

Ecological site F111XA009IN

Till Ridge

Last updated: 5/01/2020
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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.

111A – Indiana and Ohio Till Plain, Central Part. This area is in the Till Plains Section of the Central Lowland Province of the Interior Plains. It is dominated by broad, nearly level ground moraines that are broken in some areas by kames, outwash plains, and stream valleys along the leading edge of the moraines. Narrow, shallow valleys commonly are along the few large streams in the area. Elevation ranges from 680 to 1,250 feet (205 to 380 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 plains.

The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA is as follows: Wabash (0512), 46 percent; Great Miami (0508), 30 percent; Scioto (0506), 22 percent; and the Middle Ohic (0509), 2 percent. The major rivers in the area include the East and West Forks of the White River and the Whitewater River in Indiana and the Great Miami, Stillwater, Big Darby, Scioto, and Big Walnut Rivers in Ohio.

Surface deposits in this area include glacial deposits of till, lacustrine sediments, and outwash from Wisconsin and older glacial periods. A moderately thick mantle of loess covers much of the area. Most of this MLRA is underlain by Silurian and Devonian limestone and dolostone. Also, some areas of Late Ordovician shale and limestone are in the western part of the MLRA (USDA, 2006).

Classification relationships

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

USFS Ecological Regions (USDA, 2007):

Sections – Southern Unglaciaded Allegheny Plateau (221E), Central Till Plains, Beech Maple (222H), Interior Low Plateau-Transition Hills (223B), Interior Low Plateau-Bluegrass (223F)

Subsections - Lower Scioto River Plateau (221Eg), Bluffton Till Plains (222Ha), Miami-Scioto Plain-Tipton Till Plain

(222Hb), Little Miami Old Drift Plain (222Hc), Mad River Interlobate Plains (222Hd), Darby Plains (222He), Brown County Hills (223Ba), Northern Bluegrass (223Fd), Muscatatuck Flats and Valleys (223Fe), Scottsburg Lowlands (223Ff)

NatureServe Systems anticipated (NatureServe, 2011): Agriculture - Cultivated Crops and Irrigated Agriculture, Agriculture - Pasture/Hay, Allegheny-Cumberland Dry Oak Forest and Woodland, Appalachian (Hemlock)-Northern Hardwood Forest, Central Appalachian Pine-Oak Rocky 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 Floodplain, North-Central Interior Freshwater Marsh, North-Central Interior Oak Savanna, North-Central Interior Wet Flatwoods, North-Central Interior Wet Meadow-Shrub Swamp, North-Central Oak Barrens, Northeastern Interior Dry-Mesic Oak 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, Southern Ridge and Valley / Cumberland Dry Calcareous Forest, Successional Shrub/Scrub

LANDFIRE Biophysical Settings anticipated (USGS, 2010): Allegheny-Cumberland Dry Oak Forest and Woodland, Appalachian (Hemlock-) Northern Hardwood Forest, 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, 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 Oak Savanna, North-Central Interior Wet Flatwoods, 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 an upland site formed on glacial till parent materials located in a swell (convex) landscape position. It is located on summits, shoulders and backslopes on steep slopes that can be up to 50%. The soils are moderately well to well drained. The soil surface color is relatively light (lighter than 3/2 Munsell) with subsurface being in the loamy texture group.

The characteristic vegetation of the site is of a till ridge forest with the understory and canopy dominated by sugar maple, American beech, and basswood. Canopy level associates include white oak, bitternut and shagbark hickory, and black walnut. The site is dominated by shade tolerant, fire sensitive species. The most common disturbance dynamic is individual tree or small group mortality or windthrow with catastrophic windthrow or damage from ice storms to occur very infrequently. Currently, a large portion of the site has been converted for agricultural use, primarily corn and soybean rotations. The extant areas with natural vegetation are impacted by or under threat of invasion by woody, non-native species, such as Asian honeysuckles and Callery pear, which can come to dominate the understory.

Associated sites

F111XA006IN	Till Depression Site is located in a depression (concave) landscape position
F111XA007IN	Till Depression Flatwood Site is located in a depression (concave) landscape position; soil surface color is 3/2 Munsell or darker; soils are mollisols; site is occasionally to frequently ponded
F111XA008IN	Wet Till Ridge Site is on adjacent, lower, landscape positions; soils are poorly to somewhat poorly drained.
R111XA010IN	Till Ridge Prairie Soil surface color is 3/2 Munsell or darker; soils are mollisols.

Similar sites

F111XA012IN	Lacustrine Forest Site is on adjacent, lower, landscape positions; soils are poorly to somewhat poorly drained
F111XA020IN	Deep Restricted Soils parent material is lacustrine; soils are somewhat poorly to well drained.
F111XA008IN	Wet Till Ridge Soils parent material is residuum; soils have a restricted layer at 40 inches or deeper.
F111XA006IN	Till Depression Site is located in a depression (concave) landscape position

Table 1. Dominant plant species

Tree	(1) <i>Acer saccharum</i> (2) <i>Fagus grandifolia</i>
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site is located in the 111A - Indiana and Ohio Till Plain, Central 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%.

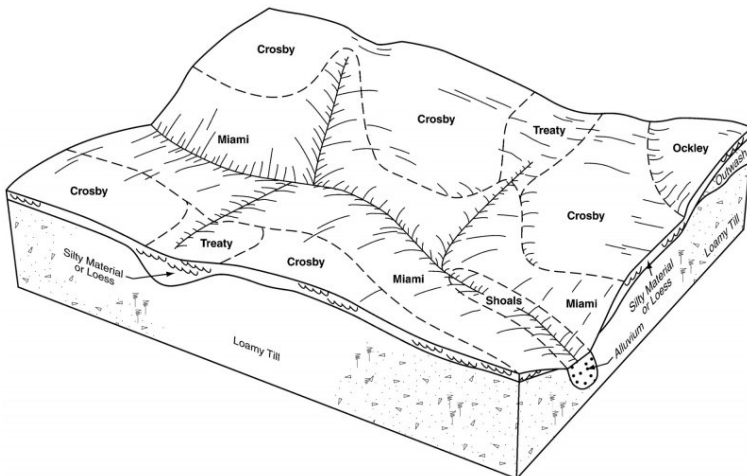


Figure 1. Block diagram showing soil series on the landscape.

Table 2. Representative physiographic features

Landforms	(1) Till plain (2) Moraine
Flooding frequency	None
Ponding frequency	None
Elevation	107–466 m
Slope	0–50%
Ponding depth	0 cm
Water table depth	30–183 cm
Aspect	W, NW, N, NE, E, SE, S, SW

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 53 degrees F (9 to 12 degrees C). The freeze-free period averages about 195 days and ranges from 175 to 215 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	142-149 days
Freeze-free period (characteristic range)	178-186 days
Precipitation total (characteristic range)	1,016-1,092 mm
Frost-free period (actual range)	141-162 days
Freeze-free period (actual range)	172-191 days
Precipitation total (actual range)	1,016-1,118 mm
Frost-free period (average)	148 days
Freeze-free period (average)	182 days
Precipitation total (average)	1,067 mm

