

13060

East Gulf Coastal Plain Northern Loess Plain Oak-Hickory Upland

BpS Model/Description Version: Aug. 2020

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Modelers		Reviewers	
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Vegetation Type

Forest and Woodland

Map Zones

47, 48

Geographic Range

This Loess plain forest occurs under suitable conditions in the loess hills of the coastal plain. This is the former matrix hardwood system of the most northern portions of the Upper East Gulf Coastal Plain of western Tennessee, western Kentucky, possibly southern Illinois, and northern Mississippi. It does not include the mesic forests of the adjacent bluffs to the west, which constitute a different system. Today it is reduced to remnants in a largely agricultural landscape.

NatureServe (2006) notes that the core distribution of this system is mapped as the Loess Plains (Level IV Ecoregion 74b) of Omernik (EPA 2004), which is approximately equivalent to Section 231H.

Biophysical Site Description

This model is specific to the dry-mesic forests of the loess plain. The distribution of these forests is determined by the interaction of topography and fine textured soils. Within the type, local variability in topography and moisture determine the dominant canopy. Drier sites occur along the bluff tops and on the loess plain. Loess deposits make the fertility and the local topography of this area distinct (NatureServe 2006, Braun 1950). The core distribution of this system is mapped as the Loess Plains (Level IV Ecoregion 74b) of Omernik (EPA 2004). Extensive forests once covered this broad area of generally flat to rolling uplands. Most have been cleared for agriculture due to the rich, productive soils derived from relatively thick loess deposits. The areal extent of this forested system has been so heavily reduced, that the component community types remain undocumented and speculative at best (NatureServe 2006).

Vegetation Description

Most stands are (or at least were historically) co-dominated by white oak (*Quercus alba*), with other oaks (*Quercus falcata*, *Quercus velutina*, *Quercus stellata*, *Quercus marilandica*), hickories, and other hardwoods, including yellow poplar (*Liriodendron tulipifera*) and or sweetgum (*Liquidambar styraciflua*). Cherrybark oak (*Quercus pagoda*) may be an important canopy component. Loblolly pine (*Pinus taeda*) is largely absent, occurring to the south of this system. Some scattered successional stands are dominated by *Juniperus virginiana* var. *virginiana*.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
QUAL	<i>Quercus alba</i>	White oak
QUFA	<i>Quercus falcata</i>	Southern red oak
QUPA5	<i>Quercus pagoda</i>	Cherrybark oak
LIST2	<i>Liquidambar styraciflua</i>	Sweetgum
JUVIV	<i>Juniperus virginiana</i> var. <i>virginiana</i>	Eastern redcedar
CAAL27	<i>Carya alba</i>	Mockernut hickory
QUMA3	<i>Quercus marilandica</i>	Blackjack oak
QUST	<i>Quercus stellata</i>	Post oak

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

Disturbance Description

Fire regime characterized by frequent, low intensity surface fires. The mean fire return interval (MFR) is about 15yrs with wide year-to-year and within-type variation related to moisture cycles, degree of sheltering, and proximity to more fire-prone vegetation types. Anthropogenic fire may have contributed to pre-settlement fire frequency.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	383	2		
Moderate (Mixed)	87	10		
Low (Surface)	9	88		
All Fires	8	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

East Gulf Coastal Plain Northern Loess Plain Oak-Hickory Upland forests are considered matrix communities by NatureServe (2006), while the loess bluff forests are described as large patch communities.

Adjacency or Identification Concerns

This type transitions into a more mesic type (East Gulf Coastal Plain Northern Mesic Hardwood Slope Forest, CES203.47 -- BpS 1325) on the bluffs and slopes to the west. There is a more subtle gradient along the eastern edge of the loess plain. This Biophysical Setting (BpS) transitions into the oak-shortleaf pine type to the south in central and southern Mississippi, and to the dry oak hickory type to the east in the remainder of the Coastal Plain in northern Mississippi, Tennessee and Kentucky.

Issues or Problems

To the east, this system grades into East Gulf Coastal Plain Northern Dry Upland Hardwood Forest (CES203.483 -- BpS 1307). These two types (BpS 1306 and 1307) may be similar and difficult to distinguish where they come together, but the former (1306) is believed to be more mesic and richer floristically due to the influence of the loessal soils. However, it is also rare due to the fertility of the soils for agriculture. More work is needed to better quantify the differences between these types and their exact boundaries (NatureServe 2006).

The southern boundary of this system has not been clearly delineated; Omernik (EPA 2004) Ecoregion 74b extends farther south than the presumed boundary of this system. For now, the boundary is assumed to occur in northern Mississippi at the latitude of the junction of Omernik (EPA 2004) Ecoregion 65e and Ecoregion 65d (ca. 34 degrees N) (NatureServe 2006).

Native Uncharacteristic Conditions

Comments

We have included the use of keep relative age in this model, realizing that in the long-term modeling, this will either have to be accommodated in the software or reworked. The inclusion makes more ecological sense. Without it the proportion of forests shift to the mid-successional forest class, which is not expected on the ground. We have included some of the dry-oak hickory upland type of the loess plain in with this model. The Southern Appalachian group needs to deal with the dry-oak hickory type as a part of the interior low plateau modeling. Reviewers may want to consider specifically the fire return interval given this Potential Natural Vegetation Group in the tension zone between a high fire frequency landscape and the Mississippi Alluvial Plain that is considered non-pyrogenic (Frost 1998). Questions that came up as part of the review included the potential for Native American burning in this BpS, which would lead to more open conditions.

