

Ecological site F088XY005MN

Forestland Peatland

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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): 088X–Northern Minnesota Glacial Lake Basins

MLRA 88 consists of the lake beds of glacial Lakes Agassiz, Upham, and Aitkin. These vast glacial lake beds were formed by meltwaters associated with the last glaciation of the Wisconsin age. The large, flat, wet landscapes are filled with lacustrine lake sediments, wave-washed glacial till, and vast expanses of organic soils. This area is entirely in Minnesota and makes up about 11,590 square miles (30,019 square kilometers). The western boundary of MLRA 88 with MLRA 56B is gradual. MLRA 56B is a portion of the Red River Valley that was formed by glacial Lake Agassiz and is dominantly prairie. The southern boundary of MLRA 88 with MLRA 57 consists of distinct moraines that formed from the glacial drift sediments of Late Wisconsin age. The eastern and southeastern boundaries are with portions of MLRAs 90A and 93A. These MLRAs are in a distinct glaciated region of sediments of the Rainy and Superior Lobes, and much of MLRA 93A is bedrock controlled (USDA-Ag Handbook 296, 2022).

Classification relationships

Relationship to Other Established Classifications: MN DNR Native Plant Community (MN DNR, 2003); the reference community of this Provisional Ecological Site is most similar to: FPN63 White Cedar Swamp FPN73 Northern Alder Swamp FPN82 Northern Rich Tamarack Swamp (Western Basin) WFn53 Northern Wet Cedar Forest

Ecological site concept

Forested Peatland sites typically occur on level to gently sloping surfaces on all landforms through the area. Soils have greater than 16" of organic material and soil pH values are greater than 4.5.

Associated sites

F088XY003MN	Open Peatland Open Peatland occurs on level to gently sloping surfaces. Soils have greater than 16" of organic material and soil pH values are greater than 4.5. This site has a high water table that remain near the surface throughout the growing season, preventing the establishment of significant tree cover.
F088XY004MN	Acid Peatland Acid Peatland occurs in shallow wetland basins, closed depressions, and along drainage ways. Soils and water content have a pH lower than 4.5. Soils are occasionally ponded with standing water in spring but tend to recede by late summer. Soil surface layers are typically muck 8 to 16" thick over variable parent materials.

Similar sites

F088XY004MN	Acid Peatland Acid Peatland occurs in shallow wetland basins, closed depressions, and along drainage ways. Soils and water content have a pH lower than 4.5. Soils are occasionally ponded with standing water in spring but tend to recede by late summer. Soil surface layers are typically muck 8 to 16" thick over variable parent materials.
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Table 1. Dominant plant species

Tree	(1) <i>Thuja occidentalis</i> (2) <i>Picea mariana</i>
Shrub	(1) <i>Rhamnus alnifolia</i> (2) <i>Alnus incana</i>
Herbaceous	(1) <i>Caltha palustris</i> (2) <i>Rubus pubescens</i>

Physiographic features

Forested Peatland sites typically occur on level to gently sloping surfaces on all landforms through the area. Soils have greater than 16" of organic material and soil pH values are greater than 4.5.

Table 2. Representative physiographic features

Slope shape across	(1) Linear
Slope shape up-down	(1) Linear
Landforms	(1) Depression (2) Lake plain > Bog (3) Lake plain > Depression
Runoff class	Negligible
Flooding frequency	None
Ponding duration	Long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	180 – 620 m
Slope	0 %

Ponding depth	0 – 30 cm
Water table depth	0 cm
Aspect	Aspect is not a significant factor

Climatic features

The average annual precipitation is 25 to 27 inches (635 to 711 millimeters). Most of the rainfall comes from convective thunderstorms during the growing season. Snowfall generally occurs from October through April. The average annual temperature is 43 to 46 degrees F (6 to 8 degrees C). The mean frost free period ranges from 82 to 109 days, with the mean freeze-free period ranging from 116 to 134 days.

Table 3 Representative climatic features

Frost-free period (characteristic range)	80-110 days
Freeze-free period (characteristic range)	120-130 days
Precipitation total (characteristic range)	640-690 mm
Frost-free period (actual range)	80-110 days
Freeze-free period (actual range)	110-140 days
Precipitation total (actual range)	610-710 mm
Frost-free period (average)	100 days
Freeze-free period (average)	130 days
Precipitation total (average)	660 mm

- (1) INTL FALLS INTL AP [USW00014918], International Falls, MN
- (2) LEECH LAKE [USC00214652], Bena, MN
- (3) CAMP NORRIS DNR [USC00211250], Beltrami Isl State for, MN
- (4) BAUDETTE INTL AP [USW00094961], Baudette, MN
- (5) RED LAKE INDIAN AGCY [USC00216795], Ponemah, MN
- (6) WASKISH 4NE [USC00218700], Big Falls, MN
- (7) BIG FALLS [USC00210746], Big Falls, MN
- (8) LITTLEFORK 10 SW [USC00214809], Big Falls, MN
- (9) WARROAD [USC00218679], Warroad, MN
- (10) POKEGAMA DAM [USC00216612], Cohasset, MN
- (11) SANDY LAKE DAM LIBBY [USC00217460], McGregor, MN
- (12) FLOODWOOD 3 NE [USC00212842], Floodwood, MN

- (13) HIBBING CHISHOLM HIBBING AP [USW00094931], Hibbing, MN

Influencing water features

Water is received through precipitation, runoff from adjacent uplands, and subsurface flow. Seasonal variation in water table is the most important site factor defining Forested Peatlands. Water levels are greatly influenced by ground water, precipitation rates and runoff from upland sites. Water tables limit the amount of oxygen available to plant roots. Oxygen levels determine the extent to which root respiration can take place, the level of organic litter decomposition, and the release of important nutrients for uptake by plants (MN DNR, 2011). Forested Peatlands are wetter, less hydrologically variable ecosystems when compared to the Wet Depressional ecological site which has a greater variety of species adapted to its variation in water saturation.

Wetland description

Under the Cowardin System of Wetland Classification, or National Wetlands Inventory (NWI), these sites could be classified as:

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

Under the Hydrogeomorphic Classification System (HGM), these sites could be classified as:

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

Permeability of the soil is moderately slow to slow

Hydrologic Group: A/D, B/D, C/D

Soil features

Parent material is fibric and/or herbaceous organic material more than 40 centimeters thick. Where underlying impermeable layers minimize groundwater movement through the peat. The main source of water to the site is precipitation, since the site formed through a buildup of peat over thousands of years, causing the soil surface to develop a crest shape with sloping concave sides.

All soils in the Forestland Peatland ecological site are Histosols. The soils for this site can be further classified as Terric Haplohemists, Terric Haplosaprists, Typic Borochemists, Typic Haplohemists, and Typic Haplosaprists.

Soil series within this site include: Tacoosh, Cathro, Rifle, Dora, Daisybay, Lupton, Markey, Mooselake, Berner, Bullwinkle, Tawas, Borochemists, and Lougee.

Table 4. Representative soil features

Parent material	(1) Organic material (2) Till
Surface texture	(1) Muck (2) Mucky peat (3) Peat
Drainage class	Very poorly drained
Permeability class	Moderately rapid
Depth to restrictive layer	Not specified

Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	35.05 – 48.01 cm
Soil reaction (1:1 water) (25.4-101.6cm)	5.6 – 8.4
Subsurface fragment volume <=3" (0-203.2cm)	0 – 10 %
Subsurface fragment volume >3" (0-203.2cm)	Not specified

Ecological dynamics

Forested Peatland sites typically occur on level to gently sloping surfaces on all landforms through the area. Soils have greater than 16" of organic material and soil pH values are greater than 4.5. The organic material ranges in decomposition from muck, mucky peat to peat textures underlain by variable parent material. These sites are typically groundwater recharged.

Plant communities typical with Forested Peatland tend to be dominated by black spruce, tamarack, northern white cedar, and balsam fir; ericaceous shrubs such as Labrador tea, creeping snowberry, Speckled alder, and significant amounts of brown moss or minerotrophic Sphagnum cover.

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 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 2.2 plant community composition

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

Information presented was derived from Minnesota Department of Natural Resources Field Guide to the Native Plant Communities of Minnesota, USDA-NRCS soil survey information, and USDA Plants Database.

Other references

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Contributors

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Approval

Suzanne Mayne-Kinney, 8/12/2024

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	08/20/2026

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:
