

13260

South-Central Interior/Upper Coastal Plain Flatwoods

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None	None	None	None
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Vegetation Type

Forest and Woodland

Map Zones

49

Geographic Range

South Central Interior/Upper Coastal Plain Flatwoods are characteristic of glacial till of the Illinoian age, occurring over much of southern Indiana and Illinois. Flatwoods were also characteristic of nearly level sites in unglaciated regions south of the Illinoian till plain, occurring on broad, flat ridges of the Salem Plateau in Missouri, and on high, flat areas in Kentucky that represent ancient Quaternary or Tertiary post-glacial meltwater lakebeds and high terraces of the Upper Gulf Coastal Plain and Shawnee Hills (NatureServe 2007). In map zone (MZ) 49, this biophysical setting (BpS) was characteristic of the Interior River Valleys and Hills Level III Ecoregion (Omernik 1987, Woods et al. 2006a, 2006b), particularly within the Southern Illinoian Till Plain Level IV Ecoregion.

Biophysical Site Description

South Central Interior/Upper Coastal Plain Flatwoods occur on level or nearly level uplands or terraces characterized by a subsurface hardpan (typically an argillic horizon) that causes a shallowly perched water table (Taft et al. 1995, NatureServe 2007). The presence of argillic horizons on level terrain results in slow drainage and seasonal saturation and/or ponding in winter and spring, and significant desiccation in summer due to high evapotranspiration and the inability of subsurface moisture to penetrate the clay pan to primary rooting zones (Taft et al. 1995). Surface soils are typically alfisols, including hapludalfs and endoaqualfs (Woods et al. 2006a). Silt loam is the commonest soil texture; sandy loams and sandy clay loams may also be present (Taft et al. 1995). Soils are generally acidic and low in organic matter. Surface layers are underlain by shale, sandstone, or limestone bedrock. In Illinois, this BpS is characteristic of the Interior River Valleys and Hills Level III Ecoregion, occupying glacial till of the Illinoian age (Woods et al. 2006a). Annual precipitation in the Illinois range of this BpS averages 39-45in; length of average growing season is 187-192 days (Woods et al. 2006a, 2006b). In Indiana, this BpS is characteristic of the driftless area of the Southwestern Lowlands Natural Region, occurring in the SW portion of the state in the Southern Wabash Lowlands Level IV Ecoregion (Woods et al. 1998). Annual precipitation in the Indiana range of this BpS is 41-43in; length of average growing season is 175-200+ days (Woods et al. 1998).

Vegetation Description

Canopy structure is typically intermediate between savanna and closed forest, characterized by local openings and wet depressions (Taft 2005). Taft et al. (1995) found an average density of 464 trees/ha and an average basal area of 23.1 m²/ha in several stands on the Illinoisan till plain of southern Illinois. However, tree density varied among sites. Dominant trees are typically post oak (*Quercus stellata*) and blackjack oak (*Q. marilandica*). Canopy associates include several additional oaks, e.g. white oak (*Q. alba*), black oak (*Q. velutina*), shingle oak (*Q. imbricaria*), red oak (*Q. rubra*), and cherrybark oak (*Q. pagoda*); shagbark hickory (*Carya ovata*); mockernut hickory (*C. tomentosa*); black hickory (*C. tomentosa*); sassafras (*Sassafras albidum*); black cherry (*Prunus serotina*); slippery elm (*Ulmus rubra*); and American elm (*U. americana*). (Dolan and Menges 1989, Taft et al. 1995, Jacquart et al. 2002, Edgin et al. 2003, Taft 2005, NatureServe 2007).

