Ecological site F094BY008MI
Sandy Upland

Last updated: 11/16/2023
Accessed: 05/05/2024

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): 094B–Michigan Eastern Upper Peninsula Sandy Glacial Deposits

The Michigan Eastern Upper Peninsula MLRA (94B) corresponds closely with the Northwestern Sands Ecological Landscape. Some of the following brief overview is borrowed from the Wisconsin Department of Natural Resources ecological landscape publication (2015).

The Michigan Eastern Upper Peninsula MLRA is in northeast Wisconsin on the border of the Upper Peninsula of Michigan, with a very small portion on the Lake Michigan coast disjoined from the rest of the MLRA. The Wisconsin portion of the MLRA is a bit shy of 1.1 million acres (1,668 square miles). This region, which was covered entirely by the Green Bay Lobe in Wisconsin's most recent glaciation, has a unique glacial landscape defined by intermingled loamy moraines and sandy heads-of-outwash. Extensive pitted outwash plains dominate the region, with significant glaciolacustrine sediments in the southeast portion of this region.

A prominent landform in this MLRA is the hummocky ridges of intermingled loamy moraines and sandy heads-of-outwash that protrude from extensive pitted outwash plains. These north-south trending, loamy morainal ridges were deposited as the Green Bay Lobe was stagnant—the rate of melting was relatively equal to the rate of advancement. This stagnation allowed the deposition of a ridge of sandy loam materials. Supraglacial till was deposited unevenly, and buried ice blocks melted and collapsed the surface to form hummocky topography on the moraines. The heads-of-outwash formed while the ice was melting and thinning rapidly. Large amounts of sand and gravel outwash materials, and some till and loamy debris-flow sediment, were deposited on top of the thin edge of ice. They, too, have hummocky topography resulting from the collapse of buried ice. The topographically similar appearances of the moraines and heads-of-outwash make them difficult to distinguish superficially, but they are formed in different-textured materials and the vegetation divergence is often evident. These moraines and heads-of-outwash mark the western extent of the Green Bay Lobe and are sometimes referred to as the Athelstane Moraines.

As the Green Bay Lobe receded, meltwaters carried sand and gravel outwash sediments to lower-lying areas. The outwash buried broken ice that melted, collapsed the surface, and created extensive pitted outwash plains that occur between the high elevation moraines and heads-of-outwash. More than 50% of this land region is covered in outwash sediments, and most of the outwash is pitted or collapsed.

The southeast portions of this MLRA are dominated by glacial lake sediments. Glacial Lake Oshkosh covered a portion of this MLRA when it was at its largest extent (1.4 million acres). The lake deposited silts and clays along the southeast portion of the inland section of this MLRA. Beach terraces, ridges, and dunes were also formed by the lake. In the Lake Michigan coastal section of this MLRA, Glacial Lake Nipissing deposited a level lake plain full of sandy lacustrine material that overlies dolomite and limestone bedrock. Glacial Lake Nipissing was a postglacial lake that occurred in the Lake Michigan Basin as the Lake Michigan Lobe was receding. Wetlands are abundant in this area of the MLRA. In the north section, Glacial Lake Dunbar formed when ice dams impounded glacial meltwater between the Athelstane Moraine and the Inner Athelstane Moraine. This glacial lake deposited small areas of level sandy lacustrine materials.

The northeast section of this MLRA is a till plain that formed in later advances of the Green Bay Lobe. Some pitted outwash is present, but the till plain is much more exposed here than elsewhere in the MLRA. The till deposited throughout 94B is primarily sandy, dolomitic till. The dolomite was scraped off the Niagara Escarpment as the Green Bay Lobe moved across it. In some areas, the carbonates are deeply leached.

Historically, this MLRA was dominated by a mixture of northern hardwood forests, Jack pine-scrub oak barrens, and forested coniferous wetlands at 30%, 29%, and 20%, respectively. White pine (Pinus strobus) and red pine (Pinus resinosa) were dominant tree species and covered an estimated 15% of the area. Northern hardwood forests were dominated by eastern white pine, eastern hemlock (Tsuga canadensis), and American beech (Fagus grandifolia). The Jack pine-scrub oak barrens were dominant in the sandy portions of this MLRA. Forested coniferous wetlands were occupied by norther white-cedar (Thuja occidentalis), black spruce (Picea mariana), and tamarack (Larix laricina).

