

Ecological site R111XB401IN

Wet Outwash Mollisol

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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

111B – Indiana and Ohio Till Plain, Northeastern Part. This area is in the Eastern Lake and Till Plains Sections of the Central Lowland Province of the Interior Plains. The entire MLRA is glaciated, and most areas are dominated by ground moraines that are broken in places by lake plains, outwash plains, flood plains, and many recessional moraines. The ground moraines and lake plains in front of the recessional moraines are flat to undulating. In many places stream valleys occur at the leading edge of the recessional moraines. Narrow, shallow valleys commonly are along the major rivers and streams in this MLRA, and some areas along the major rivers and streams have deposits of sand. Elevation ranges from 630 to 1,550 feet (190 to 470 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: Western Lake Erie (0410), 41 percent; Wabash (0512), 28 percent; Scioto (0, 28 percent; Scioto (0506), 10 percent; St. Clair-Detroit (0409), 9 percent; Great Miami (0508), 6 percent; Southeastern Lake Michigan (0405), 5 percent; and Southwestern Lake Huron (0408), 1 percent. The Huron River in Michigan, Cedar Creek in Indiana, and the Sandusky River in Ohio have been designated as National Wild and Scenic Rivers in this MLRA. The surficial materials in this area include glacial deposits of till, outwash, and lacustrine sediments from Wisconsin and older glacial periods. A thin mantle of loess occurs in some areas. Most of the MLRA is underlain by Silurian and Devonian limestone and dolostone. Middle Devonian to Early Mississippian black shale and Early to Middle Mississippian siltstone and shale are in some areas of the northern part of the MLRA.

Classification relationships

Major Land Resource Area (USDA-Natural Resources Conservation Service, 2006) USFS Ecological Regions (USDA, 2007): Sections –Central Till Plains, Beech Maple (222H), South Central Great Lakes (222J) Subsections – Bluffton Till Plains (222Ha), Bluffton-Ann Arbor Till Plains (222Je), Jackson Interlobate Moraine (222Jg), Steuben Interlobate Moraines (222Ji) NatureServe Systems anticipated (NatureServe, 2011): Agriculture - Cultivated Crops and Irrigated Agriculture, Agriculture – Pasture/Hay, North-Central Interior Beech-Maple Forest, North-Central Interior Dry-Mesic Oak Forest and Woodland, North-Central Interior Floodplain LANDFIRE Biophysical Settings anticipated (USGS, 2010): Central Interior and Appalachian Floodplain Systems, North-Central Interior Beech-Maple Forest, North-Central Interior Dry-Mesic Oak Forest and Woodland

Ecological site concept

This site is an upland site formed on glacial outwash parent materials in soils that are very poorly or poorly drained and in the aquic taxonomic suborder. The soils surface color is dark (3/2 Munsell or darker) and extends beyond 10 inches, making them taxonomically mollisols. This site is found on flat portions (slope 0-2%) on outwash plains and terraces. Similarly, ponding of water to a depth of 15 inches occurs frequently for a duration that can exceed 30 days. The characteristic vegetation of this site is of a tall-grass prairie that is dominated by prairie cordgrass, big bluestem, and a variety of sedge species. The combination of accumulation of organic material and seasonal changes in water which led to an increased probability of fire limited the encroachment of woody species. Fires occurred on this site every 5 years or less with the ignitions being a mix of lightning strikes and those set by Native Americans. During the dormant season, these fires were less frequent and of lower intensity and size than those that occurred during the growing season. Grazing by ungulates had an effect on the production and species diversity of this site, but the magnitude of the impact was less than that for prairies farther west. Reduction, or in most cases elimination, of fire as converted the site that of a woodland or forest dominated primarily by oak and hickory species. The understory would contain many of the prairie species until the canopy closed. Woody understory species would include sassafras, some willows, and dogwood species. Currently, most of this site is in agricultural production, with the majority being used to raise corn and soybeans after the installation of drainage, followed by tillage, and management.

Associated sites

R111XB402IN	Dry Outwash Integrate Dry Outwash Integrate. Soils not in aquic taxonomic suborder and are somewhat poorly drained or drier.
F111XB403IN	Outwash Upland Outwash Upland. Soil surface is light in color (lighter than 3/2 Munsell)
F111XB404IN	Dry Outwash Upland Dry Outwash Upland. Soil surface is light in color (lighter than 3/2 Munsell) and are moderately well drained or drier.

Similar sites

R111XB402IN	Dry Outwash Integrate Dry Outwash Integrate
R111XB301IN	Dark Bedrock Prairie Dark Bedrock Prairie

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Spartina pectinata</i> (2) <i>Andropogon gerardii</i>

Physiographic features

This ecological site is found in outwash plain landscapes in MLRA 111B: Indiana and Ohio Till Plain, Northeastern Part. Unique landforms that contain this site include depressions, flats, drainageways, and outwash plains and terraces. With slopes ranging from 0 to 2 percent

Figure 1. Physiographic Image – Block diagram with Gilford representing the site on the landscape

Table 2. Representative physiographic features

Landforms	(1) Depression (2) Flat (3) Drainageway (4) Outwash plain (5) Terrace
Runoff class	Negligible to low
Flooding frequency	None
Ponding duration	Very brief (4 to 48 hours) to very long (more than 30 days)
Ponding frequency	None to frequent
Elevation	110 – 400 m
Slope	0 %
Ponding depth	0 – 40 cm
Water table depth	0 – 120 cm
Aspect	Aspect is not a significant factor

Climatic features

The average annual precipitation in this area is 30 to 39 inches (760 to 990 millimeters). Most of the rainfall occurs as convective thunderstorms during the growing season. About half or more of the annual precipitation occurs during the freeze-free period. Snowfall is common in winter. The average annual temperature is 47 to 52 degrees F (8 to 11 degrees C). The freeze-free period averages about 180 days and ranges from 165 to 195 days.

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)	940-1,020 mm
Frost-free period (actual range)	130-150 days

Freeze-free period (actual range)	170-190 days
Precipitation total (actual range)	860-1,040 mm
Frost-free period (average)	140 days
Freeze-free period (average)	180 days
Precipitation total (average)	970 mm

- (1) COLUMBIA CITY [USC00121739], Columbia City, IN
- (2) WABASH [USC00129138], Wabash, IN
- (3) LIMA WWTP [USC00334551], Lima, OH
- (4) MONTPELIER [USC00335438], Montpelier, OH
- (5) ANN ARBOR U OF MICH [USC00200230], Ann Arbor, MI
- (6) PONTIAC WWTP [USC00206658], Auburn Hills, MI
- (7) BELLEFONTAINE [USC00330563], Bellefontaine, OH
- (8) TIFFIN [USC00338313], Tiffin, OH

Influencing water features

This ecological site is largely a recharge depressional wetland that receives water from precipitation, the surrounding uplands, and ground water discharge. A distinguishing characteristic of this site is the seasonal abundance (winter/spring) and lack of abundance (late summer) of water on the site creating annual wet and dry periods. Ponding occurs up to frequently to a maximum average depth of 15 inches with a duration from very brief (4 to 48 hours) and very long (> 30 days).

Wetland description

The hydrogeographic model classification for this site is DEPRESSIONAL: Outwash Plain, Loamy; herbaceous. This site has a Cowardin Classification of PEM1Cn; it is a persistent herbaceous vegetation palustrine site that is seasonally ponded on a mineral soil.

Soil features

The soil series associated with this site are: Westland, Sebewa, Rensselaer, Pella, Millgrove, Lippincott, Gilford, Colwood. They are moderately deep to deep, very poorly drained to poorly drained, and slow to very rapid permeable soils, with slightly acidic to neutral soil reaction, which formed in outwash.

Parent Materials Kind: outwash
 Surface Texture: clay loam, fine sandy loam, loam, sandy loam, silt loam, silty clay loam
 Surface Modifier: mucky
 Subsurface Texture group: loamy

Figure 8. Location of mapunits in MLRA.

Table 4. Representative soil features

Parent material	(1) Outwash
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Surface texture	(1) Clay loam (2) Fine sandy loam (3) Loam (4) Silt loam (5) Sandy loam (6) Silty clay loam
Drainage class	Very poorly drained to poorly drained
Permeability class	Slow to very rapid
Soil depth	80 – 130 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (Depth not specified)	11.94 – 21.34 cm
Calcium carbonate equivalent (Depth not specified)	0 – 20 %
Electrical conductivity (Depth not specified)	Not specified
Sodium adsorption ratio (Depth not specified)	Not specified
Soil reaction (1:1 water) (Depth not specified)	6.3 – 7.9
Subsurface fragment volume <=3" (Depth not specified)	0 – 30 %

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

The historic plant community of the Wet Outwash Mollisol ecological site is a wet outwash prairie. This site is dominated by tall-grass prairie species that often reach 3-8 feet in height, particularly prairie cordgrass and big bluestem. Fluctuation of the amount of water on the site varies greatly, even over the course of a single year, which make the site prone to wildfires. The fluctuating water table, amount of organic material and cover, and fires maintain the herbaceous dominance of the site to the exclusion of trees.

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 (%)
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Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 3.2 plant community composition

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

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

Other references

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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	09/20/2026
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):

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:
