



Recession Effects on the Forests and Forest Products Industries of the South

Authors: **Hodges, D.G.**
The University of Tennessee; Department of Forestry,
Wildlife and Fisheries; 274 Ellington Plant Sciences Bldg.;
2341 Joe Johnson Drive; Knoxville, TN 37996 USA

Hartsell, A.J., Brandeis, C., Brandeis, T.J. and Bentley, J.W.
USDA Forest Service, Southern Research Station, Forest
Inventory and Analysis Unit, 4700 Old Kingston Pike,
Knoxville, TN 37919 USA

ABSTRACT

The economic recession affected southern forests and related industries substantially, particularly those sectors most closely related to home construction. Between 2005 and 2009, for example, the three primary forestry sectors – wood manufacturing, paper manufacturing, and forestry and logging – lost more than 110,000 jobs in the southern United States. This article assesses the effects of the recession on the southern U.S. by reviewing existing data related to economic and resource impacts, including employment, timber product output, production facilities, state economies, exports, and forest area and management activities. While all sectors were affected, wood products and furniture manufacturing experienced the greatest change. As a result of the downturn, the South's forest sector's direct contribution to the regional economies decreased by 24 percent between 2004 and 2009. Some developments such as rebounding paper consumption, expanding export markets, and bioenergy, however, offer potential growth opportunities for the future.

INTRODUCTION

The southern U.S. has been a major contributor to the global forest economy for more than 50 years. The region produces approximately 72 percent of the annual volume of pulpwood and 53 percent of the saw-log and veneer products for the U.S. (Brandeis et al. 2012). Although the region

represents only 2 percent of the global forests, the South annually provides 19 percent of the pulpwood and 12 percent of the industrial timber for the world (FAO 2012). Given the importance of the region in providing and processing the raw materials for wood and paper products, understanding the effects of the recent recession

on the forests and forest-based industries of the southern United States is critical.

The most important part of the recession for the forest products sector was the collapse of U.S. housing construction, which fell by more than 75 percent between 2005, a high point in the sector, and 2009 (Woodall et al. 2011). This resulted in significant losses for many sectors of the southern forest products industry, most notably wood manufacturing and housing-dependent industries such as millwork and cabinetry. Between 2005 and 2009, for example, southern pine lumber production fell from 19.0 to 11.8 billion board feet (Southern Forest Products Association 2012); eastern hardwood lumber production dropped for an all-time high of 12.6 to 5.7 billion board feet during the same period (Hardwood Market Report 2012). Coupled with the housing decline, paper consumption declined throughout the 2000s and the U.S. furniture industry continued to face intensive global competition. As a consequence, the recession and these external forces combined to affect the region substantially from 2000-2010, resulting in the loss of more than 25 percent of the region's forest industry workforce between 2005 and 2010 (USDOL, 2012) as well as losses of processing capacity for most wood products.

The purpose of this article is to assess the effects of the recession on southern U.S. forests and forest industry by reviewing existing data related to economic and resource impacts. This includes employment, timber product output, production facilities, state economies, exports, and forest area and management activities. Although the effects of the recession began in the late 2000s, we evaluated the trends from 1999 or earlier to illustrate longer-term trends that were affecting these variables prior to the economic downturn.

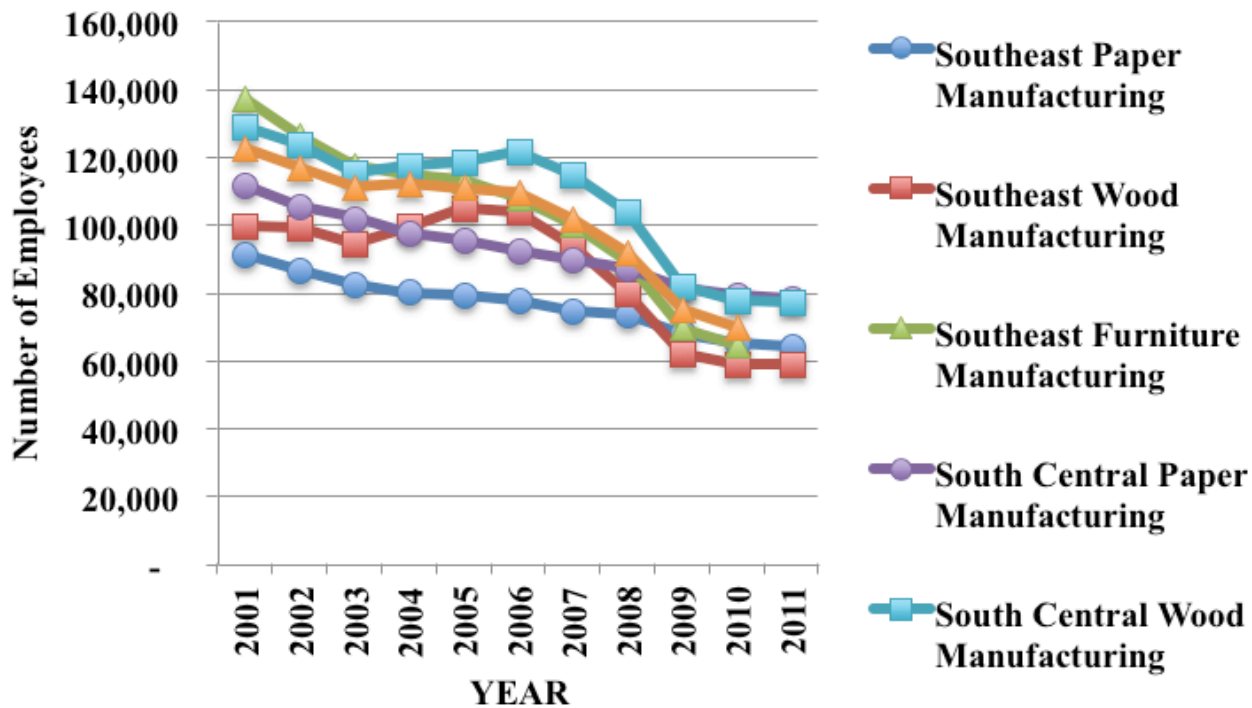
DATA SOURCES AND METHODS

The data used in this report come from several sources. The Timber Product Output (TPO) and forest inventory data come from the U.S.D.A. Forest Service Southern Research Station Forest Inventory and Analysis (FIA) program. The Southern Research Station FIA program collects, analyzes and reports the data for the Southern

States. Only primary wood-using mills are canvassed and in this report only statewide totals are reported. Primary mills are those that process roundwood in log or bolt form, or as chipped roundwood. Examples of industrial roundwood products are saw logs, pulpwood, veneer logs, poles, posts, and logs used for composite board products. Mills producing products from residues generated at primary or secondary processors are not canvassed. Trees chipped in the woods are included only if they are delivered to a primary domestic manufacturer. Much of the data FIA inventory and TPO data, and the effects of the recession on these data series are contained in Brandeis et al. (2012).

Employment data were derived primarily from the U.S. Department of Labor Bureau of Labor Statistics, which provides quarterly and annual employment estimates by North American Industrial Classification System (NAICS) codes for industrial sectors. The employment numbers are the primary source of employment estimates in the U.S. for most sectors, particularly for manufacturing. BLS employment estimates for the logging sector often underestimate the total population for a number of reasons, mostly due to the number of independent contractors who are not recorded. For the economic impact analysis we used the IMPLAN analysis for PLANing (IMPLAN) Version 3.0 economic modeling tools and associated datasets for 2004, 2006, 2007, 2008, and 2009 (Minnesota IMPLAN Group, Inc. 2009). All estimated dollar values are shown in 2010 dollars. With IMPLAN's built-in economic multipliers one can assess an industry's direct economic impact on the study area, as well as the industry's total effect or, for the present scenario, the entire contribution of the forest sector to the economy of the study area. Total effects include the direct, indirect and induced impacts. The direct effects for the sector analysis indicate total sales by the forest industry. The indirect effects are the total sales by the sector's supply chain. Induced effects include the impacts resulting from the changes in household expenditures caused by the change in production from the direct effects (changes in household income). For

Figure 1. . Changes in wood, paper, and furniture manufacturing employment, southern U.S., 2001 – 2011



each of these impact effects, IMPLAN generates estimates for employment (full and part-time jobs), labor income, output, and total value added. Output represents the industry's total value of production. An industry's value added is the difference between the total output and the costs of intermediate inputs. Note that the IMPLAN analyses include primary and secondary wood product industries, while the TPO assessments include only primary industries.

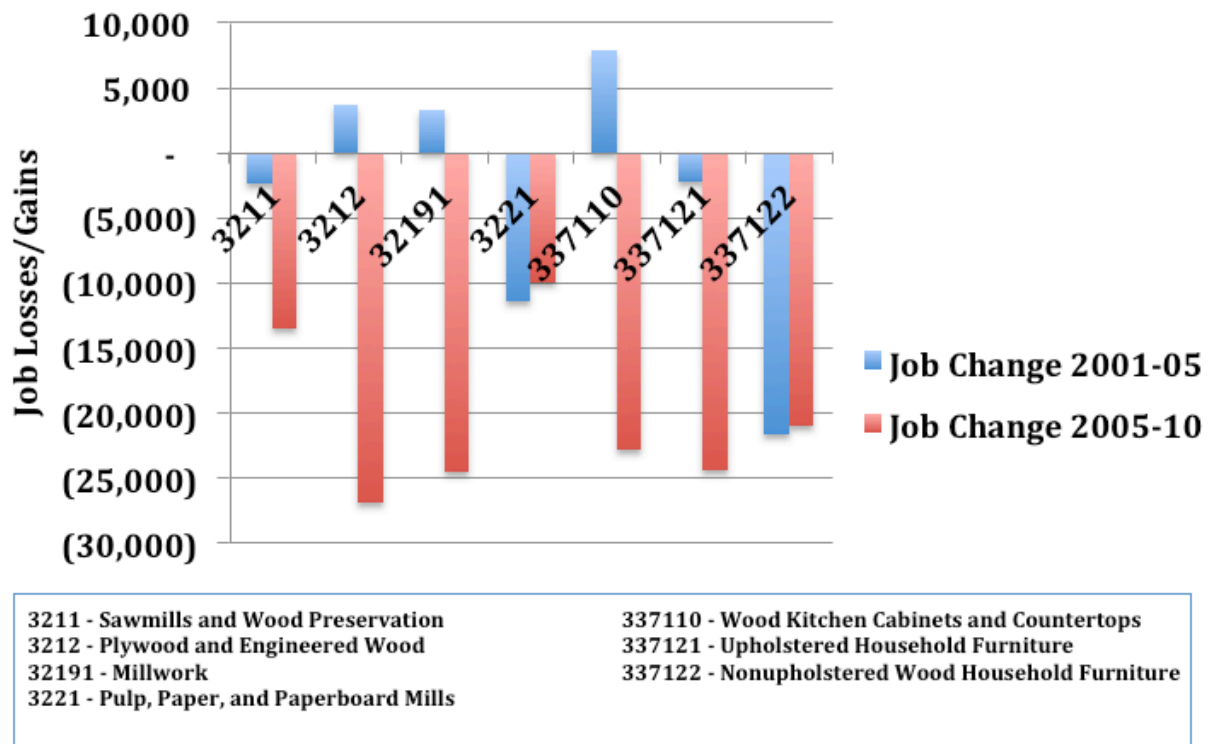
EMPLOYMENT EFFECTS

Employment in many of the major forestry and forest products sectors of the South had been declining for several years but the losses increased substantially during the downturn. For the most part, the losses were felt equally across the Southeast (Florida, Georgia, North Carolina, South Carolina, Virginia) and the South Central (Alabama, Arkansas, Kentucky, Louisiana, Mississippi, Oklahoma, Tennessee, Texas) regions (Figure 1), although the few notable differences will be discussed below. Between 2001 and 2005, for example, the wood products manufacturing sector lost more than 5,000 jobs (NAICS 321) and the paper manufacturing sector (NAICS 322)

more than 27,000 jobs. Furniture manufacturing (NAICS 337) lost more than 35,000 jobs during the same period (BLS 2012). The substantial decline in paper manufacturing was the result of several factors, including increased competition for global markets and a decline in paper consumption domestically during the period, which began to rebound in 2010 (Ince et al. 2010, 2011). The regional furniture industry was being hit by increased global competition during this period, particularly from China (Drayse 2008). During the next five years, 2005-2010, the regional losses totaled almost 31,000 for paper manufacturing, 87,000 for wood manufacturing, and 90,000 for the furniture manufacturing. Forestry and logging lost more than 6,000 jobs between 2005 and 2010 (BLS 2012).

The impacts within each sector differed somewhat by state and sub-industry (Figure 2). The job loss rate in the paper manufacturing sector increased somewhat between 2001 and 2010, but did not exhibit a significant increase during the recession. Moreover, the losses in this sector were similar between the Southeast and South Central sub-regions on a relative basis. States with the largest

Figure 2. Employment changes by selected forest product sub-industries, southern U.S., 2001 – 2011



percentage of state employment loss in this sector between 2005 and 2010 included Louisiana (25 percent), Mississippi and Virginia (21 percent), Georgia (18 percent), and Texas (17 percent).

The wood manufacturing sector experienced dramatic changes due to the economic downturn, due largely to the impacts on financial and housing markets. Given the importance of the southern region for lumber and plywood and engineered wood products used in construction, this sector was most affected by the recession. Across the region, more than 35 percent of the wood manufacturing jobs were lost between 2005 and 2010, with some notable differences among the regions, states, and sub-industries. The Southeastern sub-region experienced a disproportionate share of the losses, losing 41 percent of the 2005 wood manufacturing jobs, while the South Central states lost 31 percent. This was due, in part, to the fact that four of the five most populous states in the region (Florida, Georgia, North Carolina, Virginia) are in the Southeast, all of which possess the largest employment numbers in the sector. These four

states experienced a loss of more than 40,000 jobs in the sector.

Sub-industries within the wood manufacturing sector were affected differently, based primarily on the dependence of the sub-industry to housing. Interestingly, sawmills and wood preservation (NAICS 3211) experienced smaller losses on average (27 percent) than most of the other sub-industries; however, major losses in this sector were experienced in Oklahoma (49 percent), Florida (45 percent), Tennessee (33 percent), and Mississippi (30 percent). The most significant decline in wood manufacturing in the South occurred in the plywood and engineered wood product manufacturing sub-industry (NAICS 3212), in which employment declined by more than 48 percent between 2005 and 2001, after increasing slightly (7 percent) in the previous 5 years. The entire North American engineered wood composite panel industry experienced wide-scale mill curtailments, closures, and consolidation, after an extended growth period during the mid-1990s through 2005. The largest losses were realized in 2008 and 2009, in which

jobs declined by almost 40 percent from 2007 employment levels. The Southeast suffered the largest losses (55 percent compared with 40 percent in the South Central), but employment in the sub-industry fell by more than 30 percent in 10 of the 13 Southern states. Florida (72 percent), Georgia (56 percent), and North Carolina (53 percent) reported the largest downturns.

Millwork (NAICS 32191) also experienced a significant job loss between 2002 and 2010 in the South, with an overall regional decline of more than 46 percent (24,582 jobs), split evenly between the Southeast and South Central. Similar to the plywood and engineered wood product manufacturing sub-industry, millwork is tied closely to housing construction. The most significant losses by a percentage of 2005 jobs were recorded in Oklahoma (74 percent), Florida (62 percent), Georgia and North Carolina (50 percent), and Tennessee (49 percent).

Three sub-industries within the Furniture and related product manufacturing sector (NAICS 337) were examined. The first, 337110 (wood kitchen cabinet and countertop manufacturing), is a significant industry in the South and is closely linked to housing construction as well as remodeling. The remaining two sub-industries examined, 337121 (upholstered household furniture manufacturing) and 337122 (nonupholstered wood household furniture manufacturing), are more closely linked to the traditional furniture manufacturing industry. The furniture industry has long been a major industrial sector in several southern states, most notably Mississippi, North Carolina, Tennessee, and Virginia, which combined comprise 61 percent of all furniture manufacturing employment in the region (Drayse 2008). The decline in employment and production began well before the recession, due primarily to increased international competition from China which increased from less than \$10 billion in 1997 to more than \$26 billion by 2006 (Quesada and Gazo 2006, Cooney 2007).

Wood kitchen cabinet and countertop manufacturing (NAICS 337110), unlike much

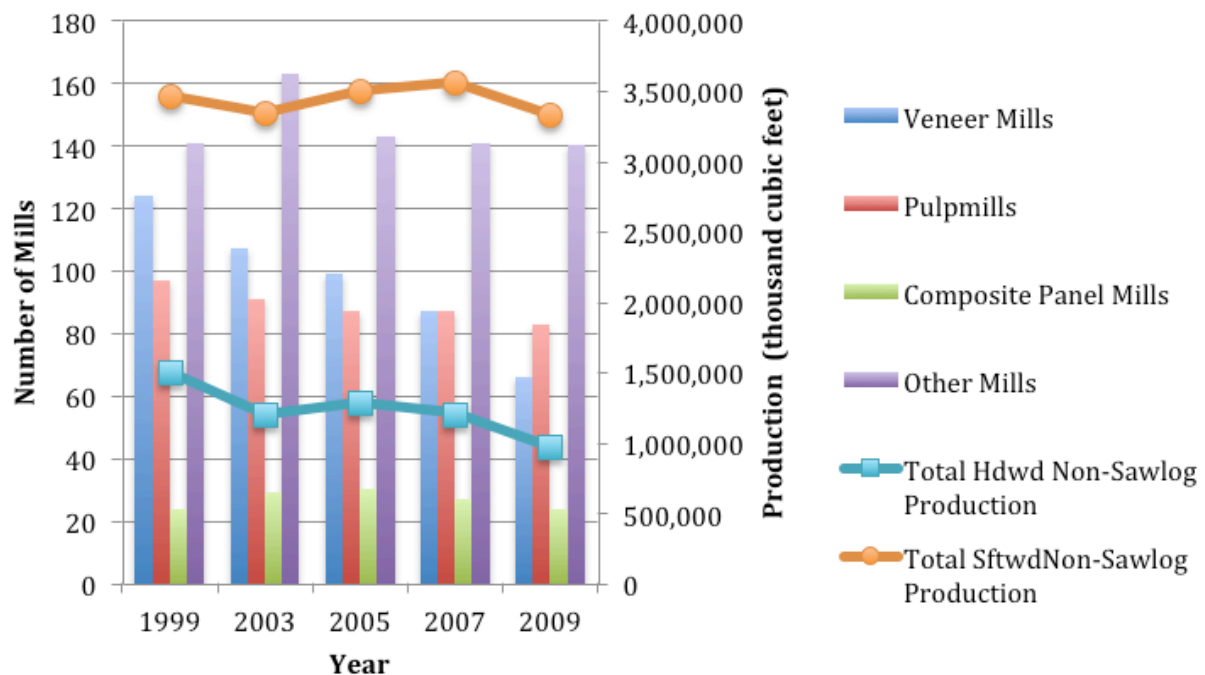
of the furniture manufacturing sub-industries experienced more than a 16 percent increase in employment numbers between 2001 and 2005, mirroring the trends in housing starts described by Woodall and others (2011). Similar to housing, however, the sub-industry declined significantly from 2005 to 2010 by 41 percent, with employment in the Southeast declining by more than 46 percent and the South Central by approximately 37 percent. The states most affected by the downturn were Florida (56 percent), Arkansas (45 percent), North Carolina (45 percent), and Virginia (43 percent).

The upholstered (337121) and nonupholstered (337122) wood household furniture sub-industries continued their decline that began in the late 1990s, with employment losses between 2005 and 2010 totaling 38 and 62 percent, respectively. Upholstered furniture manufacturing is concentrated primarily in North Carolina, Mississippi, and Tennessee, which accounts for more than 85 percent of the regional employment in the sub-industry. Southwide employment in upholstered furniture remained relatively constant from 2001 to 2005, declining by less than 4 percent, but dropped by more than 38 percent between 2005 and 2010. The three primary states accounted for almost 21,000 of the 24,500 jobs lost. The nonupholstered wood household furniture manufacturing (337122) sub-industry, concentrated primarily in North Carolina and Virginia, followed a significantly different pattern over the past decade. The nonupholstered sector has faced intensive international competition since the late 1990s. As a result, employment has been declining much longer. Job losses totaled more than 21,626 between 2001 and 2005 and 21,076 between 2005 and 2010, with 80 percent of these losses being in North Carolina and Virginia

PRODUCTION EFFECTS, MILL TRENDS

The results presented in this section were drawn from the FIA and TPO programs. Figure 3 presents changes in the number of all wood processing mills, other than sawmills, in the southern U.S. from 1999 to 2009 (the years for which data are available). Figure 3 also contains

Figure 3. Trends in mill numbers and production, southern U.S., 1999 – 2009



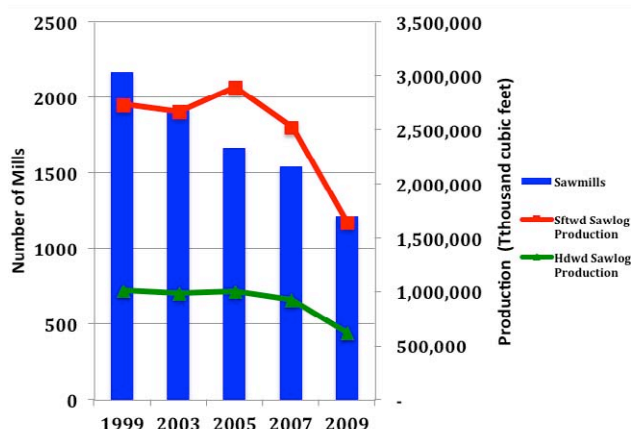
regional data on total softwood and hardwood non-sawlog production for the same years. Changes in the number of mills varied by type, but generally numbers have been declining for several decades. Veneer mills have dropped most dramatically during the 10-year period examined, falling from 124 in 1999 to 66 in 2009. Not surprisingly, softwood and hardwood veneer log production decreased 54 percent and 57 percent, respectively, from 2005 to 2009. Fourteen pulp mills closed, leaving a total of 83 in the South in 2009; composite panel mills and the remaining mill types remained unchanged.

These losses did not necessarily translate into similar trends among volume production. Total softwood non-sawlog timber product output in the South reached a historical high of 3.6 billion cubic feet in 2005, after which it declined. There was a particularly sharp drop in 2007, when output fell to 3.3 billion cubic feet, or an overall loss of 8.3 percent. Total non-sawlog hardwood output followed a different pattern, increasing to a peak of 1.6 billion cubic feet in 1995, but then steadily decreasing through 2009. There was a notable decrease in total non-sawlog hardwood output between 2005 and 2009, during which

time output fell to 1.0 billion cubic feet. Total pulpwood production declined by 12 percent between 1999 and 2003, but then staying relatively stable since. Given the rebounding paper consumption since 2010 mentioned above in the employment section, pulpwood production is likely to increase in the near term. Hardwood pulpwood production reached its highest level in 1995 (1.49 billion cubic feet) and then gradually decreased to 0.91 billion cubic feet by 2009. Softwood pulpwood production, however, grew and has remained relatively stable (except for dips in 2003 and 2005) through to the 2009 survey, ranging from 2.21 to 2.52 billion cubic feet since 1986.

