Thinning Opportunities in the Midsouth
during the 1980's

by

Charles E. Thomas and Mary S. Hedlund

Abstract

Two independent sources of data were used to determine the number of acres of pine plantation in the Midsouth. Ten million acres are presently described as pine plantation. A sharp increase in annual acreage (from 200,000 to 600,000 acres) is predicted to be of commercial thinning age during the decade. Nearly 75% of the acres will be found in Alabama, Mississippi and Louisiana. And 50% of the acres will be on forest industry owned lands.

Recent inventories indicate that an average of 1 to 4 cords of pine per acre characterize current stands at age 15. These volumes are somewhat lower than reported in the Southeastern states. Reasons for the low returns include the predominance of Soil Bank era plantings in the age class and the state of forest inventory at the time.
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Mary S. Hedlund

Southern Forest Experiment Station

New Orleans, Louisiana

Pine plantations, as has been noted (Knight and Sheffield), represent the hope and investment of the forest industry in the South. Other sources of timber are likely to be less productive and lower in quality. Considerable research resources have been devoted to describing and modeling the potential returns from intensive management of southern pine plantations. Unfortunately, most of these studies have been case studies emphasizing the better stands and their yields. In the past there has been little attempt to summarize the current state of plantations or to forecast production returns from existing stands over a wide area. Extensive area reports, such as the Forest Statistics of the U.S., 1977, made no attempts to delineate plantations from the total resource in the projections of timber supply. This paper attempts to give an overview of the acres and volumes likely to be available for commercial exploitation during the decade of the 80's in the seven Midsouth states.
Two aspects of the thinning opportunities will be examined. First, the acreages available - their distribution in time and geography - will be reported. Second, a sketch of the volumes and basal areas currently found in one specific state (Mississippi) will be reviewed. Based on the findings in Mississippi, implications for the total resource of the Midsouth will be made.

As reported in the previous paper by Knight and Sheffield, two sources of information were used to obtain the numbers of acres in plantations. The first is the U.S. Forest Service planting record. This report shows that the Midsouth still trails the Southeast in total acres planted with about 13 million acres as of fiscal year 1978. These planting record acreages (which are apt to overestimate true acreage) were compared to Southern Forest Experiment Station state inventory estimates of plantation acreage. Totals for all states and for the most recent 10-year interval in two states (Arkansas and Mississippi) were compared. As with the Southeast, the inventory findings alone are apt to be conservative. In the Midsouth the percentage of inventoried plantations to planted acres is considerably lower than for the Southeast. Our inventory consistently shows between 70 and 80 percent of the plantation acreage reported in the planting records. Using a 20 percent reduction factor on the reported acres yields about 10 million acres of plantation in the seven states. This figure is about 33 percent of the 30 million acres of commercial forest presently considered pine type in the Midsouth.
Figure 1 illustrates the trend in plantings over a 25-year period. The trend is somewhat different from that found in the Atlantic South. There a clear, nearly linear trend was established in the 50's. Even after the planting expansion during the Soil Bank Program, forest industry continued to increase the acres planted almost yearly. Our experience is different. After the brief explosion of planting during the late 50's, planting generally returned to the levels of the earlier part of the decade and remained at that level until the late 1960's. Total acres planted did not regularly exceed 400,000 per year until after 1970. At the state level the ages of plantations and acreages involved reveals an additional trend, the westward movement of forest management practices. Figures 2 - 5 show the onset of plantation establishment in several of the states. The oldest significant plantation acreages are those of Alabama, while the youngest are to be found in Texas and Arkansas. Only in the past 5 years have significant acres of plantation been established in Arkansas; these will not become suitable for commercial thinning until well into the 1990's.

The distribution of pine plantation is almost evenly divided in quarters among Alabama, Mississippi, Louisiana and the remaining four states of the Midsouth (Figure 6). For the next 10 years significant acreages suitable for thinning will come from the three Gulf Coast states.
FIGURE 1. ACRES OF FOREST PLANTING
MIDSOUTH TOTALS BY OWNERSHIP

THOUSAND ACRES/AN.


NAT'L FOREST
OTHER PUBLIC
FOREST IND
HIPF'S
FIGURE 3. ACRES OF FOREST PLANTING
MISSISSIPPI: BY OWNERSHIP

THOUSAND ACRES / AN.

AN.
FIGURE 4. ACRES OF FOREST PLANTING
ARKANSAS: BY OWNERSHIP

THOUSAND ACRES / AN.

AN.

NAT’L FOREST
OTHER PUBLIC
FOREST INDUS
NPFP’S
FIGURE 5. ACRES OF FOREST PLANTING

THOUSAND ACRES / AN.

NAT'L FOREST
OTHER PUBLIC
FOREST INDUS
HPPF'S
FIGURE 6. PLANTATION ACREAGE
Midsouth States

Based on 10 million acres
The next two figures (7 and 8) portray the ownership classes of commercial forest land in the region. Figure 7 is the overall ownership pattern indicating that industry owns nearly 20 percent of the 188 million acres reported in Forest Statistics of 1977. Seventy two percent of the acreage is owned by NIPF's (Non-Industrial Private Forest owners). In terms of plantations Forest Industry has nearly 50 percent of the reported acres planted, while only 38 percent of these acres are NIPF (Figure 8). (National Forest and other public owners represent less than 10 percent of the plantation acres). Many of the NIPF acres of plantation can be attributed to the Soil Bank Program. Forest survey data indicated significant shifts in land use between the two most recent surveys. Examination of the survey data did not reveal the specific disposition of Soil Bank era acres. Some certainly reverted to agricultural use, others remain in plantation. Because many of these Soil Bank-NIPF acres are now biologically ready to be thinned, disposition of these plantation acres will receive some attention in upcoming surveys.

The age distribution of existing pine plantations was determined from the planting data. Figure 9 shows percentage distribution of the data in 5-year age classes over the 10 million acres planted. Again the largest concentration is in the 20-year-old class, those established under Soil Bank aegis. The second largest class is the recent planting (5-year-old class). Recall from Figure 4 that some of these young plantings are on poor shortleaf sites in the western part of the region and they will probably require longer to reach a commercially thinable density and volume.
FIGURE 7. OWNERSHIP OF COMMERCIAL FOREST
Midsouth States

Based on 188 million acres
FIGURE 8. OWNERSHIP OF PLANTATION
Midsouth States (1978)

Based on 10 million acres
Based on planting records
The acreage of thinning opportunity in the Midsouth during the decade ahead is illustrated in Figure 10. Unlike the Southeastern area trend, a more pronounced upward trend in acres is noticeable. The number of acres planted in 1965 was less than 250,000, and when discounted for the acres observed in our state inventories this amounts to 200,000 acres that should be available for thinning. However, by the end of the period an annual thinning potential on nearly 600,000 acres could exist in the Midsouth. In the relatively short span of 10 years there will be a three-fold expansion in the numbers of acres requiring commercial thinnings, if the optimistic estimates of production under intensive management are realized. Such an increase could easily require technological or systems changes, thus it would be well to begin planning now for this development.

A second consideration in the region is the timing of the availability. A comparison of the years in which plantings began to increase noticeably shows clearly the movement east to west. It should not be surprising that significant acreages reach commercial thinning densities and volumes in Alabama and Mississippi earlier than in Louisiana, Texas, and Arkansas. This state-by-state trend does have something of a mitigating influence on the overall increases, but in some cases it could mean that the time to plan is already slipping past — as in Alabama. This problem of acreages available for thinning, deserves considerable attention by the states and private industry now.
FIGURE 10. Projected Commercial Thinning Acres
Mid-South Plantations

- adjusted planting acreage
- smoothed trend
Originally we were to estimate potential thinning volumes in pine plantations for the entire Midsouth. Time and data access limited us to estimates for a single state. The Mississippi survey was chosen because it is the most recent one completed among the important Gulf Coast states. It must be noted that yields identified on existing plantations may be poor predictors of future yields on well-managed forest industry lands. Nonetheless, the data we have collected reflects a real work situation in which many plantation acres are not managed at the intensity of some forest industry lands.

