USDA Natural Resources Conservation Service

Ecological site F111XE301OH
Wet Restricted

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

111E – Indiana and Ohio Till Plain, Eastern Part. Most of this area is in the Till Plains Section of the Central Lowlands Province of the Interior Plains. The northeast tip of the area is in the Southern New York Section of the Appalachian Highlands. The entire area has been glaciated. It is dominated by ground moraines that are broken in places by kames, lake plains, outwash plains, terraces, and stream valleys. Narrow, shallow valleys commonly are along the few large streams in the area. Elevation ranges from 580 to 1,400 feet (175 to 425 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 plain.

The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA is as follows: Scioto (0506), 33 percent; Muskingum (0504), 31 percent; and Western Lake Erie (0410), 28 percent; Upper Ohio (0503), 5 percent; and Southern Lake Erie (0411), 3 percent. The headwaters of many rivers in central Ohio, including the Vermillion, Black Fork, Sandusky, Little Scioto, and Olentangy Rivers, are in this MLRA.

This MLRA is underlain by late Devonian shale and sandstone. Surficial materials include glacial deposits of till, glaciolacustrine sediments, and outwash from Wisconsin and older glacial periods.

Classification relationships

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

USFS Ecological Regions (USDA, 2007):
Sections –Central Till Plains, Beech Maple (222H), Western Glaciated Allegheny Plateau (221F)

Subsections – Allegheny Plateau (221Fa), Bluffton Till Plains (222Ha), Miami-Scioto Plain – Tipton Till Plain (222Hb)

NatureServe Systems anticipated (NatureServe, 2011): Agriculture - Cultivated Crops and Irrigated Agriculture, Agriculture – Pasture/Hay, North-Central Interior Dry-Mesic Oak Forest and Woodland, Northeastern Interior Dry-Mesic Oak Forest, Ruderal Forest

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

Ecological site concept

This site is an upland site generally formed on residium weathered from sandstone overlain with till or loess. The depth to the restrictive layer is greater than 30 inches. Drainage is somewhat poorly drained with slopes generally from 0-4%. The characteristic vegetation of this site is that of a forest comprised largely of fire sensitive, shade tolerant species. The dominant canopy level species include sugar maple, American beech, and tuliptree. Gap phase regeneration is the most common disturbance dynamic on the site and allows these species to reach the canopy. Windthrow and ice storms are larger scale disturbance mechanisms, but they incur very infrequently. The site can be susceptible to the establishment and dominance of the understory by woody, invasive, non-native species. Most of this historically woodland site is now being for agriculture to include hay, pasture, and row crops.

Associated sites

F111XE302OH	**Dry Restricted** Soils are moderately well to well drained

Similar sites

F111XE102OH	**Lacustrine Forest** Located on lacustrine parent materials; no soils restrictive layer within 36 inches of the surface; soils are somewhat poorly drained or drier.
F111XE403OH	**Outwash Upland** Located on outwash parent materials; soils are very poorly to somewhat poorly drained; soils do not have a restrictive layer within 36 inches of the surface.
F111XE502OH	**Wet Till Ridge** Located on glacial till parent materials; site is located on a convex landscape position; soils do not have a restrictive layer within 36 inches of the surface.

F111XE503OH	**Till Ridge** Located on glacial till parent materials; site is located on a convex landscape position; soils are moderately well to well drained; soils do not have a restrictive layer within 36 inches of the surface.

Table 1. Dominant plant species

Tree	(1) *Acer saccharum* (2) *Fagus grandifolia*
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This ecological site is found in bedrock controlled landscapes in MLRA 111E: Indiana and Ohio Till Plain, Eastern Part. Soils are moderately deep (20-40 inches) from lithic contact. Landforms that contain this site include ground moraines and till plains. Slopes for this site can be low and range from 0 to 4 percent.

