

Ecological site F094DY006WI

Steep Sandy Ridges

Accessed: 08/08/2026

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): 094D–Northern Highland Sandy Pitted Outwash

The Northern Highland Sandy Drift region (also referred to as MLRA 94D) lies mostly in northern Wisconsin with a few narrow outwash channels extending into the upper peninsula of Michigan. MLRA 94D encompasses 1.364 million acres and is surrounded by much larger, geologically different MLRAs. MLRA 94D is characterized mainly by sandy and gravelly soils formed in outwash sediments deposited by melt-water streams from late Wisconsin-Age glaciers, which receded from the area about 10,000 years before present (Attig 1985). The Steep Sandy Ridges ecological site occupies about 75,000 acres in MLRA 94D.

Classification relationships

The Steep Sandy Ridges ecological sites correlates to a hybrid of two habitat types--PQE and PARV-- both developed by Kotar et al (2002); these habitat types are named after *Pinus strobus* (white pine)-*Quercus* spp. (oak species)/*Gaultheria procumbens* (wintergreen) and *Pinus strobus* (white pine)-*Acer rubrum* (red maple)/*Vaccinium angustifolium* (low-bush blueberry) respectively. 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 dry 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 modal concept of the Steep Sandy Ridges is that they occur on slopes of 16% or greater and this affects their soil-plant relationships, productivity and management. Steep Sandy Ridges ecological site differs markedly from Sandy Uplands in several important aspects, and most notably one: aspect. Most of these sites have a strong linear orientation, but some are curvilinear, which reduces the overall effect of aspect on the site. The effect in question is caused by the site's orientation relative to the sun. Given a south-southwest exposure and other factors equal a site is drier, due to the greater potential evapo-transpiration.

Table 1. Dominant plant species

Tree	(1) <i>Pinus resinosa</i> (2) <i>Quercus rubra</i>
Shrub	(1) <i>Diervilla lonicera</i> (2) <i>Vaccinium angustifolium</i>
Herbaceous	(1) <i>Maianthemum canadense</i> (2) <i>Gaultheria procumbens</i>

Physiographic features

The Steep Sandy Ridges ecological site is mainly a glaciofluvial stream deposit of well-rounded sand and gravel. There are several modes of deposition for these landforms. Quantity and velocity of the meltwater is crucial. As are the three main locations for these deposits to be laid down: 1) under glacial ice creating eskers, kames and crevasse fillings 2) on top of glacial ice which becomes collapsed outwash and 3) away from the glacial ice. The first two ice contact deposits are more likely to produce Steep Sandy Ridges after the ice melts and the land attains stability, while the third creates outwash plains which were once braided meltwater channels.

Table 2. Representative physiographic features

Landforms	(1) Esker (2) Crevasse filling (3) Collapsed outwash plain
Elevation	410 – 570 m
Slope	20 – 50 %
Aspect	NE, SW

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)	110 days
Freeze-free period (average)	130 days
Precipitation total (average)	840 mm

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

Influencing water features

This ecological site is not directly related to surface water and wetlands. But the hydraulic conductivity of the soils on this site is very high, which means they offer potentially rapid recharge to aquifers and nearby wetlands and water bodies. This site is steep, therefore the potential for runoff could be high, however infiltration is very rapid given the coarse textures and vegetative cover on this site and that makes runoff less of a factor. The lines of hydraulic equipotential beneath this site have a steep gradient as well.

Soil features

The soil components associated with this ecological site have a slope of 16% or greater and a loamy sand or coarser surface texture. They are members of Vilas, Sayner, Rubicon, Emmert, or Pelissier series. These soils are characterized by their very high hydraulic conductivity and their very low water-holding capacity. Vilas and Rubicon represent the sandy end of the spectrum while Sayner, Emmert and Pelissier are gravelly to extremely gravelly, which makes them sought after for road-building material.

Table 4. Representative soil features

Surface texture	(1) Gravelly loamy sand (2) Very gravelly sand
Family particle size	(1) Sandy
Drainage class	Excessively drained
Permeability class	Rapid to very rapid
Soil depth	200 cm
Surface fragment cover <=3"	0 – 20 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	5.08 – 7.62 cm
Calcium carbonate equivalent (0-101.6cm)	Not specified
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	5.1 – 5.9
Subsurface fragment volume <=3" (Depth not specified)	10 – 40 %

Subsurface fragment volume >3" (Depth not specified)	0 – 10 %
---	----------

Ecological dynamics

The Steep Sandy Ridges ecological site contains a number smaller sites. The aspect of steeper slopes determines the microclimate variation. South facing slopes are warmer and drier, thus much more drought-prone than north-facing slopes, west-facing slopes, with afternoon sun, are slightly warmer and drier than eastern exposure. The drier slopes are likely to be less productive. Also, upper slopes are drier than their lower counterparts. The lower side slopes, while still steep, seem to be more productive, probably because they more sheltered. The summit areas (ridgetops) of Steep Sandy Ridges are less sloping but they are more exposed to wind, with it's drying effect and higher potential for damage to trees. The white pines on ridgetops often show pronounced flagging, that is, more branches on the downwind side of the tree. So while this site is distinctive in it's own right due to steepness, it can broken down into small components that are have different productivity classes and disturbance regimes.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
-------	-------------	--------	-----------------	----------------------	------------------

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
-------	-------------	--------	-----------------	----------------------	------------------

Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
-------	-------------	--------	-----------------	----------------------	------------------

Table 8. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
-------	-------------	--------	-----------------	----------------------	------------------

Table 9. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
-------	-------------	--------	-----------------	----------------------	------------------

Table 10. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
-------	-------------	--------	-----------------	----------------------	------------------

Table 11. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
-------	-------------	--------	-----------------	----------------------	------------------

Table 12. Community 4.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
-------	-------------	--------	-----------------	----------------------	------------------

Other references

Attig JW. 1985 Pleistocene geology of Vilas County, Wisconsin. Wis. Geol. and Nat. Hist. Surv. Information Circular 50. 38 pp.

Black MR., Judziewicz EJ. 2009. Wildflowers of Wisconsin and the Great Lakes Region: a comprehensive field guide. 2nd ed. Univ. Wisc. Press 275pp.

Curtis JT. 1971. The Vegetation of Wisconsin: an ordination of plant communities. Univ. Wisc. Press. 657 pp.

ECOMAP. 1993. National hierarchical framework of ecological units. USDA Forest Service, Washington, D.C.

Epstein E, Smith W, Dobberpuhl J, Galvin A. 1999. Biotic inventory and analysis of the Northern Highland-American Legion State Forest. Bureau of Endangered Resources, Wisconsin Department of Natural Resources. 263pp.

Faber-Langedoen D, editor. 2001. Plant communities of the Midwest: Classification in an ecological context. Association for Biodiversity Information, Arlington, VA. 61 pp. + appendix (705 pp.).

Grime JP. 1981. Plant Strategies and vegetation Processes. J Wiley and Sons. 222pp.

Kent M, Coker P. 1992. Vegetation Description and Analysis: A Practical Approach. CRC Press, Boca Raton, FL. 363pp.

Kotar J, Kovach JA, Burger TL. 2002. A Guide to Forest Communities and Habitat Types of Northern Wisconsin. 2nd ed. University of

Wisconsin-Madison, Dept. of Forest Ecology and Management.

Kozlowski TT, Pallardy SG. 2002. Acclimation and adaptive responses of woody plants to environmental stresses. *The Botanical Review* 68(2): 270-334.

Mitchell SJ. 2013. Wind as a natural disturbance in forests; a synthesis. *Forestry* 86:147-157.

Natural Resources Conservation Service. 2008. Hydrogeomorphic Wetland Classification System: An overview and modification to better meet the needs of the Natural Resources Conservation Service. Technical Note No. 190–8–76.

Pielou EC. 1991. *After the Ice Age: the return of life to glaciated North America*. Univ. Chicago Press, Chicago, IL. 366 pp.

Wisconsin Department of Natural Resources (DNR). 2014. *The ecological landscapes of Wisconsin: an assessment of ecological resources and a guide to planning sustainable management*. Chapter 14, Northern Highland Ecological Landscape. Wisconsin Department of Natural Resources, PUB-SS-1131P 2014, Madison. 84 pp.

Wisconsin Initiative on Climate Change Impacts (WICCI) 2011. *Wisconsin's Changing Climate: Impacts and Adaptations*. Nelson Institute for Environmental Studies, University of Wisconsin-Madison & the Wisconsin Department of Natural Resources, Madison, Wisconsin.

Zobel RW. 1992. Soil environment constraints to root growth. *Adv. Soil Science* 19:27-51.

Contributors

Mark Krupinski

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:
-