

LANDOWNER ATTITUDES AND PERCEPTIONS OF FOREST AND WILDLIFE MANAGEMENT IN RURAL NORTHERN MISSOURI

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Abstract.—Improving Missouri's forest lands depend on private landowners. Cluster analysis was used to combine nonindustrial private forest landowners with similar interests based on attitudinal information gathered from a mail questionnaire to forest landowners in Macon County, MO. Clusters were analyzed based on objective data gathered in the questionnaire. Seven types of forest landowners were identified: absentee hunter, agrarian/steward, residential landowner, agrarian/economic, wildlife manager, uncertain landowner, and next generation landowner. Outreach efforts are discussed relative to potential impact and use of various methods for each of the seven clusters.

INTRODUCTION

Private forest lands are held by a diverse array of landowners. The Missouri Department of Conservation (MDC) offers technical assistance to landowners for a variety of natural resource management activities, including forest and wildlife management. Requests for timber sale assistance and guidance regarding woodland and wildlife habitat improvement are not uncommon, but in reality they involve only a small percentage of the forest landowner population. Numerous studies in other states have revealed similar situations (Arano and others 2002, Egan and others 1993, Clark and others 1992, Rom and others 1990).

OBJECTIVES

This study was designed to update and refine natural resource managers' understanding of forest landowners, including their knowledge of and willingness to implement a variety of forest and wildlife management activities. Willingness to adopt management practices will be examined from the perspective of a landowner motivational typology (Fairweather 1979, Greene and Blatner 1986, Kurtilla and others 2001, Kendra and Hull 2005, and Lewis 1979). The landowner motivational typology entails describing the landowner respondents, as they are grouped into clusters based on their responses to a series of attitudinal survey questions. Their responses may reveal motivational characteristics, which become the cornerstones for identifying groups of landowners with similar motivations and possibly land management styles. Groups of forest landowners are further described based upon their land management practices and interests, including landowner propensities for resource management (Kurtz and others 1984).

A deeper understanding of what motivates landowners with regard to their forest resources is needed in order to develop better outreach programs and more appropriate outreach products. To learn more about forest landowners, we undertook a study designed to: 1) delineate groups of landowners based upon attitudinal data regarding motivations for and interest in land ownership; 2) gauge the interest in and willingness among the groups to implement forest and wildlife management practices; and 3) compare the groups regarding interest in and methods of conducting a timber sale.

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STUDY AREA

The study area consisted of Macon County, MO, located in the north-central part of the state. According to the U.S. Census Bureau, Macon County had 15,762 residents in 2000. The city of Macon is the largest town and the county seat with a population of 5,538. The next largest town in Macon County is Bevier, with a population of 723.

Macon County consists of 538,745 acres. Dominant land uses include cropland (25.7 percent), grassland (51.6 percent), and forest land (20.1 percent). The remaining areas are open water (1.4 percent) and other areas such as roads and other impervious materials (1.2 percent) (MORAP 16 Class Land Cover Map: 1982). Of the forested land, 89.5 percent is held by private non-industrial landowners. Forests are frequently neglected and cut over. Threats to the resource include cattle grazing in the woodlands, land clearing, and lack of professional forest management which often leads to over-harvesting and high-grading.

Settlement of the area occurred in the mid-1800s. Before Euro-American settlers arrived, open prairie and savannas, along with upland and bottomland forests and woodlands were present. Nigh and Schroeder (2002) divide the county into two ecological subsections: the Chariton River Hills subsection lying west of U.S. Highway 63 and the Claypan Till Plains subsection lying east of US Highway 63. Highway 63 divides the county roughly in half.

The Chariton River Hills is characterized historically as a mosaic of prairie, savanna, and woodland and forest. The topography consists of rolling hills with narrow ridges and valleys. Within the Claypan Till Plains, the topography is much different. The landscape is much flatter, with rolling hills near streams and drainages. As the name implies, it has well developed claypan soils. Presettlement vegetation was largely prairie with narrow belts of timber along the streams (Nigh and Schroeder 2002).

Following settlement, much of the woodlands and forests were cleared and the landscape was converted to pastureland and cropland. In the southwest part of the county, coal mining prevailed. This enterprise began as small shaft mines run more locally but evolved into larger strip mines that reshaped the topography of a significant component of the area. The Macon County Soil Survey indicates that 1.3 percent of the county is in a soil type that was derived from surface mining (USDA Soil Conserv. Serv. 1995).

Currently, the local economy depends largely on agriculture, which consists of row crop farming of soybeans, corn, wheat, and sorghum. Macon County is home to one ethanol plant. Livestock production, mainly cattle and hogs, is also prominent. Coal mining ceased in the early 1990s.

METHODS

Sampling Design

The landowner database for this study was developed at the county level. It focused on 475,498 acres of privately owned land in Macon County. This acreage excludes all state-owned lands, lands leased for public use by the state, and lands within any incorporated areas.

To be included in this study, private landowners had to own at least 20 acres of forest cover. Parcels could include individual ownerships, partnerships, and clubs or organization-owned lands.

The common land unit (CLU) data layer developed by the USDA Farm Services Agency was used to identify landowners with 20 or more acres of forest land. This data layer outlined landowner boundaries as they fell into the following categories: forest cover, residential, impervious areas, and other open acres such as cropland and pasture.

ArcMap 3.2 and 8.1 (Environmental Systems Research Institute, Redlands, CA) were used to determine all acreages and to refine the CLU data layer. Each polygon has an identifying farm number, from which an ownership data layer was developed. In addition, forest land cover was identified by farm number and acreages summarized to determine which ones met the minimum acreage criteria.

Parcels were identified using the Macon County 2002 Plat Book. A landowner address list was obtained from the county courthouse in May of 2003. Names were matched to the ArcMap database and addresses were entered. The final data layer consisted of 1,368 usable addresses. Landowners in the study owned 343,808 acres or 63.8 percent of the eligible land area.

Survey Design

The survey was administered by mail following methodology outlined by Dillman (2000). The survey was designed to gather two basic kinds of information: 1) subjective elements - motivational and attitudinal assessments regarding reasons for land ownership, ecological perspectives, economic intentions, quality of life, and social orientation; and 2) objective information of two types: pure objective demographics and other landowner attributes, and landowner reports on past and intended management practices and sources of information. The typology is to be constructed exclusively on the basis of the first subjective information. Types are further described in relation to the second objective set of measures.

Attitudinal/motivational information was gathered using a series of statements. Statements included a range of interest in each topic (Hickman and Gelhausen 1981). Respondent interest in the topics was measured based upon their level of agreement with statements using a 5-point Likert scale. The evaluative categories of strongly disagree, disagree, undecided, agree, and strongly agree were used. In other instances, it was more appropriate to use a similar scale based on importance rather than agreement. Objective demographic data gathered were either ordinal or categorical.

Typology Establishment

Cluster analysis was used to analyze the data and develop the landowner typology. The raw scores from the surveys were used for 48 attitudinal statements in a hierarchical agglomerative method. This method assumes that each case initially defines a separate cluster and then merges cases into larger clusters. The Wards Method, within the statistical software program SAS 8.02 (SAS Institute, Inc., Cary, NC), was used to identify these larger clusters.

All of the variables for each record that are used in cluster analysis must have a completed response. Of the 753 surveys that were returned, 521 surveys had 100 percent of the clustering variables completed. An additional 83 surveys were missing only one of the 48 variables. Logistic regression was used to help salvage the 83 surveys that were missing one variable (Lohr 1999).

The number of clusters was determined by examining the semi-partial R^2 and the squared multiple correlation, R^2 . The semi-partial R^2 represents the decrease of variability explained between one cluster

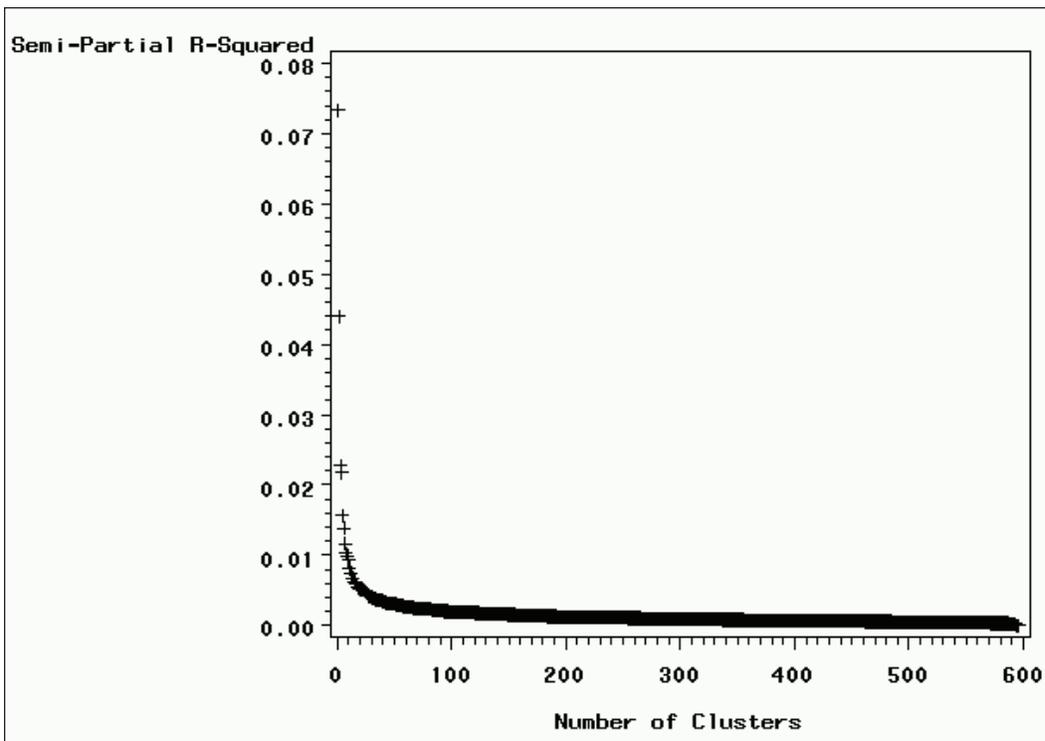


Figure 1.—Graph of semi-partial R^2 and number of clusters.

and the next subsequent cluster. R^2 represents the proportion of the variability accounted for by each subsequent cluster. The goal of this method is to generate the largest R^2 value for the fewest number of clusters possible as determined in conjunction with the decrease in variance explained in the semi-partial R^2 from one cluster to the next (SAS 8.02 online documentation).

Subsequent clusters were analyzed with ANOVA and LSD test in SAS 8.02 to determine if significant differences were present between clusters for all possible pairs in terms of the 48 subjective variables. Clusters were further described based on objective information provided in the survey. Such information included land uses, owner demographics, and residence, along with self reports of landowner forest and wildlife management interests. Statistical tests used were Pierson's Chi Square, the Monte Carlo Estimate of the Exact Test, and ANOVA. A 0.05-level of significance was used for all tests.

RESULTS

The first mailing yielded 1,312 viable addresses. Of this, 753 (57-percent response rate) surveys were returned and 596 (45-percent response rate) surveys were used in the clustering procedure and subsequent analysis. Among the 596 surveys were those that were 100 percent completed and the ones with a single calculated variable.

Seven clusters were chosen based upon guidelines outlined in the methods section. Within Figure 1, each "+" symbol represents where one cluster was joined with another. The distance between the joins indicates the amount of variability explained in the Semi-Partial R^2 . Seven clusters were chosen since at this stage, the amount of variability explained becomes negligible as we move down the graph towards higher subsequent clusters.

