

Nonindustrial private forest landowners' forest management activities and expenditures in Mississippi

1998-2000 data

by

Kathryn G. Arano

Ion A. Munn



Forest and Wildlife Research Center
RESEARCH BULLETIN

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On the cover: The cover photo is of Mississippi Outstanding Tree Farmers of 1999, Dr. Terry and Anne Ozier. Dr. Ozier, a veterinarian, first became interested in tree farming for the long-term investment aspects it provides. In 1958, the Oziers bought their first tract of land in Rankin County—1800 acres of crop land and unproductive forest land. Some 30 years after starting their tree farm, the Oziers became the Nation's Outstanding Tree Farmers of 1990.

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and

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Table of Contents

| | |
|--|---|
| Introduction | 1 |
| Methods and Procedures | 2 |
| Study Population | 2 |
| Data | 2 |
| Analysis | 2 |
| Results | 3 |
| Survey | 3 |
| Forest Ownership | 3 |
| Silvicultural and Harvesting Activities | 4 |
| Overhead Expenses | 5 |
| Statewide Acres Treated and Expenditures | 6 |
| Discussion | 7 |
| Literature Cited | 9 |

List of Figures

| | | |
|-----------|---|---|
| Figure 1. | Comparison of the distribution of Mississippi NIPF landowners by ownership size class for survey respondents and the population of state landowners | 3 |
| Figure 2. | Average acres of timberland by forest type owned by NIPF respondents in Mississippi (1998–2000 average) | 4 |
| Figure 3. | Timberland composition by forest type by NIPF respondents in Mississippi (1998–200 average) | 4 |
| Figure 4. | Allocation of forest management expenditures for NIPF respondents in Mississippi (1998–2000 average) | 6 |

List of Tables

| | | |
|----------|---|----|
| Table 1. | Silvicultural activities and expenses of NIPF respondents in Mississippi during 1998–2000 | 10 |
| Table 2. | Harvesting activities of NIPF respondents in Mississippi during 1998–2000 | 11 |
| Table 3. | Overhead activities and expenses of NIPF respondents in Mississippi during 1998–2000 | 11 |
| Table 4. | Estimated acreage treated and expenditures for silvicultural activities by NIPF landowner in Mississippi during 1998–2000 | 12 |
| Table 5. | Estimated expenditures for overhead activities by NIPF landowners in Mississippi during 1998–2000 | 13 |
| Table 6. | Estimated acres harvested by NIPF landowners in Mississippi during 1998–2000 | 13 |

Abstract

Nonindustrial private forest (NIPF) landowners were surveyed to determine their annual forest management activities and related expenditures for the period 1998-2000. Respondents were asked to report their overhead and silvicultural activities and associated expenses. Overhead expenses included property taxes, fees for professional services, routine expenses, fee hunting expenses, and miscellaneous expenses. Silvicultural activities included site preparation, planting, intermediate treatments, and timber harvests. Most silvicultural activities occurred infrequently. With the exception of property taxes, fewer than 11 percent of respondents reported annual expenditures for any specific activity in any year during the survey period. Planting and site preparation were the most common silvicultural expenditures reported. Property taxes were the most common overhead expenses reported. Total expenditures for all NIPF respondents averaged \$11.51/acre-owned. This represents an annual outlay of \$146 million when extrapolated to the state level.

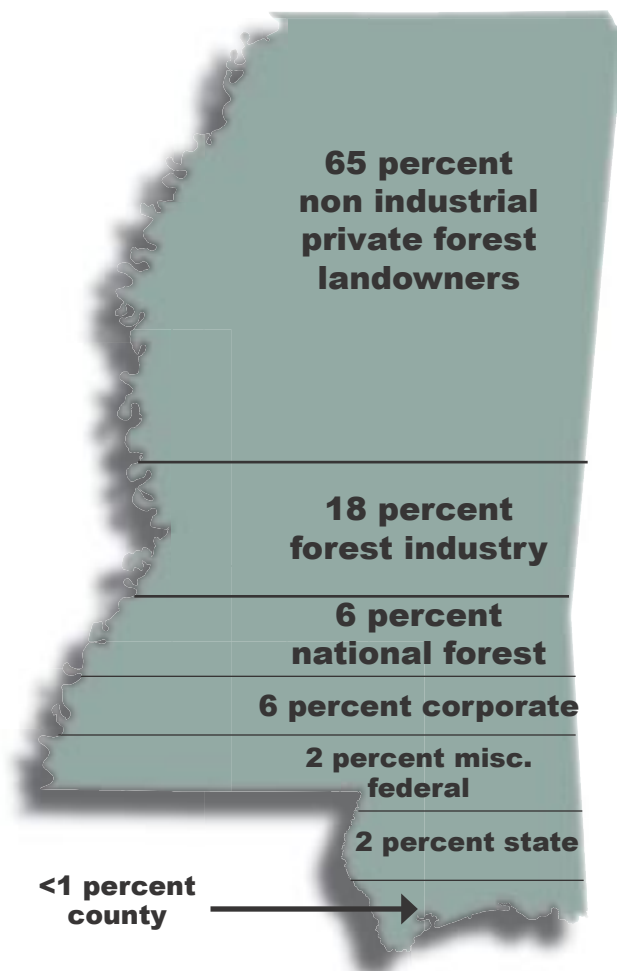
Introduction

Mississippi's forest land covers 18.6 million acres or 62 percent of the state's total land area. Nonindustrial private forest (NIPF) landowners own nearly 66 percent of Mississippi's timberlands. These landowners play a vital role in the long-term sustainability of the nation's timberlands. The level of forest management investment by these landowners can have a dramatic impact on timber inventory and future harvest levels. Little information is available, however, on NIPF landowners' investment in forest management activities. While numerous studies have estimated the cost of various forest management practices, the actual dollar amounts invested by NIPF landowners are not readily available (Harou et al. 1986). Information regarding various forest management practices and

costs is generally collected from forest industry, state foresters, and scientists but not from NIPF landowners (Moffat et al. 1998). In previous studies, the authors have investigated forest management activities and expenditures for this landowner group but did not determine treatment costs per acre or total acres treated.

Information regarding expenditures by private landowners over a period of time demonstrates how investments on their forestlands are distributed among various management and silvicultural activities. This information provides a useful benchmark for landowners and forest planners. Expenditures for forest management activities also reflect landowner thoughts on the expected returns of various treatments and provide insights into landowner objectives. Finally, such information also provides an estimate of the economic contribution of forestry activities to the state's economy.

This study examines the forest management activities and expenditures of NIPF landowners in Mississippi from 1998 to 2000. While expenditure data is collected annually, the analysis was limited to the three-year period because of differences in the sampling procedures and survey instrument used during the previous survey periods.



Forest Ownership

Individuals and farmers are the predominant owners of Mississippi land.

Methods & Procedures

Study Population

The study population consisted of NIPF landowners who own at least 20 acres of uncultivated lands in Mississippi. Uncultivated land refers to those rural land-uses other than agriculture, the majority of which are forest-related. The 20-acre threshold was chosen to eliminate non-forestry uses (e.g., home sites). Landowners who own less than 20 acres account for only 8.5 percent of the state's uncultivated acreage (Doolittle 1996).

Data

The data set used in this study was derived from a 3-year mail survey (1999-2001) conducted by the Social Science Research Center at Mississippi State University. The survey collected information on forest management activities and expenditures by Mississippi NIPF landowners from 1998 to 2000. The survey was limited to landowners who own at least 20 acres of uncultivated land in 73 of 82 counties.

The survey instrument was designed to elicit information from NIPF landowners about the area of forestland they own in Mississippi, their annual forest management activities, and associated expenditures. Landowners were asked to report the area of forestland they owned in Mississippi by forest type, their silvicultural activities and associated costs, and their overhead expenses for the previous year. Silvicultural activities included site preparation (mechanical treatments, chemical treatments, burning and fertilization), planting, intermediate treatments (prescribed burning, fertilization, pruning, chemical release, pre-commercial thinning, and timber stand improvement), and timber harvests. Overhead expenses included property taxes, fees for professional services (consulting forester, attorney, accountant, and surveyor), routine expenses

(property line maintenance, protection, road maintenance, animal damage control, and supervision and administration), hunting costs associated with hunting leases and other fee hunting arrangements, and miscellaneous expenses (road construction, timber sales, others).

Analysis

Silvicultural Activities: For each silvicultural treatment, the percentage of respondents who conducted the treatment, the average percentage of their land base treated, the average cost per acre of the treatment for respondents engaged in the activity, and the average cost per acre-owned for all respondents were computed. Costs per acre treated and costs per acre owned were weighted by the number of acres owned in computing the averages. The percentage of landowners conducting treatments and the percentage of their land base treated illustrate the distribution and frequency of silvicultural activities in the state. Information on costs per acre treated provides useful information to Mississippi landowners, who may be considering such activities on their lands. Information on costs per acre-owned illustrates the magnitude of forest management expenditures for NIPF landowners as a group. Silvicultural expenditures were extrapolated to the state level by multiplying average costs per acre-owned for all respondents by the total acres of Mississippi NIPF timberland larger than 20 acres as reported by Doolittle (1996). Similarly, acres treated were extrapolated to the state level by multiplying average percentage of acres treated by the total acres of Mississippi NIPF timberland larger than 20 acres.

Overhead: For each overhead expense or activity, the percentage of respondents who incurred the expense, the average cost per acre

owned for respondents that incurred the expense, and the average cost per acre owned for all respondents were computed. The percentage of landowners incurring specific overhead expenses illustrates the distribution and frequency of these expenditures for forestland owners. Information on costs per acre owned for respondents incurring the overhead expense provides useful information

to Mississippi landowners as benchmarks for their own expenses. Information on costs per acre-owned for all respondents illustrates the magnitude of overhead expenditures for NIPF landowners as a group. Overhead expenditures were extrapolated to the state level by multiplying average costs per acre-owned for all respondents by the total acres of Mississippi NIPF timberland larger than 20 acres.

Results

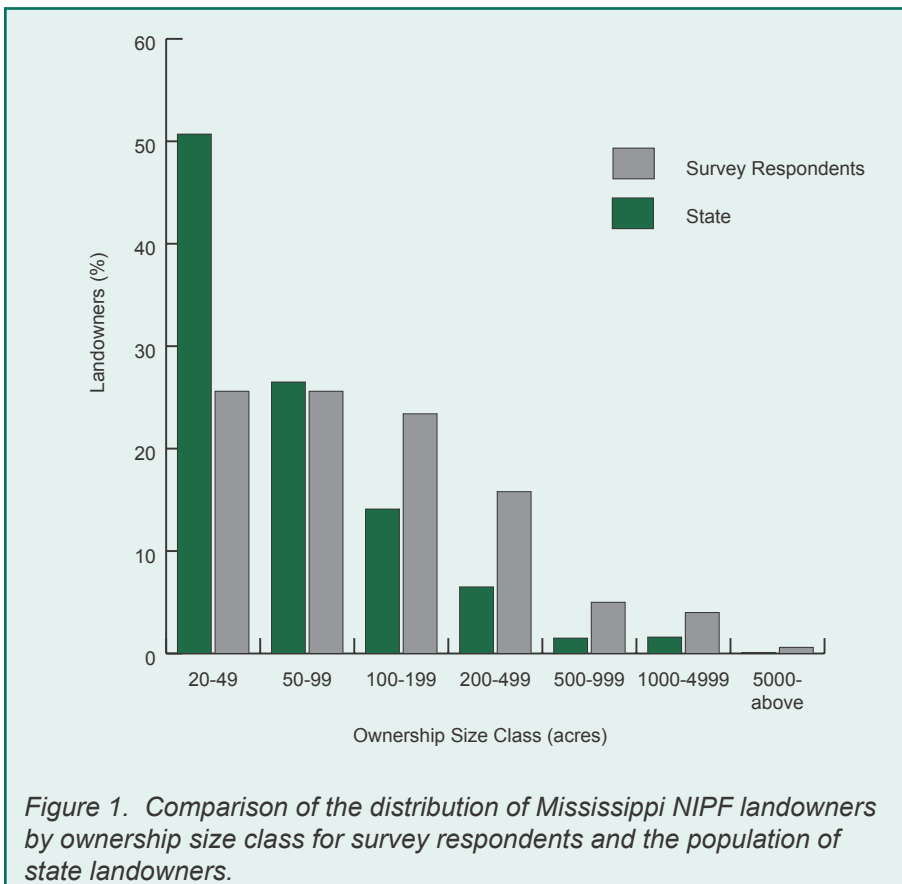
Survey

The mail surveys resulted in 1,605 usable responses for the three-year period, a 35 percent response rate. In light of the low response rate, there was a concern about response bias. Therefore, the distribution by ownership size of the respondents was compared to

that of the statewide population of forestland owners (Figure 1). The distribution of NIPF respondents differed significantly from that of the state population of NIPF landowners. For example, the smallest ownership size class (20-49 acres) is under-represented in the sample. Although this ownership size class accounts for over 50 percent of the number of forest landowners, it represents a disproportionately small percentage of the forest land base. In Mississippi, this ownership class owns less than 17 percent of the total NIPF area in ownerships 20 acres or larger. Nonetheless, response bias by ownership size may potentially bias the survey results. To investigate the potential impact of response bias, ownership size was regressed on per acre expenditures to determine whether expenditures varied by ownership size. The results of the regression indicated that response by ownership size did not bias the survey. Although the survey response rate varies by ownership size class, response bias is unlikely to bias the sample means calculated for this study.

Forest Ownership

The average ownership size reported over the three-year study period was 261 acres



