

PINE TIMBER VOLUME - TO - WEIGHT CONVERSIONS

Mississippi State
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Can you give approximate answers to the following questions? If not, read on!

How many tons does 1 MBF Pine Sawtimber weigh? 1 cord of chip-n-saw? 1 cord of pine pulpwood? How can a bid per ton be compared to a bid per MBF? Per ton versus per cord?

Measurement standards for pine timber are changing. Most high-production pine sawmills have converted to weight scaling and purchase timber by the ton (2,000 pounds). Mills producing chips, pulp, or paper are almost exclusively measuring timber by weight. But many high-grade pine lumber and specialty mills still measure volume using the Doyle Log Rule and pay per MBF (1000 board feet). A local woodyard may still stick-scale pulpwood and pay by the cord (128 cubic feet).

The diversity of measurements within the forest industry is confusing to timber buyers as well as landowners. State law requires Mississippi mills to purchase timber in the same unit they measure it at the mill. Mills that weigh logs must purchase by weight. Mills that scale timber volume must pay using the same unit of volume.

If you make a pay-as-cut timber sale (selling on a per unit basis) you will likely receive bids based on different units of measurement. Almost all landowners will eventually make a pay-as-cut timber sale, even those that prefer selling lump-sum. Thinning, salvage, and small acreage sales usually can be marketed easier when sold pay-as-cut. Income tax rules on capital gains also require certain landowners to sell timber pay-as-cut. This publication will help you know how to

compare a bid in \$/cord or \$/MBF to another bid in \$/ton.

The volume-to-ton conversions presented are “ballpark” figures close enough for most landowners’ needs. The conversions were developed after years of data collection in southern Mississippi and southeast Louisiana by James McCreight, consulting forester. Procurement experts in the forest industry

checked the numbers and agreed they are close to theirs. The conversions presented will be useful statewide for loblolly, shortleaf, longleaf, and slash pine. Do not use these conversions for spruce pine or for damaged and dead timber.

You should use the conversions only as estimates and guidelines. Wood characteristics, like moisture content and specific gravity, vary from tree to tree, making the exact volume-to-ton conversion for your timber different.

VOLUME-TO-TON CONVERSIONS

For weight conversion you can divide pine timber into three product types: shortwood pulpwood (8 feet and less in length), longwood pulpwood (more than 8 feet) and chip-n-saw, and pine sawtimber.

Shortwood. A 1983 Mississippi law set a standard weight of 2.6 tons (5,200 pounds) per cord for shortwood pine pulpwood. But today this type of product is getting rare. Some mills will not accept shortwood pulpwood because it produces inferior quality chips.

Longwood. Timber delivered tree length (longwood) is exempt from the standard weight for shortwood.

Longwood pulpwood and chip-n-saw are common prod-

ucts delivered tree-length. Pines with diameters (at breast height) ranging from 4 up to 22 inches can qualify for pulpwood. Chip-n-saw is a timber product that yields 2x4s and chips. Straight, clear stems with diameters from 8 to 14 inches can qualify for chip-n-saw. The weight of a cord of longwood varies by species. Loblolly and shortleaf pines have the same weight as shortwood, 2.6 tons per cord. Longleaf and slash pines have a higher specific gravity and are therefore 6 % heavier on average. Their weight is 2.775 tons per cord.

Sawtimber. The Doyle Log Rule commonly is used to estimate the volume of lumber in standing trees. Doyle was the only legal measure in Mississippi until 1996 even though it is not accurate for estimating lumber volume, especially for relatively small diameter trees. The Doyle Rule underestimates volume in small diameter trees (10 to 16 inches) and overestimates volume in very large trees (30+ inches). There also tends to be a higher percentage of waste when lumber is produced from small diameter trees. To compensate for waste and the Doyle log rule's inaccuracies, volume-to-ton conversions are presented by 2-inch diameter classes. Determining the average tree size is critical in getting an accurate conversion from volume-to-tons (Figure 1). Weight can vary from a high of 12.70 tons/MBF for 10-inch diameter timber down to 4.81 tons/MBF for 30-inch timber. Diameter used here is the average diameter at breast height (dbh) for the timber stand.

USE OF CONVERSIONS

Converting pine timber volume to tons can be useful for tax recordkeeping, growth monitoring, and marketing. You usually take inventories of standing timber first in units of volume (cords and MBF). Volume tables, not weight tables, are readily available for standing timber. If you need the weight of pine timber, you can change the inventory to tons. Multiply volume by the appropriate tons/volume conversion as shown in Example 1.

