

Ecological site F103XY030MN

Wet Footslope/Drainageway 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

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 Relationship to Other Established Classifications: The reference state shares similarities with Minnesota Department of Natural Resources MHs49 Southern Wet-Mesic Hardwood Forest

Ecological site concept

The Wet Footslope/Drainageway Forest ecological site is located in drainageways and on footslopes in northeastern MLRA 103. Soils saturation is at or very near the soil surface during the spring months but may drop to as low as six feet during dry periods. Soil drainage class is somewhat poorly drained to poorly drained.

Associated sites

F103XY029MN	Footslope/Drainageway Forests The Footslope/Drainageway Forest ecological site is located in drainageways and on footslopes in the northeastern portion of MLRA 103. Soil drainage class is somewhat poorly drained to well drained. This site generally does not flood or pond.
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 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.
R103XY014MN	Recharge Depressions The Recharge Depressions ecological site has a high water table and is ponded in a natural state. Soils are poorly drained. This site has a hydrologic interaction with adjacent sloping ground and is classified as a recharge wetland.

Similar sites

F103XY027MN	Loamy Wet Forests The Loamy Wet Forests ecological site is located on footslopes and toeslopes. The soils have a dark surface layer (mollic epipedon) and are poorly drained. Soils on this site are derived from fine loamy till, so have a loamy surface texture.
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Table 1. Dominant plant species

Tree	(1) <i>Ulmus americana</i> (2) <i>Acer saccharum</i>
Shrub	(1) <i>Prunus virginiana</i>
Herbaceous	(1) <i>Elymus hystrix</i>

Physiographic features

This ecological site occurs on wet footslopes and drainageways. Landforms include end moraines, lateral moraines, ground moraines, and drainageways. The slope shape is linear to slightly concave both vertically and horizontally. This site is predominantly located in the Big Woods ecoregion of northeastern MLRA 103.

Figure 1. Block diagrams of the representative Wet Footslope/Drainageway and associated ecological sites.

Figure 2. Distribution of the Wet Footslope/Drainageway 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
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Landforms	(1) End moraine (2) Lateral moraine (3) Ground moraine (4) Drainageway
Runoff class	Negligible to high
Elevation	210 – 490 m
Slope	0 %
Water table depth	0 – 180 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 mean annual precipitation is 32 inches. The average freeze-free period for this ecological site is 158 days, while the frost-free period is 136 days. Cold air drainage and the fact that wet soils are colder than dry soils make this ecological 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)	790-840 mm
Frost-free period (actual range)	130-140 days
Freeze-free period (actual range)	150-170 days
Precipitation total (actual range)	760-840 mm
Frost-free period (average)	140 days
Freeze-free period (average)	160 days

Precipitation total (average)	810 mm
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- (1) STEWART [USC00218025], Brownton, MN
- (2) WINNEBAGO [USC00219046], Winnebago, MN
- (3) FAIRMONT [USC00212698], Fairmont, MN

Influencing water features

The Wet Foothlope/Drainageway Forests ecological site may receive water through precipitation, runoff, and lateral subsurface flow, and can serve as a groundwater recharge areas. Spring is the wettest time of the year for this site. The soils 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 during drier periods.

In the hydrogeomorphic (HGM) classification system, Wet Foothslope-Drainageway Prairies are considered Slope wetlands, producing recharge to adjacent Provisional Ecological Sites (USDA-NRCS, 2008; Gilbert et al., 2006). This site has a Saturated Cowardin Hydrologic Regime of Palustrine; Forested, Broad-Leaved Deciduous. It also has a United States Army Corps of Engineers (USACE) Wetland Plant Community of C; Hardwood Swamps, Shrub-Carrs and Alder Thickets (Mineral Soils) (USACE; Wetland Plants and Plant Communities of Minnesota and Wisconsin).

