

# IS THE FOOTPRINT OF LONGLEAF PINE IN THE SOUTHEASTERN UNITED STATES STILL SHRINKING?

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Longleaf pine (*Pinus palustris* Mill.) was once one of the most ecologically important tree species in the southern United States. Longleaf pine and the accompanying longleaf forest ecosystems covered vast swaths of the South. Longleaf forests covered an estimated 92 million acres at their peak distribution and represented one of the most extensive forest ecosystems in America. Only a fraction of longleaf pine ecosystems remain today. Remaining longleaf pines are scarce compared to the historical extent and are spread among eight southern states in largely fragmented stands. Additionally, scientists, conservationists, and land managers hypothesize that much of the remaining acreage is in poor condition. Therefore, it is imperative that longleaf pine receive continuous focused monitoring.

Data from the Forest Inventory and Analysis (FIA) program of the USDA Forest Service were used to explore both temporal and spatial trends in longleaf pine population dynamics of the southern U.S. in order to better understand the potential future of the species. In 2010, 4.3 million acres of longleaf pine-dominated forests existed across the South. According to broad-scale inventory data, longleaf pine forests are still fewer than those found as recently as in the 1970s. Upon visual analysis, considerable contraction of the geographic distribution of longleaf pine has occurred from 1970 to 2010 (Oswalt and others 2012).

We used FIA data collected in the 1970s to compare the geographic extent of the species to the distribution in 2010 (table 1) and quantify any range contraction or expansion along all range boundaries. We combined an outer range analysis pioneered by Woodall and others (2009) with a longitudinal/latitudinal band analysis (Zhu and others 2012). Outer ranges were identified by the 90<sup>th</sup> and 10<sup>th</sup> percentiles

for latitude and longitude. Each outer range was then dissected into 1° latitudinal or longitudinal bands. Comparisons between the mean latitude or longitude of 1970 and 2010 longleaf pine stems  $\geq 1$  inch diameter at breast height (d.b.h.) were made using Welch's two-sample t-tests and significant differences noted using an  $\alpha = 0.05$ .

**Table 1--Inventory year for each state in the southern United States where longleaf pine observations were used for a comparison of the 1970 and 2010 decades**

State	1970s	2010
Alabama	1972	2011
Florida	1970	2010
Georgia	1972	2011
Louisiana	1974	2010
Mississippi	1977	2010
North Carolina	1974	2011
South Carolina	1978	2011
Texas	1975	2010
Virginia	1977	2010

Significant contraction occurred on all boundaries. In the northern outer range, contraction occurred primarily in the eastern latitudes. The largest range contraction in the northern outer range was approximately 78 kilometers (48 miles). In the southern outer range, there were two longitudinal bands (-94 and -84) where longleaf pine was observed in the 1970s but not in 2010. Southerly expansion of approximately 33 kilometers (20 miles) occurred in the far eastern portion of the range in Florida. In the western outer range, significant contractions eastward [48 kilometers (30 miles)] occurred in the lower latitudes of the range. The eastern outer range was relatively stable with both minimal contractions and expansions observed between the two time periods (1970

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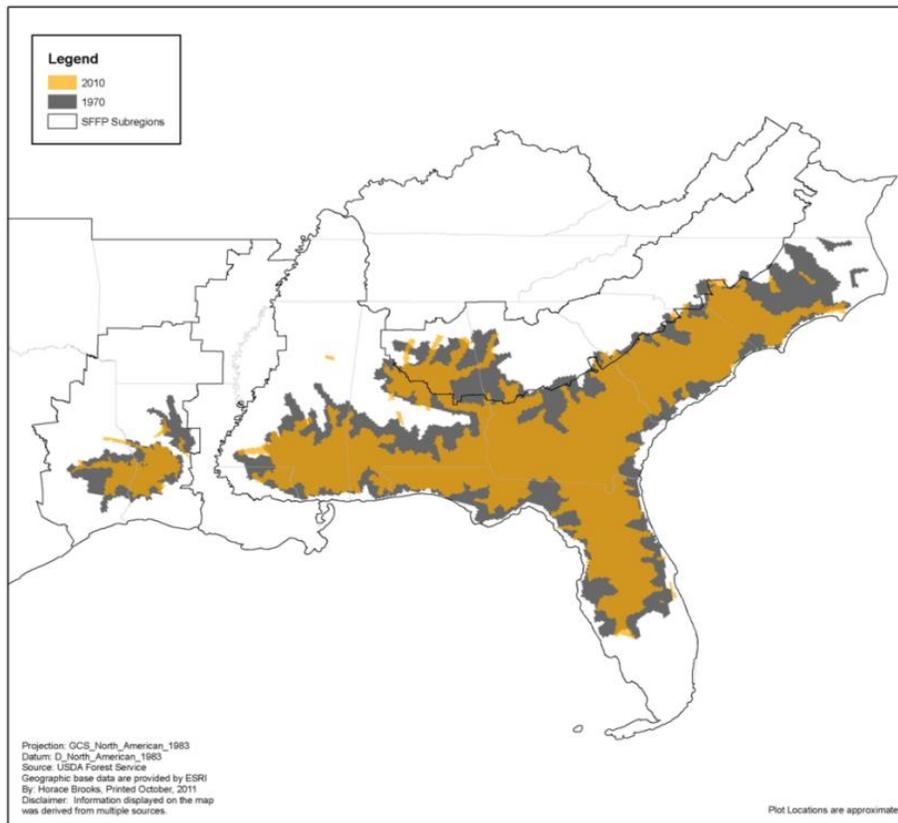


Figure 1--Comparison of the longleaf pine (*Pinus palustris* Mill.) "footprint" of observed stems  $\geq 1$  inch d.b.h. for the 1970 and 2010 periods using Forest Inventory and Analysis data.

versus 2010). The contractions are apparent when the "footprint" of the 1970 observations was coupled with the 2010 observations (fig. 1). Within the contracting footprint of longleaf pine, 32 percent of counties with longleaf pine forests in the 1970s have experienced significant (70 percent or greater) losses of longleaf pine-dominated forest area. While losses occurred throughout the longleaf range, heaviest losses occurred along the Gulf Coast and in western Louisiana. Results indicate that considerable longleaf pine loss can be attributed to the conversion to the loblolly pine (*Pinus taeda* L.) forest type. Longleaf pine forests represent an important resource in the context of the southern U.S. forest. While many conservation efforts have been and are currently active in efforts to re-establish longleaf forests across the South, these valuable forests have continued to decline over recent decades.

#### LITERATURE CITED

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