Classification relationships

Relationship to Established Framework and Classification Systems:

Habitat Types of N. Wisconsin (Kotar, 2002): Pinus-Acer/Vaccinium-Aralia, Viburnum variant (PArVAa-Vb), Pinus-Acer/Vaccinium-Apocynum (PArVAo)

Biophysical Settings (Landfire, 2014): Laurentian-Acadian Northern Hardwoods Forest, Laurentian Jack Pine-Red Pine Forest, Laurentian Oak Barrens, Laurentian-Acadian Northern Oak Forest, Laurentian-Acadian Sub-boreal Aspen-Birch Forest

WDNR Natural Communities (WDNR, 2015): Northern Dry-Mesic Forest

Hierarchical Framework Relationships:

Major Land Resource Area (MLRA): Michigan Eastern Upper Peninsula MLRA (94B)

USFS Subregions: Athelstane Sandy Outwash and Moraines (212Tc), Green Bay Sandy Lake Plain (212Te)

Wisconsin DNR Ecological Landscapes: Northeast Sands, Northern Lake Michigan Coastal

Ecological site concept

The Sandy Upland ecological site accounts for approximately 203,000 acres in MLRA 94B, or about 19.5% of total land area. It is the second-most extensive site in MLRA 94B. It is found on sandy outwash plains, lake plains, and moraines throughout the MLRA.

These sites are characterized by moderately well to somewhat excessively drained, sandy soils. Precipitation, runoff from adjacent uplands, and groundwater discharge are the primary sources of water. Soils are extremely acid to moderately alkaline.

Associated sites

F094BY001MI	**Poor Fen** Poor Fens occupy landscape depressions and drainageways. They form in deep, herbaceous organic deposits and are very poorly drained. These sites have limited interaction with groundwater and are very acidic (dysic). They occupy the lowest, wettest positions along the same drainage sequence as Sandy Upland.
F094BY004MI	**Wet Sandy Lowland** Wet Sandy Lowland are wetland sites that occupy landscape depressions in sandy landscapes, often sandy pitted outwash plains. They are poorly drained. They occupy the lower, wetter positions along the same drainage sequence as Sandy Upland.

F094BY006MI	**Moist Sandy Lowland** Moist Sandy Lowland are found in lower landscape positions on outwash plains. They are somewhat poorly drained. They occupy the lower, wetter positions along the same drainage sequence as Sandy Upland.
F094BY011MI	**Dry Upland** Dry Upland are found in upland landscape positions on outwash plains and stream terraces. They are excessively drained. They occupy the highest, driest positions along the same drainage sequence as Sandy Upland.

Similar sites

F094BY011MI	**Dry Upland** Like Sandy Upland, Dry Upland are found in upland landscape positions on outwash plains and stream terraces. These sites are very similar to Sandy Upland except they are excessively drained.
F094BY009MI	**Loamy Upland** Loamy Upland are found on moraines, lake plains, and outwash plains. They are moderately well to somewhat excessively drained. They occupy similar position on the landscape as Sandy Upland but have finer soil textures and a higher nutrient status.
F094BY010MI	**Clayey Upland** Clayey Upland are found on moraines, drumlins, and lake plains. They are moderately well to well drained. They occupy similar position on the landscape as Sandy Upland but have finer soil textures.

Table 1. Dominant plant species

Tree	(1) *Pinus strobus* (2) *Quercus rubra*
Shrub	(1) *Prunus serotina* (2) *Corylus*
Herbaceous	(1) *Eurybia macrophylla* (2) *Pteridium*

Physiographic features

This extensive site is predominantly found in the pitted outwash plains that dominate this MLRA. It may also be found on stream terraces, sandy lake plains, and in sandy till deposits in upper landscape positions. Slopes range from 0 to 35 percent.

This site is subject to neither flooding nor ponding. The apparent seasonally-high water table (endosaturation) is usually found below 24 inches (60 cm). Nearly 90% of sites have a seasonally-high water table below 51 inches (130 cm). A few sites in southeastern Florence county have evidence of a seasonally-high water table as high as 12 inches (30 cm). These sites have subsoil horizons composed of silty till. Runoff potential is generally negligible to low, but may be medium, high, or very high in sites that have silty surface horizons on steeper slopes.

Table 2. Representative physiographic features

Slope shape across	(1) Linear
Slope shape up-down	(1) Convex
Hillslope profile	(1) Summit (2) Shoulder (3) Backslope
Landforms	(1) Outwash plain (2) Stream terrace (3) Lake plain (4) Flat (5) Moraine (6) Esker
Runoff class	Negligible to very high

Flooding frequency	None
Ponding frequency	None
Elevation	610–975 ft
Slope	0–35%
Water table depth	12–80 in
Aspect	Aspect is not a significant factor

Climatic features

The continental climate of the Michigan Eastern Upper Peninsula MLRA is typical of northern Wisconsin: cooler summers, colder winters, and shorter growing seasons.

Table 3. Representative climatic features

Frost-free period (characteristic range)	98-114 days
Freeze-free period (characteristic range)	123-144 days
Precipitation total (characteristic range)	30-32 in
Frost-free period (actual range)	91-123 days
Freeze-free period (actual range)	122-149 days
Precipitation total (actual range)	30-33 in
Frost-free period (average)	106 days
Freeze-free period (average)	129 days
Precipitation total (average)	31 in