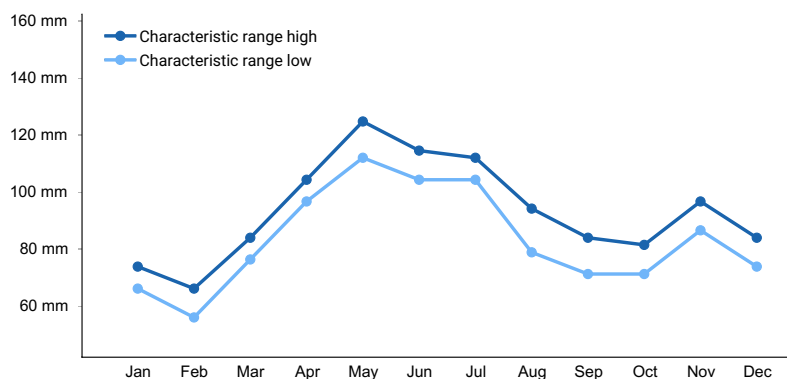


Figure 2. Monthly precipitation range

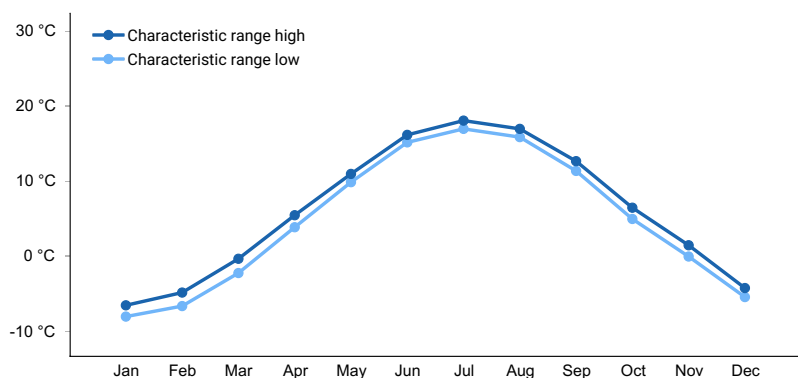


Figure 3. Monthly minimum temperature range

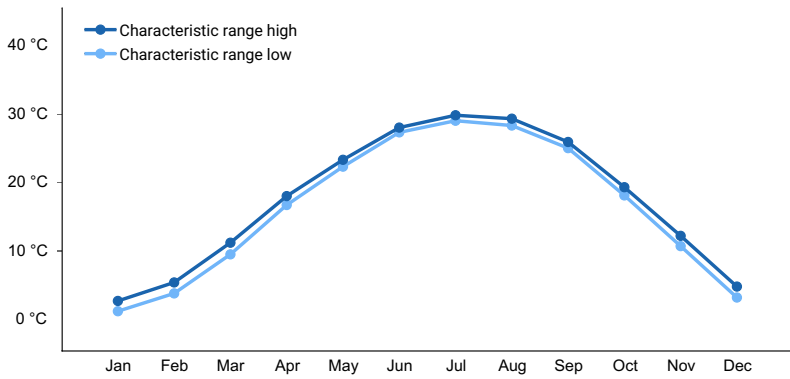


Figure 4. Monthly maximum temperature range

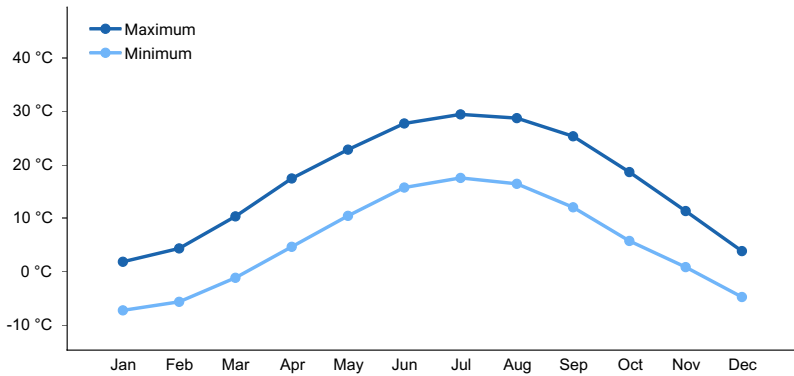


Figure 5. Monthly average minimum and maximum temperature

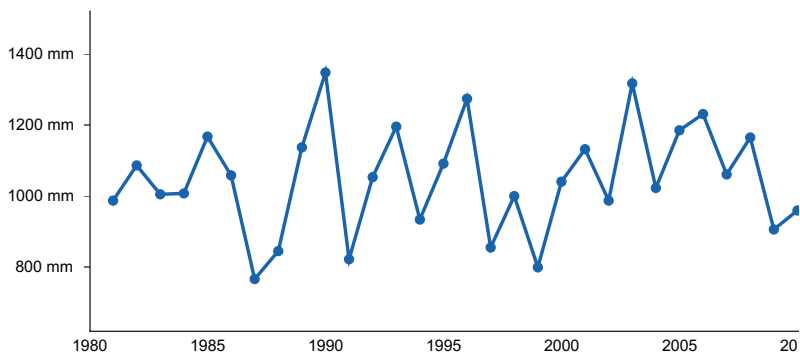


Figure 6. Annual precipitation pattern

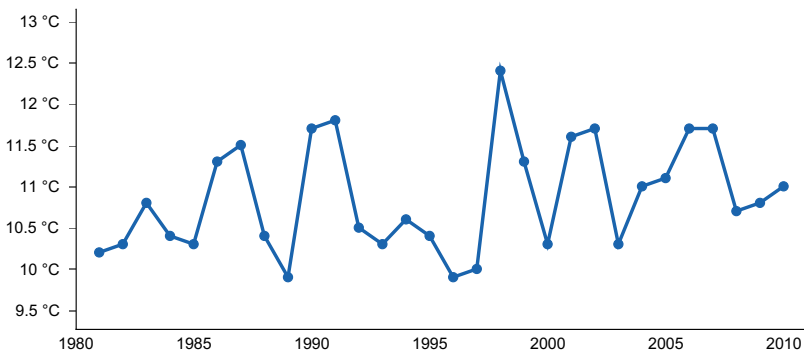


Figure 7. Annual average temperature pattern

Climate stations used

- (1) SIDNEY 1 S [USC00337693], Sidney, OH
- (2) COLUMBUS [USC00121747], Columbus, IN
- (3) RICHMOND WTR WKS [USC00127370], Richmond, IN

- (4) WHITESTOWN [USC00129557], Whitestown, IN
- (5) COLUMBUS VLY CROSSING [USC00331783], Columbus, OH
- (6) KOKOMO 3 WSW [USC00124662], Russiaville, IN
- (7) DAYTON INTL AP [USW00093815], Tipp City, OH

Influencing water features

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

Soil features

The soil series associated with this site are: Xenia, Wynn, Williamstown, Wapahani, Tuscola, Thrifton, Tarlton, Strawn, Senachwine, Ryker, Russell, Rossmoyne, Rockfield, Ritchey, Rawson, Rainsville, Nabb, Morningsun, Morley, Mississinewa, Milton, Miamian, Miami, Lybrand, Loudonville, Losantville, Lewisburg, Hickory, Hennepin, Glynwood, Cliftycreek, Cincinnati, Celina, Cardington, Cana, Bonnell, Blocher, Birkbeck, Ava, Amanda, Alexandria. They are shallow to very deep, moderately well drained to well drained, and Very slow to Very rapid permeable soils, with strongly acidic to slightly alkaline soil reaction, that formed in basal till and till from limestone, limestone and dolomite, limestone and shale, quartzite, sandstone, siltstone.

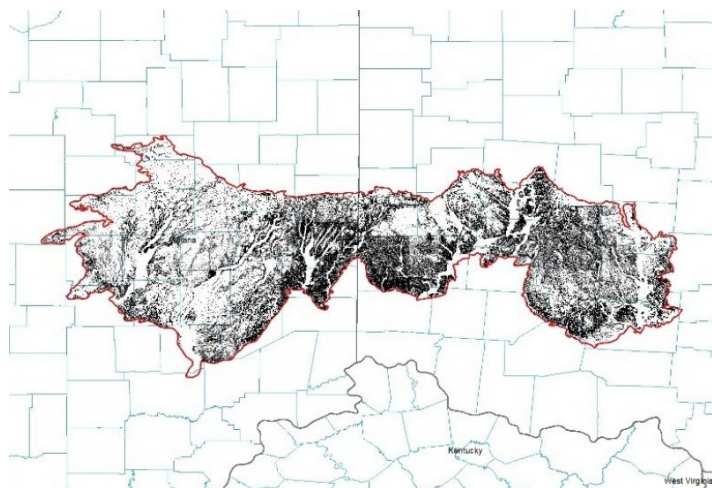


Figure 8. Mapunit locations within the MLRA.

Table 4. Representative soil features

Parent material	(1) Basal till–limestone (2) Till–limestone and shale
Surface texture	(1) Loam (2) Clay loam (3) Silty clay loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Very slow to very rapid
Soil depth	23–198 cm
Surface fragment cover <=3"	2–8%
Surface fragment cover >3"	1–8%
Available water capacity (0-101.6cm)	3.56–23.37 cm
Calcium carbonate equivalent (0-101.6cm)	0–35%
Electrical conductivity (0-101.6cm)	0 mmhos/cm

Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	5.3–7.9
Subsurface fragment volume <=3" (Depth not specified)	0–15%
Subsurface fragment volume >3" (Depth not specified)	0–13%

Ecological dynamics

The historic plant community of the Till Ridge ecological site is a till forest with the dominant species in the canopy being sugar maple, beech, and basswood. Canopy associates include white oak, bitternut and shagbark hickory, 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, much of this site has been converted to agricultural use with the majority being to grow corn and soybeans. 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

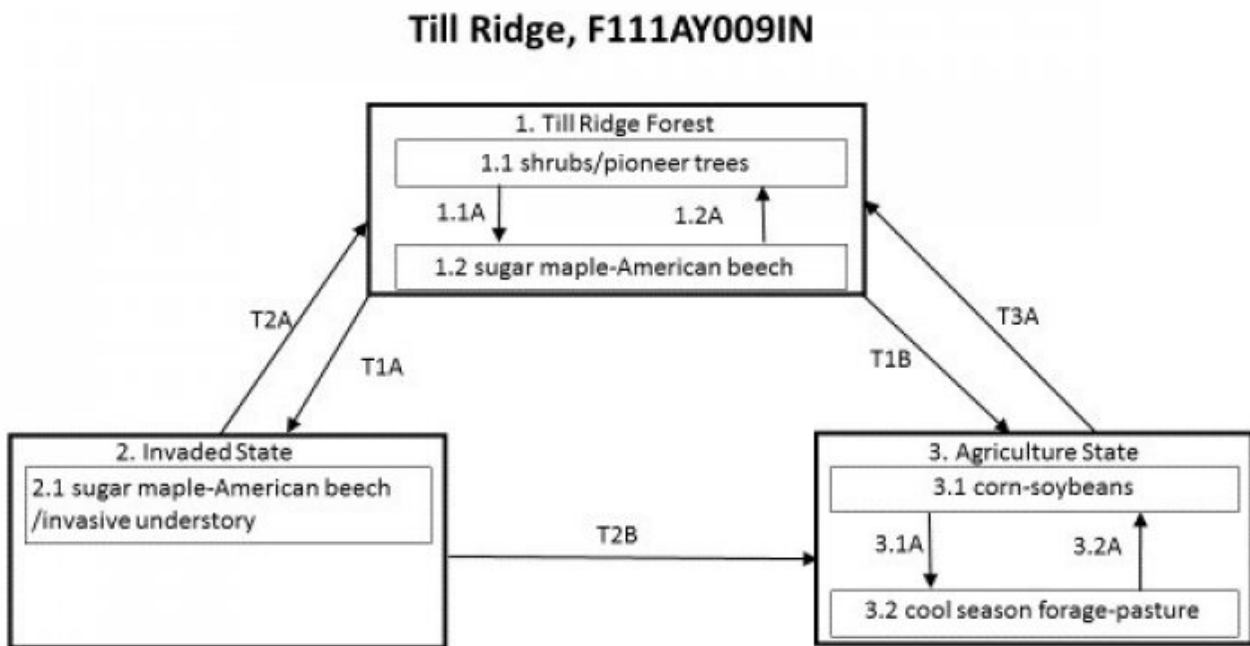


Figure 9. STM

Till Ridge, F111AY009IN

Diagram Legend

T1A	Invasive species establishment, no management
T1B	Remove woody species, drainage, site preparation, planting, management
T2A	Chemical/mechanical treatment of invasive species, timber stand improvement practices
T2B	Remove woody species, drainage, site preparation, planting, management
T3A	Drainage removal, planting, TSI management
1.1A	Succession
1.2A	Disturbance that removes canopy trees
3.1A	Pasture/forage planting and maintenance
3.2A	Tillage/no-till planting and management of row crops.

Figure 10. Legend

State 1 Till Ridge Forest

This is the diagnostic plant community for this site. In reference condition, this site was dominated by sugar maple, beech and basswood trees. An earlier successional phase of this site is comprised largely of shrubs and pioneering species like white oak and white ash. 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
- American basswood (*Tilia americana*), tree

Community 1.1 shrubs/pioneer tree species

This phase is 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/beech/basswood

This phase is characterized by tree dominance, particularly sugar maple, beech and basswood. Additional canopy species include white oak, bitternut and shagbark hickory, and black walnut

Dominant plant species

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

- sugar maple (*Acer saccharum*), tree
- American beech (*Fagus grandifolia*), tree
- American basswood (*Tilia americana*), tree
- honeysuckle (*Lonicera*), shrub
- autumn olive (*Elaeagnus umbellata*), shrub
- tree of heaven (*Ailanthus altissima*), shrub
- Callery pear (*Pyrus calleryana*), shrub

Community 2.1

sugar maple/beech/basswood/invasives

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

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 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 3.1

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

Pathway P3.1A

Community 3.1 to 3.2

Establishment and maintenance of forage /pasture species.

Pathway P3.2A Community 3.2 to 3.1

Establishment and maintenance of row crops.

Transition T1A State 1 to 2

Increase in non-native species.

Transition T1B State 1 to 3

Clearing and establishment of agricultural crops

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 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 R3A State 3 to 1

Removal of drainage system (if warranted), site preparation, weed control, brush control, tree planting, and timber standing improvement acitivities.

Additional community tables

Inventory data references

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

Other references

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Contributors

Tyler Staggs

Approval

Chris Tecklenburg, 5/01/2020

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	05/01/2020
Approved by	Chris Tecklenburg
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:**
