Ecological site R111XA002IN
Limnic Muck

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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): 111X–Indiana and Ohio Till Plain

A PROVISIONAL ECOLOGICAL SITE is a conceptual grouping of soil map unit components within a Major Land Resource Area (MLRA) based on the similarities in response to management. Although there may be wide variability in the productivity of the soils grouped into a Provisional Site, the soil vegetation interactions as expressed in the State and Transition Model are similar and the management actions required to achieve objectives, whether maintaining the existing ecological state or managing for an alternative state, are similar. Provisional Sites are likely to be refined into more precise group during the process of meeting the APPROVED ECOLOGICAL SITE DESCRIPTION criteria. This PROVISIONAL ECOLOGICAL SITE has been developed to meet the standards established in the National Ecological Site Handbook. The information associated with this ecological site does not meet the Approved Ecological Site Description Standard, but it has been through a Quality Control and Quality Assurance processes to assure consistency and completeness. Further investigations, reviews and correlations are necessary before it becomes an Approved Ecological Site Description. 111A – Indiana and Ohio Till Plain, Central Part. This area is in the Till Plains Section of the Central Lowland Province of the Interior Plains. It is dominated by broad, nearly level ground moraines that are broken in some areas by kames, outwash plains, and stream valleys along the leading edge of the moraines. Narrow, shallow valleys commonly are along the few large streams in the area. Elevation ranges from 680 to 1,250 feet (205 to 380 meters), increasing gradually from west to east. Relief is mainly a few meters, but in some areas hills rise as much as 100 feet (30 meters) above the adjoining plains. The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA is as follows: Wabash (0512), 46 percent; Great Miami (0508), 30 percent; Scioto (0506), 22 percent; and the Middle Ohio (0509), 2 percent. The major rivers in the area include the East and West Forks of the White River and the Whitewater River in Indiana and the Great Miami, Stillwater, Big Darby, Scioto, and Big Walnut Rivers in Ohio. Surface deposits in this area include glacial deposits of till, lacustrine sediments, and outwash from Wisconsin and older glacial periods. A moderately thick mantle of loess covers much of the area. Most of this MLRA is underlain by Silurian and Devonian limestone and dolostone. Also, some areas of Late Ordovician shale and limestone are in the western part of the MLRA (USDA, 2006).

Classification relationships

Major Land Resource Area (USDA-Natural Resources Conservation Service, 2006) USFS Ecological Regions (USDA, 2007): Sections – Southern Unglaciated Allegheny Plateau (221E), Central Till Plains, Beech Maple (222H), Interior Low Plateau-Transition Hills (223B), Interior Low Plateau-Bluegrass (223F) Subsections - Lower Scioto River Plateau (221Eg), Bluffton Till Plains (222Ha), Miami-Scioto Plain-Tipton Till Plain (222Hb), Little Miami Old Drift Plain (222Hc), Mad River Interlobate Plains (222Hd), Darby Plains (222He), Brown County Hills (223Ba), Northern Bluegrass (223Fd), Muscatatuck Flats and Valleys (223Fe), Scottsburg Lowlands (223Ff) NatureServe Systems anticipated (NatureServe, 2011): Agriculture - Cultivated Crops and Irrigated Agriculture, Agriculture - Pasture/Hay, Allegheny-Cumberland Dry Oak Forest and Woodland, Appalachian (Hemlock)-Northern Hardwood Forest, Central Appalachian Pine-Oak Rocky Woodland, Central Interior Acidic Cliff and Talus, Central Interior Highlands Calcareous Glade and Barrens, Central Tallgrass Prairie, Clearcut - Grassland/Herbaceous, Introduced Upland Vegetation – Treed, Managed Tree Plantation, Mississippi River Riparian Forest, North-Central Interior and Appalachian Acidic Peatland, North-Central Interior Beech-Maple Forest, North-Central Interior Dry-Mesic Oak Forest and Woodland, North-Central Interior Floodplain, North-Central Interior Freshwater Marsh, North-Central Interior Oak Savanna, North-Central Interior Wet Flatwoods, North-Central Interior Wet Meadow-Shrub Swamp, North-Central Oak Barrens, Northeastern Interior Dry-Mesic Oak Forest, Ruderal Forest, Ruderal Upland - Old Field, South-Central Interior / Upper Coastal Plain Wet Flatwoods, South-Central Interior Large Floodplain, South-Central Interior Mesophytic Forest, South-Central Interior Small Stream and Riparian, Southern Appalachian Oak Forest, Southern Interior Low Plateau Dry-Mesic Oak Forest, Southern Ridge and Valley / Cumberland Dry Calcareous Forest, Successional Shrub/Scrub LANDFIRE Biophysical Settings anticipated (USGS, 2010): Allegheny-Cumberland Dry Oak Forest and Woodland, Appalachian (Hemlock-) Northern Hardwood Forest, Central Interior and Appalachian Floodplain Systems, Central Interior and Appalachian Riparian Systems, Central Interior and Appalachian Shrub-Herbaceous Wetland Systems, Central Interior and Appalachian Swamp Systems, Central Interior Highlands Calcareous Glade and Barrens, Central Interior Highlands Dry Acidic Glade and Barrens, Central Tallgrass Prairie, Great Lakes Coastal Marsh Systems, North-Central Interior Beech-Maple Forest,

North-Central Interior Dry-Mesic Oak Forest and Woodland, North-Central Interior Dry Oak Forest and Woodland, North-Central Interior Oak Savanna, North-Central Interior Wet Flatwoods, South-Central Interior Mesophytic Forest, South-Central Interior/Upper Coastal Plain Flatwoods, Southern Appalachian Oak Forest, Southern Interior Low Plateau Dry-Mesic Oak Forest

Ecological site concept

This site is an upland site formed on herbaceous organic soil parent material overlaying coprogenic material in depressions on lake and till plains. Disturbance to the site by fire was driven by the seasonal presence of water on the site. In the spring and early summer the site is often ponded to a depth of 30 inches. The water table recedes as the summer progresses creating a much drier situation that increases the susceptibility of the site to fire. The seasonal flooding and relatively short fire return interval (~10 years or less) created a situation where the site is dominated by herbaceous vegetation. The characteristic vegetation is herbaceous in nature, mostly dominated by tall prairie grass species, most notably big bluestem and eastern gamagrass. Inclusions on the site that hold pond water more consistently will have a higher proportion of sedge species to complement the prairie grasses. Invasive species, specifically, reed canarygrass and phragmites, can invade and come to dominate the site in the absence of management to curtail or prevent their establishment and proliferation. The absence of fire will lead this site to being converted to forest or woodland dominated by wetland or facultative tree species. Currently a large percentage of the site is in agricultural production, notably corn and soybean rotations, after the installation of drainage.

Associated sites

F111XA006IN	**Till Depression** Parent material is glacial till; site generally has a higher landscape position.
R111XA001IN	**Mineral Muck** Underlying material is mineral.
R111XA003IN	**Deep Muck** Underlying material is not limnic and is deeper than 51 inches.
R111XA010IN	**Till Ridge Prairie** Parent material is glacial till; site has a higher landscape position and the soils are mollisols.

Similar sites

R111XA003IN	**Deep Muck** Underlying material is not limnic and is deeper than 51 inches.
R111XA010IN	**Till Ridge Prairie** Parent material is glacial till; site has a higher landscape position and the soils are mollisols.
R111XA001IN	**Mineral Muck** Underlying material is mineral.

Table 1. Dominant plant species

Tree	Not specified

Shrub	Not specified
Herbaceous	(1) *Andropogon gerardii* (2) *Tripsacum dactyloides*

Physiographic features

This site is located in the 111A – Indiana and Ohio Till Plain, Central Part MLRA. This site was formed on herbaceous organic material, occasionally with a top layer alluvium. It is located in depressions on till plains, lake plains, and flood plains.

Figure 1. Block diagram showing soil series on the landscape.

Table 2. Representative physiographic features

Landforms	(1) Depression
Runoff class	Negligible to low
Flooding duration	Brief (2 to 7 days) to very long (more than 30 days)
Flooding frequency	Frequent to very frequent
Ponding duration	Brief (2 to 7 days) to very long (more than 30 days)
Ponding frequency	Occasional to frequent
Elevation	180 – 380 m
Slope	0 %
Ponding depth	0 – 80 cm
Water table depth	0 – 110 cm
Aspect	Aspect is not a significant factor

Climatic features

The average annual precipitation in this area is 36 to 43 inches (915 to 1,090 millimeters). Most of the rainfall occurs as convective thunderstorms during the growing season. About half or more of the precipitation occurs during the freeze-free period. Snowfall is common in winter. The average annual temperature is 49 to 53 degrees F (9 to 12 degrees C). The freeze-free period averages about 195 days and ranges from 175 to 215 days.

Table 3 Representative climatic features

Frost-free period (characteristic range)	140-150 days
Freeze-free period (characteristic range)	170-190 days
Precipitation total (characteristic range)	990-1,070 mm
Frost-free period (actual range)	140-160 days
Freeze-free period (actual range)	170-200 days
Precipitation total (actual range)	990-1,120 mm
Frost-free period (average)	150 days
Freeze-free period (average)	180 days
Precipitation total (average)	1,040 mm

- (1) WINCHESTER AIRPORT 3 E [USC00129678], Winchester, IN
- (2) URBANA WWTP [USC00338552], Urbana, OH
- (3) SIDNEY 1 S [USC00337693], Sidney, OH
- (4) GREENVILLE WTP [USC00333375], Greenville, OH
- (5) KOKOMO 3 WSW [USC00124662], Russiaville, IN
- (6) COLUMBUS [USC00121747], Columbus, IN
- (7) COLUMBUS OHIO STATE UNIV AP [USW00004804], Dublin, OH
- (8) CHILLICOTHE MOUND CITY [USC00331528], Chillicothe, OH

Influencing water features

These wetland systems are groundwater-dependent as well as being, generally, the lowest point in the landscape. Water levels fluctuate seasonally, reaching their peak in spring and lows in late summer. Water levels typically remain at or near the soils surface throughout the year.

Soil features

The soil series associated with this site are: Warners, Wallkill, Muskego, Martisco, Edwards, Benadum. They are very deep, very poorly drained, and very slow to rapid permeable soils, with very strongly acidic to slightly alkaline soil reaction, that formed in coprogenic material, herbaceous organic material, marl, and organic material.

Figure 8. Location of mapunits within the MLRA

Table 4. Representative soil features

Parent material	(1) Coprogenic material (2) Herbaceous organic material (3) Marl (4) Organic material
Surface texture	(1) Mucky silt loam (2) Silty clay loam
Family particle size	(1) Loamy
Drainage class	Very poorly drained
Permeability class	Very slow to rapid
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	16.76 – 39.88 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 70 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	6.2 – 10

Subsurface fragment volume <=3" (Depth not specified)	0 – 20 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

The historic plant community of the Limnic Muck is a mucky prairie. This site is characterized by the soil parent material being composed of herbaceous organic matter with the subsoil being largely coprogenuous limnic material. The plant community is dominated by tall-grass prairie species along with an assortment of tall sedge species. The site is located in depressional areas principally associated with glacial lake plains and till plains. Being the lowest portion of the local landscape, the site is dependent upon groundwater and it's fluctuation, which reaches its peak in the spring and low in the late summer. This fluctuation and dominate herbaceous species create a fire dependent system. Replacement fires about every decade and seasonal flooding worked in concert to drive the species dominance and richness of the site. Lack of fire for any given time would move this site to one dominated by woody species. Since settlement, most of this site has been converted to agricultural use by drainage installation.

State and transition model

Figure 9. STM

Figure 10. Legend

Additional community tables

Table 5. Community 1.1 plant community composition

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

Table 6. Community 2.1 plant community composition

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

Table 7. Community 2.2 plant community composition

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

Table 8. Community 3.1 plant community composition

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

Table 9. Community 3.2 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 (%)

Inventory data references

Site concept developed through expert opinion, review of the literature, and field work.

Other references

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Contributors

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Approval

Greg Schmidt, 9/11/2024

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)	TYLER STAGGS
Contact for lead author	
Date	10/26/2021
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:**

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

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

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

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

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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:**
