USDA Natural Resources Conservation Service

Ecological site F111XC007IN
Glacial Ridge

Accessed: 05/19/2024

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.

111C – Indiana and Ohio Till Plain, Northwestern Part. This MLRA is in the glaciated part of north-central Indiana and is dominated by glacial till plains broken in places by lake plains, outwash plains, and flood plains. Areas that parallel most of the major rivers and streams have deposits of sand.

Although it is an important agricultural region, MLRA 111C hosts a large proportion of Indiana’s biodiversity.

Classification relationships

Major Land Resource Area (MLRA)(USDA-Natural Resources Conservation Service, 2006)

USFS Ecological Regions (USDA, 2007):
Sections - Central Till Plains, Beech Maple (222H), South Central Great Lakes (222J), Central Till Plains and Grand Prairies (251D)

Subsections - Kalamazoo-Elkhart Moraines and Plains (222Jh), Steuben Interlobate Moraines (222Ji), Bluffton Till Plains (222Ha), Entrenched Valleys (222Hf), Miami-Scioto Plain-Tipton Till Plain (222Hb), Kankakee Sands (251Dg) and Eastern Grand Prairie (251Dd).

NatureServe Systems anticipated (NatureServe, 2011): Agriculture-Pasture/Hay, Agriculture-Cultivated Crops and Irrigated Agriculture, Harvested Forest-Grass Regeneration, Harvested Forest-Herbaceous Regeneration, Introduced Upland Vegetation – Treed, Managed Tree Plantation, North-Central Interior Beech-Maple Forest, North-Central Interior Dry Oak Forest & Woodland, North-Central Interior Dry-Mesic Oak Forest & Woodland, North-Central Interior Maple-Basswood Forest, North-Central Interior Oak Savanna, Ruderal Forest, Ruderal Upland-Old Field.

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

Ecological site concept

This site is an upland site formed on glacial till parent materials. It is located on summits, shoulders and backslopes on relatively steep angles of slope (< 4%) with moderately well to well drainage. There are 4 distinct states: 1. till mesic woodland (reference state), 2. woodland state, 3. agriculture state, 4. old field state. The disturbance regime was characterized by low-severity surface fires. Most of these fires on this site were of set by Native Americans or overrun from fires on adjacent prairies and savannas. Fire frequency was a large determinant of the species dominance in the tree canopy.

Currently, roughly 60% of this site in in agricultural production, with the majority being used for corn and soybean production.

Associated sites

F111XC009IN	**Overflow**
F111XC015IN	**Dry Floodplain**
R111XC005IN	**Glacial Depression**
R111XC006IN	**Flat Glacial Ridge**
R111XC010IN	**Well Drained Overflow**

Similar sites

F111XC003IN	**Sandy Interdune**
F111XC009IN	**Overflow**

Table 1. Dominant plant species

Tree	(1) *Quercus alba* (2) *Carya ovata*
Shrub	(1) *Asimina triloba* (2) *Viburnum acerifolium*
Herbaceous	(1) *Cystopteris* (2) *Solidago*

Physiographic features

This site is located in the 111C - Indiana and Ohio Till Plain, Northwester Part MLRA. It is classified as an upland site. This site was formed on glacial till, often times with loess or silty layers at the surface on till plains and moraines. It is located on the summits, shoulders, and backslopes with a slope generally greater than 4%.

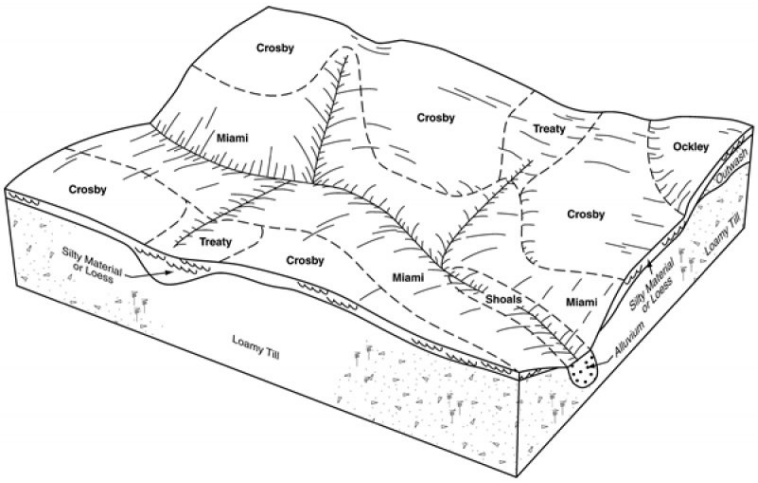


Figure 1. F111CY007IN - Block Diagram showing Miami soil pos

Table 2. Representative physiographic features

Landforms	(1) Till plain (2) Moraine
Flooding frequency	None to very rare
Ponding frequency	None
Slope	4–38%
Water table depth	61–102 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate is humid continental in nature typified by large season temperature differences, with warm to hot, humid summers and cold winters. Precipitation is relatively well distributed year-round.

The average first frost should occur around October 12 and the last freeze of the season should occur around April 25.

Table 3. Representative climatic features

Frost-free period (average)	157 days
Freeze-free period (average)	186 days
Precipitation total (average)	1,041 mm

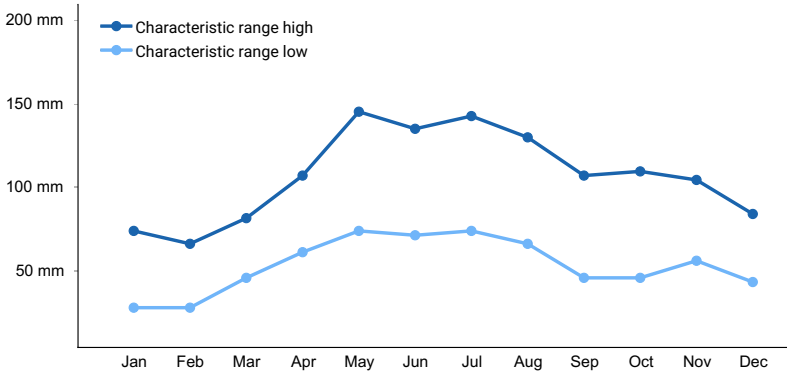


Figure 2. Monthly precipitation range

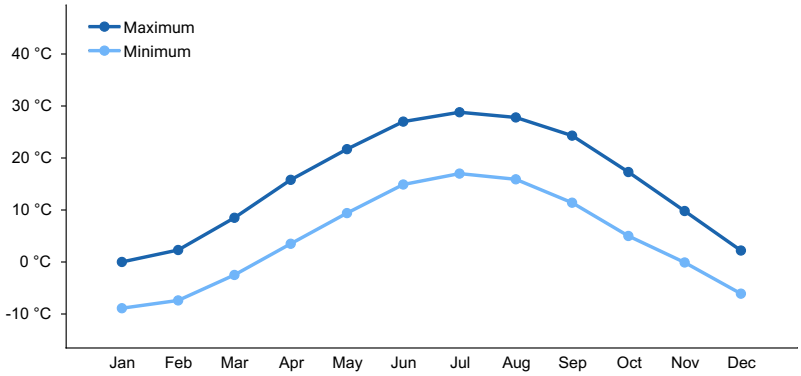


Figure 3. Monthly average minimum and maximum temperature

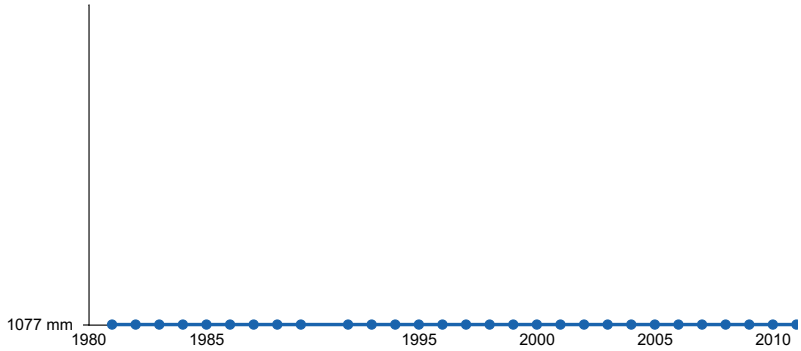


Figure 4. Annual precipitation pattern

Climate stations used

- (1) LAGRANGE 1 S [USC00124730], LaGrange, IN
- (2) RENSSELAER [USC00127298], Rensselaer, IN
- (3) ROCHESTER [USC00127482], Rochester, IN
- (4) LOGANSPORT CICOTT ST [USC00125117], Logansport, IN
- (5) PRAIRIE HEIGHTS [USC00127102], LaGrange, IN
- (6) LAKEVILLE [USC00124782], Lakeville, IN

Influencing water features

This being an upland site, it is not influenced by water from a wetland or stream.

Soil features

In a representative profile for the Glacial Ridge ecological site, the soils of this site are dark grayish to pale brown at the surface. These soils are very deep and mostly typic or oxyaquic hapludalfs.

It should be noted that there may be inclusions of other soils and because of mapping scale are not divided out.

The two largest, by acres, soils components for this site are Miami and Wawasee.

Table 4. Representative soil features

Surface texture	(1) Silt loam (2) Sandy loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to moderate
Soil depth	61–102 cm

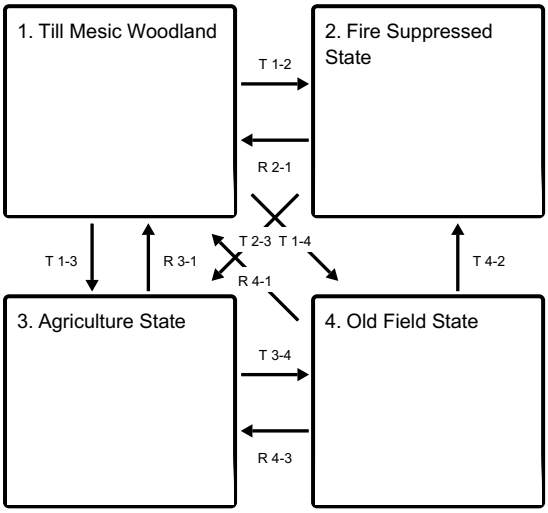
Surface fragment cover <=3"	0–10%
Subsurface fragment volume <=3" (Depth not specified)	0–10%

Ecological dynamics

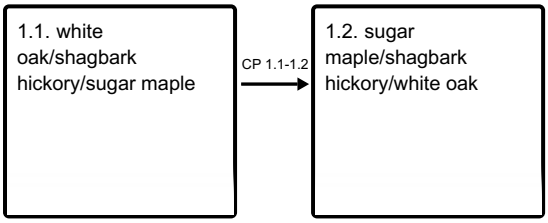
The historic plant community of the Dry Alluvium ecological site is a dry floodplain forest. The dominant species in the canopy are sugar maple and swamp white oak, with silver maple, elm, and basswood being common as well. This site is the result of hydrologic and geomorphic process at the macro scale and windthrow on a more local scale. The disturbance regime is one of somewhat frequent low intensity flooding events punctuated punctuated by high intensity events (ie. 100+ year floods, tornados, or ice storms). Since settlement, approximately 30% of this site is in agriculture production. The balance being largely a mix of the reference state and the invaded state.

State and transition model

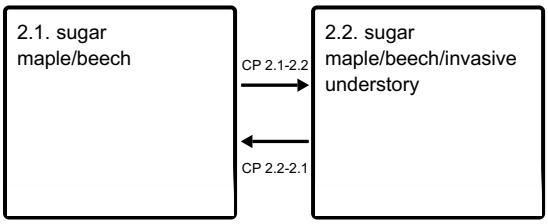
Ecosystem states



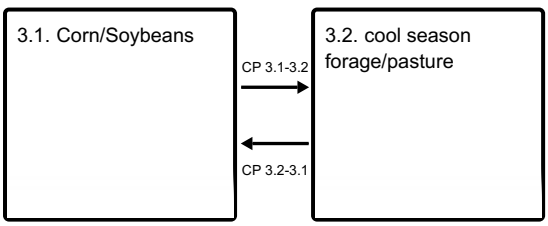
State 1 submodel, plant communities



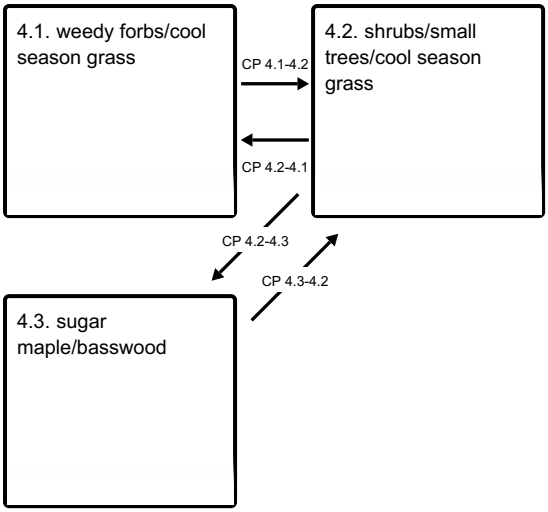
State 2 submodel, plant communities



State 3 submodel, plant communities



State 4 submodel, plant communities



State 1
Till Mesic Woodland

This is the reference or diagnostic plant community for this site. In reference conditions, this site was dominated by oak species, primarily white oak, along with shagbark hickory. Sub-canopy species included dogwood, elm, and sugar maple. Surface fires every 20-65 years maintained the site. Absence of fire longer than 65 years transitions the site to state 2. Selective tree harvest and fire would restore the site to state 1. Removal of the trees and having the area prepped for planting moves the site to state 3. Restoration to the reference community involves appropriate tree planting, timber management, and fire.

Community 1.1
white oak/shagbark hickory/sugar maple

This phase is characterized by the dominance of oak and hickory in the tree canopy. Sugar maple occurs largely in only the understory, with few individuals in the canopy. Longer fire return intervals shift this phase towards phase 2.

Community 1.2
sugar maple/shagbark hickory/white oak

This phase is characterized by protection from or a longer time since the last fire. Sugar maple is starting to become more common in the canopy and largely dominates the understory. Without fire, white oak is less competitive in the understory, but thrives in openings created by disturbance in the canopy.

Pathway CP 1.2-1.1
Community 1.1 to 1.1

Selective tree harvest followed by surface fire application

Pathway CP 1.1-1.2
Community 1.1 to 1.2

No management and no fire.

State 2
Fire Suppressed State

This state is characterized by a longer than normal fire return interval or the absence of fire as a disturbance agent. Shade tolerant species, specifically sugar maple and beech, that are present in the understory in relatively small amounts become the dominant tree species.

Community 2.1
sugar maple/beech

This state is characterized by a longer than normal fire return interval (65+ years) or the absence of fire. Sugar maple and beech are the dominant species in the canopy.

Community 2.2
sugar maple/beech/invasive understory

This state is characterized by a longer than normal fire return interval (65+ years) or the absence of fire. Sugar maple and beech are the dominant species in the canopy. Invasive species, specifically Asian bush honeysuckle species, have colonized and become the dominant species in the understory.

Pathway CP 2.1-2.2
Community 2.1 to 2.2

Establishment of invasive species and no management of them.

Pathway CP 2.2-2.1
Community 2.2 to 2.1

Chemical and mechanical treatment of invasive species.

State 3
Agriculture State

This site has largely been converted to agricultural use. Most of the historic acres are now in row crop agricultural use. Most common is a corn and soybean rotation of various types. Roughly 5% of the site is not used to grow hay or cool season forage and used for grazing.

Community 3.1
Corn/Soybeans

This phase is characterized by row crop agriculture of small grains, primarily corn and soybeans.

Community 3.2
cool season forage/pasture

This phase is characterized by forage or grazing agriculture. Different mixes of, generally, cool season grasses and forbs, largely clovers, are grown.

Pathway CP 3.1-3.2
Community 3.1 to 3.2

Planting of cool season pasture/forage species and management.

Pathway CP 3.2-3.1
Community 3.2 to 3.1

Planting, either by conventional or no-till methods, of row crop. Management that keeps the site in row crop production

State 4
Old Field State

Abandoned agricultural lands move into the old field state. This state is dominated at the outset by cool season grasses, mostly fescue, and weedy, opportunistic forbs. Absent management or fire, the site will progress to a shrub

dominated phase then to that of a mesic forest.

Community 4.1
weedy forbs/cool season grass

This phase is characterized by the absence of any management after being used for agriculture. Weedy forbs and non-native cool season grasses dominate.

Community 4.2
shrubs/small trees/cool season grass

Continued absence of management allows the site to become dominated by woody species. Shrubs and smaller, colonizing species, trees dominate the site. The same herbaceous component as found in phase 4.1 is present, just at a reduced amount.

Community 4.3
sugar maple/basswood

Continued absence of management allows for the site to develop into a mixed mesic forest. Sugar maple and basswood are the two most dominate tree species in the canopy.

Pathway CP 4.1-4.2
Community 4.1 to 4.2

Succession with no management.

Pathway CP 4.2-4.1
Community 4.2 to 4.1

Disturbance, of any type, that removes the woody species.

Pathway CP 4.2-4.3
Community 4.2 to 4.3

Succession with no management.

Pathway CP 4.3-4.2
Community 4.3 to 4.2

Disturbance, of any type, that removes some or all of the trees.

Transition T 1-2
State 1 to 2

No tree species selective management or fire has occurred for 65+ years.

Transition T 1-3
State 1 to 3

All trees are removed, the site prepared, tillage, and crops are planted.

Transition T 1-4
State 1 to 4

All the trees are removed and not follow up management is conducted. Fire is absent from the site.

Restoration pathway R 2-1
State 2 to 1

Prescribed tree thinning to give competitive advantage to desired species and fire move the site back to the reference state.

Transition T 2-3
State 2 to 3

All trees removed, the site prepared, tillage and planting the of the agricultural crop.

Restoration pathway R 3-1
State 3 to 1

Site preparation, tree planting, and regular application of fire.

Transition T 3-4
State 3 to 4

No management. Agricultural practices abandoned and succession allowed to take place

Restoration pathway R 4-1
State 4 to 1

Timber stand improvement, to include tree removal. Planting of desired tree species, especially white oak and shagbark hickory, if not present. The regular application of surface fires.

Transition T 4-2
State 4 to 2

No management over a long time frame (100+ years).

Restoration pathway R 4-3
State 4 to 3

Clear the woody species from the site, tillage, and plant the agricultural crop will move the site to state 3. Regular agricultural practices will maintain the site in that state.

Additional community tables

Inventory data references

Site concept developed through expert opinion, review of the literature, and field work. Field work has included field reconnaissance, qualitative data collection, and two Tier 3 plots.

Other references

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Contributors

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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	
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):**

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:**