

Ecological site F111XB404IN

Dry 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

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. 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 Dry-Mesic Oak Forest and Woodland, North-Central Interior Beech-Maple Forest, Ruderal Forest LANDFIRE Biophysical Settings anticipated (USGS, 2010): North-Central Interior Dry-Mesic Oak Forest and Woodland, North-Central Interior Beech-Maple Forest

Ecological site concept

Ecological Site Concept This site is an upland site formed on glacial outwash parent materials in soils that are moderately well drained or drier. The soils have a relatively light soil surface color (lighter than 3/2 Munsell) with a surface modifier of cobbly, gravelly, or very gravelly. This site is found on, generally, steeper topography than the Outwash Upland, though the range of slopes (0 to 25 percent) is the same. The topography and courser materials leads this site to being better drained and drier. The characteristic vegetation of the site is that of a somewhat dry forest dominated largely by oak species, such as white oak and black oak that can tolerate the increased drainage of the site. Hickory species are also common throughout the site along with sugar maple in somewhat fire protected areas, black cherry, and sassafras. Moderate fire return interval (40-60yrs) for low intensity fires and stand replacing fires every 100-200yrs contributed to the dominance of oak species on the site. Changes in the fire regime have led to many of the extant representation of the site to have a greater amount of fire sensitive, shade tolerate species occupying both the understory and canopy than what was present at the time of European settlement. In this state, the site progress through a phase that in characterized by a co-dominance in the canopy of oaks and sugar maples. Continued absence of fire or lack of timber stand management allows the site to more resemble a mesic forest as dominated by sugar maple and American beech. Currently, the majority of the site is in agricultural production, with the majority being used for growing corn and soybeans, though some areas are used for growing cool season forage and pasture.

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
F111XB403IN	Outwash Upland Soil surface is light in color (lighter than 3/2 Munsell)

Similar sites

F111XB303IN	Dry Bedrock Forest Dry Bedrock Forest
R111XB402IN	Dry Outwash Integrade Dry Outwash Integrade

Table 1. Dominant plant species

Tree	(1) <i>Quercus alba</i> (2) <i>Quercus velutina</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 end moraine, outwash plain, hills, and outwash terrace. Slopes are variable and range from 0 to 25 percent.

Figure 1. Block diagram with Oshtemo and Kalamazoo representing the site on the landscape.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Moraine (3) Outwash terrace (4) Outwash plain
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Runoff class	Low to high
Flooding duration	Extremely brief (0.1 to 4 hours) to brief (2 to 7 days)
Flooding frequency	None to very rare
Ponding frequency	None
Elevation	120 – 400 m
Slope	0 – 30 %
Water table depth	30 cm
Aspect	W, NW, N, NE, E, SE, S, SW

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)	910-990 mm
Frost-free period (actual range)	120-150 days
Freeze-free period (actual range)	160-190 days
Precipitation total (actual range)	810-1,020 mm
Frost-free period (average)	140 days
Freeze-free period (average)	170 days

Precipitation total (average)	940 mm
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- (1) COLUMBIA CITY [USC00121739], Columbia City, IN
- (2) HILLSDALE [USC00203823], Hillsdale, MI
- (3) BELLEFONTAINE [USC00330563], Bellefontaine, OH
- (4) LIMA WWTP [USC00334551], Lima, OH
- (5) UPPER SANDUSKY [USC00338534], Upper Sandusky, OH
- (6) CHELSEA [USC00201502], Chelsea, MI
- (7) PONTIAC WWTP [USC00206658], Auburn Hills, MI
- (8) MARION 2 N [USC00334942], Marion, OH
- (9) MONTPELIER [USC00335438], Montpelier, OH

Influencing water features

This ecological site is not influenced by wetland or riparian water features.

Soil features

Representative Soil Features

The soil series associated with this site are: Thackery, Sisson, Scioto, Rush, Riverdale, Oshtemo, Ormas, Ockley, Muncie, Martinsville, Leoni, Kosciusko, Kalamazoo, Ionia, Haney, Gallman, Fox, Eldean, Chili, Casco, Bronson, Boyer, Belmore. They are shallow to deep, somewhat poorly to somewhat excessively drained, and moderately slow to very rapid permeable soils, with moderately acidic to neutral soil reaction, that formed in outwash.

Parent Materials Kind: outwash

Surface Texture: clay loam, fine sandy loam, loam, loamy fine sand, loamy sand, sandy clay loam, sandy loam, silt loam, silty clay loam

Surface Modifier: cobbly, gravelly, very gravelly

Subsurface Texture group: loamy

Figure 8. Mapunit location within the MLRA

Table 4. Representative soil features

Parent material	(1) Outwash
Surface texture	(1) Clay loam (2) Fine sandy loam (3) Loam (4) Loamy fine sand (5) Loamy sand (6) Sandy clay loam (7) Silty clay loam (8) Silt loam (9) Sandy loam
Drainage class	Somewhat poorly drained to somewhat excessively drained

Permeability class	Moderately slow to very rapid
Soil depth	40 – 150 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	Not specified
Available water capacity (Depth not specified)	6.86 – 20.32 cm
Calcium carbonate equivalent (Depth not specified)	0 – 30 %
Electrical conductivity (Depth not specified)	Not specified
Sodium adsorption ratio (Depth not specified)	Not specified
Soil reaction (1:1 water) (Depth not specified)	5.8 – 7.9
Subsurface fragment volume <=3" (Depth not specified)	0 – 40 %
Subsurface fragment volume >3" (Depth not specified)	0 – 30 %

Ecological dynamics

The historic plant community of the Dry Outwash Upland is that of an oak-hickory forest. The forest canopy is dominated by white oak, black oak, and hickory species, with sugar maple, black cherry and sassafras being present as well. Fire was a major disturbance mechanism for this site. Ground fires occurred every 40-60 years and stand replacing fires nearly every 200 years.

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 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. 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

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	09/17/2026
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:
