

Ecological site F093BY004MI

Wet Lowlands

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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): 093B–Superior Stony and Rocky Loamy Plains and Hills

The Wisconsin portion of this MLRA is a mixture of high-relief moraines and flat till plains with interspersed glacial meltwater deposits. It is bordered on the north by glaciolacustrine deposits of Glacial Lake Duluth and on the south by extensive pitted and unpitted outwash plains. The approximate land area is just under 600,000 acres (935 sq miles). The Penokee-Gogebic Iron Range runs through the middle of the Wisconsin portion of this MLRA and into Michigan. The range is a hilly, bedrock-controlled moraine. The bedrock outcropping is composed of igneous and metamorphic materials and was created by inland folding and faulting of the ancient Superior continent when it collided with the Marshfield continent about 1.8 billion years ago (Dott & Attig, 2004). Volcanic and intrusive bedrock occurs in some places. This bedrock is overlain by a thin layer of glacial till deposited by the Chippewa Lobe. To the north of the range is a former spillway for Glacial Lake Ontonagon. The flowing meltwater cut deep channels into the morainal systems. Glaciofluvial landforms here include old beaches and dunes. South of the range, along the southern edge of this MLRA, are rolling collapsed end moraines, pushed to their extent by the Chippewa and Ontonagon Lobes. The landscape is dotted with abundant kettle lakes and swamps, especially in the eastern portion. Ice-walled lake plains and eskers are also found along these collapsed moraines. The climate is influenced by Lake Superior in areas near the lake, resulting in cooler summers, warmer winters, and greater precipitation – especially snowfall – compared to more inland locations. Historically, mixtures of eastern hemlock (*Tsuga canadensis*), sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis*), eastern white pine (*Pinus strobus*), and red pine (*Pinus resinosa*) covered the area. In wetter pockets (such as the swamps that dot the moraines to the south) white cedar (*Thuja occidentalis*), black spruce (*Picea mariana*), and tamarack (*Larix laricina*) were common (Finley, R., 1976).

Classification relationships

Relationship to Established Frameworks and Classification Systems: Habitat Types of N. Wisconsin (Kotar, 2002): All sites in this ES key out to *Fraxinus nigra* – *Acer rubrum*/ *Impatiens capensis* (FnArl). Biophysical Setting (Landfire, 2014): This ES is mapped as Boreal White Spruce-Fir-Hardwood Forest – Inland, Laurentian-Acadian Northern Hardwoods Forest – Hemlock, Eastern Boreal Floodplain, Boreal Acidic Peatland System, and Laurentian-Acadian Alkaline Conifer-Hardwood Swamp; though, it is likely most represented by the latter. WDNR Natural Communities (WDNR (2015): This ES is most similar to the Northern Hardwood Swamp. Hierarchical Framework Relationships: Major Land Resource Area (MLRA): Superior Stony and Rocky Loamy Plains and Hills, Eastern Part (93B) USFS Subregions: Winegar Moraines (212Jc) Small sections occur in the Gogebic-Penokee Iron Range (212Jb) subregion Wisconsin DNR Ecological Landscapes: North Central Forest

Ecological site concept

The Wet Lowlands ecological site is scattered throughout MLRA 93B in depressions and drainageways on outwash and lake plains, moraines, and stream terraces. These sites are characterized by very deep, poorly drained soils formed in till, alluvium, and outwash deposits. Sites are subject to occasional ponding. Precipitation and runoff are the primary sources of water, but groundwater discharge may be a significant contribution. Sites remain saturated for long periods during the growing season and meet hydric soil requirements. Soils range from extremely acid to slightly alkaline. Some sites are wetlands. The characteristic trait of Wet Lowlands the differentiates it from other sites is poor drainage. The organic sites (Acidic Poor Fens, and Mucky Swamps) also have poor drainage, but Wet Lowlands is in mineral soil. Other mineral soils outside this ecological site have improved drainage.

Associated sites

F093BY001MI	Acidic Poor Fens Acidic poor fens consist of deep herbaceous organic material. These soils are very poorly drained and remain saturated throughout the year. They are very strongly to extremely acidic. These sites are wetlands. If there is a lower landscape position bordering a Wet Lowland site, it's either an Acidic Poor Fen or a Mucky Swamp (described below).
F093BY002MI	Mucky Swamps Mucky swamps consist of deep, highly decomposed herbaceous organic material. These soils are very poorly drained and remain saturated throughout the year. Some sites are subject to occasional ponding and flooding. They are neutral to moderately acidic. These are wetlands. If there is a lower landscape position bordering a Wet Lowland site, it may be a Mucky Swamp site.
F093BY005MI	Moist Lowlands Moist Lowlands occur on footslope positions across the landscape. Unlike Wet Lowlands, they are subject to neither flooding nor ponding. These soils form in till, lacustrine deposits, or outwash deposits and may be loamy to sandy. These sites are somewhat poorly drained and occur higher on the drainage sequence than Wet Lowlands.
F093BY011MI	Dry Uplands Dry Uplands are found in the sandiest, most permeable soils on the driest landscape positions. They are very deep and excessively drained. They occur much higher on the drainage sequence than Wet Lowlands.

Similar sites

F093BY002MI	Mucky Swamps Mucky Swamps consist of deep, highly decomposed herbaceous organic material. These soils are very poorly drained and remain saturated throughout the year. Some sites are subject to occasional ponding and flooding. They are neutral to moderately acidic. These are wetlands. Some Mucky Swamp sites have a vegetative community very similar to that of Wet Lowlands.
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Table 1. Dominant plant species

Tree	(1) <i>Fraxinus nigra</i> (2) <i>Abies balsamea</i>
Shrub	(1) <i>Corylus cornuta</i>
Herbaceous	(1) <i>Dryopteris carthusiana</i> (2) <i>Arisaema triphyllum</i>

Physiographic features

These sites occur on depressions, drainageways, outwash plains, stream terraces, lake plains, and moraines in toeslope and footslope positions. Slopes range from 0 to 2 percent.

Most sites are occasionally ponded in the spring. Ponding may also occur again in the fall on some sites. Ponding duration is usually brief (2-7 days) but may be long (7-30 days) in the spring. Ponding depth ranges from 0 to 12 inches. These sites are not subject to flooding. Most sites have an apparent seasonally high water table at the soil surface (0 inches). Though infrequent, perched water tables (episaturation) may be found in soils with densic contact or massive structure.

Figure 1. Distribution of Wet Lowlands in the Superior Stoney and Rocky Loamy Plains and Hills, Eastern Part (93B).

Table 2. Representative physiographic features

Landforms	(1) Depression (2) Drainageway (3) Outwash plain (4) Stream terrace (5) Lake plain (6) Moraine
Runoff class	Negligible
Flooding frequency	None
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	None to occasional
Elevation	200 – 250 m
Slope	0 %
Ponding depth	0 – 30 cm
Water table depth	0 – 60 cm
Aspect	Aspect is not a significant factor

Climatic features

The continental climate of the Superior Stoney and Rocky Loamy Plains and Hills, Eastern Part MLRA is characterized by long, cold winters and short, warm summers where precipitation exceeds evapotranspiration. Neither average annual precipitation nor average annual minimum and maximum temperatures vary greatly within this MLRA, though the climate of the northern tip is somewhat affected by Lake Superior and receives higher annual precipitation in the form of lake effect snow.

Table 3 Representative climatic features

Frost-free period (characteristic range)	90-110 days
Freeze-free period (characteristic range)	120-140 days

Precipitation total (characteristic range)	810-890 mm
Frost-free period (actual range)	80-120 days
Freeze-free period (actual range)	120-160 days
Precipitation total (actual range)	760-910 mm
Frost-free period (average)	100 days
Freeze-free period (average)	130 days
Precipitation total (average)	840 mm

- (1) MELLENE 4 NE [USC00475286], Mellen, WI
- (2) DRUMMOND [USC00472240], Drummond, WI
- (3) MARQUETTE [USW00014838], Marquette, MI
- (4) HURLEY [USC00473800], Ironwood, WI

Influencing water features

Water is received through precipitation, runoff from adjacent uplands, and groundwater inflow. Water levels are greatly influenced by precipitation rates and runoff from upland sites. Water is lost from the site primarily through evapotranspiration and groundwater recharge.

