Ecological site R092XY005WI
Wet Floodplains

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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): 092X–Superior Lake Plain

The Wisconsin portion of the Superior Lake Plain (MLRA 92) corresponds very closely to the Superior Coastal Plain Ecological Landscape published by Wisconsin Department of Natural Resources (WDNR 2015). The following brief overview of this Ecological Landscape is borrowed from that publication. The Superior Coastal Plain is bordered on the north by Lake Supe¬rior and on the south by the Northwest Sands, Northwest Lowlands, and North Central Forest Ecological Landscapes. The total land area is approximately 12 million acres, which mostly consists of privately-owned forestland. The climate is strongly influenced by Lake Superior, resulting in cooler summers, warmer winters, and greater precipitation compared to more inland locations. The most extensive landform in this ecological landscape is a nearly level plain of lacustrine clays that slopes gently northward toward Lake Superior. The coastal plain is cut by deeply incised stream drainages and interrupted by the comparatively rugged Bayfield Peninsula.

During the Late Wisconsin glacial period, this area was covered with the advancing and retreating lobes of Superior and Chippewa. The landscape was rippled with moraines, but they were subdued by deposition of lacustrine materials. As the glaciers receded, glacial lakes riddled the landscape—most notably, Glacial Lake Duluth. The glacier receded eastward, exposing the western Lake Superior Basin. The ice covered the eastern basin, blocking the outlet of the lake, and continued to recede and contribute meltwaters. The deep, red clay was deposited during this period of glacial lakes. The meltwaters from the glacier also contained sands which deposited along the edge of the glacial lakes as beach deposits. Deep, narrow valleys have since been carved by rivers and streams flowing north into Lake Superior.

Historically, the Superior Coastal Plain was almost entirely forested. Various mixtures of eastern white pine (Pinus strobus), white spruce (Picea glauca), balsam fir (Abies bal¬samea), white birch (Betula papyrifera), balsam poplar (Popu¬lus balsamifera), quaking aspen (Populus tremuloides), and northern white-cedar (Thuja occidentalis) occurred on the fine-textured glacio-lacustrine deposits bordering much of the Lake Superior coast. Sandy soils, sometimes interlayered with clays, occur in some places. Such areas supported forests dominated by eastern white pine and red pine (Pinus resin¬osa). Eastern white pine was strongly dominant in some areas, according to mid-19th century notes left by surveyors of the federal General Land Office (Finley, R. 1976). Dry-mesic to wet-mesic north¬ern hardwoods or hemlock-hardwood forests were prevalent on the glacial tills of the Bayfield Peninsula. Large peatlands occurred along the Lake Superior shoreline, associated with drowned river mouths.

Classification relationships

Habitat Types of N. Wisconsin (Kotar, 2002): All sites in this ES key out to Fraxinus nigra – Abies balsamea / Impatiens capensis [FnAbI].

Biophysical Setting (Landfire, 2014): This is ES is mapped as as Eastern Boreal Floodplain, Boreal Acidic Peatland System, Laurentian – Acadian Alkaline Conifer – Hardwood Swamp, and Laurentian – Acadian Sub-boreal Mesic Balsam Fir-Spruce Forest. The ES is most similar to Eastern Boreal Floodplain.

WDNR Natural Communities (WDNR, 2015): This ES is most similar to Northern Hardwood Swamp.

USFS Subregions: Superior-Ashland Clay Plain Subsection (212Ya); May contain small areas of Ewen Dissected Lake Plain Subsection (212Jo), Winegar Moraines Subsection (212Jc), Gogebic-Penokee Iron Range Subsection (212Jb), and NorthShore Highlands Subsection (212Lb)*

Major Land Resource Area (MLRA): Superior Lake Plain (92)

Ecological site concept

Wet Floodplains have a small extent in MLRA 92. They occur scattered along the rivers and streams that flow into Lake Superior. These sites consist of poorly drained soils formed in loamy alluvium. They are palustrine wetlands that are saturated throughout the year and are subject to flooding and ponding. The year-round saturation of these sites is what differentiates this ES with Seasonally Dry Floodplains. This ES receives most of its water through stream overflow but remains saturated with poorly drained soils and the high groundwater table. Typical vegetation is mixed hardwoods and conifers, including black ash, American elm, northern white cedar, black cherry, and balsam fir. Ground flora includes ferns, marsh marigold, grasses, and sedges.

