

# ECONOMIES OF SCALE AND FOREST MANAGEMENT IN MISSISSIPPI

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**Abstract**—Mississippi is the leading producer of timber in the south-central region of the United States with a combined 78 billion board feet of hardwood and softwood sawtimber harvested annually. Most of this timber comes from private nonindustrial forest land, which accounts for 66 percent of the State's 18.6 million acres of forest land. The forest products industry contributes \$11.4 billion annually to the State economy. Between 1978 and 1996, the number of forest landowners in Mississippi has increased from 185,000 to just over 368,000. As the number of landowners has increased, the average size of forest properties has dropped from approximately 76 to 50 acres. This reduced forest property size increases the costs associated with forest management. For landholdings smaller than 10 acres in size, there is an even larger disparity in management costs. Although these smaller parcels can be harvested, site preparation and planting costs may be an obstacle to forest management. The education level and motivation of this large and diverse ownership group also plays a role in forest management. Recommendations for addressing these issues lie primarily in landowner education and economic incentive programs. Landowner knowledge of forest valuation, management, and sources of assistance will be critical to improving and maintaining productivity of these forests.

## INTRODUCTION

Mississippi is a heavily forested State. Approximately 18.6 million acres of forest land accounts for 66 percent of the State's land area. Forestry and the forest products industry contribute \$11.4 billion to the State economy (Munn 1997). Private nonindustrial forest (PNIF) landowners own 66 percent of the forest land in the State. Since 1978, the number of forest landowners in Mississippi has increased from 185,000 to 368,000 in 1996 (Birch 1996). Along with this increase in landowners, average land holdings have dropped from 76 to 50 acres in size. This can create a system of fragmented ownerships and diseconomies of scale for natural resource management costs (Fleury and Blinn 1996). Much of the forest land in the United States was originally in large blocks, and these blocks have been continuously fragmented over the years (Vessels 1996). Main causes of forest fragmentation include increasing numbers of forest landowners, urban sprawl, and agricultural development (Drzyzga and Brown 1998, Hill 1985, Rudis 1995). Many new forest landowners were raised in urban areas and have different management goals from traditional timber production (Dwyer and Stewart 1998, Shepard 2000). Fragmentation may also increase demands on forest land for recreation and wildlife habitat (Hill 1985, Schmidt and Raile 1998).

Recent increases in stumpage prices of southern pine sawtimber may have increased timber harvesting in the South. However, many landowners lack a basic understanding of forest valuation and management. An understanding of these two concepts is extremely important if smaller forest landowners are to receive the socio-economic benefits of their forest land. The purpose of this paper is to discuss the influence of forest fragmentation on forest management costs in Mississippi. In addition, programs offered by the Mississippi State University Extension Service, and other State and Federal programs to assist and educate PNIF landowners will be discussed.

## METHODS

### Cost Data for Mississippi

Average costs per acre are provided by the Mississippi Forestry Commission for the 1998 Forest Resources Development Program (FRDP). FRDP was established in 1974 to increase timber production on NIPF lands. It provides cost-share assistance to eligible landowners for certain forest improvement practices (Varnedoe 1993). Any private landowner, association, or agency of the State is eligible for FRDP funds except for corporations that manufacture forest products or provide public utilities. In addition, land on which Federal cost-share monies have been used is not eligible for FRDP assistance. FRDP-approved practices discussed here include mechanical and chemical site preparation, prescribed burning, and pine and hardwood planting.

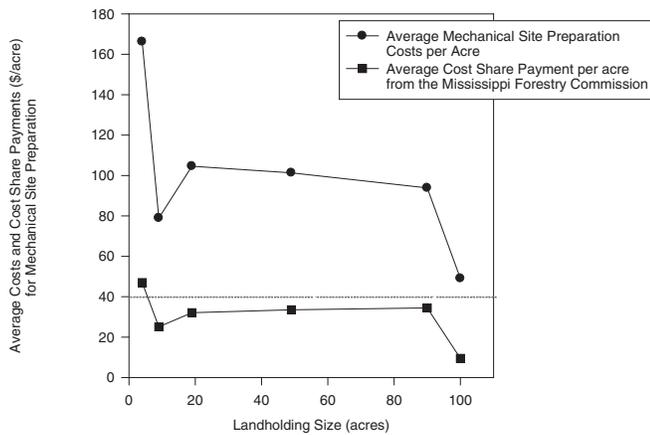
The Mississippi Forestry Commission allows FRDP funds to be available for both heavy and light mechanical and chemical site preparation. Differences in cost and cost-share payments are dramatic, with heavy mechanical site preparation reimbursed at \$40 per acre and light mechanical site preparation at only \$5 per acre. However, all mechanical and chemical site preparation cost-share data have been lumped together. Because of this, values reported here for both mechanical and chemical site preparation will be assumed to be for heavy site preparation. The Mississippi Forestry Commission has evaluated 1998 forest management costs and cost-share data by landholding size. These landholding sizes are as follows: 1 to 4 acres, 5 to 9 acres, 10 to 19 acres, 20 to 49 acres, 50 to 99 acres, and >100 acres.

## RESULTS AND DISCUSSION

### Mechanical Site Preparation

Average mechanical site preparation costs by landholding size for Mississippi are presented in figure 1. Costs for small landowners (1 to 4 acres) are highest at approximately \$170 per acre. Costs for landholdings over 100

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\*Horizontal line represents maximum cost share payment allowable for mechanical site preparation (\$40.00 per acre) by the Mississippi Forestry Commission.

Figure 1—Average costs and cost-share payments for mechanical site preparation by landholding size in Mississippi in 1998.

acres are lowest at approximately \$50 per acre. Generally, costs decrease as ownership size increases, with the exception of landholdings between 5 and 9 acres, which are the second lowest values presented.

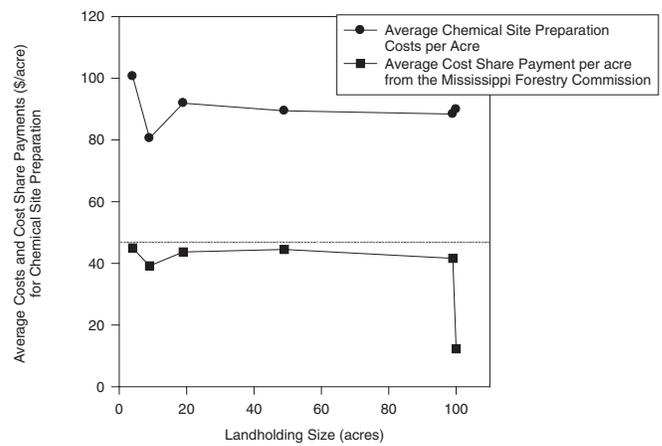
Cost-share payments per acre are highest for the 1 to 4 acre size class with a general decrease in cost-share payment with increasing acreage. Cost-share payments for the 1 to 4 acre size class are greater than the \$40 per acre maximum payment allowed. Although there is no clear reason for this, it is possible that some Section 16 land was reimbursed at a full 100 percent of expenses incurred. By State law, every 16<sup>th</sup> section is set aside for funding schools in that county. FRDP cost-share activities on Section 16 lands are 100 percent reimbursed to the counties.

### Chemical Site Preparation

Chemical site preparation costs and cost-share payments showed trends similar to mechanical site preparation with the 5 to 9 acre size class exhibiting the lowest costs. However, there was only an approximate \$20 per acre difference between the smallest and largest landholding sizes (fig. 2). Cost-share payments for the largest landholding size decreased dramatically compared to the other landholding sizes. A possible reason for this could be that more light chemical site preparation work was performed on these larger landholdings, resulting in a decrease in payments.

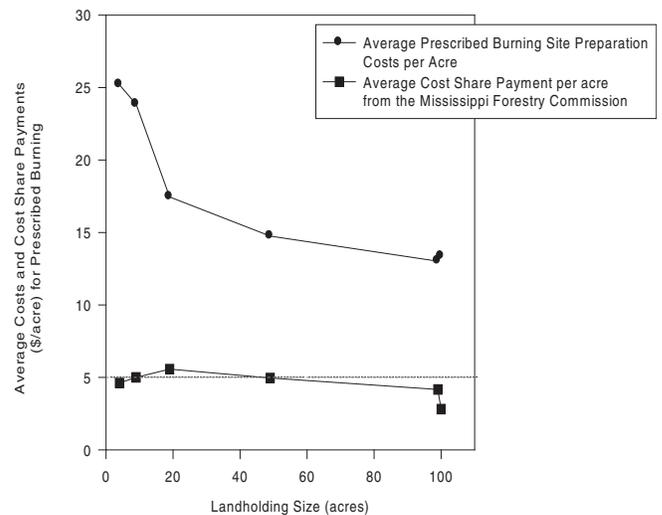
### Prescribed Burning Site Preparation

Costs varied greatly for prescribed burning with the highest costs occurring in the smallest landholding sizes, and steadily decreasing with increasing acreage. Cost-share payments were also very similar for all landholding sizes (fig. 3). Increased costs associated with smaller acreages include higher fire lane construction and maintenance costs along with the cost of moving equipment to these smaller sites. The use of prescribed burning is decreasing in Mississippi due to increased costs of liability insurance and more restrictive environmental limitations, which serve to limit days burning can occur.



