

Ecological site F093AY005MN Wet Floodplain

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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): 093A—Superior and Rainy Stony and Rocky Till Plains and Moraines

The Superior Stony and Rocky Loamy Plains and Hills, Western Part is located and completely contained in northeastern Minnesota. This area has both the highest and lowest elevations in the state, as well as some of the state's most rugged topography (Ojakangas and Matsch, 1982). The MLRA was glaciated by numerous advances of the Superior, Rainy, and Des Moines glacial lobes during the Wisconsin glaciation as well as pre-Wisconsin glacial periods. The geomorphic surfaces in this MLRA are geologically very young (i.e., 10,000 to 20,000 years) and dominated by drumlin fields, moraines, small lake plains, outwash plains, and bedrock-controlled uplands (USDA-NRCS, 2022).

There are thousands of lakes scattered throughout the region that were created by these glacial events. Most of these lakes are bedrock-controlled in comparison to adjacent glaciated regions where glacial drift deposits are much thicker and the lakes occur in depressions atop the glacial drift (Ojakangas and Matsch, 1982). In contrast to adjacent MLRAs, the depth to the predominantly crystalline or sandstone bedrock in MLRA 93A is relatively shallow because the most recent glacial events were more erosional than depositional (Ojakangas and Matsch, 1982).

Classification relationships

Major Land Resource Area (MLRA): Superior Stony and Rocky Loamy Plains and Hills, Western Part (93A)

USFS Subregions: Northern Superior Uplands Section (212L); North Shore Highlands Subsection (212Lb)

Relationship to Other Established Classifications:

FFn67-Northern Floodplain Forest, Floodplain Forest System, Northern Floristic Region, Minnesota Department of Natural Resources

Ecological site concept

This site is a wet, deciduous, floodplain forest. Soils wet layer depth is 0 - 13 inches and occasional to frequent flooding can occur in many areas. Dominant tree species include silver maple, black ash, green ash, and American elm. Plant community composition, especially the ground layer is variable depending on the duration, depth, and frequency of flooding.

Associated sites

F093AY004MN	Peatland Peatland. This site characterized by a shrub-graminoid plant community. The site is potentially ponded. Does not typically occurs at the margin of stream and river channels.
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Similar sites

F093AY006MN	Depressional Wet Hardwood Forest The Depressional Wet Hardwood Forest site is developed primarily from low lying mineral soils, but can have up to sixteen inches (41 centimeters) of organic surface. They occur on small to moderate sized closed depressions and shallow, low gradient drainage networks, surrounded by an upland forest matrix.
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Table 1. Dominant plant species

Tree	(1) <i>Acer saccharinum</i> (2) <i>Fraxinus</i>
Shrub	(1) <i>Ribes americanum</i> (2) <i>Cornus racemosa</i>
Herbaceous	(1) <i>Laportea canadensis</i> (2) <i>Onoclea sensibilis</i>

Physiographic features

This site occurs on on flat areas located on low floodplains which are occasionally to frequently flooded.

Table 2. Representative physiographic features

Landforms	(1) Till plain (2) Flood plain (3) Flat (4) Plain
Runoff class	Negligible to very low
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Occasional to frequent
Ponding frequency	None
Elevation	145–610 m
Slope	0–1%
Water table depth	0–33 cm
Aspect	Aspect is not a significant factor

Climatic features

The average annual precipitation is 26-32 inches (66 to 81 centimeters). Measurable climatic variation (due to the lake effect) near some of Lake Superior may alter temperature and precipitation (Hillman & Nielsen, 2023). About 65 percent of the precipitation falls as rain during the growing season (May through September) and about 21 percent falls as snow. The freeze-free period averages about 130 days and ranges from 97 to 150 days (USDA-NRCS, 2022).

Table 3. Representative climatic features

Frost-free period (characteristic range)	90-109 days
Freeze-free period (characteristic range)	123-143 days
Precipitation total (characteristic range)	660-813 mm
Frost-free period (actual range)	44-114 days
Freeze-free period (actual range)	97-150 days
Precipitation total (actual range)	660-813 mm
Frost-free period (average)	93 days

