ADOPTION-DIFFUSION OF WILDLIFE MANAGEMENT INNOVATIONS BY NONINDUSTRIAL PRIVATE FORESTLAND OWNERS

by

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(ABSTRACT)

An experiential forest and wildlife management training program, based on the adoption-diffusion model, was conducted for 49 nonindustrial private forestland (NIPF) owners. Participant-owners were surveyed 6 months after their training to monitor adoption and diffusion activity. Owners who were nominated by local natural resources professionals adopted significantly more management innovations than those owners not nominated. Farmers demonstrated the most adoption and diffusion activity, businesspeople the least. Farmers and businesspeople were more oriented towards timber production objectives than others, professionals were more oriented towards wildlife management objectives. An a priori developed predictive opinion-leadership model was not correlated with either adoption or diffusion activity. Owners living less than 8 km from their tract spent significantly more time in dissemination efforts than others, as did those who had voluntarily stated an intrinsic motivation to "share what they learned" upon application to the project. Those owners who had gained extensive knowledge from past contact with natural resource professionals were significantly more active in adoption-diffusion activity than others, and those with self-perceived high

interpersonal skills engaged significantly more peer owners in diffusion efforts than did others. Size of forest ownership, time residing in a community, primary objectives for owning forestland, and number of local leadership positions held had no significant effect upon adoption-diffusion activity by NIPF owners. A significant and negative correlation was found between an owner's self-perceived level of education and one-on-one diffusion outreach activity. NIPF owners were generally ambivalent about involvement in informal resource management clubs. It is suggested that future educational projects conducted for NIPF owners be scheduled for late winter or spring versus the fall season, particularly if a short (6 mo.) monitoring of adoption and diffusion activity is a constraint. This investigator hypothesizes that the same methodology used in this study of adoption-diffusion behavior of NIPF owners would be effective in instructing opinion-leading, professional change agents about adoption-diffusion theory and techniques.

Acknowledgements

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I would like to express thanks to Dr. Roy Kirkpatrick for his excellent presentation at the Smith Mountain Lake Coverts workshop and to Dave Hewitt for his fine presentation at the Front Royal Coverts workshop. Dr. Jim Johnson, Extension Forest Specialist, VCES, made presentations on silviculture which were extremely well received at both training events. Similarly, Dr. David W. Smith made an outstanding presentation at the Front Royal Coverts workshop. Mr. Thom McEvoy, Univ. of Vermont Natural Resources Extension Specialist, and Mr. Jonathan Kays, Univ. of Maryland

Natural Resources Extension Specialist, contributed mightily to the project design, as well as to the training seminars. Dr. Dean Stauffer contributed his considerable statistical expertise to the data analysis portion of the project.

Last, but not least, I would like to express my appreciation and admiration to the Ruffed Grouse Society of Coreapolis, Pennsylvania, for funding this progressive and experiential educational program for Virginia's nonindustrial private forestland owners. Because of the Society's support, I believe that Virginia Coverts Projects of 1991 and future years may be recognized as the premiere wildlife extension program of Virginia. The learnings from this first effort hopefully will allow others that follow to improve their ability to meet the information wants and needs of Virginia's NIPF owners who are concerned and proactive about being stewards of their total forest resources.

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CHAPTER 1 - INTRODUCTION

Nonindustrial private forestland (NIPF)[1] owners have long been an anomaly to the professional natural resource change agent[2]. Collectively, NIPF ownership constitutes a significant proportion, nearly 60 percent, of the nation's commercially productive forest area (Fesco 1982; Birch 1983). Private landowners also affect the national wildlife resource, since 75% of the nation's wildlife habitat is controlled by them (Wildlife Management Institute 1983). NIPF owners annually market 48% of all timber sold in the U.S. (USDA 1988). Alexander and Kellert (1984), Christensen and Grafton (1966), Haymond (1985), and McEvoy (1985) asserted that, for the majority of NIPF owners, timber production is less important than other objectives of ownership. For many professional foresters who believe severe timber shortages will occur in the future without increased production from NIPF lands, assertions of the secondary importance of timber production in the eyes of many private landowners have been disturbing (Wellman 1987).

Continued emphasis on timber production by forestry "change agents" has often led to feelings of detachment and alienation on the part of many NIPF owners toward those very change agents and the messages they carry. A condition of "benign neglect" has become a common practice among NIPF

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[1] NIPF is a distinctive data category within forestry circles and is used in discriminating among industrial and public land wood production.

[2] The natural resource change agent can either be a public, industrial, or consulting forester who seeks to alter attitude and behavior.

owners (Royer et al. 1981). For example, the Virginia Department of Forestry (VDF) (1990) reported that of the 120,000 NIPF holdings in Virginia totaling nearly 4.5 million hectares,most were without a forest management plan of any kind. This situation exists despite the efforts of a substantive infrastructure in Virginia, including VDF, the Cooperative Extension Service (CES), over 100 private consulting foresters, and other ancillary organizations and assistance programs.

The classic adoption-diffusion model, as advanced by Rogers and Shoemaker (1971), has been credited with remarkable success in technology transfer within the medical and agriculture industries. Opinion-leading subgroups of the populations of medical and agricultural professionals have often been tremendously effective in diffusing innovations to their peers. Particularly within agriculture, opinion-leading farmers that have adopted an innovation seem to be the most effective messengers in convincing other farmers to adopt as well. The interpersonal farmer-to-farmer interaction apparently helps mitigate the difficult evaluation and decision stages of the adoption process. The success of this adoption-diffusion model has not gone unnoticed by forest and wildlife management professionals. Many feel that this model may have great potential as a means for influencing NIPF owners to more actively manage their forests (Applegate 1981; Berryman 1981).

The Ruffed Grouse Society funded its first Coverts Project in 1985 in Vermont. The word "covert" typically refers to a thicket that provides sheltering habitat for wildlife. Since 1985, the word "coverts" has become known to many people as an experiential educational approach that

seeks to identify and utilize opinion-leading NIPF owners in targeted rural communities for diffusion of wildlife and forest management innovations.

A proposal was submitted to the Ruffed Grouse Society for consideration and funding of a Virginia Coverts Project in 1991. The Virginia Coverts Project, 1991, sought: 1) to present an alternative model of forest and wildlife management technology transfer in Virginia at a time when traditional methods were under increasingly severe budget cuts, and 2) to present an educational program compatible with a wide variety of NIPF owner values and objectives. The proposal was accepted and funded and formed the nucleus around which this study was conducted. Little data have been forthcoming from past Coverts projects about actual adoption and diffusion behavior resulting from this experiential extension approach. This study sought to understand the degree of effectiveness of opinion-leading NIPF owners as diffusion agents and to test a number of hypotheses.

Hypotheses

Hypothesis A: Mean predictive leadership scores (based on individual personal development) are not significantly different between nominated (by county foresters, county extension agents) opinion-leading individuals and individuals accepted into the program who were not formally nominated.

Hypothesis B: Predictive leadership scores of individuals are not significantly related to adoption and diffusion of forest and wildlife management practices taught to participants during a Coverts workshop.

Hypothesis C: Coverts cooperators who live on or within 8 km (5 mi.) of their forestland tract are not significantly more active diffusers to other forestland owners than those cooperators living more than 8 km (5 mi.) away from their forests.

Hypothesis D: Coverts cooperators living in their community for 5 years or less are not significantly less active diffusers than those living in their community for more than 5 years.

Hypothesis E: Size of forestland area owned has no influence on diffusion efforts.

Hypothesis F: Coverts cooperators exhibit no significant difference in adopting or diffusing information, regardless of whether their primary objective for owning forestland is timber/revenue production or wildlife and/or recreation production.

Hypothesis G: Coverts cooperators who indicated that a reason for wanting to become involved with the program was to diffuse what they learned to others were not significantly more active diffusers than those who did not state diffusion as a reason for participating.

Hypothesis H: Coverts cooperators who have frequently consulted with resource professionals do not have significantly different diffusion scores from those who have not used resource professionals.

Hypothesis I: There is no significant difference in adoption or diffusion behavior of Coverts cooperators who either belonged to no, 1, or more than 1 local civic organizations.

Hypothesis J: Those cooperators with maximum or nearly maximum interpersonal skills scores would not display significantly different

diffusion effort.

Hypothesis K: Cooperators whose score was above the median on their leadership evaluation did not adopt and/or diffuse significantly more forest and wildlife management innovations than those Coverts cooperators who scored below the median of the population.

Hypothesis L: Adoption and diffusion activity cannot be predicted by multiple regression models with correlation coefficients of 0.20 or greater when variables demonstrating collinearity are removed.

Hypothesis M: Primary objectives for ownership are not significantly different among cooperators of differing occupations.

A further hope for the project is that it will be a beginning for the creation of large, cooperatively managed tracts of NIPF in Virginia that will potentially maximize the opportunity for individual landowners to achieve their wildlife management and forest revenue objectives.

CHAPTER 2 - LITERATURE REVIEW

Philosophical Conflict - Foresters Versus Landowners

Biases developed by forestry students during their university education, coupled with the uncertainty of the future, probably contribute to whatever impasses that exist today between professional foresters and NIPF owners. Foresters are typically steeped in the tradition of Pinchot and have long struggled with allocating forest lands to "economically non-productive uses" (Wellman 1987). The Clark-McNary Act, which defined the forestry mission of the U. S. Government as primarily an industrial one, has contributed to the entrenchment of a productive-use attitude (Stewart 1990). Foresters have typically focused their attention on wood fiber production, and management success is often measured by volumes harvested, growing stock available, and/or corporate profits generated. Forest management, to them, is often synonymous with timber management. Fueling this attitude has been the recurrent theme offered up by forecasters predicting a timber supply shortfall in the next 50 years and urging increased timber production from NIPF lands (McEvoy 1985). NIPF owners, however, also have heard conflicting signals, such as that given by former Assistant Secretary of Natural Resources John B. Crowell, that "People have come to realize that if there is a timber supply problem, it is partly one of oversupply" (Crowell 1984). Reports from forest economists, ecologists, sociologists, and media specialists have made reference to snowballing recycling of paper products, increased building remodeling and restoration supplanting new home construction, the recognition of the value of mature forests for certain interior faunal species, and

prevalent incompatibility of private landowner goals with traditional silvicultural methods. Reading these reports, NIPF owners may become increasingly suspicious of professional foresters' compulsion to produce timber. For example, in studying the conflict that often exists between owners' objectives and traditional silvicultural methods, Haymond (1985) reported that in the piedmont of South Carolina, only 7% of NIPF owners who had recent timber sales used any sale income for reforestation. Only 13% said they plan to use future timber sale income for reforestation. This finding has important implications for a different approach toward forest management technology transfer in that area. Typically, forest regeneration recommendations in that area consisted of clearcutting, site preparation, and planting pines. Future forest management assistance programs that emphasize natural stand management may be more effective in helping landowners achieve adequate forest regeneration on a site than current artificial regeneration programs. This line of reasoning is consistent with the widely accepted premise that change agents who work within the societal structures (beliefs and traditions) are more effective than those who do not.

There may be other distinctly sociological reasons why many NIPF owners are skeptical of foresters' advice. Increasingly, landowners are, or have been, professional people that have come to realize that, even in their own professions, the **modus operandi** is often built upon shaky conceptual foundations. They may likewise suspect a similar phenomenon in any dogmatic canards offered up in a simplistic forest management prescription (Wisdom 1991 pers. comm.).

Bandura (1986:164) suggested that practices typically recommended by public agencies that enjoy monopolies over given functions are more likely to serve the interests and convenience of the staff or the agency than to maximize benefits for those the agencies are designed to serve. This may be because better service to others often means harder work for the staff without increased compensation. Simplistic forest management prescriptions based solely on fiber production and accompanied by gross generalizations such as "this prescription will increase edge effect and be good for wildlife" may be relevant examples of Bandura's observation.

Numerous sociological studies have shown that NIPF owners do not have either timber production or financial return as a primary objective (Christensen and Grafton 1966; Haymond 1985; Olson 1979; Stone 1969). These and other recent studies have shown that people own woodlands for a number of reasons, most of which are not oriented toward the production of timber, but instead for wildlife species richness and other purposes (McEvoy et al. 1988). Continued attempts to extend a commodity production perspective to woodland owners through mass media channels or personal persuasion may lead to a diminished capacity to influence management practices on private forestlands (Gramann 1984). Truisms often espoused by foresters such as "what is good for timber is good for wildlife" may only alienate further those landowners with divergent attitudes (Stewart 1990).

Yet another obstacle the forester may face in terms of public image is the increasing tendency of the public to view foresters as uninterested or incapable of advising on wildlife habitat manipulation through

silvicultural treatment. Consequently, landowners are often reluctant to mention wildlife objectives to a forester when calling upon them for assistance (Presley 1981).

From the foregoing discussion, then, it is evident that forestry as an institution in Virginia may have several major challenges. At the academic level, sociology will have to be accorded the same status as economics in the training of professionals. "Social science" must not be taken to mean just economics (Gramann 1984). On the individual level, foresters will have to become better listeners if they wish to identify correctly the objectives of the NIPF owner. Finally, foresters will have to move to a new paradigm of "good wildlife management can be good timber management" and recognize that timber production goals can likely be met through this approach, albeit at the probable cost of additional time and effort. In Virginia, the recently formulated Virginia forest stewardship program can be seen as a move toward facilitating improved understanding between foresters and NIPF owners.

Cooperative Extension and Wildlife Management on NIPF

The United States Department of Agriculture (USDA) Cooperative Extension Service (CES) has been acclaimed for its technology transfer program in helping to build the most productive agriculture in the world. While production agriculture in America is certainly laudable in terms of food production, costs borne by the taxpayer in support of past and present farm bills, deleterious changes in rural communities, soil losses, loss of wetlands, decline in water quality, and loss of wildlife habitats

have been recognized by many as debits on the American agriculture balance sheet. Nevertheless, perhaps nowhere else in the world has technology transfer worked so well in disseminating innovations in agricultural technology.

Unfortunately, the CES has not been so effective in transferring knowledge about effective use of other natural resources. Compared with agriculture, wildlife and forestry communications infrastructure is neither as extensive nor as well funded. Consequently, wildlife and forestry extension efforts are less visible to the CES constituency than are the more classical agricultural commodities. A recent directory of CES wildlife extension personnel revealed only 47 wildlife specialists, associates and vertebrate pest- management specialist field personnel working the entire U.S., Guam, Puerto Rico and the Virgin Islands (USDA CES 1990). This would seem woefully inadequate given the number of NIPF owners in the U.S. and its territories. Theoretically, the extension model has wildlife extension specialists and associates positioned as liaisons for technology transfer between the land grant universities and the local county extension agents. Extension agents, in turn, diffuse the information to early adopters, who in turn disseminate to later adopters. However, as Schoenfeld (1981) pointed out, "it may not be possible to utilize the network of county extension agents now in place (for the purpose of wildlife management information dissemination), for they may be too wedded to promoting agricultural practices that are in fact deleterious to wildlife husbandry practices." Schoenfeld continued, "we have to remember that introducing enlightened wildlife management onto

private lands may involve alienating land practices rooted not just in old world traditions, but in the assiduous work of relatively recent technology transfer."

Numerous pleas and directives have been made calling for a strong nationwide extension program in wildlife management using the adoption-diffusion model so successfully employed in agriculture (Applegate 1981; Berryman 1981; Neal 1991). In 1978, the 95th Congress passed the Renewable Resources Extension Act, authorizing $15 million annually over a 10 year period for an expanded and comprehensive program of natural resources education (Griffin 1981). However, 4 years later, no funds had been allocated. In the subsequent 9 years the act was funded at slightly more than $2 million annually. In Virginia in 1990, $76,000 was allocated under the act; however, the entire amount financed forest products marketing of raw and finished forest products, mainly by secondary producers (Cross 1991 pers. comm.). No funds were spent for assisting NIPF owners in developing and implementing forest and wildlife management objectives.

Compounding the difficulties of this situation in Virginia is the state budget reductions that have resulted in a freeze on filling the recently-vacated wildlife extension specialist position. This action effectively interrupts the adoption-diffusion network between land grant, local change agent, and client. Natural resource management diffusion efforts, thus, may become less available and effective than they are presently. As a consequence of these adverse conditions facing the Virginia CES, opportunities for private and volunteer efforts to further

the work of the CES, albeit with modifications spurred by recent socio-psychological research, would seem to be rich.

Wildlife Management Assistance and the Virginia Department of Game and Inland Fisheries

In a study by Wright (1988) of Virginia landowners, wildlife management technical assistance offered by the VDGIF had one of the lowest rates of participation by rural landowners of all natural resource assistance programs offered by any agency. Moreover, large segments of the landowner population were unaware of the existence of these VDGIF programs. One explanation for these findings may be the absence of aggressive promotion efforts due to lack of personnel and/or funding. This explanation is compatible with Adams' et al. (1988) findings from a survey of the information and education (I&E) divisions in state natural resource agencies. Responses from 40 state agencies revealed I&E divisions received 2.7% of total agency budgets and were staffed by 2.6% of total personnel. The primary program of I&E divisions was found to be the production of print media with emphasis on the agency magazine.

On a positive note, Wright did find that of all state and federal conservation programs in Virginia, more landowners indicated a desire for more advice on technical wildlife management than any other type of assistance.

With regard to the plethora of conservation assistance programs offered nationwide by the federal government, the General Accounting Office (1977) surmised that conservation policies grounded in volunteerism

and economic incentives have proven remarkably ineffective over the last 50 years. The USDA Forest Service, realizing the same phenomenon and concerned that their own innovations were not being adopted rapidly, created its own Office of Technology Transfer in 1972 (Comptroller General of the U.S. 1972).

McEvoy et al. (1988) examined the disappointing results of conservation assistance programs from the perspective of communications research and suggested that, although the programs offered to landowners provide a technical and service-oriented approach to a land use problem, the programs lack interpersonal communications network processes that affect motivation for and influence adoption of management practices. Deknatel (1979) took a more economic view in suggesting that the uneven history of federal and state habitat programs since the New Deal has been largely a result of continuing vulnerability to shifts in federal policy and to shifts in agricultural and forestry markets, technology, and costs. Given these economic and production pressures, it has been hard for landowners to maintain a wildlife management practice for long periods of time. Presley (1981) observed that differences in organizational structures, philosophies, and objectives between forestry, wildlife, and agricultural agencies contributed to a lack of coordination among (and associated ineffectiveness of) their respective assistance programs.

Wildlife Management and the Adoption-Diffusion Model

Wildlife management has been described as "the science and art of making decisions and taking actions to manipulate the structure, dynamics

and relations of populations, habitats and people to achieve specific human objectives by means of the wildlife resource" (Giles 1978:4). In the context of NIPF owners, awareness, acceptance and implementation of wildlife management may be a dynamic, heuristic convergence of many epistemological bases, or "ways of knowing" (Giles 1991 pers. comm.). Ultimately, making decisions and taking action to manage for wildlife are a function of the psychological clarity of the individual, the attributes[1] of the knowledge or innovation to be applied, and the social structure in which the individual and innovation exist. Following in this section is a review of the classic adoption-diffusion model as it relates to the NIPF owner, the forest/wildlife management innovation and social structure.

The Classic Adoption-Diffusion Model

It may be reasonable to induce that the findings after 40 years of sociological study of farmers and physicians and their propensity to adopt and diffuse new ideas may be transferable to NIPF owners. Doolittle and Straka (1987) have characterized individuals as falling into five categories that define an individual's history of adopting innovations.

> 1) Innovators--these people are largely venturesome, perhaps almost to an obsession. An innovator accepts risks and hazards and seeks the daring. Rogers (1983:247) has shown that adoption behavior can either follow a normal distribution

[1] "Attributes" is used in the context of economic advantage, complexity, riskiness, compatibility with personal values, trialability, and observability of the innovation.

(see Figs. 1 and 2) or a Poisson distribution, (depending on the innovation measured) and that innovators typically occur in 2.5% of the general population. The innovator often learns about new practices before the local change agent. Innovators travel widely, visit with other innovators and scientists and are likely to regard their county agent as a technical equal.

2) Early adopters--another descriptive term for these people(13.5% of the population) is "opinion leader." They are respected by their peers and often are consulted before others adopt an innovation. Doolittle and Straka (1987) asserted that by concentrating diffusion efforts on opinion leaders, a public forester could reduce the number of his/her landowner contacts by as much as 90%. Bunnell (1988) agreed. He concluded that early adopters/opinion leaders are most receptive to the external influence of change agents (Fig. 2).

3) Early majority--people in this category (34%) are often deliberate. They seldom lead, but generally follow.

4) Late majority--people in this category (34%) are generally skeptics. Often they adopt a new idea only as a reaction to social pressure to conform rather than based on a reasoned decision.

5) Laggards or traditionalists--these individuals (16%) are steeped in tradition. They tend to be suspicious of any

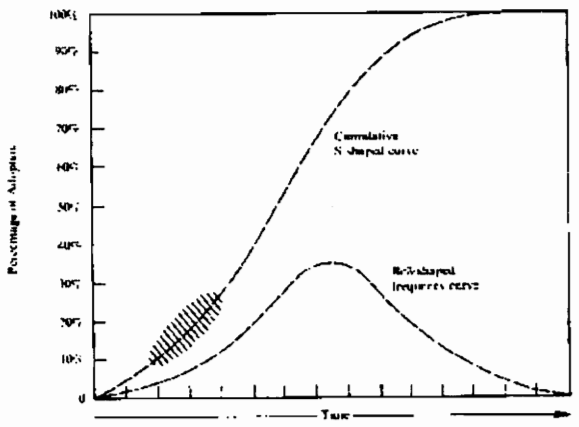

Fig. 1. The bell-shaped frequency curve and the s-shaped cumulative curve for an adopter distribution. The shaded area represents the time-period when opinion-leaders have their greatest influence (From Rogers 1983:243; permission to copy requested).

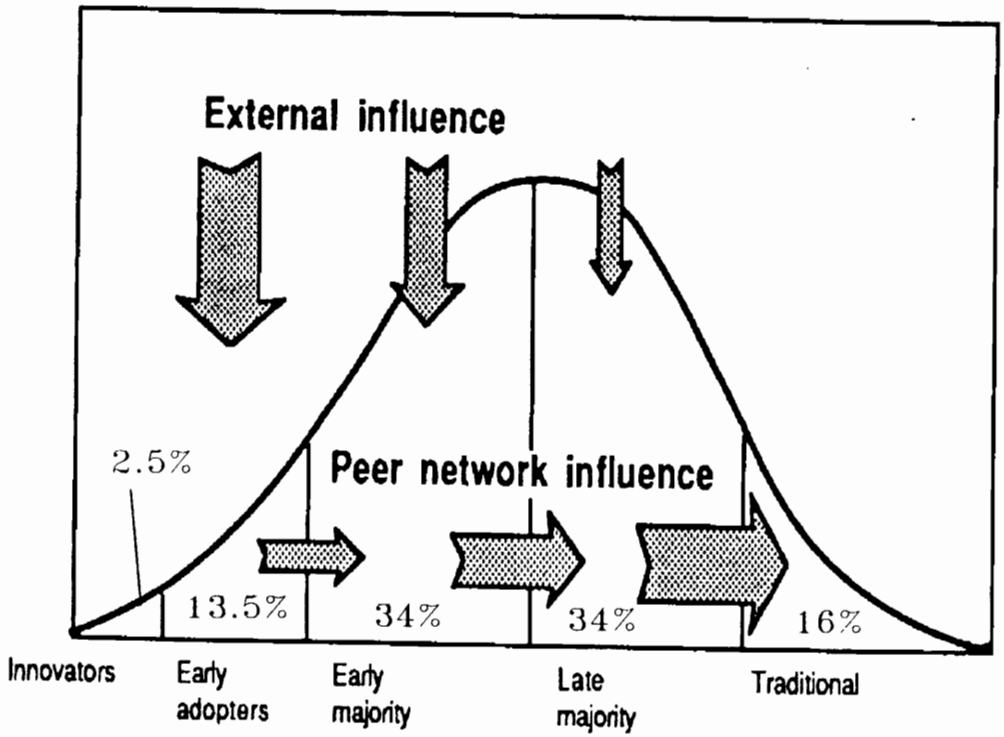

Fig. 2. Distribution of individuals with respect to rate of adopting innovations. The relative importance of external and peer influences for each group is indicated by the thickness of the arrows. Perecentages for each adopter category are given (From Bunnell 1988; permission to copy requested).

suggestion of change. If a laggard adopts a practice, it may have already become outmoded by a more recent practice. Laggards and late majority are more likely than others to depend upon friends and neighbors in the immediate locality for new information.

Bandura (1986:146) cautioned that the use of designations such as venturesome for innovators and/or early adopters and laggards for late adopters may be appropriate only in the context of an innovation that holds cultural or societal merit. People are often mesmerized by alluring marketing appeals into trying a disadvantageous innovation. In such cases, a more suitable designation for innovators and early adopters would be "gullibility" and for later adopters (particularly laggards) "astuteness". For example, in Roger's doctoral dissertation, he accepted the recommendation of agricultural scientists concerning the validity of chemical innovations such as pesticides, diethyl-stibestrol (DES) for cattle feeding, chemical fertilizers, antibiotics, swine feeding, etc. (Rogers 1983). His diffusion study categorized as laggards the few organic farmers who behaved "irrationally" by not adopting the chemicals. Of course, subsequently, DDT, DES, 2,4,5-T, antibiotic swine feeding supplements, etc., were banned and ecologic agriculture became increasingly popular. In hindsight, Rogers would have classified the "irrational" organic farmers of 1954 as "super-innovators" (Rogers 1983:190). Other examples of the paradox of early adopters and laggards, gullibility and astuteness, may be seen in such technologies as nuclear reactors (the Three Mile Island threats), side effects of the oral

contraception pill, dangers of the Dalkon Shield, the potential carcinogenic nature of saccharin in soft drinks, and perhaps even the premise "edge effect is good for wildlife."

Rogers (1983:257) made the following generalizations relevant to attributes of early adopters based on an extensive literature review. They, more than later adopters:

Have greater empathy.

Are less dogmatic.

Have more education.

Have higher social status.

Have greater ability to deal with abstractions.

Have greater intelligence.

Have more favorable attitude toward change.

Are more able to cope with uncertainty.

Have a more favorable attitude toward science.

Are less fatalistic.

Obtain greater levels of achievement and motivation.

Have greater aspirations for education and occupation.

Have greater social participation than later adopters.

Are more cosmopolite.

Have more change agent contacts.

Have greater exposure to interpersonal channels.

Have greater exposure to mass media communications.

Seek information about innovations more actively.

Have greater knowledge of innovations.

Have a higher degree of opinion leadership.

Despite several sociological studies that have specifically addressed attributes of early adopter (innovator and opinion leader) NIPF owners, most explanations for NIPF owner behavior are based upon non-sociological models such as the asset production model of economic production (Royer 1979). However, Dickson (1970) was able to distinguish early versus late adopters on the basis of several characteristics:

early life membership in youth groups;

later life membership in extension associations;

ownership of a sizable plantation (as compared to a native woods); and

physical ability and willingness to do own work.

Conversely, Dickson was unable to discriminate between early and later adopters on the basis of age, income, occupation, ethnic origin, total size of land holdings, primary reasons for ownership, and length of time of ownership. However, Stone (1969) found that forest management activities were directly related to acreage of forestland owned.

Haymond (1985), in the South Carolina piedmont, failed to find a statistical relationship between early adoption and either cost of adoption of a forestry/wildlife practice, ease of application of a forest treatment, age, income, or length of time of ownership. However, she did detect a significant relationship between adoption of silvicultural practices and the importance of improvement of the forest for uses other than timber production. Large tract size was also found to have had a strong relationship with increased number of silvicultural practices

adopted. In a later study, Haymond (1988), interestingly, found that among a population of identified NIPF owners/opinion leaders, farmers could be distinguished from other business people in their propensity to choose timber production and economics over lifestyle enhancement values (i.e., pride of ownership, stewardship, intergenerational transfer, recreation, and conservation) as reasons for forestland ownership. Haymond (1990) further found a clear and positive relationship between adoption of wildlife habitat enhancement practices and hunting.

Doolittle and Straka (1987) reported an interesting relationship between the use of consultant foresters by NIPF owners in the south and tract size. The conclusion was drawn that consultants are likely to have the more innovative NIPF clients, and public foresters the less innovative, later adopter, more difficult owners. What was surprising was that they found that non-regenerators of forestland were more likely to have consulted with public foresters than with private foresters.

In the agricultural sector, Nowak (1987) offered mixed evidence supporting and refuting some of Rogers' conclusions on opinion-leader attributes. He showed a significant correlation between attendance at field days and early adoption of conservation practices, but no relationship between the number of contacts with CES or Soil Conservation Service (SCS) personnel and conservation practices. Tenure of ownership was not significantly correlated with adoption of conservation practices, but size of ownership was. However, Pampel and Van Es (1977) found that adoption of environmental measures by farmers was best predicted by tenure, albeit weakly.

Foresters have typically keyed on owners of large tracts, assuming that these landowners would offer the best marginal response for effort spent in terms of subsequent adoption and diffusion. Working with owners of large tracts may have given the best return on their effort in terms of forest management adoption, but owners of large tracts may not be the best disseminators of management information.

Opinion Leading NIPF's--Monomorphic or Polymorphic?

Merton (1957) suggested that opinion-leading individuals fall into two categories: monomorphic or polymorphic. Monomorphic influentials are the experts in a limited field and their influence does not diffuse into other spheres of decision. Others, and these include a good number of top influentials, are polymorphic, exerting interpersonal influence in a variety of sometimes seemingly unrelated spheres. This phenomena raises a question as to whether an otherwise opinion-leading plantation tree farmer can exert influence over a later-adopter tree farmer who owns natural stands, or vice versa; or whether a forester is credible to an owner who seeks good wildlife management through forestry, as discussed earlier. King and Summers (1970) found in a study of opinion leadership and consumer product categories that only 31% of the population did not qualify as opinion leading in any category. Polymorphic opinion leadership was found to be highest between product categories which involved similar interests. However, as suggested by Rogers (1983:275), the phenomena of homophily and heterophily between change agent and adopter may confound diffusion efforts of monomorphic or polymorphic

opinion leaders. Discussion of these phenomena will follow in the section on social structure.

Opinion leadership seems dynamic along a continuum of ethnicities, age classes, gender, and even among adopter categories themselves. For example, change agents may best accomplish their goal of behavior modification through innovative opinion leaders and not through traditional-thinking opinion leaders (Haymond 1985).

Adoption of Innovations

> Wildlife management on private lands is incompatible with some deep-seated owner values and needs; it is complex; its trialability is not simple; and its observability is long in coming.
>
> Schoenfeld (1981)

Rogers (1983:189) suggested that there are 3 types of knowledge that are of main concern to the individual when adopting an innovation--what is the innovation, how does it work, and why does it work. Other areas of concern for the adopter, depending on the innovation being evaluated, might be financial risks associated with adopting the innovation and the potential for having an embarrassment feeling after having had an unsatisfactory experience with the innovation. The decision to adopt an innovation, along with the rate and pattern of adoption are influenced by 5 attributes of the innovation itself (Bandura 1986:150; Rogers 1983:231; Stewart 1990). These attributes are: relative advantage, compatibility, complexity, trialability, and observability. A brief discussion of each follows.

Relative Advantage of an Innovation

Relative advantage is the degree to which an innovation is perceived as being better than the idea it supersedes. Relative advantage may be perceived by an adopter as being associated with profitability or heightened status greater than perceived at present. Rate of adoption of an innovation is generally positively related to its perceived relative advantage. The strong encouragement offered by many public and private foresters to the NIPF owner to clearcut forest stands is often based upon the hypothesis that clearcutting will offer relatively advantageous economic return as compared to other silvicultural treatment. In agriculture, critics of the classic adoption-diffusion model suggest that no economic advantage and relatively little status have typically been conferred upon those adopting environmentally sensitive farming methods, thus an after-the-fact post hoc observation used to explain the slow rate and pattern of adoption of conservation farming methods. From this phenomenon, these same critics inferred that the classic adoption-diffusion model may not be useful outside of the context of commercial agriculture and agribusiness (Pampel and Van Es 1977). Within these 2 areas, the model has been utilized very profitably by some, but often at economic and ecologic loss to others. Flora (1992, pers. comm.), however, contended that, rather than the adoption-diffusion model being at fault, the model actually is useful in suggesting that rewards (i.e., press coverage, prizes) may be necessary where economic advantage is not guaranteed, apparent, or (in all likelihood) not properly computed.

Compatibility With Needs and Values

Compatibility of an innovation is the degree to which that innovation is perceived as consistent with the existing values, past experiences, ideas, and needs of a potential adopter. The greater the compatibility of innovation, the quicker the rate of adoption.

Shelton (1981) stated that most of the motivational factors that involve landowners and wildlife on private lands fall into three levels of needs as defined by Maslow (1970): love, esteem and self-actualization. Kellert (1976), gave 4 (naturalistic, humanistic, moralistic and ecologistic) of his nine described human attitudes towards animals that involve feelings of affection, kinship, and spiritualism, all of which can be associated with platonic love or feelings of love. NIPF owners who are early adopters of wildlife management practices may be acting as such partially to fulfill this need. Others may act out of more utilitarian, aesthetic, or dominionistic needs. Some landowners, realizing the ecological importance of wildlife in a forest ecosystem (i.e., for regenerating plants, nutrient cycling, or controlling insects) may act out of an ecologic or scientific attitude toward wildlife. Perhaps natural resource professionals working with NIPF owners have failed or neglected to identify the level of need or attitude toward wildlife held by the owner before prescribing an innovation that would satisfy the compatibility issue.

As Maslow (1970) indicated, esteem may be a very powerful motivational force in adoption. Schoenfeld (1981) theorized a cognitive dissonance model framed around an individual's esteem. For example, a

person may start to recycle cans, bottles and paper not because of concern about resource scarcity or waste disposal, but because of neighborhood pressure (and thus, threats to esteem). Later, because this motive does not sustain the inconvenience of recycling, the individual seeks information that helps resolve their feelings of dissonance, and he or she may next form an attitude of genuine ecologic concern.

Shelton (1981) reported that extension wildlife programs in Mississippi attempted to disseminate wildlife management information by appealing to 2 or more values concurrently. Management for mourning doves (Zenaidura macroura) was linked to social aspects of hunting and cookery programs, thus attracting both male and female participants. Appealing to multi-value systems when selling wildlife management may be an effective strategy.

Congruence with a previously introduced or adopted idea can also be a component of compatibility as a basis for adopting an innovation. Brandner and Kearl (1964) found that in areas where hybrid corn had already been introduced, hybrid sorghum was adopted quickly, moreso than in areas where hybrid corn had not been introduced, and even faster than in an area where sorghum was economically important. In forest management, leaving riparian corridors between unharvested stands for the purpose of facilitating unimpeded movement of certain species of wildlife may be seen as congruent with Best Management Practices, documents that encourage similar treatments, but which are primarily intended to ensure water quality of a stream.

Complexity

Whether or not an innovation is complex depends on the adopter's competencies. Hence, complexity must be viewed relative to the pre-existing competency rather than as an absolute property of an innovation. Innovations that are difficult to understand and use receive more reluctant consideration than simpler ones (Bandura 1986:150).

Wildlife management is complex. Complexity of an innovation, as perceived by members of a social system, is negatively related to its rate of adoption (Rogers 1983:226). Kivlin (1960) found that the complexity of farm innovations was more highly negatively related to their rate of adoption than any other characteristic of the innovations except relative advantage. Nowak (1987) made the point that while financial incentives may be effectively used to reduce risk of using a new technology when that practice is fairly simple, with more complex practices, the most effective way of reducing risk is through generating and distributing knowledge. It could be argued convincingly that management for certain species of wildlife on private lands is also complex and can involve potential loss of income from timber revenues and/or real estate (i.e., wetlands) values. A public policy that enjoins public financial assistance with an effective knowledge dissemination program is likely to be more effective in achieving public and private wildlife management goals than either approach alone.

Trialability

Trialability is the degree to which an innovation may be

experimented with on a limited basis. Relatively earlier adopters perceive trialability as more important than do later adopters. Laggards move from initial trial to full scale use more rapidly than do innovators and early adopters. The more innovative individuals have no precedent to follow when they adopt, while the later adopters are surrounded by peers who have already adopted the innovation (Rogers 1983:231). These peers may act as psychological or vicarious trials for the later adopters and, hence, the actual trial of a new ideas is of low significance for them.

A common misapplication of adult learning theory, relative to trialability, occurs when agencies establish demonstration wildlife and forest management areas for transfer to private landowners. Agencies do not have the same credibility as do private landowners. However sincere, the agency simply does not make decisions in the same context as an individual farmer, rancher, or forest owner (Ramsey and Shult 1981).

Observability

Observability is the degree to which the results of an innovation are observable to others. Typically, it is positively related to rate of adoption. The use of transects and small, simple experiments carried out by the landowner with consultation by the biologist or forester may be more effective in facilitating observability than showing the owner results of scientific studies that are difficult to read.

In general, the more an innovation satisfies the above-mentioned attributes, the more likely the innovation was relevant to an adopter's needs. A corollary is that if the proposed innovation matches the 5

attributes discussed, there will be less extension effort needed to diffuse it (Busch and Lacy 1983). However, on the part of change agents and researchers alike, there has often been a strong implication that an innovation should be diffused and adopted by all members of a social system, that it should be diffused rapidly, and that the innovation should neither be reinvented nor rejected (Rogers 1983:215). This has seldom been stated, but often assumed or implied, and frequently leads to an individual blame bias--a tendency for change agents and researchers that promote innovations to blame the potential adopter if the innovation is not adopted, i.e., "if the shoe doesn't fit, there must be something wrong with your foot." Later adopters and laggards are most often blamed for not adopting an innovation or being much later in adopting than the other members of their system. Many change agents perceive late-adopters as being traditional, uneducated and/or resistant to change may. This stereotype may become a self-fulfilling prophecy. Change agents do not contact the later adopters in their system because they feel, apparently on the basis of their stereotypic image, that such contact will not lead to adoption. Without information and other assistance from the change agents, the later adopters are even less likely to adopt. Thus, the individual-blame image of the later adopters fulfills itself.

Social Structure and Communications

Much diffusion-of-innovations research has examined individual characteristics of adopters and rate of adoption. Some have studied how the attributes of the innovations themselves influenced adoption.

However, little attention has been given to the social structure in which the individual and the innovation exist and to the communication channels within that structure (Goss 1979) until recently. This is partially due to the difficulty of analyzing data that rely on recollection and perception of the people who serve as experimental units (Bandura 1986:153). However, empirical findings are available throughout the literature of social psychology, and a brief review of the role of communications in adoption-diffusion process follows.

Mass Media

Fessler (1958) characterized five stages in the innovation process: awareness, interest, evaluation, trial, and adoption. With the overwhelming influence of electronic and print media in our lives, mass media have become important marketing and information tools. Some natural resource agencies have been quick to recognize and capitalize on this trend. Virginia Wildlife, a monthly publication of the VDGIF, was recently named the top state-produced conservation magazine in the country. The agency's Virginia Wildlife television program also received high honors. Most all natural resource agencies have an abundance and variety of print media espousing programs and giving explanations of forest and wildlife management innovations. However, in terms of the innovation-decision process, mass media channels are relatively important only at the awareness and interest stages, and then mainly for earlier adopters, as compared to the effect on later adopters (Rogers 1983:185).

Thus, print and electronic media, while important, are limited in their ability to affect change (Blanchard and Monroe 1990). McEvoy (1985) observed that public service and educational programs couched in media presentations have been unsuccessful in assisting the landowner through the important evaluation stage and, thus, have been ineffective in convincing a majority of private forestland owners to consider forest management.

There is another problem often associated with mass media marketing efforts. People are often led to believe in concepts or practices that, if they were fully informed, they would otherwise reject (Bandura 1986:150). Misinformation and partial information have often been conveyed through advertising. Examples relevant to forestry might be TV advertisements by Westvaco, Weyerhauser, or others depicting vast acreages of reforested plantations as being environmentally correct and laudable. The negative casting of forest fire has been fostered by the familiar "Smokey The Bear" symbol and the entrenched "Prevent Forest Fires" logo, though the role of fire in some forest ecosystems is now deemed by many ecologists to be important and necessary for long term maintenance of such systems. Examples abound outside of the context of natural resources. These include the recent attachment of the "quota" stigma to the 1991 Civil Rights Bill before Congress and the campaign to get women to smoke by exploiting the women's movement (i.e., "You've come a long way baby.").

Interpersonal Communications

Individuals are dependent upon other individuals for information to

establish the validity of their attitudes, values, and experiences (Giles 1978:233; Doolittle and Straka 1987). Marketeers have long recognized interpersonal communications as an important medium for idea exchange in contemporary American society (King and Summers 1970). Dating back to the 1930's, professional rumor-mongers reportedly organized word-of-mouth campaigns to promote clients' products or criticize competitor brands (Jacobsen 1948).

