Ecological site F094DY009WI
Wet Sandy Drainageways

Accessed: 04/18/2024

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.

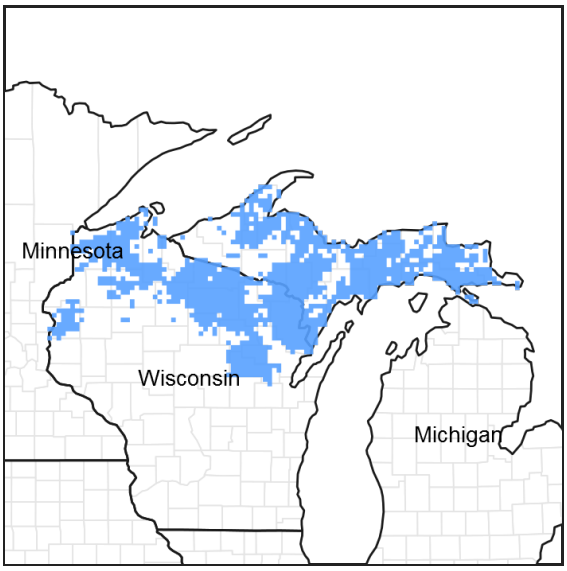


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 094D–Northern Highland Sandy Pitted Outwash

MLRA 94D, the Northern Highland Sandy Drift, comprises 1.346 million acres of outwash plains, sandy moraines, wetlands and numerous water bodies (large lakes, small ponds, large rivers, small streams and flowages of all sizes). The Wet Sandy Drainageways ecological site comprises about 30,000 acres in MLRA 94D.

Classification relationships

The Wet Sandy Drainageways ecological sites correlate to the ArAbVC habitat type developed by Kotar et al (2002); this habitat type is named after Acer rubrum (red maple)-Abies balsamea (balsam fir)/Vaccinium angustifolium (low-bush blueberry)-Coptis trifolia (goldthread). These species have very high constancy value relative to this site, i.e. they are present on a higher percentage of these sites than other species. This ecological site has a wet-mesic moisture regime and is poor in nutrients.

Ecological site concept

ATTENTION: This ecological site meets the NESH 2014 requirements for PROVISIONAL. A provisional ecological site is established after broad ecological site concepts are identified and an initial state-and-transition model is drafted. Following quality control and quality assurance reviews of the ecological site concepts, an identification number and name for the provisional ecological site are entered into ESIS. A provisional ecological site may include

literature reviews, land use history information, some soils data, legacy data, ocular estimates for canopy and/or species composition by weight, and even some line-point intercept information. A provisional ecological site does not meet the NESH 2014 standards for an Approved ESD, but does provide the conceptual framework of soil-site correlation for the development of the ESD. For more information about this ecological site, please contact your local NRCS office.

The Wet Sandy Drainageway ecological sites are of intermediate wetness. The soils are somewhat poorly drained, but they are not hydric. The plant communities have some wetland species, but no obligate wetland species. In other words, like the slightly drier Sandy Terraces and Plains ecological site, this site occupies the zone between wetlands and uplands where its characteristics are affected by a seasonal high water table that drains rapidly and frequent groundwater flowthrough events. The site is more species rich and more productive than the other sandy ecological site because of this wet-mesic moisture regime.

Associated sites

F094DY010WI	**Wet Sandy Depressions** Wet Sandy Depressions are common within larger Wet Sandy Drainageways.

Table 1. Dominant plant species

Tree	(1) *Acer rubrum* (2) *Abies balsamea*
Shrub	(1) *Corylus cornuta* (2) *Vaccinium myrtilloides*
Herbaceous	(1) *Clintonia borealis* (2) *Trientalis borealis*

Physiographic features

The Wet Sandy Drainageways ecological site is found on low gradient swales and toeslopes that often drain to deeper depressions and on low-lying flats that are not quite wet enough to be wetlands . In other words, these sites are low enough on the landscape to function as collection and transmission zones for soil water but the area these sites collect from is not large enough to completely swamp the sites as is the case for the Wet Sandy Depressions ecological sites.

