

Ecological site F111XA015IN Dry Outwash Upland

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Accessed: 05/04/2024

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.

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 outwash and colluvium parent materials in soils that are well to excessively drained. The soils have a relatively light soil surface color (lighter than 3/2 Munsell). This site is found on, generally, steeper topography than the Outwash Upland site which leads to it being better drained and drier. Slopes for this site can range from flat (summits) to quite steep with an average maximum of 30 percent.

The characteristic vegetation of the site is that of a somewhat dry forest dominated largely by oak species, such as black oak and white oak that can tolerate the increased drainage of the site. Hickory species are also common throughout the site along with sugar maple in somewhat fire protected areas, black cherry, and sassafras. Moderate fire return interval (40-60yrs) for low intensity fires and stand replacing fires every 100-200yrs contributed to the dominance of oak species on the site. Changes in the fire regime have led to many of the extant representation of the site to have a greater amount of fire sensitive, shade tolerate species occupying both the understory and canopy than what was present at the time of European settlement. Currently, the majority of the site is in agricultural production, with the majority being used for growing corn and soybeans, though some areas are used for growing cool season forage and pasture.

Associated sites

F111XA014IN	Outwash Upland Site is generally in a lower landscape position; soils are somewhat poorly to moderately well drained
R111XA016IN	Outwash Mollisol Site is located on lower landscape positions; soils surface is 3/2 Munsell or darker; soils are mollisols; soils are generally coarser textured
R111XA017IN	Dry Outwash Mollisol Site is located on similar landscape positions; soils surface is 3/2 Munsell or darker; soils are mollisols.

Similar sites

F111XA014IN	Outwash Upland Site is generally in a lower landscape position; soils are somewhat poorly to moderately well drained
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Table 1. Dominant plant species

Tree	(1) <i>Quercus alba</i> (2) <i>Quercus velutina</i>
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This ecosite is found in hills, outwash plain, river valley, till plain, upland in 111A: Indiana and Ohio Till Plain, Central Part.

The site can be found on the backslope, footslope, shoulder, summit, and toeslope.

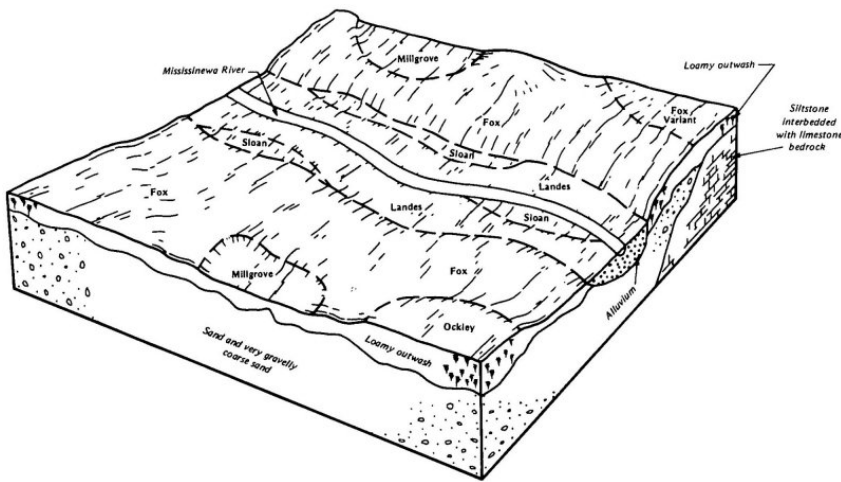


Figure 1. soil series on the landscape

Table 2. Representative physiographic features

Landforms	(1) Outwash plain (2) Outwash terrace (3) Terrace
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to very rare
Ponding frequency	None
Elevation	104–457 m
Slope	0–30%
Ponding depth	0 cm
Water table depth	119–152 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)	141-156 days
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Freeze-free period (characteristic range)	171-192 days
Precipitation total (characteristic range)	1,016-1,092 mm
Frost-free period (actual range)	135-164 days
Freeze-free period (actual range)	164-198 days
Precipitation total (actual range)	991-1,118 mm
Frost-free period (average)	148 days
Freeze-free period (average)	181 days
Precipitation total (average)	1,067 mm

