

## Estimating Timber Volume

Selling timber is not the only reason for understanding some basic ecological characteristics of a forest. Certainly, species composition, wood volume, and forest density are key components of establishing a timber sale, but they are also essential to assessing forest health and condition. There are practical ways for a forest owner to learn more about their forest.

Species composition means, in part, an ability to identify the trees. It's rather difficult to fully appreciate a forest when you don't know who lives there. Michigan has some of the most diverse forests on the planet. Composition also includes factors such as ages, relative species abundance, variability across the landscape, and where a forest lies in the time continuum. Kinda cool stuff, and it gets better.

Traditionally, the volume of wood in the trunk up to a specified top diameter has been considered "merchantable". Of course, merchantability also depends upon nearby markets. Diverse markets translate to better merchantability, improved tree utilization, more management options, and healthier forests.

Tree volume can be estimated by formulae that use diameter and height, or sometimes just diameters. The top diameter is often around 4.5 to 5 inches, when pulpwood has a market. Several "scales" have been developed to estimate board foot volume of the sawlog portion of trees. Each scale has a different application and is subject to the odd ways that trees grow. And then, there are different scales to estimate the volume in cut logs.

Estimating the volume in a forest stand is more than simply adding up all the volumes of individual trees. There are too many!

Trees in sample plots are measured. Statistical methods expand sample volumes to represent the whole timber stand or forest. Accuracy depends upon knowledge of the forest, skill in measuring, and resources available. Entire textbooks have been written describing the practices and procedures of estimating forest volume.

Most forest owners can learn to roughly estimate stand volumes by purchasing a diameter tape, making a "height stick", and figuring out a sampling procedure. MSU has a good bulletin on the topic, number E-461 "How Much Lumber In That Tree". However, keep in mind that experience and skill produce more accurate estimates. Don't go to the bank with what you do on your own.

Stand density is one of the most critical measures of ecological condition. Forests that are too dense become stagnant. Forests that are too open won't fully occupy a site and undesirable characteristics can develop.

Density considers both the number of trees and the sizes of trees. Foresters use a measurement unit called "basal area", which is the number of square feet of trunk cross-sectional area per acre. The cross-sections are at a height of 4.5 feet from the ground. Imagine the forest converted to 4.5 foot tall stumps. The number of square feet of the stump tops will be the basal area.

Most of our mature forest types have around 100-150 square feet of basal area per acre, but this can vary widely. Considerable amounts of research have demonstrated optimum growth and vigor occurs at particular levels of basal area, depending upon the age of the stand, the site, and other factors.

Our most common forest type, northern hardwoods (sugar maple, beech, basswood, etc.), grows best at around 90 square feet of basal area. The optimum distribution of diameter classes

has also been determined. These are targets that foresters try to meet when managing northern hardwoods.

Many specialized, and often expensive, tools have been developed to measure basal area. However, pretty good ballpark estimates can be done using a string and a penny. Drill a hole in the center of a penny. Knot a string through the hole. Mark the free end of the string a distance 24.75 inches from the penny. Hold the marked end under your eye. Stretch the penny out the full distance. “Count” the number of trees that are wider than the penny. Multiply the tree count by 10 and you have an estimate of the basal area at that spot. Repeat the procedure in various places throughout the timber stand, recording each basal area measurement. The recordings should begin to group around an average. That will be the approximate basal area, or estimate of density, for the forest stand. You can look up what a healthy basal area should be for your particular stand. Contact a forester, a Conservation District, or an Extension Office.

As you might imagine, there are many other considerations in determining stand volume, stand density, and assessing forest conditions. As simple as some concepts seem on the surface, accurately evaluating a forest takes skill and experience. Nevertheless, for an interested forest owner, there are inexpensive ways to employ some simple practices that can yield reasonable assessments. It’s not only interesting to practice, but it’s a good way to monitor what’s going on with what can often be a valuable investment.

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