

13490

East Gulf Coastal Plain Interior Upland Longleaf Pine Woodland

BpS Model/Description Version: Aug. 2020

Modelers		Reviewers	
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Vegetation Type

Forest and Woodland

Map Zones

46, 48, 54, 55, 99

Model Splits or Lumps

This Biophysical Setting (BpS) is lumped with: 1406.

Geographic Range

This longleaf-pine-dominated system occupied rolling, dissected, mostly mesic uplands from northern Florida and southwestern Georgia through southern Alabama to Mississippi and Louisiana (Peet 2006). Historically, it was most prevalent in southern Alabama in map zone (MZ) 46.

It is found inland of the coastal flatlands and extends landward into the Upper East Gulf Coastal Plain Ecoregion by ~80km (50mi). It potentially occupies a much larger geographic area than the related longleaf pine woodlands of the outer coastal area (NatureServe 2006).

It has been greatly reduced in its extent, with much of its range now occupied by agriculture and/or intensive forestry operations. In southwestern Mississippi, this system is apparently absent (or very rare and limited) west of 91° W longitude to the limits of the alluvial plain and northwest of a line running approximately from the intersection of 31° N latitude and 91° W longitude, northeastward to the city of Jackson, Mississippi (NatureServe 2006).

Biophysical Site Description

East Gulf Coast longleaf was found on the middle and upper hilly coastal plains region (Brockway et al. 2005). This area is characterized by low rolling hills with mostly loamy or clay soils. Thus, soils are generally well drained and quite fertile. However, more xeric poor sandy soils also dominated by longleaf were interspersed at scattered locations (Peet 2006).

Rainfall is generally plentiful ranging from 50in in Georgia to 65in near the coast of Mississippi. Because of this combination of good soils, long growing season, and abundant rainfall, the region contained many of the most productive longleaf sites. Unfortunately, these were also good sites for agricultural production, and many were cleared of native forests.

Vegetation Description

Historically, longleaf mesic uplands of this region were dominated by open-canopied stands of longleaf pine (*Pinus palustris*), sometimes with a minority component of shortleaf (*Pinus echinata*) and scattered oaks including *Quercus falcata*, *Q. marilandica*, *Q. laevis*, *Q. margarettiae*, *Q. stellata*, and *Q. incana* (Peet 2006). However, there was a band of mixed pines along the northern and western edge of the region where dominance was shared by longleaf, shortleaf, and loblolly (*Pinus taeda*) pine (Frost 2006). The dense and very diverse understory was grass dominated with a number of forbs and legumes. In the east, within its native range, Beyrich threeawn (*Aristida beyrichiana*) was common, while little bluestem (*Schizachyrium scoparium*) and other bluestems (*Andropogon* spp.) were common throughout the region (Peet 2006). Shrub and hardwood cover was kept in check by frequent fire, although hardwoods were more prevalent on the most productive silty western sites.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
PIPA2	<i>Pinus palustris</i>	Longleaf pine
ARBE7	<i>Aristida beyrichiana</i>	Beyrich threeawn
QUERC	<i>Quercus</i>	Oak

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

Disturbance Description

In longleaf pine mesic uplands, canopy gaps are created by fire mortality, lightning, and wind throw at the scale of individual trees or several trees. Frequent surface fires, every 2-6yrs (Frost 2006), generally burn most of the understory vegetation. Fires are usually low in intensity overall but will occasionally kill young regeneration patches and rarely kill individual older trees. Individual fires cover extensive areas. Replacement fires are local patches of mortality within the context of these extensive low-intensity fires. Mixed fire in the VDDT model represents the probability of a series of surface fires sufficient to move closed vegetation to open. Effects of single fires are minimal but are cumulative over time.

Replacement fires are found in each structural stage of the VDDT model. Open structural stages are characterized by surface fire disturbances while closed structural stages have less surface fire because the understory is less flammable. Thus, structural stage B has surface fire frequencies once every 10yrs which would not be sufficient to change the vegetative structure from a closed to a more open midstory layer as does a mixed fire within the same stage.

Hurricanes hit the Gulf Coastal region quite frequently with most longleaf stands within 150mi of the coast heavily impacted every 100yrs, but averaged over the entire region every 200yrs seems more accurate. These major storms produce high mortality of overstory pines and can generate large areas of relatively even-aged longleaf forests. Probability is slightly higher to go from late closed E to B because a storm does not tend to remove all the trees but rather just large trees for this transition. Some infrequent disturbances like bark beetle mortality are not included in late closed E stage because they would likely keep the area in E and thus would not change the outcome.

The dominance of *Pinus palustris* in examples of this system may be lost through fire suppression, bark beetle infestations, forestry and agricultural land conversion, and mechanical disturbance. Loss of *Pinus palustris* dominance will fundamentally change the ecological

function of the landscape occupied by the system, primarily by altering the fire regime. Without the appropriate fire regime, canopy closure will increase along with shrub dominance, and grasses, forbs and other finer-fuel components will decline, further altering the fire regime dynamics (NatureServe 2006).

Fire Frequency Results

Severity	Min FI	Max FI
Replacement	40	200
Moderate (Mixed)		
Low (Surface)	1	6
All Fires		

Scale Description

Patch size and the scale of disturbance for this system can range from single trees to 1,000s of acres. As noted above, mortality from lightning, fire, and disease are on the single tree to one-quarter acre size while hurricanes affect 100s of acres and surface fires burn from 100 to 10,000ac.

Adjacency or Identification Concerns

Many of these sites have been converted to loblolly or shortleaf pine plantations and no longer contain any longleaf pine or the native groundcover. Along the northern edge of the region near the limit of the longleaf range, this type is replaced by shortleaf pine oak forest, which is very similar to fire-suppressed longleaf woodlands.

Part of the Florida Panhandle, including Eglin Air Force Base, is xeric longleaf sandhills and not part of this system. They are differentiated by vast areas of sandy entisols, a grass-dominated but sparse understory with *Quercus laevis* sprouts and patches of bare sand.

Issues or Problems

Many subtypes probably exist across the region. The unifying factors are longleaf pine and a grassy understory on fertile soils of rolling uplands. Different hardwoods, including hickories, many species of oaks, and many species of small trees constitute isolated individuals or clumps in areas that experience lower fire frequencies. An increase in grass stage mortality due to an increase of rust disease may occur due to changes in weather patterns and climate change. There is a model showing an increase in both temperature and precipitation in Florida that would increase forest disease and pest issues. The decline of this stage density would have a negative effect on forest regrowth. The understory could become denser with both shrubs and invasive plant species due to climate change which could change increase fire intensity and shorten fire intervals.

Native Uncharacteristic Conditions

Comments

FRCC materials from Hiers, Robertson, Herman, Outcalt, Schafale, May 4, 2004, were used by Dennis Hardin to create a description and model for longleaf mesic uplands (R9LLMU) in the rapid assessment. That description and model were modified by Outcalt to create the description found in this report and an associated model.

I suggest Kevin Hiers as a potential reviewer.

This model was reviewed during a model review workshop held 19 September 2006.
Tallahassee, Florida, and by Kevin Hiers, 27 December 2006.

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 con	C con	C con	C con	C con	C con	C con	C con	C con	C con
Tree	5-10	B mix	B mix	B mix	B mix	B mix	B mix	B mix	B mix	B mix	B mix
Tree	5-10	B brdlf	B brdlf	B brdlf	B brdlf	B brdlf	B brdlf	B brdlf	B brdlf	B brdlf	B brdlf
Tree	10-25	D con	D con	D con	D con	D con	D con	D con	D con	D con	D con
Tree	10-25	E mix	E mix	E mix	E mix	E mix	E mix	E mix	E mix	E mix	E mix
Tree	10-25	E brdlf	E brdlf	E brdlf	E brdlf	E brdlf	E brdlf	E brdlf	E brdlf	E brdlf	E brdlf
Tree	25-50	D con	D con	D con	D con	D con	D con	D con	D con	D con	D con
Tree	25-50	E mix	E mix	E mix	E mix	E mix	E mix	E mix	E mix	E mix	E mix
Tree	25-50	E brdlf	E brdlf	E brdlf	E brdlf	E brdlf	E brdlf	E brdlf	E brdlf	E brdlf	E brdlf
Tree	>50	E mix	E mix	E mix	E mix	E mix	E mix	E mix	E mix	E mix	E mix
Tree	>50	D con	D con	D con	D con	D con	D con	D con	D con	D con	D con
Tree	>50	E brdlf	E brdlf	E brdlf	E brdlf	E brdlf	E brdlf	E brdlf	E brdlf	E brdlf	E brdlf

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
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Indicator Species

Maximum Tree Size Class
Medium 9-21"DBH

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	0	Mid1:OPN	12
Mid1:OPN	13	Late1:OPN	50
Mid1:CLS	13	Late1:CLS	50

Late1:OPN	51	Late1:OPN	999
Late1:CLS	51	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	10
Replacement Fire	Early1:ALL	Early1:ALL	0.01	100	Yes	0
Surface Fire	Early1:ALL	Early1:ALL	0.33	3	No	0
Alternative Succession	Mid1:OPN	Mid1:CLS	1	1	Yes	10
Wind or Weather or Stress	Mid1:OPN	Early1:ALL	0.004	250	Yes	0
Replacement Fire	Mid1:OPN	Early1:ALL	0.0083	120	Yes	0
Surface Fire	Mid1:OPN	Mid1:OPN	0.33	3	No	0
Wind or Weather or Stress	Mid1:CLS	Early1:ALL	0.004	250	Yes	0
Replacement Fire	Mid1:CLS	Early1:ALL	0.0083	120	Yes	0
Mixed Fire	Mid1:CLS	Mid1:OPN	0.01	100	Yes	0
Surface Fire	Mid1:CLS	Mid1:CLS	0.1	10	No	0
Alternative Succession	Late1:OPN	Late1:CLS	1	1	Yes	15
Insects or Disease	Late1:OPN	Early1:ALL	0.0017	588	Yes	0
Wind or Weather or Stress	Late1:OPN	Early1:ALL	0.005	200	Yes	0
Replacement Fire	Late1:OPN	Early1:ALL	0.0083	120	Yes	0
Surface Fire	Late1:OPN	Late1:OPN	0.33	3	No	0
Wind or Weather or Stress	Late1:CLS	Early1:ALL	0.004	250	Yes	0
Mixed Fire	Late1:CLS	Late1:OPN	0.005	200	Yes	0
Replacement Fire	Late1:CLS	Early1:ALL	0.01	100	Yes	0
Surface Fire	Late1:CLS	Late1:CLS	0.1	10	No	0

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