Under the Cowardin System of Wetland Classification, or National Wetlands Inventory (NWI), the wetlands can be classified as:

- 1) Palustrine, forested, broad-leaved deciduous, saturated, or
- 2) Palustrine, forested, needle-leaved evergreen, saturated, or
- 3) Palustrine, scrub-shrub, broad-leaved deciduous, saturated, or
- 4) Palustrine emergent, persistent, saturated

Under the Hydrogeomorphic Classification System (HGM), the wetlands can be classified as:

- 1) Depressional, forested/organic, or
- 2) Depressional, scrub-shrub/organic

Permeability of the soils is very slow to moderately slow. The hydrologic group of these sites is B/D and C/D.

Hydrologic Group: B/D, C/D

Hydrogeomorphic Wetland Classification: None

Cowardin Wetland Classification: None

Soil features

These sites are represented by the Fowpaw, Cable, Minocqua, Tonkey, Gay, and Pleine soil series, classified as Typic Endoaquods, Typic Epiaquepts, Typic Endoaquepts, Mollic Endoaquepts, Aeric Endoaquepts, and Histic Humaquepts, respectively.

These soils form in loamy till or loamy alluvium underlain by dense sandy till or sandy and gravelly outwash. Bedrock is absent within 80 inches. These sites are poorly drained and meet hydric soil requirements.

Surface textures are primarily silt loam to very fine sandy loam, though some soils may have a mucky surface texture. Subsurface textures generally range from silt loam to fine sandy loam overlying coarser textures of loamy sand to coarse sand. In soils formed in outwash, deeper horizons are occasionally stratified. Surface fragments up to 10 inches in diameter are found on some sites. Subsurface

fragments up to 10 inches in diameter are found on nearly all sites and may constitute 3 to 35 percent of all subsurface materials. Soil pH ranges from extremely acid to moderately alkaline with values of 4.0 to 7.9. Carbonates are generally absent, but some sites may have a calcium carbonate equivalency of up to 5 percent starting at a depth of 30 inches.

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Till (3) Loess (4) Outwash
Surface texture	(1) Sandy loam (2) Very fine sandy loam (3) Loam (4) Silt loam
Drainage class	Poorly drained
Permeability class	Very slow to moderately slow
Soil depth	200 cm
Surface fragment cover ≤3"	0 – 10 %
Surface fragment cover >3"	0 – 20 %
Available water capacity (Depth not specified)	20 – 32.51 cm
Calcium carbonate equivalent (Depth not specified)	0 – 10 %
Soil reaction (1:1 water) (Depth not specified)	0 – 7.9
Subsurface fragment volume ≤3" (Depth not specified)	0 – 30 %

Subsurface fragment volume >3" (Depth not specified)	0 – 40 %
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Ecological dynamics

Because of the poorly drained soils, the historic fire disturbance has likely been less frequent and less severe than on the better drained sites. These sites represent the Northern Hardwood Swamp Community described in the Ecological Landscapes of Wisconsin. These forested wetlands are dominated by black ash (*Fraxinus nigra*) with other hardwood associates such as red maple and American elm. Conifer species such as balsam fir, black spruce, and northern white cedar are often present. Historically, these sites may have been dominated by conifers—specifically northern white-cedar—but after the state's period of heavy logging coupled with deer browse and other pressures, these communities have succeeded to hardwood swamps. This community relies heavily on soil moisture and nutrient regimes. These sites can support more nutrient demanding species, and the plants must tolerate seasonal ponding. The standing water drains, but soils remain saturated throughout the growing season. Tree species rely on the pit-and-mound microtopography to remain above the oversaturated rooting zones to avoid prolonged anaerobic conditions. Pit-and-mound topography is caused by tree species that have shallow roots and tip from windthrow. Seasonal ponding prevents other shade-tolerant species such as sugar maple from becoming competitive on these sites.

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 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Inventory data references

Sites fit well into ESD and match FNAI Kotar Habitat Type. *Abies balsamea* very well represented on these sites, though that may not be reflected in habitat type. All sites sampled were in the same state—not representative of other states in the state-and-transition model.

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Contributors

Jacob Prater (jprater@uwsp.edu) Associate Professor at University of Wisconsin Stevens Point

Joel Gebhard (jgebhard@uwsp.edu) Associate Research Specialist at University of Wisconsin Stevens Point

Bryant Scharenbroch Assistant Professor at University of Wisconsin Stevens Point

John Kotar (jkotar@wsic.edu) Ecological Specialist, independent contractor

Approval

Suzanne Mayne-Kinney, 9/27/2023

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	09/27/2023

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:
