

FORESTRY FACTS



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What's A Forest Tree Worth? Present Value, Future Value, and Rate Earned

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Have you ever wondered what a forest tree is worth? Have you ever thought about what a tree might be worth in the future? Have you ever considered a tree as an investment and wondered if it was earning a satisfactory rate of return?

A "Rule of Thumb" table (Forestry Facts No. 38, September, 1988) was prepared to help answer these questions; however, it has limitations. That table was based on a number of simplifying assumptions: The number of 16-foot logs (and hence volume) were fixed for each tree diameter (DBH), stumpage (standing tree) prices were assumed to remain the same in the future as they are today, and DBH growth rates were fixed at 2 inches every 10 years.

In this Fact Sheet, a set of charts are presented that eliminate these restrictive assumptions when estimating present and future tree values, and the expected rate of return. The first chart, (1. Determining Tree Value - page 4), contains two separate graphs; the top one is for estimating tree volume (using DBH and No. of logs), and the bottom graph is for estimating tree value (using tree volume

and stumpage price). Chart 1 can first be used to estimate a tree's current value then, after making a few decisions about expected future conditions, the chart can be used a second time to estimate the tree's future value.

The second chart, (2. Determining Rate Earned - page 5), also contains two separate graphs; the top one is for estimating the ratio of future value to present value (future value of the tree divided by the value of the tree now), and the bottom graph is for estimating the rate earned (using the future value/present value ratio and the expected time to reach the future conditions). Instructions for using these charts are discussed in the following sections.

However, before proceeding a **PRECAUTION** is needed. The rates earned apply to an individual tree and therefore may not apply to your entire timber stand. The rate earned for a timber stand can only be estimated by measuring a number of sample trees, and then calculating an average rate. A single tree may have high potential, but the stand may collectively earn a rate of return much different.

PART A. USING THE CHARTS TO DETERMINE CURRENT TREE VALUE:

Step 1. Use the top half of Chart 1 – Determining Tree Value. Find the tree's DBH along the vertical axis.

Step 2. From the DBH, draw a straight line across the chart until it hits the curve for the appropriate number of 16-foot logs in the tree.

Step 3. Drop the line straight downward from this point to the bottom half of the chart, until it hits the line for the appropriate stumpage price (\$ per MBF).

Step 4. Extend the line straight across the chart from this point (to the right) until it hits the vertical axis. Read the tree value (\$/tree) directly.

PART B. USING THE CHARTS TO DETERMINE FUTURE TREE VALUE:

Step 1. Choose (or estimate) appropriate future values for: DBH, No. of logs, and Stumpage price.

Step 2. Repeat Steps 1-4 in Part A with these new values to estimate the tree's future value.

PART C. USING THE CHARTS TO DETERMINE THE RATE EARNED:

Step 1. Use the top half of Chart 2 – Determining Rate Earned. Find the tree's current value (obtained in Part A) along the vertical axis.

Step 2. From the current tree value, draw a straight line across the chart until it hits the curve for the appropriate future tree value (obtained in Part B).

Step 3. Drop the line straight downward from this point to the bottom half of the chart, until it hits the line for the appropriate number of years in the growth period.

Step 4. Extend the line straight across the chart from this point (to the right) until it hits the vertical axis. Read the rate earned (percent) directly.

AN EXAMPLE

Suppose you are interested in the present value, future value, and expected rate earned for a 15-inch (DBH) red oak tree that has a merchantable height of 2 16-foot sawlogs. In this example we'll assume that the appropriate stumpage price is \$150/MBF (per 1000 board feet) at the present time. Using Chart 1, and the instructions from Part A we can combine this information to estimate the tree's present value at \$20. This graphical solution is depicted by line A in the charts on page 6.

Now let's assume that the tree will grow to 20 inches DBH in 20 years what will be the future value? Let's further assume that the merchantable height will stay the same (2 logs), but that the future stumpage price will rise to \$200/MBF because we expect the tree's quality to improve from Grade 2 to Grade 1. One could also assume a price rise due to increased market demand or a reduction in red oak supplies (a real price increase over time), if such changes are expected. We can now follow the instructions in Part B and use Chart 1 again to estimate the tree's future value. This was done with line B in the charts on page 6 resulting in \$52.

