

## *Growing Poles in Southern Pine Stands*

**E. David Dickens, Bryan C. McElvany, David J. Moorhead, and Mark Frye<sup>1</sup>**

### **INTRODUCTION**

Utility poles are used in the United States and around the world to run telephone, cable, and electrical lines from their sources to customers. Poles are available in a variety of materials ranging from wood, metal, concrete, or composites.

Pine poles in the southeastern United States generally come from well managed longleaf, slash, loblolly, and shortleaf stands. Pine poles will be the best trees in the stands with minimal or no visible defects or sweep. Trees that make pine poles have historically been the highest valued wood product (Figure 1) in the southeast. Pine pole values in the last 30 years (1976-2006, TM-S 2006) and the last 5 years (2001-2006) have been 463% and 920% greater than pulpwood, 175% and 230% greater than chip and saw, and 74% and 140% greater than sawtimber, respectively. For a forest landowner to maximize the value per acre of his/her stand, each tree should be sold for its highest value.

Pine poles can come from naturally regenerated stands and planted stands. Pole producing age can vary due to several factors: pole size (smaller pole specifications can be met at an earlier age), tree species, genetics, stocking, and site quality. Most stands begin producing poles in stands 30-years of age and older but pine poles in Georgia have been produced as early as age 25-years and 22-years for pilings (down to a 9" diameter at 4.5 feet above groundline or d.b.h.) with proper and timely thinnings.

### **POLE SPECIFICATIONS**

Pine trees that qualify as poles must meet minimum size (diameter and length) and defect standards. Table 1 lists general pole specifications (specifications may vary based on pole plant, region, and pole demand). Generally the larger the pole, the higher the value; therefore pine stands with larger poles will sell for a higher price than stands with smaller poles. Photos 1 through 8 illustrate pine stands managed for poles, examples of defects, and trees that may qualify as poles. Photos 9 and 10 show poles at a plant in Vidalia, Georgia.

A small portion of trees are cut for construction or "barn" poles measuring 10 to 30 feet long (finished length) with a 4" to a 5" top diameter (without bark, add 1" for with bark). Pilings, used for docks and other marine uses, range in finished length from 20 to 70 feet.

For a southern pine to make a pole it must have the following minimum visual specifications:

- (1) < 1" sweep for every 10 feet of stem (Photo 3 with sweep and Photos 7 and 8),
- (2) < 4 knots per linear foot and < 6" diameter of knots per linear foot as a general guide (refer to Table 2 for specifics of maximum knot size and numbers),
- (3) no branches in first 10 feet (due to stress points when buried),

- (4) no sharp angled branches (Photo 5) or a fork at less than 32 feet (Photo 4),  
 (5) no stem canker for at least 32 feet (or minimum pole or piling length, Photo 6). Stem taper, knot size, and number of knots per linear foot can affect pole class and therefore price/value.

### **SOUTHERN PINE STAND MANAGEMENT FOR POLES**

Growing high valued pine products, whether from naturally regenerated or planted stands, requires (1) a population of trees that have the characteristics needed for poles or sawtimber and (2) sound and timely forest management. Thinning at the proper time to a target basal area (desired number of trees per acre of an average size) is the most commonly used forest management tool for growing out the best trees to a final harvest. A thinning primary objective should be the removal of trees that have some defect or have inferior growth characteristics that will always keep them in the lowest price category; pulpwood. This will allow the best trees that have no defects and are the most dominant in the stand to grow at an accelerated pace into more valuable solid wood products after the thinning.

From a non-industrial private forest landowner's perspective, there are at least three ways to grow value in timber, across time. These are, in order of increasing importance; (1) real product price appreciation, (2) wood volume growth, and (3) individual tree stems moving to higher value product classes through growth and management; i.e., pulpwood—to--chip-n-saw—to—sawtimber—to poles. If we look at trees in a pine stand as inventory, we are generally best to liquidate the portion of inventory that will not grow significantly in value as soon as possible. The portion of inventory that does not grow appreciably in value are trees with defects. Proper and timely thinnings achieve this goal. Trees targeted for removal (liquidation) during the first thinning generally have defects such as crook, sweep, many/large branches, a fork below 17 feet, and/or a disease (stem cankers of fusiform or pitch canker). Other trees that should be included in a first thinning with the defective trees are those that occupy the lower portions of the overall canopy (suppressed or intermediate trees) that commonly do not respond positively to a thinning as the larger dominant and co-dominant trees would. Good quality defect-free crop trees that are generally larger stems, respond to a thinning as more of the site's resources become available to them (water, nutrients, and sunlight). These crop trees grow at a faster rate after a thinning due to less competition for the site's resources. Pine poles are generally not produced until after a second thinning.