Our inventories are based on the careful measurement of not only dbh, but of upper stem diameters on thousands of trees 5.0 inches and larger at breast height. Computation of merchantable volume is on data for an individual tree using routines developed by L. Groseenbaugh. Volumes of individual trees are expanded to a per-acre basis and recorded in cubic feet per acre. Further calculations of cords per acre are based on utilization studies that are statistically sound. Because of insufficient data we could not report volumes and basal areas by site class as was done by Knight and Sheffield. Distribution of site classes (Figure 1) might give an idea of the potential number of acres producing better returns than those reported in Tables 1 - 4. Notice that the better sites are producing at least 85 cu. ft./acre. Based on our cubic foot to standard cord conversion factors, this is more than 1 cord per acre per year.
Thinning yields in Mississippi are low compared to those found in the
Southeastern region. Two of many possible reasons for this condition are cited.
First, much of the data comes from Soil Bank era planting. On average these acres
reflect a lower intensity of management—typical of many NIPF acres. Second, in
some areas hardwood competition forms a significant portion of the basal area
and volume. (The volumes reported are strictly for pine).

Tables 1–4 summarize average stocking and volumes in plantations in
Mississippi. For reference to the Southeast our tables are approximately
equivalent to the medium site tables presented by Knight and Sheffield.
Total area refers to the estimate of the acres in a given age class. Yields
refer to probable cords per acre produced as a result of thinning an average
acre to 60 square feet of basal area and conversion of cubic foot volume to
standard cords. Volumes reported are exclusively pine. Table 1 portrays
volumes and stocking for Northern Mississippi (Unit 2). Plantations
are primarily Loblolly on pine type sites. Table 2 shows similar parameters
for Central Mississippi (Unit 3). The probable thinning yields are highest
for this unit, still they are lower than the projections given for Southeast
plantations of medium site. Southeast Mississippi (Unit 4) is characterized
by lower per acre volumes and basal areas at age 15 for sites which are
primarily slash pine type (Table 3). Totals for the state are not much
different from the individual units. The potential yields reported here are
for average conditions, but they suggest that the 15-year age class (a class
dictated by inventory data collection routines) is still a little young from
which to expect substantial thinning yields.
<table>
<thead>
<tr>
<th>Stand age</th>
<th>Trees 5.0 in. dbh and larger</th>
<th>Total Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Basal Area</td>
<td>net volume</td>
</tr>
<tr>
<td></td>
<td>(sq. ft.)</td>
<td>(cu. ft.)</td>
</tr>
<tr>
<td>5</td>
<td>30</td>
<td>665</td>
</tr>
<tr>
<td>15</td>
<td>68</td>
<td>685</td>
</tr>
<tr>
<td>25</td>
<td>85</td>
<td>1146</td>
</tr>
<tr>
<td>35</td>
<td>66</td>
<td>1154</td>
</tr>
<tr>
<td>Mixed</td>
<td>2/</td>
<td></td>
</tr>
</tbody>
</table>

1/ Forest survey estimate of total plantation acres in an age class.

2/ Too few plots to make any estimate.
Table 2.—Average stocking and volume per acre and acreages
Mississippi Unit 3. (Primarily Loblolly)

<table>
<thead>
<tr>
<th>Stand age</th>
<th>Trees 5.0 in. dbh and larger</th>
<th>Basal Area</th>
<th>net volume</th>
<th>standard</th>
<th>Total Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(sq. ft.)</td>
<td>(cu. ft.)</td>
<td>cords</td>
<td>acres</td>
</tr>
<tr>
<td>5</td>
<td>11</td>
<td>100</td>
<td>1.3</td>
<td></td>
<td>179</td>
</tr>
<tr>
<td>15</td>
<td>78</td>
<td>1060</td>
<td>14.2</td>
<td></td>
<td>46</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>yield = 3.2 cords</td>
</tr>
<tr>
<td>25</td>
<td>105</td>
<td>1920</td>
<td>25.6</td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>35</td>
<td>60</td>
<td>1100</td>
<td>14.7</td>
<td></td>
<td>29</td>
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<tr>
<td>Mixed</td>
<td>60</td>
<td>1112</td>
<td>14.8</td>
<td></td>
<td>17</td>
</tr>
</tbody>
</table>

thinned to 60 ft.²

46 yield = 3.2 cords
Table 3.--Average stocking and volume per acre and acreages
Mississippi Unit 4. (Primarily slash)