However, Rogers (1983:273) asserted that the degree and quality of information exchange between individuals depends largely upon the degree of homophily or heterophily between those individuals. Homophily is the degree to which pairs of individuals who interact are similar in certain attributes such as beliefs, education, and social status. Heterophily is the degree to which pairs of individuals who interact are different in certain attributes. One of the most distinctive problems in the communication of innovations is that the participants are usually quite heterophilous. More effective communication occurs when two individuals are homophilous. However, opinion leaders who are sought out for information about innovations are usually somewhat more innovative in adopting new ideas than their peers; yet the opinion leaders are seldom innovators, seldom the very first to adopt. This suggests that there is an optimal degree of heterophily in interpersonal networks for effective diffusion to occur (Rogers 1983:275). Within the context of the homophily-heterophily dichotomy, the importance of empathy cannot be overstated. Empathy has been defined as the ability of an individual to project him or herself into the role of another; heterophilous individuals

who have considerable empathy skills can, in a socio-psychological sense, be homophilous when interacting with and diffusing innovation to people with different socio-economic and socio-psychological attributes than themselves. Muth and Hendee (1980) asserted that opinion leaders generally spread information laterally to peers rather than downward to subordinate later adopters and laggards. If this phenomenon is true, opinion leaders, in general, can be assumed not to possess sufficient empathy skills to facilitate a downward transfer of innovation during an interpersonal interaction with a later adopter or laggard. Thus, the potential for vertical diffusion is limited. Perhaps a key element in any successful information and education program is to ensure that adequate training occurs of professional agents and/or identified opinion leaders in the skills of empathy building. Successful change agents will need to realize and be equipped to employ one approach to reach early adopters and another approach to reach the later adopters and laggards. Agents must understand personal characteristics of each adopter category and be capable of role playing.

Rogers (1983:177) generalized from sociological research of interpersonal diffusion networks. He said that when such networks are heterophilous, followers seek opinion leaders:

of higher socioeconomic status;

with more education;

with greater mass media exposure;

who are more cosmopolite;

with greater change agent contact;

who are more innovative.

Bandura (1986:179), in recognizing the importance of homophily-heterophily in interpersonal diffusion, concluded that influences rooted in indigenous sources generally have greater sustaining power than those applied by outsiders. The reason is that since resident-locals may likely be more connected to community networks of influence for transmitting knowledge and cultivating beneficial patterns of behavior than outsiders. The emerging discipline of organizational development has maintained that effective diffusion between industrialized and developing countries is served best not by experts from the industrialized nation going to the developing nation to facilitate technology transfer in a culture he/she may not understand. Rather, more lasting change will occur if members of the society of the developing nation come to the developed nation, learn the technology, and then diffuse it back home in a fashion culturally acceptable. The Bureau of Indian Affairs has recognized the validity of this phenomenon for years and has attempted to give preference to Native Americans over other ethnicities in filling positions in natural resource management, medicine, social work, and elementary and secondary education. The subtle lampooning of government officials from the eastern U.S. when they visit the western U.S. (i.e., "I'm from Washington and I'm here to help") is yet another example relevant to Bandura's observation.

Granovetter (1983) looked at interpersonal diffusion pathways in the context of weak and strong social ties. He observed that innovations may be diffused most extensively through weak social ties. The reason for this paradoxical effect, he suggested, is that people who have strong ties

to each other tend to have much the same views, know the same things and interact mainly with each other. In contrast, those with weak ties are apt to travel in more diverse social circles where they can learn different things. One is more likely to learn about new ideas/practices from brief contacts with numerous acquaintances than frequent contact in the same circle of close friends. To the extent that linkages between cohesive groups rely on weak ties, they serve to broaden and extend diffusion paths.

While weak ties may increase a person's access to diversity, the social influences operating within closely-knit networks often determine what gets adopted from that diversity. Thus, structural interconnectedness provides for potential diffusion paths, but psycho-social factors are likely to determine the fate of what diffuses through those paths. It is the transactions that occur within the social relationships, rather than the ties themselves that explain adoptive behavior.

Groups, Communication, and Diffusion

> Never doubt that a small group of thoughtful,
> committed citizens can change the world. Indeed,
> its the only thing that ever has.
> Margaret Mead (Mills 1991)

Research has shown that education directed toward behavior change is most effective in small groups (i.e., 8-15 people) (Geller 1989). A resource group carries out at least 2 functions: 1) it provides additional resources and gives adopters greater economic, political and social strength; and 2) it is a source of questions, emotional help, and support

(Defleur and Ballrokeach 1975; Giles 1978:234; MacNamara 1985; Rogers 1983:406). Such groups can also give adopters greater economic, political and social strength and provide an avenue for a change agent to modify interpersonal communications within the system (Rogers 1983:406). The use of small groups as an adoption-diffusion tool may have originated in France where the word "salon" was coined to mean "a thought-traders' rendezvous." Indeed, small groups, or study circles have proven so valuable a method for involving the public in discussion of a wide variety of issues and problems, including matters of public policy, that the governments of both Sweden and Denmark subsidize them (Mills 1991). Requirements for state assistance are simple: a minimum of 5 adults willing to met for at least 20 45-minute sessions using a basic format designed to promote learning. These small study circles have become so widespread that almost a third of all Swedish adults participate (Mills 1991).

Sabido (1981:147) reported on an ingenious application of social learning in Mexico that combined the utility of groups for diffusion/support with television modeling. In an effort to reduce widespread illiteracy, the government launched a national self-instruction program. People with reading skills were urged to organize self-instruction groups in which they would teach others how to read. Instructional material had been developed for this purpose. However, these national appeals provided a disappointing social response. Sabido then selected a television soap opera which had a large, loyal following, as the best format for reaching and motivating people with problems of

illiteracy. The main story line in the dramatic series centered on the interesting and informative experiences of a self-instruction group. Assessment after the first year of the soap-opera diffusion project showed a dramatic 8-fold increase in the number of active literacy self-instruction groups. The linkage between small resource management groups and wildlife management has not gone unrecognized. Schoenfeld (1981) suggested that a cooperative adult education mechanism linking federal and state instrumentalities with small county groups might provide the best single model for helping to achieve wildlife management on private lands. In the midwest, local groups of landowners have been formed to market recreational opportunities and to supplement landowner income from improved wildlife habitat and populations, particularly pheasants (Phasianus colchicus).

The CES has also become aware of the value of small groups in diffusing conservation techniques. In Montana and Kansas, extension specialists organized "conservation tillage committees," small groups of resource professionals and farmers. These committees have undertaken diffusion efforts mainly by field demonstrations, discussion groups, seminars and videos, all organized within a county by farmers. The committees share in having a common cause, being informal, having members with diverse interests, being flexible, being independent, and having strong leadership (Bauder and Hickman 1988).

Charter and Charter (1985), ranchers in Montana, reviewed the history and process of a small management club to which they belonged. The group was comprised of 6 area families, 4 of whom were ranchers, 1 an

SCS conservationist and 1 a town couple. At the first meeting, the weak link of each operation was discussed. Group discussion tended to stimulate people to act to change the status quo rather than just sustain it. Meetings often addressed specific concerns of planning and management. Each meeting was chaired by a different person who was responsible for keeping things moving and reducing rambling. Each meeting was critiqued at the end and topics were considered for the next meeting. Although this was a ranching-oriented management club, grass, stock and even financing were not dominant themes at the early meetings, but rather discussions centered around people, relationships, and history. An important goal of the club has been for each of the participants to develop into constructive critics for each other. The Charters commented that frankness had not been easy to achieve, since everyone initially was usually trying to present the status quo in too good a light. The group came to a realization that it takes time to develop a trust relationship where real communication can take place. An ultimate goal for the group is to become a problem-solving team better than anyone alone could achieve.

As a spinoff of the first Ruffed Grouse Society funded Coverts Project in Vermont, one of the most successful applications involved Coverts volunteers working within a small, cooperative, informal association. Thirty neighbors in a valley agreed to adhere to a collective management plan that featured habitat improvement for a variety of game and non-game species. The plan was organized around a single volunteer's tract of 100 ha (250 acres). That volunteer and his neighbors

have implemented management, principally for wildlife, but also for timber where the potential exists, on more than 480 ha (1200 ac.) of forests and fields. A significant aspect of the effort was that habitat improvement, not potential income from timber sales, was the primary motivating force that bound these individual NIPF owners together (McEvoy et al. 1988).

Suppositions and Inferences Relevant to the Hypotheses Tested

Hypotheses tested during this study were either derived from inferences of past studies, or, in the cases where no prior theory had been developed or studies conducted, from assumptions that were deemed realistic and practical in the context of change agent efforts in rural communities. Following is a rationale for the derivation of each hypothesis tested in this study.

Hypothesis A: Haymond (1985) used a process that solicited nominations of opinion-leading NIPF owners from local natural resource change agents. The criteria she used in identifying opinion-leaders was taken from Roger's (1983) assessment of socio-economic attributes of early adopters/opinion leaders. I attempted to develop a predictive opinion-leadership model based on Roger's work and that of 2 Univ. of Vermont social psychologists who had developed a screening application for opinion-leading NIPF owners (McEvoy 1988). I assigned each nominated and unreferenced participant in the program a score derived from the model, and compared scores to ascertain the utility of the nomination process that Haymond had developed.

Hypothesis B: The above-mentioned model was tested for a positive

predictive relationship with the adoption of management practices and dissemination efforts.

Hypothesis C: NIPF owners, unlike farmers, often live away from their tract and the community in which it is located. This is a current trend and is expected to continue over the next 2 decades (Hodge and Southard 1992). I attempted to determine if distance a NIPF owner resided from his/her tract had a significant effect on diffusion behavior. A distance of 8 km (5 mi.) was used a cutpoint for analyzing differences in diffusion behavior because that particular distance allowed for homogeneous samples of an already small population, while still, in my opinion, addressing the issue of "resident" vs. "absentee" owners.

Hypothesis D: Dickson (1970), Haymond (1985), and Nowak (1987) did not find tenure of ownership related to adoption of either forestry or agricultural practices. Pampel and Van Es (1977) did find a weak relationship with adoption of farming practices. I could not locate in the literature a previous attempt to measure the effect of tenure of ownership upon diffusion activity. I attempted to determine the effect, if any, of time residing in the community (assuming residence was within 32 km (20 mi.) of the tract) upon diffusion behavior. I used categories of 5 or less years and more than 5 years to obtain relatively similar sample sizes of cooperators. Those residing in the community 5 years or less could be expected to be viewed as relative newcomers, while those residing in a locale for more than five years could be expected to be viewed as "having put down roots" by peers.

Hypothesis E: Dickson (1970) could not distinguish early

adopters/opinion leaders on the basis of size of land ownership, but Haymond (1985), Nowak (1987), and Stone (1969) did. I attempted to determine the effect, if any, of size of NIPF ownership upon both adoption and diffusion activity of the cooperators. Categories of < 40 ha (100 ac.), 41-120 ha (102.5-300 ac.) and > 120 ha (300 ac.) were used to equalize sample sizes while still differentiating smaller NIPF owners from medium and large tract owners.

Hypothesis F: Haymond (1985) and Dickson (1970) found that they could not detect significant differences in adoption behavior of opinion-leading NIPF owners in South Carolina and New York, respectively, by an owner's primary objective for owning forestland. I sought to test for differences in adoption and diffusion activity on the basis of whether a cooperator owned land for timber production and economic return, or for wildlife management reasons.

Hypothesis G: Coverts cooperators were asked what their reasons were for wanting to participate in the program. Some were interested only in learning the latest in wildlife and forest management techniques. Others also felt a responsibility to share what learned with peer NIPF owners. I found no theory or study in the literature that addressed whether diffusion activity varied by the level of personal responsibility an individual felt to contribute to sound natural resource management in his/her community. Consequently, this hypothesis was derived from the circumstances of the study.

Hypothesis H: Rogers (1983), in a summary of communications research conducted over 40 years, concluded that opinion leaders have more

change agent contacts than later adopters and seek information about innovations more actively. Coverts cooperators varied widely in the number of different change agent sources they had consulted with in the past (1 to 6) and in the extent of usage of these agents (none to much). I attempted to detect any differences in adoption or diffusion activity by the cooperators on the basis of amount of past consultation with natural resource change agents.

Hypothesis I: The Vermont Coverts Project (McEvoy 1988) and The Virginia Rural Leadership Development Program screened for opinion leaders partly on the basis of past and current leadership activities not in national or state organizations, but at the community level. I attempted to detect differences in adoption and diffusion activity on the basis of number of community organizations a cooperator held an office in. Cooperators varied from 0 to 5 in number of positions held. I pooled positions held into categories of 0, 1, and >1 to achieve similar sample sizes.

Hypothesis J: Rogers (1983:247) concluded that opinion leaders have greater exposure to interpersonal channels than others. McEvoy (1988) and 2 Univ. of Vermont social-psychologists used a 5-part Leichert-type question on the screening application to detect opinion-leadership in the Vermont Coverts Project. I attempted to detect difference in diffusion activity on the basis of cooperator responses to a question measuring interpersonal skills on the Virginia Coverts Project application. I reasoned that this criteria may be important for natural resources change agents to be cognizant of when selecting opinion leaders in rural

communities.

Hypothesis K: The Virginia Coverts Project did not attract enough applicants (59) to allow for selective screening of applicants to fill the 60 seats available. Therefore, the screening and acceptance criteria was less rigorous than planned. I attempted to determine if more rigorous screening and acceptance policy would likely have resulted in a population of participant-cooperators that exhibited greater adoption and diffusion activity. I tested this hypothesis by finding the median opinion-leadership score predicted by the model I had constructed, of the cooperator population. I then compared the adoption and diffusion activity of those above the median score with those below. I made the assumption that a more rigorous screening procedure would have eliminated the bottom-half of the cooperator population from participation in the program.

Hypothesis L: Sociologist routinely develop multiple regression models to evaluate variables which affect adoption of an innovation (Taylor and Miller 1978; Nowak 1987). From the variables I measured, I sought to develop a model explaining at least 20% of the variation in adoption and diffusion activity, a threshold figure derived from observations of sociological studies by Elifson et al. (1982:199).

Hypothesis M: Haymond (1985) found that she could detect differences in ownership objectives on the basis of occupation. Dickson (1970) did not find any significant differences. Merton (1957) hypothesized that opinion leaders may be monomorphic, i.e., in the context of forestry and wildlife management, opinion-leading tree farmers may not be effective

diffusers to NIPF owners with objectives oriented toward wildlife, scenic beauty, or preservation of diversity. I attempted to measure which occupations held by cooperators would most likely be associated with objectives of timber production and which occupations would most likely be associated with wildlife management. This information may be of importance to the local natural resources change agent directing a volunteer extension program in terms of who to ask to influence a NIPF owner with certain known objectives, thus maximizing homophily between diffuser and adopter.

CHAPTER 3 - METHODOLOGY

Study Areas and Timing of Projects

Two study areas were selected: 1) a 7-county area surrounding and including Franklin Co., Va., where the first educational workshop was held at the Smith Mountain Lake 4H Center, October 9-11, 1991 (Wednesday-Friday); 2) a 7-county area surrounding and including Warren Co., Va. where the second workshop was held at the Northern Virginia 4H Center November 6-8, 1991 (Wednesday-Friday). Each educational center is located in a separate physiographic region; Virginia's mountain-valley region and the piedmont region. Both are in ruffed grouse (Bonasa umbellus umbellus) range, a criterion of necessity due to the funding source. Total NIPF area for the Smith Mountain Lake 7-county area is 520,000 hectares (812 sq. mi). Total NIPF area for the Northern Virginia 7-county area is 225,000 hectares(351 sq. mi.) (USDA 1986). These figures are of general interest and have little or no bearing on the investigations outlined in this study.

The 4H Center facilities were deemed appropriate for hosting the 2.5 day workshops because their natural settings seemed likely to be more conducive to an educational program on natural resource management than an urban facility. Since field demonstration visits to NIPF tracts were an integral part of the educational program, rural facilities were more accessible to demonstration sites than urban facilities.

All lodging, meals, trips to demonstration areas, and costs of printed materials given to the Cooperators were paid for by the Ruffed Grouse Society.

Identifying Opinion-leading NIPF Owners

County and area foresters of the VDF and VCES unit directors in each of the 14 counties in the 2 study areas were contacted either by personal visit or by telephone and follow-up mailing. Each professional was asked to: 1) nominate as many individuals as possible who owned or managed at least 8 ha (20 acres) of forestland and who satisfied a set of criteria common to early adopter opinion-leading individuals (see Appendix A), and 2) promote the program at their respective Soil and Water Conservation District meetings. Applications (Appendix A) with a cover letter were sent to each nominated individual. In addition, a mailing of promotional pamphlets was made to VDGIF district wildlife biologists, members of the Ruffed Grouse Society in Virginia, and to other county and area foresters and VCES agents in the piedmont and mountain-valley regions of Virginia. The pamphlets were also sent to the headquarters of the Piedmont Environmental Council of Warrenton, Va., for distribution to their membership. The membership was anticipated to be compatible with the nature of this project. Articles explaining the project and recruiting opinion-leading NIPF owners appeared in Virginia Wildlife and The Virginia Tech School of Forestry and Wildlife Extension Newsletter.

Selection of Coverts Cooperators

With the applications was included a leadership self-evaluation test (Rogers and Shoemaker 1971; Haymond 1985), a personal history assessment of forestry/wildlife management practices implemented on their land, and a self-assessment of personal communication skills. Applicants were

intended to be selected on a weighted basis of leadership potential, communications skills, and forest management knowledge and past practices. Applicants were to be rated and accepted into the program on the basis of a composite leadership score. Applicants were rated; however, only 58 individuals applied to the program. The target population was 60 participants. Therefore, all who applied were ultimately accepted without rigorous screening, a deviation from the original study design. Applicants accepted into the program were assigned a workshop to attend according to their preference.

The Educational Program

The old, but often ignored educational axiom, "tell them and they'll forget--demonstrate and they'll remember--involve them and they'll understand" was adhered to as much as practically possible in this program. Group discussions and group decision-making were a substantial part of the pedagogical sessions. Lecture and group exercises were blended to optimize learning process.

Subject areas addressed at the workshops fell into three broad categories: 1) wildlife life cycles, habitat requirements and management; 2) forest ecology and management; 3) communications and leadership skills. Under these broad headings the following items were specifically discussed: selected game and non-game species' habitat requirements by life group, and management as appropriate; the concepts of species diversity and management for area and edge-sensitive faunal species; source/sink habitats and populations; forest succession and silviculture;

taxation, contracts, forest harvesting, Best Management Practices, and public assistance available to NIPF owners; volunteerism and outreach, role playing and empathy, and action planning. Participants were asked on the application they submitted prior to the workshop what they would like to see emphasized at the workshop, and care was taken to incorporate their desires into the training program. Presenters from VDF, VDGIF, VCES, The Nature Conservancy, and faculty and graduate students from Virginia Tech represented a multidisciplinary training approach utilized during the Coverts workshops. A comprehensive, indexed notebook, consisting of extension publications, articles from agency and other magazines, agency assistance-program explanatory material and other appropriate literature addressing all topics covered in the workshop was given to each participant as a permanent reference source. Field demonstration visits to selected NIPF forest/wildlife management sites were featured each afternoon of the first 2 days of each workshop. Evening sessions focused on lighter and less formal topics of management interest.

On the final day of the Smith Mountain Lake workshop, participants were asked to set a date (no later than 2 months from the end of the workshop) and a location for a first meeting of a small, informal, resource management club. This was not done at the Front Royal workshop due to time constraints on the final day, but the concept of resource management groups was mentioned during the course of the 2.5 day event.

Evaluating the course and awarding personalized Virginia Coverts certificates and business cards concluded both workshops. The idea of business cards as tools for information dissemination (Kays 1991, pers.

comm.) was anticipated to give added follow-up impetus to the individual to perform volunteer outreach.

The investigator attended and co-facilitated 2 meetings of Smith Mountain Lake Coverts cooperators. Further discussion on forest and wildlife management and outreach ensued during these meetings. The investigator attempted to closely monitor the discussions at the meetings to ensure that he was getting as complete a picture of the participants thinking as possible. Such an approach is similar to the use of focus groups (Morgan 1988) in sociological research. A hallmark of focus groups is the use of group interaction to produce data and insights that would otherwise be less accessible without the group interaction. By using the focus group approach, the researcher can minimize omissions that might have occurred in the initial inventory of the topic. Such omissions could be a severe problem in multivariate statistical analysis, where such omissions could be responsible for substantial bias and which would not necessarily be negated by random samples (Morgan 1988). Similarly, the focus group approach can help the researcher in the selection of more powerful manipulations for the independent variables and for more sensitive measures for the response variables. After completing the experiment, I might use data and insights from focus groups to provide an effective substitute for armchair speculation in explaining anomalous results, outliers of the independent variables, and statistically deviant response patterns (Morgan 1988).

