USDA Natural Resources Conservation Service

Ecological site F095XB002WI
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): 095X–Eastern Wisconsin, Northern Illinois, and Upper Michigan Drift Plain

This MLRA is characterized by nearly level to rolling till plains, outwash plains, drumlin fields, and glacial lake plains. It is used to produce cash crops, feed grain, and livestock. It includes the shorelines of Lake Winnebago and Lake Michigan. This area is in Wisconsin (85 percent), Illinois (10 percent), and Michigan (5 percent). It makes up about 17,255 square miles (44,690 square kilometers). This area is in the Central Lowland province of the Interior Plains. Most of the area is in the Eastern Lake section. A narrow strip along the southwestern edge of the area is in the Wisconsin Driftless section. The southwestern quarter is in the Till Plains section. The nearly level to rolling till plains, glacial lake plains, and outwash plains are mixed with drumlin fields, ground moraines, end moraines, flood plains, lake terraces, beaches, dunes, swamps, and marshes. Most of the southern part of this area has belts of morainic hills and ridges and nearly level outwash terraces. Drumlins are prominent features in the central part of the area. Glaciokarst topography occurs in the east-central parts of the area influenced by underlying Niagara Dolomite. Lakes and streams are numerous, and streams generally form a dendritic drainage pattern. Elevation ranges from 530 to 1,580 feet (160 to 480 meters). Local relief is mainly 25 feet (8 meters), but the moraines, drumlins, and bedrock escarpments rise 80 to 330 feet (25 to 100 meters) above the adjacent valleys.

The annual precipitation ranges from 28 to 37 inches (700 to 950 millimeters) with a mean of 33 inches (840 millimeters). The annual temperature ranges from 41 to 48 degrees F (5.1 to 9.2 degrees C) with a mean of 46 degrees F (7.7 degrees C). The freeze-free period ranges from 115 to 185 days with a mean of 155 days. It decreases in length from south to north and from the shore of Lake Michigan inland. Lake Michigan helps to moderate the climate of the area.

This MLRA is mostly covered with glacial drift of Wisconsin age. Some of the higher areas are moraines that appear as arc-shaped ridges representing the retreat of the ice from south to north. Most of the bedrock in the area consists of Silurian, Ordovician, and Cambrian sandstone, limestone, and dolomite. Some igneous and metamorphic rocks underlie the northwestern edge of the area. Devonian limestone and shale occur at the far eastern edge in the Milwaukee area.

The dominant soil orders in this MLRA are Alfisols, Entisols, Histosols, Mollisols, and Spodosols. The soils in the area dominantly have a mesic or frigid temperature regime, an aquic or udic moisture regime, and mixed mineralogy. They are very deep, excessively drained to very poorly drained, and sandy to clayey. Areas of Spodosols and soils with a frigid soil temperature regime occur in the northern part of the MLRA.
The northern part of this MLRA supports natural stands of mixed northern hardwoods and pine. Sugar maple, oak, white ash, elm, yellow birch, white pine, red pine, and American beech are the principal species. Low-lying areas support both mixed hardwoods and conifers. Elm, soft maple, black ash, and northern white cedar are the major species. Brush and sedge meadows also occur in the low-lying areas.

The southern part of this MLRA supports hardwoods and prairie vegetation. Uplands support natural stands of oak, sugar maple, and hickory, and natural prairie vegetation is characterized by little bluestem and big bluestem. Many of the prairies have scattered oak and hickory trees. Low-lying areas support sedge and grass meadows and mixed

stands of hardwoods and conifers. Elm, ash, eastern cottonwood, soft maple, and white cedar are the major species in the low-lying areas. (USDA-NRCS, 2022)

LRU notes

The Southern Wisconsin and Northern Illinois Drift Plain LRU (Land Resource Unit) (95XB) corresponds closely to the Central Sand Hills and Southeast Glacial Plains Ecological Landscapes. Some of the following brief overview is borrowed from the Wisconsin Department of Natural Resources Ecological Landscape publication (2015).

