Ecological site R111XC010IN
Well Drained Overflow

Accessed: 04/19/2024

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, North-Central Interior Dry Oak Forest & Woodland, North-Central Interior Dry-Mesic Oak Forest & Woodland, North-Central Interior Oak Savanna, North-Central Oak Barrens, 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 Oak Barrens.

Ecological site concept

This site is an upland site formed on glacial outwash and colluvium parent materials in soils that are well drained or drier. There are 3 distinct states: 1. tall grass savanna, 2. fire suppressed state, and 3. agriculture state. Fire frequency and intensity, along with windthrow, and occasional droughty conditions, were the disturbance mechanisms that developed and then maintained this site. Since settlement, more than 80% of this site has been converted to agriculture with the majority being row crop agriculture. The most common practice involves grain rotations between corn and soybeans.

Associated sites

F111XC009IN	**Overflow** Lower in slope and lower on the landscape
R111XC001IN	**Sand Dune** Higher on the landscape, drier, sandier, and black oak is the dominant species.

Similar sites

R111XC001IN	**Sand Dune** Higher on the landscape, drier, sandier, and black oak is the dominant species.

Table 1. Dominant plant species

Tree	(1) *Quercus velutina*
Shrub	Not specified
Herbaceous	(1) *Andropogon gerardii* (2) *Schizachyrium scoparium*

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. This site was form on outwash and colluvium parent materials that are well drained or greater.

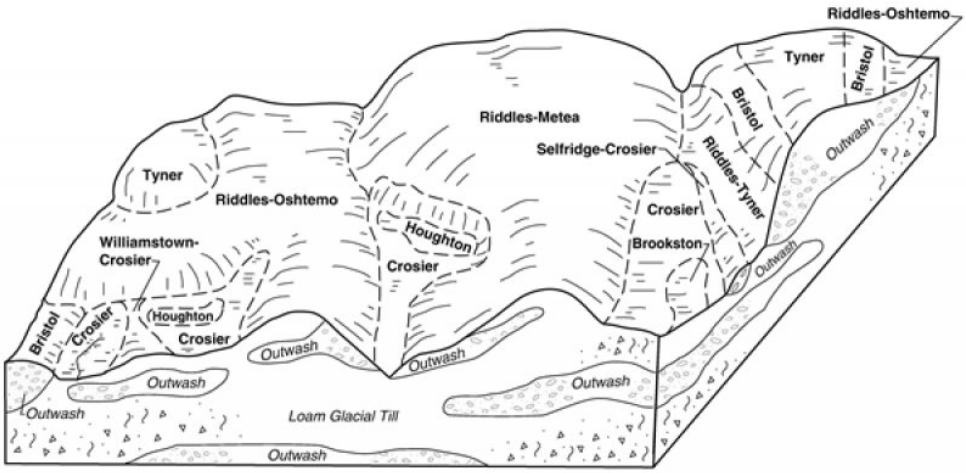


Figure 1. Block Diagram showing Riddles-Oshtemo as example

Table 2. Representative physiographic features

Landforms	(1) Till plain (2) Outwash plain (3) Outwash terrace
Flooding frequency	None to very rare
Ponding frequency	None to rare
Slope	1–22%
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 the first week of October and the last freeze of the season should occur around the last week of April.

Table 3. Representative climatic features

Frost-free period (average)	157 days
Freeze-free period (average)	184 days
Precipitation total (average)	41 in