Similar sites

R092XY004WI	**Seasonally Dry Floodplains** These sites are moderately well to somewhat poorly drained soils that formed in sandy, loamy, or clayey alluvium. Sites are subject to brief periods of flooding throughout the growing season, but ponding is not common. Soils are located along rivers and experience flooding during stream overflow. Soils range from strongly acid to neutral. These sites are located near Wet Floodplains on the same landform. These sites have a coarser texture with more drainage, so they do not remain constantly saturated.
R092XY007WI	**Wet Loamy or Clayey Lowlands** These sites are poorly drained soils formed in loamy or clayey glaciofluvial and silty glaciolacustrine sediments. They have a seasonally high water table and remain saturated for much of the growing season, creating hydric conditions. HGM criteria: recharge, Depressional. These sites are located on different landforms, and do not remain saturated as long as Wet Floodplains.
R092XY002WI	**Mucky Swamps** The soils are different, but the vegetation is similar to Wet Sandy Lowlands.

Table 1. Dominant plant species

Tree	(1) *Fraxinus nigra* (2) *Abies balsamea*
Shrub	Not specified
Herbaceous	(1) *Impatiens capensis*

Physiographic features

This site occurs on active flood plains, back swamps, and meander scars located on alluvial plains of active streams flowing into Lake Superior. Landform shape is concave to linear. Elevation of the landforms range from 185 to 330 meters above sea level. Slopes are 0 to 1 percent.

Table 2. Representative physiographic features

Landforms	(1) Alluvial plain > Flood plain (2) Alluvial plain > Backswamp (3) Alluvial plain > Meander scar
Runoff class	Negligible
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Occasional to frequent

Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	Occasional to frequent
Elevation	185–330 m
Slope	0–1%
Ponding depth	0–15 cm
Aspect	Aspect is not a significant factor

Climatic features

The Wet Floodplain PESD has a wide geographic distribution throughout the entire MLRA, including on some of the Apostle Islands. It is located along streams that flow into Lake Superior, but in areas that remains connected to the groundwater, so it is wet most of the year. It has a similar spread as Seasonally Wet Floodplain PESD, but this PESD is found on the Apostle Islands, but is less common throughout the MLRA. The annual average precipitation is 29-33 inches, with a range of 56-167 inches of average snowfall. The annual average minimum temperatures range from 29-34oF, and the maximum temperatures range from 47-52oF. The freeze-free period ranges from 156-197 days, with an average of 173 days. The frost-free period ranges from 130-169 days, with an average of 147 days. This PESD has such wide distribution, so it has large ranges for climatic features. Since these sites are located on floodplains, they are subject to flooding, especially in spring with snow melt runoff, and intense thunderstorms throughout the summer.

Influencing water features

Water is received characteristically through stream overflow, but also through precipitation, runoff from adjacent uplands, stream inflow, and ground water discharge. Water is discharged from the site primarily through surface outflow, subsurface outflow, evapotranspiration, and ground water recharge. These sites are wetlands.

Permeability of the soil is moderately slow. Runoff is negligible. The hydrologic group of this site is D.

These sites are subject to rare to frequent flooding with duration of brief to long throughout the year. These sites are subject to occasional to frequent ponding for brief to long periods during the spring and fall with water depths up to 15 cm above the surface. Enough water will percolate into the soil resulting in an apparent seasonally high water table (endosaturation) that is at a depth of 0 to 76 cm throughout the year. Water within the soil is generally lost through subsurface outflow, along with plant uptake and evapotranspiration. There is a high potential for significant ground water recharge.

Wetland description

Under the Cowardin System of Wetland Classification, or National Wetlands Inventory (NWI), the wetlands can be classified as(PEM1E, PSS1B):
1) Palustrine, emergent, persistent, seasonally flooded/saturated, or
2) Palustrine, scrub-shrub, broad-leaved deciduous, seasonally flooded/saturated.
Under the Hydrogeomorphic Classification System (HGM), the wetlands can be classified as:
1) Riverine, emergent/loamy, or
2) Riverine, scrub-shrub/loamy.

