# 9 Pine Plantation Thinning

Tre DeLoach, Consultant
Madison, Mississippi

## Thinning

Thinning is a necessary step in the management of your forestland. Both natural and planted pine stands should be thinned.

The three goals of thinning are to promote growth of the residual trees, to promote health of the residual stand, and to provide an economic return to the landowner. Thinning operations should be planned practices that meet your management objectives. It is recommended that landowners use a forestry consultant to assist with all aspects of a thinning operation.

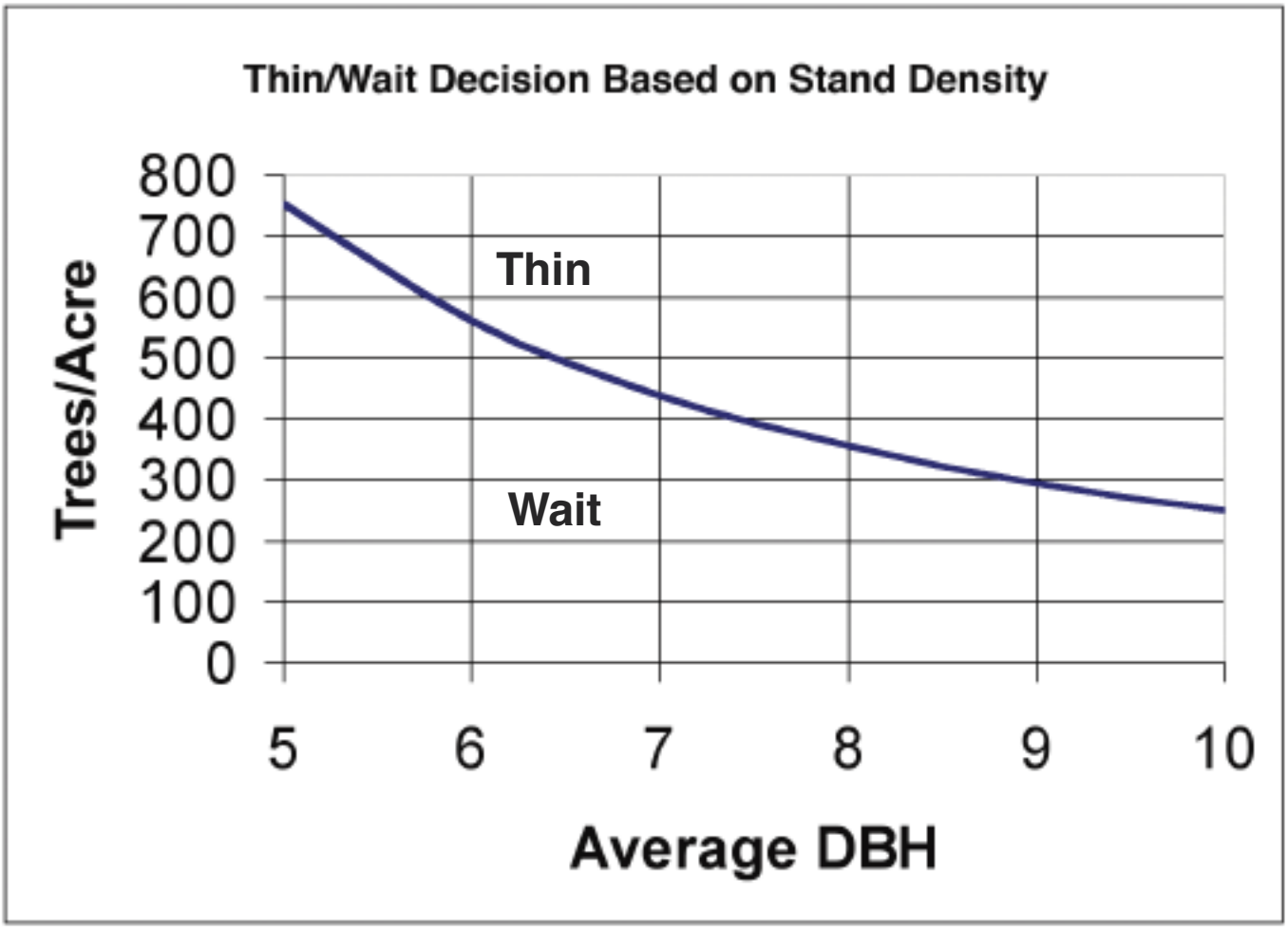
When, how, and how much to thin are commonly asked questions. To answer these questions, you must have an onsite inspection of the forest in question. Several guidelines will help you know when it's about time to thin. All thinning practices should be conducted in accordance with the management objectives of the landowner. Stand density, average stand diameter, tree heights, and growth rates are all important factors that indicate when a stand is ready to be thinned.

**Stand density.** Stand density is the most important factor in determining when to thin a pine stand. As trees grow larger, the number of trees that a stand can support declines. At the time of planting, a site might be capable of supporting 600 – 700 trees per acre (TPA). However, as the diameter at breast height (DBH) and crowns increase in size, so do the amounts of nutrients, soil moisture, and sunlight required for adequate growth rates.

Figure 1 is a Loblolly Pine Stand Density Index Graph. This graph shows the relationship between TPA and DBH. In order to increase tree size, the number of TPA needs to be reduced, providing space for trees to grow. Anywhere the number of TPA and DBH intersect above the Thin-Wait Line (Figure 1), the stand needs to be thinned.

Once stand density indicates a stand is ready to be thinned, average stand diameter, tree heights, natural pruning, and growth rates should be considered. For a stand to be merchantable it must have an average DBH of 6 inches. Because the majority of logging operations use tree-length log trucks, trees should be at least 40 feet tall before they are thinned. This will ensure that log trucks can be fully loaded (25 tons) and avoid higher hauling costs associated with "double bunking."

*Figure 1: Stand Density Index.*




***(Adapted from Traugott and Dicke, 2006)***

Natural pruning occurs because pine trees are shade intolerant. Therefore, lower limbs die and fall off over time, producing a clear stem. The trees should be naturally pruned to at least 18 feet, ensuring a high quality stem. To ensure health and vigor, thinning should be done when growth rates begin to decline.

Thinning operations are typically conducted at several points during the length of the rotation. However, the first thinning operation is the most critical for growth and development of the residual stand. Second and subsequent thinning operations promote the health of the stand and provide economic return to the landowner before final harvest.

## First Thinning

The first thinning operation is an important milestone in the life of a pine stand. It is one of the first major decisions landowners have to make and sets the stage for the future quality of the stand. It is essential that this thinning be timed properly--too early, and the residual trees might not be naturally pruned high enough; too late, and growth could have stagnated on the stand.

The goal of the first thinning operation is to create growing room in the stand. Remember that as the trees grow in size, the site can support fewer of them. In order to maintain growth rates, about 40 percent of the trees should be removed. A row thinning in pine plantations is the most cost-effective method. During a row thinning, every tree on the row is removed. Third-, fourth-, and fifth-row thinnings are common and should be decided by site quality, stand health, or landowner objectives. To create additional growing room, trees may be selectively harvested in the "leave" rows. Forked, weak, diseased, or suppressed trees should be removed from the leave row. This will leave the best trees to carry forward in the rotation.

In natural stands, lanes are typically cleared, creating room to operate. Depending on the stand density, it is common to create lanes that are about 8 – 10 feet wide. These lanes should run parallel with the topography of the land. The leave lanes should be about 5 - 8 feet wide. Selectively thin any inferior trees between the lanes. The main purpose of thinning is to provide room for these trees to continue to grow at an acceptable rate. Thinning a natural stand is much the same as in plantation management.

"Are my pine trees ready to thin?" is one of the most frequently asked questions by private landowners. The answer to this question is based on the size, growth rate, natural pruning, height of the trees, as well as stand density, and is not based on the age of the trees. The first thinning should be done when the stand meets these criteria: trees have an average DBH of 6 inches; trees are 40 feet tall and are naturally pruned to 18 feet from the ground; and the growth rate has begun to decline.

For a detailed, step-by-step process of determining if the stand is ready to thin, get a copy of *Are My Pine Trees Ready to Thin*? from your local Mississippi State University Extension office or the Mississippi State University Extension webpage at http://msucares.com/pubs/publications/p2260.pdf.

## Second Thinnings

The objectives of a second and subsequent thinnings are to promote stand health, set the stage for final harvest, and provide economic return for the landowner. These thinnings should remove the smaller, forked, damaged, and diseased trees from the stand, leaving the best trees as crop trees. The goal is to create growing space for the remaining crop trees, thereby, ensuring healthy trees.

The second thinning can be conducted as a marked thinning, in which all trees to be harvested, or all trees to be left, are marked with a specified paint color. In this type of operation, it should be clearly stated to the operators which trees are to be harvested and which are to be left. About 40 percent of the trees in the stand will be removed during this thinning operation. Row thinning should only be used for the first thinning. All subsequent thinning should be marked.

Another common method of thinning a pine stand is to leave a basal area equal to the site index of the stand. Site index is the height of dominant and codominant trees at a given base age, usually 50 years. The higher the site index, the higher quality the site is. Foresters often use the rule of site index ± 10 to allow adjustments for certain stand conditions and management objectives. When selecting trees to be removed in this thinning, the very best trees should be left, and the basal area of the leave trees should equal the target basal area. If the stand is thinned to a basal area of 10 square feet less than site index, it will take about 10 years before that stand needs to be thinned again.

Another basic way to selectively thin a pine stand is the "leave tree method." In this method, all trees to be left in the stand are marked. To determine which trees to keep, measure the diameter of the dominant trees that will remain as the crop trees. The 1.75 X DBH (diameter x breast height) rule will dictate (in feet) the spacing of the residual crop trees. For example, if the average DBH is 12 inches, then residual trees should be spaced about 21 feet apart.

## Pre-Commercial Thinning

One of the problems with pine regeneration is overcrowding of seedlings. This occurs many times during natural regeneration as well as overseeding from adjacent stands in planted pines. These stands can have thousands of trees per acre; whereas, on the typical planting site only about 600 trees per acre are planted. Referring back to Figure 1, stands with more than 800 trees per acre will take a long time to reach a merchantable diameter. These overcrowded stands will stagnate and never become a merchantable stand. To reduce this overcrowding, these stands should be thinned pre-commercially.

Because of the long time until merchantable harvest, landowners should give preference to the lowest cost method for reducing the number of trees per acre. The goal should be to reduce the number of trees per acre to 400 – 600. A combination of hand and mechanical thinning can be used to remove these trees. Chopping or bush-hogging parallel strips 8 feet wide through the stand while leaving a row of standing trees about 3 feet wide is the best method for pre-commercial thinning. The trees in the leave rows may be thinned by hand, creating more growing room and further reducing the number of trees per acre. The goal of this operation is to remove as many trees as possible with as little cost as possible. Prescribed burning can also be used for pre-commercial thinning. A backing fire during the spring will remove most trees that are 1.5 inches or less in ground line diameter. For more information, please see chapter 10.

## Conclusion

Thinning is a necessary management practice that will produce income for the landowner while increasing the quality of the stand for final harvest. Thinning at the proper time will allow trees to continue growing at acceptable rates. Remember the goal of thinning operations is to "leave the best and cut the rest." Anything else will result in reducing the quality of the stand. It is recommended that landowners use the assistance of a professional forester in all aspects of conducting a thinning operation.

# *References*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