

## GROWING VALUE IN YOUR FORESTLAND

New Practices and  
Innovative Technology

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Is your forestland as productive as it could be? It is a question most landowners ask themselves, especially as the price of labor continues to rise, and fertilizer costs skyrocket. Boosting forestland productivity can mitigate the impact of these cost increases and increase the value of your timber, but many U.S. forest landowners are unfamiliar with new practices and innovative technology that can stimulate productivity.

“More effective silviculture can produce bumper crops of timber,” says Dr. Lee Allen, director emeritus of the Forest Nutrition Cooperative. Allen’s research has shown the dramatic potential of an integrated silviculture program in improving yield and return on investment (ROI). It has resulted also in the use of a leaf area index to assist foresters in deciding when and how much fertilization or vegetation control treatment is necessary in pine plantations.

“One key to productivity will be the use of new remote-sensing technology that can help foresters monitor tree-stand growth and health,” Allen told foresters and landowners during a presentation hosted by ImageTree earlier this year as part of the company’s Idea Leadership Series. “This includes

the use of infrared photography, computer software, and imaging that provide an accurate, detailed portrait of what’s occurring in the tree stand at any given time during the growth process.”

### Precise Measurements

ImageTree’s forest management system, ForestSense, uses this type of imaging to capture and record the size and location of every visible tree crown. With this level of detail, a forest landowner can benefit from the precision available at the sub-stand or tree-crown level to make better, timelier decisions about fertilization, thinning, and harvest management.

The ForestSense integrated system is fundamentally different from traditional cruised inventories. By substituting capital (technology) for labor (heavy emphasis upon manual cruising), it provides superior value in terms of inventory precision (height, DBH, TPA, volume, health, etc.), while providing the data richness needed to make forest management decisions based on local site characteristics, rather than blanket decisions for an entire forest.

Following are some specifics about the system:

- It uses lidar (light detection and ranging) and CIR (color infrared imaging) to create a detailed, high resolution, three-dimensional view of forests. A computer records the location, size, and shape of every tree crown visible from the lidar and CIR (half-meter resolution, verifies that existing stand lines are accurate and suggests changes as appropriate). Given age and silvicultural history from a landowner’s records, ForestSense uses the imagery to identify other key land variables (species, slope, aspect, drainage, etc.) that must be considered when selecting plots for subsequent ground sampling.
- To reduce sampling error, ground plots are selected randomly for each

key land variable; crews utilize hand-held GPS-based laptops to measure the exact contents of sampled tree crowns (stems, height, DBH, species, diseases, etc.) from the lidar data. Typical forest management cruises use one plot for every five acres—or about 2,000 plots for 10,000 acres. Since these plots are used only to correlate the tree-crown shape/size with its footprint—not to count trees—only about 150 plots are needed, saving time and improving accuracy.

- ForestSense combines ground-based data with the lidar and aerial imagery data to allow biometricians to calculate the final inventory data at the property, stand, acre, and tree-crown levels.

At a cost that is competitive with typical management cruises, a ForestSense inventory offers greater precision at the stand and sub-stand level where all forest management decisions must be made. Now, with excellent precision at the stand level, the landowner can tailor and have more confidence in silviculture decisions so that productivity and financial returns are significantly improved.

### Precise Inventories and Financial Savings

Most landowners can only financially afford to inventory about 20 percent of their forest each year, or conduct a complete inventory about once every five years or so. Larger forests rely upon G&Y models to determine when and where fertilizer, thinning, and harvesting should take place. While everyone wants to achieve stand level data that has plus or minus 10 percent precision, often traditional management cruises can produce no better than plus or minus 25 percent precision. ForestSense, because of its crown-based detail, generally achieves an average precision at the stand level of about plus or minus 11 percent precision, thus improving both thinning

and harvest decision-making and dramatically reducing net present value (NPV) loss.