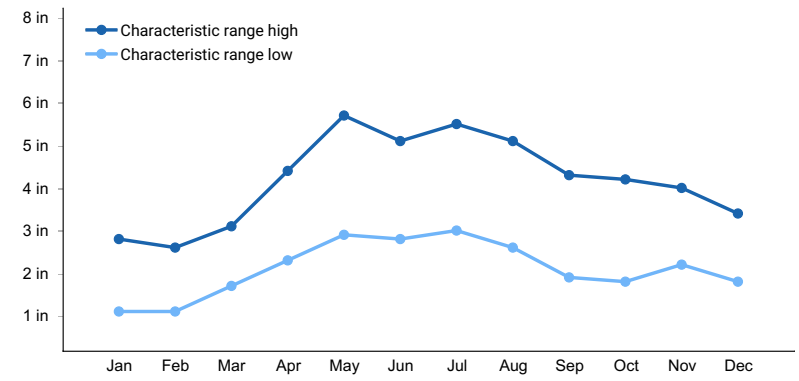


Figure 2. Monthly precipitation range

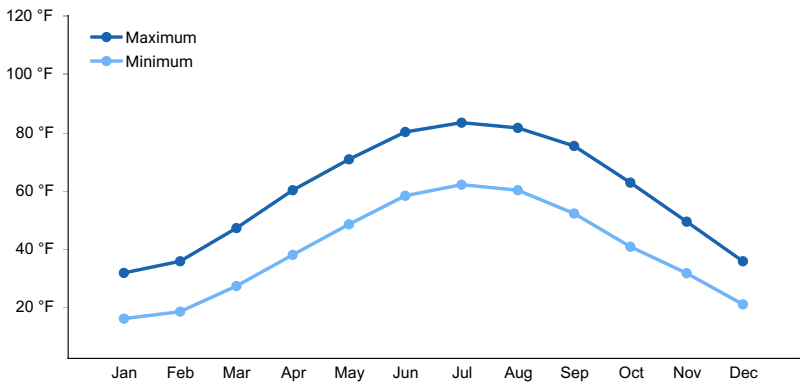


Figure 3. Monthly average minimum and maximum temperature

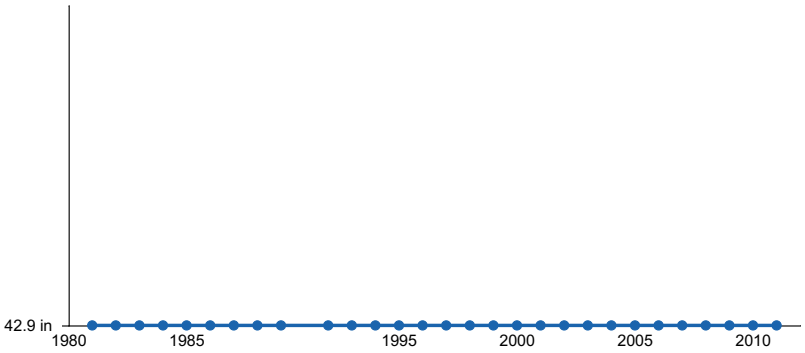


Figure 4. Annual precipitation pattern

Climate stations used

- (1) ROCHESTER [USC00127482], Rochester, IN
- (2) LAGRANGE 1 S [USC00124730], LaGrange, IN
- (3) ANGOLA [USC00120200], Angola, IN
- (4) DELPHI 2 N [USC00122149], Delphi, IN
- (5) PLYMOUTH [USC00126989], Plymouth, IN
- (6) PRAIRIE HEIGHTS [USC00127102], LaGrange, IN
- (7) LAKEVILLE [USC00124782], Lakeville, IN
- (8) LOGANSPORT CICOTT ST [USC00125117], Logansport, IN
- (9) WARSAW [USC00129240], Warsaw, IN

Influencing water features

Soil features

In a representative profile for the Well Drained Overflow ecological site, the soils of the this site are dark-grayish brown to brown at the surface. Taxonomically many of the soils for this site are mesic, typic hapludalfs. In should be noted that there may be inclusions of other soils and because of mapping scale are not divided out. Three of the largest, by acreage, soil components of this site are Kosciusko, Martinsville, and Riddles.

Table 4. Representative soil features

Surface texture	(1) Fine sandy loam (2) Sandy loam (3) Loam
Drainage class	Well drained to excessively drained
Permeability class	Moderate to rapid
Soil depth	30–90 in
Surface fragment cover <=3"	0–20%
Subsurface fragment volume <=3" (Depth not specified)	0–45%

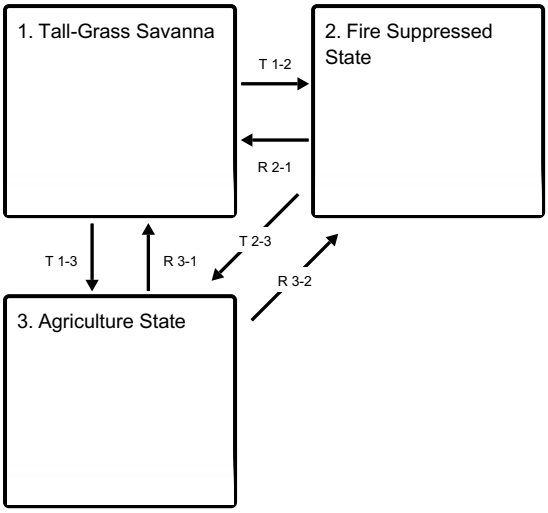
Ecological dynamics

The historic plant community of the Well Drained Overflow ecological site is that of a tall-grass savanna. This site is characterized by the ebb and flow of the co-dominant tall grass prairie species and oak species, primarily white oak. This dynamic was driven by the fire frequency and intensity. The canopy tree cover varied from about 10-60% and was dominated by white oak. Other prominent tree species included black oak and bur oak. The ground layer is dominated by graminoids principally big bluestem and little bluestem, but also included Indiangrass and switchgrass. Ground fires were the most common disturbance for this site. These frequent, but lower intensity fires, in conjunction with weather related tree mortality maintained the function of the site. Replacement fires occurred approximately every 200 years. Since settlement, the majority of this site has been converted to agricultural use

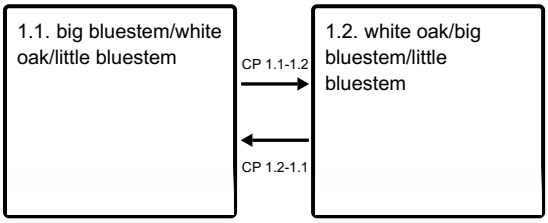
with the majority being row crop agriculture where corn and soybean production is the most common practice.

