

Timber Inventory: Managing Timberlands in the Southern U.S.

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What is your current timber inventory? How many pine sawtimber stems are currently growing on your property? Where are they located and how much are they worth? How many pre-merchantable pine stands do you have on your property? How old are they, how dense are they, how much competition is growing in these stands? When do you expect your pre-merchantable pine stands to be ready for a fertilization treatment or a woody release treatment or for a first thinning? How many stands of timber do you have that were thinned in the past three years? Where are they, how much timber volume do they currently contain, should they be thinned again and if so, when? If you are in the timber growing business, these questions go on and on, and if you cannot answer these questions, you are in the same boat as most timberland business owners.

Clearly, inventory information is critical to any business that produces goods/products to sell into the market place. This includes the timber management/growing business. Unfortunately, obtaining good estimates of timber inventory is a much more complex and daunting task than is estimating inventory for a retail establishment. There are certain points in the life of timber stands that are important inventory points, and there are established methods for obtaining inventory information that timberland owners can discuss with their foresters.

What is a Timber Inventory?

Many timberland owners, as well as professional foresters, think timber inventory is a method used to determine how much timber is in a given area. However, a timber inventory actually includes not only the amount, but also the type and spatial location of timber currently standing on a timberland parcel. Determining a timber inventory is complex because of the spatial extent over which a timber inventory is found, and because each individual tree is a unique organism with unique size and product characteristics. Thus, special techniques have been developed to help professional foresters obtain estimates of current standing inventory.

Unfortunately, not all timber inventory estimation techniques and applications are created equally. In fact, it is fair to say that some timber inventory estimates that result from ill-advised or

inappropriate timber estimation techniques may be of less value than no timber inventory information at all, since poor timber inventory information can lead to poor timber management decisions.

The requirements for timberland owners who want to make appropriate timber management decisions in an objective fashion herein assume that the timberland owner wants to earn return on invested capital, even though he or she may also want to pursue other objectives as well, such as recreational activities, improved wildlife habitat, etc..

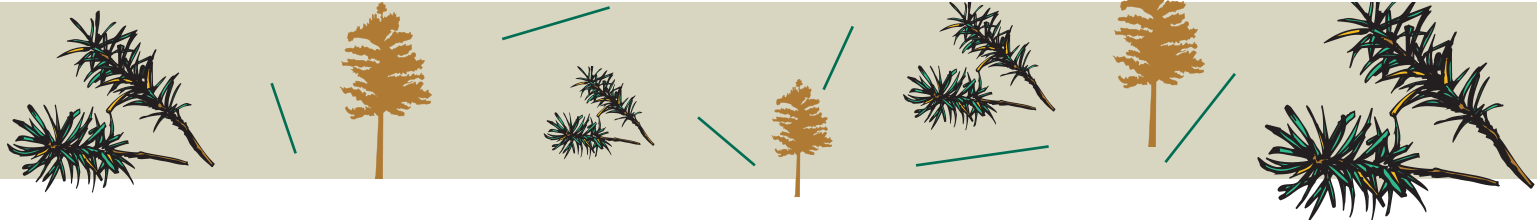
Important Timber Inventory Points

To help make timber management decisions, timber inventory information is required at certain points in the life of a timber stand as described below.

Professional foresters usually make use of a sampling approach at each of these inventory points (Shiver and Borders 1996). Useful sample designs will make use of sample information obtained from many different locations in a stand. The sample locations are usually distributed across the stand on some type of a sampling grid. That is, a starting sample location will be established near a stand corner and then additional locations will be identified by following a pre-defined compass bearing to define a sample line. Within this sample line, additional sample locations will be established on a given interval (e.g. every 150 feet). When the forester runs into the edge of the stand, a new line will be established by traveling a pre-defined distance 90 degrees from the original sample line. Sample locations will then be established on the new sample line, and the entire stand will be sampled in a similar fashion resulting in a grid of sample locations established across the stand.

Regeneration Inventory

The objective of a regeneration inventory is to determine if the regeneration process has been successful. A timberland owner can perform his or her own check on regeneration success in both planted and natural stands. In planted pine stands, it is important to determine if enough stems have survived the first growing season so as to eventually produce a viable stand. Usually, a minimum number of stems per acre is defined to produce a viable stand. For example, we may plant approximately 550 trees per acre (8-foot spacing within rows by 10-foot spacing between rows), and, if we have



at least 300 trees per acre surviving after the first growing season, we will assume the stand to be viable. However, if we have fewer than 300 trees per acre surviving, we may not believe the stand will produce a viable stand, and hence we will need to replant during the next growing season.

A very simple way for a landowner to get information to make this decision is to walk through the stand and count the number of live and dead stems found in various areas throughout the stand. It will become evident very quickly whether a landowner is finding a significant number of dead seedlings compared to live seedlings. In the example of wanting at least 300 live seedlings per acre, we would have to find at least 6 out of every 10 seedlings alive. If we only find 2 or 3 out of 10 alive, we have a pretty good indication that your survival is not as high as we would like, and hence we may have to replant. A similar walk through can be done following natural stand regeneration. However, in natural stand regeneration we are looking not only for a high proportion of live seedlings, but also an even distribution of live seedlings throughout the stand.