To help monitor a logging operation, you can change the value of 1298 tons in Example 1 to truckloads of products.

Divide the weight by 25 tons (average payload for a loaded truck weighing 80,000 pounds total) to estimate the number of truckloads of pine timber to be harvested. Example: $1298 \text{ tons} / 25 \text{ tons} = 52$ truckloads of products. Conversion by product would result in 34 truckloads of sawtimber, 5 truckloads of chip-n-saw, and 12.5 (about 13) truckloads of pulpwood.

You can use conversions to change a bid to familiar units. Most landowners are more comfortable knowing the \$/cord or \$/MBF bid price. You can estimate these from a \$/ton bid by multiplying the bid by tons/volume, as in Example 2. Look closely at the effect tree diameter has on the equivalent price per MBF, Doyle Log Rule. Selling sawtimber by the ton is tricky. The moral here is large diameter timber should receive more per ton than small diameter timber. You can also estimate a \$/ton bid price by dividing the \$/cord or \$/MBF bid by the tons/volume conversion, as in Example 3.

When selling timber on a pay-as-cut basis, you can use conversions to compare two different bids, one based on volume and the other tons. Example 4 shows this. Before deciding which bid to take, find out if the product standards at competing mills are comparable. Some mills may pay a lower \$/ton price but harvest more tons per acre, resulting in more dollars to the timber owner.

SUMMARY

As a timber owner, you can benefit from knowing how to convert from volume to tons. Conversions let you maintain timber inventories using familiar units. They also help you compare timber bids that differ in unit of measure.

Conversions are different for shortwood, longwood, and sawtimber. Shortwood pulpwood conversion is set by law. Longwood pulpwood and chip-n-saw conversion varies by species. Longleaf and slash are 6% heavier than loblolly and shortleaf pine. Tree size affects the amount of waste from lumber production as well as the accuracy of the Doyle Log Rule that estimates sawtimber volume. Therefore, sawtimber volume-to-ton conversion is most accurate when you know the average tree diameter.

EXAMPLE 1. An inventory was taken of a loblolly pine stand with the sawtimber averaging 16 inches dbh. The volume estimate was 100 MBF Doyle pine sawtimber, 50 cords chip-n-saw, and 120 cords of pulpwood. How many tons does this pine timber weigh?

Step 1. Find appropriate conversions in Table 1.

Sawtimber	16 inches dbh	8.56 tons/MBF
Chip-N-Saw	Loblolly	2.6 tons/cord
Pulpwood	Loblolly	2.6 tons/cord

Step 2. Convert to tons.

Sawtimber	100 MBF Doyle X 8.56 tons/MBF =	856 tons
Chip-N-Saw	50 cords X 2.6 tons/cord =	130 tons
Pulpwood	120 cords X 2.6 tons/cord =	312 tons
Total Weight		1298 tons

EXAMPLE 2. A landowner is offered \$40/ton for pine sawtimber in three different stands. The first stand averages 10 inches dbh, the second averages 20 inches, and the third averages 30 inches. What are the equivalent \$/MBF bids for these stands?

Step 1. Find the appropriate conversion in Table 1.

Sawtimber	10 inches dbh	12.70 tons/MBF
	20 inches dbh	6.64 tons/MBF
	30 inches dbh	4.81 tons/MBF

Step 2. Compare bids on a \$/MBF basis.

Stand 1	\$40/ton X 12.70 tons/MBF =	\$508.00/MBF
Stand 2	\$40/ton X 6.64 tons/MBF =	\$265.60/MBF
Stand 3	\$40/ton X 4.81 tons/MBF =	\$192.40/MBF

EXAMPLE 3. A timber buyer offers a landowner \$500 per MBF for longleaf sawtimber averaging 12 inches dbh and \$40/cord for pulpwood. What are the equivalent \$/ton bids?

Step 1. Find the appropriate conversion in Table 1.

Sawtimber	12 inches dbh	11.15 tons/MBF
Pulpwood	Longleaf	2.775 tons/cord

Step 2. Convert bids to \$ per ton.

Sawtimber =	$\frac{\$/\text{MBF Bid}}{\text{Conversion}} = \frac{\$500/\text{MBF}}{11.15 \text{ tons/MBF}} =$	\$44.84/ton
Pulpwood =	$\frac{\$/\text{cord Bid}}{\text{Conversion}} = \frac{\$40/\text{cord}}{2.775 \text{ tons/cord}} =$	\$14.41/ton

EXAMPLE 4. A landowner receives two bids for pine sawtimber averaging 14 inches dbh. The first bid was \$40/ton and the second \$450/MBF. Which is the higher bid?

Step 1. Find the appropriate conversion in Table 1.

Sawtimber	14 inches dbh	9.77 tons/MBF
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Step 2. Compare bids on a \$/ton basis.

Bid 1 =		\$40.00/ton
Bid 2		
\$Bid/ton =	$\frac{\$/\text{Bid/MBF}}{\text{Conversion}} = \frac{\$450/\text{MBF}}{9.77 \text{ tons/MBF}} =$	\$46.06/ton

The second bid is higher by \$6.06/ton.

Table 1. Volume-to-ton conversions for various pine products in Mississippi.
For use as estimates and guidelines only.

Pine Product ¹	Average DBH ²	Tons Per Unit Volume Conversion ³
Shortwood Pulpwood		2.6 tons per cord
Longwood Pulpwood and Chip-N-Saw		2.6 tons per cord for Loblolly and Shortleaf 2.775 tons per cord for Longleaf and Slash
Sawtimber	10	12.70 tons per MBF
	12	11.15
	14	9.77
	16	8.56
	18	7.52
	20	6.64
	22	5.94
	24	5.40
	26	5.03
	28	4.84
	30	4.81

1 Shortwood pulpwood is defined as any timber product delivered in short lengths (8 feet or shorter) for the manufacture of pulp and pulp products.

Longwood pulpwood (more than 8 feet long) and chip-n-saw are typically delivered tree-length to the mill.

Chip-n-saw is a timber product that yields 2x4s and chips.

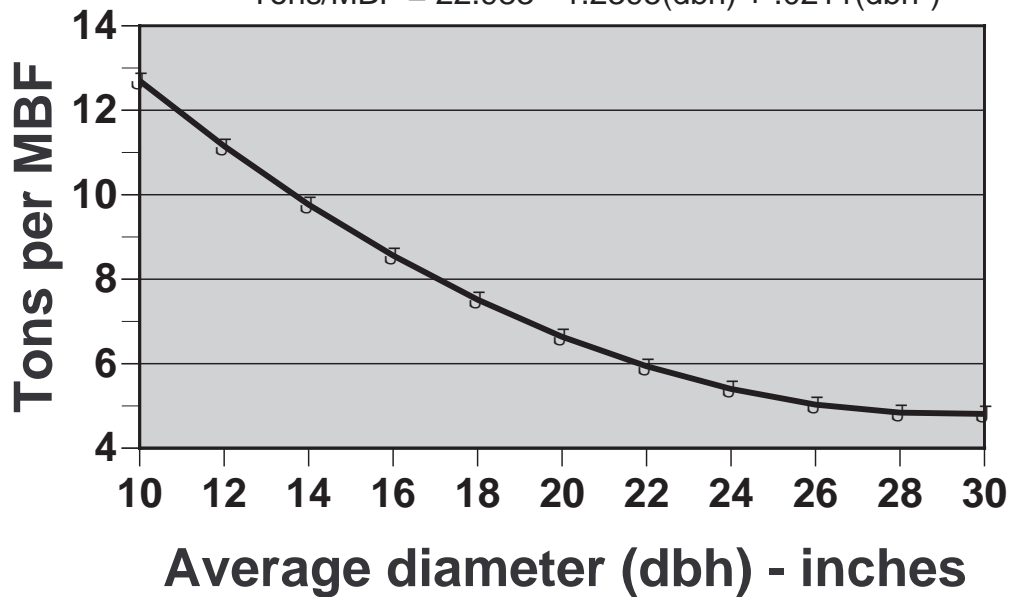
Sawtimber is a log large enough to saw into lumber, usually at least 16 feet long.

2 Average DBH – average diameter at breast height in inches

3 1 ton = 2,000 pounds; 1 cord = 128 cubic feet stacked wood; 1 MBF = 1000 board feet, Doyle Log Scale.

Figure 1. The influence stem diameter (dbh) has on weight of 1000 board feet (MBF) pine sawtimber.

The relationship equation ($R^2 = .994$) is:
$$\text{Tons/MBF} = 22.983 - 1.2395(\text{dbh}) + .0211(\text{dbh}^2)$$



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