Trees are sold by product classes (Table 3). Wood product classes are based on two major factors: defects and diameter classes (to a given length which is highly correlated to diameter). Defects generally determine whether a tree is pulpwood, the lowest valued wood. If a tree has no visible defects, then the diameter dictates what wood product the tree falls into.

From an economic standpoint, a forest landowner wants to grow as much of the highest valued wood as possible (i.e. hold the portion of inventory that will grow into the highest valued products). Pine poles have historically been the highest valued pine wood product in the southeast US (Table 3, TM-S 2006). Pine poles are currently over 10-fold the value of pulpwood (Table 3). Second to poles in value is sawtimber (ST) with a d.b.h. of 12.6 inches or greater with no defects and are relatively straight (some sawmills may take smaller diameter trees). Pine sawtimber trees are used to cut dimension lumber and is worth over 6-times the value of pine pulpwood (Table 3). . Pine chip-n-saw (CNS) trees have minimal or no visual defects, are relatively straight, and have dbh of 8.6 to 12.5 inches. Trees that qualify as CNS trees are used to make smaller dimension lumber (chip-n-saw mills will vary what dimension lumber they

manufacture and the diameter size limit as well) and is worth over 3.5 times the value of pine pulpwood (Table 3).

## CONCLUSION

If you are managing your pine to grow high valued products and you think you may have some trees that qualify as poles, then contact a professional forester, a pole buyer, your state forester, or county agent. The economic ramifications of not selling trees that qualify as poles can be large. If, for example, you have 20 trees per acre that qualify as poles and the average d.b.h. is 13" and total height is 80 feet then you have approximately 19 tons (7 cords, USDA-FS 1986) per acre of the highest valued pine product. Selling those 19 tons at a pole stumpage price versus a sawtimber price (Table 3) increases your revenue by approximately \$460 per acre. On a 200 acre tract, this would amount to a revenue increase of \$92,000.

## LITERATURE CITED:

- ANSI. 2002. American national Standards Institute - Standards for Wood Products: Specifications and Dimensions. ANSI O5.1-2002. Published by: Alliance for Telecommunicationsa Industry Solutions. 1200 G Street, NW Suite 500 Washington, DC 20005. 41 p.
- TM-S. 2006. Timber Mart South 4<sup>th</sup> Quarter 2006 Georgia pine stumpage prices. Daniel B. Warnell School of Forestry and Natural Resources. The University of Georgia. Athens, GA 30602-2152. 4 p.
- USDA-FS. 1986. U.S. Department of Agriculture Forest Service, Southern Region – Service Forester’s Handbook. Misc. Report R8-MR11. 1720 Peachtree Rd NW Atlanta, GA. 129 p.

## ABOUT THE AUTHORS

<sup>1</sup>Forest Productivity Associate Professor, Warnell School of Forestry and Natural Resources; Treutlen County Extension Coordinator, College of Agriculture and Environmental Sciences; Silviculture Professor, Warnell School of Forestry and Natural Resources; and Wayne County Extension Agent, College of Agriculture and Environmental Sciences

## CITATION

<sup>1</sup>Dickens, E.D., B.C. McElvany, D.J. Moorhead, and M. Frye. 2007. Growing poles in southern pine stands. Georgia Forest Productivity No. 010R-07. [www.bugwood.org/productivity](http://www.bugwood.org/productivity). 10 p.

Table 1. Southern pine general utility pole specifications (from Table 8 ANSI 05.1-2002 page 24).

| Total length<br>(with trim;<br>feet) | Typical pole diameters with bark |  | Minimum pole diameters with bark |                          |
|--------------------------------------|----------------------------------|--|----------------------------------|--------------------------|
|                                      | Final pole length<br>(feet)      | diameter at 6 feet<br>(inches) to a 7-8"<br>top* | diameter @ 6<br>feet (inches)    | top diameter<br>(inches) |
| 32                                   | 30                               | *10.2 – 14.6                                     | 7.5                              | 5.8                      |
| 37                                   | 35                               | 10.8 – 14.6                                      | 9.0                              | 5.8                      |
| 42                                   | 40                               | 11.5 – 14.6                                      | 10.1                             | 6.4                      |
| 47                                   | 45                               | 13.1 – 15.6                                      | 11.3                             | 7.0                      |
| 52                                   | 50                               | 14.0 – 15.9                                      | 13.4                             | 8.3                      |
| 57                                   | 55                               | 14.6 – 17.2                                      | 13.9                             | 8.3                      |
| 62                                   | 60                               | 15.6 – 19.1                                      | 14.4                             | 8.3                      |
|                                      |                                  | <b>to a 8-12" top**</b>                          |                                  |                          |
| 67                                   | 65                               | 16.7 - 21.5                                      | 14.8                             | 8.3                      |
| 72                                   | 70                               | 17.2 – 22.0                                      | 15.3                             | 8.3                      |
| 77                                   | 75                               | 17.7 – 22.6                                      | 15.6                             | 8.3                      |
| 82                                   | 80                               | 18.1 – 23.1                                      | 17.1                             | 9.0                      |
| 87                                   | 85                               | 18.6 – 23.7                                      | 17.4                             | 9.0                      |
| 92                                   | 90                               | 18.9 – 24.2                                      | 17.9                             | 9.0                      |
| 97                                   | 95                               | 19.4 – 24.7                                      | 18.2                             | 9.0                      |
| 102                                  | 100                              | 19.7 – 25.1                                      | 18.6                             | 9.0                      |

\*with bark for pole lengths from 30 through 60 feet to a 7" through 8" top (deduct 1" for without bark)

\*\*with bark for pole lengths from 65 through 100 feet to an 8" through 12" top with bark.

Table 2. Knot size limits (from Table 2 ANSI 05.1-2002, page 13)

| Length of pole (feet) | -----Maximum size permitted -----       |                 |  |
|-----------------------|---|-----------------|--|
|                       | ----- Diameter of any single knot ----- |                 |  |
| = 45                  | Classes H6 to 3                         | Classes 4 to 10 | All classes  |
| lower half of length  | 3 inches                                | 2 inches        | 1/3 of average circumference of the same 1-foot section or 8", which-ever is greater, not to exceed 12"      |
| upper half            | 5 inches                                | 4 inches        |  |
| = 50                  |   |                 |  |
| lower half of length  | 4 inches                                | 4 inches        | 1/3 of average circumference of the same 1-foot section or 10", which-ever is greater, but not to exceed 14" |
| upper half            | 6 inches                                | 6 inches        |  |

Table 3. Pine products and stumpage prices for Georgia (TM-S © 4<sup>th</sup> Qtr 2006 rounded to nearest \$)

| Product class (dbh, top minimum specs, form)                                     | Per ton price | Per cord price |
|--|---------------|----------------|
| Pulpwood (4.6 to 9.5" dbh) to a 3" top   | \$6           | \$16           |
| Chip-N-Saw (9.6 to 12.5" dbh, good form) to a 5" to 6" top                       | \$22          | \$60           |
| Sawtimber (>12.5" dbh, good form) to an 8" to 10" top                            | \$38          | \$107          |
| Poles (> 8" dbh to a 6" top diameter, with no visible defects to at least 32 ft) | \$62          | \$173          |

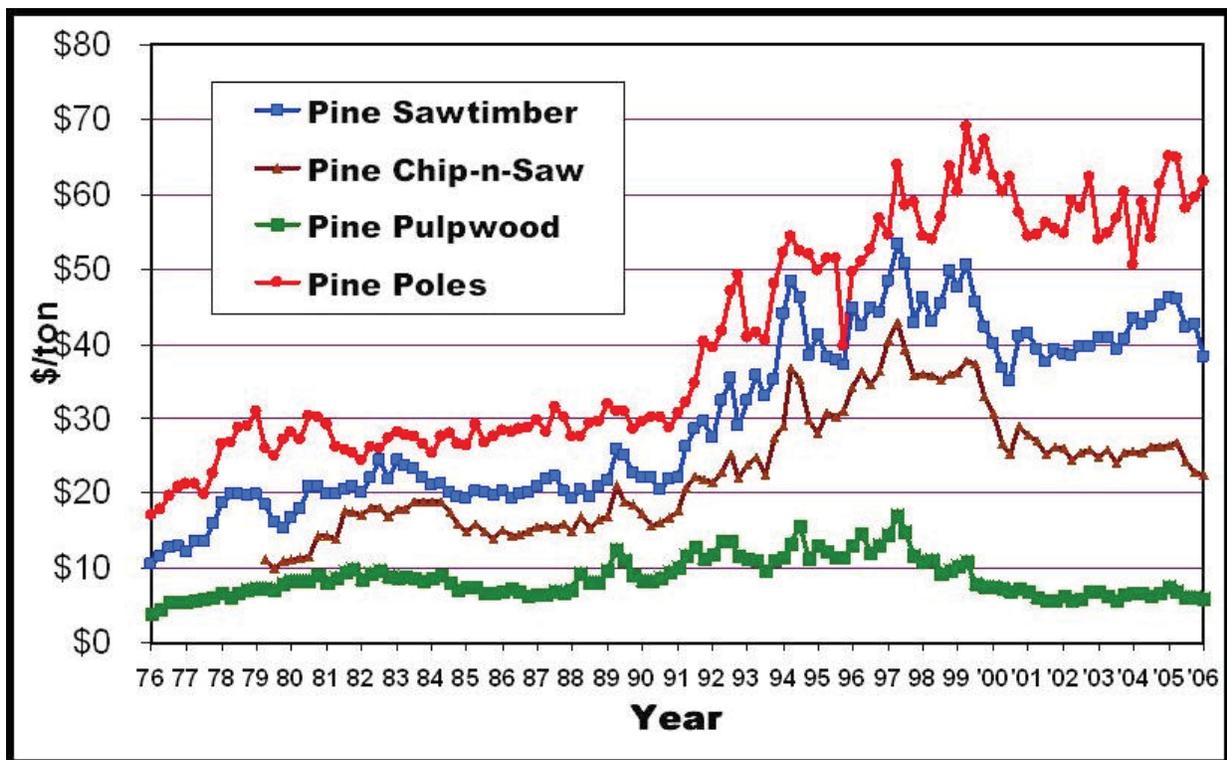


Figure 1. Georgia pine stumpage prices from 1976 through 2006.



Photo 1. Longleaf stand (38-years-old) on the Sand Hills State Forest in Chesterfield County, SC, thinned twice growing on excessively well drained low fertility deep sand. Stand has been producing pine straw and is anticipated to produce some poles and quality sawtimber.



Photo 2. A managed slash pine stand (approximately 30-years-old) in Treutlen County, GA. The stand has been thinned with the objective of growing high valued sawtimber and poles. Note the stem cankered tree in the foreground that would need to be cut above the canker to possibly produce a pole. Note also the lack of branches the first 15 to 20 feet due to stand age, species, and management.



Photos 3 and 4. Examples of excessive sweep and a fork defect (stem up to fork could be used as a pole).



Photos 5 and 6. Examples of steep branch angle and a stem canker that would make that part of the stem not usable for a pole (stem below the steep branch or canker may qualify as a pole if there is enough length and no other defects).



Photo 7. Looking up a pine stem for sweep (< 1" per 10 feet).



Photo 8. A potential pine pole with little sweep.



Photo 9. Pine poles at a plant in Vidalia, Georgia.



Photo 10. Pine poles at a plant in Vidalia, Georgia.

Warnell School of Forestry & Natural Resources  
Athens, Georgia 30602-2152

Phone: 706.542.6819 • fax: 706.542.5073

An Equal Opportunity/Affirmative Action Institution

In compliance with federal law, including the provisions of Title IX of the Education Amendments of 1972, Title VI of the Civil Rights Act of 1964, Sections 503 and 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act of 1990, the University of Georgia does not discriminate on the basis of race, sex, religion, color, national or ethnic origin, age, disability, or military service in its administration of educational policies, programs, or activities; its admissions policies; scholarship and loan programs; athletic or other University-administered programs; or employment. In addition, the University does not discriminate on the basis of sexual orientation consistent with the University non-discrimination policy. Inquiries or complaints should be directed to the director of the Equal Opportunity Office, Peabody Hall, 290 South Jackson Street, University of Georgia, Athens, GA 30602 Telephone 706-542-7912 (V/TDD), Fax 706-542-2822.