If the landowner hires a professional forester to carry out a regeneration inventory, the professional forester will make use of some type of sample. Below are questions that landowners can ask foresters concerning a regeneration inventory, as well as some guidance as to the appropriate answers to these questions:

- What size and shape sample plot will be used?
Circular or rectangular fixed area sample plots of at least 1/50th of an acre in size. Bigger plots are even better. Most foresters will not usually use a fixed area plot larger than 1/30th of an acre for regeneration surveys.
- How many sample plots will be used and what is the average number of acres represented by each sample plot?

One sample plot per 2 or 3 acres is usually the highest intensity sample that will be used in a regeneration survey. Using lower intensity samples than this may result in very poor quality information and may not pick up relatively large areas where survival is poor.

- What is the estimated sampling error for the estimate of surviving stems per acre?

A sampling error of 20 percent and lower is good. If possible, a relatively high intensity of sampling is also desired.

Post-Crown Closure/Pre-First Thin Inventory

In planted southern pine stands, this inventory will often occur between the ages of 8 and 12 years. In natural southern pine stands, this inventory will occur closer to 15 to 20 years. The objective of this inventory is to help determine if the stand is in need of some type of cultural treatment and when the stand should be scheduled for a first thin operation. It is best to rely on a forester for this inventory information. The forester will be able to judge the vitality of the stand and the nature of competing hardwoods so as to help the landowner decide whether the stand should be fertilized or considered for a hardwood control treatment using herbicide. In addition, the forester will apply a sampling design that will provide estimates of trees per acre, basal area per acre, and a stand table (number of trees per acre by diameter class). A professional forester would then plug this data into a timber management planning tool such as the SiMS 2006 timber growth and yield stand simulator (ForesTech International, LLC, www.foresotech.us).

Questions a landowner should ask the forester about this inventory information:

- What size and shape sample plot will be used?
Usually, a fixed area sample plot of 1/40th of an acre or larger should be used. If smaller sample plots are used, the

estimates may not be representative of the conditions in the stand.

Note that foresters should not use a sample “point” for this inventory. There are many reasons for this, not the least of which is that “point” sampling will not work well in these relatively young stands. You can also ask the second and third questions discussed above for regeneration inventories. The same answers apply in general. However, to help make appropriate thinning decisions, it may be prudent to try to achieve sampling error of 15 percent or less in terms of basal area per acre.

Post-Thin Inventory

Following a thinning operation in a stand, it is wise to obtain a new inventory. This inventory helps the landowner know whether the logger carried out the inventory in the appropriate fashion. More importantly, it will provide the information necessary to plan the next thinning operation or final harvest. Again, using the service of a professional forester when obtaining this inventory information is advisable. The objective of the inventory is much the same as the post-crown closure/pre-first thin inventory: estimates of trees per acre, basal area per acre, a stand table, as well as estimates of standing tons of various products (e.g. pulpwood, chip-n-saw, sawtimber).

Questions a landowner should ask the forester about this inventory information:

- What size and shape sample plot will be used?
Usually, a fixed area sample plot of 1/20th of an acre or larger should be used. Sample points can also be used at this inventory point. A Basal Area Factor (BAF) 10 or 20 sample point can be used without too much problem in these post-thinned stands. Note that you can also ask the second and third questions discussed above for regeneration inventories. The same answers apply in general.

However, to help make appropriate future thinning or final harvest decisions, it may be prudent to try to achieve sampling error of 15 percent or less in terms of basal area per acre.

Mature Stand Thin/Final Harvest Inventory

This inventory point is that which most landowners have the most experience. It is the time at which the value of standing inventory is being estimated for sale purposes. As such, it is very important to use the services of a professional forester, since fair market value of the timber will be determined from this inventory.

Questions a landowner should ask the forester about this inventory information:

- What size and shape sample plot will be used?

Usually, a fixed area sample plot of 1/20th of an acre or larger should be used. Sample points can also be used at this inventory point. In fact, point sam-

pling carried out by an experienced forester is the preferred sampling method in mature timber. If the expected basal area in the stand is above 120 square feet, a BAF 20 sample point should be used, otherwise a BAF 10 sample point can be used. Note that you can also ask the second and third questions discussed above for regeneration inventories. The same answers apply in general. However, if the timber is very valuable, it may be wise to use as many as one sample point per acre. Additionally, when the timber is very valuable, sampling error of 10 percent or lower can help insure that fair market value is well established.

Summary

Managing timber in a fiscally sound way requires timber inventory information. This information helps the landowner make well-informed decisions about cultural treatments, as well as thinning and harvest decisions. The complexity of timber inventory usually requires the assistance of a profession-

al forester.

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Literature Cited

Shiver, B.D. and B.E. Borders. 1996. Sampling Techniques for Forest Resource Inventory. John Wiley & Sons, Inc. New York, NY 356pp.



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