The Southern Wisconsin and Northern Illinois Drift Plain MLRA is found in southeast Wisconsin and extends into northern Illinois. The Wisconsin portion of this LRU is approximately 6.3 million acres (9,900 square miles). This LRU was entirely glaciated – mostly formed by the Green Bay and Lake Michigan Lobes of the Wisconsin Glaciation except the southern part, which was covered by an earlier glaciation. The landscape is dominated by till plains with drumlins, but also has large areas of outwash, pitted outwash, and glaciolacustrine deposits. The LRUcontains the Kettle Interlobate Moraine—the end moraine system formed where the Green Bay and Lake Michigan lobes met. The thickness of glacial deposits is typically less than 15 meters deep throughout the LRU, but the eastern portion can reach up to 60 meters thick. Nearly all the LRU is covered in a loess cap ranging from 1.2 meters (in the west) to 15 centimeters (in the east).

The northwest portion of LRU 95XB is part of the Central Sand Hills Ecological Landscape. The area from Portage County south through Marquette is dominated by till plains covered in outwash. The Green Bay Lobe deposited the till and created a morainal system along the west margin. The Johnstown moraine is the terminal moraine, but smaller, lateral moraines are also prominent on the landscape. As the glacier receded, meltwaters covered the intermorainal till plain with sand and gravel outwash sediments, sometimes covering blocks of ice. As the temperatures rose, the ice melted and collapsed the surface, creating an extensive area of pitted outwash. Till in this area is sandy and lacks dolomite found in other tills of this LRU. It may be hard to distinguish from the sandy outwash of the area. The rest of the northwest portion is dominated by till plains and glacial lake sediments. Glacial Lake Wisconsin covered a portion of this LRU, but the Lewiston Basin is the most significant glacial lake in this region. The Lewiston Basin formed when glacial meltwaters were impounded behind the Johnstown Moraine. Most of the lake drained after a catastrophic breach of an ice dam that supported it. The rest of this region is a till plain covered in a thin layer of loess. This till is a sandy loam with dolomite from the Niagara Escarpment. The till plain is covered with drumlins and bedrock-cored knolls and hills where the overlying till has been eroded. Wetlands are common in the low-lying outwash and the fine-textured lake sediments.

The central portion of this LRU is dominated by a rolling till plain covered in drumlins. Terminal and recessional moraines show the extent of the Green Bay Lobe. The topography of the moraines is hummocky because the supraglacial till was deposited unevenly along the ice margin and the surface collapsed after buried ice melted. Glacial lakes formed on the ice margin from ice dams, bedrock ridges, and moraines. Glacial Lakes Scuppernong and Yahara were two significant lakes that deposited clay and silty clay in deep basins. Meltwater streams deposited outwash sediments over some areas of the till plain, creating pockets of outwash and pitted outwash. The till deposited here is gravelly, clayey, and silty sand with dolomite pebbles.

The Kettle Interlobate Moraine is a unique and significant feature along the eastern border this LRU. The Kettle Moraine is a complex range of ridges and hills that formed by the end moraine systems where the Green Bay and Lake Michigan lobes met. The area ranges from 1 to 30 miles wide and landforms up to 300 feet in elevation. The area experienced massive volumes of meltwater from the two glacial lobes, which deposited primarily sand and gravel, but morainal till is also present. There are two distinct portions for the Kettle Moraine. The south potion formed as the lobes receded and deposited a series of level outwash fans between the lobes. Buried ice melted and parts of the fan collapsed to form kettles—round depressions on the surface that often fill with water to become lakes when the water table is near the surface. In the northern section, debris collected in the ice where the two lobes flowed together. As the glaciers receded, meltwaters deposited outwash materials on top of ice. As the ice melted, the surface collapsed and created a mixture of collapsed outwash and till materials. The till was in and beneath the buried ice.

