

13250

East Gulf Coastal Plain Northern Mesic Hardwood Slope Forest

BpS Model/Description Version: Aug. 2020

Update: 5/25/2018

Modelers		Reviewers	
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None	None	None	None

Vegetation Type

Forest and Woodland

Map Zones

46, 47, 48

Geographic Range

This system includes mesic deciduous hardwood forests of inland portions of the East Gulf Coastal Plain, including Alabama, Mississippi, western Kentucky, and western Tennessee. This system covers parts of the more mesic forests in the coastal plain portion of the Western Mesophytic Forest Region of Braun (1950), referred to as mesophytic mixed hardwoods, as well as mesic forests in the adjacent "Oak-Pine-Hickory" region to the south (Greller 1988). Examples of this system occur on slopes and ravines between dry uplands and stream bottoms.

Biophysical Site Description

For this model, the broader concept of the Western Mesophytic Forest of Braun (1950) has been split. This model is specific to the mesic forests of the northern portion of the East Gulf Coastal 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 canopy dominants. Drier sites (occupied by different systems) occur along the bluff tops and on the loess plain. Loess deposits make the fertility and the local topography of this area distinct (NatureServe 2005; Braun 1950; Miller and Neiswender 1987). The geology of the area is mapped as the Jackson Formation (Hardeman 1966).

Vegetation Description

The most characteristic feature of the vegetation of this system is a high cover value for *Fagus grandifolia*, but a variety of other hardwood species may also be found in the overstory. Stands are mesic, and some may be dominated by *Fagus grandifolia* and *Quercus alba*, others by *Quercus alba* or *Quercus pagoda* with other mesic hardwoods. From north to south, there is some floristic variability in the component floristics of this system. *Quercus rubra* will be of greater importance north of 35 degrees N latitude, and *Pinus taeda*, conversely, of greater importance to the south of this boundary. This system is defined as being north of the range of *Magnolia grandiflora* and *Pinus glabra*, which excludes the "Beech-Magnolia" forests of the deeper south. The core concept of this system consists of association types in which *Quercus* spp. can be present in the canopy, but are not dominant. Some may exhibit codominance by *Fagus grandifolia*, or other mesic *Quercus* spp. Other important canopy components include *Liriodendron tulipifera*, *Liquidambar styraciflua*, *Acer rubrum*, *Nyssa sylvatica*, *Fraxinus*

americana, *Magnolia acuminata* (of local distribution), *Magnolia virginiana*, and *Pinus taeda*. Some subcanopy components (in addition to canopy species) include *Carpinus caroliniana*, *Diospyros virginiana*, *Oxydendrum arboreum*, *Cornus florida*, *Acer barbatum*, *Magnolia macrophylla*, *Ostrya virginiana*, *Ulmus alata*, and *Ilex opaca*.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
FAGR	<i>Fagus grandifolia</i>	American beech
QUAL	<i>Quercus alba</i>	White oak
QUPA5	<i>Quercus pagoda</i>	Cherrybark oak
LITU	<i>Liriodendron tulipifera</i>	Tuliptree
LIST2	<i>Liquidambar styraciflua</i>	Sweetgum
PITA	<i>Pinus taeda</i>	Loblolly pine

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

Disturbance Description

Generally stable, fire-sheltered forests (NatureServe 2006). Fire frequency and severity can be classified as Fire Regime Group III, with infrequent, low intensity surface fires and rare mosaic or replacement fires. The mean fire return interval (MFRI) is about 35yrs 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 was considered and it contributes to within-type MFRI variation.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	401	9		
Moderate (Mixed)	158	22		
Low (Surface)	51	69		
All Fires	35	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

These mesic forests are described by NatureServe (2006) as large patch communities.

Adjacency or Identification Concerns

This system occurs as large to small patches in suitable habitat (e.g. slopes and ravines) throughout its range, the northern part of the East Gulf Coastal Plain north of the range of *Magnolia grandiflora* and *Pinus glabra*. There is an equivalent system to the south [Southern Coastal Plain Mesic Slope Forest (ces203.477 or biophysical setting [BpS]1357)], and separate systems (similarly divided north and south) to cover the mesic forests of the Loess Bluffs bordering the Mississippi River Alluvial Plain.

NatureServe (2006) notes East Gulf Coastal Plain Northern Loess Plain Oak-Hickory Upland (CES203.482 or BpS 1306) as an adjacent ecological system.

Issues or Problems

Native Uncharacteristic Conditions

Comments

Models and descriptions for map zones (MZ)s 46, 47, and 48 were identified as duplicates during the BpS review process. The description from MZ47 was adopted for all three map zones. Some disturbance description information in the Sclass descriptions was originally only in the description for MZ47.

