USDA Natural Resources Conservation Service

Ecological site F120CY007IN
Deep Well Drained Siltstone-Shale Uplands

Last updated: 10/01/2024
Accessed: 05/11/2025

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): 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 Fragiaqualfs (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 Deep Well Drained Siltstone-Shale Uplands ecological site is located on hillsides, shoulders and summits. Representative soils include: Hagerstown, Wellrock, Wellston, and Wrays.

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 Purdue University data for the Hoosier National Forest (Andriy Vladimirovich Zhalnin and George R. Parker, 2007, Delineation and spatial analysis of ecological classification units for the Hoosier National Forest in Southern Indiana), NatureServe.org Explorer, VegBank.org, Plant Communities of the Midwest –Indiana Subset, and Indiana DNR information.

Forest:

Aspect, topography, and soil depth will influence the gradient of communities on single mapunits. The herb dominance may show variation depending on aspect.

1.1. white oak (*Quercus alba*) –tuliptree (*Liriodendron tulipifera*) / flowering dogwood (*Cornus florida*) - sassafras (*Sassafras albidum*) / Virginia creeper (*Parthenocissus quinquefolia*) - bedstraw (Gallium spp.)

Major canopy species are white oak (*Quercus alba*) along with black oak (*Quercus velutina*), shagbark hickory (*Carya ovata*), chestnut oak (Quercus prinus), tulip poplar (*Liriodendron tulipifera*) and sugar maple (*Acer saccharum*). On north slopes, northern red oak (*Quercus rubra*) may be present and sugar maple may increase in dominance.

Minor canopy species include red maple (*Acer rubrum*), sassafras (*Sassafras albidum*), blackgum (*Nyssa sylvatica*), persimmon (*Diospyros virginiana*), American beech (*Fagus grandifolia*), and white ash (*Fraxinus americana*).

The tree-shrub layer will be variable but may include serviceberry (*Amelanchier arborea*), flowering dogwood (*Cornus florida*), hophornbeam (*Ostrya virginiana*), winged elm (*Ulmus alata*), and eastern redbud (*Cercis canadensis*).

The herbaceous layer may also include Virginia snakeroot (*Aristolochia serpentaria* (Virginia snakeroot), rattlesnake fern (*Botrychium virginianum*), Carex spp., *Desmodium nudiflorum* (naked flower ticktrefoil), wild yam (*Dioscorea quaternata*), white lettuce (*Prenanthes altissima*), false Solomon's seal (Smilacina racemosa), and three-lobed violet (*Viola triloba*).

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

Transitional Field:
State 3, Phase 3.1. maple (Acer spp.) / berries (Rubus spp.) – sumac (Rhus 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 states were included in the state and transition model for the lower sloping sites only.

Abandoned Cropland (lower slopes only):
State 4 Phase 4.1. henbit deadnettle (*Lamium amplexicaule*) – mouse-eared chickweed (Cerastium L.)
Abandonment of cropland would result in many weed species taking over the site. Initially, annual weeds would be predominate followed by grasses, shrubs and pioneers trees.

Cropland: State: 5. Phase 5.1. Dependent upon seeding and management. Most common crops are corn and soybeans.

Associated sites

F120CY006IN	**Deep Moderately Well Drained Siltstone-Shale Uplands** Deep Moderately Well Drained Siltstone-Shale Uplands

Table 1. Dominant plant species

Tree	(1) *Quercus alba* (2) *Liriodendron tulipifera*
Shrub	(1) *Cornus florida* (2) *Sassafras albidum*
Herbaceous	(1) *Parthenocissus quinquefolia* (2) *Galium*

Physiographic features

These sites are found on hillsides, shoulders, and summits.

Aspect impacts the vegetation community.

This initial PES grouping may be further divided into multiple ESDs once field work commences.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge
Runoff class	Medium to high
Elevation	400–1,000 ft
Slope	6–60%
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