Post oak tends to dominate sites with low Ca concentrations, and blackjack oak is characteristic of sites with high sand content or Mg concentrations (Taft et al. 1995). Common persimmon (*Diospyros virginiana*) is often present in the understory. Wet depressions are characterized by pin oak (*Quercus palustris*) and swamp white oak (*Q. bicolor*) (Edgin et al. 2003). The shrub layer is typically open or indistinct. Characteristic shrubs include Allegheny blackberry (*Rubus allegheniensis*), black raspberry (*R. occidentalis*) and Carolina rose (*Rosa carolina*). The ground layer is typically of low diversity, with a few species contributing most of cover and importance. In some stands, leaf litter is the dominant cover (NatureServe 2007). Commonly occurring ground layer species include Virginia creeper (*Parthenocissus quinquefolia*), poison ivy (*Toxicodendron radicans*), woodland sunflower (*Helianthus divaricatus*), wood reedgrass (*Cinna arundinacea*), dewberry (*Rubus flagellaris*), wild oats (*Chasmanthium latifolium*), poverty grass (*Danthonia spicata*), bent grass (*Agrostis perennans*), rushfoil (*Crotonopsis elliptica*), panic grasses (*Panicum* spp.), Pennsylvania sedge (*Carex pennsylvanica*), fescue sedge (*C. festucacea*), and parasol sedge (*C. umbellata*). (Taft et al. 1995, Jacquart et al. 2002, NatureServe 2007). Upland flatwoods often grade into upland savanna (post oak barrens) or wet flatwoods.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
QUST	<i>Quercus stellata</i>	Post oak
QUMA3	<i>Quercus marilandica</i>	Blackjack oak
QUERC	<i>Quercus</i>	Oak
CAOV2	<i>Carya ovata</i>	Shagbark hickory
CAAL27	<i>Carya alba</i>	Mockernut hickory
CATE9	<i>Carya texana</i>	Black hickory
DIVI5	<i>Diospyros virginiana</i>	Common persimmon
CAREX	<i>Carex</i>	Sedge

Species names are from the NRCS PLANTS database. Check species codes at <http://plants.usda.gov>.

Disturbance Description

Subsurface fragipans inhibit drainage in winter and spring, creating a perched water table with localized ponding. In summer, evaporation from coarse-textured surface soils is high, and the fragipan inhibits water movement to the rooting zone from deeper subsurface layers, leading to desiccation (Taft et al. 1995). These seasonal hydrologic fluctuations are largely responsible for the structure and species composition of upland flatwoods. Because occurrences are on flat uplands or abandoned terraces, long-term flooding and ponding is likely a rare occurrence.

Fire may have an important role in shaping flatwoods structure and species composition. Taft et al. (1995) found greater species richness and higher density of ground layer vegetation in an Illinois remnant managed with fire. They noted an increase in shade-intolerant species typical of upland habitats, but no significant decline of species favoring wetter conditions. Many flatwoods remnants occurred in proximity to open savanna and prairie communities, and were likely impacted by fires that maintained those communities. Characteristics of flatwoods suggesting they were prone to frequent fires include seasonally dry conditions, level aspect, position in a relatively undissected landscape, open woodland character allowing wind movement, association with prairie and savanna, and a moderately flammable fuel load (Taft et al. 1995). In the absence of fire, shade-tolerant tree species may become established under the canopy. Density of woody stems of these species increase in the absence of fire, and ground layer diversity declines (Taft et al. 1995). The degree and rapidity of invasion likely varies depending on soil texture and characteristics.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	128	8		
Moderate (Mixed)	33	31		
Low (Surface)	16	61		
All Fires	10	100		

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Percent of all fires is the percent of all fires modeled in that severity class. Minimum and Maximum FIs show the relative range of fire intervals as estimated by model contributors, if known.

Scale Description

This BpS was a matrix system in southern IL (White and Madany 1978). In Indiana, flatwoods were likely a small- to large-patch systems.

Adjacency or Identification Concerns

Historically, South Central Interior/Upper Coastal Plain Flatwoods may have been the matrix natural community type in southern Illinois, where it was associated with open savanna and prairie communities (wet and dry) on flat topography and oak-hickory forest on dissected topography. Fire frequency and local edaphic characteristics varied among these types. Today, flatwoods occur as isolated, small occurrences in an agricultural landscape.

Issues or Problems

Native Uncharacteristic Conditions

Prevalence of shade-tolerant tree species not characteristic of the canopy may indicate fire suppression or other disturbance. Many occurrences have been degraded or destroyed through clearing, selective logging, and grazing.

Comments

Succession Classes

Mapping Rules

Upper Layer Lifeform	Height (m)	Canopy Cover (%)									
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Herb	0-0.5	A	A	A	A	A	A	A	A	A	A
Herb	0.5-1.0	A	A	A	A	A	A	A	A	A	A
Herb	>1.0	A	A	A	A	A	A	A	A	A	A
Shrub	0-0.5	A	A	UN	UN	UN	UN	UN	UN	UN	UN
Shrub	0.5-1.0	A	A	UN	UN	UN	UN	UN	UN	UN	UN
Shrub	1.0-3.0	A	A	UN	UN	UN	UN	UN	UN	UN	UN
Shrub	>3.0	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	0-5	B	B	B	B	B	B	UN	UN	UN	UN
Tree	5-10	B	B	B	B	B	B	UN	UN	UN	UN
Tree	10-25	UN	UN	UN	UN	UN	UN	C	C	D	D
Tree	25-50	UN	UN	UN	UN	UN	UN	C	C	D	D
Tree	>50	UN	UN	UN	UN	UN	UN	C	C	D	D

Succession class letters A-E are described in the Succession Class Description section. Some classes use a leafform distinction where a qualifier is added to the class letter: Brdl (broadleaf), Con (conifer), or Mix (mixed conifer and broadleaf). UN refers to uncharacteristic native or a combination of height and cover that would not be expected under the reference condition. NP refers to not possible or a combination of height and cover which is not physiologically possible for the species in the BpS.