\*Horizontal line represents maximum cost share payment allowable for chemical site preparation (\$45.00 per acre) by the Mississippi Forestry Commission.

Figure 2—Average costs and cost-share payments for chemical site preparation by landholding size in Mississippi in 1998.



\*Horizontal line represents maximum cost share payment allowable per acre for prescribed burning site preparation (\$5.00 per acre) by the Mississippi Forestry Commission.

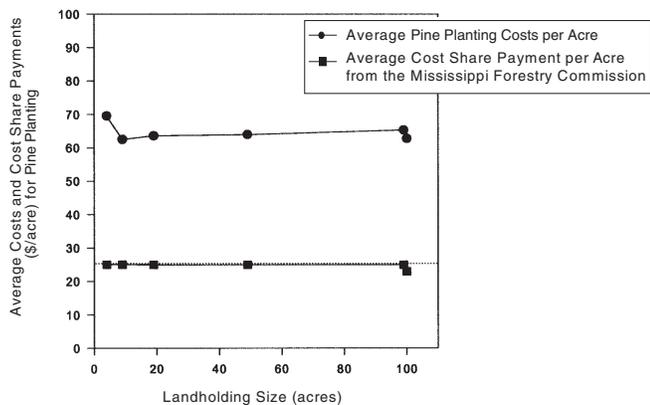
Figure 3—Average costs and cost-share payments for prescribed burning site preparation by landholding size in Mississippi in 1998.

### Pine Planting

Pine planting costs and cost-share payments are consistent across all landholding sizes (fig. 4). Often, smaller landowners can have their land planted when a contractor is planting other sites in the area. Cooperation and communication among all landowners in an area for planting and site preparation work can reduce costs for smaller landowners.

### Hardwood Planting

Hardwood planting costs were higher and more varied than pine (fig. 5) for several reasons. Hardwood seedlings are more expensive than pine seedlings in part because they are more difficult to grow in a nursery, and, as a consequence, fewer nurseries grow them for forest planting. Secondly, due to more lateral roots and an overall larger



\*Horizontal line represents maximum cost share payment allowable per acre for pine planting (\$25.00 per acre) by the Mississippi Forestry Commission.

Figure 4—Average costs and cost-share payments for pine planting by landholding size in Mississippi in 1998.

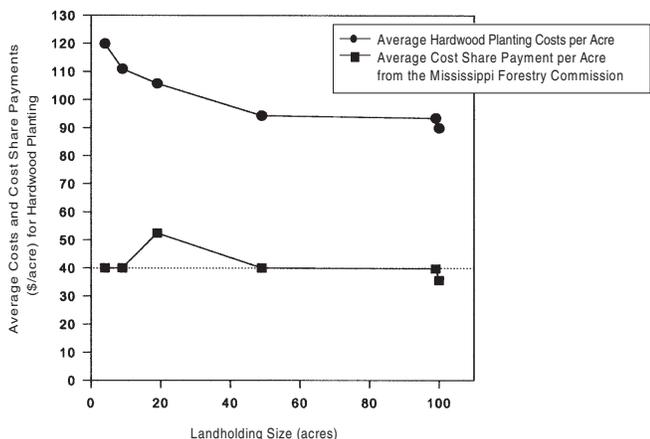


Figure 5—Average costs and cost-share payments for hardwood planting by landholding size in Mississippi in 1998.

root mass, hardwood seedlings are more difficult to plant, thus increasing costs.

## CONCLUSIONS

In summary, all the management practices discussed in this paper are more expensive for smaller landowners (1 to 4 acres) than for larger landowners ( $\geq 100$  acres). As fragmentation continues and landholding sizes become smaller, these increased management costs may become more pronounced (Leatherberry 1998). In addition to specific management costs, forestry assistance costs also increase with decreasing landholding size (Munn 2001). The average forest landholding size in Mississippi is currently 50 acres, down from 76 acres 25 years ago. The number of forest landowners has nearly doubled during this same period. However, at the same time, the total forested acreage in the State has increased. This is largely due to the conversion of former agricultural land to forest land through the Conservation Reserve Program.

The average landholding size appears to be sufficiently large to balance the economies of scale for forest

management activities. However, the decrease in landholding size over the last 25 years is likely to continue. Since most of the State's forest land is controlled by NIPF landowners, changes in this ownership group will have an effect on the forest management costs and the overall forest products industry in Mississippi.

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