West of the Kettle Moraine lies a landscape dominated by till plains with drumlins and areas of outwash formed by the Lake Michigan Lobe. Braided proglacial streams deposited outwash and pitted outwash plains. A small extent of lake plains is present. Wetlands are abundant because of impeded drainage from the underlying till and lake sediments.

The southern portion of this LRU is comprised of older glacial sediment deposited before the Wisconsin Glaciation. In the east lie broad, flat to rolling till plains. In the west, an eroded and dissected, hilly bedrock-controlled landscape is present; this area is similar in appearance to the Driftless region. Some low areas have outwash deposited by proglacial streams from Green Bay Lobe meltwater. In some areas in the west, dissolution of bedrock has created karst topography. There is a small extent of lake plain sediments.

Historically, the vegetation in this LRU was dominated in the northwest by oak forest and opening with interspersed marsh and sedge wetlands. The southern portion was dominated by oak and mesic forests with abundant wetlands. Black oak (Quercus velutina), white oak (Quercus alba), and bur oak (Quercus macrocarpa) were significant tree species in all of the LRU. There were also many areas of prairie, maple-basswood upland forest, and small areas of tamarack (Larix laricina), northern white-cedar (Thuja occidentalis), and black spruce (Picea mariana) in the lowlands. Conifers were not significant in this LRU. Wetlands covered up to 17% of land area.

Classification relationships

Relationship to Established Framework and Classification Systems:

Biophysical Settings (Landfire, 2014): This ES is largely mapped as Central Interior and Appalachian Swamp Forest, Central Interior and Appalachian Floodplain Forest, and Central Interior and Appalachian Herbaceous Wetlands

Habitat Types of N. & S. Wisconsin (Kotar, 2002, 1996): The sites of this ES keyed out to *Fraxinus nigra-Acer rubrum*-Impatiens-Ilex [FnArI-Ix], Acer saccharum – Tilia-Fraxinus/Caulophyllum (Osmorhiza) [ATiFrCa(O)], and Acer saccharum-Tilia-Fraxinus/Viburnum (Cornus) [ATiFrVb(Cr)]

WDNR Natural Communities (WDNR, 2015): This ES is most similar to the Southern Hardwood Swamp as described by the WDNR.

Hierarchical Framework Relationships:

Major Land Resource Area (MLRA): 095X–Eastern Wisconsin, Northern Illinois, and Upper Michigan Drift Plain

USFS Subregions: Central Wisconsin Moraines and Outwash (222Kb), South Central Wisconsin Prairie and Savannah (222Kd), Southern Green Bay Lobe (222Ke), Rock River Old Drift Country (222Kh)

DNR Ecological Landscapes: Southeast Glacial Plains

Ecological site concept

The Wet Floodplains ecological site occurs throughout LRU 95XB along rivers and streams. These sites are represented by a variety of soil components, most of which are hydric and poorly drained, but some are in drainage classes up to moderately well drained. These sites consist of various parent materials with the main driving force ecologically being their location within floodplains with seasonal, decadal, and longer periods of flooding. These sites receive water primarily through precipitation, runoff from adjacent uplands, groundwater discharge, and of course flooding. Most of these sites are wetlands.

These sites differ from the Mucky Swamps by virtue of a different flooding regime due to their adjacency to streams rather than being in depressions. Otherwise they may be similar in vegetation to Mucky Swamps.

Similar sites

F095XB001WI	**Mucky Swamp** Mucky Swamp consists of deep, herbaceous organic materials. They are very poorly drained and remain saturated throughout the year. The occur in landscape depressions and occupy the lowest points on their drainage sequences. Like some Wet Floodplains sites, these sites are wetlands.

F095XB003WI	**Wet and Moist Sandy Lowland** These sites consist of very deep, sandy materials, primarily glacial outwash. Some are underlain by finer-textured materials. They are very poorly to somewhat poorly drained. Like some Wet Floodplains sites, they vegetation tolerant of prolonged periods of wetness.
F095XB004WI	**Wet Loamy or Clayey Lowland** These sites consist of shallow to very deep, loamy to clayey deposits of various origin. They are sometimes underlain by sandy outwash. They are very poorly to poorly drained. Like some Wet Floodplains sites, they host vegetation tolerant of prolonged periods of wetness.

Table 1. Dominant plant species

Tree	(1) *Salix*
Shrub	(1) *Spiraea tomentosa*
Herbaceous	(1) *Carex*

Physiographic features

This site is found primarily on floodplains throughout the MLRA but may sometimes be found on landscape depressions (see Ecological Site Issues and Correlations section). Landform shape is concave or linear and sites are in the footslope or toeslope position. Slope ranges from 0 to 3 percent.

These sites are subject to both flooding and ponding. Inundation by water may last between 2 days to over a month. The apparent seasonally high water table (endosaturation) depth varies significantly. It's usually found within 6.5 feet (2 meters) of the surface but may be deeper in well-draining sites. Runoff potential ranges from low to high and is highest in soils with a silt loam surface.

Table 2. Representative physiographic features

Hillslope profile	(1) Footslope (2) Toeslope
Slope shape across	(1) Concave
Slope shape up-down	(1) Linear
Landforms	(1) Depression (2) Drainageway (3) Flood plain
Runoff class	Low to high
Flooding duration	Very brief (4 to 48 hours) to long (7 to 30 days)
Flooding frequency	None to frequent
Ponding duration	Brief (2 to 7 days) to very long (more than 30 days)
Ponding frequency	None to occasional
Elevation	705–1,001 ft
Slope	0–3%
Ponding depth	0–24 in
Water table depth	0–65 in
Aspect	Aspect is not a significant factor

Climatic features

The continental climate of MLRA 95B is typical of southern Wisconsin – cold winters and warm summers. The MLRA spans over 2 degrees of latitude, or about 150 miles. The lowest latitudes have warmer summers, warmer winters, and high precipitation rates. The growing season decreases from south to north and from the shores of the thermal mass of Lake Michigan inland.

This site occurs on landscape depressions and may have a microclimate with shorter freeze-free and frost-free periods than what is represented by the weather station data.
The average annual precipitation for this site is 35 inches. The average annual snowfall is 39 inches. The average annual maximum and minimum temperatures are 57oF and 36oF, respectively.

Table 3. Representative climatic features

Frost-free period (characteristic range)	124-132 days
Freeze-free period (characteristic range)	151-155 days
Precipitation total (characteristic range)	34-35 in
Frost-free period (actual range)	123-133 days
Freeze-free period (actual range)	149-157 days
Precipitation total (actual range)	31-37 in
Frost-free period (average)	128 days
Freeze-free period (average)	153 days
Precipitation total (average)	35 in

