Ecological site F094DY010WI
Wet Sandy Depressions

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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.

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 Depressions ecological site comprises about 20,000 acres in MLRA 94D.

Classification relationships

The Wet Sandy Depressions ecological sites correlate to the AbFnThAs habitat type developed by Kotar and Burger (2009); this habitat type is named after Abies balsamea (balsam fir)-Fraxinus nigra (black ash)-Thuja occidentalis (white cedar)/Arisaema triphyllum (Jack-in-the-pulpit). 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 moisture regime and is poor to medium 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.

This ecological site has poorly drained soils and has a thin muck surface over sandy sediments. The plant communities are composed of hydrophytes, although many of the species are facultative. Graminoid species--grasses, sedges and rushes--are very abundant on this site. Many of these graminoids species occur in patches, both large and small, of many individual plants.

Associated sites

F094DY009WI	**Wet Sandy Drainageways** Wet Sandy Drainageways frequently occur adjacent to Wet Sandy Depressions.

Table 1. Dominant plant species

Tree	(1) *Abies balsamea* (2) *Fraxinus nigra*
Shrub	(1) *Alnus incana* (2) *Acer spicatum*
Herbaceous	(1) *Osmunda cinnamomea* (2) *Coptis groenlandica*

Physiographic features

The Wet Sandy Depressions ecological site is found in small depressions within larger upland sites and in larger landscape-scale depressions adjacent to peatlands or near water bodies. Thus these sites are highly variable in size. They are however uniformly concave in shape even though they may appear linear due to low slope gradients.

Table 2. Representative physiographic features

Landforms	(1) Depression (2) Swamp
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	Occasional to frequent
Elevation	424–555 m
Slope	0–2%
Ponding depth	0–15 cm
Water table depth	0–61 cm
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. The microclimate on this site generally cooler than the average for the region.

Table 3. Representative climatic features

Frost-free period (average)	109 days

Freeze-free period (average)	130 days
Precipitation total (average)	838 mm

Climate stations used

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

Influencing water features

This is a wetland site with hydric soils, hydrophytic vegetation, and clear evidence of wetland hydrology i.e. frequent ponding and evidence of ponding such as drown-out spots of bare soil, high water marks on trees, and organic detritus moved and collecting in piles. However, groundwater also flows through this site very rapidly giving it fen-like hydrology but not too wet to grow trees.

Soil features

The soil component most closely associated with Wet Sandy Depressions is the Kinross series. These soils are poorly drained, they have a muck or mucky sand surface layer about 6 inches thick and they classify as hydric. The subsoil and substratum is sand, so they should transmit water very rapidly, however, these soils will fill with water and pond frequently in spring and after heavy rains. Also these sites have daily fluctuations in water table during the growing season; during daylight hour's water is removed from the soil profile by evapotranspiration and then the water table is recharged at night.

Table 4. Representative soil features

Surface texture	(1) Mucky sand
Family particle size	(1) Sandy
Drainage class	Poorly drained
Permeability class	Rapid to very rapid
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	7.62–15.24 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	5–6
Subsurface fragment volume <=3" (Depth not specified)	2–10%
Subsurface fragment volume >3" (Depth not specified)	0–4%

Ecological dynamics

The Wet Sandy Depressions ecological site is subject to ponding in spring and after heavy rains. These temporary ponds are important breeding sites for reptiles and amphibians. These sites also provide valuable wetland ecosystem services such as retention of potential floodwaters, surface water filtration and nutrient retention, as well as habitat for charismatic plants and animals. This site has dynamic hydrology; at various times the site serves as a groundwater discharge area, and at other times, as a recharge area. The hydroperiod is variable enough to permit a broad array wetland adapted species. The site is mostly forested, but also has areas where woody vegetation is restricted, and thus herbaceous plants are dominant in some areas. In short, this ecological site has valuable wetland functions that help protect surface water and groundwater, and benefit wildlife.

State and transition model

Ecosystem states

1. Reference State
2. Cutover State
3. Ponded State
4. Converted State

State 1 submodel, plant communities

1.1. Black Ash-Balsam Fir Phase

1.2. Balsam Fir-Black Ash Phase

State 2 submodel, plant communities

2.1. Shrubs-Sedges Phase

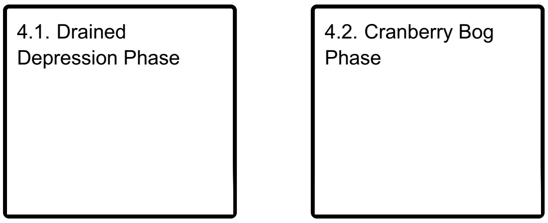
2.2. Red Maple-Balsam Fir Phase

State 3 submodel, plant communities

3.1. Standing Dead Timber Phase

3.2. Sedges-Rushes Phase

State 4 submodel, plant communities



State 1
Reference State

The Reference State has two main phases, one is dominated by hardwoods, and the other is conifer dominant. The shrub layer is also prominent on this site; speckled alder is by far the most common shrub species and can form dense thickets. In closed canopy areas, mountain maple is the more common shrub. The understory on both phases is species rich, with both obligate wetland plants and facultative wetland plants adapted to this site.

Community 1.1
Black Ash-Balsam Fir Phase

The Black Ash-Balsam Fir Phase is the hardwood dominated phase found on this site. Other hardwood trees that occur on this site include red maple, and yellow birch. Upland hardwood species, such as the shallow-rooted quaking aspen and paper birch, may occur on slightly drier microsites within this site. Note that red maple is a species capable of growing well on both upland and wetland sites due to its highly adaptable root system. In wetlands, the roots spread laterally for a considerable distance beyond the main trunk, on dry sites lateral roots are capable of sending down sinker roots to tap into deep groundwater. Black ash is the most abundant hardwood tree in this phase, but it should be noted that this species is under threat of extirpation by the emerald ash borer, a recently introduced insect pest that is spreading through this region. Basically, hardwood dominance on this site is related to a complicated interplay of hydroperiod (root zone aeration), disturbance regimes (windthrow hazard) and seed sources (productivity and herbivory).

Community 1.2
Balsam Fir-Black Ash Phase

The Balsam Fir-Black Ash Phase is the conifer dominated phase on this site. With its shallow but wide-spread lateral root system, balsam fir is another species that occurs in abundance on both wet and dry sites in this region. However, it seldom attains large tree status on either, but numbers of individual plants can be quite high and they produce copious shade. Balsam fir itself is shade tolerant, therefore it can reproduce under itself and remain in the understory for a long time until it is released into canopy gaps. Black ash, less shade tolerant but more wetness tolerant, will often grow into gaps created by the windthrow-prone balsam fir trees. Other swamp conifers that occur on this site to a lesser degree include tamarack and white cedar.

State 2
Cutover State

The Cutover State is less common on this site than on drier upland sites, although there is demand for high quality trees of just about any species, including black ash and balsam fir. Balsam fir is used mainly as pulpwood as it is too brittle to use as lumber, but black ash has value as lumber for cabinetry and paneling, neither of those uses created a logging boom as seen in days past, nor can they sustain a large modern industry. However, local demand has led to logging on, once again, the high quality sites.

Community 2.1
Shrubs-Sedges Phase

This phase occurs when the stand is harvested and as a result the water table rises due to less evapotranspiration. Under those wetter conditions forest regeneration is restricted. Alder is the most common shrub and water tolerant herbaceous plants predominate.

Community 2.2
Red Maple-Balsam Fir Phase

Reforestation of this site starts on slightly drier microsites, and proceeds when the trees start transpiring enough water to create more suitable habitat for reproduction.

State 3
Ponded State

The Ponded State is common on this site. In this state, ponding persists long enough to drown most terrestrial wetland vegetation, thus aquatic vegetation, both emergent and submergent, becomes dominant. The causes are both natural and man-made. Natural causes of ponding include beaver dams which can back up water outside the confines of the streams normal floodplain. However, man-made causes are more common, especially in areas with a higher road density. Roads, even with effective culverts, tend retard water flow out of wetlands. This creates a commonly observed “wet-side, dry-side” effect. Cattails growing in the road ditch are a good indicator of the effect.

Community 3.1
Standing Dead Timber Phase

Ponded areas that are forested will soon result in standing dead timber, probably after one full growing season of inundation. Over time, the standing dead trees will topple, but maybe not before the site drains on its own. In the meantime, standing dead timber provides nesting and perching habitat for birds such as herons, so it is not a disaster to lose some trees to ponding.

Community 3.2
Sedges-Rushes Phase

The first flush of growth after ponding has drained, or on the permanently saturated edges of ponded areas, or on slightly higher islands within the ponded areas, will be water tolerant sedges and rushes. Wool grass, cattails, common rush, bluejoint grass, and tussock-forming sedges are common to this phase. In areas that remain ponded for several years, submergent aquatic plants become dominant; they include a variety of bladderworts (Utricularia spp.) and pondweeds (Pomatogeton spp.).

State 4
Converted State

The Converted State represents a small fraction of this site, however the consequences of converting wetlands to non-wetland are undesirable. Invasive species are more likely to gain a foothold on converted sites, and spread from there. Fully functional wetlands provide valuable ecosystem services to the public, however private interests may be different. Therefore, programs have been developed to preserve or restore wetlands which provide incentives to landowners. Roads and trails are the main conversion in this region, since they occur on a public right-of-way, different mitigation programs handle those situations.

Community 4.1
Drained Depression Phase

This phase results from both intentional and unintentional wetland drainage. Artificial drainage for agricultural production is minimal in this region. Road building, on the other hand, is common and necessary to modern society. Most roads built through wetlands cause some inadvertent drainage beyond the footprint of the actual roadbed. The roadbed itself when traversing a wetland, is an example of a wetland converted to a different land use.

Community 4.2
Cranberry Bog Phase

The main agricultural conversion of wetlands in this region is for cranberry production. By law, growers have the right to do this. Typically this ecological site is not their target area, but may get affected unintentionally or be part of cranberry production support areas. Officials have deemed that this enterprise is justified. And given the extent of the land base involved and the benefits to society from that conversion, there is no environmental imperative to dispute that determination.

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):**

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:**