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South Carolina Harvest and Utilization Study, 2011

Kerry J.W. Dooley, Jason A. Cooper,
and James W. Bentley



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The Authors:

Kerry J.W. Dooley, Forester; **Jason A. Cooper**, Forester;
and **James W. Bentley**, Forester, U.S. Forest Service,
Southern Research Station, Knoxville, TN 37919.

Cover photo: pine stand after a second thinning. (photo by Chris Oswalt, U.S. Forest Service)



Grapple skidder pulling felled pines to the logging deck. (photo by Angie Rowe, U.S. Forest Service)

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Southern Research Station
200 W.T. Weaver Blvd.
Asheville, NC 28804



www.srs.fs.usda.gov

Foreword

This resource bulletin describes the principal findings of a harvest and utilization study conducted during the 10th inventory of South Carolina's forest resources. Survey crews sampled and measured trees harvested in a variety of logging operations, and analysts calculated wood volume and percent of wood utilization. Harvest volume data and factors for growing-stock and nongrowing-stock logging residue are described and interpreted.

Annual surveys of America's forest resources are mandated by The Agricultural Research, Extension, and Education Reform Act of 1998 (1998 Farm Bill). Surveys and utilization studies are part of an ongoing, nationwide undertaking by regional experiment stations of the Forest Service, U.S. Department of Agriculture. Inventories and utilization studies of the 13 Southern States (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia), the Commonwealth of Puerto Rico, and the U.S. Virgin Islands are conducted by the Southern Research Station (SRS), Forest Inventory and Analysis (FIA) Research Work Unit, and partnering state agencies. The unit headquarters is located in Knoxville, TN, and FIA has operational offices in Asheville, NC, and Starkville, MS. The primary objective of these appraisals is to develop and maintain the resource information needed

to formulate sound forest policies and programs. More information about Forest Service resource inventories is available in "The Enhanced Forest Inventory and Analysis Program—National Sampling Design and Estimation Procedures" (Bechtold and Patterson 2005).

Tabular data included in FIA resource bulletins present a comprehensive array of forest resource statistics, but additional information is available to those who require data that are more specific. For the Southern States this data is found at: <http://srsfia2.fs.fed.us/data/index.shtml>.

Acknowledgments

The authors thank Tim Adams and Byron Rominger of the South Carolina Forestry Commission for their review and comments; Anne Jenkins, Janet Griffin, and Carolyn Steppleton for the map, tables, graphs, and statistical checking; and the Southern Research Station Technical Publications Team for editorial review, styling, and publication of this report.

The SRS gratefully acknowledges the work of the South Carolina State FIA field crews in collecting harvest and utilization data. Appreciation is also extended to private landowners, forest industry, and loggers for allowing access to their land and logging operations.



Logging residue left from a total harvest (foreground). (photo by Angie Rowe, U.S. Forest Service)

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^aAll tables in this report are available in Microsoft® Excel workbook files. Upon request, these files will be supplied in the format the customer requests.

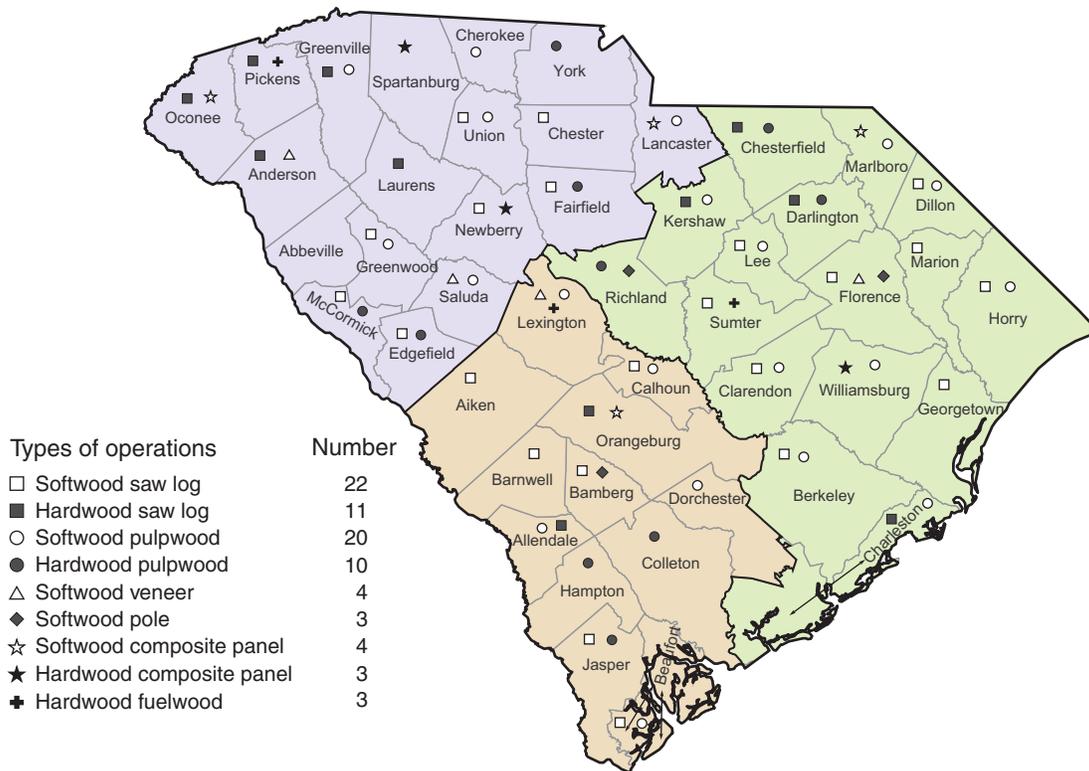


Figure 1—Harvest operations, South Carolina, 2011.

South Carolina Harvest and Utilization Study, 2011

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Introduction

Forest planners and managers have a continuing need for information about timber resources, and the public is expressing an increased interest in the effects of logging. Therefore, up-to-date data on the Nation's forests—and how the forests are changing—are essential to well-informed decisionmaking. Information about the condition of and changes in the timber resource of South Carolina comes from three primary sources: (1) inventory plots, which describe current conditions and quantify changes due to mortality, growth, removals, and land use; (2) mill surveys, which quantify timber volume harvested and delivered to primary wood products facilities (e.g., sawmills, pulpmills, veneer mills, composite panel mills, and pole mills); and (3) harvest and utilization studies, which characterize harvest operations and quantify the timber volume that is cut and utilized, as well as the portion left in the forest.

This bulletin presents the findings of a 2011 harvest and utilization study conducted in South Carolina, in which survey crews randomly selected and measured felled trees on 80 active harvest operations throughout the State (fig. 1). The study's main goal was to provide an estimate of softwood and hardwood volume used and of volume left in the woods as logging residue. This bulletin also provides some general characteristics of trees harvested for various products, such as average diameter at breast height (d.b.h.) by product, average bole length by product, average heights of residual stumps, and average diameter outside bark (d.o.b.) at the end of utilization.

Some standard Forest Inventory and Analysis (FIA) terms are used in this study. Two of particular importance for understanding and interpreting study results are growing-stock and nongrowing-stock. A growing-stock tree is a live tree (≥ 5 inches d.b.h.) of a commercial species that either contains or is capable of producing at least one 12-foot or two 8-foot logs in the saw-log portion of the



Pine stand after a second thinning. (photo by Chris Oswald, U.S. Forest Service)

bole. A nongrowing-stock tree is one that does not meet the requirements of growing stock due to poor form or rot. For growing-stock trees, the growing-stock portion of a tree includes the volume of sound wood between a 1-foot stump and a 4-inch top, d.o.b. Volume of the 1-foot stump, the main stem from 4 inches to the growing top of the tree, and of any limbs ≥ 4 inches with at least one 5-foot section are considered nongrowing-stock volume by FIA standards. Rough or rotten trees were also sampled and comprise another piece of nongrowing-stock (cull) volume. Figure 2 illustrates a poletimber tree and a sawtimber tree, and the growing-stock section of each.

Sawtimber tree

Softwood = at least 9.0 inches d.b.h.

Hardwood = at least 11.0 inches d.b.h.

Poletimber tree

Softwood = 5.0–8.9 inches d.b.h.

Hardwood = 5.0–10.9 inches d.b.h.

