13570
Southern Coastal Plain Mesic Slope Forest

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Modelers		Reviewers	
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Vegetation Type
Forest and Woodland

Map Zones
46, 47, 55, 58, 99

Geographic Range
This mesic upland system of the Southern Atlantic and Gulf Coastal Plains is found in suitable conditions from Georgia south to northern Florida and west to (and including) the loessal plains of Mississippi and Louisiana. Its range is generally congruent with the natural range of *Pinus glabra* and *Magnolia grandiflora* (NatureServe 2006). There is a gradient in species composition from east to west. The mesic forests of the southern loess bluffs and ravines (proximal to the Mississippi River) are represented by a separate (but similar) biophysical setting (BpS).

Biophysical Site Description
This BpS model is specific to the mesic mixed slope and ravine forests of the Southern Coastal Plains, within the natural range of *Pinus glabra* and *Magnolia grandiflora*. The distribution of these forests is determined by the interaction of local topography and soil texture and fertility. This system occurs in a variety of moist, non-wetland sites that are naturally sheltered from frequent fire. Most common are lower slope, bluff, and ravine examples along streams and rivers in dissected terrain, but some examples occur on mesic flats between drier pine-dominated uplands and floodplains or on local high areas within bottomland terraces or nonriverine wet flats (NatureServe 2006). Within the type, local variability in topography and moisture, as well as regional floristic variation, determine the canopy dominants. Richer and more mesic stands occur in more strongly concave and finer-textured areas. Soils cover the full range of mineral soil textures, except for the coarsest sands (NatureServe 2006). Soils are not saturated for any significant time during the growing season and seldom, if ever, are extremely dry. Soils developed from calcareous materials or rich alluvium may be basic; others are strongly acidic. Sites are normally protected from most natural fires by steep topography or by surrounding extensive areas of non-flammable vegetation.

Vegetation Description
Most stands of vegetation in this BpS are diverse, but are typically co-dominated by American beech (*Fagus grandifolia*) with or without southern magnolia (*Magnolia grandifolia*), white oak (*Quercus alba*) and spruce pine (*Pinus glabra*). The more mesic end of the gradient may not include oaks at all, but instead show dominance by American beech, southern magnolia, tuliptree (*Liriodendron tulipifera*), southern sugar maple (*Acer barbatum*), and/or sweetgum

(*Liquidambar styraciflua*). In some sites, cherrybark oak (*Quercus pagoda*) or Shumard oak (*Quercus shumardii*) are important canopy components. Swamp chestnut oak (*Quercus michauxii*) and/or water oak (*Quercus nigra*) may also be present, as well as bitternut hickory (*Carya cordiformis*), blackgum (*Nyssa sylvatica*) and umbrella magnolia (*Magnolia tripetala*). *Pinus taeda* is sometimes present, and it is probably a natural component at a lower level, but higher frequencies may indicate past removal of the hardwood canopy and subsequent invasion. Understories are usually well-developed. Shrub and herb layers may be sparse or moderately dense, with the herb layer being forb-dominated. Some typical smaller trees and shrubs include *Cornus florida, Symplocos tinctoria, Oxydendrum arboreum, Hamamelis virginiana, Morus rubra*, and *Stewartia malacodendron*. Within its range, *Sabal minor* may be a prominent shrub. Some stands may contain *Arundinaria gigantea*. Some typical herbs include *Mitchella repens* and *Hexastylis arifolia*.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
FAGR	*Fagus grandifolia*	American beech
MAGR4	*Magnolia grandiflora*	Southern magnolia
QUAL	*Quercus alba*	White oak
LITU	*Liriodendron tulipifera*	Tuliptree
QUPA5	*Quercus pagoda*	Cherrybark oak
QUSH	*Quercus shumardii*	Shumard's oak
LIST2	*Liquidambar styraciflua*	Sweetgum
PIGL2	*Pinus glabra*	Spruce pine

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

Disturbance Description

These are stable, fire-sheltered forests. There is presumably some natural disturbance from the effects of hurricanes, which are relatively frequent in the range of this system (NatureServe 2006).

Fire regime characterized by 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	404	9		
Moderate (Mixed)	159	22		
Low (Surface)	52	69		
All Fires	36	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

Stands of this type may be essentially linear features on the landscape, occupying slopes associated with concave drainage features. There may be larger patches where side-drains join

larger streams. Under closed canopy conditions, fire may only partially penetrate these systems from adjacent uplands.

Adjacency or Identification Concerns
Stands of this type may be essentially linear features on the landscape, occupying slopes associated with concave drainage features. There may be larger patches where side-drains join larger streams. Under closed canopy conditions, fire may only partially penetrate these systems from adjacent uplands.

East Gulf Coastal Plain Northern Mesic Hardwood Slope Forest (CES203.477) is a similar mesic forest system to the north of this one in the Upper East Gulf Coastal Plain that has greater dominance by deciduous trees. The systems of the loess bluffs to the west of this one, bordering the Mississippi River Alluvial Plain, are treated as distinct and are more extensive and continuous in their extent both vertically and latitudinally. (See East Gulf Coastal Plain Northern Loess Bluff Forest [CES203.481] and East Gulf Coastal Plain Southern Loess Bluff Forest (CES203.556)]). To the north of the combined ranges of *Pinus glabra* and *Magnolia grandiflora* in the Atlantic Coastal Plain, this system is replaced by Atlantic Coastal Plain Mesic Hardwood Forest (CES203.242) (NatureServe 2006).

Issues or Problems
There is an issue with respect to recognizing canopy closure of just the overstory of this forest type. In this model, the sub-canopy closure really makes the difference between what an open and closed stand represent. The keep relative age was used in the model to keep it realistic.

Native Uncharacteristic Conditions
Pinus taeda is sometimes present, and it is probably a natural component at a lower level, but higher frequencies may indicate past removal of the hardwood canopy and subsequent invasion.

Comments
This BpS is based on a revision of the descriptive material for R9OADM of the Rapid Assessment process. (Notes from R9OADM: 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.)

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 **7** **Early Development 1 - All Structures**

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
MAGR4	Magnolia grandiflora	Southern magnolia	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*) 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**

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
MAGR4	Magnolia grandiflora	Southern magnolia	Upper
FAGR	Fagus grandifolia	American beech	Upper
QUPA5	Quercus pagoda	Cherrybark oak	Upper
LITU	Liriodendron tulipifera	Tuliptree	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/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

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
MAGR4	Magnolia grandiflora	Southern magnolia	Upper
FAGR	Fagus grandifolia	American beech	Upper
QUAL	Quercus alba	White oak	Upper
LITU	Liriodendron tulipifera	Tuliptree	Upper

Description
Class C has the same overstory composition and structure as B, but without a well-developed midstory. Surface fires serve to maintain the open understory in these stands. Class C will transition into class B through an alternative succession pathway (growth of the understory/midstory) if fire is absent.

Maximum Tree Size Class
Medium 9-21"DBH

Class D 15 Late Development 1 - Open

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
MAGR4	Magnolia grandiflora	Southern magnolia	Upper
FAGR	Fagus grandifolia	American beech	Upper
QUAL	Quercus alba	White oak	Upper
LITU	Liriodendron tulipifera	Tuliptree	Upper

Description
Class D is characterized by an early-to-late mature canopy that may exceed 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 maintain the open understory in these stands. Class D will transition into class E through an alternative succession pathway (growth of the understory/midstory) if fire is absent.

Maximum Tree Size Class
Large 21-33"DBH

Class E 42 Late Development 1 - Closed

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
MAGR4	Magnolia grandiflora	Southern magnolia	Upper
FAGR	Fagus grandifolia	American beech	Upper
QUPA5	Quercus pagoda	Cherrybark oak	Upper
LITU	Liriodendron tulipifera	Tuliptree	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, e.g., 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

References

Batista, W.B. and W.J. Platt. 1997. An old-growth definition for southern mixed hardwood forests. USDA Forest Service, Southern Research Station. General Technical Report SRS-9. Asheville, NC. 11 pp.

Braun, E.L. 1950. Deciduous Forests of Eastern North America. New York, NY: Free Press. 596 pp.

Brown, James K. and Smith, Jane Kapler, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: USDA Forest Service, Rocky Mountain Research Station. 257 pp.

Buckner, E.R. 1989. Evolution of forest types in the Southeast. In Waldrop, T.A., ed. Proceedings: Pine-hardwood mixtures: a symposium on management and ecology of the type. Gen. Tech. Rep. SE-58. Atlanta, GA: USDA Forest Service, Southeastern Forest Experiment Station. 271 pp.

Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schulz, K. Snow and J. Teague. 2003. Ecological Systems of the United States: A Working Classification of U.S. Terrestrial Systems. NatureServe, Arlington, VA.

Frost, Cecil C. 1998. Presettlement fire frequency regimes of the United States: a first approximation. In Pruden, Theresa L. and Brennan, Leonard A., eds. Fire in ecosystem management: shifting the paradigm from suppression to prescription. Tall Timbers Fire Ecology Conference Proceedings, No. 20. Tallahassee, FL: Tall Timbers Research Station. Pp. 70-81.

Greenberg, C.H., McLeod, D.E. and Loftis, D.L. 1997. An old-growth definition for western mesophytic and mixed mesophytic forests. Gen. Tech. Rep. SRS-16. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 16 pp.

Hinkle, C.R., McComb, W.C., Safley, J.M. Jr. and Schmalzer, P.A. 1993. Mixed mesophytic forests. In Martin, W.H., Boyce, S.G. and Echternacht, A.C., eds. Biodiversity of the Southeastern United States: upland terrestrial communities. New York, NY: Wiley. Pp. 203-253.

Kossuth, S. V. and J. L. Michael. 1990. Pinus glabra Walt., Spruce Pine. Pages 355-358 in: R. M. Burns and B. H. Honkala, editors. Silvics of North America, Volume 1, Conifers, USDA Forest Service, Agriculture Handbook 654, Washington, DC.

NatureServe. 2007. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA. Data current as of 10 February 2007.

NatureServe. 2006. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA, U.S.A. Data current as of 18 July 2006.

Outcalt, K. W. 1990. Magnolia grandiflora L., Southern Magnolia. pages 445-448 in: R. M. Burns and B. H. Honkala, editors. Silvics of North America, Volume 2, Hardwoods, USDA Forest Service, Agriculture Handbook 654, Washington, DC.

Schmidt, Kirsten M., Menakis, James P., Hardy, Colin C., Hann, Wendel J., Bunnell and David L. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. Gen. Tech. Rep. RMRS-GTR-87. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station. 41 pp. + CD.

USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (2002, December). Fire Effects Information System, [Online]. Available: http://www.fs.fed.us/database/feis/.

Ware, S., C.C. Frost, and P.D. Doerr. 1993. Southern mixed hardwood forest: The former longleaf pine forest. Pages 447-493 in: W.H. Martin, S.G. Boyce, and A.C. Echternacht, editors. Biotic communities of the southeastern United States: Lowland terrestrial communities. John Wiley and Sons, New York.