Significant differences were found for the seven clusters at the .05 level of significance for 45 of the variables. In descriptions of differences, terms used such as “highest” and “lowest” are significant for that cluster described below. Other statements, such as mixed views, high, low, or fair, are more general in nature and did not demonstrate uniqueness of one type but reflected a trend or inclination in attitudes between groups for various statements. In addition, significance was determined for many of the land management practices and demographics as described in the next section.

Landowner Groups

Absentee Hunter (n=92)—The “Absentee Hunter” used the property mainly for turkey and deer hunting while residing elsewhere. Only 9 percent of respondents live on the property, but many more value the privacy and solitude their forest offers. They also have one of the largest proportions (36 percent) who would rather live in a larger urban area and commute as needed to the land, and 56 percent have little connection to the area via friends and family. The average size of landholding is 191 acres, much of it in forest and grassland. Income from the land is not a priority, but some respondents do receive income from various sources with conservative reserve program (CRP) being most popular. The most popular management practice is putting in food plots. Woodlands are an important part of their land, but Absentee Hunters are the group most likely to leave the forest alone and not have a timber sale. Approximately 69 percent of the respondents have some education beyond high school. This group has the highest proportion of members earning the most income, with 66 percent earning more than \$65,000 per year.

Agrarian/Steward (n=104)—Members of this group reside on the property and uses it mainly for agricultural operations but desires to manage for certain wildlife species. This group prefers to live on the land. Members value rural living and the privacy and solitude the land offers. They have spent most of their lives in rural areas. Income generation from the land is important for 87 percent of respondents, and 64 percent are farmers. Land income makes up close to one-third of their annual income. This cluster, along with the Wildlife Manager respondents, had the greatest interest in timber as an investment, but still only 29 percent of respondents expressed this view. Members have a high interest in actively managing their woodlands; 51 percent have done some woodland management for wildlife and 28 percent have done timber stand improvement. In addition, they have the highest rate of timber sales with 30 percent having had at least one in the past 5 years. They are the largest owners of land with an average of 395 acres, and the dominant uses are grassland and cropland. They expressed a desire to leave the property to their children. While 69 percent hunt deer, most do not express a desire to see more deer.

Residential Landowners (n=90)—This group likely resides on the property and uses it as a primary residence and recreation with little interest in income from the land. Members of this cluster had the smallest average landholdings. Land size averaged 98 acres and the dominant uses were forest and grassland. They value living on the land and those who do not live within 49 miles of the land. They appear to own land for a primary residence or close piece of recreational property but do not desire income from the land. Hunting is important for 94 percent of respondents. They are the highest full-time employed group at 69 percent and only 13 percent claim to be farmers. They like to help wildlife. They have done some wildlife management, such as timber stand improvement (28 percent), improving woodlands for wildlife (67 percent), and planting trees and shrubs for wildlife (45 percent). Numerous respondents hunt deer and turkey. They also enjoy nonhunting activities such as wildlife viewing and picking nuts, mushrooms, or berries.

Agrarian/Economic (n=140)—The land is viewed as a source of income through agricultural operations, and respondents have a low interest in wildlife and wildlife management. Farmers make up 73 percent of the members in this group. Common income sources are sale of crops, cattle, and hay. The sale of timber as a source of income is second highest, 23 percent have had a timber sale in the past 5 years. A small percentage of respondents indicate doing past timber management such as timber stand improvement. A higher proportion of respondents seems inclined towards clearing the land if it were economically feasible. The group values living on the land and 69 percent of respondents reside on the property. More than two-thirds of those who do not live on the land live within 49 miles of it. They value rural living and 92 percent have spent most of their lives in rural areas. Keeping the property in the family is important.

As a group, they do not believe wildlife needs help. Members value hunting, but not as strongly as do the three clusters discussed above or the Wildlife Manager cluster discussed next. They also value nonhunting recreation less than do the previous mentioned clusters. They are more likely to agree that wildlife is frequently a nuisance on their land. The Farm Services Agency is the most commonly used source of assistance for the type (62 percent). Membership is highest for the Farm Bureau at 20 percent. Out of all the clusters, this group is most inclined to do as they see fit with their land despite what others might say.