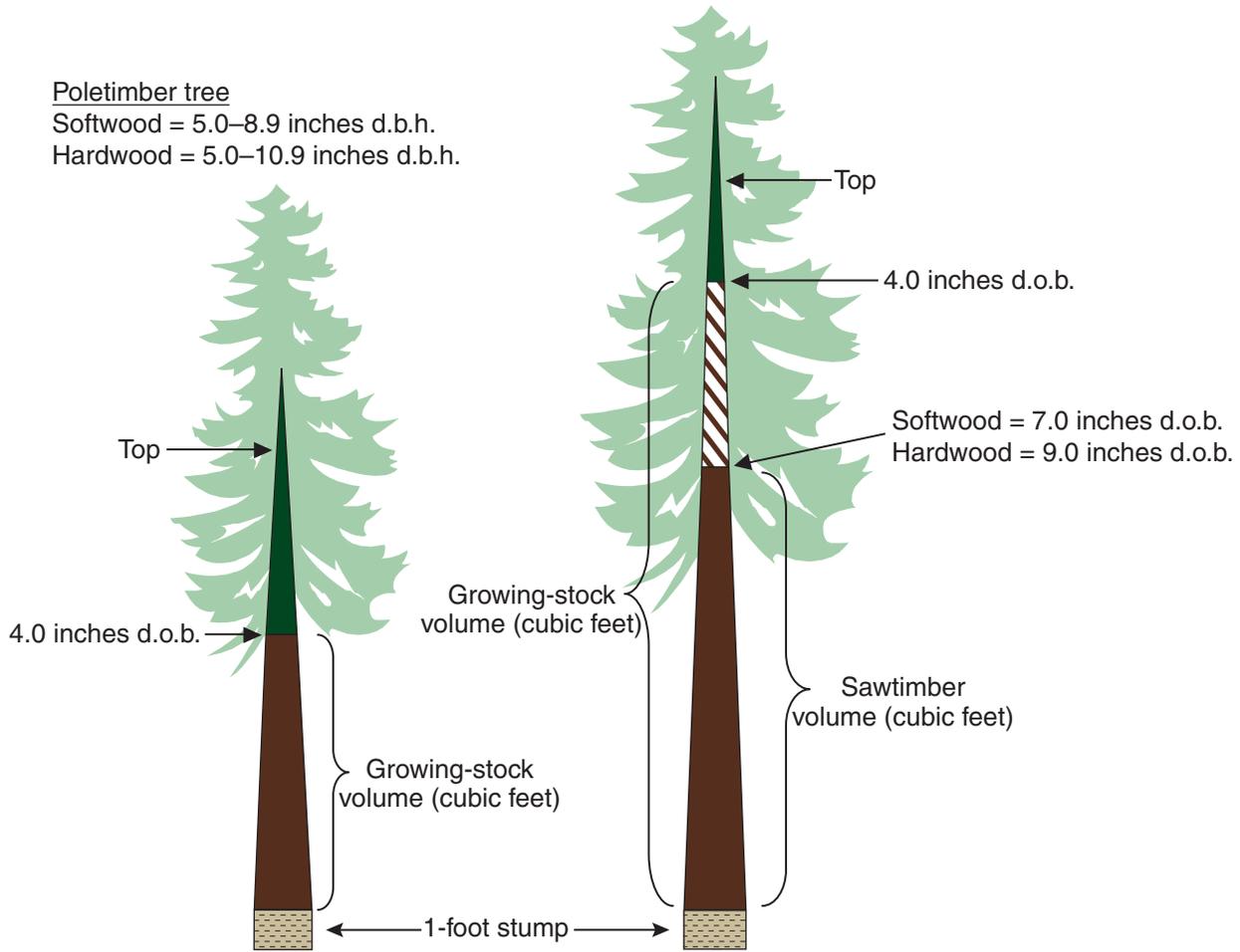


Figure 2—Stem sections of poletimber and sawtimber trees.

Methods

Site Stratification and Selection

Producing a complete list of timber harvesting operations and ownerships in a State such as South Carolina is problematic. Because of the complexity of the timber industry, it is impossible to list the names and locations of all operations during the timeframe considered in this resource bulletin. Many uncontrollable factors affect how, when, and where harvesting operations take place. The most common events that affect harvesting operations are weather and timber markets. A random sample provides a reasonably accurate estimate of utilization.

The sites selected for study were stratified by species group and product using the most recent data available for county-level output of timber products harvested in South Carolina by species group (Johnson and Adams 2011). Using those proportions, 53 of the 80 selected sites were designated as softwood operations and the remaining 27 as hardwood operations. The same guidelines were used to designate harvest operations by product, but allow for more flexibility because of the difficulty in locating harvesting operations for some products. Table 1 shows the final breakdown in number of harvest operations, total trees, trees planted, and percentage of trees planted by product and species group.

Table 1—Number of operations, total trees, planted trees, and percent planted by product and species group, South Carolina, 2011

| Product and species group | Operations | Trees | | |
|---------------------------|--------------------|-------|---------|----|
| | | Total | Planted | |
| | ----- number ----- | | percent | |
| Saw logs | | | | |
| Softwood | 22 | 526 | 316 | 60 |
| Hardwood | 11 | 234 | 26 | 11 |
| Total | 33 | 760 | 342 | 45 |
| Veneer logs | | | | |
| Softwood | 4 | 85 | 63 | 74 |
| Hardwood | 0 | 4 | 0 | — |
| Total | 4 | 89 | 63 | 71 |
| Composite panels | | | | |
| Softwood | 4 | 92 | 74 | 80 |
| Hardwood | 3 | 67 | 0 | — |
| Total | 7 | 159 | 74 | 47 |
| Pulpwood | | | | |
| Softwood | 20 | 533 | 441 | 83 |
| Hardwood | 10 | 277 | 86 | 31 |
| Total | 30 | 810 | 527 | 65 |
| Poles/pilings | | | | |
| Softwood | 3 | 81 | 48 | 59 |
| Hardwood | 0 | 0 | 0 | — |
| Total | 3 | 81 | 48 | 59 |
| Fuelwood | | | | |
| Softwood | 0 | 0 | 0 | — |
| Hardwood | 3 | 75 | 0 | — |
| Total | 3 | 75 | 0 | — |
| All products | | | | |
| Softwood | 53 | 1,317 | 942 | 72 |
| Hardwood | 27 | 657 | 112 | 17 |
| Total | 80 | 1,974 | 1,054 | 53 |

— = no sample for the cell.

After the harvest operations were stratified by major species group and product, the operations were placed in the appropriate region and county in the State. Using county-level product output data (Johnson and Adams 2011) and a map showing current mill locations, prospective utilization sites were selected based on a high probability of locating a harvesting operation for the particular product and species group assigned. Figure 1 shows where the final harvest operations considered in this bulletin were located.

Data Collection

During the 10th survey, field crews were trained to collect data on felled trees at harvest locations. Using the list of operations and a map of sites, crews began collecting data by county for the particular species group and designated product(s). Data collection from active harvest operations was completed in 2011. To locate active harvest sites, field crews visited local mills and consulted county personnel.

At each harvest operation site, field crews talked to the logger or person in charge of operations. These contacts provided vital information about product(s) utilized, specific diameters, and log lengths the receiving mill(s) would accept, along with minimum diameters at the cutoff points for specific products. Field crews also noted the type of logging equipment used. This information was applied to determine the level of mechanization for each harvesting operation.

The goal of the field crew at each harvest operation site was to measure 25 to 30 trees for each product. This number ensured an adequate representation of overutilization and underutilization for a given type of harvest operation. Randomly selected trees, alive prior to harvest and with a d.b.h. of at least 5 inches, were measured for the study. Although often bucked, limbed, and topped, the main bole of each tree selected for measurement had to be intact. The State, unit, county, and location number were recorded for each site. Each tree was assigned a number, and the species, d.b.h., tree class, product, bole length, and percentage of cull (if rot was detected) were recorded. Each tree was measured from the top of the cut stump to the end of utilization. Measurements were made along the main stem in sections no longer than 16 feet until the end of utilization.

The sawyer, according to particular specifications set by the receiving mill, usually determines the end of utilization.

FIA merchantability standards for growing-stock volume are defined as the volume in the main stem of the tree from a 1-foot stump to a 4-inch top. However, most trees are not cut exactly at a 1-foot stump, nor are they cut off at exactly 4 inches. Trees cut off above a 1-foot stump and below 4 inches would be considered underutilized, and that volume not utilized would be considered growing-stock residue. On the other hand, by FIA standards, trees cut below a 1-foot stump and above a 4-inch top are considered 100-percent utilized, and those portions below and above are considered overutilization. A myriad of combinations actually occur on active harvest operations. The aggregated volume from measured trees has provided overutilization and underutilization factors that can be applied to statewide inventory results for an estimate of growing-stock and nongrowing-stock logging residues. Other required measurements, besides d.b.h. and end of utilization, are the top diameter of the sawtimber portion (7.0 inches in softwoods and 9.0 inches in hardwoods). Those measurements allow calculation of the sawtimber and poletimber portion of the growing-stock section.

