PERSONAL AND EXTERNAL CONSTRAINTS ON NIPF

TIMBER SUPPLY IN ARKANSAS

by

John L. Greene

ABSTRACT

A discriminant analysis model for predicting forest management behavior was developed by region within the state. The model was based upon demographic and historical information obtained from responses to 3,200 questionnaires mailed to NIPF owners. The model helps to delineate timber managers from non-managers on the basis of certain of these owner characteristics. These data were supplemented with information on attitudes toward owning and managing forest land as obtained from over 200 personal interviews. A paired comparison analysis on data from these interviews show significant differences among timber sellers and non-sellers and among timber managers and non-managers.
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INTRODUCTION

The information presented here is from a study, "Attitudes and Forest Practices of Private, Non-Industrial Forest Landowners in Arkansas." The study is cosponsored by the University of Arkansas at Monticello Department of Forest Resources, Agricultural Experiment Station, the Arkansas Forestry Commission and the Arkansas Forestry Association, and is the first statewide study of NIPF owners done in Arkansas.

The study has been conducted in three phases. Phase I involved mailing out 3,200 questionnaires, to 800 randomly-selected NIPF owners in each of the state's four regions (Figure 1), to collect demographic and historical information. In Phase II we held over 200 personal interviews, 50 or more with randomly-selected Phase I respondents in each region, to collect information on their attitudes toward owning and managing forest land. Phase III was a follow-up phase. In it we held personal interviews with six selected industry procurement foresters in each region, for insight into the sociogenic determinants of NIPF owner behavior, and telephone interviews with 45 or more randomly-selected Phase I non-respondents, to test whether our sample was representative.

NIPF OWNER CHARACTERISTICS

Before beginning on timber supply constraints it might be helpful to give a thumbnail sketch of Arkansas NIPF owners. Most are male (84%), over 50 years of age (68%), have a high school or better education (60%), and are salaried, self-employed or retired from such a position (59%). They purchased their woodland (77%) fifteen or more years ago (64%), and
Figure 1. Regional map of Arkansas.
hold it for purposes compatible with timber production (timber, recreation and wildlife, or partial grazing; 74%), but do not manage it (87%). Although most of their woodlands are 100 acres or less (68%) tracts 300 acres or larger comprise 55 percent of all NIPF acreage in the state and 80 percent of NIPF acreage in the Coastal Plain region.

Delta region NIPF owners are more likely than others to be farmers (29%), young (38% are 50 or less) and college educated (28%), but also are more likely to leave their woodland idle (22%). Ozark and Ouachita region owners are more likely to be retired (30%), and to hold their woodland for grazing (46%) or such other uses (13%) as homesite or firewood source. Coastal Plain region owners are more likely than others to be active managers (25% versus 8% elsewhere) and timber sellers (58% versus 24% elsewhere); their woodlands are more likely to be over 100 acres (36%).

PERSONAL CONSTRAINTS

Phase I Information To see how timber managers and non-managers differ we developed for each region a discriminant analysis model predicting management behavior from Phase I demographic information. Our model for the Coastal Plain region (Figure 2) correctly identifies 75 percent of managers (two or more practices) and 79 percent of non-managers (one or no practices). In order of predictive power the characteristics it associated with timber management were: much of the total holding being forested, large woodland size, personal contact with a forester, formal education, grazing as an objective of ownership, having acquired the woodland through a gift or tax sale, and having non-forested acres. Characteristics associated with non-management were: much of the woodland being in an estate, a timber sale in the past five years, real estate speculation as an objective of ownership, and a high self-rating in
\[ \begin{align*}
Y &= 0.01097A + 0.36477B - 0.01251C - 0.47706D + 0.21584E + 0.04464F \\
&\quad + 0.46892G - 0.77606H + 0.001101 + 0.00066J - 0.18449K - 1.01267 \\
\end{align*} \]

A = PERCENT FORESTED
B = SIZE CLASS
E = TYPE OF CONTACT
F = LEVEL OF EDUCATION
G = GRAZING AS AN OBJECTIVE
I = ACRES BY "OTHER" MEANS
J = NON-FORESTED ACRES
C = PERCENT IN AN ESTATE
D = RECENT TIMBER SALE
H = SPECULATION AS AN OBJECTIVE
K = SELF-RATED KNOWLEDGE

77.95 PERCENT OF OWNERS GROUPED CORRECTLY

Figure 2. Discriminant analysis best model for the Coastal Plain region
knowledge of the forest products market.

Prediction in the Ozark and Ouachita regions was enhanced by lumping the two together. The combined model (Figure 3) correctly identifies 66 percent of timber managers and 81 percent of non-managers. Again in order of predictive power the characteristics it associated with management were: a formal schooling by woodland size interaction, timber as an objective of ownership, personal contact with a forester, being a wage earner or farmer, planning to sell timber, recreation and wildlife as an objective of ownership, and age. The one characteristic associated with non-management was large woodland size.

We could develop no satisfactory model for the Delta region. It appeared the border counties were heavily contaminated from neighboring regions, with northern Delta NIPF owners behaving like their neighbors in or Ozark or Ouachita regions, and southern Delta owners behaving like their neighbors in the Coastal Plain.

As well as these best models we developed for the Coastal Plain and Ozark-Ouachita regions field models, using a restricted set of easily determined demographic traits, for use by service and landowner assistance foresters. The Coastal Plain field model (Figure 4) is nearly as powerful as the best model. Characteristics it associated with timber management were: formal schooling, large woodland size, much of the total holding being forested, a large total holding, and the owner being a farmer. The sole characteristic associated with non-management was the owner being retired. Figure 5 demonstrates application of the model.

The Ozark-Ouachita field model (Figure 6) is much less powerful than the best model, correctly classifying only 69 percent of NIPF owners.
\[ y = 0.00015A - 0.85655B + 1.24591c + 0.38687D + 0.80647E + 0.83355F \\
+ 0.36918G + 0.51427H + 0.16139I - 0.82558 \\
\]

\[ A = \text{LEVEL OF EDUCATION X SIZE CLASS} \quad B = \text{SIZE CLASS} \]

\[ C = \text{TIMBER AS OBJECTIVE} \]

\[ D = \text{TYPE OF CONTACT} \]

\[ E = \text{WAGE EARNER} \]

\[ F = \text{FARMER} \]

\[ G = \text{PLAN A TIMBER SALE} \]

\[ H = \text{WILDLIFE AS OBJECTIVE} \]

\[ I = \text{AGE} \]

80.23 PERCENT OF OWNERS GROUPED CORRECTLY

Figure 3. Discriminant analysis best model for the combined Ozark-Ouachita region.
\[ \gamma = 0.93260A + 0.45955B - 0.90248C + 0.00803D \\
+ 0.00019E + 0.61373F - 2.61499 \]

A = LEVEL OF EDUCATION        C = RETIRED
B = SIZE CLASS
D = PERCENT FORESTED
E = TOTAL ACRES
F = FARMER

73.76 PERCENT OF OWNERS GROUPED CORRECTLY

Figure 4. Discriminant analysis field model for the Coastal Plain region.
WOODY LANDOWNER IS A HIGH SCHOOL GRADUATE (EDUCATION LEVEL 1). HE OPERATES A CATTLE FARM (FARMER) WITH 100 ACRES OF PASTURE AND 240 ACRES OF FOREST (SIZE CLASS 2, 70.59% FORESTED, 340 TOTAL ACRES).

\[ Y = 0.93260(1) + 0.45955(2) - 0.90248(0) + 0.00803(70.59) + 0.00019(340) + 0.61373(1) - 2.61499 = 0.4819 \]

TEST STATISTIC: NON-MANAGER \( \leq 0.29183 \leq \) MANAGER

Figure 5. Application of the Coastal Plain region field model.
\[ y = 0.00212A + 0.96702B - 0.34859C + 1.00212D - 0.99375E + 0.81299F \\
+ 0.01461G + 0.57812H + 1.16137 \]

\[ A = \text{WOODLAND ACRES} \]
\[ B = \text{LIVES ON WOODLAND} \]
\[ D = \text{WAGE EARNER} \]
\[ F = \text{FARMER} \]
\[ G = \text{AGE} \]
\[ H = \text{LEVEL OF EDUCATION} \]
\[ C = \text{TIMBER TYPE} \]
\[ E = \text{PERCENT FORESTED} \]

69.08 percent of owners grouped correctly

Figure 6. Discriminant analysis field model for the combined Ozark-Ouachita region.
Characteristics it associated with timber management were: a large woodland, the owner living on the tract, being a wage earner or farmer, age, and formal schooling. Characteristics associated with non-management were: hardwood timber types and having little non-forested land.

Formal schooling and contact with a forester were associated with timber management in both regions. As well, some non-timber objectives—grazing in the Coastal Plain, and recreation and wildlife in the Ozark-Ouachita—proved compatible with management. Woodland size and owner age appeared to change meaning between regions. Size was associated with timber management in the Coastal Plain region, but at least among less educated owners, non-management in the Ozark-Ouachita. Similarly, retirement was associated with non-management in the Coastal Plain region while age was associated with management in the Ozark-Ouachita. This last apparently indicates some social difference between the regions.

Clearly associated with non-management were woodlands held in estates or for speculation in the Coastal Plain region, and hardwood timber types in the Ozark-Ouachita.

**Phase II Information**  As part of each interview in Phase II we asked the owner to go through a series of cards, picking on each the statement he most agreed with. The cards covered every possible combination of the statements listed in Table 1. We analyzed the resulting paired comparison data to contrast the statements favored by timber managers and non-managers, and those favored by timber sellers and non-sellers, in each region.

Figure 7 contrasts the statements most favored by managers and non-managers in the Coastal Plain and Delta regions; the length of a line segment is a measure of the strength of the group's agreement with
Table 1. Paired comparison responses.

MANAGE IT FOR REGULAR INCOME
MANAGE IT FOR NON-INCOME USES
JUST LET IT GROW
CUT TIMBER FOR EMERGENCY MONEY
IT COSTS TOO MUCH TO MANAGE IT
IT TAKES TOO LONG TO GET A RETURN
MY WOODLAND IS TOO SMALL TO BOTHER WITH
TIMBER MANAGEMENT CONFLICTS WITH WHAT I USE IT FOR
Figure 7. Statements most favored by Delta and Coastal Plain region timber managers and non-managers.

Figure 8. Statements most favored by Ozark and Ouachita region timber managers and non-managers.
that statement. Timber managers in both regions agree strongly with managing their timber for regular income, and less strongly with just letting it grow or holding it for other uses. Non-managers in both regions agree most strongly with just letting their timber grow, then with holding it for emergency money or non-income uses, or that their holding is too small. The statements favored by the two groups, however, differ markedly.

Figure 8 shows the statements most favored by timber managers and non-managers in the Ozark and Ouachita regions. Again, there is strong agreement between regions, but there also is agreement between groups. All believe in just letting their timber grow, then in holding it for non-income uses and emergency money.

Figures 9 and 10 contrast the statements most favored by timber sellers and non-sellers. In the Delta and Coastal Plain regions (Figure 9) there is general agreement among sellers, but little agreement among non-sellers. This seems to indicate a social difference between the regions. Again, the statements favored by the two groups differ greatly. In the Ozark and Ouachita regions (Figure 10) there is more agreement among non-sellers than sellers. The statements favored by the two groups differ in the Ouachita region, but are again the same in the Ozark.

The analysis yielded less agreement than anticipated in the statements favored by timber managers and sellers, particularly in the more productive Coastal Plain and Ouachita regions. This may indicate that efforts to increase short- and long-term supply might best be directed toward different NIPF groups, with short-term efforts aimed at owners who don't particularly manage and in fact regard their timber as a source of emergency money, and long-term efforts aimed at owners interested
Figure 9. Statements most favored by Delta and Coastal Plain region timber sellers and non-sellers.

Figure 10. Statements most favored by Ozark and Ouachita region timber sellers and non-sellers.
in regular income from their timber or in non-timber uses.

There was good agreement in the statements favored by non-timber managers and sellers. Both groups agree heartily with just letting their timber grow, hold their timber for emergency money or non-income purposes, and consider their holdings economically inoperable.

EXTERNAL CONSTRAINTS

**Phase II Information** In another part of the Phase II interview we asked each owner what he thought would be the result of improving his woodland for some use or cutting timber from it. Most gave answers indicating they knew it would be beneficial; "It would make room for the young trees to grow,""It would help the grazing,""I would get more wildlife," or "It would increase the value of my property." Very few owners indicated they thought it would be harmful, "It would hurt the wildlife," or "It would make a fire hazard."

Yet only 13 percent of NIPF owners statewide act on their knowledge. Many evinced a lack of personal need or a sense of urgency regarding their woodland by saying as well, "I'm just too busy," "I don't need the money," and "I never thought of it." Others seemed to have adopted non- or anti-timber management attitudes from society in their region, which outweighed their intellectual knowledge. For this group the target for further forestry education may not be the owners themselves, but the general public.

**Phase III Information** None of the procurement foresters we interviewed in Phase III saw any external constraints on NIPF timber sales other than price. Nearly all said recent timber price increases have spurred landowner interest in management and sales, and noted that the area with the poorest management also has the lowest prices.
It became evident in the interviews that more than low price there is simply no market for some NIPF timber. Parts of the Delta and Ozark regions in particular are not within the timbershed of any sizeable firm; asked in Phase II why they had not sold timber a number of NIPF owners responded, "No one has asked."

The foresters had not noticed any trend where new NIPF owners were more reluctant than others to sell their timber. Indeed, they found new owners more willing to sell, to help defray their purchase costs. Other trends the foresters noted were increased concentration and competition among forest industry firms, and the slow development of aggregate and reconstituted wood products. All these trends should increase demand and bolster owner interest in managing NIPF timber.