One newsletter was prepared and sent to all Coverts cooperators approximately 4 months after the second training session. Additional

extension and other publications, news of upcoming field days and resource management club meetings, and the availability of Coverts cooperator signs for posting on cooperator NIPF land were topics. A mention of a forthcoming final survey instrument mailing to each cooperator was also made, as suggested by Rohs (1985).

A survey instrument (Appendix A), modeled after Rohs (1985), for assessing variables associated with adoption and diffusion activities was sent to cooperators exactly 6 months following their respective training event.

Data Analysis

Criteria and weights for opinion-leadership scoring for each Cooperator is given in Table 1. The criteria used for rating the applicants was taken from an extensive literature review of psychosocial and socioeconomic characteristics of opinion-leaders conducted by Rogers (1983) and from Haymond's (1985) work on opinion-leading forest landowners of South Carolina.

After assigning each Cooperator an opinion leadership score, the population of scores was tested for normality using the Shapiro-Wilk statistic (SAS 1988:413). The distribution of scores was not found to vary significantly from a normal distribution. Therefore, to test Hypothesis A, a Student's t-test was conducted on mean leadership scores, by a dichotomous variable identifying whether the individual was nominated by a local resource professional. To test Hypothesis K, that more rigorous screening of applicants may have resulted in greater adoption

Table 1. Questions used (from screening application) and assigned point values for assessing opinion leadership potential of NIPF owners participating in the Virginia Coverts Project, 1991-1992.

Question number	Criteria	Points	
		Maximum	Minimum
11	Number of Resource Professionals Consulted	7	0
13	Knowledge of Forestry/Wildlife	5	1
16	Propensity to Adopt New Ideas	5	1
17	Level of Education	4	1
19	Interpersonal Skills	5	0
20	Communication Skills	6	0
21	Number of Community/Civic Leadership Positions Held	Unlimited	0
23	Reasons for Participating in Coverts	2	0
	TOTAL	34+	3

and/or diffusion behavior, a t-test comparing the adoption and diffusion behavior of those cooperators scoring in the top and bottom 50% of the population of Coverts cooperators (by predicted leadership score) was conducted.

Other ordinal and continuous variables of forestland tract size, time residing in community, distance residing from the forestland tract, number of community civic organizations belonged to, number of forest/wildlife practices adopted, number of individuals engaged in diffusion activities, and number of hours spent disseminating information were found to be non-normally distributed. Logarithmic transformations on data were also used, including that on data on forestland acreage, number of individuals engaged in diffusion activities, number of hours spent disseminating information, and number of practices adopted resulted in distributions not significantly different from normality; however, the data distributions of these variables, when further grouped by categories, exhibited, without exception, the tendency to become non-normally distributed. Thus, virtually all hypotheses were tested using nonparametric Wilcoxon or Kruskal-Wallis statistics. Chi Square tests of hypotheses were not used because the necessity of collapsing rows to meet the frequency requirements of individual cells would have rendered the results meaningless.

Categorical variables representing a cooperator's stated willingness to diffuse natural resources related information, past use of resource professionals, primary objectives for their forestlands, and knowledge of forest management, were joined with ordinal continuous variables and were

subsequently modeled against the following dependent variables: (1) log of hours spent on diffusion outreach during the 6-month interim since the workshop; (2) log of number of individuals personally engaged in interpersonal diffusion efforts during the 6-month interim, and (3) log of number of forest and wildlife management practices adopted during the 6-month interim which were covered during the training. A stepwise regression technique that only allowed variables to enter the model if significant at $\underline{a} = 0.20$ was attempted in order to find a multiple regression model explaining considerable variance in the co-variants. Spearman's rho correlation matrix was also utilized to determine linear correlations and redundancies among certain variables. Spearman's rho was chosen because of the non-normality of many of the variables analyzed and because the population of cooperators was chosen somewhat purposively versus randomly.

Plots of residuals of simple linear regressions of the ordinal and continuous variables were modeled on either number of practices adopted, number of individuals engaged in information dissemination, or number of hours spent diffusing information and were analyzed for other-than-linear relationships.

Social scientists who investigate the relationship between attitudes and/or socio-economic attributes, routinely expect correlation coefficients between 0.20 and 0.40 (Elifson et al. 1982:199). In considering this fact, I made the decision to set my alpha level of rejection when testing hypotheses at $p > 0.20$. The only exception to this was made when using the Shapiro-Wilk statistic for testing normality, in

which case the level of rejection was set at $\underline{a} = 0.05$.

CHAPTER 4 - RESULTS

Characteristics of Coverts Cooperators

Tabulated responses to all questions eliciting data and which were asked on the screening application and 6-month interim survey instrument but not reported in the text are listed in Appendix B. However, a few of the more interesting compilations are reported here.

Cooperators came from a diversity of occupations, which are reported in Table 2. Their experiences in actualizing forest and wildlife management activities on their private forestlands during the past 3 years, however, were somewhat homogeneous: 63 % had created wildlife plantings; 59 % had conducted woodroads maintenance or stabilization; 33 % has carried out some fashion of timber stand improvement, and 29 % had previously clearcut some timber on their land. A further summary of management activities conducted by cooperators during the 3 years prior to participating in the Virginia Coverts Project is in Appendix Table B2.

Cooperators, as a population were predominantly pro-hunting: 39 were active hunters, 9 did not hunt but did not oppose hunting, and 1 was opposed to hunting.

Coverts Cooperators were not strangers to state and federal natural resource professionals. Table 3 summarizes the frequency of utilization of natural resource professionals, by agency.

Coverts applicants had a somewhat focused agenda regarding what they wanted to see covered during the training portion of the project. Table 4 summarizes the collective input of participants prior to the

Table 2. Primary Occupational categories of Virginia Coverts cooperators, 1991.

Occupation	Number Participating	Percent
Farmer	8	16.33
Business Person	21	42.86
Government	5	10.20
Professional	4	8.16
Retired	11	22.45

Table 3. Types of natural resource professionals engaged in past consultations by 1991 Virginia Coverts cooperators, by frequency and percent of cooperators engaging.

Title	Frequency	Percent
County/Area Forester (VDF)	44	89.8
Soil Conservationists (SCS)	25	51.0
Biologist (VDGIF)	22	44.9
Private Consulting Forester	18	36.7
County Agricultural Agent (VCES)	18	36.7
Natural Resources Specialist (VCES)	8	16.3
Westvaco CFM Forester	3	6.1
Non-profit Biologist	3	6.1
Va. Dept. of Conservation & Recreation Personnel	1	2.0

workshops. Similarly, Table 5 summarizes why the cooperators wished to participate in the project. Apparently, cooperators had their wants and needs met relative to the training portion of the project, as nearly 93% evaluated the workshops as "valuable", as opposed to "interesting", "fair", or "of little value."

Collectively, the participants in both workshops owned 13,353 ha. (33,383 ac.) of forestland, of which 5,290 ha. (13,225 ac.) was entered into the VDF Forest Stewardship Program during the 6-months subsequent to the Virginia Coverts Project. The area of forestland entered into the VDF Forest Stewardship Program by cooperators met the entire acreage sign-up goal for the program for 1991 (VDF 1990). Additionally, cooperators claimed that their diffusion efforts during the 6-month interim since the training had resulted in 27 tracts belonging to neighbors or friends being brought into the VDF Forest Stewardship certification process. Additionally, cooperators "felt good" about the likelihood of 130 other forestland owners pursuing at least one forest/wildlife management activity as a direct result of the cooperator's diffusion effort.

In terms of total diffusion effort, cooperators claimed to have individually contacted 250 peers and disseminated to these individuals information of which the cooperator had learned during the Coverts training. Further, cooperators had made presentations to 21 groups comprising 225 people and held 22 field days attended by an additional 246 people. Nine popular press articles/letters to the editors have been written by the cooperators during the interim, as well as 1 television

Table 4. Virginia Coverts Project cooperators responses to question 22 of the screening application regarding desired emphasis on subject matter during the Coverts workshops, 1991.

Desired Emphasis	Number Advocating*	Percent
Wildlife Management/Habitat Improvement	37	75.5
Forest Management (Silvicultural Emphasis)	12	24.5
Economic Emphasis	3	6.1

* Percent totals > 100 because of multiple responses from 3 cooperators.

Table 5. Summary of responses of 1991 Coverts cooperators to question 23 of the screening application, addressing why the individual wanted to participate in the Virginia Coverts Project.

Reason for Participation	Number Advocating	Percent*
To keep abreast of latest technology and concepts in forest/wildlife management	34	69.4
To become an informal educator in locale	18	36.7
To better understand interconnections between humans, forests and wildlife	8	16.3
To quantitatively increase timber production and/or income	4	8.2
To become better acquainted with information sources	2	4.1
To gain or keep prestige	1	2.0
To satisfy curiosity	1	2.0

* Percent totals exceed 100 % because of multiple responses by cooperators.

appearance. A total of 479.5 hours have been spent on forest/wildlife management diffusion by cooperators in 6 months, with 79% of that being spent in one-on-one consultations.

On a similar note, 463 forestry, wildlife management, or conflict-resolution practices had been adopted by cooperators since the completion of the training segment of the Project. Table 6 depicts the frequency of adoption of each practice.

Finally, 3 management club-meetings were scheduled. The 1st meeting was canceled due to lack of anticipated attendance. Six cooperators attended the 2nd scheduled meeting and 8 cooperators attended the 3rd meeting. Five of the 8 attending the 3rd meeting also attended the 2nd meeting. All who attended these meetings had initiated the process necessary for Stewardship certification, and each discussed the successes and frustrations encountered while participating in the fledgling program. Field tours were conducted at each meeting and ideas and knowledge were exchanged by attendees. Future management club meetings will be at the initiative and convenience of the Cooperators.

The Selection Process

One hundred eighty people were nominated by VCES agents and VDF foresters of 14 counties during the period July through September, 1991 (Appendix, Table B1). Each nominated person was sent an application and cover letter explaining the program and their nomination, and an invitation to apply to the program. Twenty-seven people responded by applying to the program, representing a response rate of 15%. Twenty-

Table 6. Summary of forestry and wildlife management practices either implemented within 6 months after attending a workshop or to be implemented during 1992, as a result of knowledge or motivation received through the Virginia Coverts Project training programs.

Practice	Number Adopting	Percent Adopting
Consulted with public professional forester or biologist	35	71.4
Planted annuals, biannuals, or perennials in food patches	32	65.3
Created brush piles	30	61.2
Initiated the process of "Stewardship" certification with VDF	22	44.9
Left snags, den/nest trees, and/or drumming logs during timber harvest	22	44.9
Installed water bars on roads	22	44.9
Seeded roads with anything but KY 31 Fescue	22	44.9
Did timber stand improvement, with income from or personal use of firewood	21	42.9
Installed nest boxes	21	42.9
Transformed hard edge to soft edge	21	42.9
Daylighted roads	18	36.7
Disked small area to increase weed seed	17	34.7
Consulted with private consulting forester or biologist	15	30.6
Made patch cuts to favor grapevines and other soft mast	14	28.6
Shaped timber harvest to maximize or minimize edge	14	28.6
Made selection cuts to favor the mix of red/white oak, hickory, and beech crops for mast production	13	26.5
Burned area to foster weed seed and browse production, reduce litter	10	20.4

Table 6 - Cont'd

Practice	Number Adopting	Percent Adopting
Planted hardwoods using tree shelters	10	20.4
Considered habitat juxtapositions with neighboring tracts when planning a clearcut harvest	10	20.4
Left a 100' riparian corridor of trees	8	16.3
Planned timber harvest with consideration of wind dynamics	8	16.3
Used controlled grazing in woodlots	7	14.3
Started a life list of sightings of non-game on your land	7	14.3
Thinned pines precommercially	6	12.2
Timed selection of shelterwood cut to minimize damage to residual trees and injury to nests	6	12.2
Left a forested buffer strip along public roads	6	12.2
Used controlled burns in a pine plantation to stimulate nutrient cycling and growth of crop trees	5	10.2
Thinned pines commercially	5	10.2
Participated in VDGIF's Deer Management Assistance Program	4	8.2
Entered tract into an	4	8.2
Timed clearcut to minimize impact on most wildlife	3	6.1
Sent wings of harvested ruffed grouse to VDGIF	3	6.1
Attempted conflict resolution with polarized resource-using groups	2	4.1
Improved wildlife/fish water development	2	4.1
Planted warm season grasses	2	4.1
Constructed trails	1	2.0

Table 6 - Cont'd

Practice	Number Adopting	Percent Adopting
Planted trees	1	2.0

one of those actually participated, equalling (11.2%) of the total nominated population. Twenty-eight cooperators entered the program via pathways other than the nomination process. These pathways included applying to the program as a result of the articles in Virginia Wildlife and The Virginia Tech School of Forestry and Wildlife Extension Newsletter, learning of the program via a Ruffed Grouse Society member, picking up display pamphlets at a VDF, VDGIF or VCES office, etc.

A student's t-test of Hypothesis A (that mean opinion-leadership scores of nominated and unreferenced individual Coverts cooperators did not significantly differ) resulted in failure to reject the null hypothesis ($t = -0.0101$, $p = 0.99$). They were very similar. Neither did a Wilcoxon 2-sample t-test reveal a significant difference in central tendencies between nominated and unreferenced populations of cooperators with regard to total hours spent diffusing forest and wildlife information during the 6-month period following the workshop ($Z = -0.086927$, $p = 0.93$). There was no significant difference between nominated and unreferenced cooperators in the number of people engaged in forest/wildlife management diffusion encounters ($Z = 0.590321$, $p = 0.55$). However, there was a significant difference between nominated and unreferenced populations in terms of number of forest and wildlife management practices that they adopted or planned to adopt during the remainder of 1992 (Fig. 3).

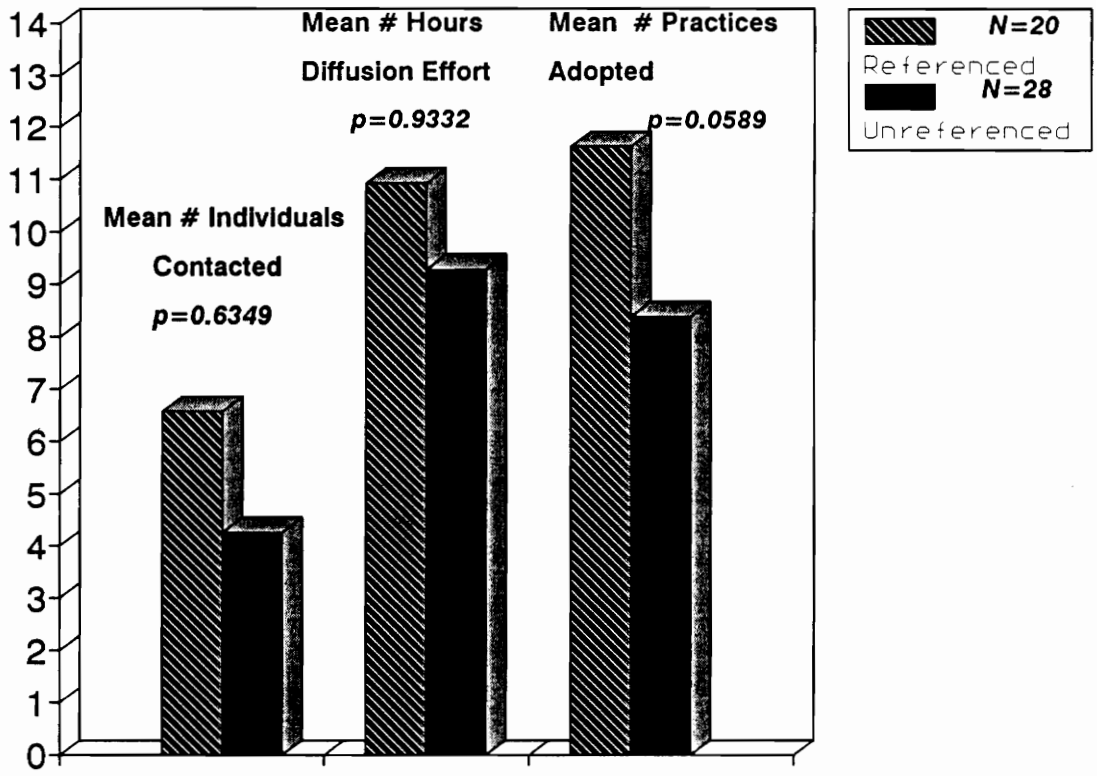

Fig. 3. Tendencies of adoption/diffusion activity by nomination status.

Prediction of Adoption-Diffusion Behavior

Hypothesis B tested the question of whether the investigator's devised method of predicting opinion-leadership via the scoring system previously described could be positively and significantly related to adoption or diffusion activity. Figs. 4, 5, and 6 represent scatter diagrams of these relationships. Table 7 summarizes the relationships analyzed and their R^2 values. No significant relationships were found. Log transformations of the dependent variables, which were non-normally distributed, resulted in an improvement of the R^2 value of only 0.02 - 0.03.

Spearman's rho correlation coefficients were determined for all components of the predictive leadership model to determine the correlation and significance of each component with the model. Coefficients and p values are given in Table 8.

Possible Effects of Residence on Diffusion Efforts

Hypothesis C addressed the question of whether cooperators who lived less than 8 km (5 mi.) from their forestland tract were significantly more active information-disseminators to other forestland owners than those cooperators living 8 or more kilometers away from their forests. Fig. 7 depicts the results of a Wilcoxon statistical analysis and mean diffusion activity, by distance category. Those cooperators living within 8 km of their forestland tract displayed a significant tendency to spend more time disseminating information to

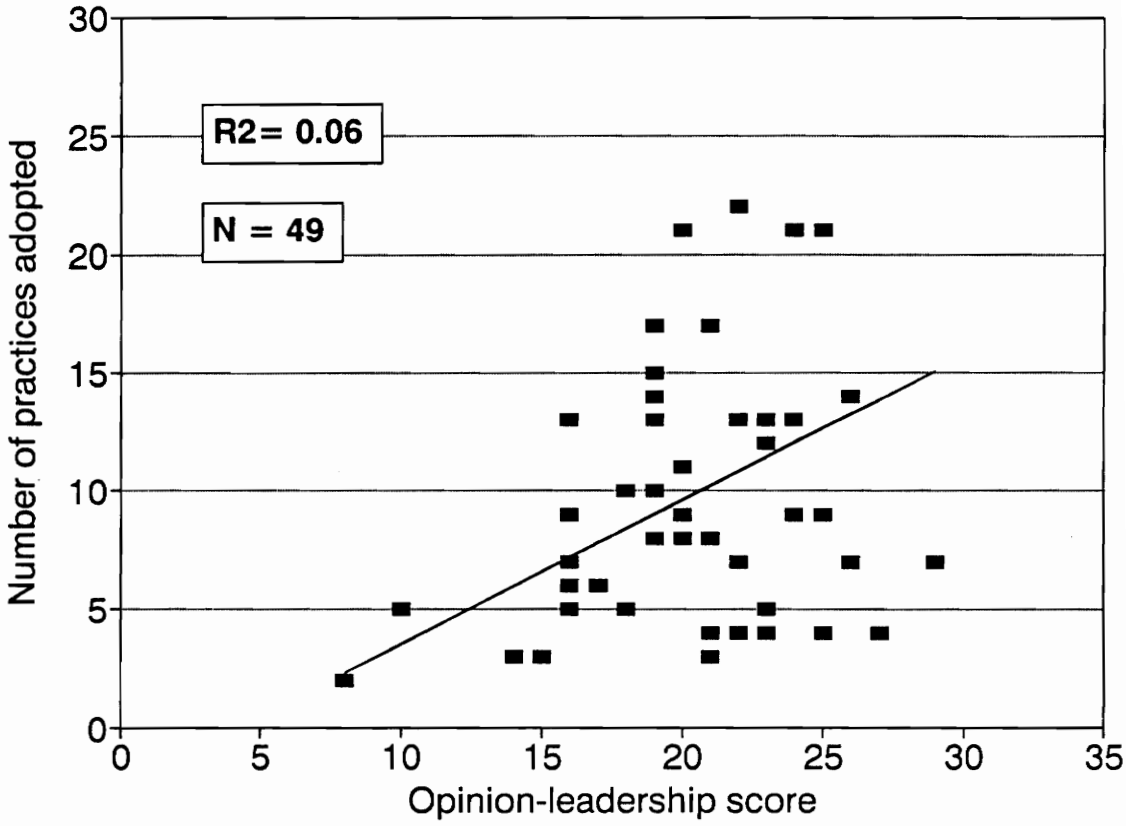

Fig. 4. Relationship of the opinion-leadership score to the number of practices adopted.