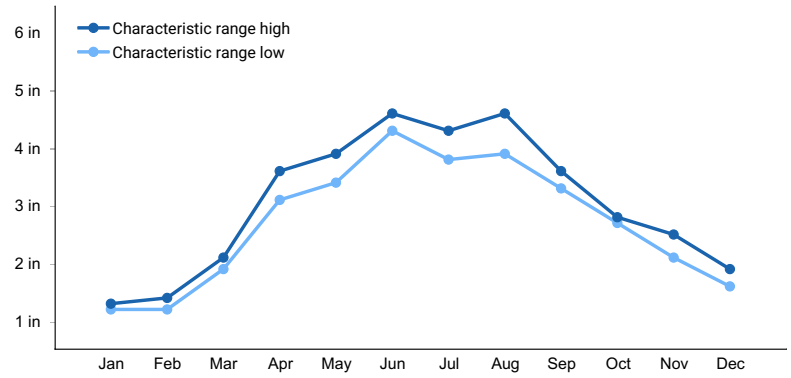


Figure 1. Monthly precipitation range

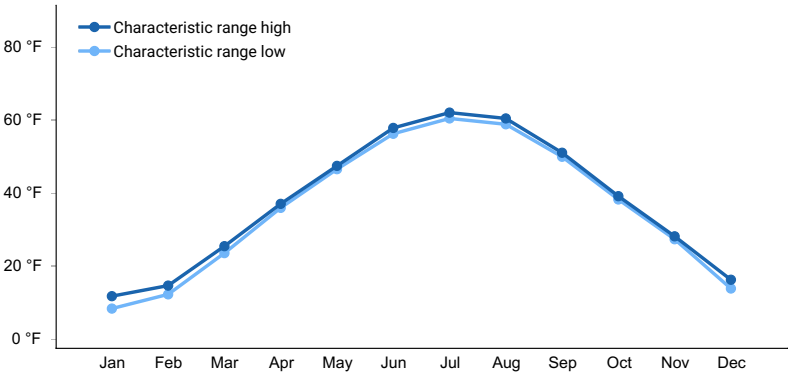


Figure 2. Monthly minimum temperature range

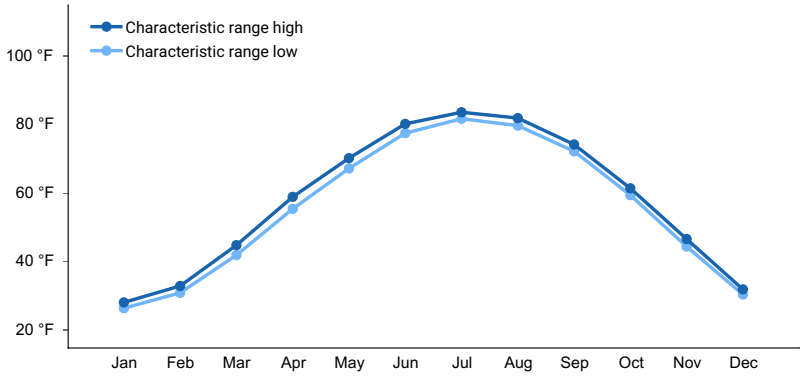


Figure 3. Monthly maximum temperature range

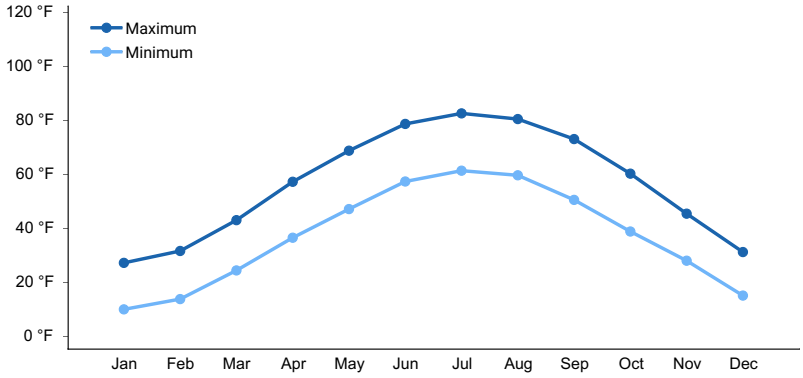


Figure 4. Monthly average minimum and maximum temperature

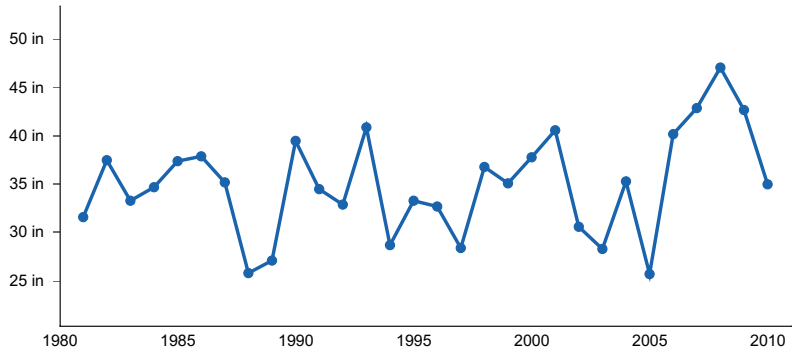


Figure 5. Annual precipitation pattern

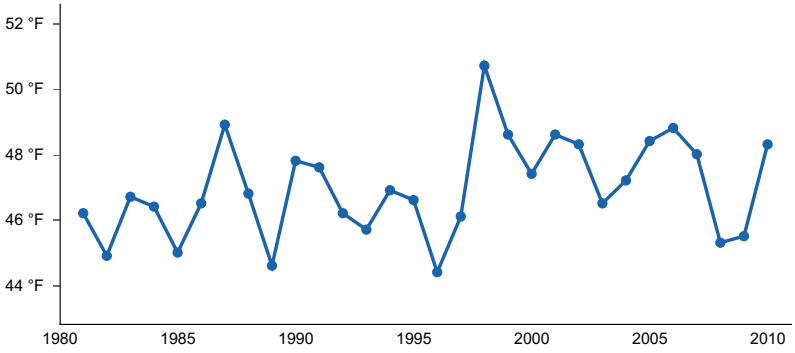


Figure 6. Annual average temperature pattern

Climate stations used

- (1) TOWN OF WESTFORD [USC00478540], Beaver Dam, WI
- (2) HORICON [USC00473756], Horicon, WI
- (3) RIPON 5 NE [USC00477209], Pickett, WI

- (4) CLINTON [USC00471667], Clinton, WI
- (5) MARENGO [USC00115326], Marengo, IL
- (6) MONROE 1 W [USC00475573], Monroe, WI
- (7) BROOKFIELD [USC00471062], Brookfield, WI

Influencing water features

Water is received primarily through precipitation, runoff from adjacent uplands, stream inflow, and groundwater discharge. Water levels are greatly influenced by rates of precipitation and runoff from upland sites. Water leaves the site primarily through stream outflow, subsurface outflow, runoff, evapotranspiration, and groundwater recharge. Some sites may be wetlands.

Frequent flooding from stream inflow is a significant factor in the ecological development of floodplain sites. The vegetation must be tolerant of frequent flooding that may persist for a month.

Wetland description

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 emergent, persistent, saturated

