

Ecological site F120CY005IN Moderately Deep Siltstone-Shale Uplands

Last updated: 10/01/2024
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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): 120C—Kentucky and Indiana Sandstone and Shale Hills and Valleys, Northeastern Part

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This area is entirely in Indiana and makes up about 1,050 square miles (2,725 square kilometers). **Physiography:** This area is in the Highland Rim Section of the Interior Low Plateaus Province of the Interior Plains. Both large and small tributaries of the Ohio River and the East Fork of the White River dissect the nearly level to very steep uplands in the area. The major streams and rivers have well defined valleys with broad flood plains and numerous stream terraces. The flood plains along the smaller streams are narrow. Summits are narrow and are nearly level to gently sloping. **Geology:** The geologic materials in this area are of Early and Middle Pennsylvanian and Late Mississippian age. The rocks consist mainly of flat-lying, interbedded sandstone, shale, coal, and siltstone with minor areas of limestone. Bedrock outcrops are common on the bluffs along the Ohio River and its major tributaries. The surficial geologic materials consist mainly of a layer of loess, typically less than 3.5 feet (1 meter) thick, on the less eroded parts of the landscape and stratified sediments of Pleistocene age along the Ohio River and its tributaries. Unconsolidated alluvium is deposited in the river valleys.

Soils: The dominant soil orders in this MLRA are Alfisols, Ultisols, and Inceptisols. The soils in the area have a mesic soil temperature regime, an udic or aquic soil moisture regime, and dominantly mixed mineralogy. They formed dominantly in loess and in residuum derived from siltstone and shale. They range from moderately deep to very deep and from somewhat poorly drained to well drained and are loamy, silty, or clayey. Fragiudults (Spickert and Tilsit series) and Hapludults (Wrays series) are the dominant soils on ridgetops and the upper parts of hills and knobs. Halpudalfs (Kurtz series), Hapludults (Gilwood and Gnawbone series), and Dystrudepts (Brownstown series) are on moderately sloping to very steep side slopes. Hapludalfs (Coolville, Rarden, Stonehead, and Wellrock series) are on the gently sloping to moderately steep lower parts of side slopes. Hapludalfs (Elkinsville series), Fragiudalfs (Pekin series), and Fragiqualfs (Bartle series) are on stream terraces. Dystrudepts (Beanblossom, Cuba, and Steff series) and Endoaquepts (Stendal series) are on flood plains.

Classification relationships

NatureServe Ecological System, Scientific Name: Southern Interior Low Plateau Dry-Mesic Oak Forest, Unique Identifier: CES202.898

Ecological site concept

The Moderately Deep Siltstone-Shale Uplands ecological site is located on hills and knobs within 120C. Representative soils include: Gilpin, Gilwood, Gnawbone.

The communities described in this provisional document reflect plant communities that are likely to be found on these soils and have not been field verified. This PES describes hypotheses based on available data of many different scales and sources and has not been developed utilizing site-specific ecological field monitoring. This PES does not encompass the entire complexity or diversity of these sites. Field studies would be required to develop a

comprehensive and science-based native plant restoration plan for these sites.

The hypotheses below were developed utilizing multiple data sources including NatureServe Explorer, Vegbank.org, Plant Communities of the Midwest – Indiana Subset, Indiana DNR, The Nature Conservancy, and Purdue University data for the Hoosier National Forest. (Andriy Vladimirovich Zhalin and George R. Parker, 2007, Delineation and spatial analysis of ecological classification units for the Hoosier National Forest in Southern Indiana)

Aspect, topography, and soil depth will influence the gradient of these communities on single mapunits. The herb dominance may be quite variable depending on aspect.

Forest:

1.1 chestnut oak (*Q. prinus*) - white oak (*Q. alba*) / blueberries (*Vaccinium* spp.) - round leaf greenbrier (*Smilax rotundifolia*) / poison ivy (*Toxicodendron radicans*) - common dittany (*Cunila organoides*)

Dominant trees include white oak and chestnut oak. Typical associates include black oak, scarlet oak, pignut hickory, shagbark hickory and on exposed south ridges and shallower south slopes, post oak.