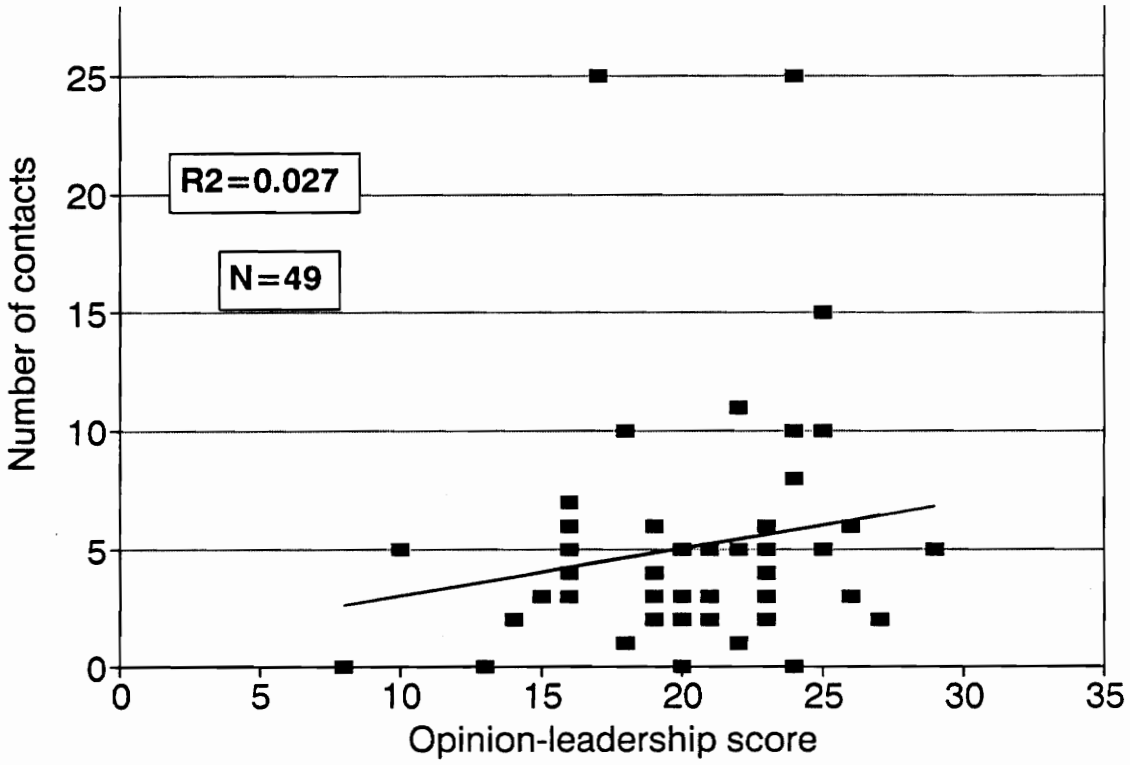

Fig. 5. Relationship of the opinion-leadership score to the mean number of individuals engaged in one-on-one outreach.

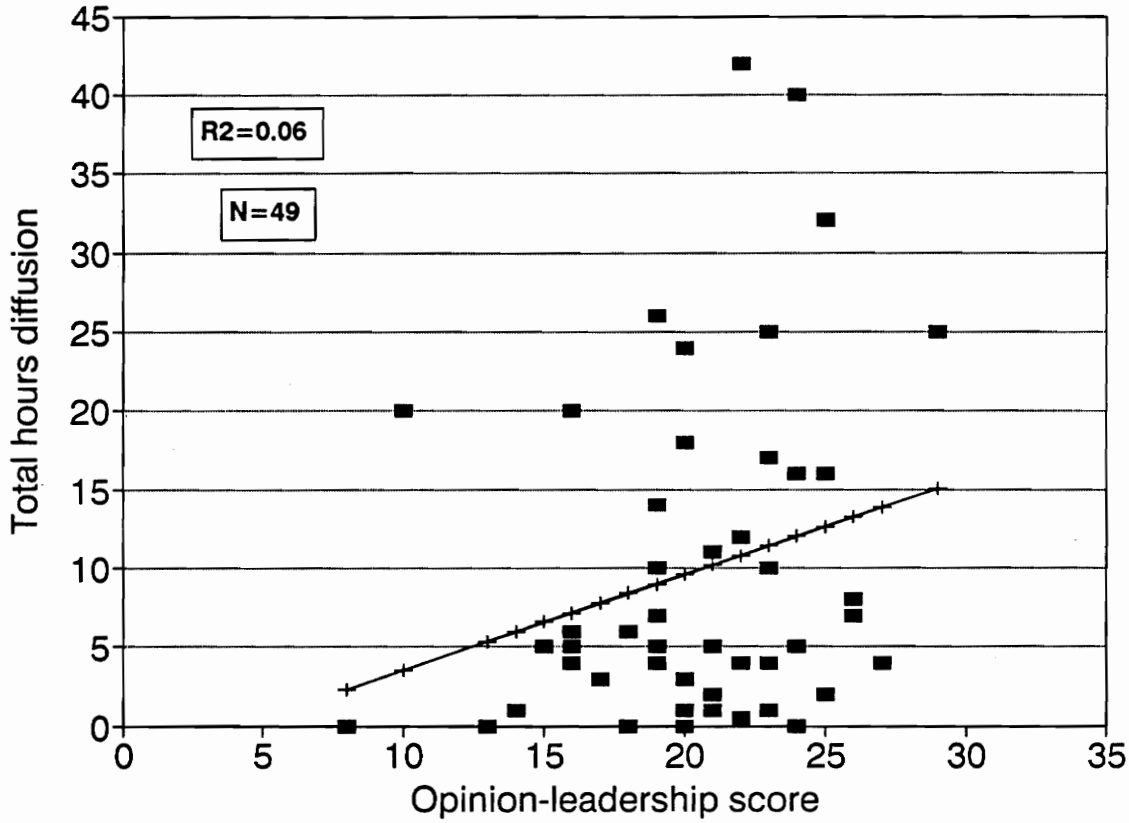

Fig. 6. Relationship of opinion-leadership score to the mean number of hours of diffusion effort a cooperator spent.

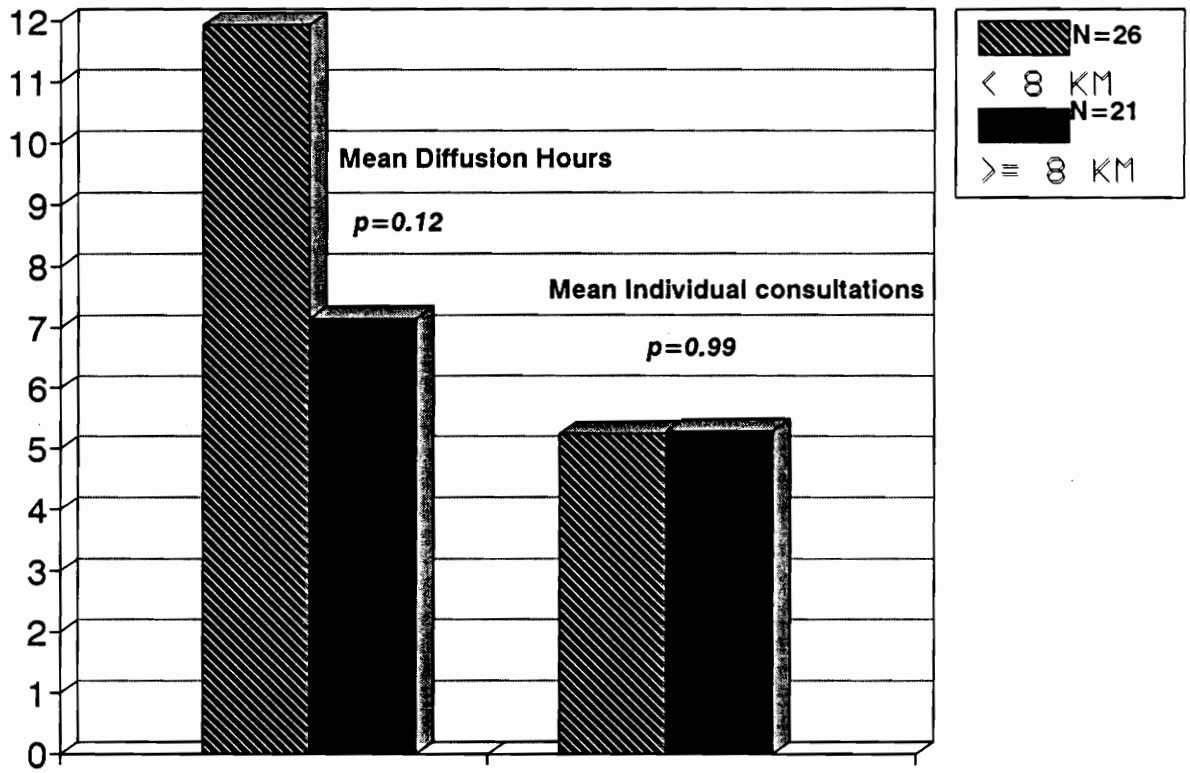

Fig. 7. Diffusion activity of cooperators related to the distance (< 8 km, >= 8 km) that they reside from tract.

Table 7. R^2 values for relationships between predicted and independent opinion-leadership scores and dependent values for total hours of diffusion behavior, number of individuals engaged in consultation regarding forest and wildlife management, and number of forest/wildlife management practices adopted, in the context of the Virginia Coverts Project, 1991-1992.

Dependent Variable	**Independent Variable**	R^2
Total Hours Diffusion Behavior	Opinion Leadership Score	0.06
Number of Individuals Contacted	Opinion Leadership Score	0.03
Number of Forest/Wildlife Management Practices Adopted	Opinion Leadership Score	0.06

Table 8. Correlation coefficients* and p values () of responses to psychosocial screening questions with a predictive opinion-leadership model and 3 adoption-diffusion activity variables used in statistical analysis of efforts of Virginia Coverts Cooperators, 1991-1992.

Component of the model	Variables			
	The opinion-leadership predictive model	Number of individuals engaged in one-on-one outreach	Number of hours of diffusion effort	Number of practices adopted
Number of Past Consultations with Resource Pros	0.56066 (0.0001)	0.8972 (0.5442)	0.16545 (0.2611)	0.35996 (0.0120)
Knowledge of Forestry and Wildlife Management Theory and Technique	0.17907 (0.2183)	0.17566 (0.2324)	0.11352 (0.4424)	0.09942 (0.5014)
Propensity to Adopt New Ideas	0.11398 (0.4355)	0.07195 (0.6270)	0.0770 (0.6029)	0.15810 (0.2832
Self-perceived Level of Education	0.40254 (0.0041)	-0.26413 (0.0697	-0.11184 (0.4492)	0.5775 (0.6966)
Self-perceived Communi-cations Strong-points	0.64561 (0.0001)	0.06161 (0.6774)	0.11386 (0.4410)	0.17657 (0.2299)
Number of Individual Positions Held in Community or Local Orgs.	0.63310 (0.0001)	0.07222 (0.6257)	0.01718 (0.9078)	-0.18542 (0.2070)
Intrinsic Reasons For Participating in Coverts	0.16769 (0.2494)	0.09941 (0.5014)	0.21376 (0.1446)	0.10754 (0.4669)

* Spearman's rho

their forestland-owing neighbors and friends than those cooperators living 8 or more km from their tracts.

There was no significant difference, however, between those who lived further than 8 km from their tract and those living within 8 km in terms of one-on-one consultations that the cooperators "felt good about."

Possible Effects of Time in Community on Diffusion Behavior

Hypothesis D (that Coverts cooperators living in their community for less than 5 years (n=24) were no less active diffusers than were those living in the community for more than 5 years) was tested using the Kruskal-Wallis non-parametric statistic. To obtain more homogeneous sample sizes, I further categorized those living in a community more than 5 years into those living in their communities 6 to 20 years (n=10), and those living in community more than 20 years (n=13). Cooperators who indicated that they lived 50 km from their tract or more were assigned into the category of 0-5 years, under the assumption that they would not be anymore well known than a relative newcomer. No significant differences were found between time in community categories for either number of individuals contacted regarding forest and wildlife management diffusion (ChiSq. = 0.8168, $p = 0.6647$), or for total time spent by cooperators in diffusion efforts (ChiSq. = 0.4403), $p = 0.8024$).

Possible Effect of Size of Forestland Ownership upon Adoption-Diffusion Behavior

Hypothesis E addressed the question of whether or not the amount of

forestland area owned (i.e., <= 40 ha., n=14; 41 - 120 ha., n=14; > 120 ha., n=19) significantly influenced adoption or diffusion behavior. Forestland area owned by cooperators ranged from 8 ha. to 3540 ha. In terms of practices adopted, size of area owned did not influence activity (Kruskal-Wallis statistic, ChiSq. = 0.77887, p = 0.6774). Neither did size significantly influence the number of individuals with whom they consulted (ChiSq. = 2.5202 p = 0.2836), nor the total hours of diffusion effort by cooperators (ChiSq. = 0.49694, p = 0.78).

Possible Primary Objectives Effect on Adoption-Diffusion Behavior

During the initial screening/application process, cooperators were asked about their primary objectives for owning forestland. Table 9 summarizes their responses. Hypothesis F tested the question of whether there was any significant difference in adoption or diffusion behavior between those with wildlife consumptive and/or non-consumptive use as a primary objective versus those with income from timber production as a primary objective of owning forestland. With respect to the number of individuals engaged in one-on-one outreach, there was no significant difference between cooperators with differing objectives (Wilcoxon non-parametric statistic, Z = -0.419371, p = 0.6749). Having different objectives for ownership had no apparent effect on the total hours of diffusion spent (Z = 1.02016, p = 0.3077), or number of forest/wildlife management practices adopted (Z = 0.2417, p = 0.8090). For other primary objectives (e.g., soil and water conservation), small sample sizes precluded their inclusion in the comparisons.

Table 9. Frequency and percent (), by 1st, 2nd, and 3rd order of importance, of management objectives on non-industrial private forestland, as stated by 49 participants in the Virginia Coverts Project, 1991-1992.

	Order of Importance		
Management Objective	1	2	3
Income from Timber	19 (38.8)	9 (18.4)	8 (16.3)
Wildlife Habitat: Game	22 (44.9)	21 (42.9)	2 (4.1)
Recreation/Non-game	4 (8.2)	12 (24.5)	16 (32.7)
Soil/Water Conservation	0	3 (6.1)	2 (4.1)
Timber Improvement	1 (2.0)	0	2 (4.1)
"Ecological Balance"	3 (6.1)	0	1 (2.0)

Possible Effect of Intrinsic Motives for Participation upon Diffusion Behavior

Hypothesis G tested whether or not those cooperators who indicated on their screening applications that a reason for wanting to participate in the program was to diffuse what they learned to others were significantly more active diffusers than those who did not state diffusion as a reason for participation. Fig. 8 depicts the means of the variables tested and the results from a Wilcoxon non-parametric statistical analysis of rank sums. Cooperators with an intrinsic motivation for "sharing what they learned" displayed a weak significant difference in their diffusion effort in terms of time spent disseminating information. This difference was partially due to a doubling of the number of field days conducted per cooperator who stated an intrinsic motivation and a near tripling of time spent conducting those field days.

Possible Influence of Professional Change Agent Contact on Adoption-Diffusion Behavior of Coverts Cooperators

Hypothesis H addressed the question about whether the degree of past contacts of cooperators with professional resource management change agents had significantly influenced his/her adoption-diffusion activity before the Coverts training program. Fig. 9 depicts the results of a non-parametric Wilcoxon statistical analysis of the data associated with the hypothesis. Diffusion data from Cooperators who indicated they had gained no or some knowledge from resource professionals were compared with data from those who claimed they had gained much knowledge from those resource professional change agents. For both adoption and diffusion behavior,

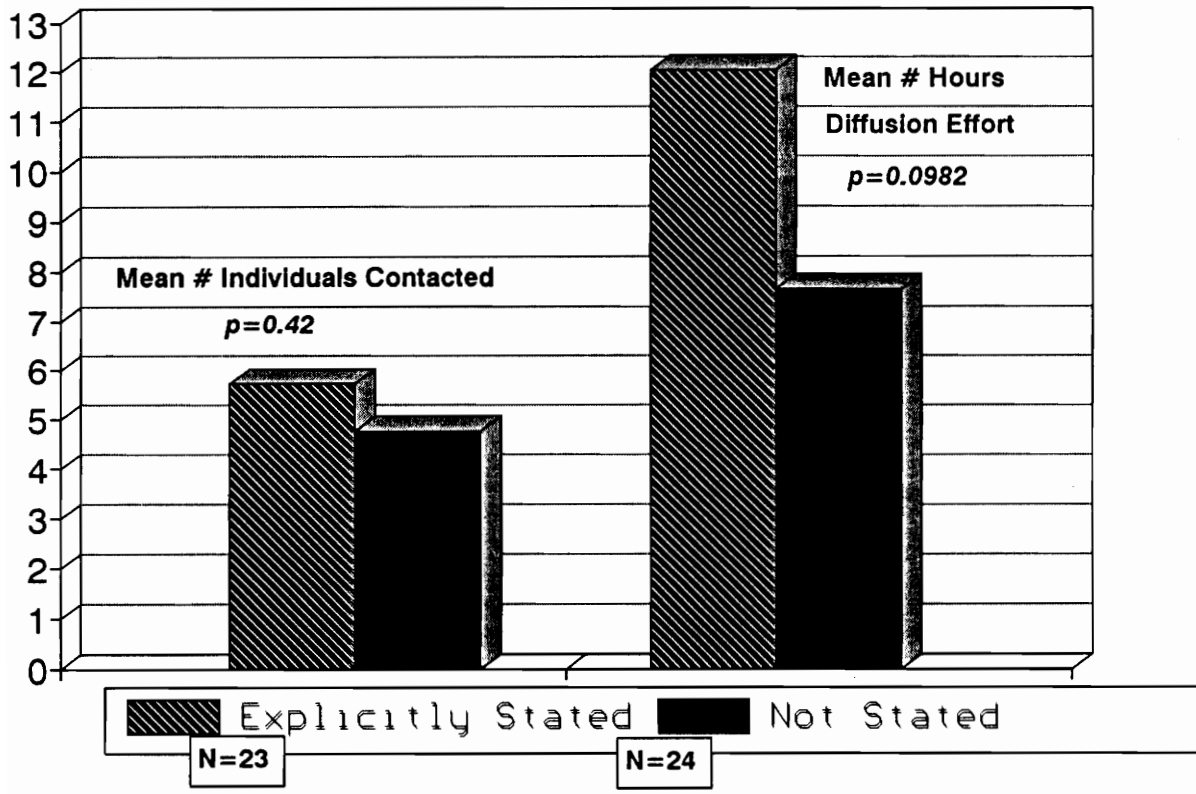

Fig. 8. Diffusion activity of cooperators as related to their intrinsic motivation .

all results were significant. However, for data categorically grouped by none, some, and much past use of private consultants, a Kruskal-Wallis non-parametric test showed no significant differences in adoption of forest/wildlife management practices(Chi Sq. = 0.90534, p=0.6359), mean number of individuals engaged in the diffusion process (Chi Sq. =1.386, p=0.5001), or mean number hours of diffusion effort (Chi Sq.=1.0003, p=0.6065).

Similarly, I addressed the question of the degree of influence of previous training in forestry/wildlife management, (specifically, knowledge gained from workshops) upon adoption-diffusion behavior of the cooperator population. Table 10 depicts a trend of *a priori* training in forestry and/or wildlife management as having a clear influence on adoption/diffusion activity of the Coverts cooperators after the Coverts workshops.