State and transition model

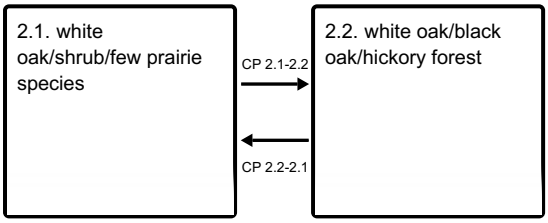
Ecosystem states



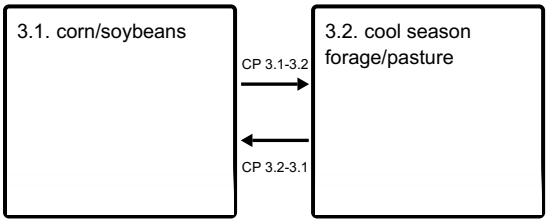
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Tall-Grass Savanna

This is the reference or diagnostic plant community for this site. In reference condition, this site was a co-dominance of prairie grass species and white oaks. Fire was the main disturbance agent that maintained the site. The more recent the fire the greater the dominance of grasses. Longer time between fire would sway dominance towards the trees. The removal of fire from the system and lack of tree management would move the site toward the fire suppressed state. Restoration back to the reference state could be accomplished with timber harvest, seeding of appropriate species, and the application of fire. Plowing the prairie portions up,removing the trees, and preparation for seeding for would transition the site to the agriculture state. Cessation of tillage practices, seeding the proper species and the application of fire would allow the agriculture state to return to the reference state.

Community 1.1

big bluestem/white oak/little bluestem

This phase is characterized by recent or frequently occurring ground fires that shift the co-dominance towards the herbaceous species. Longer fire return intervals will move this towards phase 2.

Community 1.2
white oak/big bluestem/little bluestem

This phase is characterized by protection from or longer time since the last fire. Trees and herbaceous species are co-dominant during this phase. More frequent/intense fire will shift this phase back to phase 1. Increased fire absence and no woody species management will move this site toward State 2, characterized by the marked increase in shrubs.

Pathway CP 1.1-1.2
Community 1.1 to 1.2

No fire or woody species management to remove some of the trees, especially younger age classes, from the site.

Pathway CP 1.2-1.1
Community 1.2 to 1.1

Regular application of fire and in some cases selective tree removal will move the phase back to phase 1.1

State 2
Fire Suppressed State

Absence of fire and/or lack of woody vegetation management will move this site to the fire suppressed state. This state is characterized by an increase in tree canopy concomitant with shrub species becoming the dominant growth form in the understory. White oaks will still be the dominant tree species, but black oaks and hickory become more prevalent in the canopy. Sub canopy and shrub species include the dogwood species, sassafras, and hazelnut species. Continued suppression of disturbance will lead to this site being a closed canopy oak-dominated forest at the higher end of the suggested canopy range.

Community 2.1
white oak/shrub/few prairie species

This phase is characterized by protection from or longer time since the last fire. Trees are the dominant growth form and shrubs are the secondary growth form. Timber cutting, more frequent/intense fire, and seeding will transition this phase back to State 1. Increased fire absence and no woody species management will move this site toward phase 2, characterized by shift in tree species.

Community 2.2
white oak/black oak/hickory forest

This phase is characterized by near lack of fire. Trees are the dominant growth form. black oaks and hickory species become more common/prevalent in the canopy. Timber cutting, more frequent/intense fire, and seeding will transition this phase back to phase 1.

Pathway CP 2.1-2.2
Community 2.1 to 2.2

No fire or woody species management allows, over time, for this phase to move to phase 2.2.

Pathway CP 2.2-2.1
Community 2.2 to 2.1

Selective tree harvest to remove some of the canopy level trees allow for more growth in the understory. The prairie

species may need to be planted if they are completely absent from the understory.

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 8% 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 to maintain them.

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

Transition T 1-2
State 1 to 2

No fire, no woody species management allow the site to transition to the fire suppressed state (#2).

Transition T 1-3
State 1 to 3

Tillage and/or spraying to kill the herbaceous understory species. Complete tree removal. Site preparation along with seeding will transition the site to the agriculture state (#3).

Restoration pathway R 2-1
State 2 to 1

Prescribed tree removal to allow for species, particularly white oak, competitive advantage. If the understory conditions warrant, it may be needed to also plant the herbaceous prairie species. Once established, regular application of fire will move the site back towards the reference state.

Transition T 2-3
State 2 to 3

Complete removal of the trees. Preparation of the site, tillage for seedbed preparation and seeding of the crop species. Agricultural practices will maintain the site in State 3.

Restoration pathway R 3-1

State 3 to 1

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

Restoration pathway R 3-2
State 3 to 2

Planting of both the tree species and understory plants, to include woody and prairie species. Forestry practices implemented to achieve desired species composition of the trees. No fire.

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.

Other references

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Contributors

Tyler Staggs

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:**