Mid-canopy trees include red maple, sassafras, flowering dogwood, ironwood, witch hazel, and winged elm.

The shrub layer includes *Vaccinium* species along with roundleaf greenbrier (*Smilax rotundifolia*). Carolina rose (*Rosa carolina*) may be on some sites.

Herbaceous species likely include *Toxicodendron radicans*, *Parthenocissus quinquefolia* plus *Aristolochia serpentaria*, *Desmodium* spp., *Botrychium virginiana*, *Carex picta*, *Carex cephalophora*, *Carex artitecta*, *Cardamine angustata*, *Cunila organoides*, *Galium circaezans*, *Panicum dichotomum*, *Polygonatum biflora*, *Potentilla simplex*, *Smilacina racemosa*, *Viola triloba*, and *Viburnum acerifolium*.

Located on south and southwestern aspects, these soils may include dry upland species such as post oak, eastern red cedar, black jack oak, ironwood, flowering dogwood, winged elm, southern blackhaw, farkleberry, shining sumac, and hawthorn.

Pasture (lower slopes only):

State 2, Phase 2.1. Plant species dominants: *Schedonorus arundinaceus* (tall fescue). Species present are dependent upon seeding and management.

Transitional Field (lower slopes only):

State 3, Phase 3.1 eastern red cedar (*Juniperus virginiana*) / blueberry (*Vaccinium* spp.) / broomsedge bluestem (*Andropogon virginicus*)

This phase is best described as an old field habitat with a mixture of native and introduced grasses, herbs, forbs, seedlings, and saplings.

Cropland was not included in the state and transition model due to the slope of most of the sites included in this grouping.

Associated sites

F120CY006IN	Deep Moderately Well Drained Siltstone-Shale Uplands Deep Moderately Well Drained Siltstone-Shale Uplands
F120CY007IN	Deep Well Drained Siltstone-Shale Uplands Deep, Well Drained Siltstone-shale Uplands

Table 1. Dominant plant species

Tree	(1) <i>Quercus alba</i> (2) <i>Quercus prinus</i>
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Shrub	(1) <i>Vaccinium</i> (2) <i>Smilax rotundifolia</i>
Herbaceous	(1) <i>Cunila origanoides</i> (2) <i>Toxicodendron radicans</i>

Physiographic features

These sites are on hills and knobs. Aspect and topography influence vegetative communities as some of the hills are very steep.

Field work is needed to further refine this initial PES grouping as multiple ESDs may be developed based on aspect, topography, soils depth, and available water.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Knob
Runoff class	High
Elevation	350–1,000 ft
Slope	6–75%
Water table depth	72 in
Aspect	Aspect is not a significant factor

Climatic features

Climate: The average annual precipitation in most of this area is 41 to 47 inches (1,040 to 1,195 millimeters). About 60 percent of the precipitation falls during the freeze-free period. Most of the rainfall occurs as high-intensity, convective thunderstorms in summer. Snowfall is common in winter. The average annual temperature is 52 to 56 degrees F (11 to 14 degrees C). The freeze-free period averages 205 days and ranges from 190 to 220 days. The longer freeze-free periods occur along the Ohio River. (Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. United States Department of Agriculture. Natural Resources Conservation Service. United States Department of Agriculture Handbook 296. Issued 2006.)

Table 3. Representative climatic features

Frost-free period (characteristic range)	169 days
Freeze-free period (characteristic range)	195 days
Precipitation total (characteristic range)	47 in
Frost-free period (actual range)	169 days
Freeze-free period (actual range)	195 days
Precipitation total (actual range)	47 in
Frost-free period (average)	169 days
Freeze-free period (average)	195 days
Precipitation total (average)	47 in

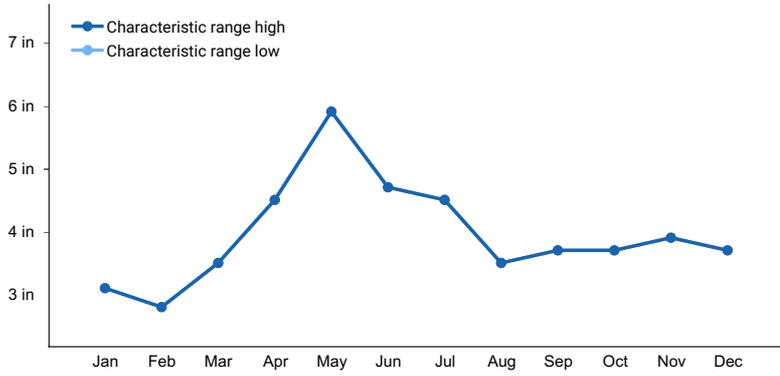


Figure 1. Monthly precipitation range

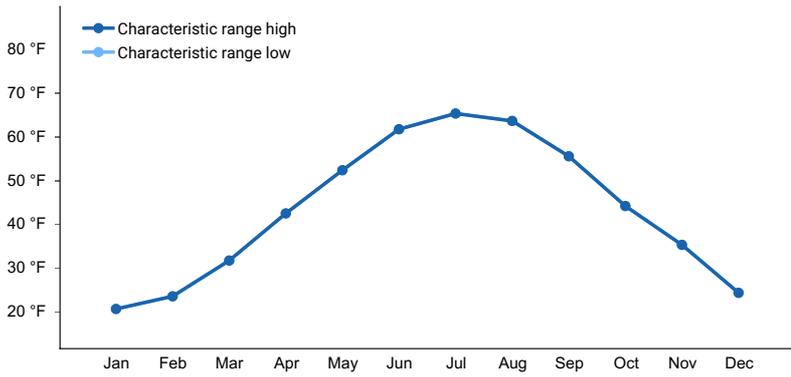


Figure 2. Monthly minimum temperature range

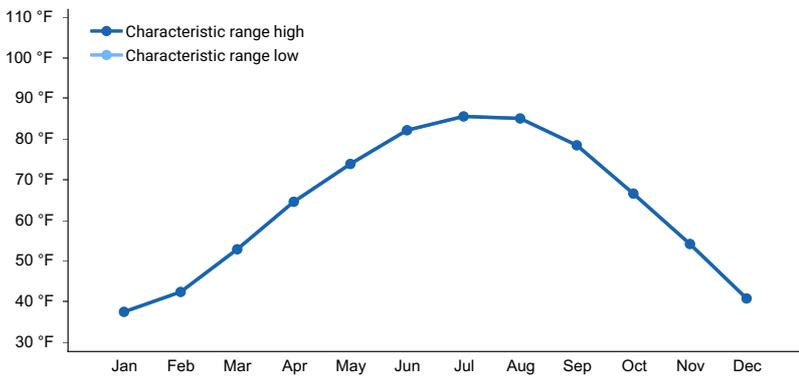


Figure 3. Monthly maximum temperature range

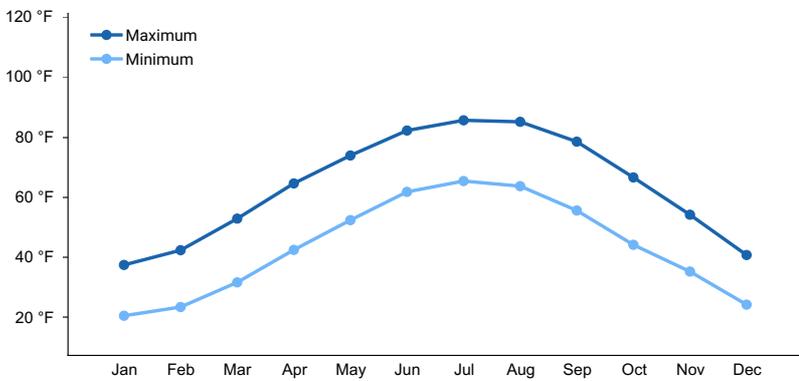


Figure 4. Monthly average minimum and maximum temperature

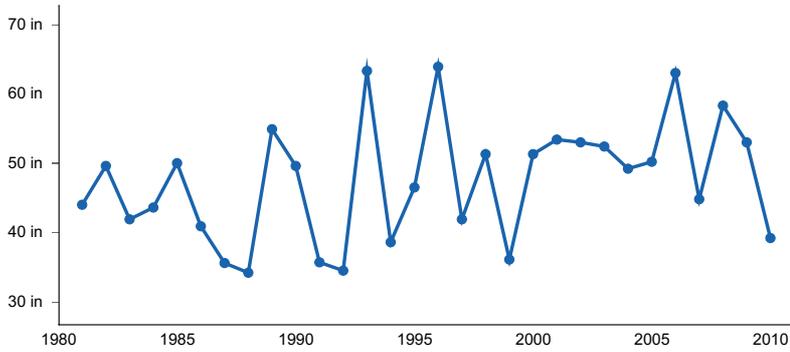


Figure 5. Annual precipitation pattern

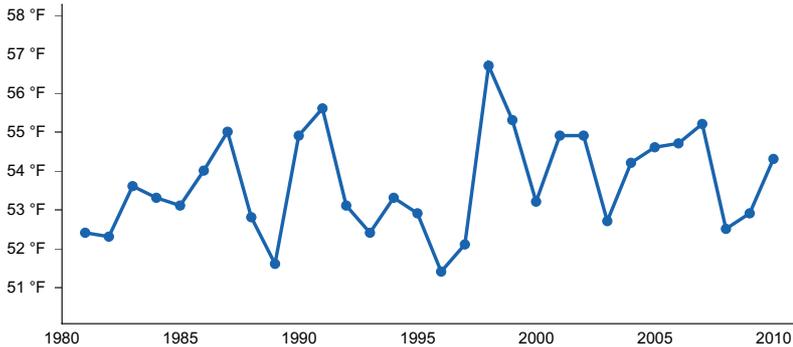


Figure 6. Annual average temperature pattern

Climate stations used

- (1) BLOOMINGTON IN UNIV [USC00120784], Bloomington, IN

Influencing water features

Soils in this group may have a seasonal perched water table.

Soil features

These soils are moderately deep, moderately well drained to well drained soils on hillsides formed in residuum of interbedded sandstone, shale, and/or siltstone. Representative soils include: Gilpin, Gilwood, Gnawbone.

Field work is needed to further refine this initial PES grouping as multiple ESDs may be developed based on drainage, aspect, topography, soils depth, and available water.

Table 4. Representative soil features

Parent material	(1) Residuum-siltstone
Surface texture	(1) Loam (2) Silt loam
Family particle size	(1) Fine-loamy (2) Fine-silty
Drainage class	Well drained to somewhat excessively drained
Soil depth	20-40 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	4-6 in

Soil reaction (1:1 water) (0-40in)	3.5–6
Subsurface fragment volume <=3" (Depth not specified)	0–2%
Subsurface fragment volume >3" (Depth not specified)	15–62%

Ecological dynamics

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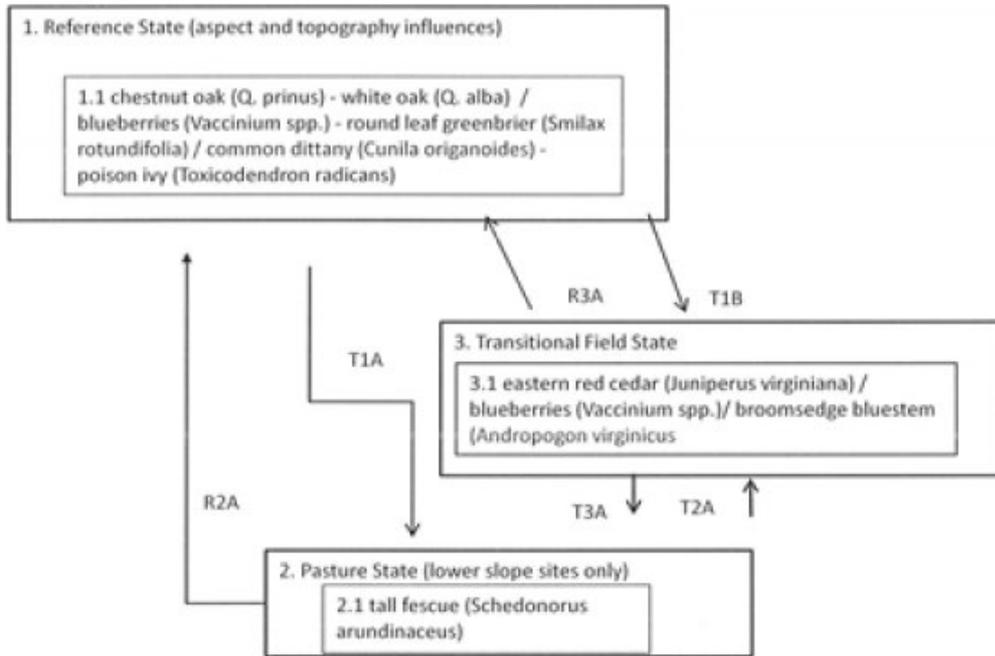
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State and transition model

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T1A: Pasture establishment.
T1B: Tree removal –no post harvest management inputs. Fescue present only if on adjacent sites.
T3A: Pasture re-establishment. Inputs may include brush/tree removal, weed control, seeding, etc.
T2A: Natural transition in absence of management inputs.
R2A, R3A: Extensive and long term forest management inputs required to create reference community.

Figure 7. 120C, Group 5, Provisional

Inventory data references

Site Development and Testing Plan

Future work is needed, as described in a future project plan, to validate the information presented in this provisional ecological site description. Future work includes field sampling, data collection and analysis by qualified vegetation ecologists and soil scientists. As warranted, annual reviews of the project plan can be conducted by the Ecological Site Technical Team. A final field review, peer review, quality control, and quality assurance reviews of the ESD are necessary to approve a final document.

Other references

Cleland, D.T., J.A. Freeouf, J.E. Keys, G.J. Nowacki, C.A. Carpenter, and W.H.McNab. 2007. Ecological Subregions: Sections and Subsections for the conterminous United States. [Map. presentation scale 1:3,500,000, colored; A.M. Sloan, cartographer] Gen. Tech. Report WO-76D. U.S. Department of Agriculture, Forest Service, Washington, DC. (<https://www.fs.fed.us/research/publications/misc/73326-wo-gtr-76d-cleland2007.pdf>)

Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schulz, and K. Snow. 2003. Ecological Systems of the United States: A Working Classification of US Terrestrial Systems. NatureServe, Arlington, VA. (https://www.natureserve.org/sites/default/files/pcom_2003_ecol_systems_us.pdf).

NatureServe 2020. NatureServe Explorer: An Online Encyclopedia of Life [web application]. NatureServe, Arlington,

VA. (<http://explorer.natureserve.org>)

Soil Survey Staff-USDA-NRCS [United States Department of Agriculture, Natural Resources Conservation Service] 2016. National Soils Information Service (NASIS Data Model Version 7.3.4) Lincoln, NE. (https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/soils/survey/tools/?cid=nrcs142p2_053552).

USDA-NRCS [United States Department of Agriculture, Natural Resources Conservation Service]. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. (https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051845.pdf).

USNVC [United States National Vegetation Classification]. 2019. United States National Vegetation Classification Database, V2.03. Federal Geographic Data Committee, Vegetation Subcommittee, Washington DC. (<http://usnvc.org>).

Approval

Greg Schmidt, 10/01/2024

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)	
Contact for lead author	
Date	05/11/2025
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:

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:**