Highlights

Characteristics of Harvested Trees in South Carolina

- Results of this study identify several key characteristics of trees harvested. Such findings cannot be obtained from a typical field inventory or a forest industry study that supplies product output data only. Characteristics such as average d.b.h. by product, average bole length by product, average residual stump height, and average d.o.b. at the end of utilization are examples of vital information for a full understanding of the complex nature of removals. Averages discussed in this section are based on the measurement of 1,974 trees, of which 1,317 (67 percent) were softwood and 657 (33 percent) were hardwood (table 1). According to Johnson and Adams (2011), softwood and hardwood saw-log volume together accounted for 26 percent of the total product output for the State. The harvest and utilization study classified 526 trees as having softwood saw logs, averaging 13.0 inches d.b.h. Of these, 60 percent (316 trees) were classified as planted softwood saw logs, averaging 12.7 inches d.b.h., less than a 1-inch difference from the natural softwood saw logs, which averaged 13.4 inches d.b.h. The study also classified 234 hardwood trees as having saw logs, averaging 15.6 inches d.b.h. Eleven percent (26 trees) of the hardwood saw-log trees were planted. The planted hardwood trees had an average d.b.h. of 13.8 inches, 2 inches smaller than natural hardwood saw-log trees, which averaged 15.8 inches d.b.h.
- Veneer was also produced in the State. Four hardwood trees, with an average d.b.h. of 19.1 inches, and 85 softwood trees, with an average diameter of 15.2 inches d.b.h. were measured for veneer. Of the softwood veneer trees, 74 percent (63 trees) were planted. Averaging 15.6 inches d.b.h., the planted softwood veneer trees were more than 1-inch larger than the natural softwood veneer trees, which averaged 14.2 inches d.b.h.
- Another major product for South Carolina was pulpwood. Pulpwood production has increased since the last harvest and utilization study, and accounts for 60 percent of South Carolina's total product output (Bentley and Johnson 2008; Johnson and Adams 2011). The 533 trees measured for softwood pulpwood had an average d.b.h.

of 7.6 inches, while the 277 trees measured for hardwood pulpwood averaged 8.6 inches d.b.h. Thirty-one percent of the hardwood pulpwood (86 trees) were planted. Averaging 7.3 inches d.b.h., these planted hardwoods were nearly 2 inches smaller than the natural hardwood pulpwood trees, which averaged 9.2 inches. Eighty-three percent (441 trees) of the softwood pulpwood trees were planted, averaging 7.5 inches d.b.h., less than a 1-inch difference in d.b.h. compared to trees from natural stands.

- Composite panels and poles/pilings constitute another two components of the product mix for South Carolina. The 81 softwood trees measured for poles/pilings had an average d.b.h. of 13.3 inches. Within this category 59 percent (48 trees) were planted and averaged 12.7 inches d.b.h., while the trees from natural stands averaged 14.0 inches d.b.h. Based on the 92 trees measured for softwood composite panels, the average d.b.h. was 6.8 inches, while the 67 trees measured for hardwood composite panels averaged 11.5 inches d.b.h. Eighty percent (74 trees) of the softwood composite panel trees were planted. These planted trees had an average d.b.h. of 7.1 inches, compared to 5.8 inches d.b.h. for softwood composite trees in natural stands. The final product measured in this study was fuelwood. Seventy-five hardwood trees were measured for fuelwood, with an average d.b.h. of 9.4 inches. Table 2 shows the average d.b.h. for each product by species group.

Table 2—Average diameter at breast height by species group, stand origin, and product, South Carolina, 2011

| Species group and stand origin | Product | | | | | |
|--------------------------------|---------------|-------------|------------------|----------|---------------|----------|
| | Saw logs | Veneer logs | Composite panels | Pulpwood | Poles/pilings | Fuelwood |
| | <i>inches</i> | | | | | |
| Softwood | | | | | | |
| Natural | 13.40 | 14.19 | 5.80 | 8.34 | 13.95 | — |
| Planted | 12.73 | 15.56 | 7.10 | 7.50 | 12.74 | — |
| Total | 13.00 | 15.20 | 6.84 | 7.64 | 13.25 | — |
| Hardwood | | | | | | |
| Natural | 15.82 | 19.10 | 11.47 | 9.16 | — | 9.35 |
| Planted | 13.75 | — | — | 7.34 | — | — |
| Total | 15.59 | 19.10 | 11.47 | 8.59 | — | 9.35 |

— = no sample for the cell.

- Bole length is the distance between a 1-foot stump and a 4-inch top. As expected, trees harvested for solid wood products tended to have longer average bole lengths than trees harvested for pulpwood, composite panels, or fuelwood. The average bole length for softwood trees measured for saw logs was 63 feet, very close to the average bole length of hardwood saw logs, 64 feet. The average bole length for softwood veneer logs was 65 feet, while hardwood veneer logs were a bit longer with an average bole length of 79 feet. Trees measured for poles/pilings had an average bole length of 62 feet. Trees measured for pulpwood had average bole lengths of 36 feet for softwoods and 37 feet for hardwoods. Softwood trees measured for composite panels had an average bole length of 28 feet, while hardwood composite panel trees were significantly longer at 48 feet. Trees measured for fuelwood had an average bole length of 35 feet.
- With the exception of fuelwood, planted sites constituted a subset of all trees measured. For poles/pilings and pulpwood products, trees measured in natural stands were longer on average than those in planted stands. For composite panels and veneer logs the opposite was true, the planted trees were longer than those in natural stands. For saw-logs hardwood trees were shorter in planted

stands, while softwood trees were longer in planted stands, compared to natural stands. Table 3 shows the average bole length by species group.

- Residual stump height is a key component in determining utilization rates for harvested trees. By FIA standards, the stump is that portion of the tree measured at ground level from the uphill side of the tree to 1 foot up the bole. Loggers try to maximize volume harvested by cutting the tree as close to the ground as possible. Residual stump heights across the products ranged from 0.34 to 0.88 feet. Most softwood trees harvested had an average residual stump height ranging from 0.34 to 0.51 feet, while harvested hardwood trees averaged slightly higher residual stumps. In softwoods and across all products, this accounted for about 49 percent of the stump volume being utilized. In hardwoods and across all products, about 23 percent of stump volume was utilized. Stump volume for both hardwood and softwood contributed to utilization of the nongrowing-stock portion of trees, i.e., overutilization. Table 4 shows the average residual stump heights for each product by species group.
- The final component we used to determine use rates was d.o.b. at the end of utilization. Tops and limbs constitute most of the nongrowing-stock volume, although they

Table 3—Average bole length by species group, stand origin, and product, South Carolina, 2011

| Species group and stand origin | Product | | | | | |
|-----------------------------------|-------------|----------------|---------------------|---------------|-------------------|---------------|
| | Saw logs | Veneer logs | Composite panels | Pulp- wood | Poles/ pilings | Fuel- wood |
| | <i>feet</i> | | | | | |
| Softwood | | | | | | |
| Natural | 60.89 | 50.73 | 20.61 | 36.59 | 63.70 | — |
| Planted | 64.41 | 70.00 | 30.22 | 35.50 | 60.26 | — |
| Total | 63.00 | 65.01 | 28.34 | 35.69 | 61.70 | — |
| Hardwood | | | | | | |
| Natural | 63.64 | 78.50 | 48.16 | 39.47 | — | 35.29 |
| Planted | 62.08 | — | — | 32.64 | — | — |
| Total | 63.47 | 78.50 | 48.16 | 37.35 | — | 35.29 |

— = no sample for the cell.

Table 4—Average residual stump height by species group, stand origin, and product, South Carolina, 2011

| Species group and stand origin | Product | | | | | |
|--------------------------------|----------|-------------|------------------|-----------|---------------|-----------|
| | Saw logs | Veneer logs | Composite panels | Pulp-wood | Poles/pilings | Fuel-wood |
| <i>feet</i> | | | | | | |
| Softwood | | | | | | |
| Natural | 0.51 | 0.64 | 0.36 | 0.42 | 0.48 | — |
| Planted | 0.38 | 0.47 | 0.41 | 0.32 | 0.30 | — |
| Total | 0.44 | 0.51 | 0.40 | 0.34 | 0.38 | — |
| Hardwood | | | | | | |
| Natural | 0.74 | 0.88 | 0.56 | 0.60 | — | 0.47 |
| Planted | 0.37 | — | — | 0.33 | — | — |
| Total | 0.69 | 0.88 | 0.56 | 0.52 | — | 0.47 |

— = no sample for the cell.

accounted for only 35 percent of the nongrowing-stock portion that was utilized. The average end of utilization for softwood saw logs was 4.5 inches d.o.b., with little difference in diameter for planted versus natural stands. For hardwood saw logs, the average end of utilization was 5.8 inches, with trees from planted stands 1.5 inches smaller on average than those from natural stands. End of utilization for hardwood veneer logs had an average diameter of 8.2 inches, while softwood veneer averaged 5.0 inches, with planted trees averaging 4.6 inches compared to 6.3 for natural stands. The average end of utilization for softwood and hardwood pulpwood was

3.0 and 3.6 inches, respectively, with about a half an inch difference in diameters based on stand origin for either species group. For composite panel trees, the average hardwood end of utilization was 4.0 inches, while softwoods averaged 2.3 inches, with almost no difference in planted compared to natural stands. Poles/pilings showed an average end of utilization of 6.1 inches. This product showed the greatest end of utilization difference in trees that were planted, 4.1 inches, compared to natural, 8.8 inches. Fuelwood averaged 4.5 inches at end of utilization. Table 5 shows the average end of utilization by the different products and species group.

Table 5—Average end of utilization by species group, stand origin, and product, South Carolina, 2011

| Species group and stand origin | Product | | | | | |
|--------------------------------|----------|-------------|------------------|-----------|---------------|-----------|
| | Saw logs | Veneer logs | Composite panels | Pulp-wood | Poles/pilings | Fuel-wood |
| <i>inches</i> | | | | | | |
| Softwood | | | | | | |
| Natural | 4.61 | 6.33 | 2.32 | 3.29 | 8.81 | — |
| Planted | 4.50 | 4.56 | 2.31 | 2.92 | 4.11 | — |
| Total | 4.54 | 5.02 | 2.32 | 2.99 | 6.07 | — |
| Hardwood | | | | | | |
| Natural | 6.01 | 8.23 | 3.96 | 3.82 | — | 4.51 |
| Planted | 4.54 | — | — | 3.24 | — | — |
| Total | 5.84 | 8.23 | 3.96 | 3.64 | — | 4.51 |

— = no sample for the cell.

Softwood Removals

- Results from this study document 31,340 cubic feet of softwood volume, of which 27,041 cubic feet (86 percent) was used for product(s). Fourteen percent (4,298 cubic feet) was left onsite as logging residue (fig. 3). Thirty-two percent of the residue volume came from the growing-stock portion of the tree, while 68 percent came from the nongrowing-stock portion (stumps, tops, and limbs) (fig. 4) (table A.1).
- The total softwood growing-stock volume measured was 27,524 cubic feet, of which 95 percent was utilized and 5 percent was logging residue (fig. 5). By FIA merchantability standards, the logging residue portion of growing-stock trees is underutilized volume. Of the total utilized volume, 912 cubic feet (3.4 percent) was from the nongrowing-stock portion of trees. By the same merchantability standards, that volume is considered overutilization (tables A.2 and A.3).
- Softwood volumes and percentages are broken down further by poletimber and sawtimber, and by the various products measured (tables A.2 through A.9). By product, trees harvested for pulpwood had average rates

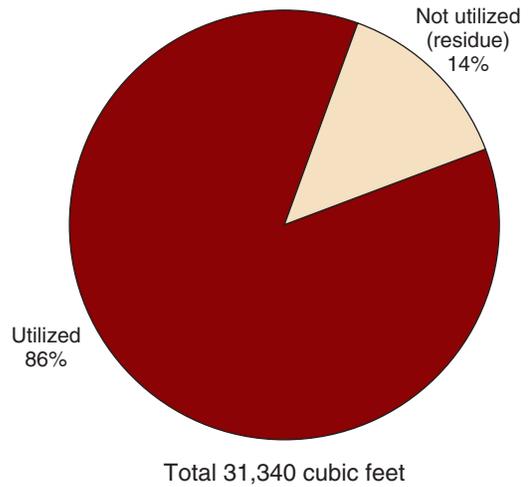


Figure 3—Disposition of total softwood harvest volume, South Carolina, 2011.

of utilization for the merchantable portion of the tree (96 percent) and the second-highest rate of overutilization (8 percent), meaning that more of the nongrowing-stock portion of the tree was used for products and less was left as logging residue.

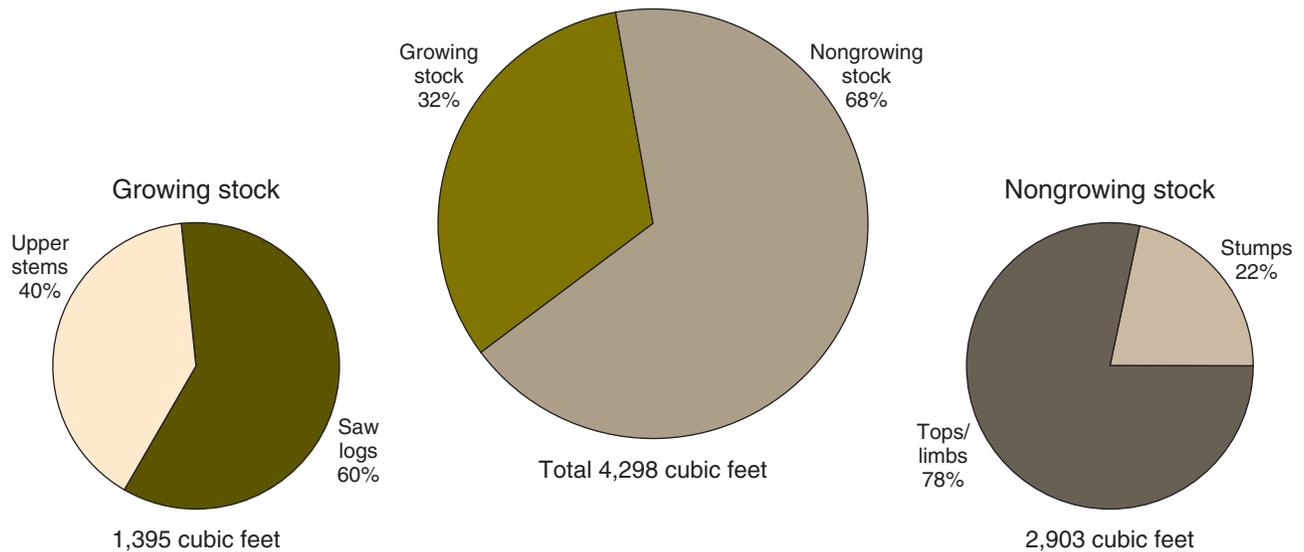


Figure 4—Softwood residue by volume type, South Carolina, 2011.

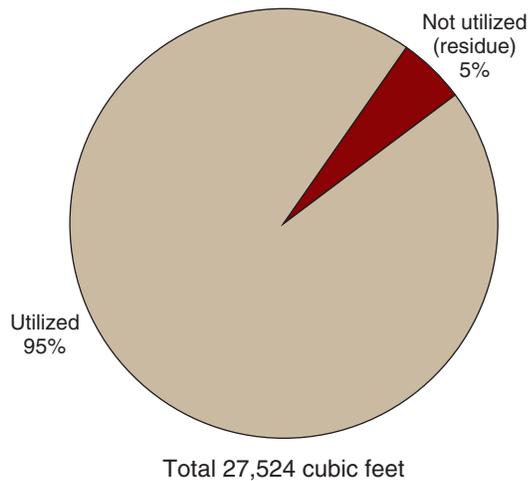


Figure 5—Disposition of softwood growing-stock volume, South Carolina, 2011.

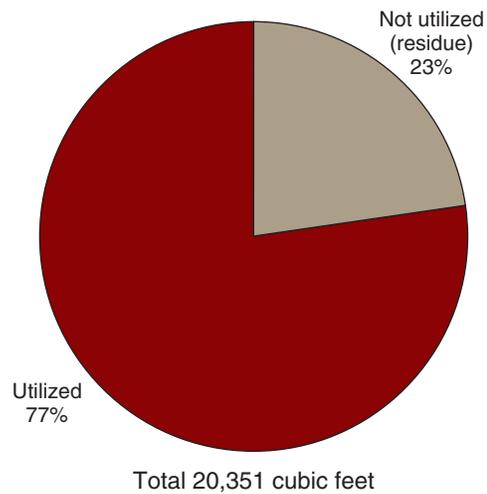


Figure 6—Disposition of total hardwood harvest volume, South Carolina, 2011.

Hardwood Removals

- Results from this study document 20,351 cubic feet of hardwood volume, of which 15,734 cubic feet (77 percent) was utilized for product(s) (table A.1). Twenty-three percent (4,617 cubic feet) was left onsite as logging residue (fig. 6). Thirty-seven percent of residue volume came from the growing-stock portion of trees, and 63 percent came from the nongrowing-stock portion (stumps, tops, and limbs) (fig. 7).

- The total hardwood growing-stock volume measured was 17,092 cubic feet, of which 90 percent was used and 10 percent was logging residue (fig. 8) (table A.1). By FIA merchantability standards, the logging residue portion is underutilized volume. Of the total utilized volume, 357 cubic feet (2 percent) was from the nongrowing-stock portion of trees. By the same merchantability standards, that volume is considered overutilization (tables A.10 and A.11).

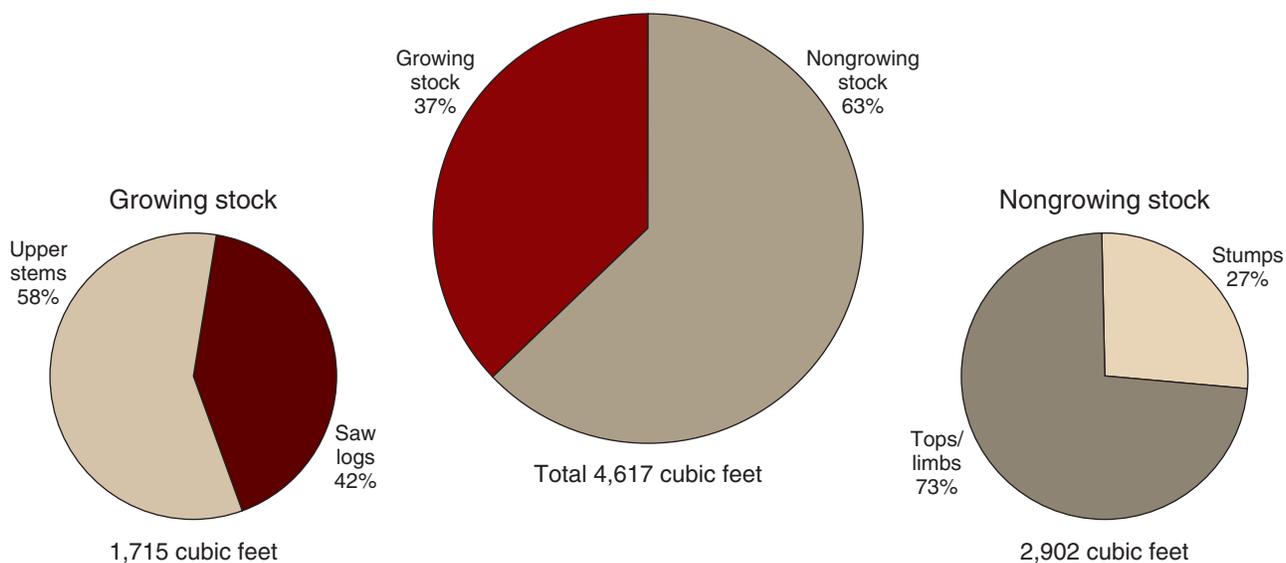


Figure 7—Hardwood residue by volume type, South Carolina, 2011.



Residual stumps after mechanized felling. (photo by Tony Johnson (retired), U.S. Forest Service)

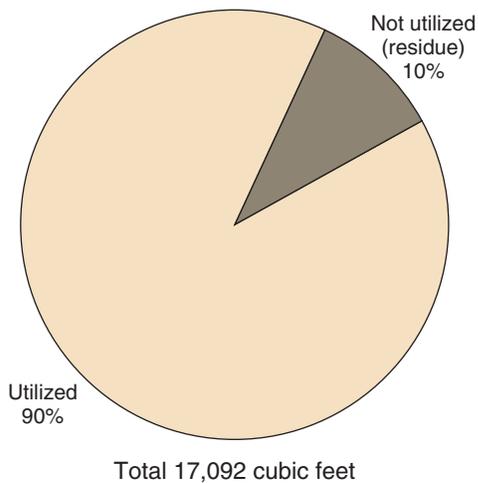


Figure 8—Disposition of hardwood growing-stock volume, South Carolina, 2011.

- Hardwood volumes and percentages also were measured for poletimber and sawtimber, and differentiated by the various products they provided (tables A.10 through A.17). At 91 percent, those trees measured for saw logs were most fully utilized, while trees measured for pulpwood used the greatest proportion of nongrowing-stock for products. Trees measured for hardwood composite panels, at 86 percent, and pulpwood, at 88 percent, were the least utilized.

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Glossary

Board foot. Unit of measure applied to roundwood. It relates to lumber that is 1-foot long, 1-foot wide, and 1-inch thick (or its equivalent).

Composite products. Roundwood products manufactured into chips, wafers, strands, flakes, shavings, or sawdust and then reconstituted into a variety of panel and engineered lumber products.

Drain. The volume of roundwood removed from any geographic area where timber is grown.

Growing-stock removals. The growing-stock volume removed from poletimber and sawtimber trees in the timberland inventory. (Note: Includes volume removed for roundwood products, logging residues, and other removals.)

Growing-stock trees. Living trees of commercial species classified as sawtimber, poletimber, saplings, and seedlings. Growing-stock trees must contain at least one 12-foot or two 8-foot logs in the saw-log portion, currently or potentially (if too small to qualify). The log(s) must meet dimension and merchantability standards and have, currently or potentially, one-third of the gross board-foot volume in sound wood.

Growing-stock volume. The cubic-foot volume of sound wood in growing-stock trees at least 5.0 inches d.b.h. from a 1-foot stump to a minimum 4.0-inch top d.o.b. of the central stem.

Hardwoods. Dicotyledonous trees, usually broadleaf and deciduous.

Soft hardwoods. Hardwood species with an average specific gravity ≤ 0.50 , such as gums, yellow-poplar, cottonwoods, red maple, basswoods, and willows.

Hard hardwoods. Hardwood species with an average specific gravity > 0.50 , such as oaks, hard maples, hickories, and beech.

Industrial roundwood products. Any primary use of the main stem of a tree, such as saw logs, pulpwood, and veneer logs, intended to be processed into primary wood products, such as lumber, wood pulp, and sheathing, at primary wood-using mills.

International 1/4-inch rule. A log rule or formula for estimating the board-foot volume of logs, allowing 1/2-inch of taper for each 4-foot length. The rule appears in a number of forms that allow for kerf. In the form used by FIA, a

1/4-inch of kerf is assumed. This rule is used as the USDA Forest Service standard log rule in the Eastern United States.

Log. A primary forest product harvested in long, primarily 8-, 12-, and 16-foot lengths.

Logging residues. The unused portion of trees cut or destroyed during logging operations.

Merchantable portion. That portion of live trees 5.0 inches d.b.h. and larger between a 1-foot stump and a minimum 4.0-inch top d.o.b. on the central stem. That portion of primary forks from the point of occurrence to a minimum 4.0-inch top d.o.b. is included.

Merchantable volume. Solid-wood volume in the merchantable portion of live trees.

Noncommercial species. Tree species of typically small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial wood products.

Nonforest land. Land that has never supported forests and land formerly forested where timber production is precluded by development for other uses.

Nongrowing-stock sources. The net volume removed from the nongrowing-stock portions of poletimber and sawtimber trees (stumps, tops, limbs, cull sections of central stem) and from any portion of a rough, rotten, sapling, dead, or nonforest tree.

Other forest land. Forest land other than timberland and productive reserved forest land. It includes available and reserved forest land that is incapable of producing annually 20 cubic feet per acre of industrial wood under natural conditions because of adverse site conditions such as sterile soils, dry climate, poor drainage, high elevation, steepness, or rockiness.

Other products. A Fuelwood category of roundwood products, e.g., cooperage, excelsior, shingles, and mill residue byproducts (charcoal, bedding, mulch, etc.).

Other removals. The growing-stock volume of trees removed from the inventory by cultural operations such as timber stand improvement, land clearing, and other changes in land use, resulting in the removal of the trees from timberland.

Other sources. (See: Nongrowing-stock sources.)

Poletimber-size trees. Softwoods 5.0 to 8.9 inches d.b.h. and hardwoods 5.0 to 10.9 inches d.b.h.

Posts, poles, and pilings. Roundwood products milled (cut or peeled) into standard sizes (lengths and circumferences) to be put in the ground to provide vertical and lateral support in buildings, foundations, utility lines, and fences. May also include nonindustrial (unmilled) products.

Primary wood-using plants. Industries that convert roundwood products (saw logs, veneer logs, pulpwood, etc.) into primary wood products, such as lumber, veneer or sheathing, and wood pulp.

Pulpwood. A roundwood product that will be reduced to individual wood fibers by chemical or mechanical means. The fibers are used to make a broad generic group of pulp products that includes paper products, as well as chipboard, fiberboard, insulating board, and paperboard.

Rotten trees. Live trees of commercial species not containing at least one 12-foot saw log, or two noncontiguous saw logs, each 8 feet or longer, now or prospectively, primarily because of rot or missing sections, and with less than one-third of the gross board-foot tree volume in sound material.