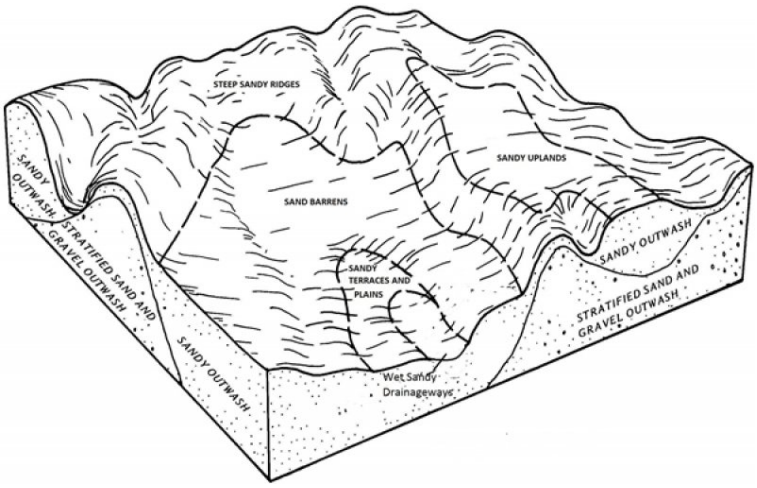


Figure 2. Sandy ecological site in pitted outwash

Table 2. Representative physiographic features

Landforms	(1) Drainageway (2) Flat (3) Draw
Flooding frequency	None

Ponding frequency	None
Elevation	1,390–1,850 ft
Slope	0–4%
Ponding depth	0 in
Water table depth	6–42 in
Aspect	Aspect is not a significant factor

Climatic features

The climate is humid continental with very cold winters and warm summers. As is common across northern Wisconsin, two-thirds of the precipitation falls as rain during the relatively short growing season of late May to early September. Most of the rainfall is transpired by plants. Snow cover is likely in the months of November through April. Snow cover prevents deep frost penetration which promotes groundwater recharge.

Table 3. Representative climatic features

Frost-free period (average)	109 days
Freeze-free period (average)	130 days
Precipitation total (average)	33 in

Climate stations used

- (1) RHINELANDER [USC00477113], Rhinelander, WI
- (2) EAGLE RIVER [USC00472314], Eagle River, WI
- (3) MINOCQUA [USC00475516], Minocqua, WI
- (4) REST LAKE [USC00477092], Manitowish Waters, WI

Influencing water features

Wet Sandy Drainageways are not wetland sites, though they have similarities to wetlands. They basically collect water from upland sites and transmit it to wetland sites at a fast enough rate to prevent seasonal ponding. Because of its landscape position, this site typically has a smaller watershed feeding it than the Wet Sandy Depressions ecological site.

Soil features

This ecological site is characterized by the Au Gres soil map unit component which is not of large extent, but is common as minor component in sandy upland map units.

Table 4. Representative soil features

Surface texture	(1) Loamy sand (2) Sand
Family particle size	(1) Sandy
Drainage class	Somewhat poorly drained
Permeability class	Rapid to very rapid
Soil depth	80 in
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0–2%
Available water capacity (0-40in)	4–6 in

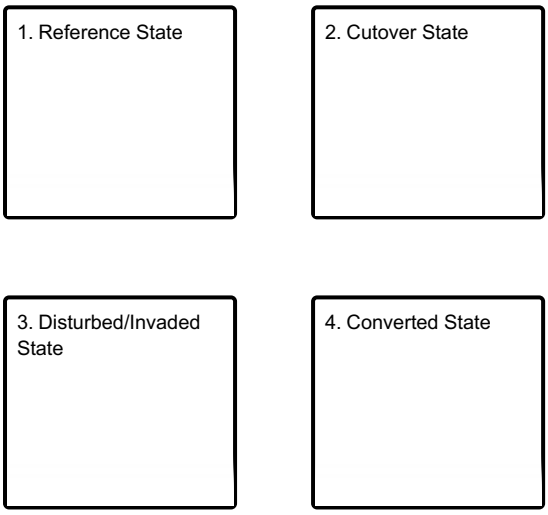
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	4.9–6.1
Subsurface fragment volume <=3" (Depth not specified)	2–20%
Subsurface fragment volume >3" (Depth not specified)	0–2%

Ecological dynamics

The Wet Sandy Drainageways ecological site is subject to a number of disturbance factors: wind damage, animal herbivory, snow and ice damage. However, disturbance caused by excess wetness is rare. In other words, the site is not subject ponding and will drain rapidly under normal conditions. The seasonal high water does occur within one foot of the surface in most years but the vegetation is well adapted to this level of wetness. Even after a clearcut, the site does not get too wet to regenerate forest trees, as wetland sites generally do. The fact that this site is a natural drainageway with porous soils means that water readily flows through this system from higher to lower elevations and that anaerobic conditions are transitory. Thus a large part of the root zone is oxygenated throughout the growing season.

State and transition model

Ecosystem states



State 1 submodel, plant communities

1.1. Quaking Aspen-Balsam Fir Phase

1.2. Red Maple-White Spruce Phase

1.3. White Pine-White Spruce Phase

State 2 submodel, plant communities

2.1. Quaking Aspen-Balsam Fir Phase

2.2. Red Maple-Balsam Fir Phase

State 3 submodel, plant communities

3.1. Open Canopy Phase

3.2. Closed Canopy Phase

State 4 submodel, plant communities

4.1. Developed Phase

4.2. Plantation Phase

State 1
Reference State

The Reference State for this ecological has three main phases, and these are complicated by the fact that this site is both highly productive and many species are adapted to grow on it. Also, documenting these phases is complicated by the fact that logging has decimated the reference state, and also by the fact that natural regeneration of white spruce cover types is problematic in the modern era, presumably for a variety of reasons including: competition from better adapted species, loss of prolific seed trees, insect damage and slow growth rates.

