13290
East Gulf Coastal Plain Southern Loess Bluff Forest

BpS Model/Description Version: Aug. 2020

Modelers		Reviewers	
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None	None	None	None
None	None	None	None

Vegetation Type
Forest and Woodland

Map Zones
45,46,99

Geographic Range
This system is endemic to the loess bluffs ("Bluff Hills" [Ecoregion 74a] of EPA (2004)) and the immediately adjacent Southern Rolling Plains (western portion of Ecoregion 74c) along the eastern edge of the Mississippi River Alluvial Plain in southwestern MS and adjacent LA (NatureServe 2006). This system extends through the lower one-third of MS into southeast LA from about 32 degrees N latitude, where the Big Black River transects the bluffs, to just below 31degrees N latitude near St. Francisville, LA.

Biophysical Site Description
Largely confined to steep bluffs east of the Mississippi River but including the hardwood-dominated western edge of the loess plains immediately to their east. Consisting of a belt of Pleistocene and Tertiary aeolian deposits (Braun 1950) that are often deeply eroded and very steep, with fertile topsoil and abundant moisture (Miller and Neiswender 1987). This BpS generally corresponds with Ecoregion 74a (Bluff Hills) and the western portion of Ecoregion 74c (Southern Rolling Plains) (EPA 2004). This system occupies upland loess bluffs, ravines, and adjacent plains that are considerably higher in elevation than the adjacent Mississippi River Alluvial Plain. The bluffs may extend to 150m (500ft) in elevation and from 30-60m (100-200ft) above the adjacent Mississippi Alluvial Plain. Loessal deposits are thickest near the river, becoming thinner to the east.

Vegetation Description
This system is usually a closed-canopy, multi-layered, forest. Defined within the range of southern magnolia (Magnolia grandiflora), it is described elsewhere as dominated by beech-magnolia on the bluffs, and cherrybark oak (Quercus pagoda), sweetgum (Liquidambar styraciflua) and other hardwoods on the plains. As with the northern bluffs, those descriptions perhaps understate the diversity of this BpS. Braun (1950) characterized the loess bluffs as mixed mesophytic forest, albeit modified in the southern loess bluffs by the occurrence of southern magnolia. Delcourt and Delcourt (1974) described a LA portion similarly. Indeed, over 50 tree species occur in the loess bluffs (Smith and Linnartz, 1980). Beyond beech, southern magnolia, cherrybark oak and sweetgum, significant canopy species include water, swamp chestnut, black, southern red and white oaks, as well as loblolly (Pinus taeda) and spruce pine (Pinus glabra), bitternut and mockernut hickories, blackgum and yellow-poplar.

Subcanopy, and some canopy, species include American hornbeam, eastern hophornbeam, red and Florida maples, sourwood, sassafras, flowering dogwood, persimmon, winged elm and American holly. These bluffs, as well as the northern bluffs, frequently provide habitat for species that are more common to the north (Delcourt and Delcourt 1975).

Vegetation of the loess plains would more likely be dominated by Quercus pagoda, Liquidambar styraciflua and other hardwood species, along with Pinus taeda (NatureServe 2006).

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
QUPA5	*Quercus pagoda*	Cherrybark oak
LIQUI	*Liquidambar*	Sweetgum
FAGR	*Fagus grandifolia*	American beech
MAGR4	*Magnolia grandiflora*	Southern magnolia
QUNI	*Quercus nigra*	Water oak
PITA	*Pinus taeda*	Loblolly pine
PIGL2	*Pinus glabra*	Spruce pine
NYSY	*Nyssa sylvatica*	Blackgum

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

Disturbance Description

Considering the southern bluffs in conjunction with a portion of the adjacent plains, along with proximity to the Gulf of Mexico, causes this BpS to be somewhat less stable and more fire prone than the bluffs alone to the north. As modeled here, replacement disturbance has roughly equal probability of occurring by either fire or weather related events. The latter include windthrow, lightning and ice damage, as well as the inclusion of the erosion and mass wastage that give the bluffs their characteristic steepness. Widespread insect or disease mortality has not been reported. Wind/weather/stress replacement frequency is modeled near 220yrs, replacement fire return at approximately 215yrs, and all fire return frequency at about 40yrs. "Open" structure is uncommon, even when defined as canopy closure <81%, and may be created by mixed-severity fire. Surface fire may maintain open conditions, but it does not transition closed classes. Disturbance is presumed to occur primarily in small gaps (less than one-half acre). The presence of aggregates of intolerant species suggests that larger scale disturbances occasionally play a role, likely more so on the plains.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	218	19	100	1250
Moderate (Mixed)	189	22	90	650
Low (Surface)	69	59	40	145
All Fires	41	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

The loess bluff forests are described by Natureserve (2006) as large patch communities. At the inferred scale of disturbance, an area of 500,000ac may capture the BpS mosaic.

Adjacency or Identification Concerns
Defined largely by hardwood domination, presumably tied to loessal depth and moisture regime, the historical eastern extent of this BpS may not be possible to determine.

