

Estimating Timber

A warmup: How sparse does a large forest have to be so that one can expect to look all the way through it in some directions?

For various reasons, such as depletion allowances in the tax structure, it is important for foresters to estimate the amount of lumber (measured, say, in “board feet”) that could be obtained from the trees in a forest tract. This is complicated in a mixed forest in which trees of various species and various ages occur. There is a very peculiar method that is often used to do make an estimate.

Briefly, the method uses a small, narrow prism with an 11° angle. If one holds the prism up (with its angle side horizontal) while looking at a tree trunk, the portion of the trunk that is seen through the prism will be offset to one side.

The forester first establishes a random grid in the tract. I don’t know how this can be done, but suspect that in practice he/she walks around in the woods. At each vertex of the grid, the forester holds up the prism and inspects the tree trunks in all directions. If a trunk is large enough or close enough, the offset piece will overlap the trunk. Every time this happens, 1 is added to a running “tree count”. At the end, the total tree count is multiplied by a suitable factor to give an estimate in “board feet”.

Project: Study this method. Under what assumptions (if any) does it make sense? What is the expected error?