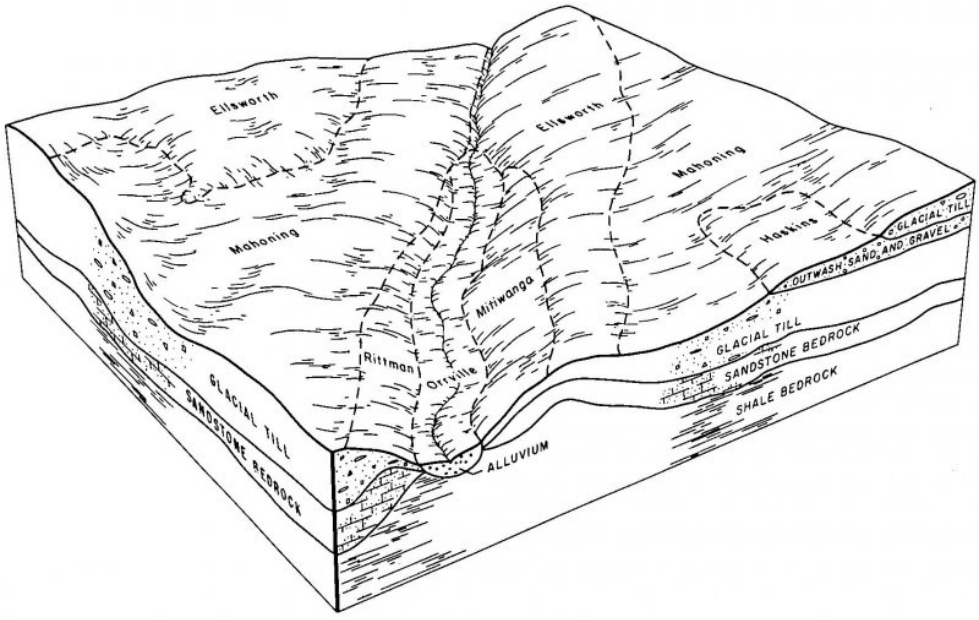

Figure 1. block diagram showing soils on the landscape.

Table 2. Representative physiographic features

Landforms	(1) Ground moraine (2) Till plain
Runoff class	Low to high
Flooding frequency	None
Ponding frequency	None
Elevation	244–335 m

Slope	0–4%
Water table depth	25–51 cm
Aspect	Aspect is not a significant factor

Climatic features

The average annual precipitation in this area is 35 to 41 (890 to 1,040 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 48 to 52 degrees F (9 to 11 degrees C). The freeze-free period averages about 185 days and ranges from 165 to 205 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	127-144 days
Freeze-free period (characteristic range)	173-179 days
Precipitation total (characteristic range)	991-1,041 mm
Frost-free period (actual range)	126-146 days
Freeze-free period (actual range)	171-181 days
Precipitation total (actual range)	991-1,067 mm
Frost-free period (average)	137 days
Freeze-free period (average)	176 days
Precipitation total (average)	1,016 mm

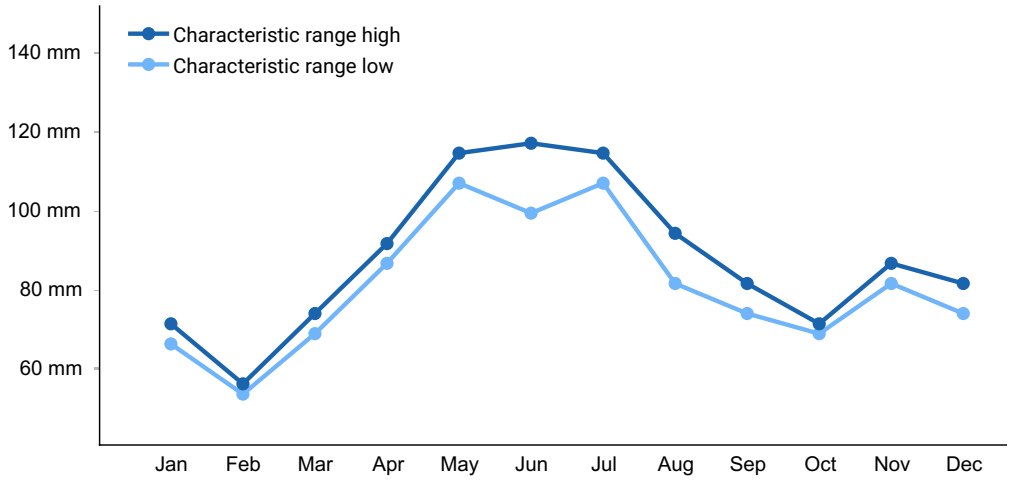

Figure 2. Monthly precipitation range

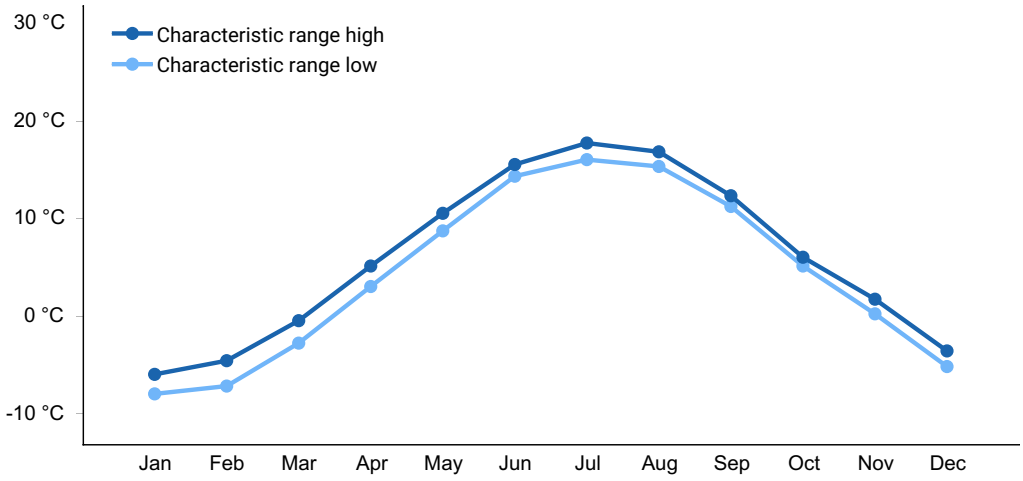

Figure 3. Monthly minimum temperature range

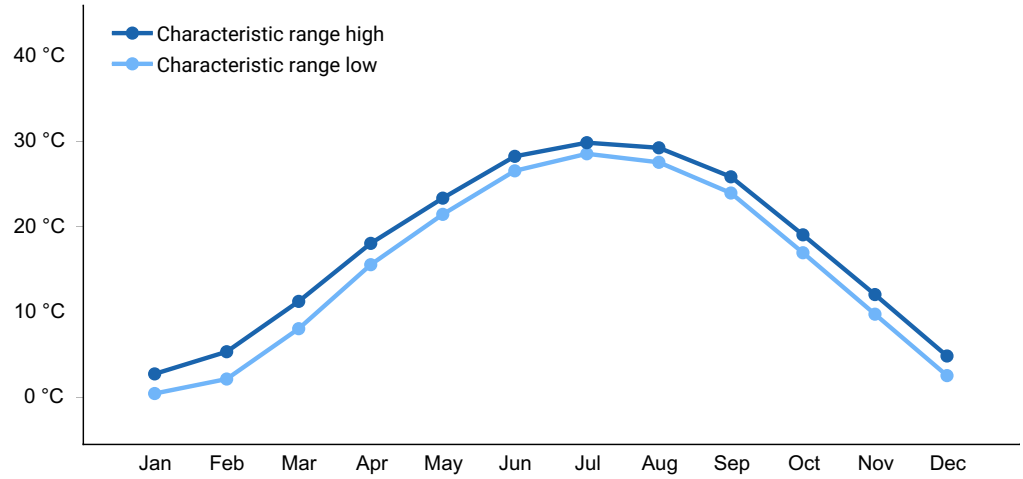

Figure 4. Monthly maximum temperature range

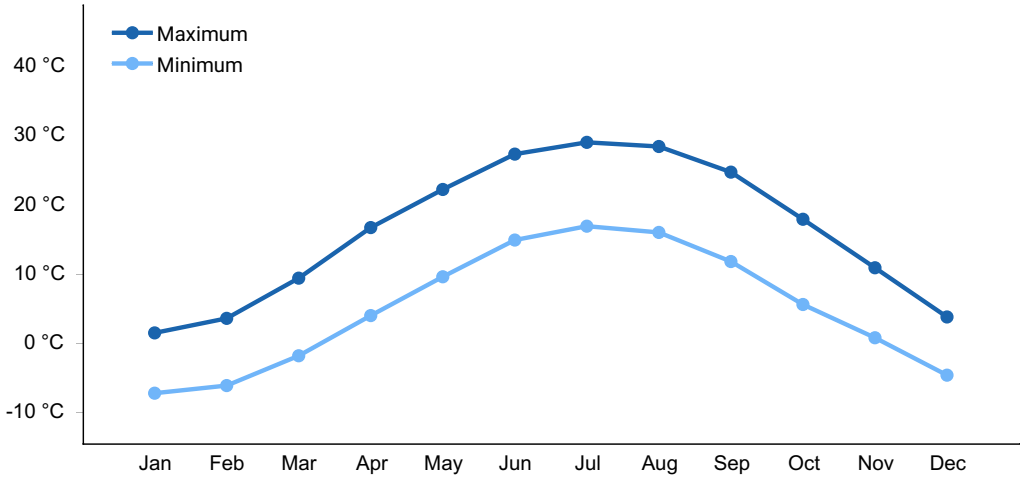

Figure 5. Monthly average minimum and maximum temperature

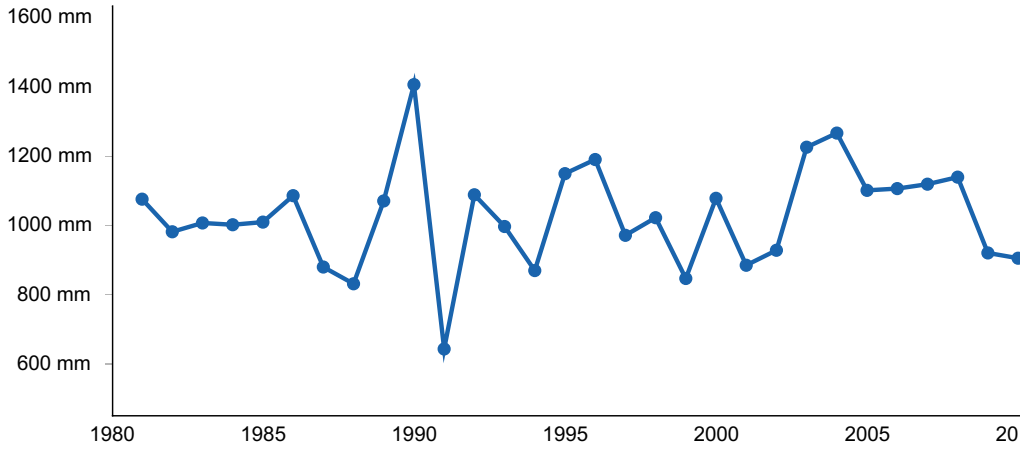

Figure 6. Annual precipitation pattern

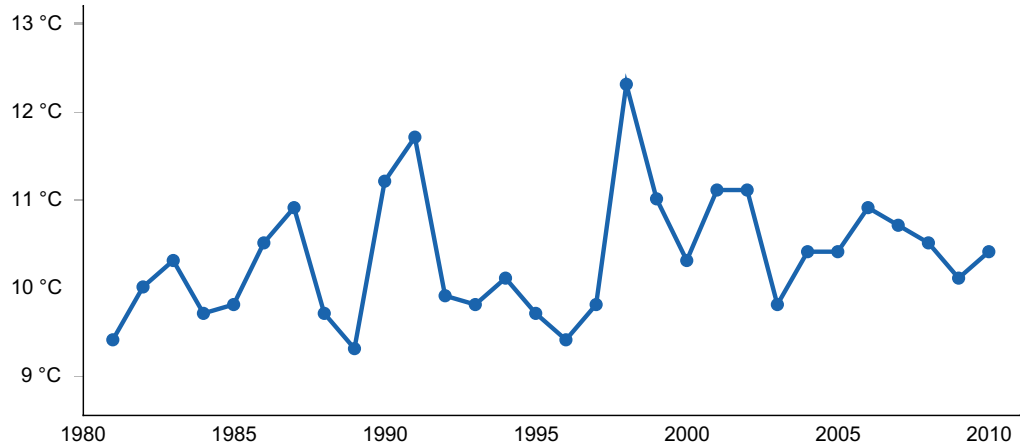

Figure 7. Annual average temperature pattern

Climate stations used

- (1) CHIPPEWA LAKE [USC00331541], Medina, OH
- (2) CENTERBURG 2 SE [USC00331404], Centerburg, OH
- (3) LANCASTER [USC00334403], Lancaster, OH
- (4) WESTERVILLE [USC00338951], Westerville, OH
- (5) BUCYRUS [USC00331072], Bucyrus, OH
- (6) GALION WTR WKS [USC00333021], Galion, OH

Influencing water features

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

Soil features

The soil series associated with this site are: Smothers, Mitiwanga. They are moderately deep, somewhat poorly drained, and slow to moderate permeable soils, with strongly acidic to slightly acidic soil reaction, that formed in residuum.

Parent Materials Kind: residuum
Surface Texture: silt loam
Subsurface Texture group: loamy

Figure 8. mapunits within the MLRA

Table 4. Representative soil features

Parent material	(1) Residuum
Surface texture	(1) Silt loam
Drainage class	Somewhat poorly drained
Permeability class	Slow to moderate
Soil depth	76–89 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	11.43–13.97 cm
Calcium carbonate equivalent (Depth not specified)	0%
Electrical conductivity (Depth not specified)	0 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0
Soil reaction (1:1 water) (Depth not specified)	5.5–6.5
Subsurface fragment volume <=3" (Depth not specified)	0%

Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The historic plant community of the Deep Restricted ecological site is a forest with the dominant species in the canopy being sugar maple, beech, and tulip-tree. Canopy associates include white oak, shagbark hickory, hackberry and black walnut. This site is dominated by fire sensitive and shade tolerant species. Species with these characteristics make it to the canopy via gap-phase recruitment on a local scale. Since settlement, parts of this site has been converted to agricultural use with the majority being to grow hay or used as pasture. The areas still in natural vegetation are at risk of having their understory invaded and dominated by invasive species such as Asian honeysuckles and even Callery pear.

State and transition model

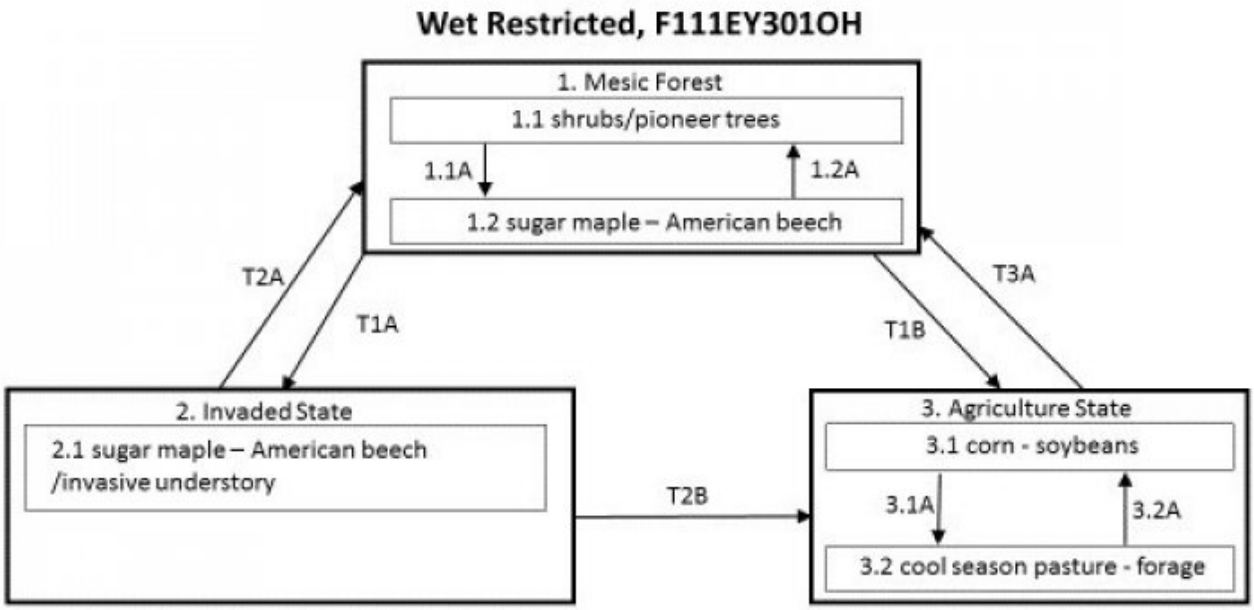

Figure 9. STM

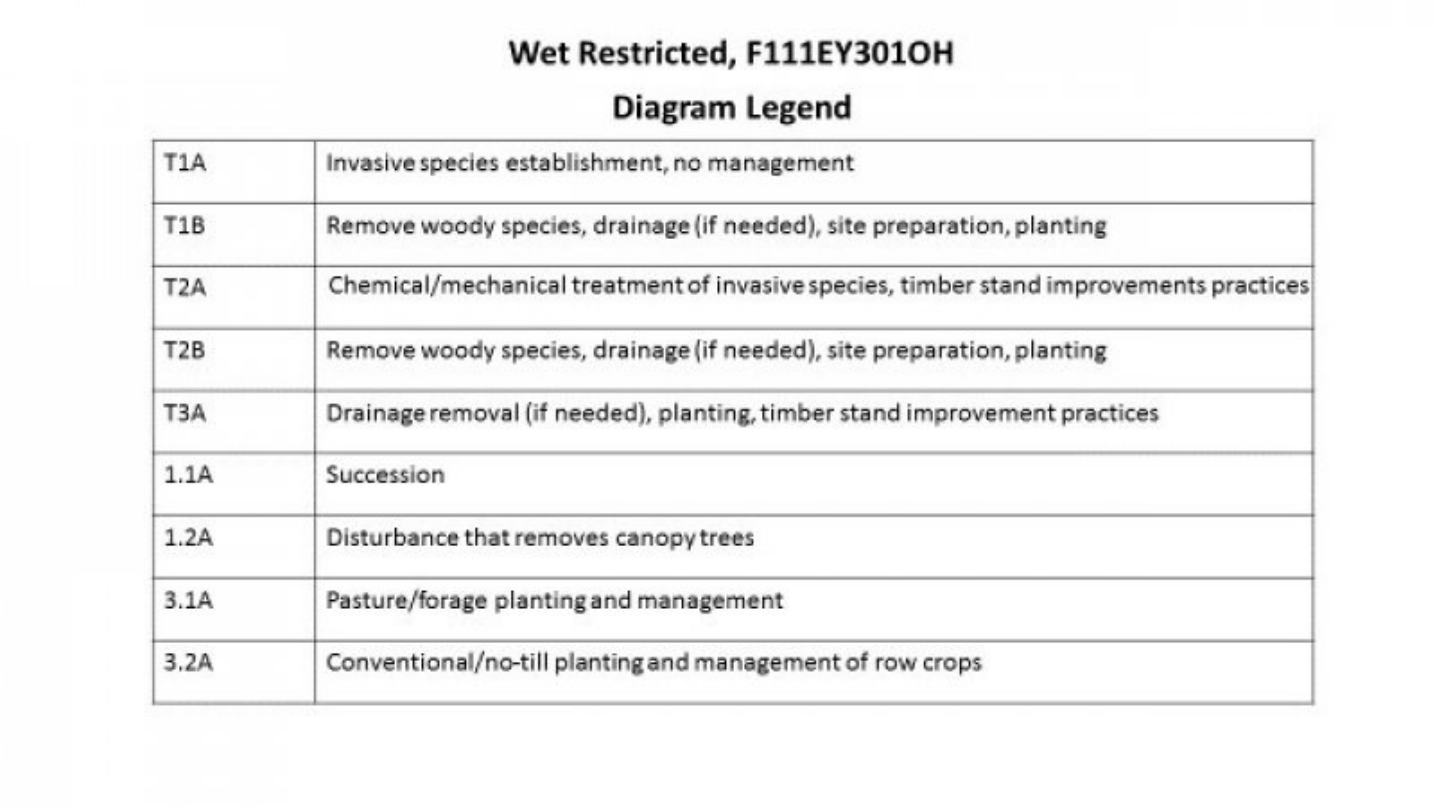

Figure 10. Legend

State 1
Mesic Forest

This is the diagnostic plant community for this site. In reference condition, this site was dominated by sugar maple, beech, and tulip-tree. An earlier successional phase of this site is comprised largely of shrubs and pioneering species. Stand replacing events were very uncommon. Small gap disturbance was the most common disturbance event that allowed propagation of these species.

Dominant plant species

- sugar maple (*Acer saccharum*), tree
- American beech (*Fagus grandifolia*), tree
- tuliptree (*Liriodendron tulipifera*), tree

Community 1.1
shrubs/ pioneer trees

This phase in characterized by pioneering woody species that respond rapidly to increased light availability. Cover is generally very heavy, but not usually very tall. As time and succession progress, the trees become larger and less dense.

Community 1.2
sugar maple - American beech

This phase in characterized by tree dominance, particularly sugar maple, tulip-tree, and

beech. Additional canopy species include white oak, shagbark hickory, hackberry and black walnut.

Dominant plant species

- sugar maple (*Acer saccharum*), tree
- American beech (*Fagus grandifolia*), tree
- tuliptree (*Liriodendron tulipifera*), tree

Pathway P1.1A
Community 1.1 to 1.2

Time and succession will move the site from this phase to the full expression of Community Phase 1.2

Pathway P1.2A
Community 1.2 to 1.1

Disturbance, whether natural or as management, that removes a large portion of the trees will move the site towards phase 1.1

State 2
Invaded State

This state is characterized by the establishment and eventual dominance of invasive species in the understory. This greatly reduces the species richness and diversity of the site as a whole. Common invasives for this site include, but are not limited to, species of Asian bush honeysuckle, Callery pear, autumn olive and ailanthus.

Dominant plant species

- Callery pear (*Pyrus calleryana*), tree
- tree of heaven (*Ailanthus altissima*), tree
- honeysuckle (*Lonicera*), shrub
- autumn olive (*Elaeagnus umbellata*), shrub

Community 2.1
sugar maple - American beech / invasive understory

This phase is characterized by the understory being dominated by woody, mostly non-native, invasive species

Dominant plant species

- sugar maple (*Acer saccharum*), tree
- American beech (*Fagus grandifolia*), tree

- honeysuckle (*Lonicera*), shrub
- autumn olive (*Elaeagnus umbellata*), shrub

State 3
Agricultural 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 forge - pasture

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

Pathway P3.1A
Community 3.1 to 3.2

Planting of cool season pasture/forage species and management to maintain them.

Pathway P3.2A
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 T1A
State 1 to 2

Establishment of invasive species with not management to control them will move the site towards state #2.

Transition T1B
State 1 to 3

The site is converted to the Agriculture State (#3) after the woody species are removed, the crops planted, and implementation of agricultural practices

Restoration pathway R2A
State 2 to 1

Chemical and mechanical treatment of the invasive species. Planting of desired species may be needed if they are not enough left to recolonize the site.

Transition T2B
State 2 to 3

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

Restoration pathway R3A
State 3 to 1

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

Additional community tables

Inventory data references

Site concept developed through expert opinion, review of the literature, and field work.

Other references

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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	02/07/2022
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:**