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	A	A	A	A	A	A	A	A
Shrub	0.5-1.0	A	A	A	A	A	A	A	A	A	A
Shrub	1.0-3.0	A	A	A	A	A	A	A	A	A	A
Shrub	>3.0	A	A	A	A	A	A	A	A	A	A
Tree	0-5	A	A	A	A	A	A	A	A	A	A
Tree	5-10	C	C	C	C	C	C	C	B	B	B
Tree	10-25	D	D	D	D	D	D	D	E	E	E
Tree	25-50	D	D	D	D	D	D	D	E	E	E
Tree	>50	D	D	D	D	D	D	D	E	E	E

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	6	Early Development 1 - All Structures
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUAL	Quercus alba	White oak	Upper
LIST2	Liquidambar styraciflua	Sweetgum	Upper
QUFA	Quercus falcata	Southern red oak	Upper
JUVIV	Juniperus virginiana var. virginiana	Eastern redcedar	Upper

Description

Class A is characterized by sprouts, seedlings, and saplings, primarily of major overstory species, in gaps created by wind, lightning, insect/disease and, less frequently, fire. Shade intolerant species (e.g., *Liquidambar styraciflua*, LIST2) are confined to multiple-tree gaps. This is not a fire driven system, so a majority of early succession would result from other disturbances, including windthrow and tree fall.

Maximum Tree Size Class

Sapling >4.5ft; <5"DBH

Class B	16	Mid Development 1 - Closed
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUAL	Quercus alba	White oak	Upper
LIST2	Liquidambar styraciflua	Sweetgum	Upper
QUFA	Quercus falcata	Southern red oak	Upper
JUVIV	Juniperus virginiana var. virginiana	Eastern redcedar	Upper

Description

Class B is dominated by a young to early mature canopy with some obligate mid-story and understory species. The closed condition is a function of understory/mid-story development and depending on the age of the overstory, at least two strata are present. The fire frequency primarily impacts the amount of subcanopy vegetation. Under standard conditions, infrequent and low intensity fires, the stands have dense undergrowth and are considered closed.

Maximum Tree Size Class

Medium 9-21"DBH

Class C	27	Mid Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUAL	Quercus alba	White oak	Upper
QUST	Quercus stellata	Post oak	Upper
CAGL8	Carya glabra	Pignut hickory	Upper

CAAL27	Carya alba	Mockernut hickory	Upper
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Description

Class C has a similar overstory composition and structure as B, but without a well-developed mid-story. Fire-intolerant species are less abundant in all strata.

Maximum Tree Size Class

Medium 9-21"DBH

Class D 33 Late Development 1 - Open

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUAL	Quercus alba	White oak	Upper
QUST	Quercus stellata	Post oak	Upper
CAAL27	Carya alba	Mockernut hickory	Upper
CAGL8	Carya glabra	Pignut hickory	Upper

Description

Class D is characterized by an early to late-mature canopy that may exceed 30m (100ft) in height. Dominant overstory species vary depending on location and stand history. The open condition is dependent on the absence of multi-layered vertical structure. Surface fires serve to maintain the open understory in these stands.

Maximum Tree Size Class

Large 21-33"DBH

Class E 18 Late Development 1 - Closed

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUAL	Quercus alba	White oak	Upper
QUFA	Quercus falcata	Southern red oak	Upper
QUPA5	Quercus pagoda	Cherrybark oak	Upper
LIST2	Liquidambar styraciflua	Sweetgum	Upper

Description

Class E exhibits the same overstory composition and structure as D. However, well-developed lower layers are present containing canopy species and other species confined to those levels. Fire frequency primarily impacts the amount of subcanopy vegetation. Under standard conditions, infrequent and low intensity fires, the stands have dense undergrowth and are considered closed.

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	14
Mid1:OPN	15	Late1:OPN	59
Mid1:CLS	15	Late1:CLS	59
Late1:OPN	60	Late1:OPN	999
Late1:CLS	60	Late1: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
Alternative Succession	Early1:ALL	Mid1:CLS	1	1	Yes	13
Replacement Fire	Early1:ALL	Early1:ALL	0.008	125	Yes	0
Surface Fire	Early1:ALL	Early1:ALL	0.14	7	No	0
Alternative Succession	Mid1:OPN	Mid1:CLS	1	1	Yes	12
Wind or Weather or Stress	Mid1:OPN	Early1:ALL	0.002	500	Yes	0
Replacement Fire	Mid1:OPN	Early1:ALL	0.003	333	Yes	0
Surface Fire	Mid1:OPN	Mid1:OPN	0.15	7	No	0
Wind or Weather or Stress	Mid1:CLS	Early1:ALL	0.002	500	Yes	0
Replacement Fire	Mid1:CLS	Early1:ALL	0.003	333	Yes	0
Surface Fire	Mid1:CLS	Mid1:CLS	0.025	40	No	0
Mixed Fire	Mid1:CLS	Mid1:OPN	0.05	20	Yes	0
Alternative Succession	Late1:OPN	Late1:CLS	1	1	Yes	15
Replacement Fire	Late1:OPN	Early1:ALL	0.001	1000	Yes	0
Insects or Disease	Late1:OPN	Early1:ALL	0.001	1000	Yes	0
Wind or Weather or Stress	Late1:OPN	Early1:ALL	0.003	333	Yes	0
Surface Fire	Late1:OPN	Late1:OPN	0.15	7	No	0
Wind or Weather or Stress	Late1:CLS	Early1:ALL	0.002	500	Yes	0
Replacement Fire	Late1:CLS	Early1:ALL	0.003	333	Yes	0
Insects or Disease	Late1:CLS	Early1:ALL	0.003	333	Yes	0

Wind or Weather or Stress	Late1:CLS	Late1:OPN	0.02	50	Yes	0
Mixed Fire	Late1:CLS	Late1:OPN	0.02	50	Yes	0
Surface Fire	Late1:CLS	Late1:CLS	0.025	40	No	0

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