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Profits from Timber Production

*Charles L. Stayton and James W. Chandler**

Most timberland owners sell their timber because they (1) need the money, (2) have received an offer, (3) want to convert timberland to cropland or pasture or (4) have been told a timber-thinning cut is needed to improve their stand.

The correct way to market trees is by bringing them to the market place where the highest bidder gets the sale if you choose to sell at the offered price. Marketing timber requires that you know what products you have for sale, the volume of each product, current and projected product values and product volume changes from expected timber growth. Impulse timber selling, without marketing data, usually results in economic losses. But, if the above marketing information is available, even sudden, pressing monetary needs or seemingly attractive offers can quickly be evaluated professionally. You may discover that a bank loan would be more economical for meeting unexpected expenses than cutting your timber. (The timber may be growing at an annual rate of return that is higher than the interest rate on the bank note.) Timberland clearing for agricultural purposes may not be the most economical choice if a higher profit timber stand becomes a marginal agricultural operation.

Marketing Products

Marketing timber requires knowledge of the

products for sale. These can be either hardwoods or softwoods. Softwoods are used primarily for construction-framing lumber and plywood, pulpwood, posts, poles and piling. Hardwoods are used mostly for railroad ties, lumber, decorative veneers and pulpwood. Hardwoods are rarely used for home construction framing. Rather, they are used for interior paneling, cabinets, furniture and other decorative purposes.

Industry demand for softwoods is mostly for southern yellow pines, primarily loblolly pine, slash pine, shortleaf pine and longleaf pine. The value of these pines is directly related to size and quality. Small trees, 4 to 10 inches in diameter at breast height (DBH), are used for fence posts and pulpwood since the trees are debarked and chipped to make paper and cardboard products. Pulpwood is purchased on volume (cords) or weight (tons) to determine quantity and price. Small diameter trees, 6 to 12 inches DBH, also are used to produce chips and construction lumber (chip-n-saw timber). These small logs are debarked and the outer core is used to make chips for the paper industry while producing a square cant out of the inner core which is sawed into lumber. Such trees are also purchased by the cord or ton but are worth more money to the timberland owner.

Trees that are 10 inches and larger at DBH are considered sawlogs and peeler logs and are purchased by volume (thousand board feet) or weight (tons) to determine quantity. Sawlogs are used to produce lumber while peeler logs are used to make veneer which is glued together to manufacture plywood. Sawlog and peeler log timber is valued by size and quality. Larger trees with fewer limbs and other defects, such as scars, crook and

*Extension wood products specialist and Extension forester, The Texas A&M University System.

sweep and grooves, produce higher grade lumber and plywood, which means the buyer can pay a higher price to the landowner.

Timber quality and size affect stumpage prices. Peeler logs require a DBH of at least 12 inches; 15 inches and up are preferred. Sawlogs are more valuable than chip-n-saw timber or pulpwood but less valuable than peeler logs. Very few natural timber stands have only one product but usually contain a mixture of pulpwood, sawlogs and peeler logs. Thus, it is important to know the volume of each product by size (diameter) classes to maximize economic gains.

Hardwood value is directly related to size, species and quality. Pulpwood, sawlog and peeler log sized trees are approximately the same in DBH as are the softwoods. There is no chip-n-saw timber classification for hardwood. Thus, all pulpwood is used by the paper industry. Low-quality hardwood sawlogs are used mostly for railroad ties, lumber for pallet manufacturing and utility grade lumber for farm and ranch structures. Higher grade sawlogs are used to produce dimension lumber for the furniture industry with oak, yellow poplar, black walnut, black cherry, ash and pecan in high demand.

Highest quality hardwood trees are used to produce veneer for furniture, paneling and cabinet industries with oak, ash, black walnut, black cherry and pecan in high demand. Due to high consumer demand, black walnut, black cherry, white oak and ash trees of high quality are worth more to the landowner and should be classified separately, if enough volume is present, to obtain maximum value. To maximize economic gains on hardwood timber sales, consult a professional forester with knowledge in hardwood sawlog and veneer log grading and how these grades relate to the highest valued end-use.

Quantity Products

Marketing timber not only requires knowing the softwood and hardwood products you have for sale but also the quantity of each, classified by DBH. This is important not only for assessing current value but for future value based on expected timber growth and product stumpage price changes. A professional forester can determine the quantities of products for sale.

To determine quantities the professional forester conducts a timber cruise which is a statistical sampling of the total timberland tract, consisting of a predetermined number of randomly selected plots (usually $\frac{1}{10}$ to $\frac{1}{5}$ acre in size) on which every commercial tree is measured (DBH and height) and

recorded under the end-use product for which it qualifies. (Heights for sawlogs and peeler log trees are recorded as the number of commercial 16-foot logs that can be cut from the tree. Heights for pulpwood, including chip-n-saw material, and poles and piling are recorded as total useable tree height in feet.) The number of plots used depends on timber size and density variation of the timberland tract and the expected accuracy. The plots are used to calculate the average quantity of products per acre which is multiplied by the total acreage to calculate total quantities of products for sale.

