

Ecological site R111XC006IN Flat Glacial Ridge

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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.

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, Central Interior Highlands calcareous Glade and Barrens, Central Interior Highlands Dry Acidic Glade & Barrens, Central Tallgrass Prairie, Harvested Forest-Grass Regeneration, Harvested Forest-Herbaceous Regeneration, Introduced Upland Vegetation – Treed, Managed Tree Plantation, North-Central Interior Sand Gravel Tallgrass Prairie, Ruderal Forest, Ruderal Upland-Old Field.

LANDFIRE Biophysical Settings anticipated (USGS, 2010): North-Central Interior Sand and Gravel Tallgrass

Prairie, North Central Oak Barrens, Central Tallgrass Prairie, Great Lakes Pine Barrens, Great Lakes Wet-Mesic Lakeplain Prairie.

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 low angles of slope (= 4%). There are 4 distinct states: 1. till mesic prairie (reference state), 2. woodland state, 3. agriculture state, 4. old field state. Frequent fires impacted this site about every 5 years maintaining the herbaceous species dominance. Much less frequently, insect and small mammal herbivory would impact local composition and dominance of the species. Currently, most of this site is in agricultural production with the most common practice being corn and soybean production.

Associated sites

F111XC007IN	Glacial Ridge
F111XC009IN	Overflow
R111XC005IN	Glacial Depression

Similar sites

R111XC008IN	Wet Overflow
R111XC005IN	Glacial Depression

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Andropogon gerardii</i> (2) <i>Sorghastrum nutans</i>

Physiographic features

This site is located in the 111C - Indiana and Ohio Till Plain, Northwestern Part Major Land Resource Area. It is classified as an upland site. It is located on the summits, shoulders, and backslopes of gentle slope, general 4% or less. This site was formed from glacial till parent materials.

Table 2. Representative physiographic features

Landforms	(1) Rise (2) Knoll (3) Till plain
Flooding frequency	None to very rare
Ponding frequency	None
Slope	0–4%
Water table depth	12–24 in
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)	161 days
Freeze-free period (average)	191 days
Precipitation total (average)	41 in

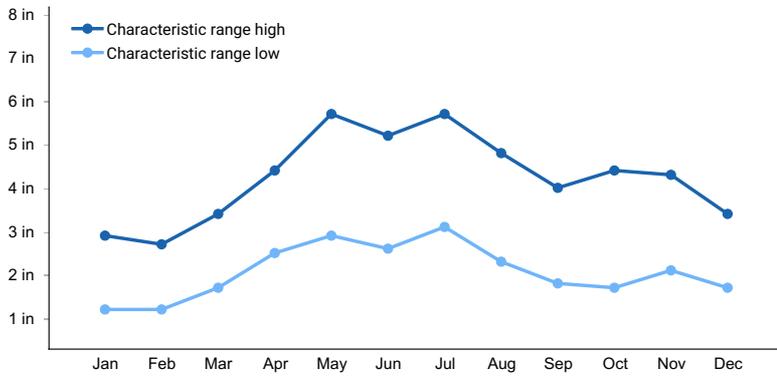


Figure 1. Monthly precipitation range

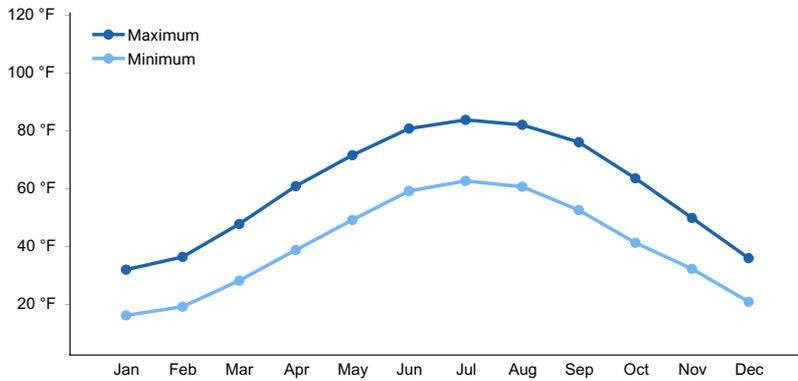


Figure 2. Monthly average minimum and maximum temperature

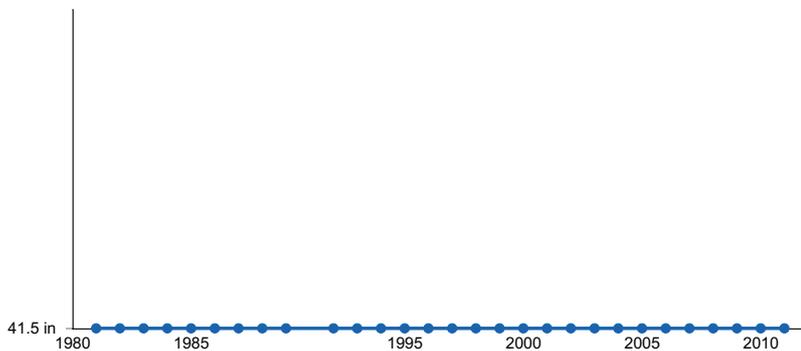


Figure 3. Annual precipitation pattern

Climate stations used

- (1) LAKEVILLE [USC00124782], Lakeville, IN
- (2) RENSSELAER [USC00127298], Rensselaer, IN
- (3) WEST LAFAYETTE 6 NW [USC00129430], West Lafayette, IN
- (4) PLYMOUTH [USC00126989], Plymouth, IN
- (5) ROCHESTER [USC00127482], Rochester, IN
- (6) CHALMERS 5 W [USC00121417], Chalmers, IN
- (7) GOSHEN 3SW [USC00123418], Goshen, 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 Flat Glacial Ridge ecological site, the soils are dark gray to brown on the surface and of generally a low class of drainage. They are formed in till on moraines, till plains, or lake plains.

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

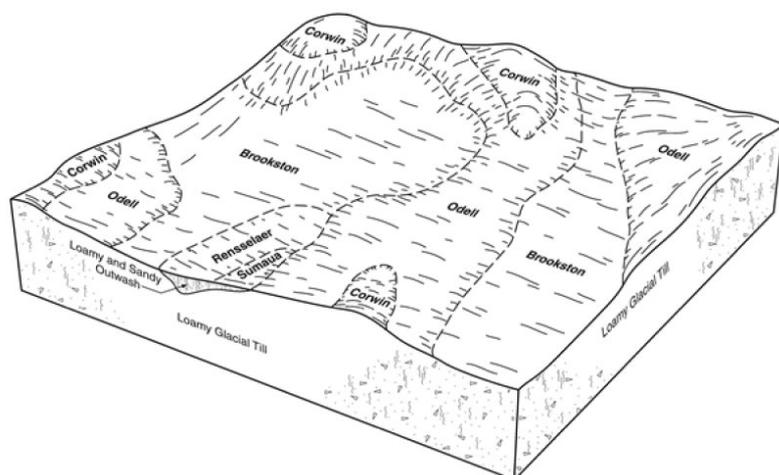


Figure 5. R111CY006IN - Flat Glacial Ridge

Table 4. Representative soil features

Surface texture	(1) Sandy loam (2) Loam (3) Clay loam
Family particle size	(1) Loamy
Drainage class	Somewhat poorly drained to well drained
Permeability class	Moderately slow to moderate
Surface fragment cover <=3"	0-3%

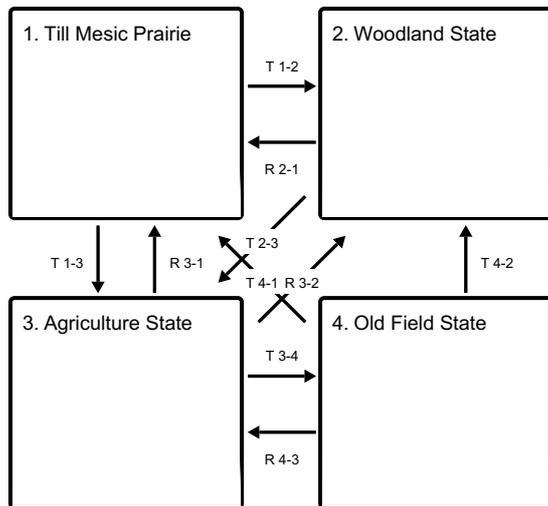
Ecological dynamics

The historic plant community of the Flat Glacial Ridge ecological site is a till mesic prairie. This site is characterized by the dominance of tall prairie grass species, particularly big bluestem, Indiangrass, and prairie dropseed. This site was maintained by frequent fires, often with a return interval of no more than 5 years. Much less frequently, insect and small mammal herbivory would impact local composition and dominance of the species. The herbaceous cover on the site was high, often times 70-100%.

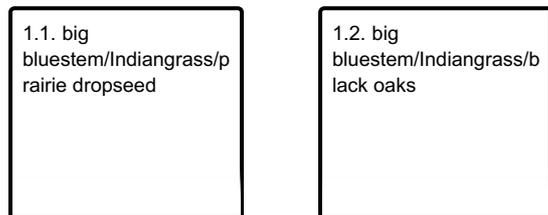
Since settlement, the majority of this site has been converted to agricultural use with the majority being in row crop agriculture. This was accomplished via improved drainage by ditches and field tile along with tillage.