Now we might be curious as to what rate of return would be earned by our red oak if these assumptions do hold true. By following Part C of the instructions and using our estimated present and future values along with Chart 2 we find an expected rate of return of 4.8 percent. This solution is depicted by line C in the charts on page 6 (note that a growth period of 20 years was used).

"FINE-TUNING" THE CHARTS

If you have trouble reading the charts accurately, you can "solve" Chart 1 and the top half of Chart 2 fairly easily with your calculator. For instance, if we return to the previous example, we can use a Scribner Tree Volume Table to find that a 15-inch, 2-log tree contains 137 board feet - a 20-inch, 2-log tree has 262 board feet. When these volumes are multiplied by the appropriate stumpage prices (\$150/MBF and \$200/MBF) we obtain a present value of \$20.55 and a future value of \$52.40.

When we divide future value by present value ($\$52.40/\20.55) we get a ratio of 2.55. If we then find this ratio along the horizontal axis in the lower half of Chart 2 and draw a vertical line upward to the "20-year" curve and then over to the right-hand side we will again find the rate earned of 4.8 percent.

A FINAL WORD

The rate of return is useful as a guideline for deciding whether to harvest a tree or to let it grow. When the expected rate of return is high further growth may be appropriate - when the expected rate is low a harvest may be wise. However, other factors, such as silvicultural considerations and your management goals, should also be considered when making a decision. Remember, before harvesting any of your valuable timber **CONSULT WITH YOUR FORESTER FIRST!**

CHART 1....Determining Tree Value

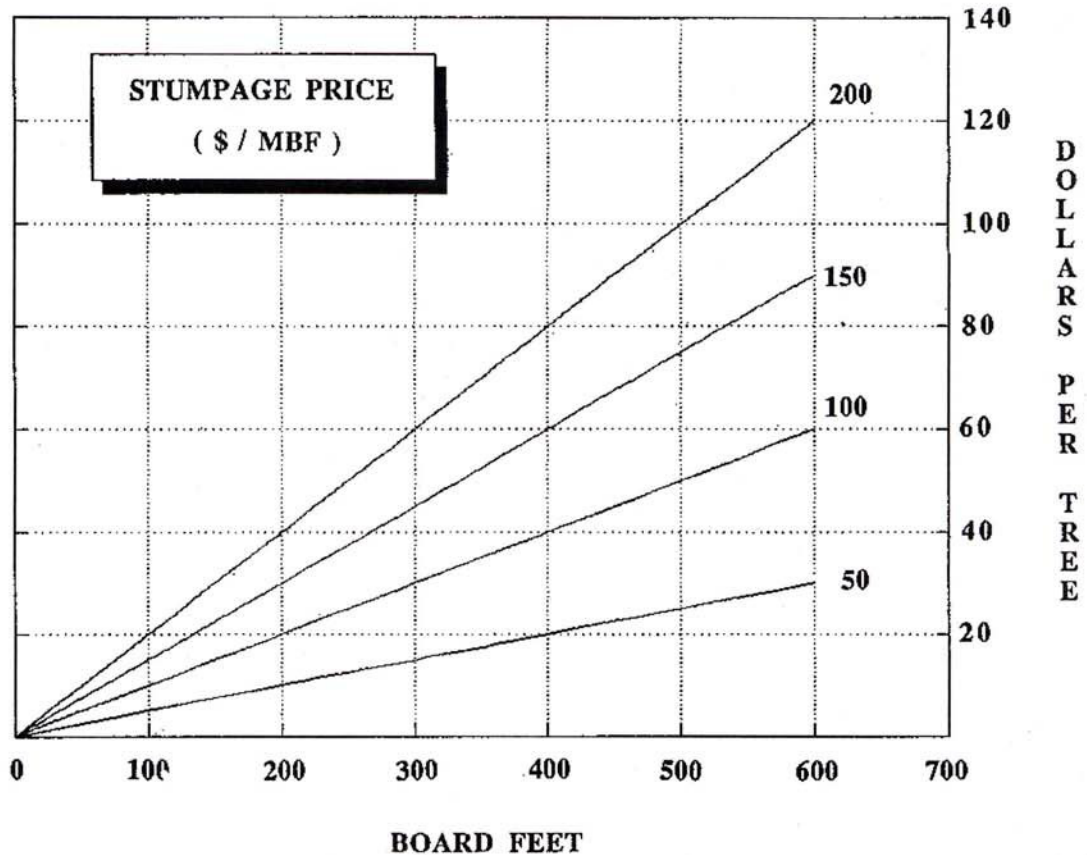
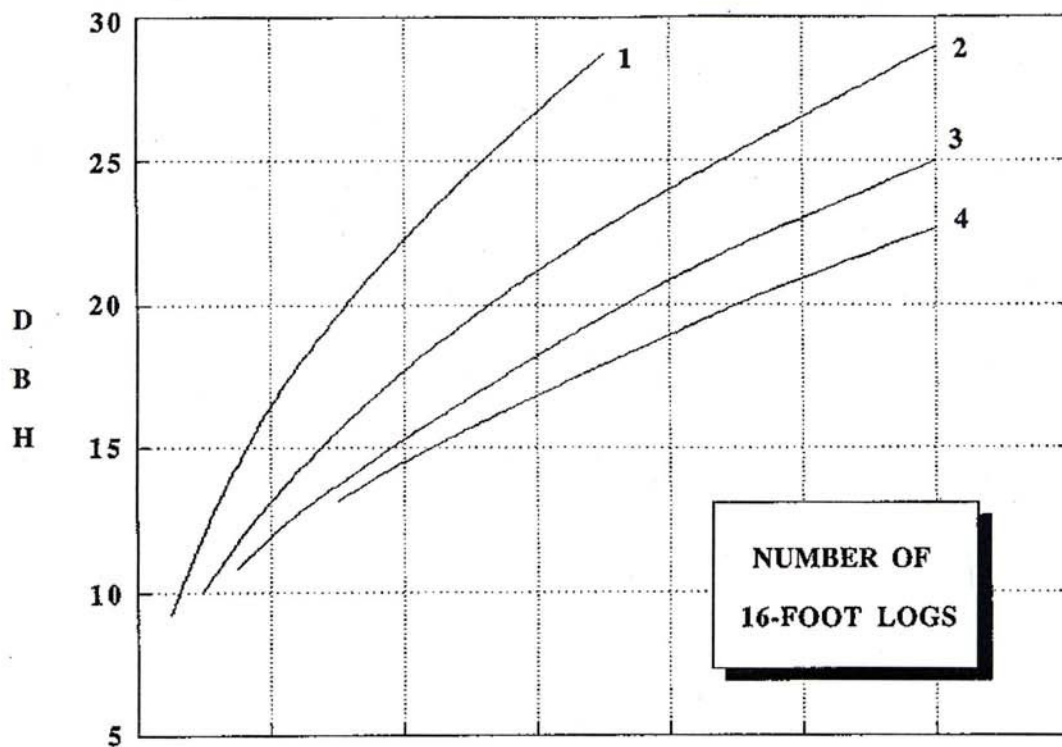


CHART 2....Determining Rate Earned

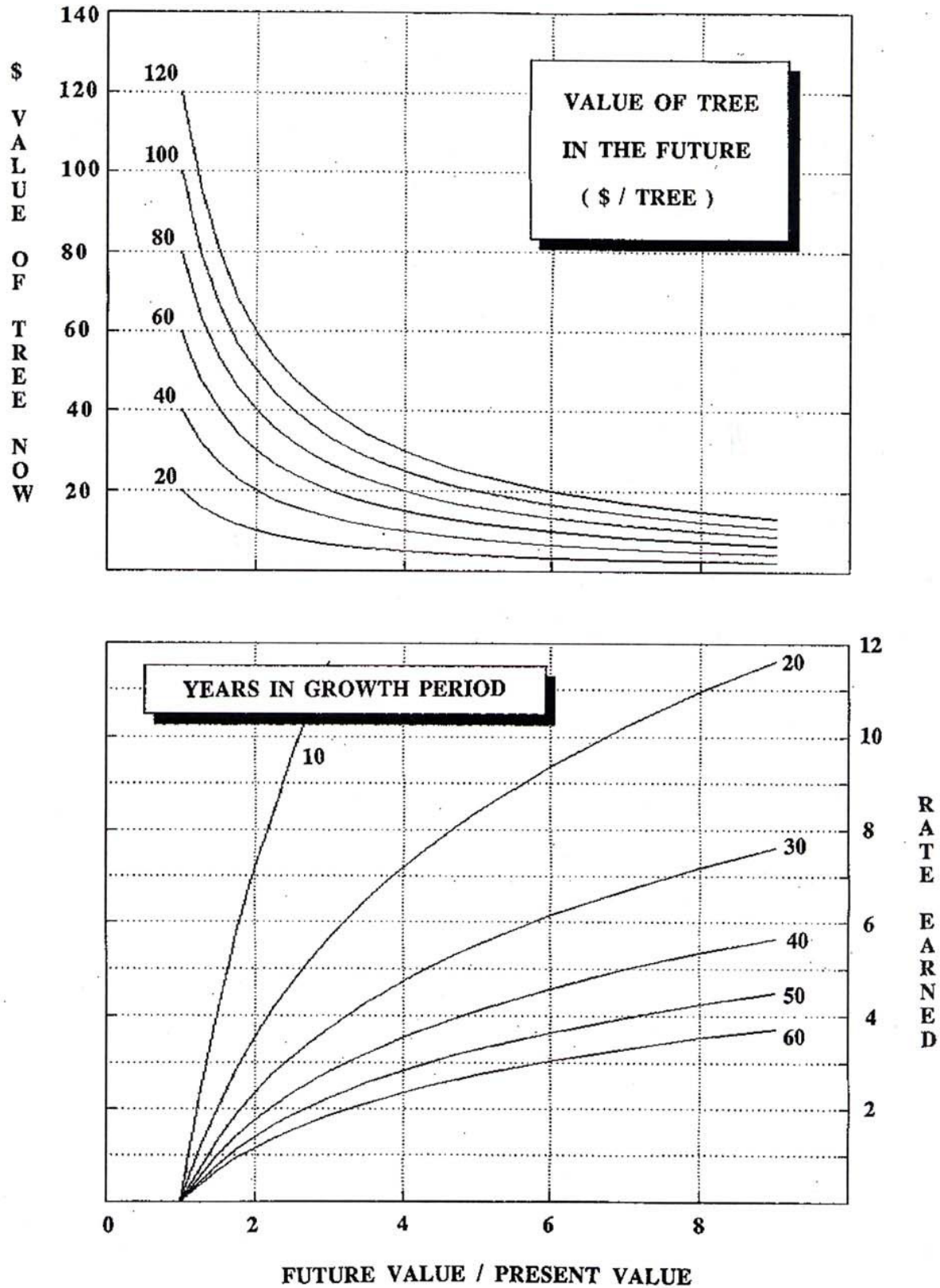
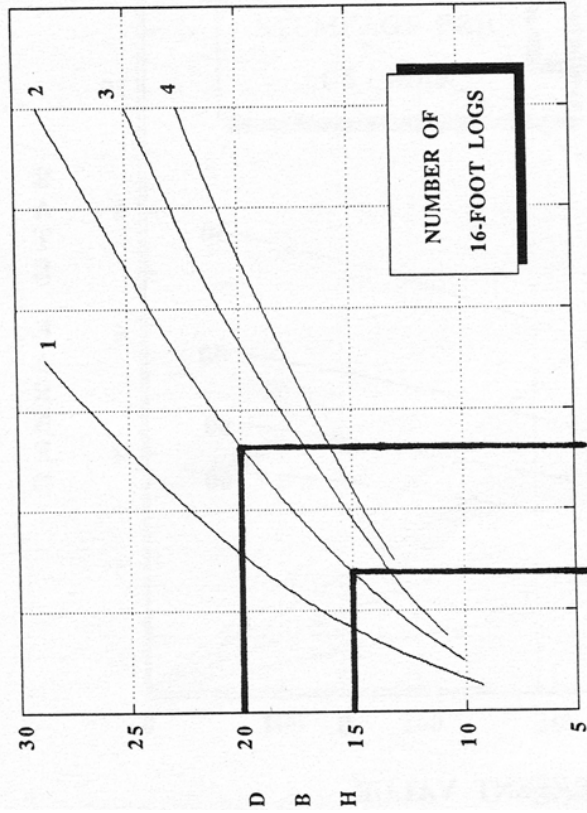