Soil features

The soils of this site are represented by the Arnheim soil series. These soils are classified as Fluvaquents.

This ecological site is characterized by very deep, poorly drained soils formed in stratified loamy alluvium. These soils formed under saturated conditions throughout most of the year and meet the criteria for hydric soils.

Gravel, cobbles, and stones are typically absent. Soil reaction (pH) in the upper 100 cm is slightly acid. Carbonates are typically absent within 200 cm.

Table 3. Representative soil features

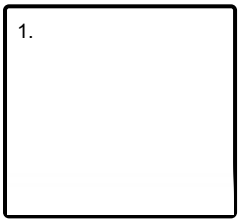
Parent material	(1) Alluvium
Surface texture	(1) Mucky silt loam
Drainage class	Poorly drained
Permeability class	Moderately slow
Soil depth	203 cm
Available water capacity (0-152.4cm)	15.75–16.26 cm
Soil reaction (1:1 water) (0-101.6cm)	6.2–6.4

Ecological dynamics

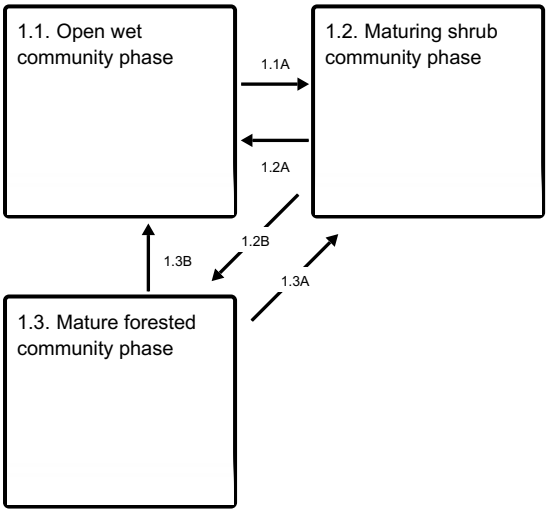
This ES can be characterized as a hydroperiod influenced ecosystem with vegetation ranging from northern wet meadow to northern shrub thicket to Black ash/Balsam fir forest. As flooding is less frequent and of shorter duration the site will tend towards Black ash – Balsam fir forest. Phases that are flooded more frequently or for longer durations may be dominated by shrubs (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

1.2A - Flooding frequency and duration increases

1.2B - Very infrequent flooding

1.3B - Flooding frequency and duration increases dramatically

1.3A - Flooding frequency and duration increases moderately

State 1

Community 1.1
Open wet community phase

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.

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 Tag and/or Speckled alder but willow may occur as well. As long as the hydroperiod is consistent this is a stable state.

Community 1.3
Mature forested community phase

In the absence of frequent long duration flooding a wet forest community composed of Black ash and Balsam fir will dominate these sites. Common associates may include Red maple, American elm, and White cedar. White cedar is

more common on these sites than on the similar phase in “Mucky Swamps”. Reproduction of Black ash is often very successful in these stands. A shrub layer may be present in this community phase as well. The shrub layer is often composed of Tag alder and Winterberry. Understory plant communities may be composed of many different species including sedges, grasses, and ferns. Dwarf raspberry and Touch-me-not are commonly present and skunk cabbage may be present if there is moving water (small streams). As long as flooding frequency and duration remain low this is a stable state.

Pathway 1.1A
Community 1.1 to 1.2

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

Pathway 1.2A
Community 1.2 to 1.1

This transition represents an increase in the hydroperiod where flooding frequency and duration increase enough for Sedges to out compete 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 1.2B
Community 1.2 to 1.3

This transition represents a decrease in hydroperiod where flooding frequency and duration decrease enough for Black ash and Balsam fir 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 Impatiens spp., sedges, and sometimes skunk cabbage. Sites where there is little deer browse may include White cedar as an associate.

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 Black ash and Balsam fir. 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 Black ash and Balsam fir.

Additional community tables

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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)	
Contact for lead author	
Date	05/18/2024
Approved by	Chris Tecklenburg
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:**