Herbaceous	(1) <i>Laportea canadensis</i>

Physiographic features

The Loamy Wet Forests ecological site occurs on end and lateral moraines in the northeastern part of MLRA 103 including the Big Woods ecoregion in Minnesota. Landform positions include drainageways, foothslopes, toeslopes, depressions, or low slope gradient linear segments. The landform positions are linear to slightly concave both horizontally and vertically.

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

Figure 2. Distribution of the Loamy 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 state of Minnesota with the Big Woods ecoregion shaded in dark green. (Minnesota Department of Natural Resources)

Table 2. Representative physiographic features

Hillslope profile	(1) Footslope (2) Toeslope
Landforms	(1) End moraine (2) Lateral moraine (3) Drainageway (4) Depression
Runoff class	Negligible to low
Elevation	200 – 490 m
Slope	0 %
Water table depth	0 – 120 cm
Aspect	Aspect is not a significant factor

Climatic features

The soil temperature regime of MLRA 103 is “mesic” (i.e., mean annual soil temperature between 46 and 59°F). The average mean freeze-free period of this ecological site is 153 days, while the frost-free period is 134 days. The average mean annual precipitation total is 31 inches. Cold air drainage and the fact that wet soils are colder than dry soils make this site slightly colder than adjacent sloping landforms.

Table 3 Representative climatic features

Frost-free period (characteristic range)	130-140 days
Freeze-free period (characteristic range)	150-160 days
Precipitation total (characteristic range)	760-790 mm
Frost-free period (actual range)	130-140 days
Freeze-free period (actual range)	150-160 days
Precipitation total (actual range)	760-790 mm
Frost-free period (average)	130 days

Freeze-free period (average)	150 days
Precipitation total (average)	790 mm

- (1) BUFFALO 2NE [USC00211107], Buffalo, MN
- (2) DELANO [USC00212088], Delano, MN
- (3) GAYLORD [USC00213076], Gaylord, MN

Influencing water features

The Loamy Wet Forests ecological site receives water through precipitation, runoff, and lateral subsurface flow. For some areas, direct precipitation may be the only water source they receive, and they serve as groundwater recharge areas. Spring is the wettest time of the year. The soils of this ecological site are classified as endosaturated. The soil saturation is at or very near the soil surface during the spring months and may drop to as low as six feet or more later during dry periods. In the hydrogeomorphic (HGM) classification system, the Loamy Wet Forests ecological site is considered a Mineral Flat wetland, producing recharge to adjacent ecological sites (USDA-NRCS, 2008; Gilbert et al., 2006). This ecological site also has a Saturated Cowardin Hydrologic Regime of Palustrine; Forested, Broad-Leaved Deciduous. It also has a United States Army Corps of Engineers Wetland Plant Community of C; Hardwood Swamps, Shrub-Carrs and Alder Thickets (Mineral Soils).

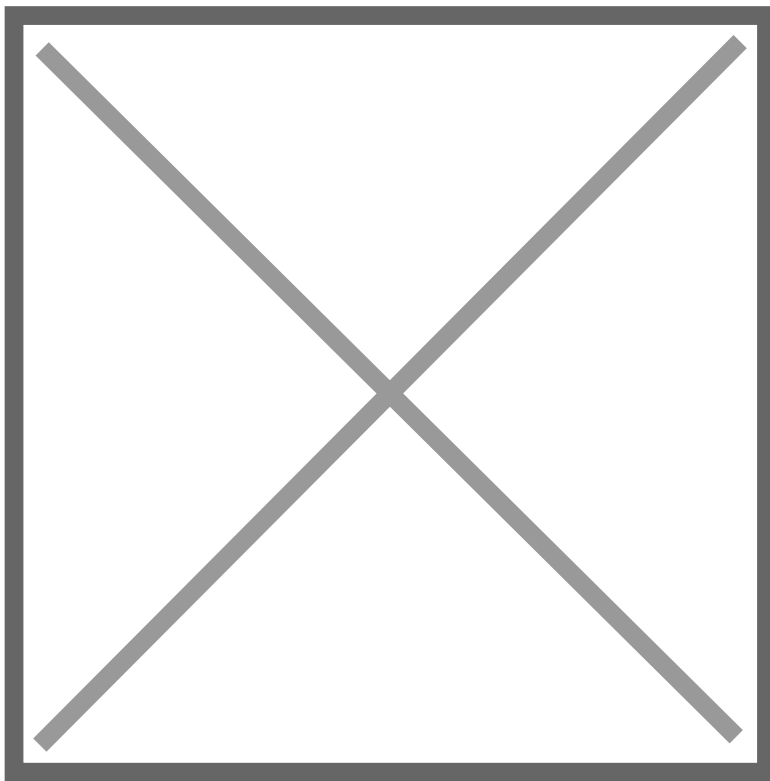


Figure 10. Representation of hydrological factors in a typical area of Wet Loamy Forests and associated ecological sites on the Des Moines Lobe (MLRA 103).

Soil features

The Loamy Wet Forests ecological site is located predominately on Cordova and Dundas soils. Parent material is loamy glacial till. Soils are loamy in texture (clay loam, loam, silty clay loam, or silt loam). Soil depth is very deep (>60 inches to bedrock). Coarse fragments are between 0 and 12 percent by volume. The drainage class is poorly drained, and the seasonal high water table is at or very near the surface. Soil pH classes are strongly acid to moderately alkaline throughout the series control section.

These soils formed under deciduous forest vegetation and classified as Typic Argiaquolls or Mollic Endoaqualls. Since the site is often in a slight depression, they can accumulate slope alluvium. As a result of this accumulation, the soil profile may have a thick, dark, soil layer (mollic epipedon). These soils were formed under saturated conditions that produced anaerobic conditions during part of the year. Organic matter tends to mask the redoximorphic features that are used to determine seasonal high depth to saturation. The primary

hydric soil indicator is a thick, dark surface (A12; USDA-NRCS, 2010).

Table 4. Representative soil features

Parent material	(1) Till
Surface texture	(1) Clay loam (2) Silty clay loam (3) Loam (4) Silt loam
Drainage class	Poorly drained
Permeability class	Very slow to moderate
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-152.4cm)	24.89 – 28.19 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 30 %
Soil reaction (1:1 water) (0-101.6cm)	5.1 – 8.4
Subsurface fragment volume <=3" (0-101.6cm)	0 – 10 %

Ecological dynamics

The Reference State is a mixed, deciduous, mature forest with a diversity of both canopy and understory species. Canopy species include sugar maple, black ash, slippery elm, and hackberry. The groundcover layer is variable and includes numerous native forbs and sedges. This site is largely confined to the eastern and northeastern portion of MLRA 103 where fire has been historically suppressed by topography and density of waterbodies. This site is common within the Big Woods ecoregion of Minnesota.

The Tillage State is characterized by tillage and agricultural crop production. The two communities under this state are the Row Crop Community and the Seeded Grassland Community.

The Disturbed Forest State is a wooded site that has undergone plant community changes due to human disturbances. Triggers include tree removal, invasive plants, and unmanaged grazing. These sites are dominated by various hardwoods along with invasive species, and do not have the ecological stability or native plant diversity of a reference state.

The current dominant land use is corn and soybean production. Areas not in row crop agriculture tend to exist as forested preserves or are in other miscellaneous land uses.

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)	
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:
