

Ecological site F111XB403IN

Outwash Upland

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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 LANDFIRE Biophysical Settings anticipated (USGS, 2010): 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 somewhat poorly to moderately well drained. The soils have a relatively light soil surface color (lighter than 3/2 Munsell) with a mostly loamy subsurface texture group. This woodland site was, historically, a mixed hardwood site with sugar maple and red oak being the dominant canopy species. Canopy associates include American beech, basswood, black cherry, and white oak. Fires were low frequency, high intensity events on the site at maturity and occurred very rarely, and even then only after large windthrow events or extreme drought. Low intensity, surface fires were more common in the mid seral stages when more fire tolerant species, oaks specifically, were more dominant in the canopy. Small gap disturbances are the most common overall disturbance mechanism and often result from windthrow or disease. Selective tree harvest moves the site to a new state where the canopy becomes dominated by less desirable timber species like beech, basswood, hickory and elm species. Currently, large areas of the site have been converted for agricultural use, mostly row crops, but some are being used for hay and pasture as well.

Associated sites

R111XB401IN	Wet Outwash Mollisol Soils are in the aquic taxonomic suborder and are very poorly to poorly drained
R111XB402IN	Dry Outwash Integrade Soils not in aquic taxonomic suborder and are SWPD or drier.
F111XB404IN	Dry Outwash Upland Dry Outwash Forest.

Similar sites

F111XB204IN	Dry Alluvium Forest Dry Alluvium Forest. Located on alluvium parent material; soils are moderately well to well drained.
F111XB102IN	Lacustrine Forest Lacustrine Forest. Located on lacustrine parent material; soils are SWPD to MWD.
F111XB302IN	Mesic Bedrock Forest Mesic Bedrock Forest. Located on bedrock parent material; soils are poorly to SWPD.
F111XB502IN	Wet Till Ridge Wet Till Ridge. Located on glacial till parent material on a convex landscape position; soils are SWPD.
F111XE503IN	Till Ridge Till Ridge. Located on glacial till parent material on a convex landscape position; soils are moderately well to well drained.

Table 1. Dominant plant species

Tree	(1) <i>Acer saccharum</i> (2) <i>Quercus rubra</i>
Shrub	Not specified
Herbaceous	Not specified

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 flats, drainageways, outwash plains, and valley train. Slopes are generally relatively flat, ranging from 0 to 6 percent.

Figure 1. Block diagram with Whitaker representing the site on the landscape.

Table 2. Representative physiographic features

Landforms	(1) Flat (2) Outwash plain (3) Valley train (4) Drainageway
Runoff class	Low to high
Flooding duration	Extremely brief (0.1 to 4 hours) to very brief (4 to 48 hours)
Flooding frequency	None to very rare
Ponding frequency	None
Elevation	120 – 350 m
Slope	0 – 10 %
Water table depth	20 – 70 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)	130-150 days
Freeze-free period (characteristic range)	170-180 days
Precipitation total (characteristic range)	940-990 mm
Frost-free period (actual range)	120-150 days

Freeze-free period (actual range)	160-180 days
Precipitation total (actual range)	840-1,020 mm
Frost-free period (average)	140 days
Freeze-free period (average)	170 days
Precipitation total (average)	940 mm

- (1) ANN ARBOR U OF MICH [USC00200230], Ann Arbor, MI
- (2) PONTIAC WWTP [USC00206658], Auburn Hills, MI
- (3) DELAWARE [USC00332119], Delaware, OH
- (4) KENTON [USC00334189], Kenton, OH
- (5) WABASH [USC00129138], Wabash, IN
- (6) DECATUR 1 N [USC00122096], Decatur, IN
- (7) HUNTINGTON [USC00124181], Huntington, IN
- (8) HILLSDALE [USC00203823], Hillsdale, MI

Influencing water features

This ecological site is not influenced by wetland or riparian water features as it is an upland site. The site does flood, but the frequency is very rare for up to a brief (2 to 7 day) duration. The majority of the water comes from precipitation, but the site does receive water from adjacent sites that are up slope. The site is a recharge depression, as the majority of the water on the site enters into the groundwater.

Soil features

The soil series associated with this site are: Whitaker, Stone, Sleeth, Riverdale, Matherton, Jimtown, Homer, Digby, Bogart, Aptakisic. They are deep to very deep, somewhat poorly to moderately well drained, and moderately slow to very rapid permeable soils, with strongly acidic to neutral soil reaction, that formed in outwash.

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

Figure 8. Mapunit location in MRLA.

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) Sandy loam (5) Silty clay loam (6) Silt loam
Drainage class	Somewhat poorly drained to moderately well drained
Permeability class	Moderately slow to very rapid
Soil depth	90 – 140 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	Not specified
Available water capacity (Depth not specified)	11.43 – 20.07 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)	5.5 – 7.9
Subsurface fragment volume <=3" (Depth not specified)	0 – 30 %

Subsurface fragment volume >3" (Depth not specified)	0 – 20 %
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Ecological dynamics

The historic plant community of the Outwash Upland ecological site is mixed hardwood forest with sugar maple and red oak being the dominant canopy species. At late seral stages, small gap disturbances are the most common overall disturbance mechanism and often result from windthrow or disease. This allows for ascension of shade tolerant species to reach the canopy. Mid-seral stages are more prone to low intensity ground fires, which allow the oak species to reach the canopy. This mixture of disturbance types and frequency permits the mix of species that occupies the majority of the canopy.

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 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. 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 work.

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
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Date	09/15/2026
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:
