Forest Management Expenses of Mississippi's Nonindustrial Private Forest Landowners

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ABSTRACT: *Detailed information about the forest management expenditures incurred by nonindustrial private forest (NIPF) landowners over time provides a wealth of information about costs associated with forestland ownership, management practices implemented by NIPF landowners, and changes in management intensity over time. A survey of Mississippi's nonindustrial private forest (NIPF) landowners owning 20 ac or more of forestland was conducted to determine their annual expenditures on forest management practices for the period 1995–1997. Landowners were asked how much they spent on property taxes, professional services, timber management activities, and other management activities. The resulting expenditures data were summarized in three ways: frequency of occurrence, mean expenditures per-acre-owned for all respondents, and mean expenditures per-acre-owned for those respondents engaged in each activity. With the exception of property taxes, most expenditures occur infrequently. Fewer than 15% of all respondents incurred expenditures for any specific activity during any survey year. Total annual expenditures for all respondents averaged $9.68/ac-owned over the study period. Across all landowners, property taxes represented the largest component of annual expenditures with planting costs and consulting forester fees ranking second and third. Mean expenditures for only those respondents engaged in each activity told a slightly different tale. Planting and consulting forester fees were the two largest expenditures, but site preparation, timber cruising, timber marking, and surveyor fees were all greater than property taxes for those engaged in these activities. South. J. Appl. For. 26(2):93–98.*

Key Words: NIPF landowners, forest management expenditures, ad valorem taxes, landowner survey.

The role of the U.S. South in satisfying the nation's demand for timber is increasingly important. Growing international and national demand for timber, coupled with harvest restrictions in the Pacific Northwest, have increased the demand on the South's forests (Cubbage et al. 1995). Accurate timber supply projections are essential for policy and planning purposes in light of this increasing demand.

The accuracy of timber supply projections largely depends on assumptions made about NIPF landowner forest management behavior. NIPF landowners own nearly 70% of the South's forestlands (Powell et al. 1994). Timber management intensity by these landowners constitutes one of the major uncertainties of timber supply modeling. Not surprisingly, management intensity and investment behavior can have a major impact on projected timber supply (Adams et al. 1982). Various approaches for estimating management intensity have been used including assuming investment remains constant, linking investment levels to expected returns (Adams et al. 1982), simulating a range of management intensities (Adams and Haynes 1991), and expert opinion surveys (Moffat et al. 1998). With profitable investment opportunities available on up to an estimated 88 million ac of southern forestlands (Dutrow and Kaiser 1984), the potential impact of increased investment is substantial.

Surprisingly, very little information is available on NIPF landowners' investment in management activities. A series of studies have estimated the costs of various forest management practices (See Dubois et al. 1991, 1995, 1997, and 1999, Belli et al. 1993, Kuhn 1984, and Moak 1982) but none have examined total expenditures. The actual dollar amounts invested by NIPF landowners are often not easily available (Harou et al. 1986).

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Timber management expenditures by NIPF landowners may provide a relative measure of management intensity. Management expenditures indicate landowners' willingness to invest in timber production. Changes in these expenditures over time reflect changes in the level and intensity of forest management and thus may prove useful in timber supply modeling.

While the initial objective of this study was to evaluate timber management expenditures as a possible input for timber supply modeling, the expenditures information generated by this study proved interesting in its own right. The distribution and magnitude of expenditures for various activities provide useful benchmark information for forest landowners. The percentage of landowners engaged in various activities indicates how common various forest management activities are. Landowners can also compare their expenditures to those of other landowner engaged in similar practices. Sample means can be extrapolated to the state level to provide an estimate of the economic contribution of these activities to the state economy. Furthermore, these data illustrate the substantial portion of "nonproductive" expenditures required by timberland ownership. Finally, expenditures for various activities reflect landowner rankings of the relative profitability of various treatments and provide additional insights into landowner intentions.

In Mississippi, the State Tax Commission annually determines forestland values that county tax assessors then use to assess local property values. This procedure results in consistent assessed values for forestland throughout the state. In the process of deriving forestland values, the State collects forest management expenditures information annually from NIPF landowners. These data can be used to investigate the uses and relative amounts of NIPF forest management expenditures over time.