Under the Hydrogeomorphic Classification System (HGM), the wetlands can be classified as:
1) Depressional, forested/organic, or
2) Depressional, herbaceous/organic

Permeability of the soil is impermeable to moderately rapid. The hydrologic group of this site is B, C, A/D, B/D, or C/D.

Hydrogeomorphic Wetland Classification: Depressional, forested/organic; Depressional, scrub-shrub/organic

Cowardin Wetland Classification: PFO1B, PEM1B

Soil features

The soils of this site are represented by the Ackmore, Algansee, Elburn, Elvers, Huntsville, Mahalasville, Marshan, Maumee, Millington, Navan, Otter, Pistakee, Radford, and Wallkill series. Classifications include Endoaquolls, Hapludolls, Argiudolls, Fluvaquents, Udipsamments, Udifluvents, and Humaquepts.

These soils form in very deep, loamy or silty alluvial materials, sometimes underlain by organic materials, sandy outwash, or clayey lacustrine deposits. Some sites may have a loess mantle.

These soils are slightly acid to moderately alkaline. Presence of carbonates varies significantly but carbonates are generally absent in those soils underlain by organic material or sandy outwash. Subsurface fragments usually occupy less than 20 percent volume and are most common in soils underlain by outwash or lacustrine deposits. Soils are very poorly to moderately well drained. Soils with poorer drainage may meet hydric soil requirements and may be wetalnds.

Figure 7. Otter Soil Series sampled on 05/26/2020 in Dodge County, Wisconsin. Image courtesy of UWSP.