Wildlife Manager (n=67)—Members express some of the greatest interests of any group for hunting and wildlife management. All respondents indicated they value owning land on which to hunt and fish. Respondents also like to help wildlife (99 percent) and believe wildlife needs assistance (75 percent). They have the highest rates of implementation of wildlife management practices, such as food plots, planting trees, managing grassland for quail, and improving woodlands for wildlife. In fact, 100 percent of respondents indicate it is “somewhat likely” or “very likely” they will improve woodlands for wildlife in the next 5 years.

The highest percentage of deer hunters and turkey hunters along with trophy buck hunters are represented in this type. They also enjoy other recreational activities such as wildlife viewing, and picking nuts, mushrooms, and berries. Members agree or strongly agree (90 percent) that some government involvement is needed to protect the environment. They also utilize MDC cost-share assistance the most (18 percent indicate using it in the past 5 years). They value living on the land, but only 56 percent do. Fifty-two percent have some education after high school and 47 percent earn \$25,000 – \$64,999 annually; 36 percent earn greater than \$65,000 annually. Sixty-seven percent of the members work full time.

Uncertain Landowner (n=59)—This category tends to have few strong opinions about the land and is generally not interested in wildlife or its management. In response to many of the motivational and attitudinal questions, respondents in this group tend not to respond as strongly agree or disagree, but more as simply agree, disagree, or are undecided. Living on the land, land to relax and enjoy, or land to hunt and fish on are expressed as important by many respondents. However, close to one-third (32 percent) do not value the land for hunting and fishing and more than one-fourth (27 percent) do not express a strong interest in privacy and solitude. The cluster is split with regard to income generation and keeping land in the family. They have a lower desire to leave the property to their children or heirs, with only 46 percent expressing a desire to do so. The potential for land to be sold in the next 5 years is highest for this group; 39 percent indicated it is “somewhat likely” to “very likely”. About two-thirds express interest in helping wildlife, but they do very little wildlife management. They own mostly grassland and forest land.

Table 1.—Summary statistics describing the land use distribution by cluster

Cluster ^a	AH	A/S	RL	A/E	WM	UL	NGL	Pr.>F ANOVA
n	92	104	90	140	67	59	44	
Percent of respondents	15	17	15	23	11	10	8	
Mean crop (acres)	24	121	4	104	22	19	107	0.0001
Mean grass (acres)	60	140	29	144	55	52	83	0.0001
Mean forest (acres)	87	95	58	67	72	51	51	0.281
Other (acres)	4	21	3	13	10	7	14	0.1315
Total (acres)	191	395	98	352	171	135	274	0.0001

^aAH = Absentee Hunter; A/S = Agrarian Steward; RL = Residential Landowner; A/E = Agrarian Economic; WM = Wildlife Managers; UL = Uncertain Landowner; NGL = Next Generation Landowner

Respondents also indicated they did not get to interact with their neighbors too often. Use of information sources is the lowest of all clusters. Half of respondents are fully or semi-retired and only 38 percent are working full time. They are the oldest respondents, along with those in the Next Generation Landowner cluster. The highest percentage of respondents earns less than \$25,000 annually (35 percent) and the lowest percentage earns more than \$65,000 (16 percent). One additional item to note: 25 percent of the respondents inherited the land.

Next Generation Landowner (n=44)—The desire to keep property in the family rates high for this type. Acquiring land through inheritance is highest for this cluster at 44 percent. They do not have a rural living preference and do not value as strongly as other groups the rural lifestyle attributes such as land for privacy and solitude. Management of the forest and open-land resources for wildlife or timber is low compared to other groups. Only 58 percent of respondents have lived most of their lives in rural areas and only 40 percent currently live in rural areas; only 13 percent live on the land. Those who do not live on the land are fairly well distributed from less than 49 miles away to more than 100 miles away. This group also has the second highest percentage of respondents earning more than \$65,000 income annually (46 percent). Income from the land is not as strong a motivation factor as for the Agrarian clusters but respondents do have several noteworthy income sources. Share-cropping income and CRP income are high when compared to other types, along with some row crop income. Respondents did express interest in helping wildlife, yet implementation of wildlife management practices is low compared to other clusters.

Landowner types are further described in Table 1 including size of clusters and acreages of the three dominant cover types. The Agrarian types have the largest proportion of members with 23 percent as economic respondents and 17 percent as stewards. The lowest membership was found in the Next Generation Landowner type with 8 percent of the respondents. Both crop acres and grass acres were significantly different between types; Agrarian and Next Generation types have the largest average landholdings. The forest cover was not significantly different between types, suggesting that forest land is not actively sought after by one group or another but is more a byproduct of the landscape.

Sources of Information

Information sources were investigated to determine some of the best possible avenues for reaching forest landowners in the area. These resources included the *Missouri Conservationist* magazine, Farm Services Agency, Natural Resources Conservation Service, Missouri Department of Conservation, and Internet web sites. The following draws attention to the groups that use these sources the most. The *Missouri Conservationist* magazine was very popular with the Wildlife Managers; 85 percent receive it. It is also popular with the Absentee Hunter (64 percent), Agrarian/Steward (69 percent), and the Residential Landowner (63 percent). The Farm Services Agency is used by 62 percent of the Agrarian/Stewards and Economic respondents, and 60 percent of the Next Generation Landowners. The Natural Resources Conservation Service shows much less use with 48 percent of the Agrarian/Steward members and 36 percent of the Wildlife Manager members. The Missouri Department of Conservation is used by 67 percent of the Wildlife Manager respondents, then in decreasing popularity by the Residential Landowner (56 percent), Absentee Hunter (52 percent) and the Agrarian/Steward (51 percent). Internet web sites were most popular with the Wildlife Managers at 42 percent, then with the Absentee Hunter members at 29 percent. The Uncertain Landowner group was not mentioned since in all these instances they use the information sources the least.

DISCUSSION

Discussion of Clusters

Several characteristics differentiate the groups found in this study. Most notable are economic intentions, wildlife orientation, rural living lifestyle preferences, and to a lesser extent, orientation toward government involvement, and legacy. The Agrarian clusters have the strongest economic motivation as it relates to their land, whereas the Absentee Hunter and Wildlife Managers have some of the strongest wildlife orientations. Concepts of legacy such as leaving property to one's children or improving it for the next generation can be seen throughout many of the types, but the Uncertain Landowner appears to have the least interest in legacy or leaving property to offspring.

Practical Implications

It is important to note that resource professionals are reaching landowners and likely have more requests for assistance than they can complete in a reasonable time frame. In addition, funding allocated to wildlife and forest management assistance is quickly spent. Many of the information sources, especially one of the most popular, the *Missouri Conservationist* magazine, contain articles and tips on forest and wildlife management. However, landscape-level goals such as increased quail numbers, and managed forest resources are difficult to attain. In many cases, outreach sources are good at reaching interested and consuming audiences, or in other words, landowners who actively seek educational or technical assistance, in this case, the Absentee Hunter, Residential Landowner, and Wildlife Manager cluster members. However, a successful landscape-level program must also reach a nonconsuming audience, or those who express little interest in educational and technical assistance.

Educational events such as peer-to-peer learning and field days have greater potential than any cost-share or other financial incentives. Incentives show great promise in meeting needs of landowners interested in intensive management but not those who are more casual. Thus, this typology of forest landowners demonstrates effectively that educational articles, services, and assistance are very appealing to specific groups. Viewing the goals and attitudes of nonconsuming audiences or those who do not actively seek out information, and marketing services to them that meet their goals and that of state and federal agencies is a vital use of these typologies. For instance, peer-to-peer events could demonstrate to Agrarian/Economic members how forest and wildlife management can be blended into their agricultural operations without

infringing upon the members' desires to farm or raise cattle. Evaluating potential effectiveness of new initiatives and incentive programs for the various groups is another opportunity.

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