### A “Standless” Forest?

Working with ForestSense data offers a unique window with which to manage every stand throughout a forest. Many stand lines are the products of decisions made long ago and might not accurately reflect how nature is behaving today. Because ForestSense inventory is based upon aggregating individual tree-crown data (each tree crown has its own stand and stocking table), the program has the capability to ignore stand lines so as to identify broad forest characteristics that occur regardless of existing stand lines. Aggregating or disaggregating stands to look for forest health trends that are likely to cross many stand lines allows landowners to more optimally manage their forest assets, increase productivity, and improve ROI. Landowners can determine, for example, the number of trees reduced through thinning, harvesting or theft, and are able to quickly assess damage from natural disasters.

Here is a real-world example: The current inventory may indicate that a group of stands all has the same characteristics: an average of 250 trees per acre; 320 trees in the southern end; and 150 trees in the northern end of these several stands. (Differences like these within stands commonly occur.) Without having to get into their trucks, landowners can use this “standless” capability to instantly identify and measure differences among each of the neighboring stands and more accurately determine necessary actions.

For instance, in the sparser area, a landowner might increase fertilizer, harvest and replant, or do nothing. He or she can look at the data and get a solid reading on the northern and southern portions of these stands:

basal area, TPA, average height, etc. Now, he or she can make smart, site-specific decisions that could involve different behaviors in different parts of the stands.

Using a very basic ROI model and only considering fertilizer expense, making different fertilizer decisions in the northern and southern portions of these stands could improve the landowner’s ROI on fertilizer dollars by 23 percent. Redrawing stand lines, therefore, could be more effective in making silviculture dollars work.

### Monitoring Change

The ForestSense system also has a popular “change management” module that utilizes the granularity of crown-based inventory to provide a highly affordable update that is customized to fit landowners’ management needs. On a very inexpensive basis, fresh imagery is correlated with ground data to measure the changes that have taken place in the forest since the baseline inventory was completed. These would include changes in timber volume by stand and property, an update in the diameter distribution profile, the location of trees removed, and the growth of existing trees.

By superimposing new imagery—often from satellites—upon a spatially explicit map of tree crowns from the baseline inventory, it is possible to identify any crowns that have been removed. Since each tree crown has its own stand and stocking table, it is possible to calculate how inventory has changed.

In addition, if a landowner has acquired carbon credits for his or her managed forest, and he or she needs to document that the forest remains intact in order to continue to be eligible for these credits, the change management module also calculates changes in carbon biomass that have occurred since the baseline inventory

measurement.

A landowner may also have applied for and received financial credits for maintaining various ecosystems on his or her property, and the ForestSense system can be helpful in corroborating their continued existence.

### About ImageTree



ImageTree is committed to providing forest landowners with the tools needed to continue to improve their forest management productivity, to monitor

and enhance habitat and various ecosystems, and to assist them in the improvement of their financial returns. While the ImageTree process is currently cost-effective for land parcels of 50,000 acres and larger, it does not mean that private landowners with fewer acres cannot benefit. ImageTree is currently working with a variety of organizations to explore methods for aggregating adjoining property among many landowners.

*Please go to [www.imagetreecorp.com/survey.html](http://www.imagetreecorp.com/survey.html) to complete a very brief survey to indicate your general interest in ImageTree’s inventory system. In addition, learn from the country’s leading forestry experts about best practices for managing your land at [www.imagetreecorp.com/idea.html](http://www.imagetreecorp.com/idea.html). ImageTree’s Idea Leadership Series, introduced earlier this year as part of our commitment to leadership within the forestry community, promotes the latest ideas for improving the preservation and management of forest environments. Through cooperation with The Society of American Foresters, certified foresters can earn continuing education credits by viewing these presentations. ♦*

# FORESTSENSE™

## FOR THE CHALLENGES OF TODAY'S FORESTRY.



In an environment of increasing costs and declining timber values, managing your forest to sustainably generate greater yield has become everyone's challenge.

ForestSense™ combines LiDAR, CIR imagery, patented software and ground based data to provide forest precision, accuracy, and scalability in an easy to use platform.

Whether you want help with sustainability, carbon credits, or productivity enhancements, ForestSense enables you to make site-specific decisions using spatial maps and stocking descriptions of every visible tree crown.

Half the battle is knowing where you need to take action—and now the tool for increasing your productivity is in your hands. For more information, visit our Web site or email [mcoleman@imagetreecorp.com](mailto:mcoleman@imagetreecorp.com).

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