Table 4. Representative soil features

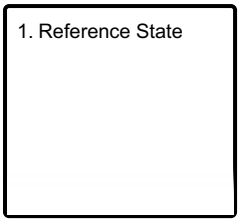
Parent material	(1) Alluvium (2) Outwash (3) Lacustrine deposits (4) Till (5) Loess (6) Herbaceous organic material
Surface texture	(1) Loamy sand (2) Sandy loam (3) Loam (4) Silt loam (5) Silty clay loam
Drainage class	Very poorly drained to moderately well drained
Permeability class	Moderately rapid
Soil depth	79 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-59.1in)	1.97–7.74 in
Calcium carbonate equivalent (0-39.4in)	0–20%
Soil reaction (1:1 water) (0-39.4in)	6.2–7.9
Subsurface fragment volume <=3" (0-39.4in)	0–56%
Subsurface fragment volume >3" (0-39.4in)	0–2%

Ecological dynamics

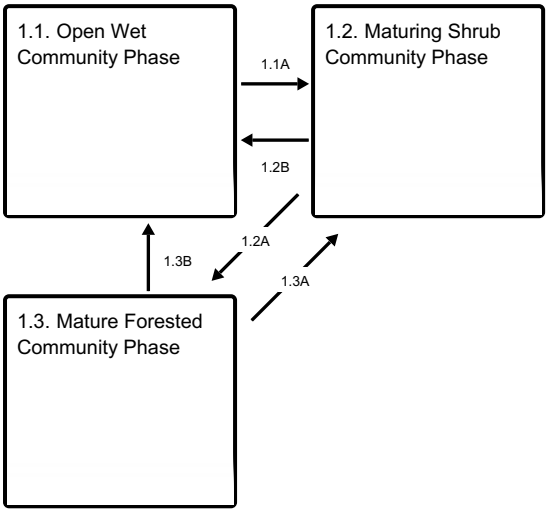
This ES can be characterized as a hydroperiod influenced ecosystem with vegetation ranging from southern wet meadow to shrub carr to Silver maple forest. As flooding is less frequent and of shorter duration the site will tend towards Silver maple forest. Phases that are flooded more frequently or for longer durations may be dominated by shrubs (Dogwoods and Tag and Speckled alder) or sedges if flooding is very prolonged. These sites are very similar to Mucky Swamps, but are more likely to be in phase 1.3 where Mucky Swamps might tend towards 1.1 and 1.2. A further difference is the operability for logging. This ES might allow logging in winter while in Muck Swamps it is quite unlikely. This difference in operability could be important for restoration after an emerald ash borer infestation.

State and transition model

Ecosystem states



State 1 submodel, plant communities



1.1A - Flooding frequency and duration decreases.

1.2B - Very infrequent flooding

1.2A - Flooding frequency and duration increase.

1.3B - Flooding frequency and duration increases dramatically

1.3A - Flooding frequency and duration increases moderately

State 1
Reference State

Reference State is a continuum of hydroperiod influenced vegetation where flooding frequency and duration drive vegetation communities. There are three distinct phases, each being stable within a window of hydroperiod variation. Sites on or near floodplains are most likely to be in phases 1.1 and 1.2 while sites farther from streams are more likely to be in phase 1.3. The higher the frequency and more prolonged the wetness the more likely the site will be a northern wet meadow 1.1 (dominantly sedges with sporadic willows and steeplebush). As wetness frequency and duration decreases the site will become a northern shrub thicket 1.2 and speckled alder (and tag alder) will appear and begin to dominate the vegetation. If a site has very low frequency flooding/ponding that is of short duration a Black ash/Silver maple forest will likely form 1.3. This forested state can be described by the Kotar Wetland Forest Habitat Types *Fraxinus nigra-Acer rubrum*-Impatiens-Ilex [FnArI-Ix].

Community 1.1
Open Wet Community Phase

Figure 8. Image courtesy of UWSP taken on 05/26/2020 in Dodge County, Wisconsin.

