USDA Natural Resources Conservation Service

Ecological site F094DY012WI
Steep Loamy-Mantled Ridges

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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.

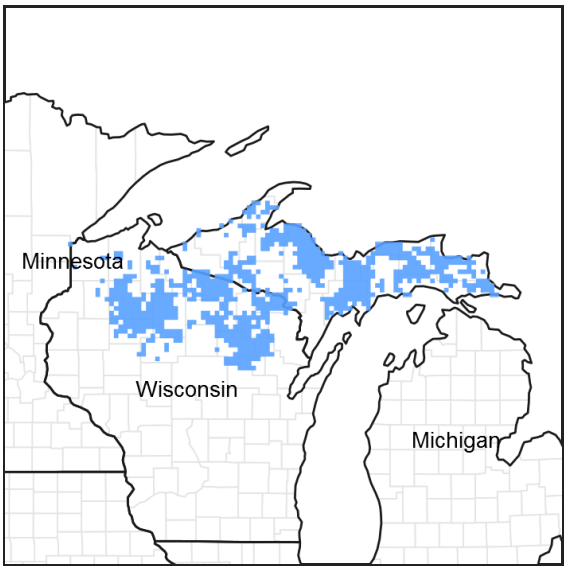


Figure 1. Mapped extent

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

The Steep Loamy-Mantled Ridges ecological site occupies about 60,000 acres in MLRA 94D.

Classification relationships

The Steep Loamy-Mantled Ridges ecological site correlates to the AVVb habitat type developed by Kotar et al (2002); this habitat type is named after Acer saccharum (sugar maple)/ Vaccinium angustifolium (low-bush blueberry)/Viburnum acerifolium (maple-leaved viburnum). 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-mesic moisture regime and is medium in nutrients. This site correlates to the Northern Mesic Forest after Curtis (1971).

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 Steep Loamy-Mantled Ridges ecological site retains enough loamy surface layer to pull this site out of the drought-prone class into the productive class. Given the steep slopes, there is usually an increase in loamy-mantle thickness from summit to footslope. This produces sharp moisture and nutrient resource availability gradients with short distances, this site has a wide or even bi-modal range of characteristics.

Associated sites

F094DY010WI	**Wet Sandy Depressions** Loamy-Mantled Uplands are typically adjacent to Steep Loamy-Mantled Ridges.

Table 1. Dominant plant species

Tree	(1) *Quercus rubra* (2) *Pinus strobus*
Shrub	(1) *Viburnum acerifolium* (2) *Corylus cornuta*
Herbaceous	(1) *Eurybia macrophylla* (2) *Maianthemum canadense*

Physiographic features

The Steep Loamy-Mantled Ridges ecological sites developed on mainly disintegration moraines and similar ice-contact features. Steep ridges were supported and stabilized by contact with glaciers. These landforms follow the classic glacial geology notion that the lower surfaces of ice produced higher mineral surfaces when the ice melts away because mineral sediments gravitated toward the glacial low spots and formed massive piles of debris that became higher ridges when finally exposed. These are known as moulin kames when they formed by sediments swept into holes on the glacier, or as crevasse fillings when mineral debris fell into large cracks in the glacier. The development of these ecological sites is influenced by the orientation of the ridge. Sites with north-facing slopes are cooler and more moist than those with south aspects, western slopes are warmer and drier than those facing east. For simplicity sake, these differences in aspect were not made into separate ecological site criteria, though they may well be considered as such. So this site concept, Steep Loamy-Mantled Ridges, combines the aspect-based and landscape position-based microsites, and their concomitant micro-climatic variation as well as the associated pedo-hydrological variation into one ecological site with multiple components.

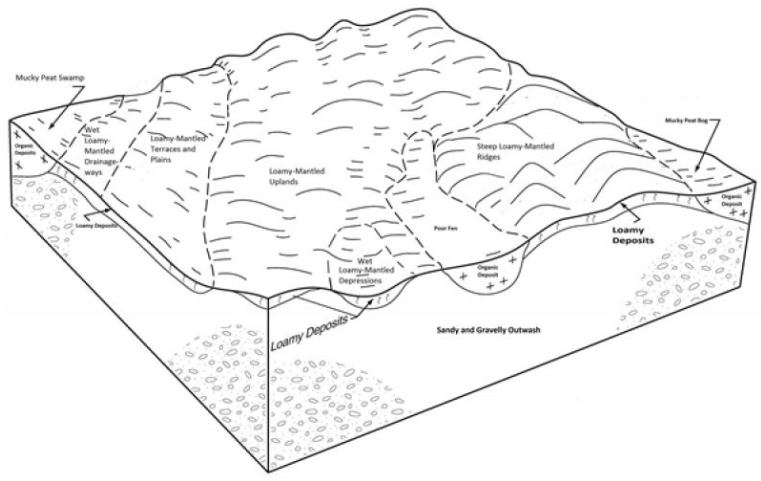


Figure 2. Sites with greater than 15 percent slopes

Table 2. Representative physiographic features

Landforms	(1) Crevasse filling (2) Kame moraine (3) Debris flow
Flooding frequency	None
Ponding frequency	None
Elevation	408–570 m
Slope	16–60%
Ponding depth	0 cm
Water table depth	203 cm
Aspect	N, S

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)	96 days
Freeze-free period (average)	123 days
Precipitation total (average)	864 mm

Climate stations used

- (1) NORTH PELICAN [USC00476122], Rhinelander, WI
- (2) REST LAKE [USC00477092], Manitowish Waters, WI
- (3) WILLOW RSVR [USC00479236], Hazelhurst, WI
- (4) LONG LAKE DAM [USC00474829], Eagle River, WI

Influencing water features

This ecological site is not a wetland, however it often adjacent to wetlands. Therefore it has influence on the properties of those wetlands. This influence is mainly through the steep slope gradient that causes high runoff potential and high groundwater flow rates towards wetlands. Disturbances that affect surface cover on this site (e. g. logging roads and trails) have the potential to increase sedimentation or alter the water chemistry in wetlands.

Soil features

The soil components on this ecological site are mainly the Padus, Pence and Keweenaw soils. They generally have a thinner loamy- mantle than loamy-mantled soils on lesser slopes (i.e. the Loamy-Mantled Uplands ecological sites). The map units that include these soils are the D-slope phases (>15% slopes). However, small areas of D slope also occur in areas where lesser slope phases are mapped. Also, it must be noted that D slope map units have areas of lower slope included within them.

Table 4. Representative soil features

Surface texture	(1) Gravelly sandy loam (2) Fine sandy loam
Family particle size	(1) Sandy
Drainage class	Excessively drained

Permeability class	Moderately rapid to very rapid
Soil depth	203 cm
Surface fragment cover <=3"	5–20%
Surface fragment cover >3"	0–3%
Available water capacity (0-101.6cm)	10.16–20.32 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)	5.3–6.2
Subsurface fragment volume <=3" (Depth not specified)	10–25%
Subsurface fragment volume >3" (Depth not specified)	0–10%

Ecological dynamics

The Steep Loamy-Mantled Ridges ecological sites have a variety of smaller sites within them. These smaller sites are differentiated based on slope gradient, position on the slope, aspect of the slope, and the thickness of the loamy mantle. All of these factors combine to create a site that has great variability in productivity and disturbance regimes within short distances (i.e. within 20 to 30 feet). Some of these factors are strongly negatively correlated, such as the steeper the slope gradient and the thinner the loamy mantle. Some of these factors are positively correlated to other environment gradients, such as slope aspect and its influence on microclimate; for example, south-facing slopes are warmer and drier (due to increased direct sunlight) than those facing north. This microclimatic effect is evident in the plant community response on the different aspects. Also, sites lower down on the ridge have a greater potential for being sub-irrigated by groundwater flowing downhill and are thus somewhat richer sites. They are also more protected from wind damage. Sites that up-slope are likely to be exposed to wind damage, and also the drying effects of wind. Trees on the upper slopes often exhibit flagging (fewer braches on the windward side) or are stunted compared to those on the lower slopes.

State and transition model

Ecosystem states

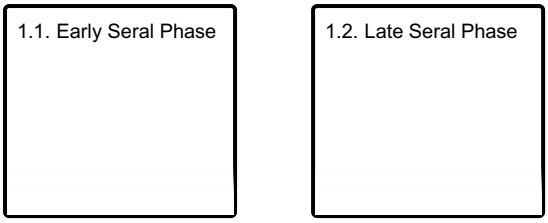
1. Reference State

2. Cutover State

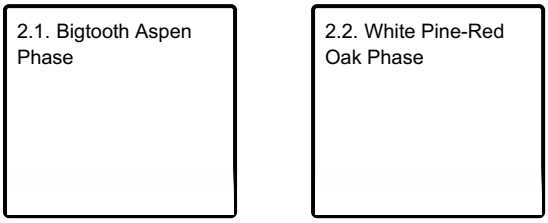
3. Disturbed/Invaded State

4. Converted State

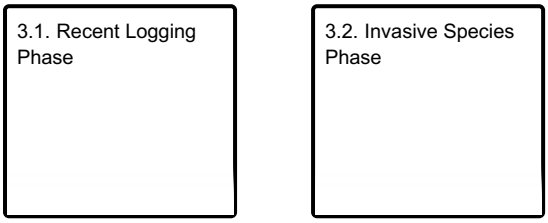
State 1 submodel, plant communities



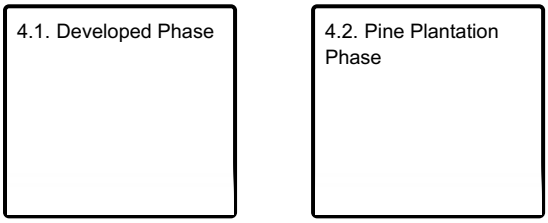
State 2 submodel, plant communities



State 3 submodel, plant communities



State 4 submodel, plant communities



State 1
Reference State

The Reference State is more common on Steep Loamy-Mantled Ridges ecological site than it is on the more readily accessible Loamy-Mantled Uplands ecological sites. This is due mainly to the steeper slopes and smaller areas involved. However, an untouched Reference State is still a relatively rare occurrence.

Community 1.1
Early Seral Phase

The Early Seral Phase is mainly an aspen-birch cover type, balsam fir is also very common and often forms thick stands to the exclusion of other species.

Community 1.2
Late Seral Phase

The Late Seral Phase is mainly a white pine-red oak cover type. These are long-lived species with intermediate shade tolerance. They are able reproduce under themselves and maintain this phase for hundreds of years in the absence of stand-replacing disturbance.

State 2
Cutover State

This state often closely resembles the reference state after the rotation age for the initial regrowth passed; many Steep Loamy-Mantled Ridges ecological sites are like this. Recently logged sites are a different story, of course. It

takes longer for a closed canopy forest to regenerate on these steeper sites, along with the higher probability that multiple microsites found on this show different trajectories toward a mature forest. For example steep, upper backslope portions with a southerly aspect will be the driest part of the site and will be likely exhibit slowest regrowth with only drought-adapted species.

Community 2.1
Bigtooth Aspen Phase

Community 2.2
White Pine-Red Oak Phase

Following the rotation age for bigtooth aspen (about 70 years) advance regeneration of white pine red oak will begin it's ascent to the canopy. Of course this is dependent on the seed sources for those species but the time elapsed is typically sufficient for the large animal transported seeds of those species to arrive on site.

State 3
Disturbed/Invaded State

This state is less common on the steeper sites than it is on lesser slopes. The edaphic conditions on the sites change rapidly over short distances.

Community 3.1
Recent Logging Phase

Generally, it takes longer for a closed canopy forest to regenerate on these steeper sites, along with the higher probability that multiple microsites found on this show different trajectories toward a mature forest. For example a steep, upper backslope with a southerly aspect will be the driest part of the site and will be likely exhibit slowest regrowth with only drought-adapted species. Whereas, the opposite conditions exist on lower backslopes or steep footslopes with a northern aspect. Exposed soils on steep slopes are subject to erosion which further retards regrowth.

Community 3.2
Invasive Species Phase

State 4
Converted State

Again, this state is of lesser extent than on sites with lower slope gradients. These sites are subject to erosion.

Community 4.1
Developed Phase

Community 4.2
Pine Plantation Phase

Additional community tables

Other references

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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:**

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

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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):**

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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:**
