

A Typology of Family Forest Owners in North Central Indiana

Amy Ross-Davis and Shorna Broussard

ABSTRACT

Patterns of forest cover across the United States partly reflect the diverse and dynamic ownership motivations and management behaviors of family forest owners. The objectives of this study were to (i) identify distinct types of landowners with regard to ownership motivations and other ownership characteristics and (ii) compare these types of landowners in terms of (a) use of specific forest management practices, (b) information seeking, (c) familiarity with and participation in private forest conservation programs, and (d) ownership and sociodemographic characteristics. A two-step cluster analysis of responses to a mail questionnaire distributed to family forest owners in north central Indiana revealed three distinct types of landowners. *Forest managers* attributed importance to diverse values with regard to owning their forest. *New forest owners* owned their properties for the least amount of time and attributed importance to all ownership motivations with the exception of producing timber. *Passive forest owners* owned the smallest forested acreages and attributed importance to none of the ownership motivations operationalized in this research with the exception of enjoying scenery. Results are discussed in terms of typologies previously described in the literature and the implications of the relationships among landowner types with regard to management.

Keywords: family forest owners, forest management, information seeking, ownership motivations, private forest conservation programs

Almost one-half of the forestland in the United States is held by family forest owners (Butler and Leatherberry 2004) who collectively constitute a heterogeneous group with regard to the values, attitudes, expectations, and behaviors associated with their ownerships. Although myriad policies have been developed to either encourage or discourage certain behaviors on privately owned forest (Cubbage et al. 1993, Kilgore and Blinn 2004), the efficacy of these efforts is variable because of the inherent diversity of the target landowners. To better design and implement a suite of policies that meets the needs of family forest owners, it is imperative to improve our understanding of the motivations and objectives they have for owning their land. Classifying landowners into distinct groupings based on shared characteristics is a practical approach that can help inform policy development and implementation. Rather than working to meet the needs of the “average” landowner, Kittredge (2004) suggests classifying landowners into distinct groups based on their needs and desires. This type of classification will help natural resource professionals to better focus their efforts on those who are likely to be most receptive and to identify communication networks through which their messages would be most effectively disseminated.

Research shows that family forest owners are not a uniform group with regard to the attitudes and values they hold for their land (e.g., Bengston [1994]), the attitudes they express toward management of their land (e.g., Bourke and Luloff [1994]), or their land-management behavior (e.g., Beach et al. [2005]). Typologies have been used to classify landowners for the purposes of market segmentation (Kendra and Hull 2005), to better direct policy efforts (Boon et al. 2004), and to better understand forest management decisions

(Kurtz and Bradway 1981, Kurtz and Lewis 1981, Marty et al. 1988, Kluender and Walkingstick 2000, Bieling 2004). These typologies have been based solely on either ownership motivations or management objectives (Bieling 2004, Boon et al. 2004, Kendra and Hull 2005); a combination of ownership motivations, management objectives, and constraints such as cost of growing timber, age, land characteristics, and forestry regulations (Kurtz and Lewis 1981, Kurtz and Bradway 1981, Marty et al. 1988); and management objectives and demographic characteristics (Kluender and Walkingstick 2000). In addition to considering which variables were used to form the typologies, studies also varied with regard to variables used to compare emergent landowner types. Following our review of the extant literature on landowner typologies, we present our rationale for identifying distinct types of landowners in north central Indiana with regard to ownership motivations and other ownership characteristics.

Four types of Missourian nonindustrial forest owners were described by Kurtz and Lewis (1981) and Kurtz and Bradway (1981): (i) *timber agriculturalists*, who favored timber production, believed that forest management results in multiple benefits (beyond timber production) and were not opposed to grazing but believed that conversion of forest to other uses was inconsistent with their goals; (ii) *timber conservationists*, who were very similar to the preceding class but were less business-oriented and more concerned with their responsibility to future generations; (iii) *forest environmentalists*, who valued many different forest benefits, not timber in particular, and viewed grazing, conversion of forests to pasture, and inappropriate timber harvesting as threats to the ecological integrity of the forest; and, (iv) *range pragmatists*, who considered their forests as one

Received April 9, 2006; accepted December 21, 2006.

Amy Ross-Davis (arossdav@purdue.edu), Department of Forestry and Natural Resources, Purdue University, 195 Marsteller Street, West Lafayette, Indiana 47907. Shorna Broussard (srb237@cornell.edu), Department of Natural Resources, Cornell University, 122C Fernow Hall, Ithaca, NY 14853. The authors thank the family forest owners who participated in this research, which was financially supported by the Department of Forestry and Natural Resources at Purdue University, the United States Forest Service, and the Initiative for Future Agriculture and Food Systems Grant 00-52103-9643 from the USDA Cooperative State Research, Education, and Extension Service.

Copyright © 2007 by the Society of American Foresters.

component of the overall farm and for whom grazing was the major source of income. Range pragmatists were least likely to manage their forest and most likely to convert it to other uses.

Marty et al. (1988) described three classes of Wisconsin landowners: (i) *resource conservationists*, who were stewardship oriented, actively managed their land for sustained timber production and were opposed to holding land strictly for recreation or grazing; (ii) *forest recreationists*, who owned their forest primarily for recreation purposes, were opposed to forest grazing and tended not to manage for timber production; and (iii) *forest utilitarians*, who valued their forest for multiple benefits, did not specifically manage for timber, were not opposed to grazing, and were willing to sell timber if the opportunity arose.

In their study of Arkansas landowners, Kluender and Walkingstick (2000) described four types: (i) *timber managers*, who typically had sold timber in the past and planned to do so again in the future; (ii) *resident conservationists*, who tended to reside on their land and generally were opposed to harvesting timber from it; (iii) *affluent weekenders*, who also were opposed to timber harvesting from their land but unlike *resident conservationists*, used the land as a second home site; and (iv) *poor rural residents*, who grew up in a rural setting, earned relatively low annual household incomes, were poorly educated, and would harvest timber from their land for revenue if they could.

Boon et al. (2004) classified Danish private forest owners into three categories: (i) *classic forest owners*, who valued their forest for economic considerations; (ii) *hobby forest owners*, who valued their forest for the lifestyle and recreational opportunities it provides; and (iii) *indifferent forest owners*, who did not value their forest. Similarly, Bieling (2004) described three types of German private forest owners as follows: (i) *economically interested forest owners*, who valued their forest for economic considerations; (ii) *conceptually interested forest owners*, who valued their forest for multiple benefits (but gave greater weight to those benefits related to personal experiences as opposed to profit), participated in landowner associations (but did not feel that the information obtained through such participation contributed significantly to their knowledge), lived near their land holdings, and often owned agricultural land (but did not derive a large proportion of their income from the primary sector); and (iii) *uninterested forest owners*, for whom their forest held no value as operationalized by the researchers, who did not actively engage in forest management, did not participate in landowner associations, lived relatively great distances from their forest, and planned to retain their property for years to come.

Kendra and Hull (2005) described six classes of "new" forest owners in Virginia, i.e., those who purchased between 0.8 and 20 ha of forest from 1994 to 1998, as follows: (i) *absentee investors*, for whom their forest held no value as operationalized by the researchers, tended not to reside on their forest holding(s) and were among the least likely to engage in forest management; (ii) *professionals*, who valued their forest for the simple life it affords, earned the highest annual income of all clusters, had attained high levels of education, held professional positions, owned relatively small parcels, and were among the least likely to engage in forest management; (iii) *preservationists*, with the highest proportion of those who were unmarried or retired, consisted of those who valued their forest for the country lifestyle it provides, who tended not to trust the ethics of forestry professionals, and believed that they did not have to manage their land because it would take care of itself; (iv) *farmers*, who valued their forest for multiple benefits (but gave greater weight to those

related to lifestyle as opposed to farming and personal finance), owned among the largest parcels with the greatest amount of forest cover, earned the lowest annual household incomes, were poorly educated, and, although many were currently or were likely to engage in active forest management, few intended to have a written management plan prepared; (v) *forest planners*, who, like *farmers*, valued their forest for multiple benefits with the exception of the personal income and social ties it affords, were the youngest, most highly educated forest owners, owned the largest parcels with the greatest amount of forest cover, and were most likely to have already participated or planned to participate in a variety of forest management practices; and, (vi) *young families*, who valued their forest for the lifestyle opportunities and social ties it provides, purchased the smallest acreages, and were not likely to actively manage their forest.

Because of the diversity of the aforementioned landowner types and the apparent influence of both the particular region in which the landowners own their land and the questions used to develop these typologies, generalizing findings from the literature to family forest owners of north central Indiana (or to any other region) is inappropriate. However, patterns that emerge across these typologies are useful in identifying potential geographic or temporal trends. One such trend is the emergence of a cluster of uninterested landowners in the more recent studies (indifferent forest owners in Boon et al. [2004]; uninterested forest owners in Bieling [2004]; and absentee investors in Kendra and Hull [2005]). Whether these uninterested landowners reflect an aging population of landowners, as in Kendra and Hull (2005), who have lost interest in their land, or a new demographic for whom motivations for owning land still have not been appropriately operationalized in survey research remains to be determined. Inclusion of demographic characteristics in cluster analysis can help to better define landowner types and complement attitudinal partitioning. Thus, it was deemed appropriate to augment our analysis by including relevant ownership characteristics in the cluster analysis as well as attitudinal ownership motivations. The objectives of this study were to contribute to this body of literature and provide a foundation for future related research in this region by (i) identifying distinct types of landowners in north central Indiana with regard to ownership motivations and other ownership characteristics and (ii) comparing these emergent types in terms of (a) use of specific forest management practices, (b) use of various sources of information, (c) familiarity with and participation in private forest conservation programs, and (d) ownership and sociodemographic characteristics.

Methods

Study Area

The study was conducted in the Wildcat, Little Vermillion, and Middle Wabash watersheds, which together cover 4,852 km² of north central Indiana (Figure 1). The area, bounded geographically by 85°44' to 87°31' W longitude and 40°42' to 40°70' N latitude, is typical of the agricultural landscapes of the American Midwest. These watersheds are part of the Eastern and Central Corn Belt Plains ecoregions, for which production agriculture (soybeans and corn) as well as grazing are the characteristic land uses (Omernik 1987).

Sample

Twelve sample sites (23 km² each) were selected in total, four from each of three landscape types (i.e., forested, agricultural, and

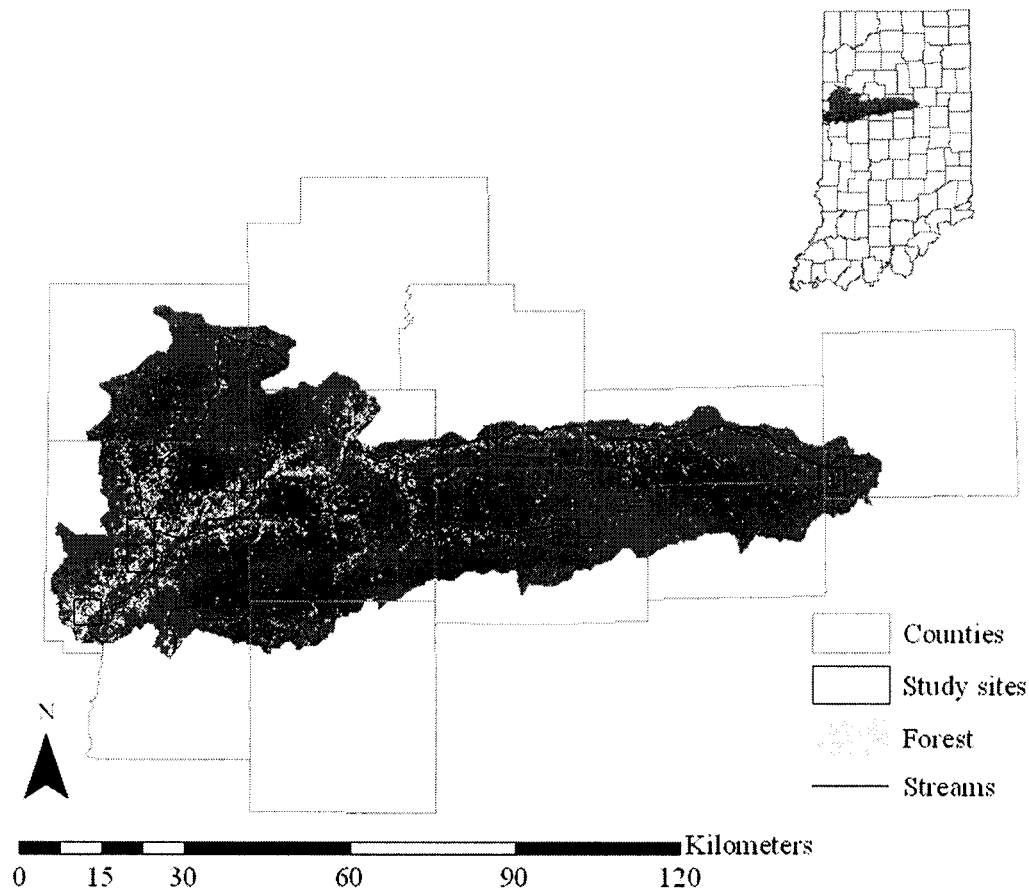


Figure 1. Distribution of sample sites in north central Indiana.

mixed forest/agricultural) within the study area described previously. Addresses for all landowners who owned at least 0.4 ha (1 ac) of forest in these sample sites were obtained from property tax records located at county assessors' offices. These records were cross-referenced with the most recent aerial photographs for all sections within our study area to ensure that each property contained at least 0.4 ha (1 ac) of forest. In this research, forest was defined as a minimum of 25 trees/ha (10 trees/ac) over a minimum of 0.4 ha (1 ac) as per the definition of forest on the National Woodland Owner Survey, which is conducted by the US Forest Service.

Survey Development

The survey used in this study was designed to examine land-use decisions made by family forest owners in North Central Indiana. Based on the Theory of Planned Behavior (Ajzen 1988, 1991), questions were created or drawn from previous surveys to measure attitudes and behavioral intentions related to forest management. This study reports on three critical forest owner behaviors: practicing forest management, enrolling in landowner assistance programs, and seeking information about forestry. Behaviors were compared among landowner typologies, which were constructed based on attitudinal, land, and demographic variables. Survey questions were developed by researchers from Purdue University, the University of Missouri at Columbia, and the University of Tennessee at Knoxville. Researchers looked to the literature described previously, qualitative data from interviews conducted in the same study regions

(Steiner 2003, Schaaf 2005), and other surveys (e.g., the National Woodland Owner Survey) to develop the survey questions.

Survey Methodology

A 12-page survey was created that consisted of 55 questions organized within seven sections as follows: (i) general characteristics of the land, (ii) importance of the forest, (iii) forest management and use, (iv) attitudes toward community and land, (v) tax information, (vi) demographics, and (vii) unrestricted open-ended comments provided by the respondent. The survey was pretested via the Tailored Design Method (Dillman 2000) in a representative 23-km² sample site from Sept. 25 to Nov. 3, 2003 and revised accordingly before being mailed to the broader sample. On Feb. 6, 2004, a notification letter was sent to all forest owners in each of the 12 sample sites. The first survey was sent on February 23 and was accompanied by a personalized cover letter and a packet of eastern redbud (*Cercis canadensis* L.) seeds as an incentive. On March 3, a personalized thank you/reminder postcard was sent to all forest owners. On March 10, a second copy of the survey was sent to all nonrespondents and was accompanied by a personalized cover letter. Finally, on March 24, a third copy of the survey accompanied by a personalized cover letter was sent to all remaining nonrespondents by first class mail. Of the 737 surveys sent to landowners, 23 were undeliverable, 3 were sent to landowners who were deceased, 19 were sent to landowners who no longer owned forest, 12 landowners refused to complete the survey, and 348 were returned completed

Table 1. Comparison of landowner types with regard to ownership and demographic characteristics.

Characteristic	Overall (n = 176)	Forest managers (n = 76)	New forest owners (n = 66)	Passive forest owners (n = 34)
Total acreage ^a (ha; $F = 2.374$; $P = 0.096$)	38.88 ± 62.46	50.40 ± 69.03	28.54 ± 57.12	33.22 ± 53.67
Forested Acreage ^a (ha; $F = 7.615$; $P = 0.001$)	10.78 ± 14.59	14.56 ± 17.96b	10.29 ± 12.24b	3.27 ± 3.15a
Tenure ^a (yr; $F = 5.589$; $P = 0.004$)	17.36 ± 11.70	17.64 ± 11.51ab	14.42 ± 11.66a	22.44 ± 10.62b
Age ^a (yr; $F = 9.955$; $P < 0.001$)	55.48 ± 12.11	57.89 ± 11.46b	50.55 ± 10.98a	59.68 ± 12.70b
Resident landowner ^{a,b}	88%	80%	97%	85%
Farmer ^a ($\chi^2 = 3.183$; $P = 0.074$)	18%	24%	12%	18%
Male ^a ($\chi^2 = 0.390$; $P = 0.823$)	72%	71%	71%	76%
Married ($\chi^2 = 8.511$; $P = 0.014$)	84.6%	93.3%	80.3%	73.5%
Riparian forest ^b	73.7%	76.3%	83.1%	50.0%
Children at home ($\chi^2 = 4.192$; $P = 0.123$)	40.3%	35.5%	50.0%	32.4%
Children < 18 yr ($\chi^2 = 7.507$; $P = 0.023$)	31.8%	26.3%	43.9%	20.6%
Retired ($\chi^2 = 12.488$; $P = 0.002$)	34.9%	46.1%	18.5%	41.2%
Liberal ^b	11.6%	8.0%	18.2%	6.3%
Conservative ($\chi^2 = 1.821$; $P = 0.402$)	45.7%	50.7%	39.4%	46.9%

Values reported are means ± standard errors. Statistically significant differences are in bold; letters indicate significant differences among groups such that a < b.

^a Used to create typology.

^b χ^2 -tests can not be performed because one or more cells have expected counts of less than five.

for a final response rate of 50.3%. To examine potential nonresponse bias, a number of property and tax features (e.g., total forest acreage, home site value, and true tax value of the land) were compared between respondents and nonrespondents (refusals and unknowns). The only characteristic by which nonrespondents differed from respondents related to total acreage enrolled in the Classified Forest Program, a state forest stewardship program that provides tax breaks, forestry literature, and periodic free inspections by a professional forester to any private forest owner who chooses to enroll by maintaining a minimum of 4.05 ha (10 ac) of forest cover. Respondents had significantly more acreage enrolled in the Classified Forest Program than did nonrespondents ($t = -2.309$; $P = 0.021$).

Analyses

Two-step cluster analysis was used to form clusters of distinct landowners based on a combination of continuous (total acreage, forested acreage, age, and tenure) and categorical (ownership motivations, farming status, residency status, and gender) variables (Coleman and Woodruff 2000, Norušis 2003). Because all cases for which data were missing must be excluded from the analysis, n was reduced from 348 to 177 for this analysis. Preclusters were formed before the final clusters, which were formed hierarchically such that the Schwartz Bayesian Information Criterion (BIC) and the change in BIC from the previous number of clusters were minimized. In this case, the BIC for $n = 3$ clusters was 8,171.493 and the change from $n = 2$ clusters was -119.063. The clustering algorithm was based on a log-likelihood distance measure, because both continuous and categorical data were used in the analysis. Cluster 1 contained 76 cases (43%), cluster 2 contained 66 cases (37%), and cluster 3 contained 34 cases (19%). An outlier cluster was created so that cases that differed markedly from the others did not artificially increase the number of clusters selected or reduce homogeneity within clusters. This cluster contained a single case, which was not included in subsequent analyses.

Pearson's chi-square tests were used to compare these clusters with respect to use of various forest management practices, use of information sources, familiarity with and participation in conservation programs, and categorical demographic characteristics. It is important to note, however, that in several cases cells had counts less than five and thus could not be examined (i.e., liberal political ideology; residency status; riparian forest; possession of a written

management plan; familiarity with Forestry Incentives, Stewardship Incentives, and Forest Land Enhancement programs; conservation easements; and with opportunities for forest certification, all program enrollment variables and use of the following information sources: the US Forest Service, Natural Resources Conservation Service [NRCS], Farm Bureau, Cooperative Extension, TV, radio, and newspaper, environmental groups, and landowner associations). Landowner types were compared with regard to total acreage, forested acreage, age, and tenure via analysis of variance (ANOVA) followed by Tukey's tests. Additionally, open-ended comments provided by respondents were used to help interpret the emergent clusters. All analyses were conducted using SPSS version 12.0.

Results

Overall, respondents owned a mean of 10.78 forested ha (26.64 ac) and 38.88 ha (96.07 ac) in total (Table 1). Most (88%) resided on their land and had done so for an average of 17 years. Respondents valued their forest most for scenery and privacy and least for opportunities to collect firewood or to produce timber (Table 2). Most respondents were male, married, and did not self-identify as farmers. Fewer than one-half of the respondents had children living at home and less than one-third had young children (i.e., under 18 years of age). Approximately one-third was retired, and almost two-thirds possessed some level of postsecondary education. Almost one-half identified themselves as politically conservative with 12% identifying as liberal. Approximately 39% earned annual household incomes of \$75,000 or more.

Although 64% of respondents indicated that they manage their land, only 4% had a written management plan prepared for their forest (Table 3). Approximately 67% of respondents had planted trees, which decreased to 39% when those who had planted trees to landscape around their yard were omitted from the calculation. Almost one-half (47%) had previously harvested timber and 20% had conducted timber stand improvement operations. The most commonly accessed sources of information pertaining to forest management among surveyed landowners were books and magazines, friends, family, and neighbors, and the Indiana Department of Natural Resources (IDNR; Table 4). The least commonly accessed sources of information were landowner associations, the Farm Bureau, and County Extension.

Table 2. Comparison of landowner types with regard to ownership motivations.

Motivation	Overall (n = 176)	Forest managers (n = 76)	New forest owners (n = 66)	Passive forest owners (n = 34)
To pass on to my children or other heirs	4 (1-5)	4 (2-5)	5 (1-5)	2 (1-5)
As part of my family heritage	3 (1-5)	3 (1-5)	4 (1-5)	1 (1-5)
To enjoy scenery	5 (1-5)	4 (1-5)	5 (4-5)	4 (1-5)
As a long-term financial investment	3 (1-5)	3 (1-5)	4 (1-5)	1 (1-5)
To collect firewood	2 (1-5)	2 (1-5)	3 (1-5)	1 (1-5)
To pick nuts, berries, mushrooms, and so on	3 (1-5)	3 (1-5)	4 (1-5)	1 (1-4)
To supply food and habitat for wildlife	4 (1-5)	4 (2-5)	5 (2-5)	3 (1-5)
For privacy	5 (1-5)	4 (1-5)	5 (3-5)	3 (1-5)
For timber production	2 (1-5)	2 (1-5)	1 (1-5)	1 (1-5)
To have trees surrounding home	4 (1-5)	4 (1-5)	5 (1-5)	3 (1-5)
For hunting and fishing	3 (1-5)	3 (1-5)	4 (1-5)	1 (1-5)
For recreation other than hunting and fishing	3 (1-5)	3 (1-5)	5 (1-5)	1 (1-5)
To learn from nature	3 (1-5)	3 (2-5)	5 (2-5)	3 (1-5)
To protect watershed and provide clean water	4 (1-5)	4 (2-5)	5 (2-5)	3 (1-5)

Median (minimum-maximum) values are reported where 1 = not important and 5 = very important.

Table 3. Comparison of landowner types with regard to use of specific forest management practices.

Forest management practice	Overall (n = 176)	Forest managers (n = 76)	New forest owners (n = 66)	Passive forest owners (n = 34)
Have written management plan ^a	3.5%	4.1%	4.5%	0%
Consider land to be managed ($\chi^2 = 9.559$; $P = 0.008$)	63.8%	67.6%	71.2%	41.2%
Planted trees ($\chi^2 = 7.813$; $P = 0.020$)	67.3%	60.3%	80.0%	57.6%
Planted trees beyond landscaping yard ($\chi^2 = 3.671$; $P = 0.160$)	38.8%	34.7%	47.7%	30.3%
Conducted timber stand improvement ($\chi^2 = 5.148$; $P = 0.076$)	19.5%	24.0%	21.5%	5.9%
Harvested timber ($\chi^2 = 6.599$; $P = 0.037$)	47.1%	53.3%	50.0%	27.3%

Statistically significant differences are in bold.

^a χ^2 -tests can not be performed because one or more cells have expected counts of less than five.

Table 4. Comparison of landowner types with regard to use of information sources.

Information source	Overall (n = 176)	Forest managers (n = 76)	New forest owners (n = 66)	Passive forest owners (n = 34)
Indiana Department of Natural Resources ($\chi^2 = 7.440$; $P = 0.024$)	37.3%	32.9%	49.2%	22.6%
US Forest Service ^a	13.3%	12.3%	20.3%	0%
USDA Natural Resource Conservation Service ^a	14.4%	15.1%	18.8%	3.3%
Farm Bureau ^a	6.1%	6.9%	7.9%	0%
Soil and Water Conservation District ($\chi^2 = 4.804$; $P = 0.091$)	24.4%	24.7%	30.8%	10.0%
Forester ($\chi^2 = 6.832$; $P = 0.033$)	24.7%	26.4%	31.3%	6.7%
Logging contractor ($\chi^2 = 5.879$; $P = 0.053$)	17.4%	25.0%	13.8%	6.7%
County extension officer ^a	11.4%	9.7%	15.4%	6.7%
Internet ($\chi^2 = 6.605$; $P = 0.037$)	19.6%	15.3%	29.2%	9.7%
Books and magazines ($\chi^2 = 9.239$; $P = 0.010$)	44.6%	47.9%	52.3%	20.0%
TV, radio, and newspaper ^a	12.6%	5.5%	23.4%	6.7%
Friends, family, and neighbors ($\chi^2 = 3.114$; $P = 0.211$)	35.9%	32.9%	43.8%	26.7%
Environmental Groups ¹	13.9%	8.2%	23.8%	6.7%
farm suppliers or tree nurseries ($\chi^2 = 2.719$; $P = 0.257$)	22.0%	16.4%	28.1%	22.6%
Landowner associations ^a	3.0%	2.7%	4.7%	0%

Statistically significant differences are in bold.

^a χ^2 -tests can not be performed because one or more cells have expected counts of less than five.

Generally, respondents were neither familiar with nor participating in any of the landowner assistance programs or other opportunities inquired about in the survey (Table 5). Respondents were most familiar with the Conservation Reserve, Wildlife Habitat, Wetland Reserve, and Classified Forest programs. Enrollment also was highest among these programs.

Cluster 1—Forest Managers

Approximately 43% of respondents ($n = 76$) fell within this cluster, accounting for 56% of the total acreage and 58% of the forested acreage. Forest managers had the highest proportion of married respondents and those who were retired and in general attributed importance to leaving a forest legacy for future genera-

tions, enjoying scenery, providing food and habitat for wildlife, privacy, having trees surround their home, and protecting the local water quality (Table 2). These landowners tended to consider their forest to be managed and were among the most likely to have harvested timber from their land in the past (Table 3). They were more likely to refer to the IDNR, foresters, the Internet, and books and magazines to learn about their forest than passive forest owners but were somewhat less likely to do so than new forest owners (Table 4). There were no statistically significant differences among clusters with regard to program familiarity or enrollment (Table 5); however, relative to other landowners, forest managers were generally more familiar with many of the programs and opportunities specified in the survey (e.g., the Conservation Reserve Program).

Table 5. Comparison of clusters with regard to program familiarity and enrollment.

Program	Overall (n = 176)	Forest managers (n = 76)	New forest owners (n = 66)	Passive forest owners (n = 34)
Classified Forest Program—familiar ($\chi^2 = 1.026$; $P = 0.599$)	25.6%	28.0%	26.2%	18.8%
Classified Forest Program—enrolled ^a	4.1%	6.7%	3.1%	0%
Wildlife Habitat Program—familiar ($\chi^2 = 0.142$; $P = 0.932$)	35.5%	36.0%	33.8%	37.5%
Wildlife Habitat Program—enrolled ^a	4.7%	6.7%	3.1%	3.1%
Conservation Reserve Program—familiar ($\chi^2 = 5.106$; $P = 0.078$)	40.4%	50.0%	33.8%	31.3%
Conservation Reserve Program—enrolled ^a	8.8%	9.5%	7.7%	9.4%
Forest Incentives Program—familiar ^a	13.5%	14.7%	12.5%	12.5%
Forest Incentives Program—enrolled ^a	0%	0%	0%	0%
Stewardship Incentives Program—familiar ^a	8.1%	10.7%	6.2%	6.3%
Stewardship Incentives Program—enrolled ^a	0%	0%	0%	0%
Wetland Reserve Program—familiar ($\chi^2 = 1.404$; $P = 0.705$)	30.4%	33.8%	26.2%	31.3%
Wetland Reserve Program—enrolled ^a	2.3%	1.4%	4.6%	0%
Forestland Enhancement Program—familiar ^a	8.1%	8.0%	7.7%	9.4%
Forestland Enhancement Program—enrolled ^a	0%	0%	0%	0%
Wildlife Habitat Improvement Program—familiar ($\chi^2 = 1.820$; $P = 0.403$)	17.4%	18.7%	20.0%	9.4%
Wildlife Habitat Improvement Program—enrolled ^a	0%	0%	0%	0%
Certification—familiar ^a	10.5%	10.7%	9.2%	12.5%
Certification—enrolled ^a	0.6%	1.3%	0%	0%
Easement—familiar ^a	12.2%	16.0%	7.7%	12.5%
Easement—enrolled ^a	0.6%	0%	1.5%	0%
Land trust—familiar ($\chi^2 = 1.443$; $P = 0.486$)	17.2%	20.3%	12.7%	18.8%
Land trust—enrolled ^a	1.2%	2.7%	0%	0%

^a χ^2 -tests can not be performed because one or more cells have expected counts of less than five.

Cluster 2—New Forest Owners

Approximately 38% of respondents (n = 66) fell within this cluster, accounting for 28% of the total acreage and 36% of the forested acreage. New forest owners were among the youngest, had the shortest ownership tenures, and contained the highest proportions of those with children under the age of 18 years and those who were working (Table 1). They attributed importance to all ownership motivations included in the questionnaire with the exception of producing timber (Table 2). Most considered their forest to be managed and were most likely to have planted trees and more likely to have harvested timber from their land in the past than passive forest owners (Table 3). Overall, they were most likely to refer to the IDNR, foresters, the Internet, and books and magazines to learn about their forest (Table 4). Although there were no statistically significant differences among clusters with regard to program familiarity or enrollment (Table 5), new forest owners generally were somewhat less familiar with and less likely to be enrolled in many of the programs and opportunities specified in the survey relative to forest managers but more familiar and more likely to be enrolled than passive forest owners.

Cluster 3—Passive Forest Owners

Approximately 19% of respondents (n = 34) fell within this cluster, accounting for 17% of the total acreage and 6% of the forested acreage. Passive forest owners typically owned the smallest forested acreages but had among the longest ownership tenure (Table 1). Passive forest owners attributed importance to none of the ownership motivations included in the questionnaire with the exception of enjoying scenery (Table 2). These landowners were least likely to consider their forest to be managed and none had a written management plan for their forest (Table 3). They were least active when it came to planting trees and harvesting timber from their forests (Table 3) and also were least likely to refer to the IDNR, foresters, the Internet, or books and magazines to learn about their forest (Table 4). Relative to other landowner types, passive forest owners generally were least familiar with and least likely to be enrolled in many of the programs and opportunities specified in the

survey, although these differences were not statistically significant (Table 5).

Discussion

Family forest owners in north central Indiana clustered into three distinct types based on ownership motivations, total acreage, forested acreage, age, tenure, farming status, residency status, and gender. These types differ with regard to land management, the use of various management practices, reference to information sources, and ownership and sociodemographic characteristics. Clusters do not differ with regard to familiarity with the variety of programs and other opportunities available to them. What follows is a comparison between landowner types in this study and those that have been reviewed in the literature followed by a discussion of the implications of these results.

Forest Managers

This group of landowners is comparable with aspects of many of the landowner types described in previous research. Similar to Kurtz and Lewis's (1981) and Kurtz and Bradway's (1981) *forest environmentalists*, *forest managers* valued many different forest benefits, not timber in particular; and like *timber conservationists*, granted importance to their responsibility for future generations. For example, one *forest manager* provided the following open-ended comment:

It is very important for those who have the resources to own large tracts of land to maintain or improve their land to provide a space for wildlife, to give something back to nature, and to provide natural spaces for future generations.

Given their ownership motivations and past management behavior, they were also similar to *forest utilitarians* as described by Marty et al. (1988) in that they valued their forest for multiple benefits and did not specifically manage for timber, but were willing to sell timber if the opportunity arose. Having previously harvested timber also bears a resemblance to Kluender and Walkingstick's (2000) *timber managers*, although explicit management for timber production was not an ownership motivation expressed by *forest managers*. A likeness

to Kendra and Hull's (2005) *farmers and forest planners* also was apparent in that *forest managers* owned parcels with relatively high forest cover (compared with *passive forest owners*) and many were actively engaged in forest management.

New Forest Owners

New forest owners were most comparable with Kendra and Hull's (2005) *young families* in that they valued their forest for the lifestyle opportunities it provided and were among the youngest respondents. Unlike *young families*, however, *new forest owners* did consider their forest to be managed and in fact many had previously planted trees and harvested timber. Similar to Kluender and Walkingstick's (2000) *resident conservationists*, *new forest owners* tended to reside on their land; however, they were not opposed to harvesting timber from their forests. Based on their ownership motivations and past management behavior, *new forest owners* also can be likened to Kurtz and Lewis' (1981) and Kurtz and Bradway's (1981) *forest environmentalists* and *timber conservationists*, Marty et al.'s (1988) *forest utilitarians*, and Kluender and Walkingstick's (2000) *timber managers* as mentioned previously. Comments provided by one *new forest owner* exemplify the characteristics that define this cluster:

Our property was certified by National Wildlife Federation as Backyard Wildlife Habitat. Our 2.8 acres attracts wildlife ranging from chipmunks and squirrels to frogs and one snapping turtle.

Passive Forest Owners

Passive forest owners were most comparable with Boon et al.'s (2004) *indifferent forest owners* and Bieling's (2004) *uninterested forest owners* in that their forest held little value as operationalized in the questionnaire. However, unlike Boon et al.'s (2004) *indifferent forest owners* and Bieling's (2004) *uninterested forest owners*, *passive forest owners*, although least active in managing their forest, still were considerably active in that 57.6% had previously planted trees on their property and 27.3% had previously harvested timber. We did not inquire as to their plans to retain forest for years to come as in Bieling (2004); however, *passive forest owners* had among the longest ownership tenure. It is possible that this lack of interest toward their forest relates to the existence of forest on their land simply because the land could not be farmed or perhaps it stems from a detachment from their forest because of agedness or general lack of interest. Additional research could help determine the particular reasons underlying this disinterest as a first step in engaging these nonparticipating landowners.

Implications

The majority of family forest owners in north central Indiana, who also own the largest forested acreages, are interested in and actively managing their forest (i.e., *forest managers* and *new forest owners*). However, 19% of respondents representing 17% of the total acreage and 6% of the forested acreage are neither interested in nor managing their forest as we have operationalized it. Interestingly, these *passive forest owners* have among the longest ownership tenure. Despite being among the eldest landowners, leaving a legacy for future generations was not of great interest to *passive forest owners*. Perhaps this relates to the low abundance of forest cover on properties owned by *passive forest owners*—they do not perceive their forest to be a valuable heirloom to be passed on to future generations.

The one ownership motivation for which respondents shared an interest related to enjoying scenery. In addition, all three clusters were most likely to refer to friends, family, and neighbors as well as the IDNR to learn more about their forest, apparently conduits through which information is most likely to be received by family forest owners overall. What is striking about these results is the evident lack of polarized orientations. Not one type was defined by a preservationist orientation as by the *preservationists* described by Kendra and Hull (2005); and there were no strong economic motivations characteristic of any of the landowner types. Although nearly one-half of the respondents had harvested timber from their forests in the past, not one landowner type granted explicit importance to timber production as an objective associated with forest ownership. In addition, only *new forest owners* saw their forest as a long-term investment.

Unmistakably, most family forest owners in north central Indiana value their forest largely for amenity values and not solely for timber production. For the most part, they have not tapped into the professional information network available to them, with the exception of the IDNR and friends, family, and neighbors, and, perhaps consequently, are neither aware of nor engaged in the opportunities available to help manage their forest. Those landowners who are most interested in and actively engaged in their forest (i.e., *new forest owners*) are presumably among the busiest, given that most are working and have young families. Thus, the time required to learn about and invest in such opportunities likely just is not available. In fact, when asked why landowners were not participating in private assistance programs and other opportunities available to them, almost one-half (45%) said they were not aware of them.

The questions for natural resource professionals become, Do we as natural resource professionals serve those constituents who are likely to be most receptive to the current suites of policies available or do we strive to engage, understand, and satisfy the needs of those who are seemingly uninterested in, unqualified for, or unaware of what we currently have to offer? Or, do we attempt to do both? Do we try to meet the needs of the handful of landowners who own the largest forested acreages or are we willing to invest the time and effort to work with the multitude of smaller landholders who apparently express the greatest interest in their forested land? Do we focus our efforts on a dedicated core or strive to engage nonparticipants? Bliss (1990) argues that natural resource professionals need to focus their attention on those who own smaller acreages despite the increased time and effort required. Particularly, as these larger forested acreages continue to be parcelized and owned by a new demographic of forest owners, a healthy discussion of these questions and potential answers is warranted as a first step to improving our efforts to sustain private forests across the landscape. Last, we underscore the importance of identifying and understanding the population of landowners and the heterogeneity within this population. An understanding of the variation within the target population of forest landowners can offer meaningful insights when selecting design elements of landowner assistance programs.

Literature Cited

- AJZEN, I. 1988. *Attitudes, personality, and behavior*. Dorsey Press, Chicago, IL. 175 p.
- AJZEN, I. 1991. The theory of planned behavior. *Organ. Behav. Hum. Dec.* 50:179–211.
- BEACH, R.H., S.K. PATTANAYAK, J.C. YOUNG, B.C. MURRAY, AND R.C. AFT. 2005. Econometric studies of non-industrial private forest management: A review and synthesis. *For. Policy Econ.* 7:261–281.

- BENGTSON, D.N. 1994. Changing forest values and ecosystem management. *Soc. Natur. Resourc.* 76:515-523.
- BIELING, C. 2004. Non-industrial private-forest owners: Possibilities for increasing adoption of close-to-nature forest management. *Eur. J. For. Manag.* 123:293-303.
- BLISS, J. 1990. Missing the target. *J. For.* 88:64.
- BOON, T.E., H. MEILBY, AND B.J. THORSEN. 2004. An empirically based typology of private forest owners in Denmark: Improving communication between authorities and owners. *Scand. J. For. Res.* 19:45-55.
- BOURKE, L., AND A.E. LULOFF. 1994. Attitudes toward the management of nonindustrial private forest land. *Soc. Natur. Resourc.* 7:445-457.
- BUTLER, B.J., AND E.C. LEATHERBERRY. 2004. America's family forest owners. *J. For.* 102:4-9.
- COLEMAN, D.A., AND D.L. WOODRUFF. 2000. Cluster analysis for large datasets: An effective algorithm for maximizing the mixture likelihood. *J. Comput. Graph. Stat.* 9:672-688.
- CUBBAGE, F.W., J.O. LAUGHLIN, AND C.S. BULLOCK. 1993. *Forest resource policy*. John Wiley & Sons, Inc., New York. 562 p.
- DILLMAN, D.A. 2000. Mail and Internet Surveys: The tailored design method, 2nd Ed. John Wiley & Sons, Inc., New York. 464 p.
- KENDRA, A., AND R.B. HULL. 2005. Motivations and behaviors of new forest owners in Virginia. *For. Sci.* 51:142-154.
- KILGORE, M.A., AND C.R. BLINN. 2004. Policy tools to encourage the application of sustainable timber harvesting practices in the United States and Canada. *For. Policy Econ.* 6:111-127.
- KITTREDGE, D.B. 2004. Extension/outreach implications for America's family forest owners. *J. For.* 102:15-18.
- KLEUNDER, R.A., AND T.L. WALKINGSTICK. 2000. Rethinking how nonindustrial landowners view their lands. *South. J. Appl. For.* 24:150-158.
- KURTZ, W.B., AND C.J. BRADWAY. 1981. Understanding nonindustrial private forest landowner management decisions. P. 40-54 in *Proc. of the 1981 southern forest economics workshop: Southern timber supply constraints on NIPF lands*, Mar. 17-19, 1981, Mountain View, AR. Robinson, V.L. (comp.). Southern Forest Economics Workers, Raleigh, NC.
- KURTZ, W.B., AND B.J. LEWIS. 1981. Decision-making framework for nonindustrial private forest owners: An application in the Missouri Ozarks. *J. For.* 79:285-288.
- MARTY, T.D., W.B. KURTZ., AND J.H. GRAMANN. 1988. PNIF owner attitudes in the Midwest: A case study in Missouri and Wisconsin. *North. J. Appl. For.* 5:194-197.
- NORUSIS, M.J. 2003. *SPSS 12.0 Statistical procedures companion*. Prentice Hall, Upper Saddle River, NJ.
- OMERNIK, J.M. 1987. Ecoregions of the conterminous United States. Map (scale 1:7,500,000). *Ann. Assoc. Am. Geogr.* 77:118-125.
- SCHAAF, K.A. 2005. *Comparative case studies of private landowner collaboration in North-Central Indiana: Antecedents, process, and outcomes*. Ph.D. dissertation, Purdue Univ., West Lafayette, IN. 352 p.
- STEINER, M.L.E. 2003. *Understanding the experience of non-participant private forest landowners: A phenomenological investigation*. M.S. thesis, Univ. of Tennessee, Knoxville, TN. 145 p.