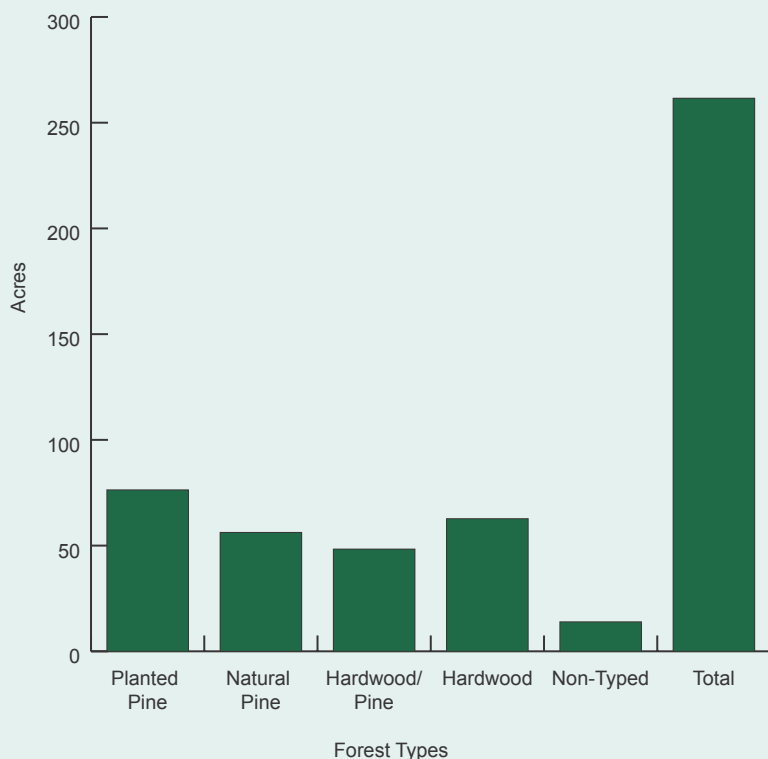


Figure 2. Average acres of timberland by forest type owned by NIPF respondents in Mississippi (1998–2000 average).

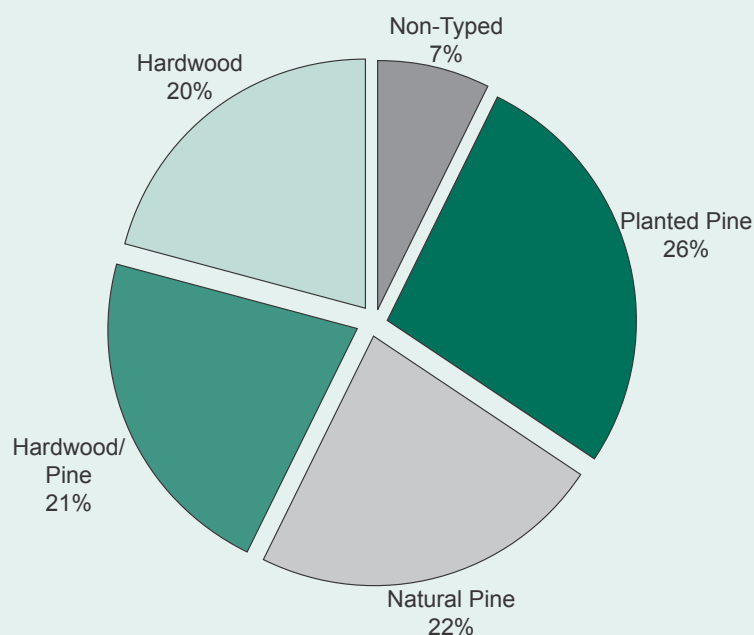


Figure 3. Timberland composition by forest type for NIPF respondents in Mississippi (1998–2000 average).

(Figure 2). This compares to an average ownership size of 99 acres for the statewide population of landowners with 20 acres or more of forestland (Doolittle 1996), again demonstrating the under representation of the smallest ownership size in the sample.

Pine plantations constituted the largest forest type owned by NIPF landowners in Mississippi (Figure 2). Pine plantations accounted for 26 percent of the acreage owned by NIPF respondents (Figure 3). The remaining acreage was roughly evenly distributed between natural pine (22 percent), hardwood/pine (21 percent), and hardwood (20 percent) forest types. Non-typed areas represented the remaining 7 percent.

Silvicultural and Harvesting Activities

Most silvicultural activities occurred infrequently, in terms of both percentage of landowners conducting the activity and the percentage of acreage treated (Table 1). On an annual basis, 16 percent of landowners conducted some type of silvicultural activity, treating approximately 9 percent of their acreage. Site preparation and planting accounted for the majority of these activities, both in terms of landowners participating and percentage of acres treated. Chemical site preparation was far more common than mechanical site preparation, accounting for almost twice the acres treated. Disking was the most common mechanical treatment and aerial application was the most common method of chemical treatment. Less than one fourth of the acres site prepared were also burned. Fewer than 4 percent of landowners conducted any intermediate treatments, treating less than 2 percent of their acreage.

Mechanical and chemical site preparation treatments averaged \$88.17/acre-treated and \$69.68/acre-treated, respectively.

Aerially-applied chemical site preparation averaged \$84.74/acre-treated and ground applications averaged \$34.01/acre-treated. Site preparation burning averaged \$12.05/acre-treated. Planting costs averaged \$64.45/acre-treated excluding the cost of seedlings. Intermediate treatment costs averaged \$33.60/acre-treated. Chemical release, timber stand improvement, pruning, and pre-commercial thinning all averaged just over \$50.00/acre-treated annually while fertilization costs averaged \$31.00/acre-treated. A substantially lower amount was spent on prescribed burning, which averaged only approximately \$9.00/acre-treated for respondents who practiced it.

Averaged across all landowners, silvicultural expenditures averaged \$4.27/acre-owned. Site preparation and planting accounted for \$3.90 of this total or approximately 18 percent and 16 percent of total expenditures, respectively (Figure 4). Among site preparation activities, chemical site preparation accounted for most of the expenses, averaging \$1.29/acre-owned. Mechanical treatments averaged \$0.63/acre-owned. Respondents spent less than \$0.40/acre-owned on intermediate treatments, which accounted for 3 percent of their total expenditures.

Annually, fourteen percent of landowners harvested timber, representing 5 percent of their land base (Table 2). Final harvests occurred on 2.33 percent of the land base. This indicates that the average rotation age for NIPF lands across all forest types is slightly over 40 years. Clearcutting was the most common final harvest method, occurring on 1.76 percent of the land base. Intermediate harvests occurred on 1.68 percent of the land base with first thinnings accounting for the majority of this category. Uneven age harvests accounted for approximately 20 percent of the acreage harvested.

Overhead Expenses

Approximately 72 percent of landowners incurred some type of overhead expense (Table 3). This relatively high percentage is attributed to property taxes that landowners are required to pay. Fewer than 10 percent of landowners incurred expenditures for any other overhead activity each year.

Approximately 65 percent of the respondents reported paying property taxes on their forestland during the survey period. Although some Mississippi landowners are exempt from paying property taxes, this percentage is obviously low. Several respondents noted that they were unable to determine what portion of their tax bill was due to forestland versus agricultural land and, therefore, they could not report the taxes paid on forestland. In counties where joint ownership of agricultural and forestland is prevalent, this would affect the number of non-responses. Property taxes averaged \$3.20/acre for landowners who reported this expenditure.

Over the study period, an average of 11 percent of landowners reported paying fees for some type of professional service each year. Consulting forester fees were the most common, reported by approximately 5 percent of landowners. On average, these landowners spent \$3.61/acre-owned in consultant fees. Accountant fees were incurred by 4 percent of landowners. Attorney and surveyor fees were the least common, reported by 2 percent and 3 percent of landowners, respectively.

Routine expenses include expenditures on routine management and maintenance activities associated with forest property. For landowners who incurred these routine expenses, expenditures averaged \$2.38/acre-owned. Property line maintenance and road maintenance were the most frequently occurring in this

category, incurred by approximately 9 percent of respondents. Supervision and administration was the least common expenditure, reported by only 2.5 percent of all respondents annually.

Few landowners incurred expenses related to commercial wildlife management. On average, only 2 percent of landowners incurred fee-hunting related expenses during the study period. These expenditures averaged less than \$2.00/acre-owned. Road construction expenses were incurred by 5 percent of landowners and slightly fewer than 5 percent of landowners spent money on timber sales and other activities. It is important to recognize that many timber sale expenses are included in consultant fees and not reported as separate expenditures.

Over the study period, total annual overhead expenses averaged \$7.24/acre-owned across all respondents. Overhead expenses comprise the majority of landowner expenditures or approximately 63 percent (Figure 4). Property taxes accounted for 22

percent of total expenditures.

Expenditures for professional services averaged \$1.07/acre-owned across all respondents. Consulting forester fees were the largest component, averaging \$0.72/acre-owned. Expenses for this service represent more than half of the amount spent on professional services. Attorney, accountant, and surveyor fees each averaged less than \$0.15/acre-owned.

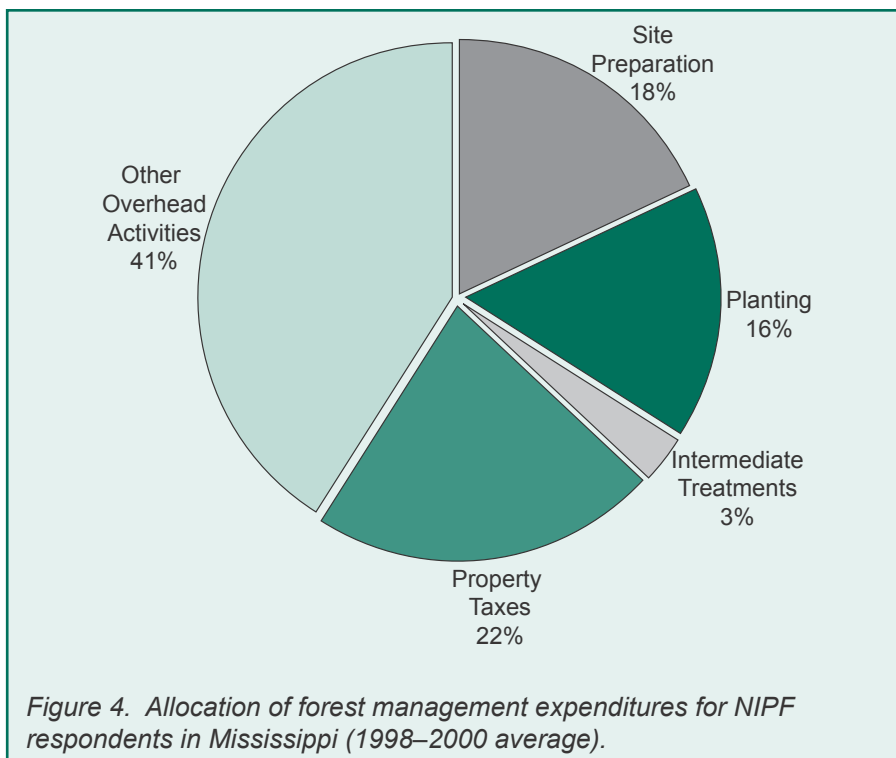
Routine expenses averaged \$0.76/acre-owned. Property line maintenance, road maintenance, and administration and supervision each averaged \$0.21/acre-owned and represented the largest component of routine expenses. Annual hunting costs associated with fee hunting averaged \$0.25/acre-owned annually.

Miscellaneous expenses were the largest component of overhead expenses. In total, these expenditures averaged \$2.66/acre-owned for all respondents. Expenditures on timber sales and road construction accounted for approximately 72 percent of this total, averaging \$1.02/acre-owned and \$0.89/acre-owned, respectively. Other miscellaneous expenses averaged \$0.76/acre-owned.

Statewide Acres Treated and Expenditures

NIPF respondents in Mississippi spent an average of \$11.51/acre-owned for forestry activities and overhead annually during the 3-year survey period. When extrapolated to the state level, NIPF landowners' total forest management expenditures represented an annual outlay of \$146 million (Table 4 and Table 5) for the 12,695,073 acres of timberland in Mississippi in ownerships larger than 20 acres.

Based on the survey results, NIPF landowners mechanically site prepared an estimated 126 thousand acres and chemically site prepared 244 thousand acres annually (Table 4). Of these acres, 145 thousand were also burned



prior to planting. Approximately 368 thousand acres were planted annually. Mississippi NIPF landowners spent \$26.9 million on site preparation and planting. In contrast, only \$4.9 million was spent on intermediate silvicultural treatments.

Statewide, an estimated 637 thousand acres were harvested annually (Table 6). Final harvests accounted for 44 percent of these or approximately 284 thousand

acres. Clearcuts accounted for 224 thousand acres of the final harvests. Intermediate harvests accounted for 224 thousand acres with first thinnings accounting for over 70 percent of these or approximately 166 thousand acres. Uneven aged harvests accounted for 140 thousand acres. Single tree selection was the most common uneven age harvest method, accounting for 114 thousand acres.

Discussion

This study examined the forest management activities and expenditures of NIPF landowners in Mississippi during the period 1998-2000. It provided detailed information on the various activities that landowners perform annually and the associated expenditures. Expenditures data provide a wealth of information with potential uses in a broad range of applications. Expenditures reflect the level of investment in the different forestry activities.

Most forest management expenditures occur infrequently. A large percentage of landowners are not engaged in any forestry-related activities in any given year. With the exception of property taxes, fewer than 11 percent of respondents reported annual expenditures for any specific activity in any year during the survey period. Even when expenditures were aggregated into broader categories, the percentage of respondents incurring expenditures in any given year remained below 20 percent. Landowners only treated a small percentage of their total timberland, averaging less than 10 percent annually. These low percentages suggest that little has changed since Dutrow and Kaiser's (1984) assessment of the investment opportunities in forestry. One explanation for these low percentages is that most silvicultural

activities are necessary only a few times during a typical rotation, thus the percentage of acreage treated in any given year will be small. For example, planting occurs only once during a rotation. Planting 2.9 percent of the timberland base annually translates to an average 35-year rotation age for NIPF lands, which is certainly within reasonable limits. Another possible reason is the nature of NIPF timberland holdings. Timberland holdings by NIPF landowners are predominantly in smaller tracts and are fragmented. Landowners with smaller and fragmented holdings have the fewest management options (Conner and Hartsell 2002), which could be one of the reasons why many landowners do not engage in forestry practices. While it is generally known that NIPF landowners are not as actively involved in intensive management as industrial owners, these findings may suggest some serious problems for future timber availability in the South. Provencher (1990) reported that intensive management of NIPF timberlands is needed to substantially reduce future timber scarcity. This is particularly important because NIPF landowners control the majority of timberlands in the South.

Information on relative percentages is also informative. It provides information regarding what

forestry activities are commonly conducted by landowners, which can ultimately be an indicator on how private lands are managed. How these lands are managed has an important bearing on their productivity (Thomas 1998). For example, planting and site preparation costs were the most common silvicultural expenditure reported, averaging 10 percent of the landowners over the study period. In contrast, expenditures on intermediate treatments were incurred by only 3.43 percent. Site preparation and planting are necessary first steps in intensive forest management (Dubois et al. 1999). Although the percentages of landowners who conducted these activities are relatively low, their importance relative to the other activities suggests a direction towards intensive management.

This study also documents the magnitude of forest management expenditures incurred annually by NIPF landowners. In Mississippi, total expenditures for all NIPF respondents averaged \$11.51/acre-owned. This represents an annual outlay of \$146 million when extrapolated to the state level. This represents an increase of approximately 20 percent from 1995-1997 expenditures reported by the author in a previous study.

Expenditures also reflect an informal ranking of forestry activities. Focusing strictly on activities directly related to timber growing, landowners view site preparation and planting as the most important silvicultural activities. A little over 90 percent of the money spent on silvicultural activities was spent on these two activities. In contrast, intermediate treatments (e.g. timber stand improvement, pruning) account for less than 10 percent of total silvicultural expenses. This

provides evidence that landowners consider site preparation and planting more profitable than other silvicultural activities.

This study also illustrates an interesting aspect of investing in forestland. Silvicultural expenses and forestry consultant fees account for approximately 43 percent of total average annual expenditures. These expenses are directly related to timber production, either through enhancing timber growth or returns on sales. As such, these expenditures result in a direct return on investment. The remaining expenditures—overhead expenses, except for the fees for consulting foresters—do not generate a direct return on investment in that they do not result in increased growth or increased returns on timber sales, and yet, they comprised the major component of what landowners spend for forest management. These expenditures averaged \$6.52/acre-owned annually and accounted for 57 percent of their total expenditures. Over a rotation, these amounts are substantial, and may reduce the attractiveness of forestland investments, particularly for those investors concerned about cash flow requirements. These expenditures, as a proportion of total expenditures, have risen 12 percent since the 1995-1997 survey. Total expenditures have risen by approximately 19 percent since the last study, averaging \$9.68/acre-owned in the 1995-1997 study and \$11.51/acre-owned in this study. Most of the increase in landowner spending is due to increases in non-productive costs associated with forestland ownership, not increases in management intensity. This finding provided evidence that non-productive costs will continue to constitute the majority of landowner expenses and may make timberland

investment increasingly less attractive to landowners.

Calculating mean expenditures using only those respondents engaged in the practices provides better estimates of the actual costs landowners are likely to incur than do sample means. For this reason, silvicultural expenses were also calculated on a cost per acre-treated basis and overhead expenses were calculated on a cost per acre-owned basis for landowners who incurred the overhead expense. The former is best suited for activities that most likely occur only on a portion of a landowner's property while the latter is best suited for property level expenses such as fees for professional services, supervision and administration, or property taxes. The study illustrates how expenditures can vary dramatically depending on the activities a landowner conducts. For example, landowners who pay property taxes, hire consulting foresters to sell timber, then site prepare and plant harvested areas, could incur over \$100/acre-treated for site preparation and planting and an additional \$7/acre-owned for property taxes and consulting forester fees. In contrast, custodial landowners who only pay property taxes face annual expenditures of only \$3/acre-owned.

In summary, expenditures data provides a wealth of information with potential uses in a broad range of applications. With minor modifications, the annual landowner survey conducted by the Social Science Research Center for the Mississippi Tax Commission could provide the basis for a continuing study of forest management expenditures, costs of forestry practices, and landowner behavior.

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Table 1. Silvicultural activities and expenses of NIPF respondents in Mississippi during 1998-2000.

| Expense Category | 3 Yr. Annual Average | | | | |
|---|--|-------------------|-----------------------|-----|---------------------|
| | Landowners who incurred silvicultural expenses | Land base treated | Cost per acre treated | | Cost per acre owned |
| | percent | percent | \$/ac-treated | n | \$/ac-owned |
| Site Preparation | 9.53 | 4.28 | 57.24 | 153 | 2.10 |
| Mechanical Treatments | 3.36 | 0.99 | 88.17 | 54 | 0.63 |
| Chopping | 0.44 | 0.16 | 96.53 | 7 | 0.14 |
| Ripping | 0.06 | 0.03 | 50.00 | 1 | 0.02 |
| Bedding | 0.19 | 0.05 | 28.90 | 3 | 0.002 |
| Shear | 0.19 | 0.03 | 105.14 | 3 | 0.01 |
| Pile | 0.93 | 0.18 | 71.72 | 15 | 0.11 |
| Disk | 1.12 | 0.10 | 33.63 | 18 | 0.03 |
| Combination | 1.00 | 0.42 | 113.08 | 16 | 0.33 |
| Chemical Treatments | 5.30 | 1.92 | 69.68 | 85 | 1.29 |
| Aerial | 3.80 | 1.36 | 84.74 | 61 | 1.11 |
| Ground | 1.50 | 0.57 | 34.01 | 24 | 0.19 |
| Burning | 3.61 | 1.14 | 12.05 | 58 | 0.11 |
| Aerial | 0.19 | 0.07 | 16.31 | 3 | 0.01 |
| Ground | 3.43 | 1.07 | 11.70 | 55 | 0.10 |
| Fertilization | 1.56 | 0.23 | 38.11 | 25 | 0.07 |
| Planting | 9.97 | 2.90 | 64.45 | 160 | 1.80 |
| Intermediate Treatments | 3.43 | 1.70 | 33.60 | 55 | 0.39 |
| Prescribed burning | 1.37 | 0.66 | 9.09 | 22 | 0.03 |
| Fertilization | 0.93 | 0.26 | 30.78 | 15 | 0.08 |
| Pruning | 0.25 | 0.04 | 50.00 | 4 | 0.02 |
| Chemical release | 0.93 | 0.25 | 56.15 | 15 | 0.12 |
| Pre-commercial thinning | 0.19 | 0.05 | 53.24 | 3 | 0.01 |
| Timber stand improvement | 0.37 | 0.44 | 54.23 | 6 | 0.13 |
| Total for Silvicultural Activities | 15.58 | 8.88 | 56.12 | 0 | 4.27 |

Table 2. Harvesting activities of NIPF respondents in Mississippi during 1998-2000.

| Harvest Type | 3 Yr. Annual Average | |
|------------------------------|---------------------------------------|---------------------|
| | NIPF respondents who harvested timber | Land base harvested |
| | percent | percent |
| Final Harvest | 7.60 | 2.33 |
| Clear-cut | 6.79 | 1.76 |
| Seed tree | 0.62 | 0.25 |
| Shelterwood | 0.50 | 0.22 |
| Intermediate Harvests | 5.86 | 1.68 |
| First Thinning | 5.30 | 1.31 |
| Second Thinning | 1.12 | 0.37 |
| Uneven Age Harvests | 3.12 | 1.10 |
| Group selection | 1.00 | 0.20 |
| Single tree selection | 2.18 | 0.90 |
| Total Harvests | 13.58 | 5.02 |

Table 3. Overhead activities and expenses of NIPF respondents in Mississippi during 1998-2000.

| Expense Category | 3 Yr. Annual Average | | | |
|---------------------------------------|---|---|-------|---------------------|
| | NIPF respondents with overhead expenses | Cost per acre owned for those who incurred expenses | | Cost per acre owned |
| | percent | \$/ac-owned | n | \$/ac-owned |
| Property Taxes | 65.36 | 3.20 | 1,049 | 2.49 |
| Fees for professional services | 11.15 | 3.51 | 179 | 1.07 |
| Consulting forester | 4.74 | 3.61 | 76 | 0.72 |
| Attorney | 2.49 | 1.24 | 40 | 0.15 |
| Accountant | 4.30 | 0.49 | 69 | 0.08 |
| Surveyor | 3.24 | 1.61 | 52 | 0.12 |
| Routine Expenses | 16.70 | 2.38 | 268 | 0.76 |
| Property line maintenance | 9.22 | 1.06 | 148 | 0.21 |
| Protection | 4.61 | 0.81 | 74 | 0.08 |
| Road maintenance | 8.97 | 1.06 | 144 | 0.21 |
| Animal damage control | 3.97 | 0.95 | 46 | 0.10 |
| Supervision and administration | 2.49 | 3.67 | 40 | 0.21 |
| Fee Hunting Expenses | 7.48 | 1.76 | 120 | 0.25 |
| Miscellaneous Expenses | 12.40 | 8.45 | 199 | 2.66 |
| Road construction | 5.36 | 8.35 | 86 | 0.89 |
| Timber sales | 4.98 | 5.46 | 80 | 1.02 |
| Others | 4.55 | 6.64 | 73 | 0.76 |
| Total | 72.02 | 8.45 | 1,156 | 7.24 |

Table 4. Estimated acreage treated and expenditures for silvicultural activities by NIPF landowners in Mississippi during 1998-2000.

| Expense Category | Extrapolated Acres Treated (‘000 Acres) | Extrapolated Expenditures (‘000 \$) |
|---|--|--|
| Site Preparation | 544 | 26,939 |
| Mechanical treatments | 126 | 8,149 |
| Chopping | 21 | 1,777 |
| Ripping | 5 | 254 |
| Bedding | 7 | 25 |
| Shear | 4 | 127 |
| Pile | 23 | 1,396 |
| Disk | 13 | 381 |
| Combination | 53 | 4,189 |
| Chemical Treatments | 244 | 16,504 |
| Aerial | 172 | 14,092 |
| Ground | 72 | 2,412 |
| Burning | 145 | 1,397 |
| Aerial | 9 | 127 |
| Ground | 136 | 1,270 |
| Fertilization | 29 | 889 |
| Planting | 368 | 22,851 |
| Intermediate Treatments | 216 | 4,951 |
| Prescribed burning | 83 | 381 |
| Fertilization | 34 | 1,016 |
| Pruning | 5 | 254 |
| Chemical release | 32 | 1,523 |
| Pre-commercial thinning | 6 | 127 |
| Timber stand improvement | 56 | 1,650 |
| Total for Silvicultural Activities | 1,128 | 54,741 |

Table 5. Estimated expenditures for overhead activities by NIPF landowners in Mississippi during 1998-2000.

| Expense Category | Extrapolated Expenditures ('000 \$) |
|--------------------------------------|--|
| Property taxes | 31,611 |
| Fees for professional services | 13,584 |
| Routine expenses | 9,775 |
| Fee hunting expenses | 3,174 |
| Miscellaneous expenses | 33,769 |
| Total for Overhead Activities | 91,913 |

Table 6. Estimated acres harvested by NIPF landowners in Mississippi during 1998-2000.

| Expense Category | Acres Harvested ('000 Acres) |
|------------------------------|---|
| Final Harvests | 284 |
| Clear-cut | 224 |
| Seed trees | 32 |
| Shelterwood | 28 |
| Intermediate Harvests | 213 |
| First thinning | 166 |
| Second thinning | 47 |
| Uneven Age Harvests | 140 |
| Group selection | 26 |
| Single tree selection | 114 |
| Total Area Harvested | 637 |



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