Description

Class A 14 Early Development 1 - All Structures

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
SCSC	Schizachyrium scoparium	Little bluestem	Upper
ANGE	Andropogon gerardii	Big bluestem	Upper
QUERC	Quercus	Oak	Upper

Description

Open grassland or shrubland resulting from catastrophic, stand-replacing fire. Vegetative composition would have varied, depending in part on degree and duration of canopy closure prior to stand-replacing fire. Grasses would have included species typical of barrens or nearby prairie areas. This class was likely uncommon in this system. Stand-replacing fire maintains system in this class.

Maximum Tree Size Class

Seedling <4.5ft

Class B 16 Mid Development 1 - Open

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUST	Quercus stellata	Post oak	Upper
QUMA3	Quercus marilandica	Blackjack oak	Upper

CARYA	Carya	Hickory	Mid-Upper
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Description

Barrens stage. Oak sprouts and seedlings have grown large enough to survive ground fire, and form a scattered, partial canopy. Hickories and other trees also appear. Understory vegetation is typical of barrens communities, and is graminoid-dominated (e.g., little bluestem, Pennsylvania sedge, dewberry, etc.).

Maximum Tree Size Class

Medium 9-21"DBH

Class C	57	Late Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUST	Quercus stellata	Post oak	Upper
QUERC	Quercus	Oak	Upper
CARYA	Carya	Hickory	Upper
DIVI5	Diospyros virginiana	Common persimmon	Mid-Upper

Description

Open woodland stage, dominated by post oak (*Quercus stellata*) and/or blackjack oak (*Q. marilandica*), the last primarily on sandy substrates and/or substrates with high magnesium concentrations. Canopy associates include several oaks (*Quercus* spp.), hickories (*Carya* spp.), sassafras (*Sassafras albidum*), black cherry (*Prunus serotina*), and elm (*Ulmus* spp.). Persimmon (*Diospyros virginiana*) is a characteristic understory tree. Shrub and ground layer vegetation is patchy and usually sparse. This class is maintained by frequent ground-layer fires that reduce stem density by causing mortality of small-stemmed trees, particularly hickories.

Maximum Tree Size Class

Medium 9-21"DBH

Class D	13	Late Development 2 - Closed
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUST	Quercus stellata	Post oak	Upper
QUERC	Quercus	Oak	Upper
CARYA	Carya	Hickory	Upper
DIVI5	Diospyros virginiana	Common persimmon	Mid-Upper

Description

Closed-canopy flatwoods with high stem density and presence of fire-intolerant vegetation resulting from lack of fire. Shrub and ground layer vegetation sparse. Ground fires maintain the system in this stage; mixed fires may open the class.

Maximum Tree Size Class

Large 21-33"DBH

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	0	Mid1:OPN	19
Mid1:OPN	20	Late1:OPN	50
Late1:OPN	51	Late1:OPN	999
Late2:CLS	81	Late2:CLS	999

Probabilistic Transitions

Disturbance Type	Disturbance occurs In	Moves vegetation to	Disturbance Probability	Return Interval (yrs)	Reset Age to New Class Start Age After Disturbance?	Years Since Last Disturbance
Replacement Fire	Early1:ALL	Early1:ALL	0.01	100	Yes	0
Replacement Fire	Mid1:OPN	Early1:ALL	0.02	50	Yes	0
Mixed Fire	Mid1:OPN	Mid1:OPN	0.04	25	No	0
Alternative Succession	Late1:OPN	Late2:CLS	1	1	Yes	30
Replacement Fire	Late1:OPN	Early1:ALL	0.005	200	Yes	0
Mixed Fire	Late1:OPN	Late1:OPN	0.04	25	No	0
Surface Fire	Late1:OPN	Late1:OPN	0.1	10	No	0
Wind or Weather or Stress	Late2:CLS	Early1:ALL	0.003	333	Yes	0
Replacement Fire	Late2:CLS	Early1:ALL	0.003	333	Yes	0
Mixed Fire	Late2:CLS	Late1:OPN	0.01	100	Yes	0
Surface Fire	Late2:CLS	Late2:CLS	0.03	33	No	0

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