<table>
<thead>
<tr>
<th>Stand age</th>
<th>Trees 5.0 in. dbh and larger</th>
<th>Basal Area (sq. ft.)</th>
<th>net volume (cu. ft.)</th>
<th>standard cords</th>
<th>Total Area thousand acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>9</td>
<td>60</td>
<td>.8</td>
<td></td>
<td>317</td>
</tr>
<tr>
<td>15</td>
<td>55</td>
<td>615</td>
<td>8.2</td>
<td></td>
<td>238 no yield</td>
</tr>
<tr>
<td>25</td>
<td>80</td>
<td>1065</td>
<td>14.2</td>
<td></td>
<td>68</td>
</tr>
<tr>
<td>35</td>
<td>45</td>
<td>1425</td>
<td>25.0</td>
<td></td>
<td>11 2/</td>
</tr>
<tr>
<td>Mixed</td>
<td>26</td>
<td>265</td>
<td>3.5</td>
<td></td>
<td>23 2/</td>
</tr>
</tbody>
</table>

2/ Very rough estimates.
Table 4.-- Average stocking and volume per acre and acreages State totals for Mississippi (includes unit 1 & 5)

<table>
<thead>
<tr>
<th>Stand age</th>
<th>Trees 5.0 in. dbh and larger</th>
<th>: Basal area (sq. ft.)</th>
<th>: net volume (cu. ft.)</th>
<th>: standard cords</th>
<th>: Total Area thousand acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>13</td>
<td>170</td>
<td>2.2</td>
<td>622</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>.66</td>
<td>730</td>
<td>9.7</td>
<td>547</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>85</td>
<td>1230</td>
<td>16.4</td>
<td>236</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>68</td>
<td>1300</td>
<td>17.3</td>
<td>126</td>
<td></td>
</tr>
<tr>
<td>Mixed</td>
<td>50</td>
<td>670</td>
<td>8.9</td>
<td>52</td>
<td></td>
</tr>
</tbody>
</table>

thinned to 60 ft.²
yield = 0.8 cord
We feel that average volumes will be considerably greater when the increases in forest industry managed lands begin to appear in the statistics. In addition, if we remember that plantation forestry was much better developed in the Atlantic South during the Soil Bank era, it is possible that a greater dilution of industry land's production levels is present in the Mississippi data than in comparable Atlantic data. There is also a good deal of volume in hardwood on the plantations in Mississippi. If this volume is directly utilized or converted to pine through proper site occupancy and maintenance, it increases the net volumes available from the site significantly. Stands which will reach thinning age during the 80's originated more recently than the ones analyzed and the impact of improved forest management should be realized during the 80's. Thus, it is quite likely that yields similar to those reported by Knight will be available in the Midsouth.

To put potential volumes in perspective, consider the pulp production for the seven-state area (Figure 12). There was a total of 25 million standard cords reported in Southern Pulpwood Production, 1977. During the past 20 years roundwood production has increased significantly from 6 million to 12 million standard cords per year. Most of the increase occurred between 1965 and 1970. The most recent increases in overall pulp production have come from better utilization of wood residues. Wood residues, which accounted for 5 - 15 percent of the pulp production during the 1960's, now contribute 35 percent of the total. Further expansions in pulping capacity may be possible through gains in utilization of residues. However, a major opportunity for increased production will be available from thinnings, especially toward the end of the coming decade. Potential thinning volumes in the Midsouth at the end of the period will approach 1.25 million cords even at conservative levels used for prediction in this paper. This represents nearly 15 percent of the current annual softwood roundwood production. If averages per acre volumes increase significantly due to the impact of better management expected in the region during the 80's, the figure could be closer to
FIGURE 11. DISTRIBUTION BY SITE CLASS
Plantations in Mississippi

> 85 cu ft/an.
56.1%

< 50 cu ft/an.
21.3%

50 - 85 cu ft/an.
22.6%
FIGURE 12. Midsouth Pulp Production 1951-1977
In summary, review Figure 10. Regardless of the interval between planting and commercial thinning, be it 15 or 20 years, there is an imminent expansion of the acres suitable for thinning in the Midsouth. This expansion will occur during an expected period of economic uncertainty. This could signal a shift in emphasis to management activities that are economically efficient, which could have a serious impact on the potential production of many acres needing to be thinned during the decade. The first solid data on thinning of non Soil Bank era plantations will become available on completion of the 1980 - 81 RRE inventory of the resources in Alabama. The Southern Station will be critically involved in the gathering of pertinent timely data concerning the status of commercial thinning opportunities in Alabama and the rest of the Midsouth.