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Marking First Thinnings in Pine Plantations: Potential for Increased Economic Returns[1]

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Introduction

This document summarizes a study to determine if landowners may gain increased economic returns when investing in marking the first thinning in southern pine stands. The study found that investing in marking can bring higher revenue at final harvest. The greater number of high-quality and faster-growing trees remaining after a marked thinning is the main reason for immediate and future increases in value.

Some Background on Stand Density and Thinning

Southern pines are planted at varying densities, from approximately 400 trees per acre (TPA) up to approximately 900 TPA, and for a variety of forest and wildlife habitat objectives. When pulpwood markets are favorable and a short rotation (the time from planting to harvest) is compatible with the landowner's objectives, a complete stand harvest within 15 to 20 years may bring an acceptable return. However, where markets for solid wood products (such as chip-n-saw, sawtimber, plylogs [veneer], or poles) are favorable, longer rotations can bring higher financial returns on larger-diameter trees, as well as enhance other objectives like wildlife habitat, recreation, and aesthetics.

When managing pine plantations for solid wood products, it is often necessary to thin the trees at some point in the rotation. **Thinning** is a partial tree harvest in an immature stand to reduce the density of trees for a variety of purposes, for instance, to increase the growth of the remaining trees or to improve wildlife habitat or recreational opportunities. The increased tree growth after thinning results from the greater availability of light, water, and nutrients to the remaining trees. Ideally, the best and largest trees should be retained to assure the most rapid increase in timber value. For the best results, thinning should favor the tallest, best-formed trees over those that are overtopped, crooked, forked, diseased, or otherwise undesirable. Timberland owners planning a future harvest of high-value trees sized for sawtimber, plylog (veneer), or poles should consider thinning a necessity. If it is done properly, and if markets are favorable for solid wood products, thinning can bring substantially higher revenues from future harvests. Depending on species and site, southern pine trees will respond to thinning best if they are thinned before 16 or 17 years of age.

Thinning pine plantations typically involves row selection (removing all trees in a row, regardless of quality or size), combined with removing individual trees from the remaining, adjacent rows. There are a variety of thinning methods, with different methods suiting different management objectives. These topics are covered more thoroughly in *Thinning Southern Pines—A Key to Greater Returns* at http://edis.ifas.ufl.edu/pdffiles/FR/FR15900.pdf.

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When planning a thinning, consider first who will be deciding which trees to remove. Landowners generally have two options:

1. hire a forester to mark the trees, or

2. allow the logger to make these selections (also known as "operator-select") during the harvest.

Foresters are trained to understand forest stand dynamics and can make the best decision about which trees to remove and which to leave. A forester works from the ground and can look at each tree from all directions to determine which ones to take and leave. Tree marking paint is used to indicate which trees loggers are to remove or leave. Although this approach is certainly beneficial, the cost of hiring a forester to mark the thinning could reduce potential revenues from the thinning operation.

Operator-select thinning leaves the decision to the person operating the harvesting equipment. Loggers typically can't spend the time to look at each tree from multiple angles, and their view is often restricted inside the felling machine. Operator-select thinning is lower cost because selections are made during the harvesting operation, which eliminates the need to hire a forester to mark trees ahead of time, but does the long-term benefit of a more carefully marked thinning by a forester produce more revenue in the future than the short-term cost?

To mark or not to mark? That is the question.

A case study was conducted in north Florida comparing pine plantations marked by a forester before thinning with those in which the equipment operator selected the trees to remove. The intent was to determine if marking the first thinning pays off in the future.

Methods

Three pine stands had areas designated to be marked by a forester or operator-select thinned. These areas will be referred to here as marked stands and operator-select stands. Pre-thin and post-thin stand conditions were determined by basic inventory sampling. Post-thin data was used in a growth and yield model, and volume projections were made to the age of final stand harvest. An economic analysis was performed based on the projected volume data.

Two basic economic measures were calculated for each stand: Net Present Value (NPV) and Land Expectation Value (LEV). NPV is the difference in the discounted costs and revenues over the life of an investment. This measure provides a present value to different management options. Similarly, LEV considers the difference in present values of costs and revenues, but does so using an infinite time horizon and therefore provides a value of the bare land.

Results

There were some differences between the marked and operator-select stands after thinning. On average, marked stands had a higher residual stand density, with 27 more trees per acre than the operator-select stands. Residual basal area was five square feet per acre greater, on average, in the marked stands. The percentage of low-quality (crooked, forked, and/or diseased) residual trees remaining after thinning was two percent higher in the operator-select areas (Table 1).

Table 1. Post-thinning average stand parameters per acre.

Parameter	Marked Area	Operator-Select Area
Trees Per Acre	252	225
Basal Area (ft^2/ac.)	72	67
Low-Quality Trees (%)	6	8

Differences in economic values were found between the marked and operator-select stands as well. NPV for the marked stand was on average $25 per acre higher than the operator-select stand. LEV of the marked stand was $66 per acre higher than the operator-select stand on average (Table 2).

Table 2. Average NPV and LEV per acre at a 5% discount rate.

Measure	Marked Area	Operator-Select Area
NPV ($/ac.)	941	916
LEV ($/ac.)	1557	1491

Discussion

While some of the differences between the marked and operator-select thinnings in this study were not significant, small differences can have a considerable impact on stand quality and value later in the rotation, especially on larger scales. The marked thinning resulted in higher residual tree density and basal area, but a lower residual percentage of low-quality trees. Low-quality trees have deformities from disease, stems with excessive sweep or crook, and stems with a low fork (Figure 1).

These types of trees will have no value for solid wood products, and it is generally recommended that these trees be removed during a first thinning (Demers et al. 2013). In this specific case, the timber marker was able to do a better

job than the operator with tree selection, allowing more high-quality trees to remain on the site, while removing a greater proportion of low-quality trees.

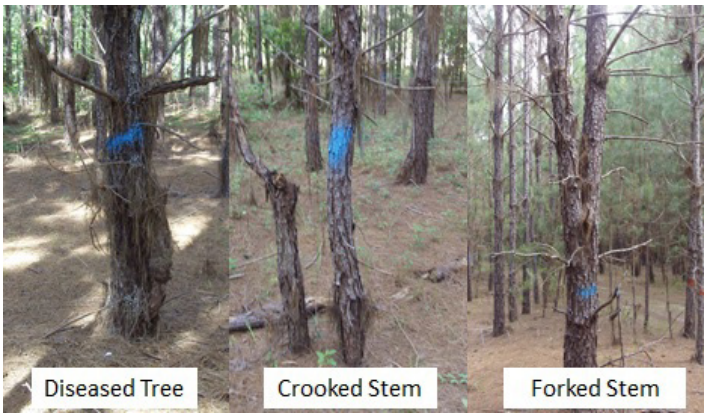

Figure 1. Examples of low-quality trees that should be removed during the first thinning.
Credits: Byron Love

The economic benefits of marked first thinnings are realized at final harvest. In this case study specifically, better selection in the marked stands translated into greater returns than in the operator-select stands. Though a difference of $25 per acre for NPV and $66 per acre for LEV does not seem substantial, it can be when considered on a stand level basis. Tract sizes between 11 and 100 acres account for the largest percentage of non-industrial private timberland ownership in Florida (Thompson 1999). When the differences in LEV are applied to these acreages, the increased land value from hiring a forester to mark the first thinning can range from $726 to $6,600. For a landowner depending on revenue from timber grown on his or her property, this benefit may be significant.

Conclusions

Landowners can gain increased economic returns when investing in marking the first thinning in southern pine stands. The greater number of high-quality and faster-growing trees remaining after a marked thinning is the main reason for future increases in value. Based on the results from this case study, landowners are encouraged to hire an experienced consulting forester to mark their stands for the first thinning. Consultants can help with many other forest management activities as well. Get some useful tips on *Selecting a Consulting Forester* at http://edis.ifas.ufl.edu/fr125.

References

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