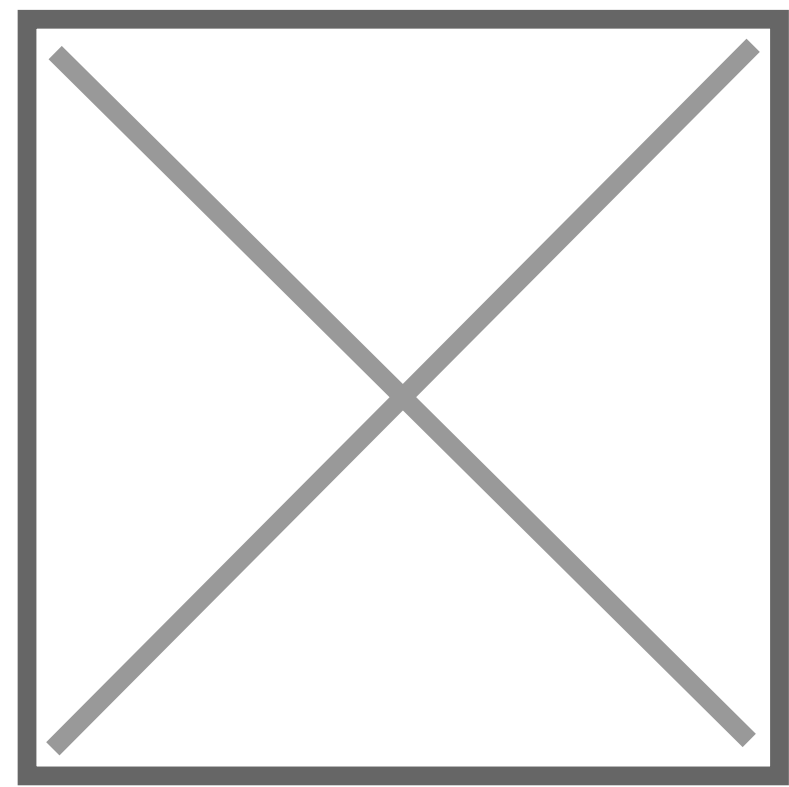


Figure 10. Hydrologic representation of a typical Des Moines Lobe (MLRA 103) Wet Foothslope/ Drainageway Forest and associated Provisional Ecological Sites.

Soil features

This ecological site is located on Hamel, Derrynane, Forestcity, and Mazaska soils. These soils formed under deciduous forest vegetation and are classified as Typic Argiaquolls or Cumulic Vertic Endoaquolls. Because of their positions on the landscape, these soils accumulated slope alluvium from adjacent areas resulting in a soil profile with a thick, dark, epipedon.

These soils also formed under saturated conditions that produced anaerobic conditions during at least 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 Thick Dark Surface (A12; USDA-NRCS, 2010).

Soils of this ecological site are very deep (>60 inches to bedrock), and the drainage class is poorly drained to somewhat poorly drained, with a seasonal high water table that ranges from 0 to 30cm. Soil textures include loam, clay loam, silty clay loam, fine sandy loam or silt loam. The soil family particle size class is fine loamy or fine. Coarse fragments are 0 to 9 percent by volume. Soil pH classes are

moderately acid to moderately alkaline throughout the series control section.

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Colluvium (3) Till
Surface texture	(1) Loam (2) Clay loam (3) Silty clay loam (4) Fine sandy loam (5) Silt loam
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Moderately slow to moderately rapid
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-152.4cm)	22.1 – 30.23 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 – 10 %

Subsurface fragment volume >3" (0-101.6cm)	0 – 10 %
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Ecological dynamics

The reference state is a mature deciduous forest with multiple co-dominant tree species. The site is found predominantly in the northeastern part of MLRA 103 where fires were historically suppressed by topography and density of waterbodies. This ecological site is generally stable in absence of large-scale natural or anthropogenic disturbances.

Three states are included in the state and transition model at this time. The Reference State, the Tillage State, and the Disturbed Forest State.

Following European settlement, most areas were cleared of their trees and converted to agriculture. Currently, the dominant land use is corn and soybean production. Remaining unfarmed areas include forested preserves and 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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Contributors

Clayton Johnson (Clayton.Johnson@usda.gov), Soil Survey Office Leader, USDA-NRCS, Albert Lea, MN
Myles Elsen (Myles.Elsen@usda.gov), Soil Scientist, USDA-NRCS, Albert Lea, MN
Anita Arends (anita.arends@usda.gov), USDA-NRCS, Springfield, IL

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	08/17/2026
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:
