FORESTRY 101

Measuring Tree Diameter

by Billy Thomas

Determining the size of your trees is not difficult, and it is important information to know. A key part of determining tree size is knowing the tree's diameter. Recall that diameter is the length of a straight line that passes through the center of a circle. The tree diameter measurement allows you to quantify the size of trees, monitor tree growth (by re-measuring the same trees over time), and make informed management decisions. Tree volume can be determined by combining tree diameter with tree height. Knowing tree volume can have economic implications, because timber is bought and sold by the board foot, a measure of wood volume equivalent to a board that is 12 inches by 12 inches by 1 inch.

Various methods and tools can be used to measure tree diameter, and foresters often will use a diameter tape or tree caliper to accurately provide readings to the tenth of an inch. However, for many diameter measurements, simple tools such as a tree scale stick or a piece of string can be used to give good estimates of tree diameter. Tree diameter is measured at 4.5 feet above the ground on the uphill side of the tree and this is referred to as "diameter at breast height" or "DBH." DBH provides a standardized (and convenient) location to measure tree diameter. This is important because if everyone measures the tree diameter at the same location we can be more assured of getting similar measurements. You can use either of the following techniques to measure the diameter of your trees and gain a better understanding of the trees in your woodlands.

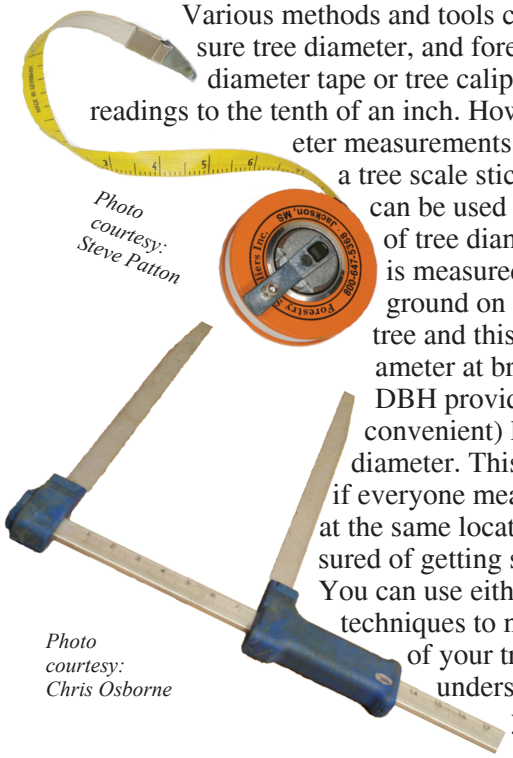


Photo courtesy: Steve Patton

Photo courtesy: Chris Osborne

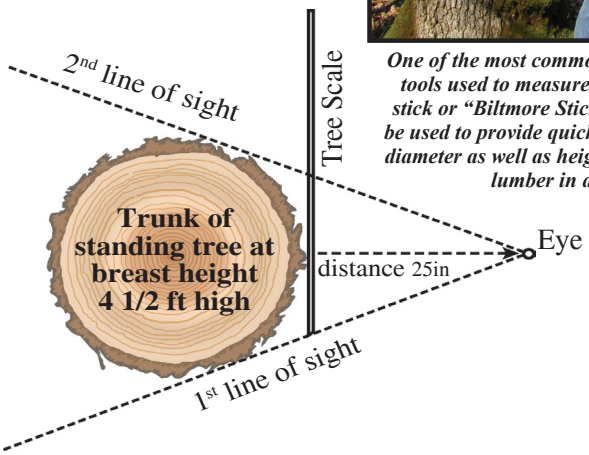
When it is important to be very accurate in measuring tree diameter a diameter tape (top) or tree caliper (bottom) can be used to provide readings to the 1/10 of an inch.

Tree Scale Stick

One of the most commonly used forestry tools is the tree scale stick. These sticks are relatively inexpensive and can be ordered from forestry supplier companies. The tree scale stick has several built in formulas based on geometric functions that make it especially useful. It can be used to measure tree diameter, log diameter, tree height, and

Photo courtesy: Billy Thomas

One of the most commonly used forestry tools used to measure trees is the tree stick or "Biltmore Stick". This tool can be used to provide quick estimates of tree diameter as well as height and volume of lumber in a tree.



it includes a tree volume table that can be used once tree diameter and height are known. The tree scale stick is held flat against the tree at DBH with the tree-scale side (as opposed to the log-scale side) facing the user, 25 inches from the user's eye. The left edge of the stick is lined up with the left outer edge of the tree, and the user then looks to the right edge of the tree without moving his or her head to note the diameter measurement on the stick where the right edge of the tree is visible. While not the most precise way to measure tree diameter, the tree scale stick can quickly be used to provide a good estimate of tree diameter.

Photo courtesy: Renee' Williams

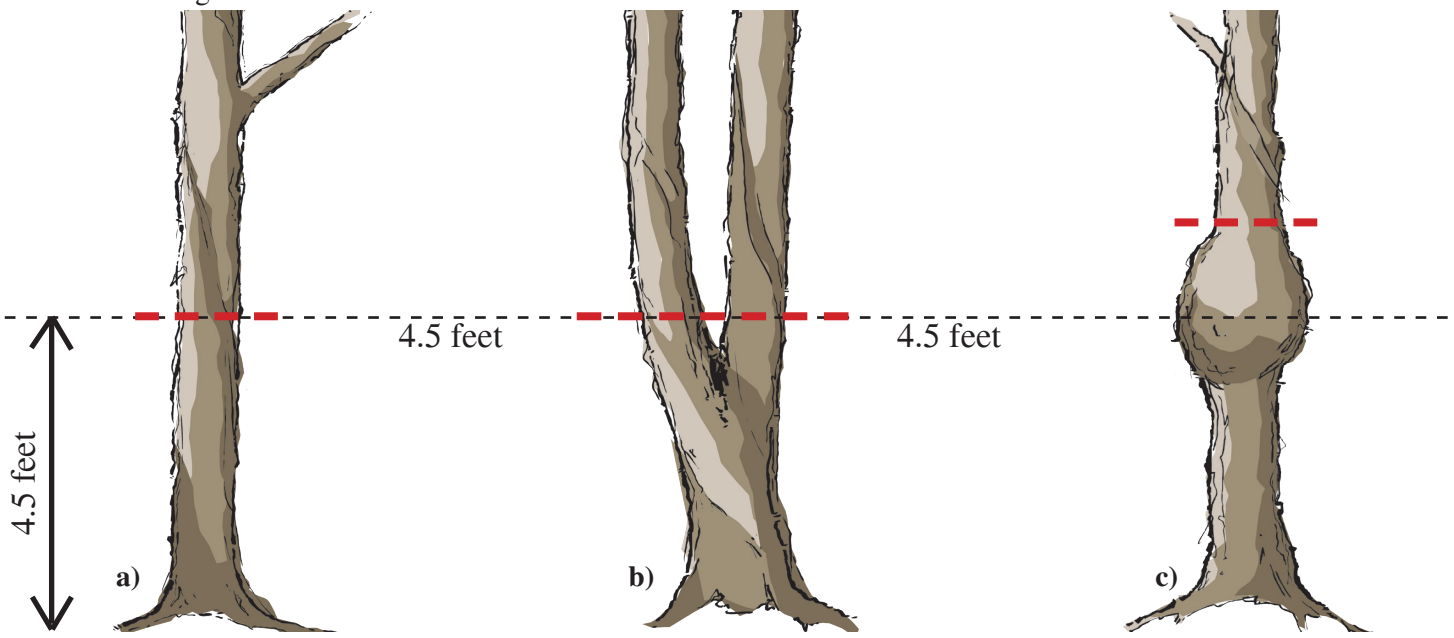
Strings or flexible measuring tape can be used to measure tree diameter. Wrap the string or measuring tape around the tree and divide the length in inches by 3.14 (pi) to obtain a good estimate of tree diameter.

String Technique

A low-tech option to measure tree diameter involves the use of a string, tape measure, and some simple math. Wrap a string around a tree at DBH, and pull it tight—make sure the string is level all around the tree. Hold the end of the string against the tree with one hand, and use the other hand to hold the location on the string that matches up with the end of the string after it has been wrapped around the tree. Use a tape measure to measure the number of inches of string that went around the tree (the circumference), divide that number by 3.14 (*pi*), and the result will be the tree diameter. The same technique can be done by using a flexible tape measure and noting the number of inches around the tree directly from the tape measure and then dividing by 3.14.

Diameter Measuring Challenges

Although trees generally are cylindrical in shape they are living organisms that have a variety of shapes, sizes, and growth patterns that generally keep them from being perfect cylinders. When trees are less than cylindrical in shape, taking multiple measurements with a tree scale stick on the long and short axis and averaging them will yield a better result. Trees that fork below 4.5 feet are measured as separate trees and if there is a large knot or other defect at 4.5 feet then we measure above that. Like most efforts, the more you practice measuring tree diameter the better you will become at it. Experienced foresters and woodland owners can often closely approximate tree diameter by visual observation because of their experience in measuring tree diameter.



Because trees are not perfect cylinders you may encounter abnormalities where tree diameter is typically recorded (4.5 feet above the ground on the uphill side). This diagram shows the location to take the diameter measure for three commonly encountered situations: a) trees that are mostly cylindrical are measured at 4.5 feet above ground on the uphill sides—if the tree is more oval or elliptical in shape then take multiple diameter readings on the long and short axis then average them, b) trees that fork below 4.5 feet above ground are measured as separate trees, and c) trees that have bulges or other abnormalities at 4.5 feet are measured just above the abnormality.

For more information visit: www.ca.uky.edu/forestryextension/Publications/FOR_FORFS/FORFS98_13.pdf

Tree Scale Stick Sources:

- Forestry Suppliers, www.forestry-suppliers.com, 1-800-647-5368
- Ben Meadows Company, www.benmeadows.com, 1-800-241-6401

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