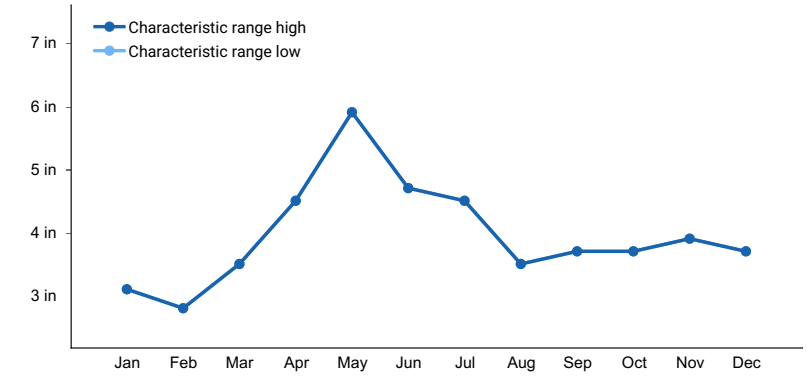

Figure 1. Monthly precipitation range

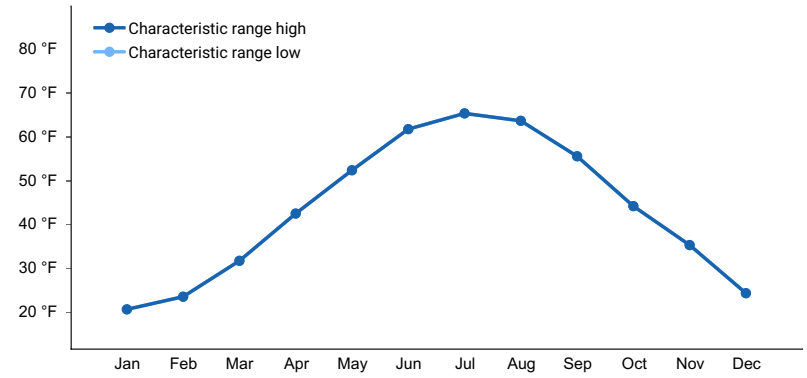

Figure 2. Monthly minimum temperature range

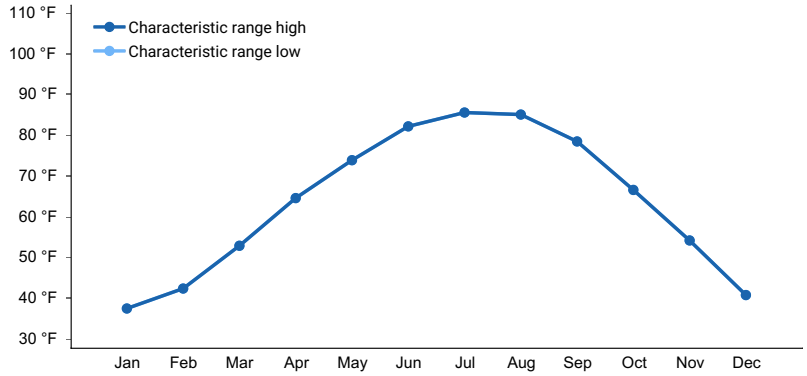

Figure 3. Monthly maximum temperature range

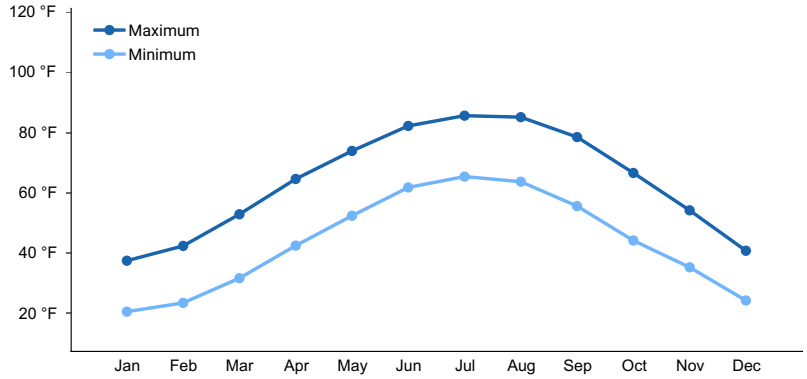

Figure 4. Monthly average minimum and maximum temperature

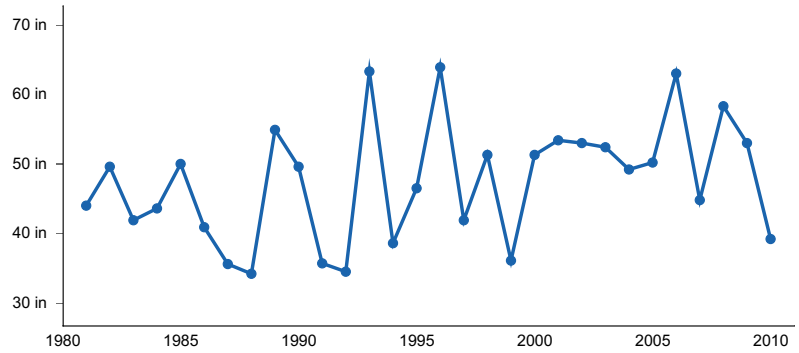

Figure 5. Annual precipitation pattern

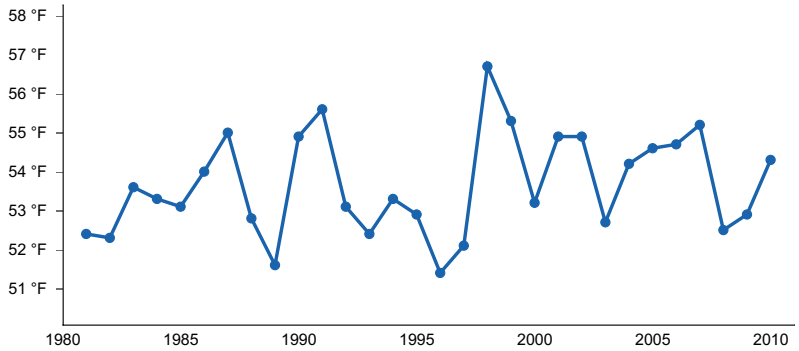

Figure 6. Annual average temperature pattern

Climate stations used

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

Influencing water features

There are no influencing water features on these sites.

Soil features

These soils are deep to very deep, well drained, and on hillsides shoulders, and summits. Representative soils include: Hagerstown, Wellrock, Wellston, and Wrays.

Table 4. Representative soil features

Parent material	(1) Residuum–shale (2) Loess–siltstone
Surface texture	(1) Silt loam (2) Silty clay loam
Family particle size	(1) Loamy (2) Fine-silty
Drainage class	Moderately well drained to well drained
Permeability class	Very slow to moderate
Soil depth	43–80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	6–7 in

Soil reaction (1:1 water) (0-40in)	3.5–7.3
Subsurface fragment volume <=3" (Depth not specified)	0–16%
Subsurface fragment volume >3" (Depth not specified)	0–60%

Ecological dynamics

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State and transition model

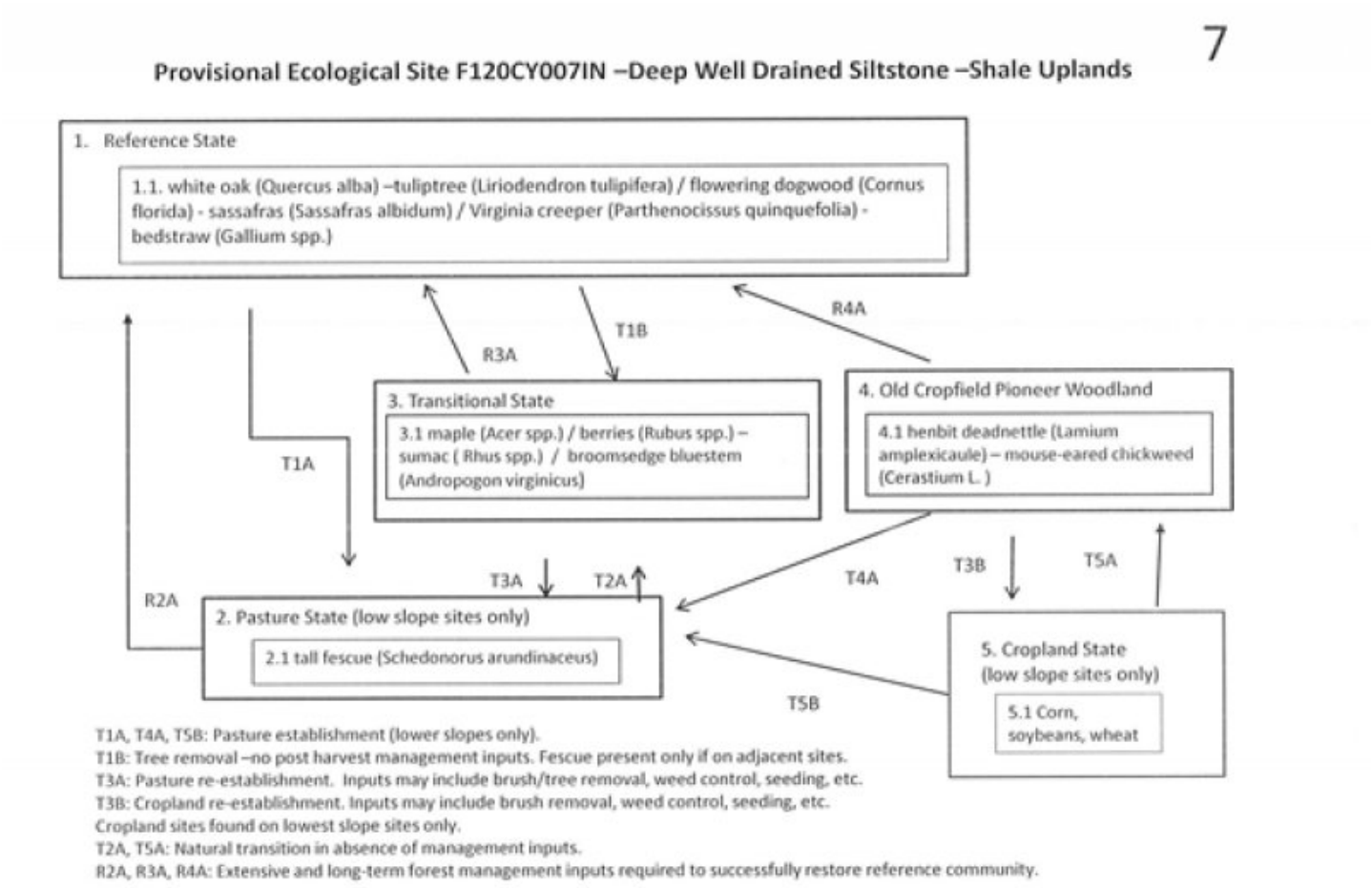

Figure 7. 120C, Group 7

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):**

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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:**