Community 1.1
Quaking Aspen-Balsam Fir Phase

This is the early successional phase that was started by a stand-replacing disturbance event.

Community 1.2
Red Maple-White Spruce Phase

This mid-successional phase results from a more stable period with less disturbance. White spruce is a slow-growing species with poor reproductive potential.

Community 1.3
White Pine-White Spruce Phase

This late successional phase was common on this site in the pre-logging era, but has since become exceedingly rare in the modern era.

State 2
Cutover State

The Cutover State has largely replaced the Reference State on this site. Loggers in the past targeted the large white pine and white spruce that occurred on this site. There are two phases of this state and many intergrades of these phases. A variety of tree species will grow on this site but there are numerous conditions issues (tree damage) owing to numerous site-related disturbance factors and a high level of plant competition.

Community 2.1
Quaking Aspen-Balsam Fir Phase

This phase has become one of the most abundant on this site. Mainly because quaking aspen and balsam fir are at their most productive and competitive on this site. Aspen in particular is highly productive, enough so that it has become a target species for the forest products industry.

Community 2.2
Red Maple-Balsam Fir Phase

This phase occurs when the Quaking Aspen-Balsam Fir Phase becomes senescent, if indeed that is allowed to occur. Commonly aspen is logged off, and the successional clock is set back, but some sites are missed and this phase ensues. In places, this phase is dominated by low quality hardwoods with a thick balsam fir understory that seldom matures. Red maple itself is not a highly sought-after species, and low quality hardwoods which also occur in this phase include sugar maple with common defects, multi-stem basswood trees, and short-lived and crooked-stemmed paper birch. Some very tall white pines are also present in this phase, as a reminder of their former stature.

State 3
Disturbed/Invaded State

This state is even more problematic than the Cutover State. The disturbance factors (e.g. insects and diseases) and invasive species (e.g. earthworms and garlic mustard) have the potential to reduce forest productivity on this site and spread beyond this site. In general, the productivity of this site feeds some of the more deleterious pests found on the site, so in a sense, this site becomes a fertile breeding ground for forest pests if allowed to do so.

Community 3.1
Open Canopy Phase

This phase is the result of a stand destroying disturbance, which fortunately are not extensive, but occurred intensively in small areas. High grade logging practices, which were common in the past, led to open canopy gaps that promoted low quality, readily wind damaged trees. Over-browsing by whitetail deer can prolong this phase. Defoliating insects and wind storms also opened canopy gaps. If the gap replacement trees were of low quality, genetically or structurally, then stand deterioration ensued. Beaver herbivory also led to stand replacement, as hardwoods were selected against and conifers filled the gaps. The timing of logging operations on this site is a constant concern. Operations during unfrozen periods on wet soils leads to severe rutting which reduces forest regeneration potential, increases the likelihood of invasive weeds, and is not only an aesthetic and environmental problem but also a practical operational concern with muddy logs and excessive wear on equipment on the negative list.

Community 3.2
Closed Canopy Phase

Eventually canopy closure produces this phase, which is a mix of native and non-native species. Quaking aspen and balsam fir are common, so are an array low quality hardwoods, previously discussed. This is one of the more common phases on this site due the spread of weeds, earthworms, forest trails with ruts and washouts, sediment deposits, and old forest openings with compacted soils. In other words, this phase is the result of forest regrowth on used and abused sites.

State 4
Converted State

The Converted State is the result of intentional land use changes. The forest canopy is removed and the site is bulldozed to remove stumps and other debris. In this state, the low areas get filled and the higher areas get cut, thus leveling the surface. There are two main phases to this state, the developed phase and the plantation phase.

Community 4.1
Developed Phase

This phase is mostly the result of roads and trails. The affected area is often larger than roadbed alone. Building sites are limited due to wetness.

Community 4.2
Plantation Phase

This phase is somewhat rare on this site, but attempts have been made to create white spruce or white pine plantations. Disturbed/Invaded State sites can be reclaimed in this way.

Additional community tables

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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)	
Contact for lead author	
Date	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

   _____

2. **Presence of water flow patterns:**

   _____

3. **Number and height of erosional pedestals or terracettes:**

   _____

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

   _____

5. **Number of gullies and erosion associated with gullies:**

   _____

6. **Extent of wind scoured, blowouts and/or depositional areas:**

   _____

7. **Amount of litter movement (describe size and distance expected to travel):**

   _____

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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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:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**