CHART 1....Determining Tree Value



A

B

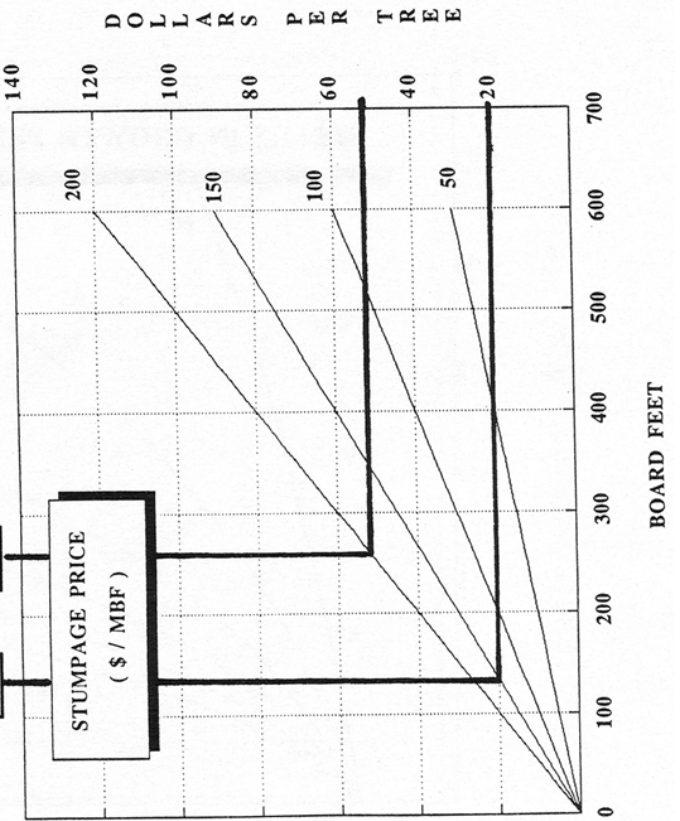
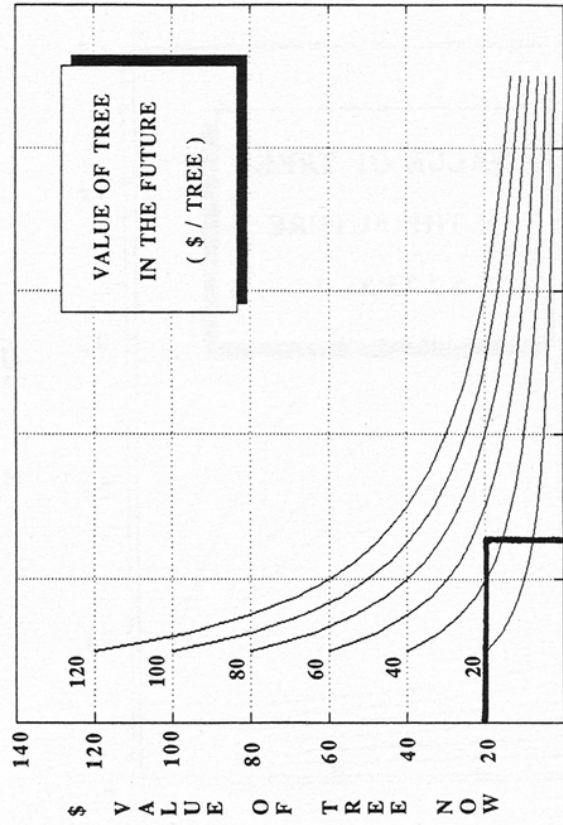


CHART 2....Determining Rate Earned



C