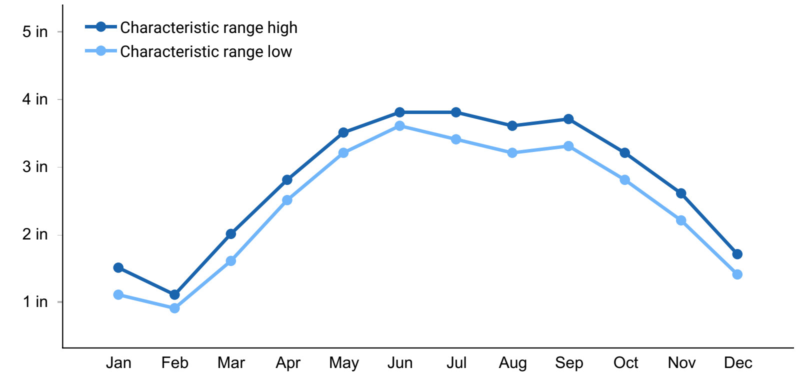


Figure 1. Monthly precipitation range

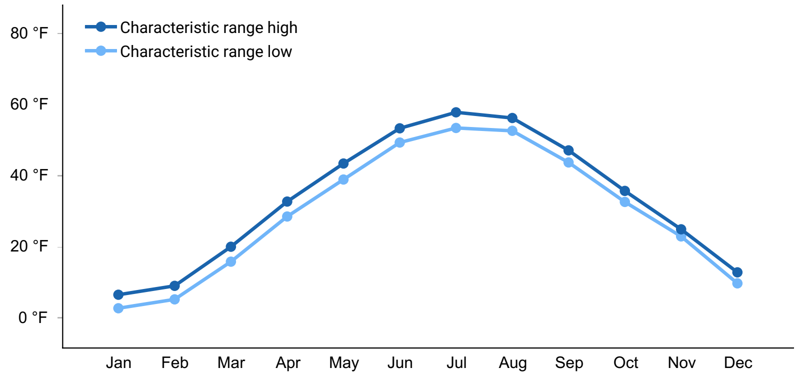


Figure 2. Monthly minimum temperature range

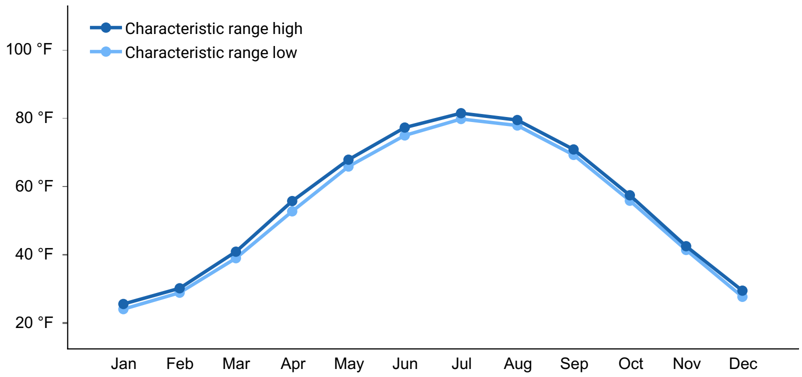


Figure 3. Monthly maximum temperature range

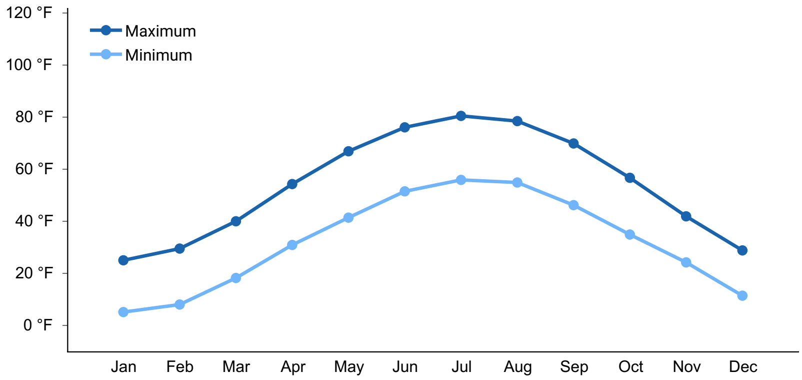


Figure 4. Monthly average minimum and maximum temperature

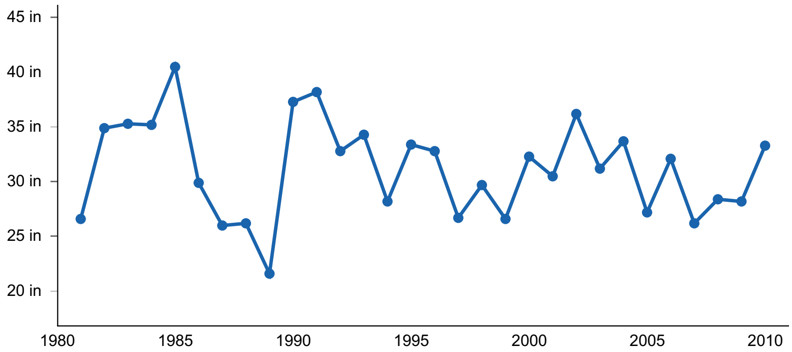


Figure 5. Annual precipitation pattern

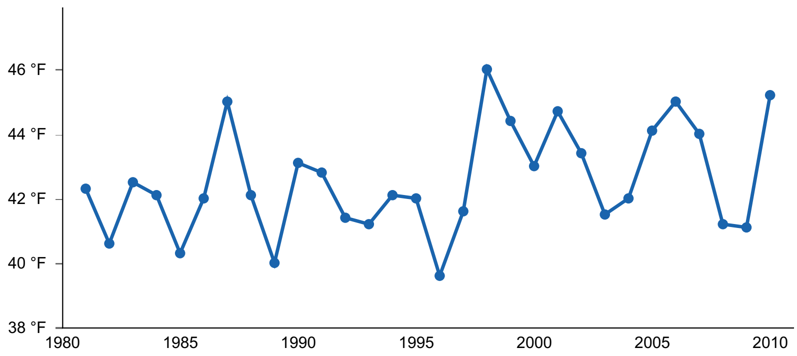


Figure 6. Annual average temperature pattern

Climate stations used

- (1) CRIVITZ HIGH FALLS [USC00471897], Crivitz, WI
- (2) PESHTIGO [USC00476510], Peshtigo, WI
- (3) SHAWANO 2SSW [USC00477708], Shawano, WI

- (4) SURING [USC00478376], Suring, WI
- (5) STEPHENSON 5WSW [USC00207867], Stephenson, MI
- (6) LAKEWOOD 3 NE [USC00474523], Lakewood, WI
- (7) MARINETTE [USC00475091], Menominee, WI

Influencing water features

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

Wetland description

Permeability of these sites is very slow to rapid, or impermeable where bedrock or fine subsurface textures perch the water table.
Hydrologic Group: A, B
Hydrogeomorphic Wetland Classification: None
Cowardin Wetland Classification: None

Soil features

The soils of this site are represented by the Cress, Crex, Cromwell, Croswell, Cublake, Ishpeming, Karlin, Keweenaw, Mancelona, Manistee, Menominee, Morganlake, Neconish, Noseum, Pence, Rousseau, Tourtillotte, and Wurtsmith soil series. Haplorthods make up 96% of the acreage of this site. Udipsamments and Dystrudepts make up the remaining acreage and can be found in Menominee county.