The professional forester always records quantities of available products by volume. The volume measurement for sawlogs and peeler logs is the board foot and is recorded by thousands of board feet. The volume measurement for pulpwood is the cord. Many timber buyers use weight rather than volume when purchasing timber. Thus, the timberland owner must know how many tons it takes to make a thousand board feet or a cord of wood to be sure he is getting a fair price. The professional forester can also assist with such conversions.

Board Feet Volume

One board foot is a piece of wood 1 inch thick, 12 inches wide and 1 foot long (1" × 12" × 1'). The task of the forester is to estimate how many board feet are in each sawlog or peeler log tree he measures on the sample plots during the timber cruise. This is a simple task because he has volume tables that give board feet in a tree based on its DBH and number of commercial 16-foot logs. These volume tables were developed using log rules which estimate the number of board feet in a log before it is sawed into lumber, taking into account volume lost due to saw kerf, taper and bark. There are three log rules — the Doyle, Scribner and International $\frac{1}{4}$ inch. The Doyle rule is used almost exclusively for buying and selling timber in the South.

The timber cruise provides the forester with data needed to calculate sawlog and peeler log board foot volumes for a timber tract. He records tree data as shown in table 1. This timber tally is then used to group trees by DBH and number of 16-foot logs to calculate total volume. For example, in table 1 there are 10 trees with 10-inch DBH and one 16-foot log. This size tree has a volume of 14 board feet as given by the Doyle scale volume table using a form class of 78. (Form class is the percentage ratio between the diameter, inside bark, at the top of the first 16-foot log and the diameter outside bark at DBH. For example, a tree with a first-log

scaling diameter of 16 inches and a DBH of 20 inches has a form class of $(16 \div 20 \times 100)$ 80 percent. The higher the form class, the more volume per tree with the same DBH due to less stem taper. An average form class is determined for each timber tract.)

Thus, the total volume of the 10 trees in table 2, with 10-inch DBH and one 16-foot log is $10 \times 14 = 140$ board feet. Thus, the 10 tallied trees in table 2, in this size class, have a total volume of $15 \times 17 = 255$ board feet. In this manner, the forester calculates the total volume of the tallied trees shown in table 1. The total tree volume for the 25 $\frac{1}{5}$ -acre sample plots in table 2 is 28,000 board feet. Twenty-five $\frac{1}{5}$ -acre sample plots give a total of 5 acres in which all commercial trees were measured by a forester. Thus, the average tree volume per acre is 28,000 board feet divided by 5 acres, which equals 5,600 board feet per acre. If the 25 $\frac{1}{5}$ -acre sample plots represent a 20 percent cruise of a 125-acre timber tract, total volume is 5,600 board feet per acre times 125 acres, which equals 700,000 board feet.

Knowing he has 700,000 board feet of sawlogs and peeler logs on his 125 acres, the landowner can quickly assess the volume of peeler logs from table 1, because trees have been grouped by DBH classes. Thus, if local companies pay higher prices for peeler logs than sawlogs, the difference can be evaluated quickly.

Table 1. Example timber cruise tally sheet for sawlogs and peeler logs representing measured trees on 25 $\frac{1}{5}$ -acre sample plots.

DBH	Number of 16-foot logs						
	1	1½	2	2½	3	3¼	4
10	10	15					
12		10	25				
14		5	50	5			
16			12	5	5		
18				10	5		
20			5	20	5		
22							
24				5	5		
26					5		

To determine the price per thousand board feet divide the offered amount by 700. If you don't know the current value per thousand board feet of sawlogs, call your county Extension agent, state forester or consulting forester to obtain this amount and compare it to the offered price. Current prices obtained from foresters usually represent the average value. Thus, your timber could be worth more or less depending on tree quality and size, tract location, hauling distance to the mill, difficulty of terrain for logging and other factors.

Cord Volume

The forester who is cruising your timber tract must also estimate how many pulpwood cords are available. A standard cord is a stack of wood containing 128 cubic feet. Dimensions of a standard cord usually are 4 feet wide, 4 feet high and 8 feet long but can be any dimensions that give 128 cubic feet. Volume tables are available that give cubic feet volume per tree based on DBH and merchantable height. The forester tallies all the pulpwood trees on each sample plot in the same manner used for estimating sawlogs. He should make a notation on the tally sheet to separate pulpwood cords for the paper mill from pulpwood cords for a chip-n-saw mill, because the values are extremely different in many areas of the South.

Weight Measurements

Weight instead of volume is often used to purchase sawlogs, peeler logs and pulpwood. To receive a fair value the timberland owner should know conversion factors. Weight-to-volume relationships, tons per thousand board feet or cords vary by area, time of the year and timber size and species. Most mills that purchase timber by weight use average conversion factors for a particular tree species.

Pulpwood is purchased on a green-weight-per-cord basis. Weights per cords vary from area to area because of wood density and moisture content differences. Southern yellow pine groups show the greatest differences. Loblolly-shortleaf pine groups range from 2.3 to 2.6 tons per cord, and longleaf-slash pine groups have an average value of around 2.8 tons per cord. Check with your county Extension agent, state forester or consulting forester to obtain conversion factors for your area. For example, if a green weight cord weighs 2.6 tons and pulpwood is selling for \$14 per cord, calculate price per ton by dividing \$14 per cord by 2.6 tons per cord which equals \$5.38 per green ton.

Sawlogs and peeler logs are purchased on a green-weight-per-thousand-board-feet basis. Weights per thousand board feet vary by area and species due to specific gravity and moisture content differences. The conversion factors used by industry are based on the Doyle Log Rule. Average conversion factors for loblolly and shortleaf pine are 8.9 tons per thousand board feet and 12 tons per thousand board feet for longleaf pine and slash pine. Since yields (thousand board feet per ton) vary with log diameter, industry uses conversion factors for DBH groups usually grouped 10 to 12

inches, 14 to 16 inches and 18 inches and up. However, the above average values can be used to quickly see if an offer is fair. For example, if you have 700,000 board feet of loblolly and shortleaf pine for sale, the average conversion factor for these species is 8.9 tons per thousand board feet. If the current price for pine timber is \$200 per thousand board feet, you can quickly convert to a price based on weight by dividing \$200 per thousand board feet by 8.9 per thousand board feet, which gives \$22.47 per ton.

Selling Timber Products

The importance of conducting a timber cruise is obvious. It provides necessary data to make sound economic decisions about selling timber and whether to sell part or all of it. The mechanics of selling timber are equally important. There are also many problems. For example, if you sell all your timber and know the amount from timber cruise data, how do you put timber up for bid, develop a written sales contract, determine if the logging operation meets contract agreements or understand income tax benefits? If you sell only a portion of your timber, because you want to maintain a sustained yield, how do you know which trees to sell? Professional assistance is available from a variety of sources, including your county Extension agents, state forest service, Soil Conservation Service, Agricultural Stabilization and Conservation Service, forest products industries and state forestry associations to help make decisions, but a professional, consulting forester working for you can maximize the economic gains. Contact several consulting foresters and visit other landowners who have used their services. Remember, the consulting forester is working toward achieving your goals even if that includes complete timber removal. However, the forester is also obligated to inform you of the economic potential to properly manage timber for sustained yields. Then you can determine your long-term objectives.

Consulting foresters are familiar with industry product specifications. They can mark trees for sale to improve a timber stand and still meet industry specifications. They also will tally the volume of the marked timber by DBH classes and send sale notifications to buyers. Buyers, if interested, will submit sealed bids which are opened in their presence by the consulting forester and you, if you choose to be present. You may select any offered bid or reject them all. Sometimes the highest bid may not be the best choice if the bidder has a reputation for poor logging or badly damaging

land. If you accept a bid, the offered money is paid before any timber is cut. This is called a lump-sum payment and is usually the most economical way to sell timber. A good consulting forester usually insists that this method be used if the volume is sufficient to attract several bidders.

If you accept a bid, the consulting forester will develop a written sales contract agreeable to buyer and seller. It will cover many items of importance to both parties such as guaranteed entrance and exit to the timber for the buyer; maximum time allowed for the buyer to remove the timber; penalties against the buyer if he cuts unmarked timber or destroys fences or landscape with his equipment; and many other limitations or agreements. He also makes periodic inspections to be sure the buyer is meeting contract agreements.

The consulting forester usually charges a fee based on a percentage of the gross timber sale. The percentage depends on what he agrees to do. For example, if the timber tract is to be clearcut, there is no need to mark and tally the timber because it will be sold using the timber cruise volume data. Therefore, the consultant would probably charge a smaller percentage for this type sale, or he may just charge a daily rate for his time.

If the timber tract is small, less than 75,000 board feet or just a few hundred cords of pulpwood, it may be difficult to market the timber using the lump-sum payment method. You may have to accept a payment for each truckload hauled from the tract. Unless you are clearcutting, the timber should be marked and tallied to determine the volume to be removed. With this payment method the buyer may or may not remove all the marked trees, often leaving low-quality timber that needs to be removed. It is also difficult to maintain a count of how many truckloads are actually removed. However, lump-sum payment doesn't always guarantee complete removal of all marked timber either.

Continuing Management

If sustained timber management for maximum economic gains is your goal, the timber marketing program should compliment this. Timber removal is always within the framework of sustained yields controlled by a long-range forest management plan developed for you by a professional forester.

The economic future for timber products is sound. Projections are for the timber supply to fall

short of demand which means increasing stumpage prices. For 200 years of recorded market values, timber has been at least 2 percent above the annual inflation rate. This has been achieved during times of good timber supply. With the supply decreasing rapidly, investment returns will show

annual rates of 14 percent and more over the next timber growth cycle in the South. Probably most important is that the South will be expected to supply the majority of timber products for the entire country.



Figure 1. Timber value relates directly to tree size. Small timber is used for pulpwood and large logs are used for sawlogs and veneer logs.



Figure 2. Southern yellow pine timber is used primarily for home construction framing materials.

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