With frequent flooding and long durations of inundation this ES will exhibit as a northern wet meadow. The vegetation will be dominated by sedges and grasses with sporadic willows and steeplebush present. Willows can be quite extensive in these sites at times. As long as the hydroperiod is consistent this is a stable state. This phase may also include some isolated large shrubs or trees that persist from a previous phase with a different hydroperiod.

Dominant plant species

- willow (*Salix*), tree
- steeplebush (*Spiraea tomentosa*), shrub
- sedge (*Carex*), grass

Community 1.2
Maturing Shrub Community Phase

With moderate frequency of flooding with out very long durations of inundation a shrub thicket will form on these sites. The composition of the shrubs on these sites is often dominated by Dogwoods and Tag and/or Speckled alder but willow may occur as well. As long as the hydroperiod is consistent this is a stable state.

Dominant plant species

- willow (*Salix*), tree
- gray dogwood (*Cornus racemosa*), shrub
- gray alder (*Alnus incana*), shrub
- speckled alder (*Alnus incana ssp. rugosa*), shrub
- redosier dogwood (*Cornus sericea*), shrub

Community 1.3

Mature Forested Community Phase

Figure 9. Image courtesy of UWSP taken on 06/13/2020 in Green County, Wisconsin.

In the absence of frequent long duration flooding a wet forest community composed of Silver Maple will dominate these sites. Common associates may include Willows, Other maples (including Boxelder), Ashes. White cedar and Hemlock may occur sparsely. A shrub layer may be present in this community phase as well. The shrub layer is often composed of Dogwoods, but may contain various species.. Understory plant communities may be composed of many different species including sedges and grasses. Jewelweed and Rhibes are very common understory species.

Dominant plant species

- silver maple (*Acer saccharinum*), tree
- dogwood (*Cornus*), shrub
- sedge (*Carex*), grass
- jewelweed (*Impatiens capensis*), other herbaceous
- currant (*Ribes*), other herbaceous

Pathway 1.1A
Community 1.1 to 1.2

This transition represents a decrease in hydroperiod where flooding frequency and duration decrease enough for Dogwoods, Tag alder and Speckled alder to establish in what was previously open sedges with Steeplebush, and a few isolated Willows.

Pathway 1.2B
Community 1.2 to 1.1

This transition represents a decrease in hydroperiod where flooding frequency and duration decrease enough for Silver maple to establish and out compete Tag alder and Speckled alder. This ecosystem is stable with very

infrequent and/or short duration flooding. Understory species will shift to Jewelweed, sedges, and grasses. Sites where there is little deer browse may include White cedar and Hemlock as an associates.

Pathway 1.2A
Community 1.2 to 1.3

This transition represents an increase in the hydroperiod where flooding frequency and duration increase enough for Sedges to out compete Dogwoods and Tag alder and Speckled alder. This could be done as a restoration effort if hydroperiod is controllable or the stream channel is made narrower causing increased frequency of flooding.

Pathway 1.3B
Community 1.3 to 1.1

Mature Forested Community Phase **Open Wet Community Phase**

This transition represents a dramatic increase in the hydroperiod where flooding frequency and duration increase enough for Sedges to out compete Silver maple. This could be done as a restoration effort if hydroperiod is controllable or the stream channel is made narrower causing increased frequency of flooding.

Pathway 1.3A
Community 1.3 to 1.2

This transition represents an increase in the hydroperiod where flooding frequency and duration increase enough for Tag alder and Speckled alder to outcompete Silver maple.

Additional community tables

Inventory data references

Plot and other supporting inventory data for site identification and community phases is located on a NRCS North Central Region shared and one drive folder. University of Wisconsin-Stevens Point described soils, took photographs, and inventoried vegetation data at community phases within the reference state. The data sources include WI ESD Plot Data Collection Form - Tier 2, Releve Method, NASIS pedon description, NRCS SOI 036, photographs, and Kotar Habitat Types.

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Contributors

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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)	
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Date	05/01/2024
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:**

17. **Perennial plant reproductive capability:**