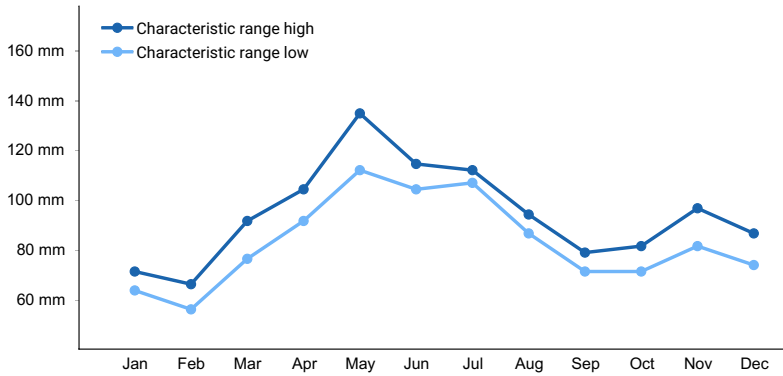


Figure 2. Monthly precipitation range

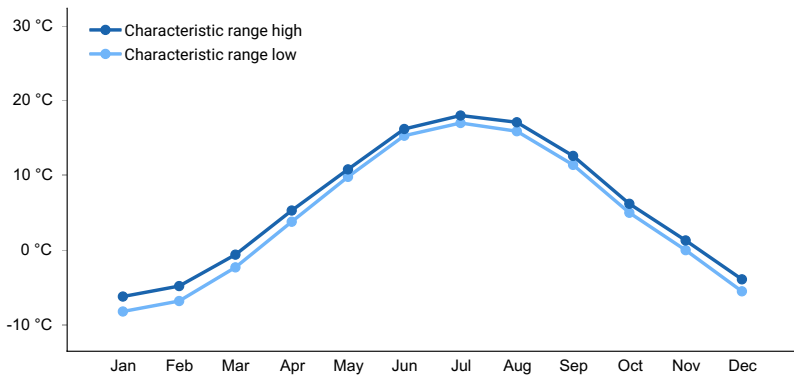


Figure 3. Monthly minimum temperature range

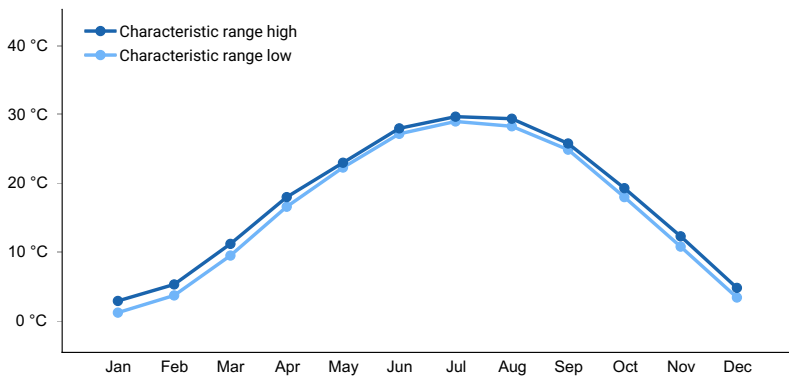


Figure 4. Monthly maximum temperature range

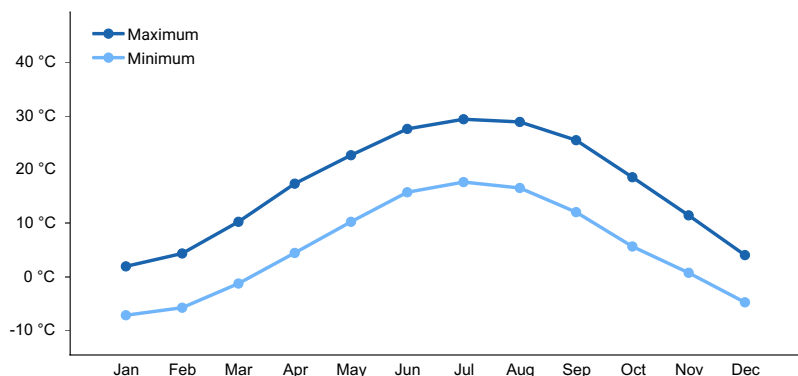


Figure 5. Monthly average minimum and maximum temperature

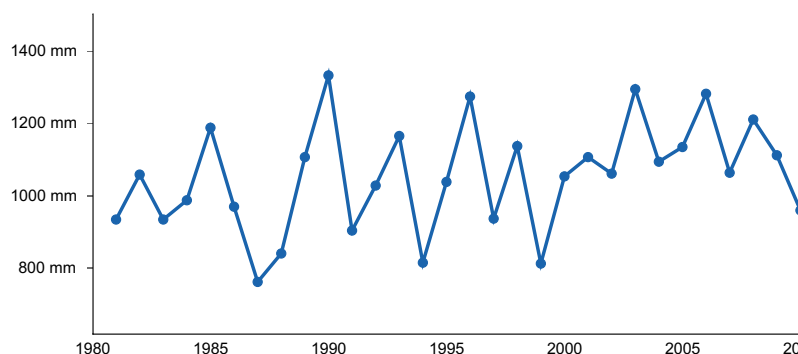


Figure 6. Annual precipitation pattern

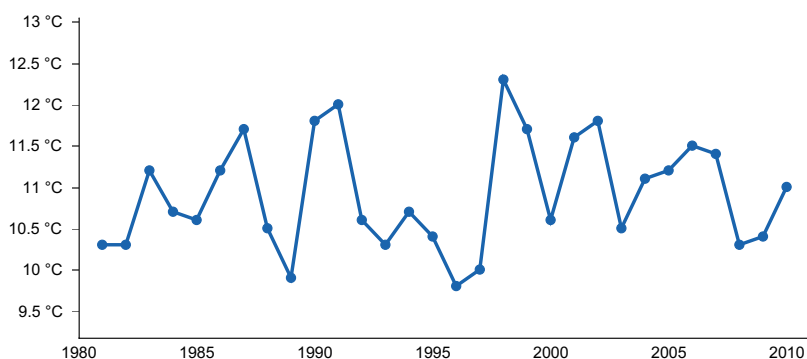


Figure 7. Annual average temperature pattern

Climate stations used

- (1) INDIANAPOLIS SE SIDE [USC00124272], Indianapolis, IN
- (2) KOKOMO 3 WSW [USC00124662], Russiaville, IN
- (3) COLUMBUS [USC00121747], Columbus, IN
- (4) EATON [USC00332485], Eaton, OH
- (5) SIDNEY 1 S [USC00337693], Sidney, OH
- (6) CHILLICOTHE MOUND CITY [USC00331528], Chillicothe, OH
- (7) COLUMBUS OHIO STATE UNIV AP [USW00004804], Dublin, 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: Williamsburg, Wawaka, Spargus, Sisson, Shelocta, Rush, Pike, Parke, Ockley, Negley, Muncie, Mountpleasant, Martinsville, Gallman, Fox, Eldean, Chili, Chetwynd, Casco, Camden, Belmore. They are shallow to very deep, well drained to somewhat excessively drained, and slow to very rapid

permeable soils, with strongly acidic to neutral soil reaction, that formed in colluvium and outwash.

