USDA Natural Resources
Conservation Service

Ecological site F111XD008IN
Till Depression Flatwood

Last updated: 9/11/2024
Accessed: 05/21/2025

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.

111D – Indiana and Ohio Till Plain, Western Part. This MLRA occurs in two separate areas. One area is in the west-central part of Indiana (73 percent), and the other is in southwestern Ohio (27 percent). The MLRA makes up 5,355 square miles (13,880 square kilometers). It includes the towns of Crawfordville, Delphi, Frankfort, Lafayette, and Liberty, Indiana, and Hamilton, Lebanon, Middletown, and Wilmington, Ohio. Interstates 65 and 74 cross the part of this area in Indiana, and Interstates 71 and 75 cross the part in Ohio. Shades and Turkey Run State Parks are in the part in Indiana, and Caesar Creek and Hueston Woods State Parks are in the part in Ohio. A small portion of the Wright-

Patterson Air Force Base, in Ohio, is in the northern part of the area.

This area is in the Till Plains Section of the Central Lowland Province of the Interior Plains. It is dominated by loess hills and flats that are broken in places by moraines, kames, outwash plains, and stream terraces. Narrow, shallow valleys commonly are along the few large streams in the area. Elevation ranges from 530 to 1,050 feet (160 to 320 meters), increasing gradually from southwest to northeast. 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: Wabash (0512), 68 percent; Great Miami (0508), 15 percent; Middle Ohio (0509), 14 percent; Scioto (0506,) 2 percent; and Upper Illinois (0712), 1 percent. Wildcat Creek in Indiana and the Little Miami River in Ohio have been designated as National Wild and Scenic Rivers. Sugar Creek and Walnut Creek occur in the part of the area in northern Indiana, and the Whitewater River is in the part in southeastern Indiana. The Sevenmile, Fourmile, and Great Miami Rivers cross the part of the area in Ohio.

Most of the eastern part of this MLRA is underlain by Late Ordovician shale and limestone. The western part is underlain by shale, siltstone, sandstone, limestone, and dolostone ranging in age from Middle Pennsylvanian to Silurian. Surficial materials include glacial deposits of till, outwash, and lacustrine sediments from Wisconsin and older glacial periods. A thin or moderately thick mantle of loess overlies much of the area.

Classification relationships

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

USFS Ecological Regions (USDA, 2007):
Sections –Central Till Plains, Beech Maple (222H), Interior Low Plateau-Shawnee Hills (223D), Interior Low Plateau-Bluegrass (223F), Central Till Plains-Oak Hickory (223G), Central Till Plains and Grand Prairies (251D)

Subsections -Bluffton Till Plains (222Ha), Miami-Scioto Plain-Tipton Till Plain (222Hb), Little Miami Old Drift Plain (222Hc), Mad River Interlobate Plains (222Hd), Crawford Uplands (223De), Crawford Escarpment (223Df), Northern Bluegrass (223Fd), Lower Wabash Alluvial Plain (223Gc), Southwest Indiana Glaciated Lowlands (223Ge), Eastern Grand Prairie (253Dd).

NatureServe Systems anticipated (NatureServe, 2011): Agriculture - Cultivated Crops and Irrigated Agriculture, Agriculture - Pasture/Hay, Allegheny-Cumberland Dry Oak Forest and Woodland, Central Interior Acidic Cliff and Talus, Central Interior Highlands Calcareous Glade and Barrens, Central Tallgrass Prairie, Clearcut - Grassland/Herbaceous, Introduced Upland Vegetation – Treed, Managed Tree Plantation, Mississippi River Riparian Forest, North-Central Interior and Appalachian Acidic Peatland,

North-Central Interior Beech-Maple Forest, North-Central Interior Dry-Mesic Oak Forest and Woodland, North-Central Interior Dry Oak Forest and Woodland, North-Central Interior Floodplain, North-Central Interior Freshwater Marsh, North-Central Interior Maple-Basswood Forest, North-Central Interior Oak Savanna, North-Central Interior Wet Flatwoods, North-Central Interior Wet Meadow-Shrub Swamp, North-Central Oak Barrens, Northern Atlantic Coastal Plain Hardwood Forest ,Ruderal Forest, Ruderal Upland - Old Field, South-Central Interior / Upper Coastal Plain Wet Flatwoods, South-Central Interior Large Floodplain, South-Central Interior Mesophytic Forest, South-Central Interior Small Stream and Riparian, Southern Appalachian Oak Forest, Southern Interior Low Plateau Dry-Mesic Oak Forest, Successional Shrub/Scrub

LANDFIRE Biophysical Settings anticipated (USGS, 2010): Allegheny-Cumberland Dry Oak Forest and Woodland, Bluegrass Savanna and Woodland, Central Interior and Appalachian Floodplain Systems, Central Interior and Appalachian Riparian Systems, Central Interior and Appalachian Shrub-Herbaceous Wetland Systems, Central Interior and Appalachian Swamp Systems, Central Interior Highlands Calcareous Glade and Barrens, Central Interior Highlands Dry Acidic Glade and Barrens, Central Tallgrass Prairie, Great Lakes Coastal Marsh Systems, Mississippi River Alluvial Plain Dry-Mesic Loess Slope Forest, North-Central Interior Beech-Maple Forest, North-Central Interior Dry-Mesic Oak Forest and Woodland, North-Central Interior Dry Oak Forest and Woodland, North-Central Interior Maple-Basswood Forest, North-Central Interior Oak Savanna, North-Central Interior Wet Flatwoods, Paleozoic Plateau Bluff and Talus, Pennyroyal Karst Plain Prairie and Barrens, South-Central Interior Mesophytic Forest, South-Central Interior/Upper Coastal Plain Flatwoods, Southern Appalachian Oak Forest, Southern Interior Low Plateau Dry-Mesic Oak Forest

Ecological site concept

This site is a wetland site formed on glacial till parent materials. It is located on the depressions, flats, and swales of glacial till plains and moraines. The soils have loamy textured, dark soil surfaces and are very poorly or poorly drained. Taxonomically these soils are mollisols having been formed in anaerobic conditions with a high amount of organic matter. These sites are not flooded, but do often experience frequent ponding for up to extended durations (> 30 days).

The characteristic vegetation of the site is that of a flatwoods type dominated by pin oak and sweetgum with swamp white oak, cottonwood, green ash, and silver maple being common in the canopy as well. The large, seasonal fluctuation of water on the site allows for the co-existence of upland and lowland trees. Inundation of the site generally occurs in the spring which leads to a sparse and patchy understory. Fire did occur on the site, but high intensity fires were rare. Low intensity surface fires were more common on sites that are adjacent to more fire prone sites such as prairies and savannas. Ponding in the spring followed by summer drought along with windthrow were the most dominant disturbance factors. A large portion of this site has been drained and is in agricultural production.

Associated sites

F111XD005IN	**Till Depression** Located on adjacent landscape position; soil surface lighter than 3/2 Munsell; soils are taxonomically Alfisols
R111XD006IN	**Mollic Till Depression** Located on an adjacent landscape position; dark soil surface color extends less than 10 inches deep.
R111XD007IN	**Till Depression Prairie** Located on similar landscape position; soils are well drained.

Similar sites

F111XD013IN	**Wet Lacustrine Forest** Located on lacustrine parent material.
F111XD015IN	**Wet Loess Upland** Located on loess parent material; soils are somewhat poorly to well drained and are taxonomically Alfisols.

Table 1. Dominant plant species

Tree	(1) *Quercus palustris* (2) *Liquidambar styraciflua*
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This ecosite is found in till plain in MLRA 111D: Indiana and Ohio Till Plain, Western Part. It is located in depressional areas; footslopes and toeslopes.

Table 2. Representative physiographic features

Landforms	(1) Depression (2) Glacial drainage channel (3) Till plain
Runoff class	Negligible to low
Flooding frequency	None
Ponding duration	Brief (2 to 7 days) to very long (more than 30 days)
Ponding frequency	None to frequent
Elevation	137–396 m
Slope	0–2%

Ponding depth	0–38 cm
Water table depth	0–137 cm
Aspect	W, N

Climatic features

The average annual precipitation in this area is 36 to 43 inches (915 to 1,090 millimeters). Most of the rainfall occurs as convective thunderstorms during the growing season. About half or more of the precipitation occurs during the freeze-free period. Snowfall is common in winter. The average annual temperature is 49 to 54 degrees F (10 to 12 degrees C). The freeze-free period averages about 200 days and ranges from 180 to 215 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	133-150 days
Freeze-free period (characteristic range)	173-180 days
Precipitation total (characteristic range)	991-1,067 mm
Frost-free period (actual range)	131-151 days
Freeze-free period (actual range)	170-182 days
Precipitation total (actual range)	991-1,092 mm
Frost-free period (average)	142 days
Freeze-free period (average)	176 days
Precipitation total (average)	1,041 mm

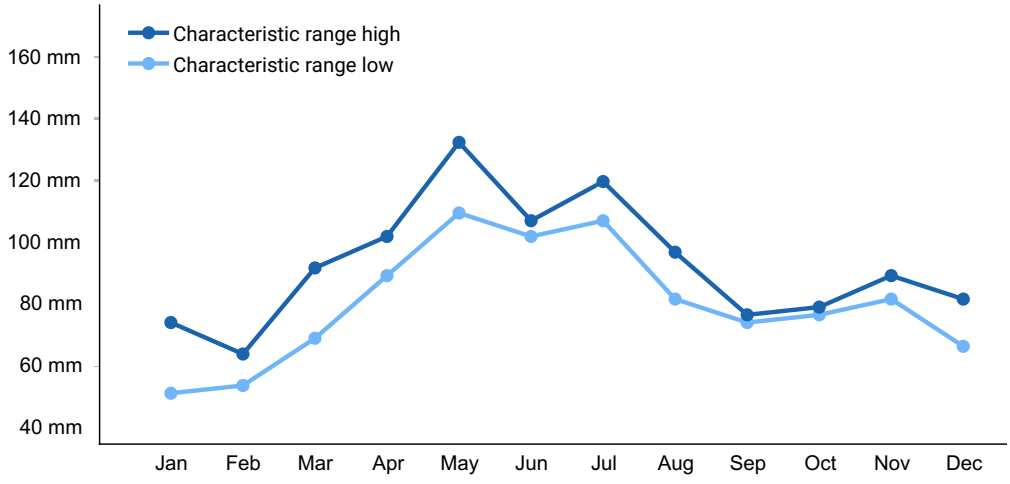

Figure 1. Monthly precipitation range

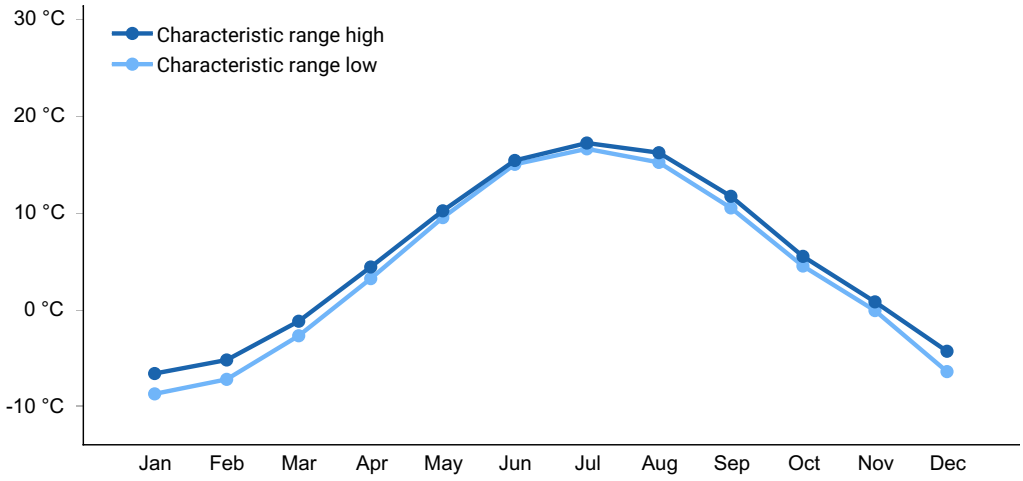

Figure 2. Monthly minimum temperature range

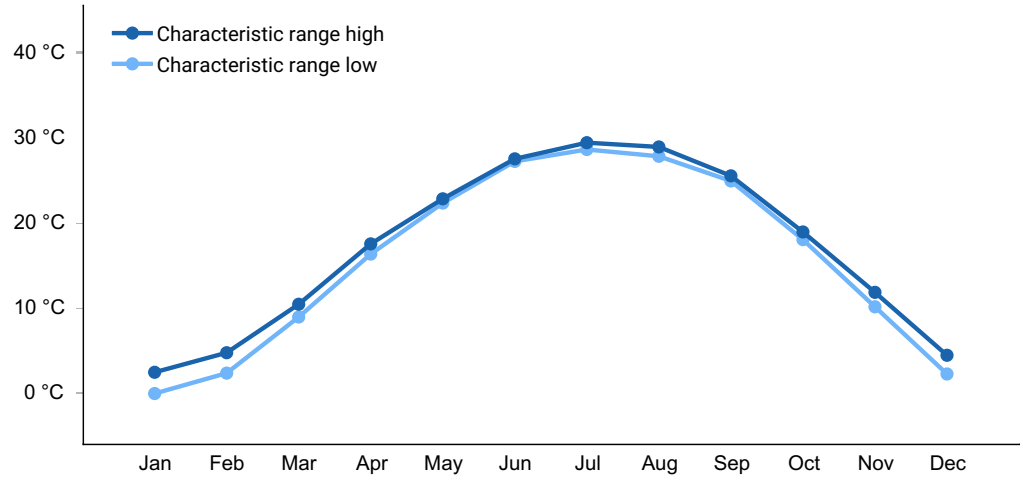

Figure 3. Monthly maximum temperature range

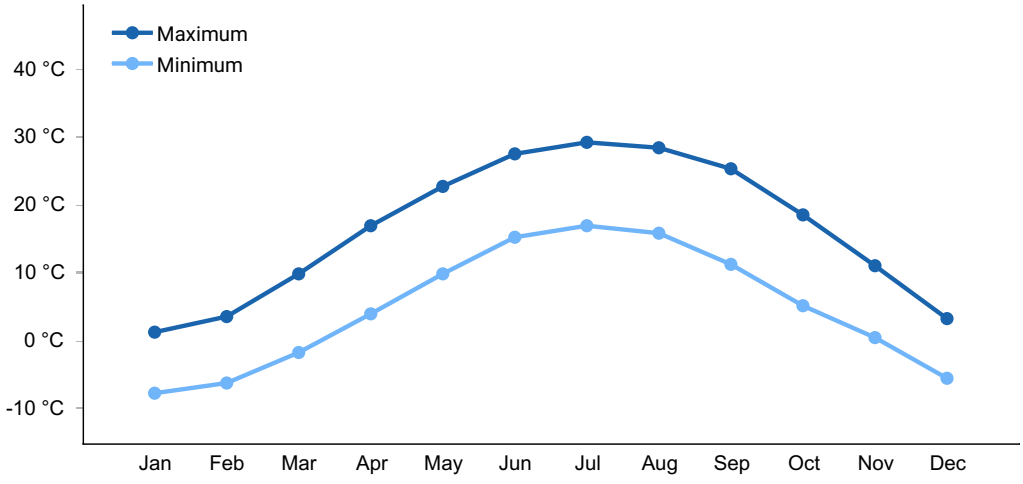

Figure 4. Monthly average minimum and maximum temperature

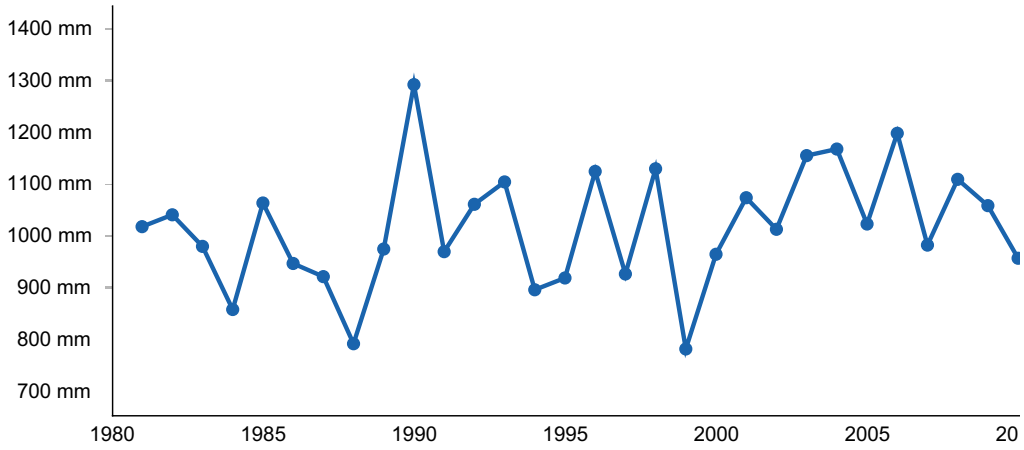

Figure 5. Annual precipitation pattern

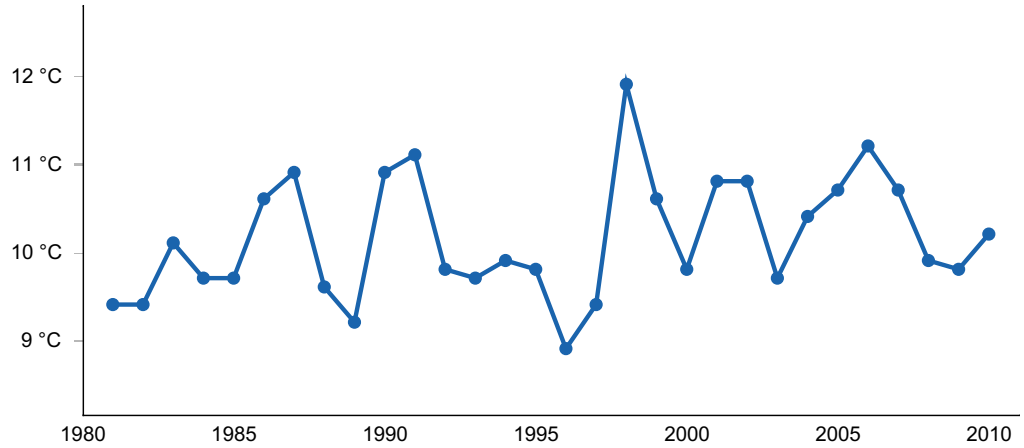

Figure 6. Annual average temperature pattern

Climate stations used

- (1) BOSWELL 4WNW [USC00120858], Fowler, IN
- (2) BROOKVILLE [USC00121030], Metamora, IN
- (3) WABASH [USC00129138], Wabash, IN
- (4) YOUNG AMERICA [USC00129905], Kokomo, IN
- (5) WILMINGTON 3 N [USC00339219], Wilmington, OH

Influencing water features

This site is a depressional wetland that receives water via precipitation and runoff from surrounding landscapes. The soils are mostly very poorly to somewhat poorly drained. Drainage and permeability (slow to moderate) along with landscape position lead much of the site being frequently ponded, most often in the spring and occasionally in the fall. Duration of ponding varies from brief (2 to 7 days) to very long (> 30 days). Ponding depth is has an average maximum of 15 inches.

Wetland description

The hydrogeographic model classification of this site is DEPRESSIONAL: Till Plain, Ponded, Swale; forested. This site has a Cowardin Classification of PFO6An; it is a palustrine system deciduous forests that is temporarily ponded on mineral soil.

Soil features

The soil series associated with this site are: Treaty, Selma, Secondcreek, Pewamo, Pella, Millsdale, Lisbon, Kokomo, Cyclone, Cope, Chalmers, Brookston, Ashkum. They are very deep, very poorly drained to somewhat poorly drained, and very slow to moderate permeable soils, with extremely acidic to neutral soil reaction, that formed in Glaciofluvial deposits, Glaciolacustrine deposits, Lacustrine deposits, Loess, Outwash, Residuum, Slope alluvium, Till from Limestone, Limestone and dolomite, Limestone and shale, Quartzite, Sedimentary rock.

Table 4. Representative soil features

Parent material	(1) Till–limestone
Surface texture	(1) Loam (2) Silt loam (3) Clay loam
Family particle size	(1) Loamy
Drainage class	Very poorly drained to somewhat poorly drained
Permeability class	Slow to moderate
Soil depth	53–119 cm
Surface fragment cover <=3"	1%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	9.14–22.35 cm
Calcium carbonate equivalent (Depth not specified)	0–20%
Electrical conductivity (Depth not specified)	0 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0
Soil reaction (1:1 water) (Depth not specified)	6.3–7.9
Subsurface fragment volume <=3" (Depth not specified)	0–14%
Subsurface fragment volume >3" (Depth not specified)	0–2%

Ecological dynamics

The historic plant community of this ecological site is a flatwood forest. The dominant species in the canopy are pin oak, sweetgum, with swamp white oak, cottonwood, green ash, and silver maple being common as well. The soils of this site are very poorly or poorly drained and characterized by seasonal ponding in the spring and much drier in the summer. This seasonal change in water presence limited seed germination and diversity of shrubs and ground layer species.

State and transition model

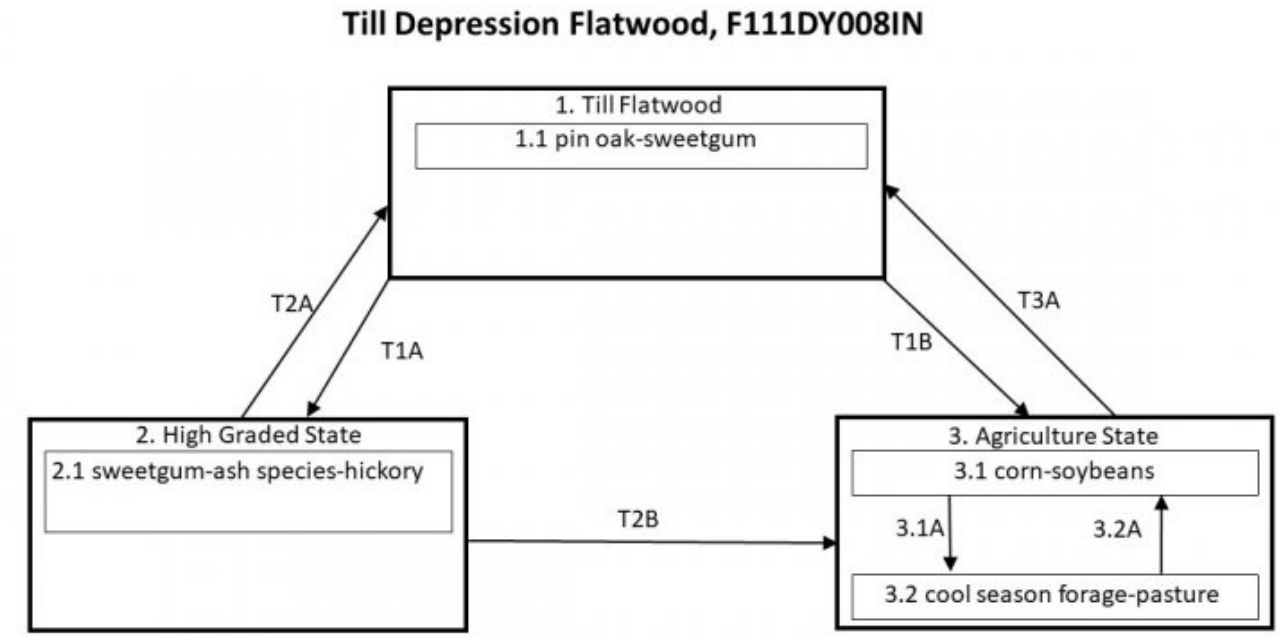

Figure 7. STM

Till Depression Flatwood, F111DY008IN

Diagram Legend

T1A	Selective tree harvest
T1B	Remove woody species, drainage, site preparation, planting, management
T2A	Timber stand improvement, tree planting
T2B	Remove woody species, drainage, site preparation, planting, management
T3A	Drainage removal, tree planting, TSI management
3.1A	Pasture/forage planting and maintenance
3.2A	Tillage/no-till planting and management of row crops.

Figure 8. Legend

State 1
Till Flatwood

This is the diagnostic plant community of the site. The dominant species in the canopy are pin oak, sweetgum, with swamp white oak, cottonwood, green ash, and silver maple being common as well. The seasonal change in water presence limited seed germination and diversity of shrubs and ground layer species.

Community 1.1
pin oak/sweetgum

This phase is characterized by a closed to partially open canopy dominated by pin oak and sweetgum.

State 2
High Graded State

This phase is characterized by the removal of the more marketable tree species, primarily oak species. The resulting tree species, sweetgum, ash, hickory, become the dominant species in the canopy.

Community 2.1
sweetgum/ash/hickory

This phase is characterized by the removal of the oaks and the sweetgum/ash/hickory

dominate the canopy.

State 3
Agriculture State

This state is characterized by the conversion of the site to agricultural use. Most common practice is a corn and soybean rotation of various types. A small portion of the historic acres are used for forage and pasture.

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 pasture/forage

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

Pathway P3.1
Community 3.1 to 3.2

Establishment of forage /pasture species.

Pathway P3.2
Community 3.2 to 3.1

Establishment and management of row crops

Transition T 1-2
State 1 to 2

Selective tree harvest of the more marketable species, primarily oaks.

Transition T 1-3
State 1 to 3

Removal off trees and other wood species. Install drainage system (if warranted), prepare the site for planting the agricultural crop, and regular agricultural practices.

Restoration pathway R 2-1
State 2 to 1

Timber stand improvement practices and planting (if warranted) of desired species.

Transition T 2-3
State 2 to 3

Removal off trees and other wood species. Install drainage system (if warranted), prepare the site for planting the agricultural crop, and regular agricultural practices.

Restoration pathway R 3-1
State 3 to 1

Removal of drainage system (if warranted), site preparation, and tree planting.

Additional community tables

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Contributors

Tyler Staggs

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
Contact for lead author	
Date	02/01/2022
Approved by	Greg Schmidt
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:

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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):**

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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:**

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17. **Perennial plant reproductive capability:**