These sites primarily form in sandy outwash deposits, sometimes underlain by loamy to clayey lacustrine materials or till, and sometimes with a veneer of loamy outwash or alluvium. Some sites may form in eolian (wind-blown) sands or sandy lacustrine deposits. Soils are moderately deep to very deep. They are moderately well to somewhat excessively drained and do not meet hydric soil requirements.

The surfaces of these soils are sand to sandy loam. Subsurface horizons will primarily be sand or loamy sand but may have textures as fine as clay. Small fragments (gravel) may occupy up to 25 volume of the substratum. Soils are extremely acid to moderately alkaline. Accumulations of secondary carbonates are found in many sites in the eastern half of this MLRA. They may occupy up to 18 percent volume and start at depths as high as 28 inches.

Figure 7. Rousseau Soil Series sample taken in Marinette County, WI on 06/26/2020. Courtesy of UWSP.

Table 4. Representative soil features

Parent material	(1) Outwash (2) Lacustrine deposits (3) Alluvium (4) Till (5) Eolian deposits
Surface texture	(1) Sand (2) Loamy sand (3) Sandy loam
Drainage class	Moderately well drained to somewhat excessively drained
Permeability class	Very slow to rapid
Soil depth	27–80 in
Surface fragment cover <=3"	0–8%
Surface fragment cover >3"	0–2%
Available water capacity (0-60in)	3–8.6 in
Calcium carbonate equivalent (0-40in)	0–18%
Soil reaction (1:1 water) (0-40in)	4.2–7.9
Subsurface fragment volume <=3" (Depth not specified)	0–25%
Subsurface fragment volume >3" (Depth not specified)	0–7%

Ecological dynamics

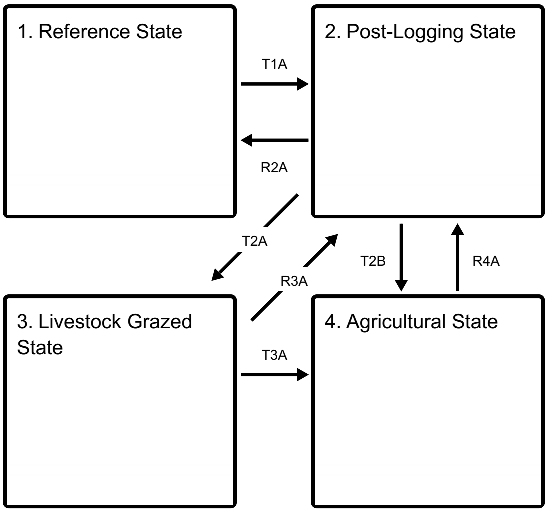
Perhaps the most important ecological characteristic of this Ecological Site, in terms of its influence on forest community dynamics, is its lack of capacity to support the high to moderate soil moisture and nutrient requiring species such as sugar maple, basswood and white ash, the shade-tolerant species, that typically dominate the more productive sites throughout Wisconsin.

In pre-European settlement time wild fire was the main controlling factor of forest community dynamics. Following a severe, stand-replacing fire, any of the species present on the landscape could become established, depending on seed source availability and specific conditions of post-fire seedbed. The newly established young stands of any species were easily eliminated by recurring fires, but differences in fire-resisting properties among the species began to play a role in any species' survival success. White pine is best adapted for long-term success on this Ecological Site. Although vulnerable to damage or elimination by fire in early life it eventually develops thick fire-resistant bark which helps to extend its longevity, in some cases for up to four centuries or more. These survival properties assure the species' relatively continuous seed source in the region as a whole. White pine is also moderately shade-tolerant in early life which means that it can become established in some pioneer communities, such as aspen – white birch stands, or in poorly stocked oak and red maple dominated communities. Red pine had in the past been a common associate of white pine stands. It shares some of the fire-resisting properties of white pine, but it lacks shade-tolerance and does not become established in the understory. For this reason, it has not maintained its presence in current stands and its seed source has been greatly reduced throughout its natural range following the unset of fire suppression.

Red maple has not been identified by Finley (1976) as an important component of pre-settlement pine or oak forests, but it is a prominent member in current stands. Absence of fire since the original logging era is probably the main reason. Red maple is extremely sensitive to fire, but is a prolific and early seed producer. Stems of 2-4 inches in diameter can produce large amounts of seed (USDA For. Serv. 1990). It is sufficiently shade-tolerant to become established in the understories of most communities on sandy soils. On this Ecological Site it behaves similarly to white pine, but because of its much smaller size at maturity, it does not compete with white pine in the upper canopy

State and transition model

Ecosystem states



T1A - Clear cutting or stand-replacing fire.

R2A - Disturbance-free period 70+ years.

T2A - Grazing by livestock.

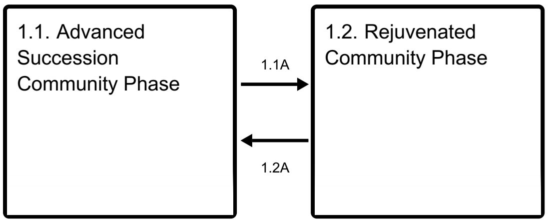
T2B - Removal of forest vegetation and tilling.

R3A - Removal of livestock grazing.

T3A - Removal of forest vegetation and tilling.

R4A - Cessation of agricultural practices, natural or artificial afforestation.

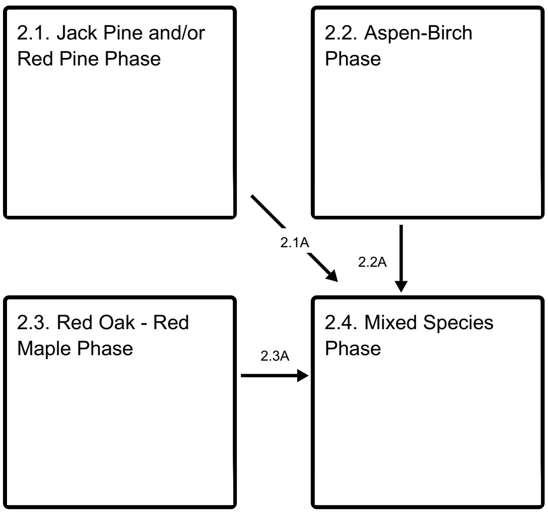
State 1 submodel, plant communities



1.1A - Light to moderate intensity fires, blow-downs, snow-ice breakage.

1.2A - Disturbance-free period 30+ years.

State 2 submodel, plant communities



2.1A - Immigration and establishment of white pine and red maple.

2.2A - Immigration and establishment of white pine and red maple.

2.3A - Immigration and establishment of white pine and red maple.

State 3 submodel, plant communities

3.1. Livestock Grazed Forest Phase

State 4 submodel, plant communities

4.1. Crop Production

State 1
Reference State

In absence of stand-leveling disturbances the Reference State Community oscillates between two easily definable community phases, a mature, or late successional, community phase and a rejuvenated community phase.

Community 1.1
Advanced Succession Community Phase

A mature forest community contains a super-canopy, or a scattering, of large white pine trees. In pre-European settlement time such trees would have been anywhere from 80 to more than 300 years old (Sterns, 1950). Common associates have been red pine (P. resinosa), red oak (Q. rubra) and white oak (Q. alba). However, only white pine and white oak are moderately shade-tolerant and able to reproduce in small canopy openings and remain as permanent members of mature community in absence of moderate to severe disturbance. Red maple (*Acer rubrum*) had not been an important species in pre-settlement forests, but is today the most successful reproducing tree species in forest communities on this Ecological Site.

Dominant plant species

- eastern white pine (*Pinus strobus*), tree
- northern red oak (*Quercus rubra*), tree
- red maple (*Acer rubrum*), tree
- black cherry (*Prunus serotina*), shrub
- hazelnut (*Corylus*), shrub
- bigleaf aster (*Eurybia macrophylla*), other herbaceous
- brackenfern (*Pteridium*), other herbaceous

Community 1.2
Rejuvenated Community Phase

The canopy of the rejuvenated community is still dominated by original species, but the understory now also includes a well established younger cohort and perhaps a few additional seedlings and saplings of less shade tolerant species.

Dominant plant species

- eastern white pine (*Pinus strobus*), tree
- northern red oak (*Quercus rubra*), tree
- red maple (*Acer rubrum*), tree
- black cherry (*Prunus serotina*), shrub

- hazelnut (*Corylus*), shrub
- bigleaf aster (*Eurybia macrophylla*), other herbaceous
- brackenfern (*Pteridium*), other herbaceous

Pathway 1.1A
Community 1.1 to 1.2

Light intensity fires, crown breakage from ice and snow and small scale blow-downs create canopy openings, releasing advance regeneration and stimulating new seedling establishment. Some additional less shade tolerant species such as red oak may be able to enter the community.

Pathway 1.2A
Community 1.2 to 1.1

A long period without major canopy disturbance allows gradual replacement of oldest canopy trees by younger cohorts. Small scale disturbances may still occur periodically, but once second or third canopies are established there is minimal new regeneration taking place and the forest gradually returns to mature state.

State 2
Post-Logging State

Post-logging state may consist of considerable diversity of pioneer and mid-successional community phases. Here we are describing four, most commonly found under current conditions.

Community 2.1
Jack Pine and/or Red Pine Phase

Jack pine and red pine have historically been almost entirely dependent on fire for regeneration. Jack pine is a predominantly a northern species and in southern part of Wisconsin seldom approaches its growth potential. Everywhere it occurs it is a pronounce pioneer, highly light demanding and resistant to drought and frost. It has low requirements for soil organic matter and nutrients. It is a prolific producer of seed and it often colonizes burnt over areas. Forest fires speed natural regeneration by opening the cones. However, today, jack pine is regenerated mostly by planting. Without disturbance jack pine does not regenerate and is readily succeeded by various species, even those of only moderate shade tolerance, such as white pine and red oak. Historically, red pine has often occurred in mixtures with jack pine. In terms of light, soil moisture and nutrient requirements it is intermediate between jack and white pines. In contrast to jack pine, natural red pine regeneration is often found in moderately dense pure or mixed pine stands, although not to the same extent as is white pine. Under current ecological and economic conditions red pine is regenerated almost entirely by planting.

Dominant plant species

- jack pine (*Pinus banksiana*), tree
- red pine (*Pinus resinosa*), tree

Community 2.2
Aspen-Birch Phase

Although a ubiquitous species, quaking aspen (*Populus tremuloides*) is far more characteristic of northern rather than southern forest regions. Its most notable ecological characteristic is the ability to rapidly invade cut-over and burned-over areas. However, its perpetuation depends entirely on recurrence of disturbance. Because of its extreme intolerance to shade, it is readily replaced by many tree species in the absence of disturbance. Once in place, aspen reproduces entirely by sprouting from extensive, superficial root systems (root suckering). Most aspen stands on this Ecological Site resulted from sprouting following clear cutting of mixed stands of pine and/or oak, in which some aspen trees were still present. Paper birch (*Betula papyrifera*) is often a member of aspen stands. It shares aspen's intolerance of shade and also produces small, winged seeds that readily disperse by wind. It does not sucker from root sprouts, but it readily sprouts from stumps upon clear cutting. It also has greater ability than does aspen of reproducing from seed under favorable seedbed conditions and in presence of large canopy openings. However in absence of disturbance it also succeeds to other species.

Dominant plant species

- quaking aspen (*Populus tremuloides*), tree
- birch (*Betula*), tree

Community 2.3
Red Oak - Red Maple Phase

Figure 8. Photo courtesy of UWSP taken on 06/28/2020 in Marinette County, WI.

This community phase occurs by invading and succeeding a pioneer aspen-birch community. Stand structure consists of dominant red oak and red maple in combination with a modest, or strong presence of mature, or decaying, aspen and/or paper birch. The shrub layer, dominated by beaked hazelnut (*Corylus cornuta*), typically reaches its best development in this community phase.

Dominant plant species

- northern red oak (*Quercus rubra*), tree
- red maple (*Acer rubrum*), tree

Community 2.4
Mixed Species Phase

Figure 9. Photo courtesy of UWSP taken on 06/26/2020 in Oconto County, WI.

This community phase is considered a mid-successional community between the pioneering communities 2.1, 2.2, 2.3 and the Reference State. The community is characterized by canopy dominance of any of the early - succession species (i.e.: oaks, aspen - birch, jack pine) and strong presence in the understory of white pine and/or red maple seedlings and saplings.

Dominant plant species

- oak (*Quercus*), tree
- quaking aspen (*Populus tremuloides*), tree
- birch (*Betula*), tree
- jack pine (*Pinus banksiana*), tree

Pathway 2.1A
Community 2.1 to 2.4

Immigration and establishment of relatively shade tolerant white pine and red maple into shade – intolerant communities of aspen – birch, oaks or jack pine.

Pathway 2.2A
Community 2.2 to 2.4

Immigration and establishment of relatively shade tolerant white pine and red maple into shade – intolerant communities of aspen – birch, oaks or jack pine.

Pathway 2.3A
Community 2.3 to 2.4

Red Oak - Red Maple Phase

Mixed Species Phase

Immigration and establishment of relatively shade tolerant white pine and red maple into shade – intolerant communities of aspen – birch, oaks or jack pine.

State 3
Livestock Grazed State

Indefinite period of applying agricultural practices. Cropping systems vary on these sites and likely include tillage, row crops, hay or pasture, and specialty crops.

Community 3.1
Livestock Grazed Forest Phase

This community phase is characterized as an open woodland where grazing has diminished the number and coverage of trees and grasses and forbs now compose the majority of the understory. Persistence in this phase may eventually lead to pasture type conditions as trees mature and die without regeneration.

State 4
Agricultural State

Community 4.1
Crop Production

This community phase is characterized by row crop production using tillage and potentially irrigation. In some instances there may be hay production or permanent pasture as well.

Transition T1A
State 1 to 2

Clear cutting with initial control of competing vegetation, or stand-replacing fire, prepare the site for occupancy by shade intolerant species. This may occur through natural regeneration or by planting.

Restoration pathway R2A
State 2 to 1

A period of some 70-100 years without major stand disturbance, especially fire, leads to decreased presence, through natural mortality, of early successional species and the dominance of relatively shade tolerant white pine and sub-canopy of red maple, returning the community to Reference State.

Transition T2A
State 2 to 3

Introduction of grazing by livestock. Livestock remove and trample most of the regenerating trees, shrubs, and understory plants leading to the establishment of grasses and forbs.

Transition T2B
State 2 to 4

Removal of forest vegetation for agricultural crop production. Includes plowing, tilling, and irrigation.

Restoration pathway R3A

State 3 to 2

Removal of livestock grazing. As long as grazing was not present for too great a length of time the understory plants may recover and return to the site. Grasses are likely to persist and out compete the native understory plants until the canopy is closed.

Transition T3A
State 3 to 4

Removal of forest vegetation for agricultural crop production. Includes plowing, tilling, and irrigation.

Restoration pathway R4A
State 4 to 2

Cessation of agricultural practices, natural or artificial afforestation. Process of afforestation is likely to take over 100 years to reach the reference state.

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 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
Habitat Types of N. Wisconsin (Kotar, 2002): Pinus-Acer/Vaccinium-Aralia, Viburnum variant (PArVAa-Vb), Pinus-Acer/Vaccinium-Apocynum (PArVAo)
Biophysical Settings (Landfire, 2014): Laurentian-Acadian Northern Hardwoods Forest, Laurentian Jack Pine-Red Pine Forest, Laurentian Oak Barrens, Laurentian-Acadian Northern Oak Forest, Laurentian-Acadian Sub-boreal Aspen-Birch Forest
WDNR Natural Communities (WDNR, 2015): Northern Dry-Mesic Forest

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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	05/05/2024
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:**