Tree Planting in the South, 1925 to 2012

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Abstract

Historic tree planting records were actively maintained throughout the United States until 1999. Since then, incomplete public records in the South have created some confusion in the number of acres planted during the first decade of the 21st century. The U.S. Department of Agriculture (USDA) Forest Service, Forest Inventory and Analysis, in coordination with the USDA Forest Service, Southern Region, State and Private Forestry and the Auburn University Southern Forest Nursery Management Cooperative collaborated to fill the gap from 2000 to 2012. This report is an update of the 1986 publication *A Statistical History of Tree Planting in the South 1925-1985* (Williston 1986). Tree planting has contributed significantly to the productivity and wood supply sustainability of the southern forests. Tree planting has offered options to enhance the southern forests while maintaining a balance of wood supply, jobs, a variety of wood products, and quality of life. This article describes the major influences on and from tree planting, and the associated online tables (http://www.rngr.net/publications/tpn/treeplanting-tables) provide the historic journey of tree planting in the South.

Historical Overview

Tree planting in the South (i.e., five Southeastern States plus eight South Central States) has significantly contributed to the productivity and wood supply for more than a century. At the end of the 19th century, Carl Schenck, a professionally trained forester from Germany, grew pine and hardwood seedlings in nurseries and, with the help of his students, established several plantations near Asheville, NC. In 1897, Schenck planted 500,000 white pine (*Pinus strobus* L.) seedlings (shipped from Germany) on three compartments of the Biltmore Estate (Schenck 2011). In 1921 and 1922, the Great Southern Lumber Company established a small pine nursery in Bogalusa, LA. This nursery was likely the first pine nursery (larger than one-third ac [0.13 ha)) in the South (Barnett 2013). By the end of 1925, about 3,000 ac (1,214 ha) of plantations had been established in the South (Zillgitt 1958).

As a continuum of forest land protection and restoration policy at the turn of the 20th century, Section 4 of the 1924 Clarke-McNary Act provided for Federal and State governments to furnish seeds and plants for reforestation in the United States. With the first-year allocation of funds in 1926, so began the first records of tree planting in the South (Hitt 1969). By 1929, official records of tree planting showed almost 10,000 ac (4,046 ha) planted that year in seven Southern States. Tree planting did not begin in earnest, however, until the New Deal reforestation and conservation programs occurred from 1935 to 1942. During those seven years, more than 1 million ac (404,000 ha) were planted in the South by Civilian Conservation Corps enrollees (Williston 1968). The U.S. Department of Agriculture (USDA) Forest Service, State and Private Forestry program collected tree planting data from State forestry agencies annually until 1999, when funding was discontinued.

Leaders in the southern forestry community increasingly recognized the value of tree planting programs as harvesting and reforestation needs increased during the post-World War II economic boom. Between 1956 and 1965, 4.3 million ac (1.7 million ha) were planted on public, forest industry, and private, nonindustrial lands in the South. An additional 1.9 million ac (769,000 ha) were planted during this same period through the Soil Bank Program, a USDA cost-share program to reforest and stabilize unproductive cropland (Williston 1968).

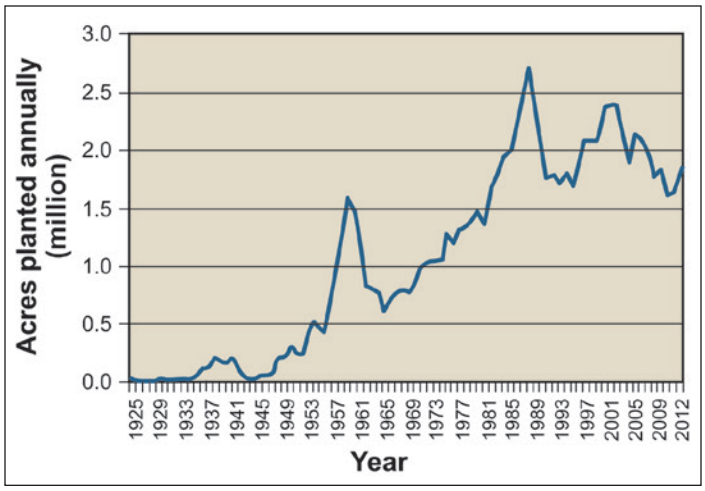

Figure 1. Acres of timberland planted annually in the South, 1925 to 2012.

After the peak of 1.6 million acres planted in 1959, the area planted annually in the South declined sharply to the low of 555,511 ac (224,807 ha) in 1966 (figure 1). For the next 22 years, acres planted each year steadily increased to 2.7 million ac (1.1 million ha) planted in 1988. This steady increase was the result of several factors, including Federal and State cost-share programs, strong primary wood markets, and landowner assistance programs provided by the forest industry and State agencies, and also because of land-grant universities' extension education programs.

Since 1982, an average of about 2 million ac (809,000 ha) per year has been planted in the South. Tree planting cost-share incentives (1985 to 2012) contributed about 9 million ac (3.6 million ha) in the South. The most recent major Federal program, the Conservation Reserve Program (CRP), began as part of the 1985 U.S. Farm Bill. CRP continues in various farm bill appropriations and contributed nearly 6 million ac (2.4 million ha) of tree planting in the South through 2008. In addition to CRP planted acres, an estimated 3 million ac (1.2 million ha) were planted in the South under other Federal and State incentive funding programs during this same period, although no complete records were found for the South (Hoge 2014).

Planted Forests in the South

Viable timber markets that provide economic returns from growing timber are the best incentives for landowners to replant after harvest. Of the 57 million ac (23 million ha) planted by tree planters from 1985 to 2012 in the South (figure 1), 84 percent received no Federal or State incentive payment. The continued cooperative research and development efforts among forest industry, government natural resource agencies, and university research and extension departments in the South have led to improved cultural practices and seedling survival, genetic improvement of planting stock, and better wood utilization (Carter et al. 2015). Increased wood yields of planted stands resulting from these improvements and a ready market for timber have made planting trees an economically attractive proposition for landowners and forest managers.

The South contributes about 18 percent of the world's roundwood production (logs delivered to the mills) from less than 2 percent of the world's total forested area (FAO 2011, Prestemon and Abt 2002) across various ownerships (table 1). The many incentives for tree planting have clearly helped the South become a primary player in the global market for wood products while also maintaining a sustainable wood supply. According to a recent report (South and Harper 2016), pine plantations in the South in 2012 comprise approximately 44.6 million ac (18 million ha). These planted acres are truly the working forests of the South.

Table 1. Acres of pine and hardwood plantations by ownership group in the South, 2005 to 2012.

Ownership	Million acres	Percent
Public	2.7	6
Corporate	17.8	38
Industry	8.7	18
Individual	18.0	38
Total	**47.2**	

Source: Forest Inventory and Analysis data query 2014.

What is the contribution of the planted forests to the total southern forests? The 47 million acres of planted forest in table 1 represent only 22 percent of the total timberland area in the South and 16 percent of the timber volume. Nonetheless, this acreage contributes 38 percent of the average annual biological net growth for the region and 40 percent of the harvested volume each year. These working forests represent 46 percent of the harvested area and grow nearly 50 percent more wood than is being harvested (FIA data query 2014). Tree planting is a major contribution to the fact that the South has more standing tree inventory volume today (both softwood and hardwood) than it had in 1952 (McGuire and Dickerman 1958).

Planted forests also have nontimber benefits. The open, early successional planted forest areas provide habitat for neotropical migratory birds and protective cover for small mammals while offering browse for deer and other grazing wildlife. When effectively managed long term with a prescribed fire regime, planted stands provide improved habitat for threatened and endangered flora and fauna species (Yarrow and Yarrow 1999). To improve these nontimber benefits, cost-share programs have established forest restoration projects and stabilized eroded farmland (Carter et al. 2015). An increase in forest cover typically improves water quality in streams and lakes (Yarrow and Yarrow 1999).

A key point that is often overlooked is how tree planting and these working forests remove pressure from the other areas of southern forests, thereby allowing landowners to reserve and conserve areas for other uses (e.g., hunting, recreation, and aesthetics) or to enhance sensitive areas for long-term conservation.

Methodology To Estimate Annual Tree Planting in the South

Williston (1986) summarized statistics published annually by the USDA Forest Service, the Agricultural Stabilization and Conservation Service (now the USDA Natural Resource and Conservation Service), and the Tennessee Valley Authority (TVA) from 1925 through 1985. The data for the earliest years come from the files in the USDA Forest Service Washington Office, the TVA, various State forestry agencies, and some industrial organizations that planted trees before World War II. These data were sometimes fragmented and incompatible, especially where more than one source of data was used for the same period. Very few records were kept between 1942 and 1944 because of World War II (Williston 1986). The USDA Forest Service began publishing nursery production data in 1950 (Anonymous 1950) and, a few years later, began estimating planted acres (Rotty 1953). To estimate acres planted before 2000, historical tree planting records were reviewed and corrected. Typos and inconsistencies among sources were reconciled and are available online (http://www.rngr.net/publications/tpn/treeplantingtables).

After official Federal recordkeeping was discontinued in 1999 from lack of funding and personnel, the USDA Forest Service, State and Private Forestry, in collaboration with Auburn University, produced empirical tree planting data in the South from 2000 to 2012. Auburn developed the survey form, contacted the forest and conservation nurseries that grow forest tree seedlings in the South, and collected forest tree seedling production data directly from those nurseries. Survey forms were mailed to 72 nurseries in 12 States in the South. The response rate averaged close to 90 percent and represented 95 percent of the total production. Nursery data collected were reported by the number of hardwood and conifer seedlings produced and by the number of bareroot and container seedlings produced. From those data, the number of acres planted was estimated. Assumptions used to estimate seedlings per acre (SPA) from 2000 to 2012 are detailed in Harper et al. (2014).

Forest tree seedlings remain in the general area where they are produced; however, seedlings are routinely shipped across State borders and, at times, across international borders. Due to the closing of many State nurseries and the consolidation of privately owned nurseries, it is clear that an imbalance of exports and imports is reported for acres planted in some States. Therefore, State-level values are not reported from 2000 to 2012 in the online database; values for the entire region should be a reasonable estimate.

Estimating the number of acres planted from nursery production is a problematic computation. With improved nursery handling and shipping practices, genetically improved seedlings, and containerized seedlings, the necessary SPA by some forest land managers are less today than they were 20 years ago because the objectives of many landowners have changed. For example, some landowners now want to optimize value production (either economic or ecological) as opposed to maximizing volume production. The estimated SPA from 2000 to 2012 is based on the Cost of Practices survey that the Auburn University Cooperative Extension conducted and published in Forest Landowner biennially (table 2). The estimated SPA values (table 2) are based on a range of 5 to 29 percent sample of the area planted for the year (http://www.rngr.net/publications/tpn/treeplantingtables). Odd-year values result from an interpolation of the two even years before and after the odd year. Excel tables available online (http://www.rngr.net/publications/tpn/treeplantingtables) list the values used to estimate acres planted. The reader can adjust the SPA on these working tables to conduct additional analyses.

Table 2. Estimated average seedlings per acre planted in the South.

Survey year	Seedlings per acre	Percent of total	Source
2000	631	5	Dubois et. al. 2001
2001	617*		
2002	602	8	Dubois et. al. 2003
2003	594*		
2004	585	7	Smidt et al. 2005
2005	542*		
2006	499	11	Folegatti et al. 2007
2007	549*		
2008	599	29	Barlow et al. 2009
2009	552*		
2010	504	14	Barlow et al. 2011
2011	507*		
2012	510	7	Dooley and Barlow 2013
2013	488*		
2014	465	7	Barlow and Levendis 2015

Note: Values with an asterisk (*) are interpolated.

Conclusions

During the past 60 years, nearly 94 million ac (38 million ha) of trees have been planted across the South, with some acres planted more than once. This acreage is equivalent to an area covering Alabama, Georgia, and South Carolina, plus nearly 2 million additional ac (809,000 ha). With a demand for approximately 5,000 consumer wood products, it is unlikely that southern forests could provide a sustainable wood supply and be competitive in local, national, and global markets without a viable tree planting program.

Maintaining an annual assessment of tree planting in the South provides a prediction of future production and estimates of surplus versus shortfall. Without these data, foresters and nursery managers must speculate on current and future conditions with limited information. This project reinstitutes a long history of collecting tree planting data and attempts to bridge a 12-year gap of tree planting data. It is anticipated that the project will produce annual updates for the online tables (http://www.rngr.net/publications/tpn/treeplantingtables).

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