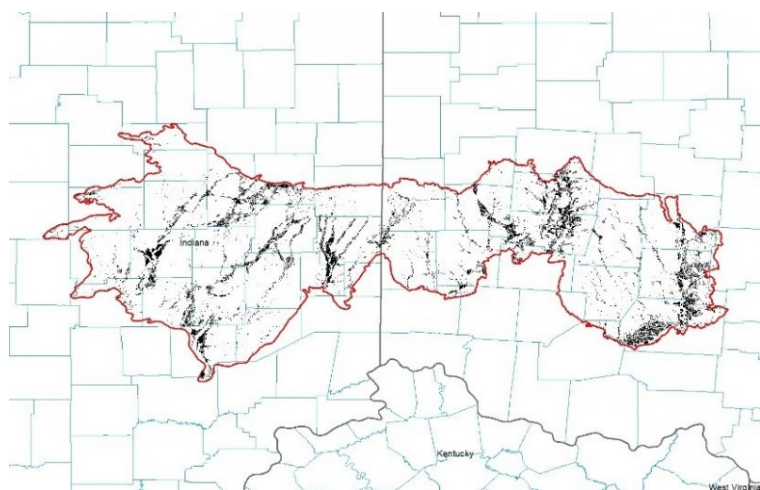


Figure 8. Location of mapunits within the MLRA

Table 4. Representative soil features

Parent material	(1) Outwash–limestone (2) Glaciofluvial deposits–siltstone
Surface texture	(1) Channery sandy clay loam (2) Gravelly sandy loam (3) Fine sandy loam
Family particle size	(1) Sandy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Slow to very rapid
Soil depth	33–279 cm
Surface fragment cover ≤3"	1–2%
Surface fragment cover >3"	1%
Available water capacity (0–101.6cm)	6.6–21.08 cm
Calcium carbonate equivalent (0–101.6cm)	0–52%
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)	0–35%
Subsurface fragment volume >3" (Depth not specified)	0–20%

Ecological dynamics

The historic plant community of the Dry Outwash Upland is oak-hickory forest. The forest canopy is dominated by white oak, black oak, and hickory species, with sugar maple, black cherry and sassafras being present as well. Fire was a major disturbance mechanism for this site with return intervals greater than 15 years. Currently, much of this site is being used for agriculture production.

State and transition model

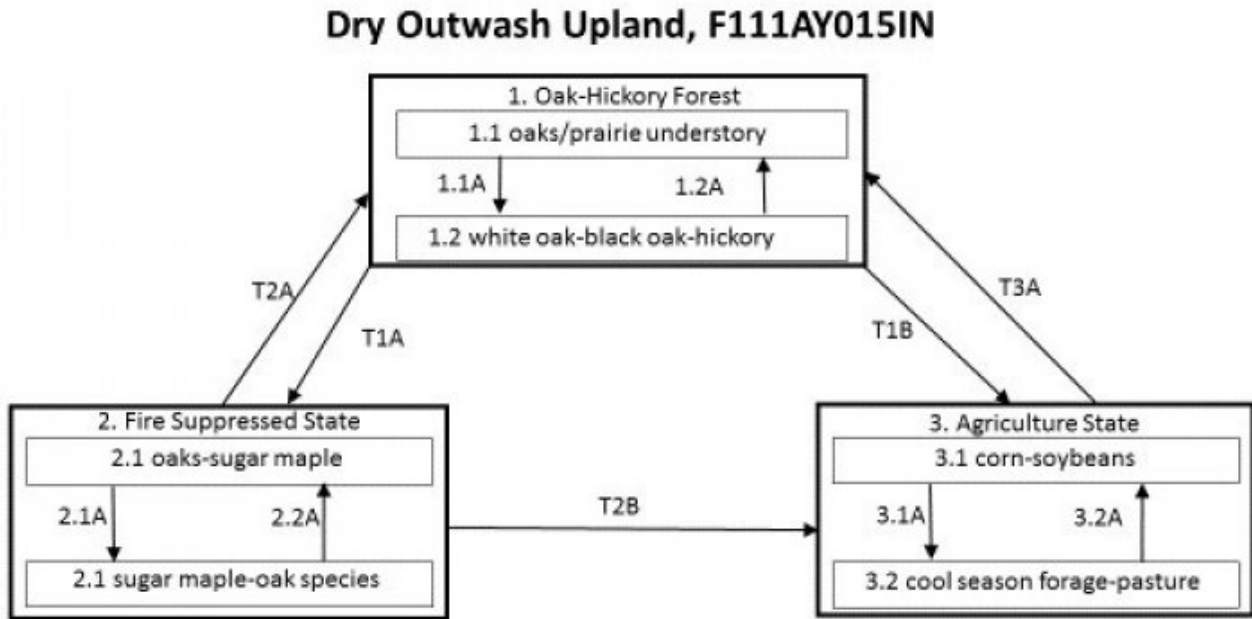


Figure 9. STM

Dry Outwash Upland, F111AY015IN

Diagram Legend

T1A	No management, no fire
T1B	Remove woody species, site preparation, planting, management
T2A	Prescribed tree thinning, fire
T2B	Remove woody species, site preparation, planting, management
T3A	Tree planting, timber stand improvement practices, fire
1.1A	Succession
1.2A	Fire, disturbance that removes canopy trees
2.1A	No management or disturbance
2.2A	Selective tree harvest
3.1A	Pasture/forage planting and maintenance
3.2A	Tillage/no-till planting and management of row crops.

Figure 10. legend

State 1 Oak-Hickory Forest

This is the reference or diagnostic plant community for this site. In reference conditions, this forested site was dominated by white oak, black oak, and hickory species in the canopy. Secondary species included sugar maple, black cherry and sassafras. Brambles and native roses were common in the understory. Less common, but present were some of the prairie species such as Pennsylvania sedge and big bluestem.

Dominant plant species

- white oak (*Quercus alba*), tree
- black oak (*Quercus velutina*), tree
- hybrid hickory (*Carya*), tree

Community 1.1 oaks/prairie understory

Short time since the last fire or more frequent fires or timber stand improvement have this phase closely resembling that of an oak savanna. Prairie grass species such as big bluestem and Indiangrass become more prominent and abundant.

Dominant plant species

- oak (*Quercus*), tree

Community 1.2 white oak/black oak/hickory

This community phase is an oak-hickory forest. The forest canopy is dominated by white oak, black oak, and hickory species, with sugar maple, black cherry and sassafras being present as well. Fire was a major disturbance mechanism for this site with return intervals greater than 15 years.

Dominant plant species

- white oak (*Quercus alba*), tree
- black oak (*Quercus velutina*), tree
- hybrid hickory (*Carya*), tree

Pathway P1.1A Community 1.1 to 1.2

Fire intervals exceeding 15 years and succession of the site will move this community phase towards 1.2.

Pathway P1.2A Community 1.2 to 1.1

Fire or any disturbance or management that removes the majority of the canopy trees will move this towards community phase 1.1.

State 2 Fire Suppressed State

This state is characterized by a longer than normal fire return interval or the absence of fire as a disturbance agent. Shade tolerant species, specifically sugar maple and beech, that are present in the understory in relatively small amounts become the dominant tree species.

Dominant plant species

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

Community 2.1 white oak/sugar maple

This state is characterized by a longer than normal fire return interval (100+ years) or the absence of fire. Sugar maple becomes quite common in the canopy.

Dominant plant species

- white oak (*Quercus alba*), tree
- sugar maple (*Acer saccharum*), tree

Community 2.2 sugar maple/oak species

This state is characterized by a longer than normal fire return interval (150+ years) or the absence of fire. Sugar maple becomes the dominant canopy tree species with some oaks being present.

Dominant plant species

- sugar maple (*Acer saccharum*), tree
- oak (*Quercus*), tree

Pathway P2.1A Community 2.1 to 2.2

No management or disturbance to remove trees allow shade tolerant, fire resistant trees to become dominant.

Pathway P2.2A Community 2.2 to 2.1

Selective tree harvest to create openings for oaks 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 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 P3.1A Community 3.1 to 3.2

Planting of cool season forage and pasture species along with appropriate management of those species will move this phase to 3.2.

Pathway P3.2A Community 3.2 to 3.1

Conventional or no-till planting of row crops and associated practices will move this phase to 3.1.

Transition T1A State 1 to 2

No management, to include fire, or other large disturbance to remove trees from the canopy will allow the site to

move towards State #2.

Transition T1B **State 1 to 3**

Removal of the tree species, tillage, and planting of the agricultural crop transition the site to state 3.

Restoration pathway R2A **State 2 to 1**

Prescribed tree thinning to give competitive advantage to desired species and fire move the site back to the reference state.

Transition T2B **State 2 to 3**

All trees removed, the site prepared, tillage and planting the of the agricultural crop.

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 reconnaissance.

Other references

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Contributors

Tyler Staggs

Approval

Chris Tecklenburg, 4/17/2020

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	05/04/2024
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:**
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17. **Perennial plant reproductive capability:**