Rough trees. Live trees of commercial species not containing at least one 12-foot saw log, or two noncontiguous saw logs, each 8 feet or longer, now or prospectively, primarily because of roughness, poor form, splits, and cracks, and with less than one-third of the gross board-foot tree volume in sound material; and live trees of noncommercial species.

Roundwood (roundwood logs). Logs, bolts, or other round sections cut from trees for industrial manufacture or consumer uses.

Roundwood chipped. Any timber cut primarily for industrial manufacture, delivered to nonpulpmills, chipped, and then sold to pulpmills for use as fiber. Includes tops, jump sections, whole trees, and pulpwood sticks.

Roundwood product drain. That portion of total drain used for a product.

Roundwood products. Any primary product, such as lumber, poles, pilings, pulp, or fuelwood that is produced from roundwood.

Salvable dead trees. Standing or downed dead trees that were formerly growing stock and considered merchantable. Trees must be at least 5.0 inches d.b.h. to qualify.

Saplings. Live trees 1.0 to 5.0 inches d.b.h.

Saw log. A roundwood product, usually 8 feet in length or longer, processed into a variety of sawn products such as lumber, cants, pallets, railroad ties, and timbers.

Saw-log portion. The part of the bole of sawtimber trees between a 1-foot stump and the saw-log top.

Saw-log top. The point on the bole of sawtimber trees above which a conventional saw log cannot be produced. The minimum saw-log top is 7.0 inches d.o.b. for softwoods and 9.0 inches d.o.b. for hardwoods.

Sawtimber-size trees. Softwoods 9.0 inches d.b.h. and larger and hardwoods 11.0 inches d.b.h. and larger.

Sawtimber volume. Growing-stock volume in the saw-log portion of sawtimber-sized trees in board feet (International ¼-inch rule).

Seedlings. Trees <1.0 inch d.b.h. and >1 foot tall for hardwoods, >6 inches tall for softwood, and >0.5 inch in diameter at ground level for longleaf pine.

Softwoods. Coniferous trees, usually evergreen, having leaves that are needles or scalelike.

Standard cord. A unit of measure applied to roundwood, usually bolts or split wood. It is a stack of wood 4 feet high, 4 feet wide, and 8 feet long encompassing 128 cubic feet of wood, bark, and air space. This usually translates to approximately 75.0 to 81.0 cubic feet of solid wood for pulpwood, because pulpwood is more uniform.

Standard unit. A unit measure applied to roundwood timber products. Board feet (International ¼-inch rule) is the standard unit used for saw logs and veneer; cords are used for pulpwood, composite panel, and fuelwood; hundred pieces for poles; thousand pieces for posts; and thousand cubic feet for all other Fuelwood forest products.

Timberland. Forest land capable of producing 20 cubic feet of industrial wood per acre per year and not withdrawn from timber utilization.

Timber product output. The total volume of roundwood products from all sources plus the volume of byproducts recovered from mill residues (equals roundwood product drain).

Timber products. Roundwood products and byproducts.

Timber removals. The total volume of trees removed from the timberland inventory by harvesting, cultural operations such as stand improvement, land clearing, or changes in land use. (Note: Includes roundwood products, logging residues, and other removals.)

Tree. Woody plant having one erect perennial stem or trunk at least 3 inches d.b.h., a more or less definitely formed crown of foliage, and a height of at least 13 feet (at maturity).

Upper-stem portion. The part of the main stem of sawtimber trees above the saw-log top and the minimum top diameter of 4.0 inches outside bark, or to the point where the main stem breaks into limbs.

Utilization studies. Studies conducted on active logging operations to develop factors for merchantable portions of trees left in the woods (logging residues), logging damage, and utilization of the unmerchantable portion of growing-stock trees and nongrowing-stock trees.

Veneer log. A roundwood product either rotary cut, sliced, stamped, or sawn into a variety of veneer products such as plywood, finished panels, veneer sheets, or sheathing.

Weight. A unit of measure for mill residues, expressed as oven-dry tons (2,000 oven-dry pounds).

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Table A.1—Harvest and utilization volume by species group, source, and volume type, South Carolina, 2011

| Species group and source | Total tree volume | Growing stock | | | | | Nongrowing stock | | | | |
|--------------------------|-------------------|---------------|-----------|--------------|------------|--------------|------------------|----------|--------------|------------|--------------|
| | | Total | Saw log | | Upper stem | | Total | Stumps | | Tops/limbs | |
| | | | Utilized | Not utilized | Utilized | Not utilized | | Utilized | Not utilized | Utilized | Not utilized |
| <i>cubic feet</i> | | | | | | | | | | | |
| Softwood | | | | | | | | | | | |
| Sawtimber | 28,026.16 | 24,812.17 | 22,225.86 | 836.90 | 1,216.63 | 532.78 | 3,213.99 | 492.05 | 549.79 | 88.57 | 2,083.58 |
| Poletimber | 3,313.52 | 2,712.28 | — | — | 2,686.92 | 25.36 | 601.24 | 114.19 | 79.09 | 217.20 | 190.76 |
| Total | 31,339.68 | 27,524.45 | 22,225.86 | 836.90 | 3,903.55 | 558.14 | 3,815.23 | 606.24 | 628.88 | 305.77 | 2,274.34 |
| Hardwood | | | | | | | | | | | |
| Sawtimber | 17,412.01 | 14,727.89 | 11,839.88 | 717.77 | 1,281.61 | 888.63 | 2,684.12 | 149.10 | 649.68 | 30.89 | 1,854.45 |
| Poletimber | 2,939.42 | 2,364.34 | — | — | 2,255.58 | 108.76 | 575.08 | 75.57 | 125.10 | 101.81 | 272.60 |
| Total | 20,351.43 | 17,092.23 | 11,839.88 | 717.77 | 3,537.19 | 997.39 | 3,259.20 | 224.67 | 774.78 | 132.70 | 2,127.05 |

— = no sample for the cell.

Table A.2—Volume of softwood growing stock by product and utilization for sawtimber and poletimber, South Carolina, 2011

| Product | Total volume utilized | Growing stock | | | Nongrowing stock utilized | Saw-log portion | | | |
|-------------------|-----------------------|---------------|-----------|--------------|---------------------------|-----------------|-----------|---------------|--------------|
| | | Total | Utilized | Not utilized | | Total | Utilized | Cull utilized | Not utilized |
| <i>cubic feet</i> | | | | | | | | | |
| Saw logs | 16,445.08 | 17,055.17 | 16,047.68 | 1,007.49 | 397.40 | 15,675.85 | 15,041.66 | 610.27 | 23.92 |
| Veneer logs | 3,682.84 | 3,725.26 | 3,609.08 | 116.18 | 73.76 | 3,561.23 | 3,513.93 | 45.42 | 1.88 |
| Composite panels | 469.80 | 425.38 | 418.33 | 7.05 | 51.47 | 69.38 | 64.59 | 4.79 | 0.00 |
| Pulpwood | 4,062.39 | 3,871.57 | 3,733.91 | 137.66 | 328.48 | 1,440.57 | 1,355.70 | 80.98 | 3.89 |
| Poles/pilings | 2,381.29 | 2,447.06 | 2,320.40 | 126.66 | 60.89 | 2,315.73 | 2,249.98 | 65.75 | — |
| Fuelwood | — | — | — | — | — | — | — | — | — |
| Total | 27,041.40 | 27,524.44 | 26,129.40 | 1,395.04 | 912.00 | 23,062.76 | 22,225.86 | 807.21 | 29.69 |

Numbers in rows and columns may not sum to totals due to rounding.

— = no sample for the cell.

Table A.3—Percent of overutilization and underutilization for softwood growing stock by product for sawtimber and poletimber, South Carolina, 2011

| Product | Overutilization | | Underutilization | | Saw-log portion | | |
|------------------|--|---|--|---|--|--|---|
| | Growing stock utilized/ total volume utilized | Nongrowing stock utilized/ total volume utilized | Growing stock utilized/total growing-stock volume | Growing stock not utilized/ total growing-stock volume | Saw log utilized/total saw-log volume | Cull utilized/ total saw-log volume | Saw log not utilized/ total saw-log volume |
| | <i>percent</i> | | | | | | |
| Saw logs | 97.58 | 2.42 | 94.09 | 5.91 | 95.95 | 3.89 | 0.15 |
| Veneer logs | 98.00 | 2.00 | 96.88 | 3.12 | 98.67 | 1.28 | 0.05 |
| Composite panels | 89.04 | 10.96 | 98.34 | 1.66 | 93.10 | 6.90 | 0.00 |
| Pulpwood | 91.91 | 8.09 | 96.44 | 3.56 | 94.11 | 5.62 | 0.27 |
| Poles/pilings | 97.44 | 2.56 | 94.82 | 5.18 | 97.16 | — | — |
| Fuelwood | — | — | — | — | — | — | — |
| All products | 96.63 | 3.37 | 94.93 | 5.07 | 96.37 | 3.50 | 0.13 |

— = no sample for the cell.

Table A.4—Volume of softwood growing stock by product and utilization for sawtimber, South Carolina, 2011

| Product | Total volume utilized | Growing stock | | | Nongrowing stock utilized | Saw-log portion | | | |
|------------------|-----------------------|---------------|-----------|--------------|---------------------------|-----------------|-----------|---------------|--------------|
| | | Total | Utilized | Not utilized | | Total | Utilized | Cull utilized | Not utilized |
| | <i>cubic feet</i> | | | | | | | | |
| Saw logs | 16,225.52 | 16,845.84 | 15,839.95 | 1,005.89 | 385.57 | 15,675.85 | 15,041.66 | 610.27 | 23.92 |
| Veneer logs | 3,662.94 | 3,706.71 | 3,590.53 | 116.18 | 72.41 | 3,561.23 | 3,513.93 | 45.42 | 1.88 |
| Composite panels | 85.92 | 86.65 | 81.86 | 4.79 | 4.06 | 69.38 | 64.59 | 4.79 | 0.00 |
| Pulpwood | 1,667.42 | 1,725.90 | 1,609.74 | 116.16 | 57.68 | 1,440.57 | 1,355.70 | 80.98 | 3.89 |
| Poles/pilings | 2,381.29 | 2,447.06 | 2,320.40 | 126.66 | 60.89 | 2,315.73 | 2,249.98 | 65.75 | — |
| Fuelwood | — | — | — | — | — | — | — | — | — |
| Total | 24,023.09 | 24,812.16 | 23,442.48 | 1,369.68 | 580.61 | 23,062.75 | 22,225.86 | 807.21 | 29.69 |

Numbers in rows and columns may not sum to totals due to rounding.

— = no sample for the cell.

Table A.5—Percent of overutilization and underutilization for softwood growing stock by product for sawtimber, South Carolina, 2011

| Product | Overutilization | | Underutilization | | Saw-log portion | | |
|------------------|--|---|--|---|--|--|---|
| | Growing stock utilized/ total volume utilized | Nongrowing stock utilized/ total volume utilized | Growing stock utilized/total growing-stock volume | Growing stock not utilized/ total growing-stock volume | Saw log utilized/total saw-log volume | Cull utilized/ total saw-log volume | Saw log not utilized/ total saw-log volume |
| <i>percent</i> | | | | | | | |
| Saw logs | 97.62 | 2.38 | 94.03 | 5.97 | 95.95 | 3.89 | 0.15 |
| Veneer logs | 98.02 | 1.98 | 96.87 | 3.13 | 98.67 | 1.28 | 0.05 |
| Composite panels | 95.27 | 4.73 | 94.47 | 5.53 | 93.10 | 6.90 | — |
| Pulpwood | 96.54 | 3.46 | 93.27 | 6.73 | 94.11 | 5.62 | 0.27 |
| Poles/pilings | 97.44 | 5.18 | 2.62 | 5.18 | 97.16 | 2.84 | — |
| Fuelwood | — | — | — | — | — | — | — |
| All products | 97.58 | 2.42 | 94.48 | 5.52 | 96.37 | 3.50 | 0.13 |

— = no sample for the cell.

Table A.6—Volume of softwood growing stock by product and utilization for poletimber, South Carolina, 2011

| Product | Total volume utilized | Growing stock | | | Nongrowing stock utilized |
|-------------------|-----------------------|---------------|----------|--------------|---------------------------|
| | | Total | Utilized | Not utilized | |
| <i>cubic feet</i> | | | | | |
| Saw logs | 219.56 | 209.33 | 207.73 | 1.60 | 11.83 |
| Veneer logs | 19.90 | 18.55 | 18.55 | — | 1.35 |
| Composite panels | 383.88 | 338.73 | 336.47 | 2.26 | 47.41 |
| Pulpwood | 2,394.97 | 2,145.67 | 2,124.17 | 21.50 | 270.80 |
| Poles/pilings | — | — | — | — | — |
| Fuelwood | — | — | — | — | — |
| Total | 3,018.31 | 2,712.28 | 2,686.92 | 25.36 | 331.39 |

Numbers in rows and columns may not sum to totals due to rounding.

— = no sample for the cell.

Table A.7—Percent of overutilization and underutilization for softwood growing stock by product for poletimber, South Carolina, 2011

| Product | Overutilization | | Underutilization | |
|------------------|--|---|---|---|
| | Growing stock utilized/ total volume utilized | Nongrowing stock utilized/ total volume utilized | Growing stock utilized/ total growing-stock volume | Growing stock not utilized/ total growing-stock volume |
| <i>percent</i> | | | | |
| Saw logs | 94.61 | 5.39 | 99.24 | 0.76 |
| Veneer logs | 93.22 | 6.78 | 100.00 | — |
| Composite panels | 87.65 | 12.35 | 99.33 | 0.67 |
| Pulpwood | 88.69 | 11.31 | 99.00 | 1.00 |
| Poles/pilings | — | — | — | — |
| Fuelwood | — | — | — | — |
| All products | 89.02 | 10.98 | 99.06 | 0.94 |

— = no sample for the cell.

Table A.8—Volume of softwood cull by product and utilization, South Carolina, 2011

| Product | Total volume utilized | Nongrowing stock | | |
|-------------------|-----------------------|------------------|----------|-------------------------|
| | | Merchantable | | Unmerchantable utilized |
| | | Total | Utilized | |
| <i>cubic feet</i> | | | | |
| Saw logs | — | — | — | — |
| Veneer logs | — | — | — | — |
| Composite panels | 45.15 | 40.25 | 40.25 | — |
| Pulpwood | 330.10 | 316.63 | 316.60 | 0.03 |
| Poles/pilings | — | — | — | — |
| Fuelwood | — | — | — | — |
| Total | 375.25 | 356.88 | 356.85 | 0.03 |

Numbers in rows and columns may not sum to totals due to rounding.

— = no sample for the cell.

Table A.9—Percent of overutilization and underutilization for softwood cull by product, South Carolina, 2011

| Product | Overutilization | | Underutilization | |
|------------------|---|---|---|---|
| | Merchantable utilized/ total volume utilized | Unmerchantable utilized/ total volume utilized | Merchantable utilized/total merchantable volume | Merchantable not utilized/ total merchantable volume |
| | <i>percent</i> | | | |
| Saw logs | — | — | — | — |
| Veneer logs | — | — | — | — |
| Composite panels | 89.15 | 10.85 | 100.00 | — |
| Pulpwood | 95.91 | 4.09 | 99.99 | 0.01 |
| Poles/pilings | — | — | — | — |
| Fuelwood | — | — | — | — |
| All products | 95.10 | 4.90 | 99.99 | 0.01 |

— = no sample for the cell.

Table A.10—Volume of hardwood growing stock by product and utilization for sawtimber and poletimber, South Carolina, 2011

| Product | Total volume utilized | Growing stock | | | Nongrowing stock utilized | Saw-log portion | | | |
|------------------|-----------------------|---------------|-----------|--------------|---------------------------|-----------------|-----------|---------------|--------------|
| | | Total | Utilized | Not utilized | | Total | Utilized | Cull utilized | Not utilized |
| | <i>cubic feet</i> | | | | | | | | |
| Saw logs | 10,409.89 | 11,310.65 | 10,287.47 | 1,023.18 | 122.42 | 9,441.81 | 9,110.31 | 141.41 | 190.09 |
| Veneer logs | 262.30 | 292.97 | 261.28 | 31.69 | 1.02 | 255.92 | 255.91 | -16.88 | 16.89 |
| Composite panels | 1,490.01 | 1,686.90 | 1,449.40 | 237.50 | 40.61 | 1,190.94 | 1,048.72 | 121.21 | 21.01 |
| Pulpwood | 2,660.01 | 2,838.16 | 2,508.81 | 329.35 | 151.20 | 1,187.71 | 983.90 | 196.19 | 7.62 |
| Poles/pilings | — | — | — | — | — | — | — | — | — |
| Fuelwood | 912.26 | 963.56 | 870.12 | 93.44 | 42.14 | 481.28 | 441.05 | 40.23 | — |
| Total | 15,734.47 | 17,092.24 | 15,377.08 | 1,715.16 | 357.39 | 12,557.66 | 11,839.89 | 482.16 | 235.61 |

Numbers in rows and columns may not sum to totals due to rounding.

— = no sample for the cell.

Table A.11—Percent of overutilization and underutilization for hardwood growing stock by product for sawtimber and poletimber, South Carolina, 2011

| Product | Overutilization | | Underutilization | | Saw-log portion | | |
|------------------|--|---|--|---|---|--|---|
| | Growing stock utilized/ total volume utilized | Nongrowing stock utilized/ total volume utilized | Growing stock utilized/total growing-stock volume | Growing stock not utilized/ total growing-stock volume | Saw log utilized/ total saw-log volume | Cull utilized/ total saw-log volume | Saw log not utilized/ total saw-log volume |
| | <i>percent</i> | | | | | | |
| Saw logs | 98.82 | 1.18 | 90.95 | 9.05 | 96.49 | 1.50 | 2.01 |
| Veneer logs | 99.61 | 0.39 | 89.18 | 10.82 | 100.00 | -6.60 | 6.60 |
| Composite panels | 97.28 | 2.72 | 85.92 | 14.08 | 88.06 | 10.18 | 1.76 |
| Pulpwood | 94.32 | 5.68 | 88.40 | 11.60 | 82.84 | 16.52 | 0.64 |
| Poles/pilings | — | — | — | — | — | — | — |
| Fuelwood | 95.38 | 4.62 | 90.30 | 9.70 | 91.64 | 8.36 | — |
| All products | 97.73 | 2.27 | 89.97 | 10.03 | 94.28 | 3.84 | 1.88 |

— = no sample for the cell.

Table A.12—Volume of hardwood growing stock by product and utilization for sawtimber, South Carolina, 2011

| Product | Total volume utilized | Growing stock | | | Nongrowing stock utilized | Saw-log portion | | | |
|------------------|-----------------------|---------------|-----------|--------------|---------------------------|-----------------|-----------|---------------|--------------|
| | | Total | Utilized | Not utilized | | Total | Utilized | Cull utilized | Not utilized |
| | <i>cubic feet</i> | | | | | | | | |
| Saw logs | 10,078.25 | 10,974.08 | 9,965.44 | 1,008.64 | 112.81 | 9,441.81 | 9,110.31 | 141.41 | 190.09 |
| Veneer logs | 262.30 | 292.97 | 261.28 | 31.69 | 1.02 | 255.92 | 255.91 | -16.88 | 16.89 |
| Composite panels | 1,199.08 | 1,410.60 | 1,180.36 | 230.24 | 18.72 | 1,190.94 | 1,048.72 | 121.21 | 21.01 |
| Pulpwood | 1,233.64 | 1,459.97 | 1,199.75 | 260.22 | 33.89 | 1,187.71 | 983.90 | 196.19 | 7.62 |
| Poles/pilings | — | — | — | — | — | — | — | — | — |
| Fuelwood | 528.24 | 590.28 | 514.67 | 75.61 | 13.57 | 481.28 | 441.05 | 40.23 | — |
| Total | 13,301.51 | 14,727.90 | 13,121.50 | 1,606.40 | 180.01 | 12,557.66 | 11,839.89 | 482.16 | 235.61 |

Numbers in rows and columns may not sum to totals due to rounding.

— = no sample for the cell.

Table A.13—Percent of overutilization and underutilization for hardwood growing stock by product for sawtimber, South Carolina, 2011

| Product | Overutilization | | Underutilization | | Saw-log portion | | |
|------------------|--|---|---|---|---|--|---|
| | Growing stock utilized/ total volume utilized | Nongrowing stock utilized/ total volume utilized | Growing stock utilized/ total growing-stock volume | Growing stock not utilized/ total growing-stock volume | Saw log utilized/ total saw-log volume | Cull utilized/ total saw-log volume | Saw log not utilized/ total saw-log volume |
| <i>percent</i> | | | | | | | |
| Saw logs | 98.88 | 1.12 | 90.81 | 9.19 | 96.49 | 1.50 | 2.01 |
| Veneer logs | 99.61 | 0.39 | 89.18 | 10.82 | 100.00 | -6.60 | 6.60 |
| Composite panels | 98.44 | 1.56 | 83.68 | 16.32 | 88.06 | 10.18 | 1.76 |
| Pulpwood | 97.25 | 2.75 | 82.18 | 17.82 | 82.84 | 16.52 | 0.64 |
| Poles/pilings | — | — | — | — | — | — | — |
| Fuelwood | 97.43 | 2.57 | 87.19 | 12.81 | 91.64 | 8.36 | — |
| All products | 98.65 | 1.35 | 89.09 | 10.91 | 94.28 | 3.84 | 1.88 |

— = no sample for the cell.

Table A.14—Volume of hardwood growing stock by product and utilization for poletimber, South Carolina, 2011

| Product | Total volume utilized | Growing stock | | | Nongrowing stock utilized |
|-------------------|-----------------------|---------------|----------|--------------|---------------------------|
| | | Total | Utilized | Not utilized | |
| <i>cubic feet</i> | | | | | |
| Saw logs | 331.64 | 336.57 | 322.03 | 14.54 | 9.61 |
| Veneer logs | — | — | — | — | — |
| Composite panels | 290.93 | 276.30 | 269.04 | 7.26 | 21.89 |
| Pulpwood | 1,426.37 | 1,378.19 | 1,309.06 | 69.13 | 117.31 |
| Poles/pilings | — | — | — | — | — |
| Fuelwood | 384.02 | 373.28 | 355.45 | 17.83 | 28.57 |
| Total | 2,432.96 | 2,364.34 | 2,255.58 | 108.76 | 177.38 |

Numbers in rows and columns may not sum to totals due to rounding.

— = no sample for the cell.

Table A.15—Percent of overutilization and underutilization for hardwood growing stock by product for poletimber, South Carolina, 2011

| Product | Overutilization | | Underutilization | |
|------------------|--|---|--|---|
| | Growing stock utilized/ total volume utilized | Nongrowing stock utilized/ total volume utilized | Growing stock utilized/total growing-stock volume | Growing stock not utilized/ total growing-stock volume |
| <i>percent</i> | | | | |
| Saw logs | 97.10 | 2.90 | 95.68 | 4.32 |
| Veneer logs | — | — | — | — |
| Composite panels | 92.48 | 7.52 | 97.37 | 2.63 |
| Pulpwood | 91.78 | 8.22 | 94.98 | 5.02 |
| Poles/pilings | — | — | — | — |
| Fuelwood | 92.56 | 7.44 | 95.22 | 4.78 |
| All products | 92.71 | 7.29 | 95.40 | 4.60 |

— = no sample for the cell.

Table A.16—Volume of hardwood cull by product and utilization, South Carolina, 2011

| Product | Total volume utilized | Nongrowing stock | | |
|-------------------|-----------------------|------------------|----------|-------------------------|
| | | Merchantable | | Unmerchantable utilized |
| | | Total | Utilized | Not utilized |
| <i>cubic feet</i> | | | | |
| Saw logs | — | — | — | — |
| Veneer logs | — | — | — | — |
| Composite panels | — | — | — | — |
| Pulpwood | 200.80 | 192.62 | 190.85 | 1.77 |
| Poles/pilings | — | — | — | — |
| Fuelwood | — | — | — | — |
| Total | 200.80 | 192.62 | 190.85 | 1.77 |

Numbers in rows and columns may not sum to totals due to rounding.

— = no sample for the cell.

Table A.17—Percent of overutilization and underutilization for hardwood cull by product, South Carolina, 2011

| Product | Overutilization | | Underutilization | |
|------------------|---|---|---|---|
| | Merchantable utilized/ total volume utilized | Unmerchantable utilized/ total volume utilized | Merchantable utilized/ total merchantable volume | Merchantable not utilized/ total merchantable volume |
| | <i>percent</i> | | | |
| Saw logs | — | — | — | — |
| Veneer logs | — | — | — | — |
| Composite panels | — | — | — | — |
| Pulpwood | 95.04 | 4.96 | 99.08 | 0.92 |
| Poles/pilings | — | — | — | — |
| Fuelwood | — | — | — | — |
| All products | 95.04 | 4.96 | 99.08 | 0.92 |

— = no sample for the cell.

Dooley, Kerry J.W.; Cooper, Jason A.; Bentley, James W. 2015. South Carolina harvest and utilization study, 2011. e-Resour. Bull. SRS-200. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 27 p.

In 2011, a harvest and utilization study was conducted on 80 operations throughout South Carolina. There were 1,974 total trees measured; 1,317 or 67 percent were softwood, while 657 or 33 percent were hardwood. Results from this study showed that 86 percent of the total softwood volume measured was utilized for a product, and 14 percent was left as logging residue. Seventy-seven percent of the total hardwood volume measured was utilized for a product, while 33 percent was left as logging residue.

Keywords: FIA, growing stock, logging residue, nongrowing stock, overutilization, product, removals, underutilization.



Grapple skidder heading out to retrieve felled trees. (photo by Angie Rowe, U.S. Forest Service)



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