This study examines forest management expenditures of NIPF landowners in Mississippi from 1995 to 1997. The analysis was limited to these 3 yr because of differences in both the sampling procedures and the survey instrument during previous and subsequent years. Arano et al. (2001) presented preliminary summary statistics. Total annual expenditures per landowner averaged $2,200 over the 3 yr study period. However, expenditures were highly variable, due in large part to the range of ownership sizes.

Methods

Mississippi NIPF landowners were surveyed in 1996, 1997, and 1998 to determine their forestry-related expenditures for the previous year. The survey was conducted by the Social Science Research Center, Mississippi State University. Survey procedures followed Dillman's (1978) total design method. Landowner address lists were obtained from the tax assessors' records for 66 of Mississippi's 82 counties. The records for the remaining 16 counties were either not computerized or were otherwise unavailable. To eliminate as many nonforestry holdings as possible, the survey was limited to landowners who owned at least 20 ac of forestland. Although landowners with less than 20 ac represent 59% of all forest landowners in Mississippi, they account for only 8.5% of the total forest area (Doolittle 1996).

The survey instrument was designed to elicit information from NIPF landowners about the area of forestland they own in Mississippi and their associated annual forest management expenditures.[1] Landowners were asked to report the area of forestland they owned in Mississippi by county and in total. Expenditures were grouped in four categories: professional services, timber management, other management expenditures, and property taxes. Professional services included forestry consultants, attorneys, accountants, and surveyors. Timber management included timber stand improvement, timber cruising, timber marking, prescribed burning, site preparation and planting, and others. Other management expenses included property line maintenance; protection against fire, insects, or disease; road construction and maintenance; and overhead expenses. The survey was not designed to determine the cost per acre for the various treatments so the number of acres treated was not elicited.

To illustrate the frequency and distribution of forest management activities, we computed the percentage of respondents who incurred expenditures for each forest management activity. This percentage was computed for each survey year and for the 3 yr period.

Next, to illustrate the magnitude of forest management expenditures for NIPF landowners as a group, we computed the sample means for the reported expenditures for each activity on a per-acre-owned basis for all respondents for each survey year. In computing the mean, per-acre expenditures were weighted by the number of acres owned. The responses to the annual surveys were pooled to calculate average annual expenditures over the 3 yr period.

Sample means provide useful information about population-level expenditures; however, they do not necessarily provide useful information about expenditures of sub-groups within that population. For example, when most respondents report zero expenditures for an activity, as in the case of this study, sample means do not provide realistic estimates of the mean expenditures of landowners engaged in that activity. For example, a landowner who planted trees most likely incurred expenses greater than the sample mean. Landowners considering planting would be far more interested in the expenditures of those landowners engaged in planting than in the mean planting expenditures of all NIPF landowners. Therefore, we also computed mean expenditures per acre owned based on only those respondents who incurred each expense. Again, per acre expenditures were weighted by the number of acres owned.

Expenditures were compared on the basis of frequency of occurrence as well as magnitude. An analysis of variance (ANOVA) determined whether management expenditures changed significantly over the study period using $\alpha = 0.05$ level of significance.

Results

Mail surveys were conducted in 1996, 1997, and 1998 to obtain management expenditures information for 1995, 1996, and 1997, respectively. The mail surveys resulted in 1,075 usable responses, a 21% response rate. In light of the low response rate, we were concerned about response bias. There-

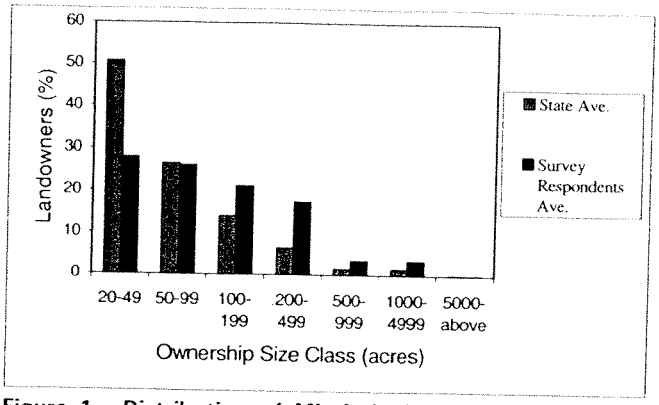

Figure 1. Distribution of Mississippi NIPF landowners by ownership size class.

fore, we compared the distribution by ownership size of the respondents to that of the statewide population of forestland owners (Figure 1). The smallest ownership size class (20–50 ac) is under-represented in our sample. Although this ownership size class accounts for over 50% of the number of forest landowners, it represents a disproportionately small percentage of the forestland base. In Mississippi, this ownership class owns less than 17% of the total NIPF area in ownerships 20 ac or larger. Nonetheless, the response bias by ownership size may potentially bias the survey results. Therefore, we regressed ownership size on per acre expenditures and found no significant relationship. Thus, although the survey response rate varies by ownership size class, this response bias is unlikely to bias the sample means calculated for this study.

The average ownership size reported over the 3 yr study period was 231 ac (Table 1). This compares to an average ownership size of 99 ac for the statewide population (Doolittle 1996), again demonstrating the under-representation of the smallest ownership class in our sample. The average area owned did not vary significantly over the study period. The median ownership size reported over the 3 yr study period was 80 ac. Some ownerships in our sample were less than 20 ac because of the lag between the date landowner lists were obtained and the date the surveys were conducted. These landowners had disposed of portions of their landholdings during the interim.

Table 1. Forest area owned by NIPF respondents in Mississippi, 1995–1997.

	1995	1996	1997	3 yr. period
	(ac)			
Mean	319 a*	183 a	193 a	231
Median	80	80	80	80
Minimum	3	8	1	1
Maximum	44,617	3,800	4,000	44,617

* Annual means followed by the same letter are not significantly different at $\alpha = 0.05$.

Frequency of Occurrence

Most forest management expenditures occur infrequently. With the exception of property taxes, fewer than 15% of respondents reported annual expenditures for any specific activity in any year during the survey period (Table 2). None of these percentages varied significantly over the survey period.

Fees for Professional Services.—Over the study period, an average of 17.4% of landowners reported paying fees for some type of professional service in any year. Accountant fees were the most common, reported by 8.4% of landowners. Consulting forester fees were incurred by 6.9% of landowners. Attorney and surveyor fees were the least common.

Timber Management Expenditures.—Approximately 20% of landowners incurred timber management expenditures in any given year. Planting costs were the most common timber management expenditure reported, averaging 12.1% of the landowners over the study period. Site preparation costs were incurred by only 5.6% of landowners. Just over 3% paid for timber stand improvement and

Table 2 Percentage of landowners who incurred forest management expenses, Mississippi, 1995–1997.

Expense category	1995	1996	1997	3 yr average
	(%)			
Fees for professional services	16.6 a*	19.1 a	16.5 a	17.4
Consulting forester	5.4 a	8.1 a	7.2 a	6.9
Attorney	6.3 a	5.6 a	5.2 a	5.7
Accountant	8.9 a	8.8 a	7.7 a	8.4
Surveyor	5.7 a	3.8 a	5.2 a	4.9
Timber management expenditures	21.1 a	18.4 a	21.2 a	20.3
Timber stand improvement	4.3 a	2.8 a	3.7 a	3.6
Timber cruising	2.6 a	1.9 a	2.0 a	2.1
Timber marking	1.7 a	1.9 a	0.7 a	1.4
Prescribed burning	3.1 a	3.8 a	3.2 a	3.4
Site preparation	4.6 a	5.3 a	6.9 a	5.6
Planting	13.4 a	9.7 a	13.1 a	12.1
Other	3.4 a	3.4 a	4.2 a	3.7
Other management expenditures	25.1 a	28.8 a	27.2 a	27.2
Property line maintenance	10.6 a	14.1 a	11.6 a	12.1
Protection against fire, insects or disease	7.4 a	7.5 a	8.9 a	7.9
Road construction and maintenance	10.9 a	10.9 a	10.9 a	10.9
Supervision and administration	10.3 a	14.7 a	11.9 a	12.3
Property taxes	65.4 a	77.8 b	75.8 b	73.0
Total expenditures	79.1 a	82.5 b	82.0 b	81.2

* Annual means in a row with the same letter are not significantly different at $\alpha = 0.05$.

prescribed burning annually. Sale expenses such as cruising and timber marking were even less common.[2]

Other Management Expenditures.—This category included routine management and maintenance activities associated with forest property. Almost 30% of all landowners incurred expenditures in this category in any given year. Property line maintenance and supervision and administration were the most common, each averaging approximately 12% during the survey period.

Property Taxes.—Seventy-three percent of the respondents reported paying property taxes on their forestland during the survey period. In Mississippi, some landowners are not required to pay property taxes. Landowners over 65 yr old are exempt from taxes for property valued at less than $60,000.[3] Property values for forestland are determined by the State Tax Commission and range from $20 to $284/ac with $198/ac representing the assessed value for Site Class B forestland, the most prevalent forest site in the state (Mississippi State Tax Commission 2000). Thus, the $60,000 exemption represents approximately 300 ac, which is greater than the average ownership size in Mississippi. Twenty-two percent of Mississippi's forest landowners are over 65 (Birch 1997), and most are probably exempt from property taxes on their forest property. However, 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 nonresponses.

Mean Expenditures for All Respondents

Over the survey period, total annual expenditures averaged $9.68/ac-owned (Table 3). Although these average expenditures ranged from $8.84 to $10.36/ac-owned over the 3 yr period, the variation was not significant.

Fees for Professional Services.—Expenditures for professional services averaged $1.94/ac-owned for all respondents. Consulting forester fees accounted for more than half of this total, averaging $1.22/ac-owned for all respondents. Accountant, attorney, and surveyor fees each averaged less than $0.35/ac-owned.

Timber Management Expenditures.—Annual timber management expenditures for all respondents averaged $4.19/ac-owned. Planting represented the largest component of this category, averaging $2.16/ac-owned for all respondents. Site preparation accounted for $0.97/ac-owned and timber stand improvement accounted for $0.56/ac-owned. Timber marking, cruising, prescribed burning, and other miscellaneous timber management expenditures each averaged less than $0.25/ac-owned.

Other Management Expenditures.—In total, these expenditures averaged $1.28/ac-owned for all respondents, annually. Road maintenance and construction represented the largest component of this category, averaging $0.48/ac-owned. The remainder was roughly divided among property line maintenance; protection against fire, insects, and disease; and supervision and administration.

Property Taxes.—Annual property taxes averaged $2.28/ac-owned for all respondents.

Mean Expenditures of Landowners Engaged in Management Activities

Over the survey period, total annual expenditures averaged $11.45/ac-owned for those landowners who incurred any type of expense related to their forest property (Table 4). This is roughly 18% higher than the total annual expenditures reported for all respondents. Differences for specific management activities were substantially greater.

Fees for Professional Services.—Consultant fees averaged $5.69/ac-owned for those landowners who engaged consultants during the survey period (Table 4). Consultant

Table 3. Mean expenditures per acre owned for all NIPF respondents, Mississippi, 1995–1997.

Expense category	1995	1996	1997	3 yr average
	($/ac owned)			
Fees for professional services	0.95 a*	2.21 ab	2.66 b	1.94
Consulting forester	0.26 a	1.85 a	1.56 a	1.22
Attorney	0.30 ab	0.06 a	0.66 b	0.34
Accountant	0.29 a	0.14 b	0.12 b	0.18
Surveyor	0.10 a	0.16 a	0.32 a	0.19
Timber management expenditures	4.24 a	4.42 a	3.88 a	4.19
Timber stand improvement	1.01 a	0.12 b	0.54 ab	0.56
Timber cruising	0.10 a	0.13 a	0.40 a	0.21
Timber marking	0.05 a	0.14 b	0.03 a	0.07
Prescribed burning	0.15 a	0.10 a	0.15 a	0.13
Site preparation	1.43 a	0.78 b	0.69 b	0.97
Planting	1.49 a	3.07 b	1.93 ab	2.16
Other	0.02 a	0.09 ab	0.15 b	0.09
Other management expenditures	1.33 a	1.37 a	1.14 a	1.28
Property line maintenance	0.14 a	0.43 a	0.23 a	0.27
Protection against fire, insects or disease	0.32 a	0.12 a	0.13 a	0.19
Road construction and maintenance	0.62 a	0.40 a	0.43 a	0.48
Supervision and administration	0.25 a	0.42 a	0.35 a	0.34
Property taxes	2.31 a	2.35 a	2.17 a	2.28
Total expenditures	8.84 a	10.36 a	9.86 a	9.68

* Annual means in a row with the same letter are not significantly different at $\alpha = 0.05$.

Table 4. Mean expenditures per acre owned for NIPF respondents who incurred the expense, Mississippi, 1995–1997.

Expense category	1995	1996	1997	3 yr average
	($/ac owned)			
Fees for professional services	1.46 a	5.32 ab	7.48 b	4.75
Consulting forester	2.35 a*	7.98 a	6.74 a	5.69
Attorney	0.48 a	0.53 a	4.36 a	1.79
Accountant	0.46 a	0.45 a	0.41 a	0.44
Surveyor	1.99 a	4.93 a	1.54 a	2.82
Timber management expenditures	6.30 a	11.48 a	9.76 a	9.18
Timber stand improvement	1.93 a	1.73 a	5.66 a	3.11
Timber cruising	1.33 a	3.28 a	6.34 a	3.65
Timber marking	0.61 a	2.48 a	0.69 a	1.26
Prescribed burning	0.33 a	1.38 a	1.06 a	0.92
Site preparation	3.08 a	7.42 a	5.04 a	5.18
Planting	2.59 a	11.89 b	6.27 ab	6.92
Other	1.18 a	2.09 a	2.32 a	1.86
Other management expenditures	1.84 a	3.37 a	2.93 a	2.71
Property line maintenance	0.26 a	3.73 b	1.25 a	1.75
Protection against fire, insects or disease	0.70 a	1.58 a	1.00 a	1.09
Road construction and maintenance	1.16 a	2.04 a	1.89 a	1.70
Supervision and administration	1.22 a	2.54 a	1.47 a	1.74
Property taxes	2.63 a	2.60 a	2.52 a	2.58
Total expenditures	9.81 a	11.13 a	13.40 a	11.45

* Annual means in a row with the same letter are not significantly different at $\alpha = 0.05$

fees were substantially greater than fees for any other professional services. For example, attorney fees averaged less than $2.00/ac-owned for landowners who engaged attorneys.

Timber Management Expenditures.—Annual site preparation and planting expenditures, the largest in this category, averaged $5.18/ac-owned and $6.92/ac-owned, respectively, for landowners who engaged in these practices. Expenditures for timber stand improvement were also substantial, averaging $3.11/ac-owned during the survey period.

Other Management Expenditures.—Annual expenditures for road construction and maintenance; property line maintenance; and supervision and administration, all averaged approximately $1.70/ac-owned while protection against fire, insects, and disease averaged $1.09/ac-owned for landowners engaged in these activities.

Property Taxes.—Property taxes averaged $2.58/ac-owned for landowners reporting such taxes.

Discussion

This study examined forest management expenditures of NIPF landowners in Mississippi during the period 1995–1997. Expenditures data provide a wealth of information with potential uses in broad range of applications.

The results document that most forest management expenditures occur infrequently. With the exception of property taxes, fewer than 15% of respondents reported annual expenditures for any specific activity in any year during the survey period. Even when expenditures were aggregated into three broad categories—fees for professional services, timber management expenditures, and other management expenditures—the percentage of respondents incurring expenditures in these aggregated categories in any given year remained below 30%. These low percentages suggest that little has changed since Dutrow and Kaiser's (1984) assessment of the investment opportunities in forestry. Relative percentages are also informative. For example, planting costs were the most common timber management expenditure reported, averaging 12.1% of the landowners over the study period. In contrast, site preparation costs were incurred by only 5.6%. Agricultural conversions undoubtedly account for some of the area planted but not site prepared; however, these numbers suggest that substantial areas are planted without any type of site preparation.

The study also documents the magnitude of forest management expenditures incurred annually by private landowners. In Mississippi, total expenditures for all NIPF respondents averaged $9.68/ac-owned. This represents an annual outlay of $122 million when extrapolated to the state level for the 12,695,073 ac in Mississippi in ownerships larger than 20 ac (Doolittle 1996).

Expenditures also reflect an informal ranking of timber management activities. Focusing strictly on timber management activities, it is clear that landowners view planting as the most important timber management activity as evidenced by the fact that over half the money spent on timber management is spent on planting. In contrast, timber stand improvement accounts for less than 14% of such expenditures. In light of Dutrow and Kaiser's (1984) evaluation of timber management investment opportunities, it is extremely unlikely that a lack of suitable acres limits the amount spent on timber stand improvement. It is clear that landowners believe that money is more profitably spent on planting than other timber management activities such as TSI.

This study also illustrates an interesting aspect of investing in forestland. Timber management expenditures and forestry consultant fees account for only approximately 55% of total average annual expenditures. These expenses are directly related to timber production, either through enhancing timber growth or returns on timber sales. As such, these expenditures result in a direct return on investment. The remaining expenditures—fees for professional services other

than consulting foresters, other management expenditures, and property taxes—do not generate a direct return on investment in that they do not result in increased growth or increased returns on timber sales. On average, these expenditures total $4.28/ac/yr annually. Over a rotation, these amounts are substantial and may reduce the attractiveness of forestland investments, particularly for those investors concerned about cash flow requirements. Unlike other investment opportunities available to NIPF landowners (e.g., stocks, mutual funds) that are typically one-time investments, forestland investments require these periodic cash outlays that may deter some investors. From a policy perspective, it is interesting to note that property taxes are NIPF landowners' greatest expenditure. At $2.28/ac-owned, they represent slightly over 23% of the total $9.68/ac-owned annual expenditures incurred by all NIPF respondents in the survey.

Calculating mean expenditures for forest management practices using only those respondents engaged in the practices provides better estimates of the actual costs landowners are likely to incur should they engage in those practices than do the sample means. While an improvement over the sample means for all respondents, this method is best suited for property level activities such as fees for professional services, supervision and administration, or property taxes. For activities that most likely occur only on a portion of a landowner's property, costs per acre-treated, such as those reported by Dubois et al. (various), provide a much better estimate of actual costs. Our results, however, do illustrate how expenditures can vary dramatically depending on the activities a landowner engages in. For example, landowners who pay property taxes, hire a consulting forester to sell timber, then site-prepare and plant the harvested area, could face expenditures of over $20/ac-owned. In contrast, custodial landowners who only pay property taxes face annual expenditures of less than $3/ac-owned.

Forest management expenditures may provide a useful tool in timber supply modeling. This study has demonstrated that the essential first step, collecting the data, is feasible and relatively inexpensive. While it is not currently possible to make direct inferences about the magnitude of management intensity from annual expenditures data, it is reasonable to assume that changes in annual expenditures reflect changes in management intensity. Therefore, annual expenditures data provide a relative measure of management intensity over time and, as this study has demonstrated, are relatively easy to obtain. Such information collected annually in a consistent format and adjusted for inflation would provide a measure of changes in management intensity over time. Even without further refinement, this information would signal timber supply modelers when fundamental changes in management intensity occur, thus triggering investigations to identify the nature of the changes that are occurring. With further research, it may be possible also to establish a direct relationship between expenditures and forest productivity. In that case, expenditures information could be included as a determinant of timber supply in timber market models.

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

Endnotes

[1] See Arano et al. (2001) for further details of the survey design and data collection procedures.

[2] Some expenditures for these activities may be included in consulting foresters fees and thus are not included here.

[3] Pat Kight, Oktibbeha County Tax Assessor, pers. comm., 2000.

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