Ecological site F110XY012IL
Moist Glacial Drift Upland Forest

Last updated: 4/22/2020
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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.

MLRA notes

Major Land Resource Area (MLRA): 110X–Northern Illinois and Indiana Heavy Till Plain

The Northern Illinois and Indiana Heavy Till Plain (MLRA 110) encompasses the Northeastern Morainal, Grand Prairie, and Southern Lake Michigan Coastal landscapes (Schwegman et al. 1973, WDNR 2015). It spans three states – Illinois (79 percent), Indiana (10 percent), and Wisconsin (11 percent) – comprising about 7,535 square miles (Figure 1). The elevation is about 650 feet above sea level (ASL) and increases gradually from Lake Michigan south. Local relief varies from 10 to 25 feet. Silurian age fractured dolomite and limestone bedrock underlie the region. Glacial drift covers the surface area of the MLRA, and till, outwash, lacustrine deposits, loess or other silty material, and organic deposits are common (USDA-NRCS 2006). The vegetation in the MLRA has undergone drastic changes over time. At the end of the last glacial episode – the Wisconsinan glaciation – the evolution of vegetation began with the development of tundra habitats, followed by a phase of spruce and fir forests, and eventually spruce-pine forests. Not until approximately 9,000 years ago did the climate undergo a warming trend which prompted the development of deciduous forests dominated by oak and hickory. As the climate continued to warm and dry, prairies began to develop approximately 8,300 years ago. Another shift in climate that resulted in an increase in moisture prompted the emergence of savanna-like habitats from 8,000 to 5,000 years before present (Taft et al. 2009). Forests maintained footholds on steep valley sides, morainal ridges, and wet floodplains. Fire, droughts, and grazing by native mammals helped to maintain the prairies and savannas until the arrival of European settlers, and the forests were maintained by droughts, wind, lightning, and occasional fire (Taft et al. 2009; NatureServe 2018).

Classification relationships

USFS Subregions: Southwestern Great Lakes Morainal (222K) and Central Till Plains and Grand Prairies (251D) Sections; Kenosha-Lake Michigan Plain and Moraines (222Kg), Valparaiso Moraine (Kj), and Eastern Grand Prairie (251Dd) Subsections (Cleland et al. 2007) U.S. EPA Level IV Ecoregion: Kettle Moraines (53b), Illinois/Indiana Prairies (54a), and Valparaiso-Wheaton Morainal Complex (54f) (USEPA 2013) National Vegetation Classification – Ecological Systems: North-Central Interior Maple-Basswood Forest (CES202.696) (NatureServe 2018) National Vegetation Classification – Plant Associations: Acer saccharum – Tilia Americana/Ostrya virginiana – Carpinus caroliniana Forest (CEGL002062) (Nature Serve 2018) Biophysical Settings: North-Central Interior Maple-Basswood Forest (BpS 4213140) (LANDFIRE 2009) Illinois Natural Areas Inventory: Mesic forest (White and Madany 1978) Wisconsin Natural Communities: Southern mesic forest (WDNR 2015)

Ecological site concept

Moist Glacial Drift Upland Forests are located within the green areas on the map (Figure 1). They occur on uplands. The soils are Alfisols that are somewhat poorly to moderately well drained and very deep, formed in loess or other silty or loamy material, loamy outwash, glacial till, or lacustrine deposits. The historic pre-European settlement vegetation on this ecological site was dominated by a closed canopy maple-basswood forest. Sugar maple (Acer saccharum Marshall) and American basswood (Tilia americana L.) are the dominant species in the tree canopy, but American beech (Fagus grandifolia Ehrh.) is an important canopy associate (White and Madany 1978; WDNR 2015). American hornbeam (Carpinus caroliniana Walter) is an important gap-phase shrub. Dutchman's breeches (Dicentra cucullaria (L.) Bernh.) and white trillium (Trillium grandiflorum (Michx.) Salisb.) are characteristic herbaceous species of this closed canopy forest (White and Madany 1978; WDNR 2015). Herbaceous species characteristic of an undisturbed plant community associated with this ecological site include snow trillium (Trillium nivale Riddell), wreath goldenrod (Solidago caesia L.), and threebirds (Triphora trianthophora (Sw.) Rydb.) (Taft et al. 1997; Bernthal 2003; WDNR 2015). Damage from storms and pest infestation characterize the natural disturbance regime of this site (WDNR 2015).

Associated sites

F110XY011IL	**Dry Glacial Drift Upland Forest** Loess or other silty or loamy material, loamy outwash, glacial till, or lacustrine deposits that are not shallow to a seasonal water table including Fox, Hebron, Martinsville, Ockley, Ozaukee, Rush, Saylesville, Senachwine, Sisson, Somonauk, Strawn, St. Clair, and Zurich soils

Similar sites

F110XY011IL	**Dry Glacial Drift Upland Forest** Dry Glacial Drift Upland Forests occur on adjacent, higher landscapes and are influenced by a fire regime

Table 1. Dominant plant species

Tree	(1) *Acer saccharum* (2) *Tilia americana*
Shrub	(1) *Carpinus caroliniana*
Herbaceous	(1) *Dicentra cucullaria* (2) *Trillium grandiflorum*

Physiographic features

Moist Glacial Drift Upland Forests occur on uplands. They are situated on elevations ranging from approximately 470 to 3332 feet ASL. The site does not experience flooding but rather generates runoff to adjacent, downslope ecological sites

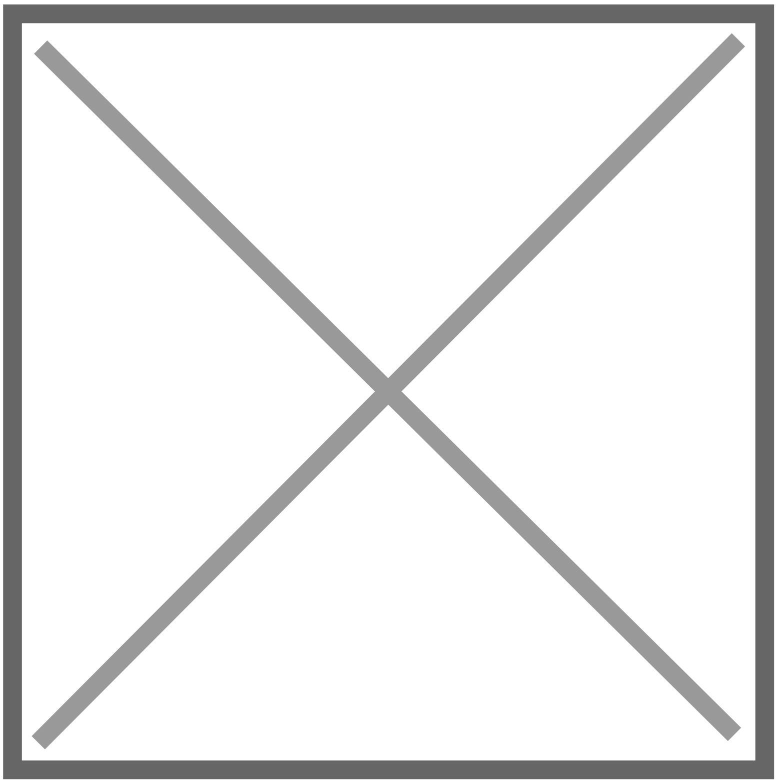

Figure 1.

Table 2. Representative physiographic features

Slope shape across	(1) Convex
Slope shape up-down	(1) Convex
Landforms	(1) Upland
Runoff class	Negligible to very high
Elevation	140 – 1,020 m
Slope	0 – 20 %
Water table depth	50 – 180 cm
Aspect	Aspect is not a significant factor

Climatic features

The Northern Illinois and Indiana Heavy Till Plain falls into the hot-summer humid continental climate (Dfa) and warm-summer humid continental climate (Dfb) Köppen-Geiger climate classifications (Peel et al. 2007). The two main factors that drive the climate of the MLRA are latitude and weather systems. Latitude, and the subsequent reflection of solar input, determines air temperatures and seasonal variations. Solar energy varies across the seasons, with summer receiving three to four times as much energy as opposed to winter. Weather systems (air masses and cyclonic storms) are responsible for daily fluctuations of weather conditions. High-pressure systems are responsible for settled weather patterns where sun and clear skies dominate. In fall, winter, and spring, the polar jet stream is responsible for the creation and movement of low-pressure systems. The clouds, winds, and precipitation associated with a low-pressure system regularly follow high-pressure systems every few days (Angel n.d.).

The soil temperature regime of MLRA 110 is classified as mesic, where the mean annual soil temperature is between 46 and 59°F (USDA-NRCS 2006). Temperature and precipitation occur along a north-south gradient, where temperature and precipitation increase the further south one travels. The average freeze-free period of this ecological site is about 175 days, while the frost-free period is about 144 days (Table 2). The majority of the precipitation occurs as rainfall in the form of convective thunderstorms during the growing season. Average annual precipitation is 38 inches, which includes rainfall plus the water equivalent from snowfall (Table 3). The average annual low and high temperatures are 40.1 and 59.3°F, respectively.

Table 3 Representative climatic features

Frost-free period (characteristic range)	140-150 days
Freeze-free period (characteristic range)	170-180 days
Precipitation total (characteristic range)	910-1,040 mm
Frost-free period (actual range)	140-150 days
Freeze-free period (actual range)	160-180 days

Precipitation total (actual range)	840-1,070 mm
Frost-free period (average)	140 days
Freeze-free period (average)	180 days
Precipitation total (average)	970 mm

- (1) DANVILLE [USC00112140], Danville, IL
- (2) MARSEILLES LOCK [USC00115372], Marseilles, IL
- (3) VALPARAISO WTR WKS [USC00128999], Valparaiso, IN
- (4) MUNDELEIN 4WSW [USC00115961], Lake Zurich, IL
- (5) MILWAUKEE MT MARY CLG [USC00475474], Milwaukee, WI

Influencing water features

Moist Glacial Drift Upland Forests are not influenced by wetland or riparian water features. Precipitation is the main source of water for this ecological site. Infiltration is slow (Hydrologic Group C), and surface runoff is negligible to very high. Surface runoff contributes some water to downslope ecological sites.

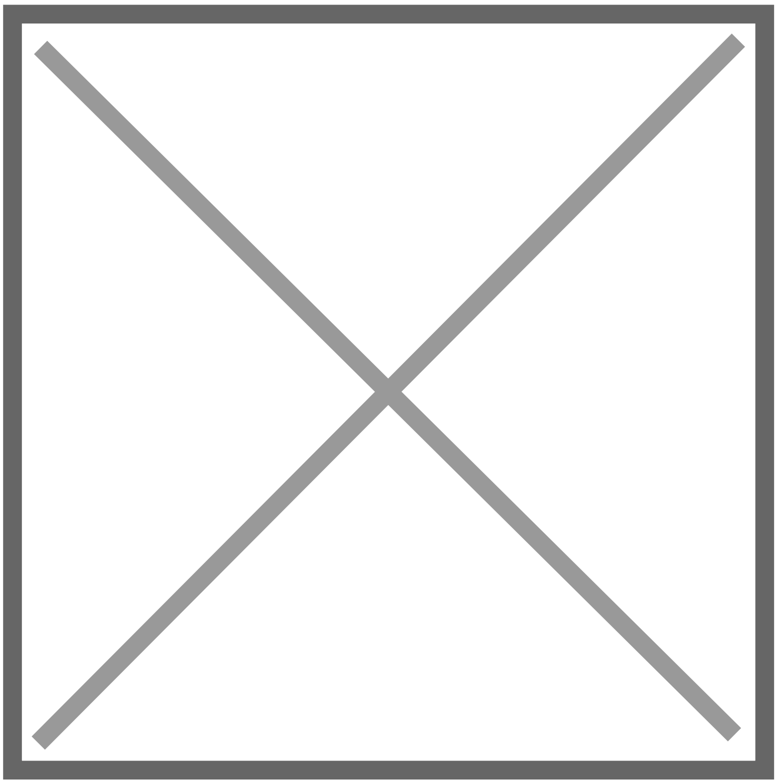

Figure 8. Hydrologic cycling in Moist Glacial Drift Upland Forest ecological site.

Soil features

Soils of Moist Glacial Drift Upland Forests are in the Alfisols order, further classified as Aeric Endoaqualfs, Aeric Epiaqualfs, Aquic Hapludalfs, and Oxyaquic Hapludalfs with slow infiltration and negligible to very high runoff potential. The soil series associated with this site includes Aptakisic, Blount, Del Rey, Nappanee, Ozaukee, Sabina, Starks, St. Clair, Tuscola, and Whitaker. The parent material is loess or other silty or loamy material, loamy outwash, glacial till, or lacustrine deposits, and the soils are somewhat poorly to moderately well drained and very deep. Soil pH classes are very strongly acid to moderately alkaline. No rooting restrictions are noted for the soils of this ecological site.

Figure 9. Profile sketches of soil series associated with Moist Glacial Drift Upland Forest.

Table 4. Representative soil features

Parent material	(1) Loess (2) Outwash (3) Till (4) Lacustrine deposits
Family particle size	(1) Fine (2) Fine-silty (3) Fine-loamy (4) Fine-loamy over sandy or sandy-skeletal
Drainage class	Somewhat poorly drained to moderately well drained
Permeability class	Moderately slow
Depth to restrictive layer	200 cm
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (Depth not specified)	2.54 – 20.32 cm
Calcium carbonate equivalent (Depth not specified)	0 – 40 %
Electrical conductivity (Depth not specified)	Not specified
Sodium adsorption ratio (Depth not specified)	Not specified

Soil reaction (1:1 water) (Depth not specified)	4.5 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	0 – 20 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

The information in this Ecological Site Description, including the state-and-transition model (STM), was developed based on historical data, current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. Key indicator plant species, disturbances, and ecological processes are described to inform land management decisions.

The MLRA lies within the tallgrass prairie ecosystem of the Midwest, but a variety of environmental and edaphic factors resulted in landscape that historically supported prairies, savannas, forests, and various wetlands. Moist Glacial Drift Upland Forests form an aspect of this vegetative continuum. This ecological site occurs on uplands on sopmewhat poorly to moderately well drained soils. Species characteristic of this ecological site consist of a closed canopy maple-basswood forest with shade-tolerant herbaceous vegetation.

Damage from wind and ice storms as well as pest infestations are importance disturbance regimes that maintain Moist Glacial Drift Upland Forests. Storm damage and pest infestation to trees can vary from minor, patchy effects of individual trees to stand effects that temporarily affect community structure and species richness and diversity (Irland 2000; Peterson 2000). This results in gap-phase replacement, where the patchy gaps quickly fill in with sapling trees or shrubs (WDNR 2015).

Today, Moist Glacial Drift Upland Forests have been reduced as they have been type-converted to agricultural or other human-modified landscape. Remnants that do exist have experienced extensive fragmentation, infestations of invasive plants and diseases, and overbrowsing resulting in significant changes to the forest structure. A return to the historic plant community may not be possible following extensive land modification, but long-term conservation agriculture or forest reconstruction efforts can help to restore some biotic diversity and ecological function. The state-and-transition model that follows provides a detailed description of each state, community phase, pathway, and transition. This model is based on available experimental research, field observations, literature reviews, professional consensus, and interpretations.

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 4.1 plant community composition

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

Table 11. Community 4.2 plant community composition

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

Table 12. Community 4.3 plant community composition

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

Table 13. Community 5.1 plant community composition

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

Table 14. Community 5.2 plant community composition

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

Inventory data references

No field plots were available for this site. A review of the scientific literature and professional experience were used to approximate the plant communities for this provisional ecological site. Information for the state-and-transition model was obtained from the same sources. All community phases are considered provisional based on these plots and the sources identified in this ecological site description.

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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	05/24/2026
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:**