This model was developed for MZs 46 and 47. Although the model description is based upon the rapid assessment model R9OADM, it has been modified to more accurately describe or tease apart the mesic slope portion of the R9OADM model. The modelers of the R9OADM model were Bruce Davenport, Alexa McKerrow, and Paul Arndt.

Ideally, the modelers would like to see more forest in the late successional classes (D & E) rather than in mid-succession (B & C) and with more closed than open structure. The Vegetation Dynamics Development Tool (VDDT) model for this BpS was conceived of by modifying the R9OADM model to more accurately reflect the desired class percentages as noted below. The original R9OADM description had indicated the class percentages in this model, but the actual VDDT model was modified to adhere to LANDFIRE modeling rules without consulting the class information below. Thus, there was a discrepancy between VDDT class percent outputs and what the modelers intended.

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	C	C	C	C	C	C	C	B	B	B
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	7	Early Development 1 - All Structures
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
LIST2	Liquidambar styraciflua	Sweetgum	Upper
FAGR	Fagus grandifolia	American beech	Upper
QUPA5	Quercus pagoda	Cherrybark oak	Upper
LITU	Liriodendron tulipifera	Tuliptree	Upper

Description

This class 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. *Liriodendron tulipifera*, LITU) are confined to multiple-tree gaps. This is not a fire-driven system, so most of early succession would result from other disturbances, including tree fall.

Maximum Tree Size Class

Sapling >4.5ft; <5"DBH

Class B	30	Mid Development 1 - Closed
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
LIST2	Liquidambar styraciflua	Sweetgum	Upper
FAGR	Fagus grandifolia	American beech	Upper
QUPA5	Quercus pagoda	Cherrybark oak	Upper
LITU	Liriodendron tulipifera	Tuliptree	Upper

Description

This class 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/midstory 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	6	Mid Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
LIST2	Liquidambar styraciflua	Sweetgum	Upper
FAGR	Fagus grandifolia	American beech	Upper

QUPA5	Quercus pagoda	Cherrybark oak	Upper
LITU	Liriodendron tulipifera	Tuliptree	Upper

Description

This class has a similar overstory composition and structure as earlier closed states but without a well-developed midstory.

Maximum Tree Size Class

Medium 9-21"DBH

Class D	15	Late Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUAL	Quercus alba	White oak	Upper
FAGR	Fagus grandifolia	American beech	Upper
QUPA5	Quercus pagoda	Cherrybark oak	Upper
LITU	Liriodendron tulipifera	Tuliptree	Upper

Description

This class 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.

Maximum Tree Size Class

Large 21-33"DBH

Class E	42	Late Development 1 - Closed
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUAL	Quercus alba	White oak	Upper
FAGR	Fagus grandifolia	American beech	Upper
QUPA5	Quercus pagoda	Cherrybark oak	Upper
LITU	Liriodendron tulipifera	Tuliptree	Upper

Description

This class 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:CLS	14
Mid1:OPN	15	Late1:OPN	79
Mid1:CLS	15	Late1:CLS	79
Late1:OPN	80	Late1:OPN	999
Late1:CLS	80	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
Replacement Fire	Early1:ALL	Early1:ALL	0.004	250	Yes	0
Mixed Fire	Early1:ALL	Early1:ALL	0.01	100	No	0
Alternative Succession	Mid1:OPN	Mid1:CLS	1	1	Yes	25
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	0.04	25	No	0
Wind or Weather or Stress	Mid1:CLS	Early1:ALL	0.003	333	Yes	0
Replacement Fire	Mid1:CLS	Early1:ALL	0.003	333	Yes	0
Mixed Fire	Mid1:CLS	Mid1:OPN	0.006	167	Yes	0
Surface Fire	Mid1:CLS	Mid1:CLS	0.012	83	No	0
Alternative Succession	Late1:OPN	Late1:CLS	1	1	Yes	25
Replacement Fire	Late1:OPN	Early1:ALL	0.002	500	Yes	0
Wind or Weather or Stress	Late1:OPN	Early1:ALL	0.003	333	Yes	0
Surface Fire	Late1:OPN	Late1:OPN	0.04	25	No	0
Replacement Fire	Late1:CLS	Early1:ALL	0.002	500	Yes	0
Wind or Weather or Stress	Late1:CLS	Early1:ALL	0.004	250	Yes	0
Mixed Fire	Late1:CLS	Late1:OPN	0.009	111	Yes	0
Surface Fire	Late1:CLS	Late1:CLS	0.018	56	No	0

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