Sawmill numbers and production provide a much more complex picture, particularly if we examine a much longer time period than 1999 to today (Figure 4). More than 4,000 mills existed in the South in 1970, many of which were small operations operating sporadically. These numbers had dropped to less than 3,000 by 1990, and continued to decline to 2,165 mills in 1999. By 2009, only 1,216 mills were identified in the region, many of which have closed in the past 2 years. Specifically, 21 softwood sawmills,

Figure 4. Trends in sawmill numbers and sawlog production, southern U.S., 1999 – 2009

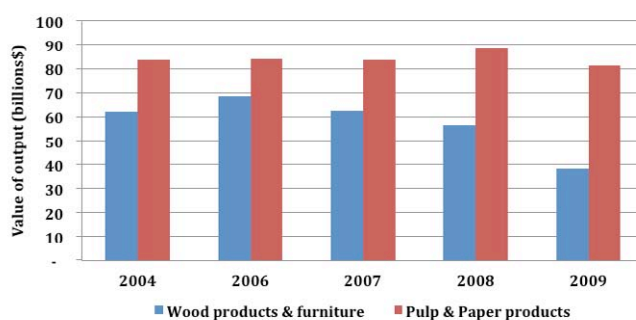


with an aggregate annual capacity of 783 million board feet, closed between 2009 and 2011 (Smith and Baldwin 2012). While the loss of 950 mills between 1999 and 2009 affected production levels, many of the closures were older, smaller and less efficient mills. As a consequence, the loss of capacity was not as severe. Spelter et al. (2009a), for example, reported that the South's softwood sawmills had a capacity of 42.7 million cubic meters in 1999, which decreased to 38.3 million by 2007. Smith and Baldwin (2012) reported that capacity had increased to 44.1 million by 2011. Examining volume production, both softwood and hardwood saw log production increased gradually until the mid 1990s, followed by a period of relative stability prior to decreasing in 2007 and 2009 (Figure 4). Softwood sawlog production decreased by 43 percent between 2005 and 2009 (to 1.64 billion cubic feet). Hardwood sawlog production was relatively stable between 2001 and 2005, but then dropped 38 percent from 2005 to 2009 (to 0.61 billion cubic feet).

WAGES AND ECONOMIC EFFECTS

In 2004, the South's forest sector had a total economic value of production estimated at \$250 billion, of which \$168 billion came directly from the goods produced by the industry (Figure 5). By 2009, the value of the sector's direct contribution to States' economies had decreased by 24 percent while the total effect fell by 20 percent. Detailed tables by State on the employment, wages and

Figure 5. Value of industrial output for wood products and furniture and pulp and paper, southern U.S., 1999 – 2004



output can be found in Brandeis et al. (2012).

Across the forest products manufacturing industries, solid wood products industries suffered the largest decline, with output from sawmills and wood preservation industries falling by more than 40 percent. In contrast, direct and total industrial production from the pulp and paper industry fell by less than 10 percent. At the same time, direct labor income fell from \$31.98 billion to \$24.77 billion over the same period, a 23 percent decline in the sector's direct contribution of salary and wages to the region's economy. Similar to production output, solid wood industries experienced the heaviest fall in labor income, with a 32 percent decline in direct salaries and wages. For the pulp and paper industries direct labor income from primary industries fell 13 percent, or \$894 million, while the contribution from secondary industries dropped 17 percent or \$1.29 billion. Overall, the total effect of the sector's downward trend on the region's payroll is estimated at a \$9.68 billion loss in wages and salaries, or a 17 percent decline between 2004 and 2009.

TRADE

The South continued to be a significant source of wood and paper exports for the U.S. during the period examined (Figure 6), with China, Canada, Mexico, and the European Union being the primary destinations. The impact of the recession can be seen in 2009 and 2010, but exports for all components examined (timber and

Figure 6. Forest products exports, southern U.S., 1999 – 2009

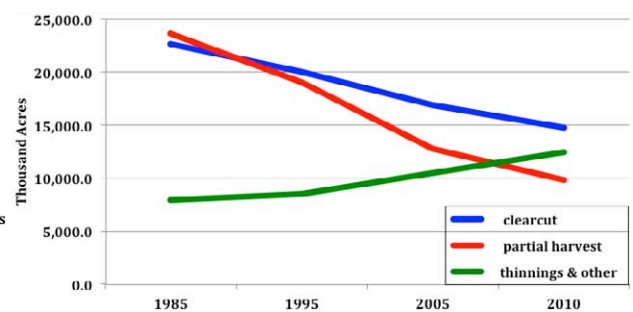


logs, wood products, furniture and fixtures, and paper) exceeded pre-recession levels by 2011, in nominal terms (U.S. Census Bureau 2012).

Paper (NAICS 322) exceeds the other wood-based exports substantially, with the primary states being Georgia (\$3.4 billion in 2011), followed by Texas, Florida, and South Carolina. Primary trade partners in 2011 for paper and paper products were China, Mexico, and Canada. Timber and logs (NAICS 1133) exports exceeded \$380 million in 2011, with North Carolina (\$124 million), Georgia (\$62 million) and Virginia (\$55 million) being the primary sources. The primary destinations for southern hardwood logs were Canada, China, and European Union; Japan, Canada, and South Korea were the primary trade partners for softwood logs.

Wood product exports rose from \$1.1 billion in 2002 to \$1.75 billion by 2008, before falling back in 2009 to a low of \$1.4 billion. Since that time, exports have recovered and approached \$1.9 billion in 2011. A significant factor in the upward trend of southern exports has been a weakening U.S. dollar that has made all exports more competitive. Beyond the dollar, recovering paper and paperboard consumption, and easy access to some primary markets have enhanced the viability of regional exports.

Figure 7. Area of forest harvests and treatments, southern U.S., 1985 – 2010



FOREST AREA AND MANAGEMENT EFFECTS

Forest Inventory and Analysis plot data reveal that mill closures and reduced product output are affecting forest management practices and forest structure. The amount of timberland area classified as having undergone either a clearcut or partial harvest has dropped 47 percent since the mid 1980s. At the same time, the area of timberland that underwent thinnings, tree stand improvement (TSI), or salvage cutting has increased 57 percent (Figure 7). Since 2005, final harvests have dropped from 29.7 million acres south-wide to 24.6 million acres, a 17 percent decrease. Conversely, areas in which thinnings and other mid-cycle silvicultural treatments were performed rose from 10.5 million acres in 2005 to 12.4 million acres in 2010, an 18 percent gain. While the rate of final harvests has decreased and the rate of thinnings has increased, the former still occurs more than the latter.

Readers are advised to consider that for a given survey year, the values presented represent an average over the entire survey cycle for that State. For example, inventory estimates for the state of Alabama are based on a 7 year inventory cycle. This means that the 2010 survey period includes plots measured from 2004 to 2010. This averaging across multiple years will tend to mask sudden increases or decreases in the values. Therefore, as much as 40-50 percent of the 2010 area, volume,

growth, and removals estimates occurred before 2007-2008. It may be several years before FIA field data accurately describes the exact impact of the recession on the forest resources of the South.

Average annual removals of all-live trees on timberland loosely mirrors the trends in area treated and harvested. Starting with the 2005 survey period, removals of hardwoods decreased more than 20 percent, the first decline in removals for this species group in a quarter of a century. Average annual softwood removals peaked in the mid 1990s, never varying by more than one percent since 1995. Currently, 6.4 million cubic feet of softwoods and 3.4 million cubic feet of hardwoods are removed each year across the South.

Hardwood and softwood species growth reflect very divergent trends. Average annual growth of softwoods is currently 9 million cubic feet per year. Softwood growth experienced a 17 percent gain over the last 5 years, and a 76 percent accretion since 1985. Present average annual hardwood growth is 6 million cubic feet per year, an increase of 32 percent since 1985. Analysis of hardwood growth trends reveals a gradual increase for each survey period up to 2005, where hardwood growth dropped almost five percent, reflecting the decline in hardwood product output and mill capacity due to the economic downturn. Growth-to-removals ratios for both hardwoods and softwoods are positive, indicating that more volume is grown each year than removed.

The primary driver for the differences in current softwood and hardwood volume and growth and removals estimates is the establishment of pine plantations. Plantations are usually established with genetically superior seedlings and are intensively managed, which results in high productivity. Many of the stands that undergo final harvest are converted to southern yellow pine plantations, even if the prior stand was a hardwood type. While total timberland area has increased slightly over the study period (less than 6 percent), plantation acreage has increased 60 percent since 1985 and 21 percent since 1995. These plantations are now 15-30 years old and are

contributing to the increased volume and growth and removal estimates of softwood species.

The final synopsis of the FIA inventory data is that average annual growth and removals of hardwoods has been negatively affected by the recession. This could be due to the decline in furniture and other hardwood product output and the closures of hardwood and furniture manufacturing mills. Softwood growth may have been impacted, but the increase in plantation establishment, along with a steady demand for pulp products, may mitigate some these factors. Landowners have been responding by performing fewer final harvests and more thinnings.

FUTURE OUTLOOK

Not surprisingly, the recession affected southern forests and the regional forest products sector substantially, particularly those industries most closely tied to housing. External factors such as declining domestic paper demand and increased international competition hurt other forest products industries as well, resulting in a downturn in employment, wages, and output as highlighted above. Still, there are reasons for optimism in many sectors of the forest products industry. As Ince et al. (2011) note, U.S. and European paper and paperboard consumption has rebounded from a low in 2006, and this recovery is projected to continue. Southern softwood and hardwood pulpwood prices have remained relatively steady during the past decade, even with the recession, and now are lower than the primary international competitors – Brazil, Canada, and Sweden. This is a reverse from the first half of the decade, and is due primarily to easing demands for paper and paperboard domestically and internationally, a stable wood base, and a weakening dollar (Timber Mart-South 2012). While paper and paperboard consumption is increasing, the South should maintain this price advantage for some time.

The recovery of the housing market and home construction is critical to many sectors of the southern forest economy. The pace at which the recovery will occur is difficult to predict, but 2 million starts as experienced in 2005 is not likely

to occur in the near term. While the primary industries affected by the housing slowdown have already adjusted production, we are likely to see more closures if the minor rebound in housing starts is not maintained. At the present time, for example, southern softwood sawmills operate at less than 75 percent capacity (Smith and Baldwin 2012).

A new industry that could have an economic impact on state and local economies is wood-based energy. While most forest products mill have utilized wood and processing by-products for fuel for decades, increased emphasis on new types of wood-based energy such as biofuels may result in new opportunities for the southern forests and forest industries. A number of bioenergy plants have been established or announced in the region, which could increase employment and economic activity considerably, at least in some

locations. The wood pellet industry, for example, has become well established in the region over the past decade, with employment in the South estimated at 1,855 in 2008 (40 percent of U.S.) and production of more than 1.8 million metric tons (32 percent). (Spelter and Toth 2009). A primary question at this point continues to be the level of competition for raw material and the resulting impact on all product prices, which could affect the global competitiveness of the traditional industries. Additionally, differences in the values and employment for producing traditional wood products such as lumber and paper versus wood pellets and other bioenergy products could affect the value added impacts to the regional economy substantially.

LITERATURE CITED

- Brandeis, T.J., Hartsell, A.J., Bentley, J.W., and Brandeis, C. 2012. Economics dynamics of forests and forest industries in the Southern United States. e-General Technical Report, SRS-152. USDA Forest Service, Southern Research Station, Asheville, NC. 77 pp.
- Cooney, S. 2007. U.S. furniture manufacturing: overview and prospects. CRS Report for Congress, Order Code RL34001. U.S. Congressional Research Service, Resources, Science, and Industry Division, Washington, DC. 15 pp.
- Drayse, M.H. 2008. Globalization and regional change in the U.S. furniture industry. *Growth and Change* 39(2): 252-272.
- FAO. 2012. ForesSTAT. Food and Agricultural Organization of the United Nations, Rome, Italy. <http://faostat.fao.org/site/630/default.aspx>. Last accessed February 29, 2012.
- Hardwood Market Report. 2012. Personal communication with David M. Caldwell. Memphis, TN. February 26.
- Ince, P.J., Akim, E., and Lombard, B. 2010. Rebound from steep drop in demand amid simmering global trade issues: markets for paper, paperboard and wood pulp, 2009-2010. In: Forest Products Annual Market Review, 2009-2010. United Nations, Geneva timber and forest study paper 25, pp. 85-97.
- Ince, P.J., Akim, E., Lombard, B., Parik, T., and Tolmatsova, A. 2011. Paper, paperboard and wood pulp markets, 2010-2011. In: Forest Products Annual Market Review, 2010-2011. United Nations, Geneva timber and forest study paper 27, pp. 71-84.
- Minnesota IMPLAN Group, Inc. 2009. IMPLAN System (data and software), 502 2nd Street, Suite 301, Hudson, WI 54016. www.implan.com.
- Quesdada, H.J. and Gazo, R. 2006. Mass layoffs and plant closures in the U.S. Wood products and

furniture manufacturing industries, *Forest Prod. J.* 56(10): 101-106.

Smith, S., and Baldwin, S. 2012. The South's softwood sawmill capacity 2011: losses & changes. Timber Mart-South Market News Quarterly, 4th Quarter 2011 Report, University of Georgia Warnell School of Forestry and Natural Resources. pp. 15-16.

Southern Forest Products Association. 2012. Personal communication with Russell Richardson. Metairie, LA. February 26.

Spelter, H., McKeever, D., and Toth, D. 2009. Profile 2009: softwood sawmills in the United States and Canada. Research Paper FPL-RP-659. USDA Forest Service, Forest Products Laboratory, Madison, WI. 55 pp.

Spelter, H., and Toth, D. 2009. North America's wood pellet sector. Research Paper FPL-RP-656. USDA Forest Service, Forest Products Laboratory, Madison, WI. 21 pp.

Timber Mart-South. 2012. U.S. South still competitive in world pulpwood markets. Market News Quarterly, 4th Quarter 2011 Report, University of Georgia Warnell School of Forestry and Natural Resources. pp. 18-19.

U.S. Department of Labor (USDOL). 2012. Bureau of Labor Statistics. <http://www.bls.gov/>. Last accessed February 26, 2012.

U.S. Census Bureau. 2012. USA Trade Online. <https://www.usatradeonline.gov/usatrade.nsf/vwRef/Home?Open&mc=F90000/>. Last accessed March 28, 2012.

Woodall, C.W., Ince, P.J., Skog, K.E., Aguilar, F.X., Keegan, C.E., Sorenson, B., Hodges, D.G., and Smith, W.B. 2011. An overview of the forest products sector downturn in the United States. *Forest Prod. J.* 61(8): 595-603.