Issues or Problems
For this BpS, the effect of surface fire is more reflected in the status of the sub-canopy than the overstory. However, since an open/closed distinction based on sub-canopy requires ground-based data, this model omits it, and only rarely allows mixed severity fire to create "open" stands. The result is a significant reduction in the percent displayed in open classes from previous models. Also, this BpS is sandwiched between the nonpyrophytic alluvial plain (Frost 1998) and the much drier loess plains which were home to significant aboriginal populations and thus, a heightened chance of fire. The degree of sheltering here is based on topography and a westerly approach of significant wind events.

Native Uncharacteristic Conditions

Comments
The Rapid Assessment model R9OADM served as a basis for the development of the VDDT model.

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	C	B	B
Tree	10-25	C	C	C	C	C	C	C	C	B	B
Tree	25-50	D	D	D	D	D	D	D	D	E	E
Tree	>50	D	D	D	D	D	D	D	D	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 **12** **Early Development 1 - All Structures**

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUPA5	Quercus pagoda	Cherrybark oak	Upper
LIQUI	Liquidambar	Sweetgum	Upper
FAGR	Fagus grandifolia	American beech	Upper
MAGR4	Magnolia grandiflora	Southern magnolia	Upper

Description

This class is characterized by sprouts, seedlings and saplings, primarily of major overstory species, in gaps or small openings created by wind, lightning, soil slippage, insect/disease or fire. Shade intolerant species are confined to multiple-tree gaps. Canopy closure is usually complete beyond the first 3-5yrs.

Maximum Tree Size Class

Sapling >4.5ft; <5"DBH

Class B 43 Mid Development 1 - Closed

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUPA5	Quercus pagoda	Cherrybark oak	Upper
LIQUI	Liquidambar	Sweetgum	Upper
FAGR	Fagus grandifolia	American beech	Upper
MAGR4	Magnolia grandiflora	Southern magnolia	Upper

Description

Class B is dominated by young to early mature canopy species with high canopy closure. A well-developed mid-story is likely present, particularly at later ages of this class, in the absence of surface fire.

Maximum Tree Size Class

Medium 9-21"DBH

Class C 7 Mid Development 1 - Open

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUPA5	Quercus pagoda	Cherrybark oak	Upper
LIQUI	Liquidambar	Sweetgum	Upper
FAGR	Fagus grandifolia	American beech	Upper
MAGR4	Magnolia grandiflora	Southern magnolia	Upper

Description

Similar to class B but with less canopy closure and no established mid-story. Surface fire may maintain open structure, but without it, or replacement disturbance, the canopy will close.

Maximum Tree Size Class
Medium 9-21"DBH

Class D 4 Late Development 1 - Open

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUPA5	Quercus pagoda	Cherrybark oak	Upper
LIQUI	Liquidambar	Sweetgum	Upper
FAGR	Fagus grandifolia	American beech	Upper
MAGR4	Magnolia grandiflora	Southern magnolia	Upper

Description
Class D is characterized by an early to late mature canopy that may exceed 100ft in height. Canopy closure is less than full without well-developed lower layers. Dominant overstory species vary depending on location and stand history. Similar to class C, this class closes, barring other intervening transitions.

Maximum Tree Size Class
Large 21-33"DBH

Class E 34 Late Development 1 - Closed

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUPA5	Quercus pagoda	Cherrybark oak	Upper
LIQUI	Liquidambar	Sweetgum	Upper
FAGR	Fagus grandifolia	American beech	Upper
MAGR4	Magnolia grandiflora	Southern magnolia	Upper

Description
Class E exhibits canopy characteristics similar to class D, but with higher canopy closure. This class often displays a multi-layered vertical structure except where an open understory has been maintained by light surface fire.

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	15
Mid1:OPN	16	Late1:OPN	80
Mid1:CLS	16	Late1:CLS	80
Late1:OPN	81	Late1:OPN	999
Late1:CLS	81	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	0.005	200	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	0.005	200	Yes	0
Replacement Fire	Mid1:OPN	Early1:ALL	0.009	111	Yes	0
Surface Fire	Mid1:OPN	Mid1:OPN	0.02	50	No	0
Wind or Weather or Stress	Mid1:CLS	Early1:ALL	0.004	250	Yes	0
Replacement Fire	Mid1:CLS	Early1:ALL	0.005	200	Yes	0
Mixed Fire	Mid1:CLS	Mid1:OPN	0.006	167	Yes	0
Surface Fire	Mid1:CLS	Mid1:CLS	0.014	71	No	0
Alternative Succession	Late1:OPN	Late1:CLS	1	1	Yes	25
Replacement Fire	Late1:OPN	Early1:ALL	0.006	167	Yes	0
Wind or Weather or Stress	Late1:OPN	Early1:ALL	0.008	125	Yes	0
Surface Fire	Late1:OPN	Late1:OPN	0.025	40	No	0
Replacement Fire	Late1:CLS	Early1:ALL	0.003	333	Yes	0
Mixed Fire	Late1:CLS	Late1:OPN	0.004	250	Yes	0
Wind or Weather or Stress	Late1:CLS	Early1:ALL	0.007	143	Yes	0
Surface Fire	Late1:CLS	Late1:CLS	0.019	53	No	0

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