State and transition model

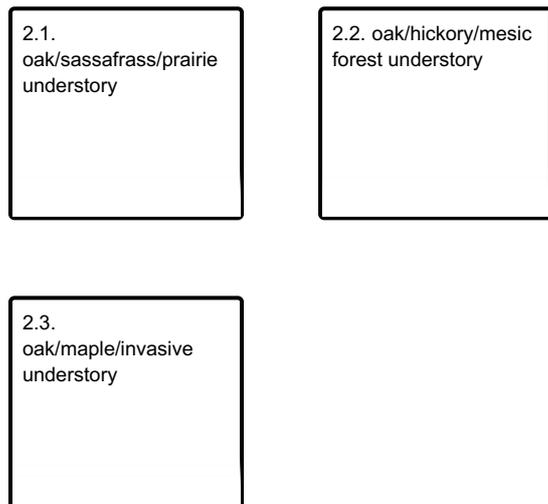
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 4 submodel, plant communities

4.1. weedy forbs/cool season grass

4.2. shrubs/small trees/cool season grass

4.3. Maple/Oak/mesic understory

State 1 Till Mesic Prairie

This is the reference or diagnostic plant community for this site. In reference conditions, this site was dominated by prairie grass species. Dominant species include big bluestem, Indiangrass, and prairie dropseed. Fire was the main disturbance agent that maintained this site and occurred quite frequently, often with a return interval of 5 years or shorter. The removal of fire from the system and/or lack of woody species management would move this site toward state 2. Drainage and tillage of the site allows the site to be converted to cropland (state 3).

Community 1.1 big bluestem/Indiangrass/prairie dropseed

This phase is characterized by frequent fire events (1-5 years) that maintain herbaceous species dominance. Dominant species include big bluestem, Indiangrass, and prairie dropseed. Secondary species are little bluestem, porcupine grass, and switchgrass.

Community 1.2 big bluestem/Indiangrass/black oaks

This phase is characterized by a longer fire return interval (5-20 years) than phase 1. Big bluestem, Indiangrass, and prairie dropseed remain the dominant species, but the production is less as the thatch builds up. Likewise, fire has allowed for trees, mostly black oak, to get established or to grow from existing grubs.

State 2 Woodland State

Absence of fire or lack of woody species management will move this site to a woodland state dominated by oak species, specifically black oak and white oak. The understory would contain many of the prairie species until the canopy closed. Woody understory species would include sassafras.

Community 2.1 oak/sassafras/prairie understory

This phase is characterized by the absence of fire. Trees, particularly oak species, have become the dominant growth form on the site. The understory still contains some prairie herbaceous species at the lower tree canopy levels, but they all disappear at the higher levels.

Community 2.2 oak/hickory/mesic forest understory

This phase is characterized by the absence of fire. Trees remain the dominant growth form. Hickory trees

become present in the canopy. The understory is occupied mostly by mesic species.

Community 2.3 oak/maple/invasive understory

This phase is characterized by the absence of fire. Trees remain the dominant growth form. More shade tolerant species, particularly sugar maple, become common in the canopy. The understory has been invaded by non-native invasive species, particularly species of Asian bush honeysuckle.

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.

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 Maple/Oak/mesic understory

Continued absence of management allows for the site to develop into a mixed mesic forest. Maple and white oak are the two most dominant tree species in the canopy.

Transition T 1-2 State 1 to 2

No woody species management and/or no fire moves the site to the woodland state

Transition T 1-3

State 1 to 3

Installation of drainage via either a ditch, field tile, or both followed by tillage and seeding move the site to the agriculture state. Regular agricultural practices maintain the site.

Restoration pathway R 2-1

State 2 to 1

Remove all trees and woody vegetation, seeding, and fire restores the site to the reference state.

Transition T 2-3

State 2 to 3

Removal of the trees, installation of drainage system, tillage and planting of the crop move this site to the agriculture state.

Restoration pathway R 3-1

State 3 to 1

Site preparation, removal of drainage (if needed), seeding, and regular application of fire.

Restoration pathway R 3-2

State 3 to 2

Forestry planting/practice, no fire applied.

Transition T 3-4

State 3 to 4

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

Transition T 4-1

State 4 to 1

Remove woody species and drainage system, seed appropriate species and regular application of fire moves the site back to the reference state.

Transition T 4-2

State 4 to 2

Forestry practices, to include tree planting and timber stand improvement practices, and no fire will move the site to the woodland state.

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 was developed using Tier 1 field reconnaissance, expert opinion, and review of the literature.

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:

-
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:**