Freeze-free period (average)	130 days
Precipitation total (average)	737 mm

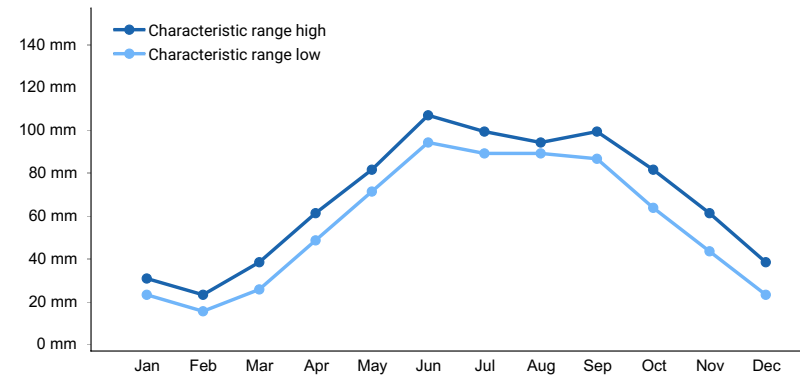


Figure 1. Monthly precipitation range

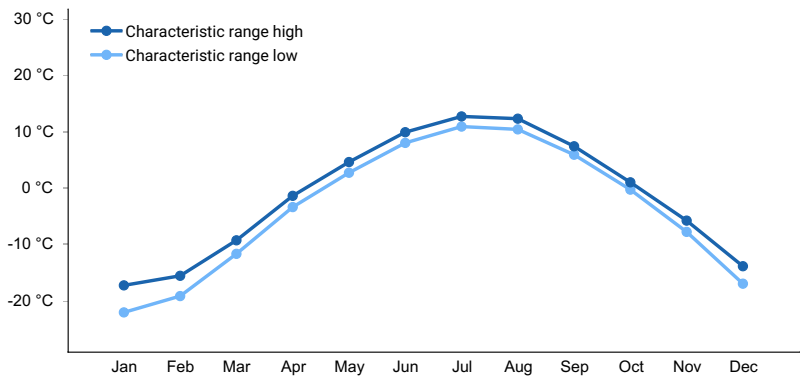


Figure 2. Monthly minimum temperature range

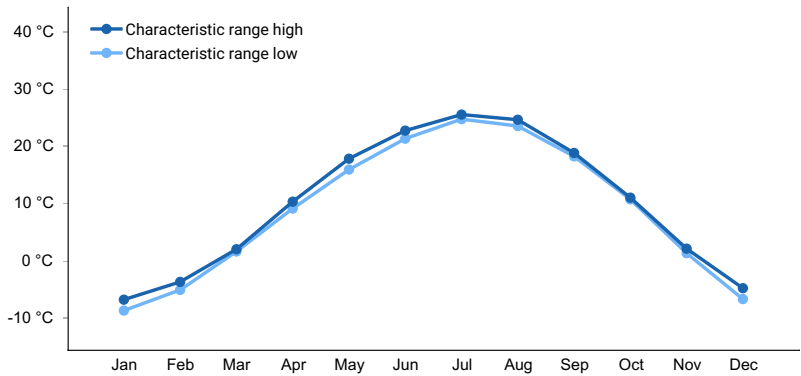


Figure 3. Monthly maximum temperature range

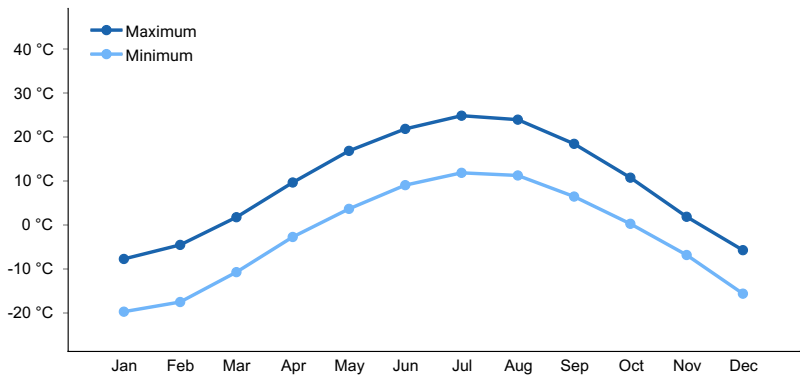


Figure 4. Monthly average minimum and maximum temperature

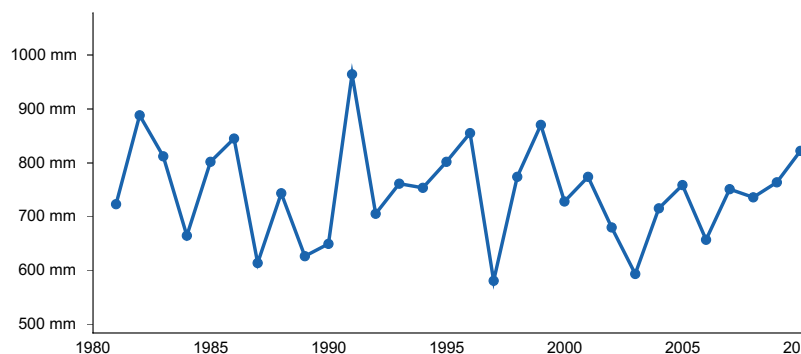


Figure 5. Annual precipitation pattern

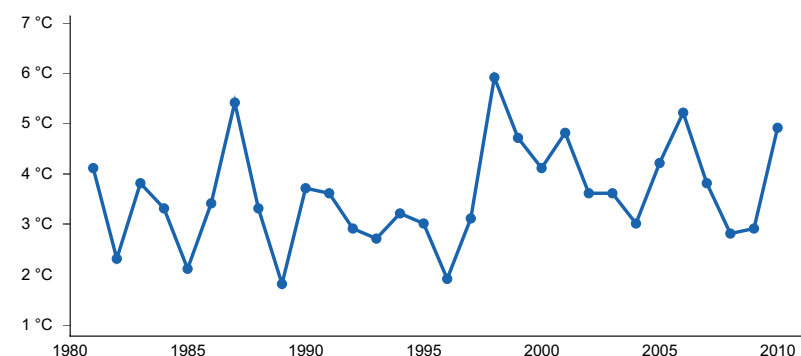


Figure 6. Annual average temperature pattern

Climate stations used

- (1) GRAND PORTAGE [USC00213296], Grand Portage, MN
- (2) KABETOGAMA [USC00214191], Orr, MN
- (3) ELY 25E [USC00212555], Ely, MN
- (4) DULUTH [USW00014913], Duluth, MN
- (5) WOLF RIDGE ELC [USC00219134], Finland, MN
- (6) KETTLE FALLS [USC00214306], Voyageurs Natl Park, MN
- (7) BRIMSON 2S [USC00210989], Brimson, MN

Influencing water features

This site is influenced by riparian features. Some areas of this site are frequently flooded. The soil wet layer depth is 0 - 13 inches.

Wetland description

N/A

Soil features

Soils are deep, somewhat poorly drained to very poorly drained Entisols and Inceptisols. Soils parent material is alluvium. Components representative of this site include Fluvaquents, Hassman, Sax, Psammaquents, and Udifluvents.

Table 4. Representative soil features

Parent material	(1) Alluvium
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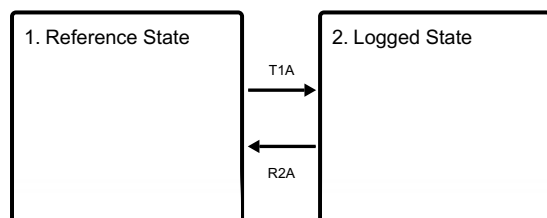
Surface texture	(1) Loam (2) Loamy sand (3) Sandy loam (4) Mucky silt loam
Drainage class	Somewhat poorly drained to very poorly drained
Permeability class	Very slow to moderate
Soil depth	183–203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0–25%
Available water capacity (0-152.4cm)	7.62–25.4 cm
Calcium carbonate equivalent (0-101.6cm)	0–10%
Electrical conductivity (Depth not specified)	0 mmhos/cm
Soil reaction (1:1 water) (0-101.6cm)	4.5–7.3
Subsurface fragment volume <=3" (Depth not specified)	0–30%
Subsurface fragment volume >3" (Depth not specified)	0–45%

Ecological dynamics

This site is a wet deciduous floodplain forest on very poorly drained to somewhat poorly drained soils. Frequent flooding may occur in some areas which will greatly influence the plant community composition. A variety of native forbs and ferns are present on these sites. Woodnettle (*Laportea canadensis*), sensitive fern (*Onoclea sensibilis*), mad dog skullcap (*Scutellaria lateriflora*), and fringed loosestrife (*Lysimachia ciliata*) are common. Virginia wild rye (*Elymus virginicus*) is often the dominant grass along with multiple species of sedge (*Carex* spp.). Woody vines include wild grape (*Vitis riparia*) and the shrub layer is composed of gray dogwood (*Cornus racemosa*) and wild black currant (*Ribes americanum*). Flooding frequency, duration, and depth are the drivers for this community and will create variability in the plant community composition and structure.

State and transition model

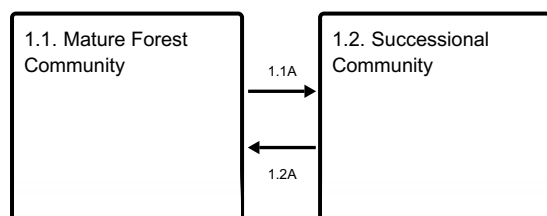
Ecosystem states



T1A - Site disturbance; invasive species

R2A - Restoration; weed control; forest management

State 1 submodel, plant communities



1.1A - Severe natural disturbance

1.2A - Absence of disturbances

State 2 submodel, plant communities

2.1. Logged Disturbed
Community

State 1 Reference State

The reference state is a mature, deciduous, wet floodplain forest. Flooding varies from rare to frequent. The dominant canopy species include silver maple, black ash, green ash, American elm, and willow. Common are wet-tolerant species such as mad dog skullcap (*Scutellaria lateriflora*), sensitive fern (*Onoclea sensibilis*), fringed loosestrife (*Lysimachia ciliata*), clear weed (*Pilea* spp.), and touch-me-not (*Impatiens* spp.). Flooding depth, frequency, and duration will influence the plant community composition.

Dominant plant species

- silver maple (*Acer saccharinum*), tree
- black ash (*Fraxinus nigra*), tree
- green ash (*Fraxinus pennsylvanica*), tree
- American elm (*Ulmus americana*), tree
- gray dogwood (*Cornus racemosa*), shrub
- American black currant (*Ribes americanum*), shrub
- sedge (*Carex*), grass
- Virginia wildrye (*Elymus virginicus*), grass
- sweet woodreed (*Cinna arundinacea*), grass
- Canadian woodnettle (*Laportea canadensis*), other herbaceous
- sensitive fern (*Onoclea sensibilis*), other herbaceous

Community 1.1 Mature Forest Community

This community is a mature, deciduous, wet floodplain forest. Flooding may occur frequently in some areas resulting in a sparse and open understory. The high levels of soil moisture favor wet-tolerant species such as sedges and woodnettle. Areas that are higher in elevation will flood less frequently and exhibit a denser shrub layer and more upland forest species.

Dominant plant species

- black ash (*Fraxinus nigra*), tree
- silver maple (*Acer saccharinum*), tree
- green ash (*Fraxinus pennsylvanica*), tree
- gray dogwood (*Cornus racemosa*), shrub
- willow (*Salix*), shrub
- sedge (*Carex*), grass
- sweet woodreed (*Cinna arundinacea*), grass
- Canadian woodnettle (*Laportea canadensis*), other herbaceous
- sensitive fern (*Onoclea sensibilis*), other herbaceous

Community 1.2 Successional Community

Early successional forests recovering from a severe flood event or wind storm, will consist of a mix of deciduous tree seedlings and saplings including silver maple, ash, and willow. Canopy removal will increase light to the forest floor. Type and severity of the disturbance and the available seed sources will determine the initial post-disturbance community composition.

Dominant plant species

- black ash (*Fraxinus nigra*), tree
- silver maple (*Acer saccharinum*), tree
- willow (*Salix*), shrub
- dogwood (*Cornus*), shrub
- sedge (*Carex*), grass
- Virginia wildrye (*Elymus virginicus*), grass
- Canadian woodnettle (*Laportea canadensis*), other herbaceous
- Canadian clearweed (*Pilea pumila*), other herbaceous

Pathway 1.1A

Community 1.1 to 1.2

A natural disturbance event such as severe flooding or a windstorm will transition the community to an earlier successional stage.

Pathway 1.2A

Community 1.2 to 1.1

An absence of large-scale disturbances will allow the plant community to transition to a mature floodplain forest.

State 2

Logged State

Site disturbance due to anthropogenic activities such as logging or road construction. This disturbance removes all or part of the canopy and can introduce non-native species.

Dominant plant species

- glossy buckthorn (*Frangula alnus*), shrub
- honeysuckle (*Lonicera*), shrub
- reed canarygrass (*Phalaris arundinacea*), grass
- sedge (*Carex*), grass
- garlic mustard (*Alliaria petiolata*), other herbaceous
- Canadian woodnettle (*Laportea canadensis*), other herbaceous

Community 2.1

Logged Disturbed Community

This community is characterized by canopy removal/disturbance and the introduction and establishment of invasive species. Reed canarygrass and purple loosestrife are potential invasives. Wet Floodplains are highly susceptible to invasive plant species becoming established when logged.

Dominant plant species

- glossy buckthorn (*Frangula alnus*), shrub
- honeysuckle (*Lonicera*), shrub
- reed canarygrass (*Phalaris arundinacea*), grass
- sedge (*Carex*), grass
- garlic mustard (*Alliaria petiolata*), other herbaceous
- Canadian woodnettle (*Laportea canadensis*), other herbaceous

Transition T1A

State 1 to 2

Disturbance of site through anthropogenic activities such as road building and intensive logging. Soils disturbance and transported seed sources result in an introduction of invasive plant species.

Restoration pathway R2A

State 2 to 1

Restoration activities include forest stand management and eradication of non-native species.

Additional community tables

Inventory data references

No field plots were established for this project. 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. Future field verification will refine the plant communities described in this project.

References

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Approval

Suzanne Mayne-Kinney, 9/06/2024

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	09/06/2024
Approved by	Suzanne Mayne-Kinney
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:
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17. **Perennial plant reproductive capability:**
-