I also addressed the question about the degree of influence of *a priori* utilization of forest/wildlife management extension material upon adoption and diffusion behavior of cooperators. Responses of "none," "some," and much were used as categorical variables. A Wilcoxon rank sums test revealed no significant difference in the central tendencies of the categorical populations for the variables representing number of individuals contacted during the diffusion process or number of practices adopted. However, a weak significant difference was found between cooperators grouped into the aforementioned categories populations and their total hours of diffusion effort. Z values and p values are not reported here because sample sizes were extremely unequal, ranging from 8

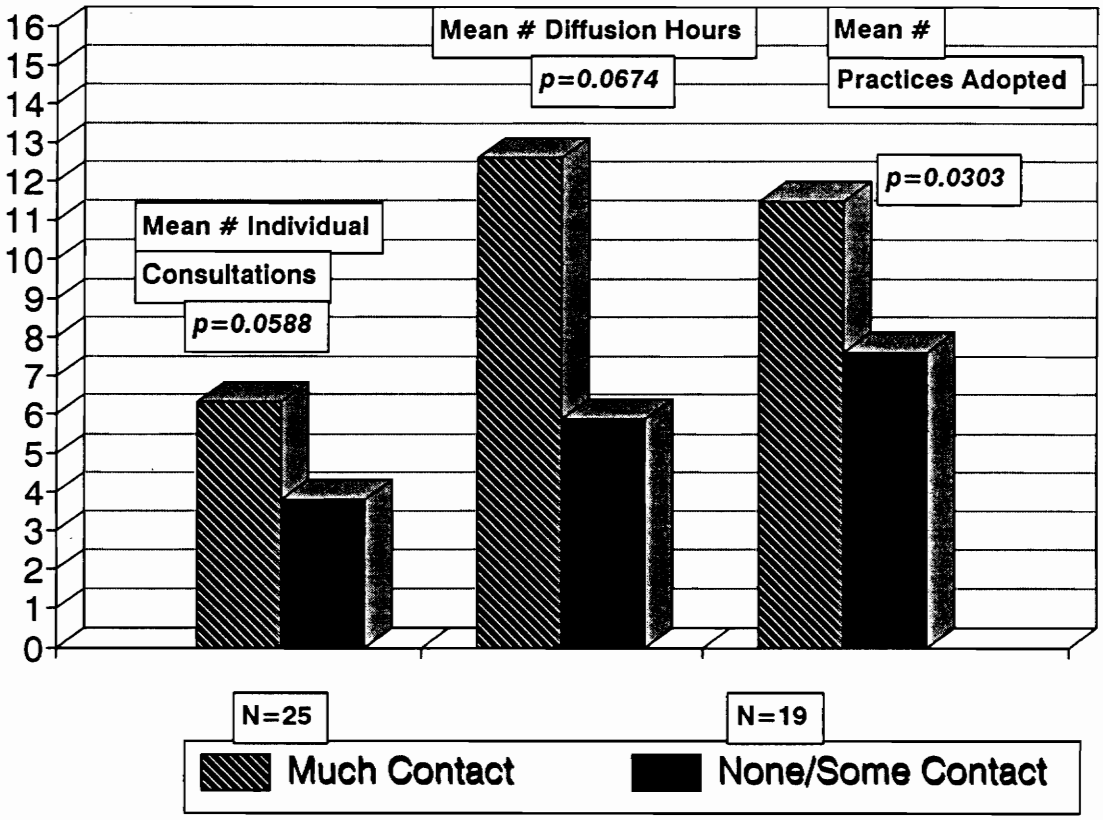

Fig. 9. Possible effects upon adoption/diffusion activity of knowledge gained from past change agent contact.

Table 10. Mean adoption-diffusion scores of Virginia Coverts Cooperators, categorized by previous forestry/wildlife management training exposure, over a 6-month period 1991-1992.

Adoption/Diffusion Behavior	Level of Prior Training		
	None	Some	Much
Mean Number of Individuals Contacted During Dissemination Process (SE)	3.87* (0.657)	6.90 (2.168)	7.33 (1.944)
Mean Number of Hours Total Diffusion Effort (SE)	5.87* (1.530)	9.85* (4.119)	15.83 (3.554)
Mean Number of F/W Practices Adopted During Previous 6 mo. and Conjectured for the Next 6 months (SE)	8.00* (1.404)	9.70* (1.542)	14.75 (1.300)

* Central tendencies significantly different from other categories @ P <=0.2 (Wilcoxon 2-sample t-test)

to 20, making the results suspect. Further pooling of categories, i.e., combining "none" and "some" into 1 category and comparing to the "much" category seemed misleading for the reason that in all cases, cooperators gaining no knowledge from extension publications displayed more active adoption and diffusion activity than those claiming "some" or even "much" past knowledge had been gained from extension-type publications. Pooling in this manner showed significant differences among categories, but obviously, the reported significance would have been misleading.

Spearman's rho correlation analysis showed a high correlation between past use of extension publications and past knowledge gained from workshops ($r=0.33465$, $p=0.0373$), number of resource professionals consulted with in the past ($r=o.53958$, $p=0.0001$), and between past knowledge gained from workshops and past consultations with resource professionals ($r=0.46821$, $p=0.0026$).

Possible Influence of Participation in Community Civic-Organizations on Adoption-Diffusion Behavior of Coverts Cooperators

Tests of Hypothesis I engage the question of whether belonging to and holding a position of leadership in a local civic or government organization influenced adoption-diffusion activity of cooperators. The number of participatory and leadership positions held by any one cooperator ranged from 0 to 5, with an average of 1.23 organizations per individual. A Kruskal-Wallis nonparametric statistical analysis of cooperators who participated with and held leadership positions in 0, 1,

or > 1 civic organizations in their community revealed no significant differences in number of individuals contacted during dissemination efforts (ChiSq.=0.90579, p=0.6358), total hours of diffusion effort (ChiSq.=0.87224, p=0.6465), or number of forest/wildlife management practices adopted over the previous 6-month period (ChiSq.=2.8229, p=0.2438).

Effects of High Levels of Self Perception of Interpersonal Skills upon Diffusion Behavior

Two questions on the initial screening application attempted to measure interpersonal/communications skills of the applicants and what each individual would feel most comfortable doing to satisfy the information dissemination prerequisite we had stipulated as payback for the privilege of being accepted into the program. Tables 11 and 12 summarize how the cooperators saw themselves in terms of interpersonal and communication skills. This information was useful when relating it to the diffusion efforts that the cooperators actually made during the first 6 months after the workshops.

Question 19 of the Coverts screening application asked the cooperators to self-assess the level of their interpersonal skills by rating themselves on a Leichert scale with 5 choices. Hypothesis J tested the hypothesis that those Cooperators with maximum or nearly maximum scores on the question would not behave significantly different in terms of diffusion effort. The hypothesis was rejected for the variable representing number of people engaged during the diffusion process, but

Table 11. Responses of the 1991 Virginia Coverts cooperators to question 19 of the screening application, by frequency and percent of participants responding. The question attempted to measure self-perceptions of leadership ability and communications skills.

	Response		
Stimulus Statement	**Disagree**	**Neutral**	**Agree**
I find it difficult to express my ideas	45 (93.4)		3 (6.1)
It is easy for me to act naturally in a group	1 (2.0)	4 (8.2)	43 (89.6)
I enjoy speaking in public	9 (18.8)	14 (29.2)	25 (52.1)
Others expect me to be a leader in my community	5 (10.4)	17 (35.4)	26 (54.2)
I am more likely than others in my circle of friends to be asked my views on natural resource issues		16 (34.8)	30 (65.2)

Table 12. Summary of self-perceptions of the 3 strongest communications skills by Coverts cooperators in response to question 20 of the Virginia Coverts Project screening application, 1991.

Communication Skill	Frequency	Percent
Conversations with neighbors	40	81.6
Leading groups in the field	28	57.1
Public speaking	21	42.9
Organizing workshops or displays	19	38.8
Writing for newspapers, periodicals	11	22.4
Appearing on television	5	10.2
Appearing on radio	4	8.2

there was failure to reject the hypothesis that mean individual hours ofdiffusion activity over the trial period was related to interpersonal skills (see Fig. 10).

Effect of Rigorous Screening on Adoption-Diffusion Behavior

Analysis of Hypothesis K addressed the concern as to whether a more rigorous screening of the applicants (had we had more applicants) would have resulted in more adoption diffusion behavior. As reported in this section, tests failed to reject the hypothesis that no positive or significant relationship existed between predictive leadership scores and adoption/diffusion variables for all cooperators. However, by dividing the population into 2 subsets, i.e., those with predicted leadership scores below the median and those above, a comparison was possible. I attempted to see if a more selective acceptance policy would have resulted in more predictable adoption-diffusion behavior. A Wilcoxon 2-sample t-test revealed no significant differences in number of individuals engaged one-on-one in diffusion effort ($Z=1.0297$, $p=0.30$), total hours of diffusion effort ($Z=1.2013$, $p=0.23$), or number of practices adopted ($Z=0.2714$, $p=0.78$).

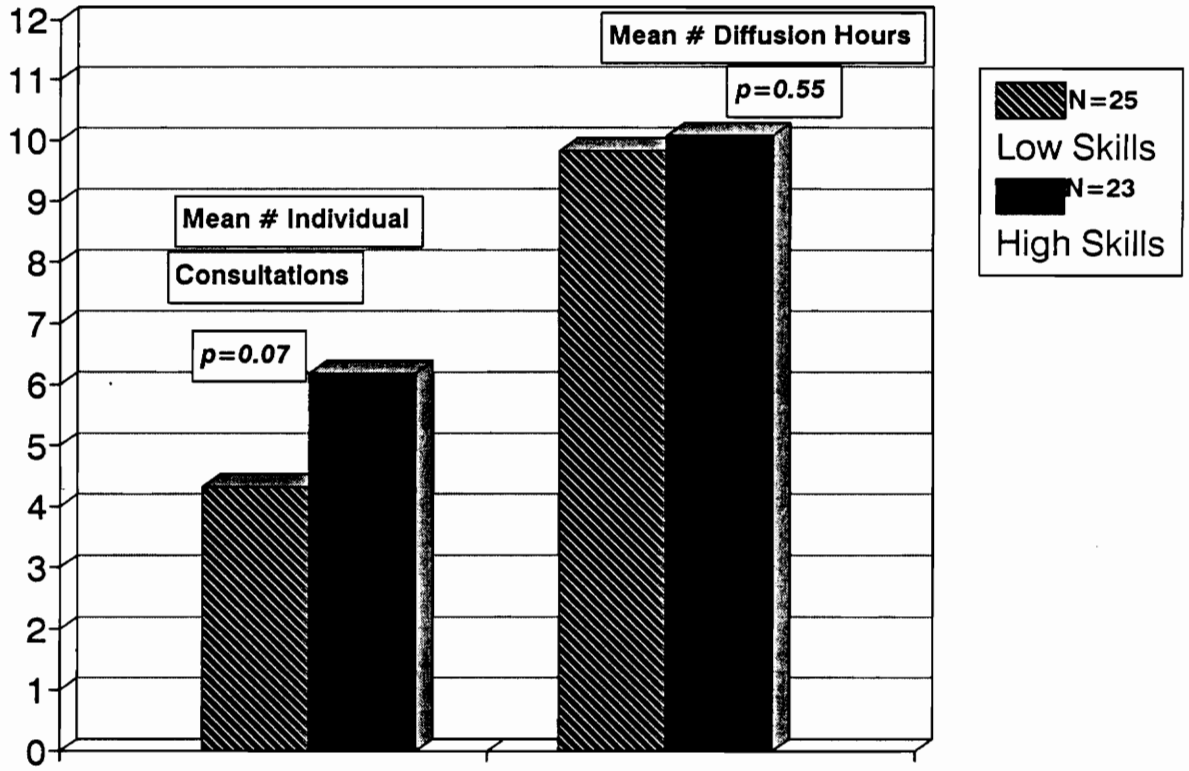

Fig. 10. Possible effects of high interpersonal skills on diffusion activity.

Modeling Opinion-Leadership with Multiple Regression

Hypothesis L: The log transformations of the response variables representing one-on-one outreach, total hours of diffusion effort, and number of practices adopted were modeled against ordinal-continuous and ordinal-categorical variables. Log transformations were used. A stepwise regression with an entry and staying level of 0.20 for all variables fitted was attempted. No R^2 could be obtained equal to or exceeding 0.2 with any combination of independent variables in the model without collinearity becoming a significant factor. Therefore, no coefficients are reported here, as there was a failure to reject hypothesis L.

Relationship of Occupation with Primary Objective of Ownership and with Adoption and Diffusion Activity

Hypothesis M: Farmers tended to have as a primary objective timber production and economics significantly more often than professionals. Businessmen tended to be significantly more oriented towards timber production and economics than professionals ($Z=-2.334$, $p=0.019$) or retired cooperators ($Z=-1.340$, $p=0.18$). No other tendencies of certain occupations to have an affinity for a particular primary objective were found.

Farmers engaged significantly more individuals in one-on-one outreach ($Z=2.0199$, $p=0.04$), spent more time in diffusion effort ($Z=1.874$, $p=0.06$), and adopted significantly more practices ($Z=2.680$, $p=0.007$) than businessmen. Farmers also engaged significantly more individuals in one-

on-one outreach (Z=1.534, p=0.12) and adopted more practices (Z=2.087, p=0.03) than professionals. Farmers spent significantly more time in diffusion efforts (Z=1.378, p=0.16) and adopted significantly more practices than retired people (Z=1.808, p=0.07). No significant differences in adoption or diffusion activity were detected among other pairings of occupations.

CHAPTER 5 - DISCUSSION

Introduction

Using opinion-leading private citizens as attitudinal and behavioral change-agents in communities has become increasingly popular among institutions with an educational mission. Coverts projects similar to the one conducted in Virginia have been implemented by USDA CES in Vermont, Connecticut, Massachusetts, Maryland, and Ohio (Snyder and Broderick 1992). The Department of Health and Human Services has a current 3-year research project underway (titled "Community Intervention to Reduce AIDS Risk Behavior") in which opinion-leading homosexual men who frequent gay bars are asked to disseminate safe sex information among their peers (Desiderato, pers. comm.). Even the National Cattlemen's Association has undertaken a "Mythbusters" program that features the selection and training of 20 opinion-leading cattlemen from around the nation. These ranchers are intensively trained in writing and speaking skills and dispersed as master communicators to muster support from peer agriculturalists and beef consumers for the industry's goals and positions (High Country News 1992). Virtually all of these dissemination attempts are grounded in Rogers' (1983) work Diffusion of Innovations. Effectiveness of such programs, however, is only beginning to be quantified, with perhaps the most notable example being Snyder and Broderick's (1992) follow-up assessment of the Vermont and Connecticut Coverts Project. This study of certain parameters of the Virginia Coverts Project will add to the research available on the adoption-diffusion process of NIPF landowners.

The Marketing and Selection Process of the Virginia Coverts Project

Similar to the Ohio Coverts Project, but unlike those conducted in other states, we chose to conduct the 2.5 day workshops during the business week. This factor may have eliminated many otherwise-interested individuals from attending due to work constraints and may have biased the population towards an older, more affluent, retired population of participants. Our reasoning behind choosing the timing that we did centered around the concern over the availability of speakers to address the cooperators if weekend workshops had been scheduled.

A second confounding factor that may have impacted the attendance at the Front Royal workshop was the concurrent opening of ruffed grouse and wild turkey (Meleagris gallopavo) hunting season. I believe that future Coverts Projects may be more attractive and useful to more opinion-leading NIPF landowners if these aforementioned conflicts are avoided.

Haymond (1985) identified opinion-leading NIPF owners in South Carolina by asking local county foresters and local extension agents to serve as resources and to nominate a third resource person who, like the forester and agent, was knowledgeable about which NIPF landowners in the community could be regarded as influential. The forester, agent, and nominated resource person were then asked to submit a list of names of opinion-leading NIPF landowners in the community. Individuals whose names appeared on more than 1 resource person's list were selected for the study.

I attempted to follow a similar format. I asked, however, only the county extension agent and county forester for lists of names. I quickly

discovered that county extension agents generally felt incompetent to nominate NIPF landowners. Reasons given for this feeling by the agents included lack of routine interaction with NIPF landowners and lack of their involvement in wildlife and forestry extension activities. County agents often felt more comfortable "brainstorming" names with county foresters, so in many counties, I deferred and accepted lists generated collaboratively by the resource persons versus lists generated independently.

Personally visiting with or talking by phone to the county agents and foresters, however, did seem to be a worthwhile endeavor. I was able to explain the program to them and elicit some level of commitment to help promote and recruit for the project in their counties. I anticipate that marketing and overall recruitment into the program would have been less successful without the personal contact. Twenty-one (11.7%) of the nominated individuals entered into the program. The remaining individuals form a rich pool from which future Coverts project personnel can be drawn upon.

The Virginia Coverts Project was the only one implemented in any state to date to have conducted 2 workshops with 2 distinct groups within 1 year.

Implications from the Coverts Cooperator Selection Process--Hypothesis A

The lack of significant difference in opinion-leadership scores between nominated Coverts Cooperators and those who entered the program via awareness of the program by other pathways does not necessarily mean

that local agents and foresters were naive above who the influential NIPF landowners were in their community. Rather, some cooperators who came from counties outside the target area might have been nominated had their local agent or forester been asked. What this phenomenon may mean is that a project publicly marketed (e.g., via the Coverts pamphlet, Virginia Wildlife, Virginia Tech School of Forestry and Wildlife Extension Newsletter) as one which solicits involvement by people who are willing to take an active role in adopting practices and diffusing information relative to forest and wildlife management, may be attracting, by default, the same type of person who would otherwise be nominated by a county agent or forester.

Interestingly, the nominated cooperators significantly outperformed ($p=0.06$) the unreferenced Cooperators in number of forest/wildlife management practices adopted, thus giving some credence to the validity of the selections of the local change-agents and to need for and success from soliciting nominated individuals into a program of this nature.

Validation Testing of a Predictive Opinion-Leader Scoring Model--Hypothesis B

There was a failure to reject Hypothesis B, that there did not exist a positive and significant relationship between the opinion-leadership scoring model devised by this investigator (based on the findings of Rogers and Shoemaker (1971), Rogers (1983), and Haymond (1985)) and adoption and/or diffusion activity variables. The model apparently was not constructed with appropriate weightings of the component criteria. As

reported, very little variance in adoption-diffusion activity behavior measured during this research was explained by the model.

Adoption and diffusion of innovations involves the interaction of the attributes of the innovation with the setting of the adoption and the psychosocial interface between the adopter and the change-agent (Nowak 1987). The short monitoring period allowed for measuring adoption of practices discussed at the workshops and diffusion effort may have been inadequate to reflect the true performance impact of this approach to extension. For example, one person's wife became gravely ill soon after he attended the Smith Mountain Lake workshop. She died approximately 2 months prior to my survey of cooperator activity. Needless to say, this cooperator had not been active in any behavior relevant to the study, yet he was ranked second of all cooperators on the basis of his opinion-leadership score. He may have indeed demonstrated his true potential had not the illness and death of his wife intervened. Another cooperator had a prolonged personal illness during the 6-month interim. The winter season, over which the 6-month interim transpired, most certainly confounded adoption of certain forest and wildlife management practices, upon which trialability is weather-related. Future Coverts Projects perhaps should be initiated in late winter or early spring if 6-month monitoring periods are to be used. Adoption of innovations dependent upon the planting season or dry-weather timber harvesting will surely be greater during the spring and summer than in late fall, winter, and early spring.

Rogers (1983:204) illustrated the relative lag time between aware-

ness and adoption by farmers of the use of a 2-4D weed spray in Iowa (Fig. 11). For innovators and opinion leaders, this lag time ranged from slightly more than 1 year to nearly 2 years, thus supporting the contention that a window of only 6-months may have been too short to adequately reflect the impact of the program and the potential of the Cooperators. The complexity of a forestry or wildlife management innovation of the type discussed during the workshops could be considered as greater than that of weed spray technology; hence the lag time for adoption of a forestry or wildlife management practice may be even longer, with diffusion of firsthand knowledge about that practice delayed further still.

McEvoy (1988) noted that many cooperators from the original Coverts Project in Vermont were just getting started after 12 months. Snyder and Broderick (1992) collected data in 1987 from the same original group, which went through the program in 1985. The reasons remain unclear for the failure to develop a predictive model, but length of time of the initial monitoring period may have been responsible for much of the variation between the model and adoption/diffusion behavior.

Unexpectedly, a significantly negative relationship existed between the cooperators' self-perceived level of education relative to their friends and neighbors and their activity in one-on-one outreach. This suggests that cooperators with the highest levels of education may

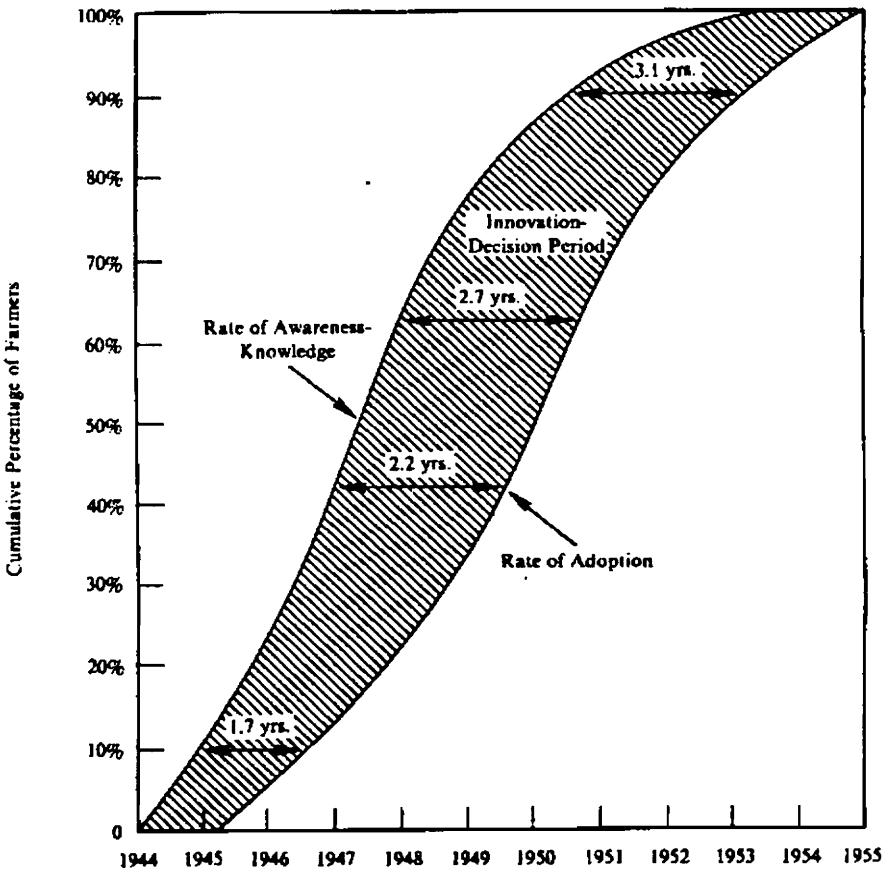

Fig. 11. Rate of awareness-knowledge, rate of adoption, and length of the innovation-decision period for Iowa farmers adopting a weed spray, by year (From Rogers 1983:204; permission to copy requested).

either be too busy with other activities, or less optimally heterophilous in communicating with their neighbors. Indirectly, this particular trend in the Coverts data supports Roger's generalization that opinion leaders have more education than average, but not the most.

When testing Hypothesis L, no significant difference in adoption ($p=0.78$) or diffusion behavior ($p=0.30$, $p=0.23$) was found between cooperators in the bottom half of the class (as measured by opinion-leadership score) and those in the top half of the class. Thus, the notion that a more rigorous screening (had we had more applicants and thus, not have accepted everyone who applied) would have resulted in more active Cooperators was dispelled.

Again, it is difficult to assess whether the complexity and trialability of the innovations were such that the short monitoring period was inadequate to measure any detectable differences in performance, or whether the model was indeed incorrectly weighted.

Possible Effect of Distance between Residence and Forestland Tract upon Diffusion Behavior--Hypothesis C

While at first glance, the results of Hypothesis C may seem incongruous (i.e., spending significantly more time in diffusion effort ($p=0.12$), but not engaging significantly more people in diffusion efforts than more "absentee" owners ($p=0.99$)), spending more hours with neighboring landowners in dissemination efforts when cooperators live close to their forestland tracts is common-sensical. Cooperators living on or near their tracts likely know their neighbors well and may spend more quality

time conversing about forest/wildlife management than cooperators considered more distant-living, i.e., the "resident" cooperators may have more rapport with local NIPF owners. Snyder and Broderick (1992) found that cooperators in Vermont who did not live near their woodland put significantly more time into organizing seminars than conducting demonstration field days on their land or engaging in one-on-one outreach.

The fact that "resident" cooperators may be spending more time with neighbors diffusing information than others, but do not really "feel good" about the impact of their efforts may be partially explained by the following phenomena: 1) complexity of forest/wildlife management practices is high, and trialability and observability are difficult. Cooperators may thus feel that they are not conveying to others a sense of the relative advantage of adopting the practice (this can likely be rectified over time); or 2) there may exist on the part of the neighboring landowner an apprehension that he/she will be embarrassed and feel a loss of esteem if a "fenceline" contrast of properties shows a marked difference in management skills; therefore the neighbor may ridicule and belittle a new practice as a defense mechanism. Savory (1989) discussed this phenomenon in the context of sustainable agriculture practices. A similar analogy exists with smokers who quit the habit but are subtly encouraged to resume smoking by their smoking "friends" so that feelings of embarrassment at having an addiction and resultant feelings of social inferiority can be relieved. The interaction of these 2 phenomena may largely explain the trends in the data relevant to this hypothesis.

I conclude that cooperators residing more near to their NIPF will

likely be more successful over time in swaying their neighbors to adopt a practice(s) and will distinguish themselves from other cooperators in the numbers of nearby NIPF owners that they "feel good about" in terms of qualitative diffusion effort.

Possible Effect of Time Residing in Community of Diffusion Behavior--Hypothesis D

NIPF owners established in their communities might be expected to diffuse forest and wildlife innovations to more people and perhaps spend more time doing it, than relative newcomers. They did not (p=0.67 and p=0.44, respectively). Virginia is a rapidly changing state in terms of land ownership patterns. Two reasons may largely account for this phenomenon. First, 50% of Virginia NIPF owners are 61 years of age or older (Hodge and Southard 1992). This may lead to a significant turnover of forestland ownership over the next 15-20 years, with large tracts being divided into small ownerships, thus having the effect of increasing the number of NIPF owners in the state. Secondly ,the poor economic viability of agriculture has resulted in many farmers selling off forestland to well-to-do immigrants from the northeastern corridor of the U.S. These immigrants are likely used to higher land prices and taxes and consider Virginia land "a deal." During this rapid change in land ownership patterns, there may be a widening heterophily between landowners in terms of education, life experiences, social skills and knowledge of farming and forestry. It may be difficult for older, more established people in the community to relate to, be trusted by, or advise relative newcomers.

Similarly, relative newcomers may feel more homophilous in terms of education, social background, age, etc., and may only diffuse to others in their socio-economic class. Muth and Hendee(1980) asserted that opinion-leaders generally diffuse laterally rather than vertically relative to adopter classes. Thus, established NIPF owners in the community may perceive newcomers as laggards that do not know anything about forestry, while relative newcomers may also perceive the established NIPF owners in the community as too steeped in traditional forestry and consider them laggards as well. This possibly could explain the lack of significant differences between the two groups in diffusion behavior.

Further, Granovetter's (1983) observation that diffusion may be most extensive through weak ties than strong ties may partially explain why cooperators owning their land and residing near it for 5 years or less are not significantly different in diffusion activity than their more established counterparts. Newcomers may be more cosmopolite, have more weak ties, have more information sources, and subsequently convert these advantages into diffusion efforts.

The complexity, delayed observability, low relative advantage, and difficult trialability of many wildlife management practices may contribute to the desirability that adoption of an innovation by a NIPF owner precede any diffusion behavior that will be received credibly by others. The non-significant findings here can be correlated to other studies relating land tenure to adoption of farming and forestry practices. Neither Haymond (1985), Nowak (1987), nor Dickson (1970) found a significant positive relationship between tenure of ownership and adoption

of silvicultural or conservation practices. However, Pampel and Van Es (1977) did find a weak positive relationship between adoption of environmental practices and tenure.

Possible Effect of Size of Forestland Ownership upon Adoption-Diffusion Behavior--Hypothesis E

Nowak (1987) found a significant relationship ($r=0.26$, $p=0.01$) between farm acreage operated and whether a person will adopt conservation practices. Haymond (1985) also found a significant positive relationship ($r=0.35$, $p=0.006$) between size of forestland acreage owned and number of silvicultural practices adopted. I found no significant differences among categories of size of forestland tract owned and either forest/wildlife management practices adopted ($p=0.68$) during the interim and projection periods or diffusion outreach activity in terms of number of people ($p=0.28$) or hours of effort ($p=0.78$).

To explain my results, I again have to rely on the interaction of the substantial complexity of the innovations relative to this study, and the difficulty of trialability and observability of the practices in the context of the short monitoring period. Kivlin (1960) observed that complexity of farm innovations was more highly negatively related to rate of adoption than any other characteristic except relative advantage. Following from his conclusion, without the needed time to assimilate, plan and implement a relatively complex forest or wildlife management innovation that was learned at a Coverts workshop, cooperators may have been reluctant to spend much time talking about a specific practice with

no demonstration area on their forest to validate their statements. Monitoring of cooperator activity over the next several years will give much more confidence in whatever trend finally emerges.

There has been a discernable trend, historically, among forestry change agents to concentrate their diffusion efforts upon large landowners (Haymond 1985). The rationale for this has been that the change agent is likely to experience, by concentrating on large landowners, the most (marginally) reaction expended in terms of practices adopted per unit of time and effort. The lack of support for that thesis in this study suggests that opinion-leading, small landowners may be just as likely to adopt and diffuse as the larger landowner. A case in point can be made regarding the faster rate of adoption of eco-agriculture techniques by smaller farmers than larger farmers with more capital investment in machinery associated with conventional agriculture.

Possible Effect of Differing Primary Objectives for Land Ownership upon Adoption-Diffusion Behavior--Hypothesis F

Virginia Coverts Cooperators showed no significant differences in terms of one-on-one outreach ($p=0.67$), hours of diffusion effort ($p=0.31$), or number of practices adopted ($p=0.81$) relative to whether their primary objective was timber production and income or wildlife management for consumptive or non-consumptive use. Haymond (1985) found adoption of silvicultural practices significantly negatively correlated with the importance of a quick monetary return from the timberland ($r=-0.35$,

p=0.006), a positive and significant correlation with importance of improvement of the land for uses other than timber (r=0.31, p=0.01), and a weak positive and significant relationship with importance of increased timber production (r=0.22, p=0.10).

The findings of this study refute the conjecture that NIPF owners managing for wildlife often have a "do-nothing" approach to forest-management as compared to those managing actively for timber. However, this population was comprised of 79.6% hunters who were very much interested in actively managing to improve their forests for game populations. A similar sized population of non-hunting NIPF owners may have displayed a "do-nothing" attitude towards forest management.

Intrinsic Motives for Participation in Coverts and Possible Effect upon Diffusion Behavior--Hypothesis G

"It never hurts to ask" is an often heard cliche. Twenty five Cooperators stated in some fashion that a reason for wanting to participate in the Coverts Project was to "share what they learn" (my paraphrase). Those that made such a statement did not engage in significantly more individual outreach (p=0.42), but did spend significantly more time in diffusion effort (p=0.10). The difference in time spent was a result of these uniquely-motivated cooperators working significantly more field days on their own tracts (p=0.04). Since landowner-sponsored field days were perhaps the most hoped-for outcome of the Virginia Coverts Project, this simple test of intrinsic motivation of applicants admitted to a program such as this "to share what they learned" may be the most

important finding of the study in terms of identification of opinion-leading NIPF owners who will be active in the diffusion process. This propensity for sharing may be related to the striving to satisfy any or all of Maslow's (1970) hypothesized levels of human needs; love, esteem, and self-actualization.

Possible Effect of Knowledge Gained from Past Change Agent Contact on Adoption-Diffusion Behavior--Hypothesis H

Most would readily admit that attendance at a 2.5 day seminar will not by itself likely make a tremendous difference in future adoption-diffusion behavior. The cumulative effects of past contact with natural resources change agents, attendance at past training events, and knowledge gained from past use of extension publications could be expected to act considerably upon the understanding of ecological processes and management techniques, criteria critical to subsequent adoption-diffusion efforts. Rogers (1983:257), in summarizing a plethora of communications research, generalized that early adopters/opinion leaders have more change agent contacts, seek information more actively, and have greater knowledge of innovations than later adopter categories. In this population of cooperators, only 25 of 49 individuals indicated on their screening application that they had gained "much" information in their past from public natural resource professionals. Perhaps these 25 individuals could be classified as the opinion-leaders/early adopters of the Coverts Project opinion-leaders population.

For all dependent variables, i.e., one-on-one outreach with other

forest landowners ($p=0.06$), hours of diffusion effort ($p=0.07$), and number of forest and wildlife management practices adopted ($p=0.03$), those cooperators with extensive past contact with public natural resources change agents were significantly more active than others. Thus, I would infer that an important point to address when screening for potential quasi-extension agents for volunteer service in forest and wildlife management information dissemination is to ascertain the degree of past involvement with local and university extension, county foresters, and area biologists and conservationists.

For the significant differences found in adoption and diffusion activity based on past training in forestry and wildlife through workshops, seminars, etc., the following points can be made: (1) an assumption can be made that the more self-directed an individual has been in learning theory and technique about forest management, the more likely that person will have been to understand and adopt certain practices. Following from that, (2) a person may feel more comfortable in disseminating information concerning a practice for which he/she has an observable field demonstration. It was surprising that those with extensive prior training continued to outperform others in adopting practices. One school of thought might suggest that those cooperators who had not received much prior training would display a surge of adoptions of the less complex, more trialable and observable practices learned during the Coverts training. However, cooperators who have been implementing forestry and wildlife management innovations in the past apparently have the mental, economic, and physical infrastructures in place to allow them to continue

to adopt at a superior pace.

With regard to past knowledge gained from extension publications, there was no significant difference in adoption of innovations by cooperators who had varyingly used this source of information in the past. Extension publications can be considered as forms of mass media in that they are a knowledge transfer tool that lacks any interpersonal communication. Mass media are thought to be important only at the awareness and interest stages of the adoption process and relatively weak in the evaluation, trial and decision stages (Rogers 1983:185; McEvoy 1985). They are important sources mainly for early adopters/opinion leaders compared to later adopters. The finding of non-significance among categories of past users of extension publications suggests that Rogers and McEvoy are correct in their assessment.

Possible Influence of Participation in Community Civic Organizations upon Adoption-Diffusion Behavior of Coverts Cooperators--Hypothesis I

Rogers (1983:257) generalized that opinion-leaders obtain greater levels of achievement and motivation, have greater social participation, and have more education than later adopters. These are some of the same characteristics generally attributed to community leaders of local civic organizations and governments. I expected that those cooperators who were more active in civic affairs would be significantly more active in diffusion and adoption behavior. However, no significant differences were detected in either individual outreach ($p=0.64$), hours spent in the diffusion process ($p=0.65$), or adoption of practices ($p=0.24$), among those

active in 0, 1, or > 1 organizations. Those active in > 1 organizations, while likely more pressed for spare time than others, would seemingly have more opportunity to network and diffuse with peers, but no such trend was evident. Conversely, those with no civic leadership obligations would be expected to have more time for adoption-diffusion activities, but that did not occur in this population either. This measurement index was used in the predictive opinion-leadership scoring model discussed under Hypotheses A and B. The implication of the failure to reject Hypothesis H is that this was a superfluous question to include in the model and may have contributed to its overall insensitivity. I conclude that participation in local civic/governmental leadership positions is not a good indicator of the potential of volunteer quasi-extension agents for forestry and wildlife management.

Possible Effect of Self-Perception of High Interpersonal Skills upon Diffusion Activity--Hypothesis J

Question 19 of the screening application was devised by 2 social psychologists at the University of Vermont (McEvoy 1988). Respondents scoring 4+ on the question likely view themselves as articulate in expressing their ideas, someone who is at ease in a group, someone who enjoys public speaking, and someone who is viewed by others as a leader.

These people apparently feel high self-worth, and may possibly be viewed as optimally homophilous with peers who are socio-economically similar. They may also display an optimal degree of heterophily that allows them to diffuse vertically to later adopters.

While this exceptional group contacted significantly more individuals ($p=0.07$) than others scoring more moderately on this question, there was no significant difference in the total hours of diffusion effort spent by these cooperators in dissemination activities ($p=0.55$). Possibly, the interpersonal and communications skills of the high-scoring group allow them to get a point across in a more marginally reactive manner. Interestingly, cooperators who scored higher on this question as a group "felt good" about their one-on-one outreach efforts with their peers significantly more often ($p=0.06$) than did the lower scoring group. Whether this phenomenon was a function of the characteristics of the particular innovation they attempted to persuade their peers to adopt, or a function of a unique cooperator's empathy and communications skills, it is impossible to say from the data available. However, I would conclude that these individuals are representative of opinion-leading NIPF owners who may be most effective in diffusing of forest and wildlife management innovations. They may likely be the best choices for a county agent or forester to target for being the focal point of a management club or working group in the community as well.

A further discovery related to this question was the fact that only 6 individuals who were nominated by county agents or foresters scored 4+ on the self-perception test. This suggests that the nominated individuals of the entire pool of 180 who chose to involve themselves with Coverts may not have had tendencies to be or develop in the high self-perception class. These local natural resource change agents may not be cognizant of the type of skills addressed by this question. Similarly, local agents

and foresters may not value these types of skills as particularly important. A fourth explanation is that some people are threatened by people with these types of skills. The case could be advanced that this finding supports the often-heard contention that foresters, in particular, have "low people skills". Alternatively, the case could be made that the instrument this investigator gave to the county agents and foresters which identified attributes of opinion-leading NIPF owners was deficient, since none of the perceptions listed in question 19 appeared on the form used to elicit names.

Relationship of Occupation with Primary Objectives of Ownership and with Adoption and Diffusion Activity--Hypothesis M

That farmers and businesspeople did not differ in having an orientation towards timber production and economics as a primary objective for owning forestland is not surprising. Farmers are, like business people, subject to swings in the local and national economy, price changes of materials and labor, fluctuating interest rates, etc. Forestland may likely be an economic reserve for both groups. Professionals and retired NIPF owners, on the other hand, apparently feel that they have more economic security and rely less on their forestland as an economic reserve. Professionals may be the most homophilous in diffusing to peer NIPF owners who have as a primary objective for ownership wildlife management.

Farmers were the most active adopters and diffusers of the Coverts population. Businesspeople were the least active. Farmers often have the

implements and knowledge needed to adopt a forestry or wildlife management practice. Farmers enrolled in this program apparently had well-established networks for diffusion activities, as well. However, farmers are aging, are becoming a smaller percentage of Virginia's NIPF owners, and may likely not be a force in adoption-diffusion of forest and wildlife management innovations in the future. Professionals may be the next most active group of adopters/diffusers to target upon for quasi-extension efforts.

Comparison of the Descriptive Statistics from This Study with Other Studies

Snyder and Broderick (1992), in a follow-up survey of the 1985 Vermont Coverts class, received a 75% response rate to telephone interview of Coverts cooperators 17 months after their the training portion of the program was completed. Virginia Coverts cooperators responded to a mailed survey instrument at the rate of 98%. Twenty-one Vermont cooperators claimed to have personally provided information to 493 people. Forty-eight Virginia cooperators claimed to have diffused to 250 individuals one-on-one, and an additional 476 people through group talks and field-day demonstrations. Vermont cooperators considered themselves successful in their personal diffusion efforts 43% of the time. Virginia cooperators "felt good" about convincing 130 people (52%) to adopt a forestry/wildlife management practice. Vermont cooperators tended to favor seminars as a diffusion method (71%) over one-on-one outreach (67%), newspaper articles (52%), and posters (52%). In Vermont, nearly 50% of cooperators had

demonstration field days. Virginia cooperators, in contrast, preferred one-on-one outreach (96%), followed by group presentations (25%), demonstration field-days (25%), and newspaper/TV (21%). The low percentage of demonstration field-days held by Virginia cooperators was likely a function of the time differential in the survey period. Vermont cooperators, over their 17-month interim period, spent an average of 36 hours in dissemination activities. Virginia cooperators, over a 6-month reporting period, spent time disseminating at a similar rate, 10 hours per individual. It was hoped that cooperators would contribute 4-5 hours per month. News releases to the home-town newspapers of the individual cooperators would likely have gained attention to the cooperators in their communities and may have had the effect of creating demand for their knowledge. Cooperators were given extension materials on how to write a press release, but none took the initiative to do so, though several approached the Coverts Project coordinators to do so under the banner of Virginia Tech. However, Coverts cooperator signs, just recently presented to the cooperators for display on their forested tracts, may function as marquises that will arouse curiosity in the community and thereby serve as stimuli for discussions of forest and wildlife management with local NIPF owners.

Evidence that the Virginia Coverts cooperators were indeed a select group of opinion-leading NIPF owners came from a comparison of the history of cooperators interaction with natural resources professionals to Wright's (1988) study of Virginia landowners. From Table 9, 89.8% of cooperators have participated in forest management programs offered by

VDF, compared to 19.8% in Wright's study. Similarly, 44.9% of the Cooperators had sought advice from a biologist (VDGIF), compared to only 4.2% of Wright's respondents (n=1,100). Clearly, the actions of seeking nominations from resource professionals and marketing the project as one that solicited opinion-leading NIPF owners produced a population of cooperators with desirable characteristics.

Virginia cooperators may have been somewhat more utilitarian and somewhat larger forestland owners than the typical Virginia NIPF owner. Hodge and Southard (1992), in a survey of 531 randomly selected Virginia NIPF owners, found that the top reasons cited for owning forestland were: 1) preserving nature; 2) maintaining scenic beauty; and 3) viewing wildlife. Top reasons cited as not important were: 1) leasing land for hunting; 2) producing firewood for personal use; and 3) producing commercially saleable timber. Fifty-nine percent of the cooperators, when asked about their management objectives for their forestland, responded that wildlife habitat improvement for game, recreation, and ecological balance were primary concerns. In contrast, 40.8% stated that income from timber or timber production were their top objectives. An inference may be drawn from this that cooperators, as a population, had either a more utilitarian or more ecologic attitude toward forest management than did Hodge's and Southard's respondents, who apparently were more preservationist in their attitudes. However, opinion-leading cooperators had a wide range of attitudes (as classified by Kellert). Some cooperators will undoubtedly be more effective in diffusing to peers with preservationist attitudes than those with ecologic or utilitarian, and vice versa.

Cooperators were owners of larger forestland area than the typical Virginia NIPF owner. Twenty percent of Hodge's and Southard's sample owned 100 ha. or more, while 51% of Coverts Cooperators owned 100 ha. or more. Forty percent of Hodge and Southard's sample owned 40 ha. or less, compared to 27% of Virginia cooperators. Larger landowners often have high economic pressure upon them to manage their forestland for income to offset property taxes, interest payments, property maintenance fees, etc., thus partially explaining why cooperators were more interested in managing their forests for timber production and income.

Almost 46% of Virginia NIPF owners reported that they had never sought professional forestry assistance, including 32% of NIPF owners who had previously harvested timber. These are precisely the individuals the Coverts concept targets for forest management information dissemination.

Hodge and Southard (1992) conjectured that there will be significant changes of forestland ownership over the next 15-20 years due to the large proportion of Virginia NIPF owners who are over the age of 61 (50%). Following from this, there will likely be a trend towards division of large forested land holdings into smaller parcels. NIPF owners with smaller parcels of land have less tendency to seek professional forest management assistance than larger owners (Hodge and Southard 1992), thus making the potential for programs utilizing the adoption-diffusion model to be timely and likely of impact.

Cooperator's Ambivalence Toward Management Clubs

Cooperators did not respond well to the concept of forming

management from within their ranks. Geographic distance was obviously one impediment, time another; perhaps the way this investigator introduced the concept to them, a third. A hope for the project was that cooperators would use management clubs as a springboard for collaboratively conducting demonstration field-days and local seminars. While to some extent, these outreach activities occurred, management clubs have not been a driving force in these events. I believe the main cause of ambivalence to maintaining these clubs is the lack of economic incentive. Long-term maintenance of management clubs that focused on agricultural innovations, particularly in eco-agriculture, are typically driven not just by desires to farm more ecologically, but also more economically. The survivability of the family farm enterprise is often at risk, which may create a sense of loyalty or "higher calling" by individuals to the club concept. Successful clubs likely provide a structure for information exchange and cooperative production and marketing. Management clubs comprised of NIPF owners who do not have strong economic motivations for managing their land may be more difficult to initiate and maintain than organizations with monetary gains. Competition from local chapters of national organizations such as the Ruffed Grouse Society, Quail Unlimited, or Ducks Unlimited, for the resources of an individual's time and energy to accomplish some local project (i.e., planting food patches on game department lands) may usurp an individual's inclination to participate actively and regularly in an informal management club with other local landowners.

Partially to offset the competition from other organizations and the perception of low economic advantage to Cooperators of participating in a

club, a local natural resources professional may need to promote and facilitate the club process, perhaps with the assistance of directors from the local resource conservation or soil and water conservation district. Without the participation of these key players, and for the reasons outlined above, management clubs are not predicted to be of much consequence in an adoption-diffusion effort.

The Use of Private vs. Public Demonstration Sites In Training Programs for NIPF Owners

Ramsey and Shult (1981) warned against using agency sites for demonstration-training for NIPF owners, suggesting that agencies do not make decisions in the same context as a NIPF owner would. While this may be true to some extent, this phenomenon may be largely offset by the advanced management techniques demonstrable on agency lands but which are difficult to find on NIPF lands. Opinion-leading NIPF owners may be a special case where agency lands being managed with progressive techniques are stimulating and challenging to non-traditional, progressive landowners, who have the capacity to understand and modify the innovation in the context of their own objectives and resources. In the context of the 2 Coverts workshops, one of the most common criticisms on the evaluations was the mediocre quality of the field trips to demonstration sites, both of which were on NIPF land. Cooperators simply were not stimulated or impressed. Yet, considerable effort was put into finding sites of even mediocre quality on NIPF lands. Excellent management practices on NIPF lands are a rarity. I suggest that unless these rare NIPF tracts can be

found, demonstration sites should be selected on well-managed agency lands that clearly meet the observability requirements necessary for adoption by others.

CHAPTER 6 - CONCLUSIONS

> In any of the human sciences, a scientific study is only as good as the intuition of those conducting it. (Keen 1991)

The promotion of complex forest and wildlife management techniques to NIPF owners may necessitate reliance upon strong interpersonal pathways of diffusion from landowner to landowner to overcome the difficult persuasion stage of the adoption process. To this end, selecting influential NIPF owners and offering them educational opportunities in advanced forest and wildlife management strategies and diffusion strategies may hold great promise for increasing the widespread rate of adoption of certain desirable practices.

The process of soliciting names of opinion-leading NIPF owners through local county agents and foresters was validated by finding that significantly greater adoption activity occurred among nominated rather than unreferenced cooperators. It is unclear as to whether local agents and foresters were adept at nominating individuals with high interpersonal and communication skills assumed to be necessary for diffusion activity. The selection process can be strengthened in the future by conveying to local agents and foresters the desirability of selecting people with these talents.

Farmers and businesspeople may be the best individuals to select as quasi-extension agents for diffusion to those interested in learning of forest management innovations. Conversely, professionals may be the best choices for diffusion to NIPF owners interested in wildlife management innovations. Farmers are likely to adopt and diffuse innovations more

than any other occupational group, and business-people are the least likely to adopt or diffuse management innovations.

A predictive leadership model based on communications and sociological research summarized by Rogers was constructed with thoughtfully assigned weightings and field tested using the data of this study. The model was not found to predict adoption or diffusion activity, nor was a multiple regression model that was created from the data able to explain more than 20% of the variance. The interaction of the complexity of the innovations being diffused through the program with confounding factors related to the short monitoring period used (e.g., weather and personal crises) may have contributed to the poor performance of both models. To minimize the impacts of a short monitoring period, future Coverts training workshops should be scheduled in the late winter or spring so that adoption of innovations by cooperators (and possibly demonstration field days) can proceed with minimal confounding by weather impediments.

A significant and negative correlation found between cooperators' self-perceived level of education relative to their friends and neighbors and 1-on-1 outreach suggests that optimal heterophily may not exist between those seeing themselves as having the highest levels of education among their friends and neighbors and those NIPF owners to whom they are attempting to inform. Those NIPF owners with very high levels of education may only be effective in disseminating to other highly educated peers.

Opinion-leading cooperators that lived less than 8 km from their NIPF tended to spend significantly more time in diffusion efforts than

NIPF owners living more distant, but did not engage significantly more of their NIPF-owning peers in one-on-one conversations and efforts to get them to adopt a forest management practice. Time residing in community did not surface as a distinguishing factor of cooperator diffusion activity. In the former case, I concluded from the data that more "resident" cooperators did not spend significantly more time organizing or conducting demonstration field days or making presentations to groups, but rather, spent more time one-on-one with the peers with whom they did attempt outreach activities, however. This did not manifest itself in more neighbors and friends actually adopting a practice. Again, the short monitoring period may have prevented me from picking up differential adoption behavior of peer landowners. Local natural resources professional change agents interested in recruiting quasi-extension agent volunteers for dissemination efforts should choose candidates who live on or near their NIPF acreage.

Neither size of NIPF acreage owned, nor number of leadership positions held in local civic or government organizations distinguished cooperators on the basis of adoption or diffusion activity. However, the response that cooperators gave to a question on their screening application as to why they wanted to participate in the Virginia Coverts project differentiated them in diffusion activity. Those volunteers who stated that they had a reason for wanting to participate which was to "share what they learn" were more active on one-on-one outreach and in total hours spent in the process of disseminating information. Thus, one way that local natural resources change agents can identify potentially effective

volunteer quasi-extension agents (and who have met other criteria) is to simply explain what is needed and ask the potential volunteer if he/she would be willing to be a force for better forest management.

Not surprisingly, cooperators who had gained extensive knowledge of forestry and wildlife management from past contact with natural resources professionals and from past training in workshops were more active in adopting and diffusing the messages of our program than their counterparts. Local change agents should readily know who these self-directed people are and take advantage of their knowledge if at all possible.

Those with high interpersonal and communications skills could be expected to more easily approach people, get their points across, and help peers through the difficult decision process involved in adopting a forestry or wildlife management practice. This study supported that contention. Local natural resources change agents should seek out volunteers who come across as empathetic and congruent. Change agents may indeed need training and focus in recognizing these skills in others. Teaming up with volunteer individuals who possess high skill levels can be expected to move a local forestry and wildlife management extension program ahead considerably.

The Virginia Coverts Project was an attempt to train and motivate opinion-leading NIPF owners to adopt advance forest and wildlife management strategies on their own and persuade their peer NIPF owners to become better forest managers by using science-based ecologic and economic concepts. As such, the cooperators have to date entered 5,290 hectares (13,225 ac.) within 22 ownerships into the Virginia Forest Stewardship

Program and have been instrumental in persuading 27 other NIPF-owning peers to also begin certification. One hundred and thirty additional landowners have been persuaded to adopt other forest management strategies not specifically included in the forest stewardship program. Presentations were made by cooperators to 21 groups comprising 225 people, and 22 demonstration-field days were held by cooperators on their lands, which attracted another 246 interested people. Nine popular press articles or letters to the editor were written by cooperators and 1 cooperator appeared on a TV spot. In all, 480 hours of time have been contributed by cooperators in their communities towards improving the dissemination of forest and wildlife management innovation. Further, cooperators themselves have adopted or plan to adopt before year's end, 463 practices learned at Coverts workshops.

Management clubs may have tremendous potential as structures through which opinion-leading NIPF owners can exchange ideas, lend encouragement and support, and collaboratively share the time and energy costs of conducting demonstration-field days. However, from the observations of this study, it appeared critical to have a NIPF owner with enthusiasm and high interpersonal and communication skills to take the lead in starting and maintaining such a club. Participation and guidance by the local natural resources professional would likely improve the probability of keeping the club active and effective in diffusion activities locally.

Training sophisticated landowners such as those attracted to Coverts type program demands that the training component be of exemplary quality. The very best demonstration areas should be visited, the very best

instructors used, and the very best reference materials available should be provided to cooperators. Emphasis should be heavily weighted upon providing a good model of how a demonstration field-day should be conducted (Cross, pers. comm.) and how adopted innovations can best be presented in the context of the NIPF owner. Bus tours to high quality educational sites, such as Virginia Tech Forestry Extension currently conducts, is an innovative educational concept. Professional natural resource agents and innovative host-landowners can interact with cooperators, creating a relaxed atmosphere for technology transfer. This strategy, combined with a follow-up 2-days of intensive training on diffusion outreach, may create an ideal educational package for preparing an opinion-leading NIPF owner for future adoption and diffusion activity in promoting science-based forestry and wildlife management in his community.

From an economic perspective, McEvoy (1988) claimed that the dissemination efforts of the first class of Vermont Cooperators far exceeded what one natural resources extension advisor could have accomplished in one year, and at a fraction of the cost. Early results from the Virginia Coverts project do not affirm this finding; however, the relatively short monitoring period of Virginia cooperators to date may have had the effect of obscuring the true potential of the program in Virginia. With continued financial support from The Ruffed Grouse Society and other foundations interested in increasing forest management of Virginia's NIPF land resource, most of the costs to the state associated with conducting this type of program are largely fixed. Given that it is

unlikely that regional wildlife and forestry extension advisors will be funded in the foreseeable future, and given that the VDF foresters may not have the skill or the attitude to move away from the traditional timber production paradigm and towards working with the apparent preservationist attitudes of the typical NIPF owner, training and then utilizing opinion-leading NIPF owners as messengers of integrated forest and wildlife management strategies may be the best possible means of meeting this important unmet need.

LITERATURE CITED

Adams, C. A,, R. A. Stone, and J. K. Thomas. 1988. Conservation education within information and education divisions of state natural resource agencies. Wildl. Soc. Bull. 16(3):329-333.

Alexander, L, and S. R. Kellert. 1984. Forest landowners perceptions of wildlife management in New England. Trans. N.Am. Wildl. and Nat. Res. Conf. 49:164-173.

Applegate, J. E. 1981. Landowners' behavior in dealing with wildlife values. In: R. T. Dumke, G. V. Burger and J. R. March (Eds.), Proceedings of Symposium: Wildl. management on private lands. La Crosse Printing Co., La Crosse, Wisc.64-72.

Bandura, A. 1986. Social foundations of thought and action. Prentice Hall, Inc., Englewood Cliffs, N.J. 617pp.

Bauder, J. W., and J. S. Hickman. 1988. Tillage committees: a local approach to effective extension education. J. Soil and Water Cons. 43(2):130-132.

Berryman, J. H. 1981. Needed now: an action program to maintain and manage wildlife habitat on private lands. In: R. T. Dumke, G. V. Burger and J. R. March (Eds.), Proceedings of Symposium: Wildlife

management on private lands. La Crosse Publ. Co., La Crosse, Wisc. p.6-9.

Birch, T. W. 1983. Private forestland owners in the U.S.: their number and characteristics. In: J. Royer and C. Risbrudt (Eds.), Nonindustrial Private Forest: A review of economic and Policy Studies. Duke Univ., Durham, N.C.

Blanchard, K. A., and M. C. Monroe. 1990. Effective educational strategies for reversing population declines in seabirds. Trans. N. Am. Wildl. and Nat. Res.Conf.55:108-117.

Brandner, L., and B. Kearl. 1964. Evaluation for congruence as a factor in adoption rate of innovation. Rural Soc.9(3): 288-303.

Bunnell, P. 1988. Guidelines for forestry extension. Forest Resource Development Agreement Report 046. Env. and Soc. Sys. Anal. Ltd., Vancouver, B. C. 24pp.

Busch, L., and W. B. Lacy. 1983. Information flows in research and extension: an alternative perspective. The Rural Sociologist 3(2):92-97.

Christensen, W. W., and A. E. Grafton. 1966. Characteristics, objectives and motivations of woodland owners in W. Va. W. Va. Agr. Exp. Sta.

Bull. 538. 28pp.

Charter, S., and J. Charter. 1985. Management clubs - an innovative approach to training. The Savory Ltr. 8:16-17.

Comptroller General of the U. S. 1972. The Forest Service needs to ensure that the best possible use is made of its research program findings. Report to Congress of the U.S. Dept. of Agric. Gen. Acct. Off., Washington, D.C. 29pp.

Crowell, J. B. 1984. Can timber growing investments be profitable? J. For. 82(9):536-538.

Defleur, M. L., and S. Ballrokeach. 1975. Theories of mass communication. 3rd Ed. McKay Publ. Co., New York, N.Y. 263pp.

Deknatel, C. 1979. Wildlife habitat development on private lands: a planning approach to rural land use. J. Soil Water Cons. 34(6):260-263.

Dickson, A. 1970. Receptivity of absentee forest owners to extension forestry. Unpublished PhD. Diss., Syracuse University, Syracuse, N.Y. 333 pp.

Doolittle, L. and J. Straka. 1987. Regeneration following harvest on nonindustrial private pine sites in the South: a diffusion of innovations perspective. South. J. App. For. 11:37-40.

Elifson, K. W., R. P. Runyon, and A. Haber. 1982. Fundamentals of social statistics. Addison-Wesley Publ. Co., Reading, Mass. 563 pp.

Fesco, R. S. 1982. Management practices and reforestation decisions for harvesting timber. USDA Stat. Reporting Service, Washington, D.C.

Fessler, D. R. 1958. Making meetings effective. VPI Agric. Ext.Service, Circular 772. Blacksburg, Va. 19pp.

Geller, E. S. 1989. Applied behavior analysis and social marketing: an integration for environmental preservation. J. Soc. Issues. 45(1):17-36.

General Accounting Office. 1977. To protect tomorrow's food supply, soil conservation needs priority attention. Comptroller General of the U.S., Washington, D.C. CED-77-30.

Giles, R. H., Jr. 1978. Wildlife management. W. H. Freeman and Co., San Francisco, Ca. 416pp.

-----. 1981. Assessing landowner objectives for wildlife. In: R. T.

Dumke, G. V. Burger and J.R. March (Eds.), Proceedings of Symposium: Wildlife management on private lands. La Crosse Printing Co., La Crosse, Wisc. p.112-129.

Goss, K. F. 1979. Consequences of diffusion of innovations. Rural Sociology 44(4):754-772.

Gramann, J. H. 1984. Sociological issues in nonindustrial private forestry. Rural Sociologist 4(5):364-368.

Granovetter, M. 1983. The strength of weak ties--a network theory revisited. In: R.Collins (Ed.), Sociological theory 1983. Jossey Bros. Publ., San Francisco, Ca. p.201-233.

Griffin, W. V. 1981. A private landowner looks at education. In: R. T. Dumke, G. V. Burger and J. R. March (Eds.), Proceedings of Symposium: Wildlife management on private lands. La Crosse Printing Co., La Crosse, Wisc. p.293-295.

Haymond, J. L. 1985. Diffusing silvicultural innovations in the nonindustrial private forestland owners' social system: a study of opinion leaders. Unpublished PhD. Diss., Clemson Univ., Clemson, S.C. 151pp.

-----. 1988. NIPF opinion leaders: what do they want? J. For. 86(4):30-35.

-----. 1990. Wildlife attitudes of early adopters who own forestland. Society and Nat. Res. 3:11-18.

Hodge, S. S., and L. Southard. 1992. A profile of Virginia NIPF landowners: results of a 1991 survey. Va. For. 47(4):7-11.

Jacobsen, D. J. 1948. The affairs of Dame Rumor. Rinehard and Co., Inc. New York, N.Y. (not seen).

Jahn, L. R. 1988. The potential for wildlife habitat improvements. J. Soil and Water Cons. 43(1):67-69.

Keen, S. 1991. Fire in the belly: on being a man. Bantam Books, New York, N.Y. 272pp.

Kellert, S. R. 1976. Perceptions of animals in American society. Trans. N. Am. Wildl. and Nat. Res. Conf. 1:533-546.

King, C. W. and J. O. Summers, 1970. Overlap of opinion leadership across consumer product categories. J. Marketing Research 7:43-50.

Kivlin, J. E. 1960. Characteristics of farm practices associated with

rate of adoption. Unpublished Phd. Diss., Penn. State Univ. University Park, Pa. 107pp.

MacNamara, M. 1985. Action learning and organizational development. J. Organizational Develop. Summer, 1985:10-15.

Martson, E. 1992. Who ya gonna call? High Country News 24(5):11.

Maslow, A. H. 1970. Motivation and personality. 2nd Edition. Harper and Row. New York, N.Y. 369pp.

McEvoy, T. J. 1985. An educational approach to increase the production of multiple benefits from private nonindustrial woodlands in America. Pages 116-120 In: Workshop Proceedings: Technologies to benefit agriculture and wildlife. Office of Technology Assessment, Washington, D.C.

-----, S. H. Broderick and R. S. Stewart. 1988. A strategy to improve the adoption of forest management practices, especially for wildlife, on private nonindustrial woodlands. Trans. N. Am. Wildl. and Nat. Res. Conf. 53:62-66

Merton, R. 1957. Social theory and social structure. Free Press, Glencoe, Ill. p.413.

Mills, S. 1991. Salons and beyond. Utne Reader. Mar./Apr. 1991:68-77.

Morgan, D. L. 1988. Focus groups as qualitative research. Qualitative Research Methods Series No. 16. Sage Publications. Newberry Park, CA. 83pp.

Muth, R. M., and J. C. Hendee. 1980. Technology transfer and human behavior. J. For. Mar. 1980:141-144.

Neal, J. E. 1991. Letter to natural resource extension specialists in the southern region. USDA CES. Southern Regional Forester's Office, Athens, Ga. April. 1pp.

Nowak, P. J. 1987. The adoption of agricultural conservation technologies: economic and diffusion explanations. Rural Sociologist 52(2):208-220.

Olson, D. D. 1979. Realities on nonindustrial private forest ownership in northern Michigan: an extension forester's opinion. J. For. 77:13-18.

Pampel, F. Jr., and J. C. Van Es. 1977. Environmental quality and issues of adoption research. Rural Sociology 42(1):57-71.

Presley, J. J. 1981. Opportunities for wildlife management through state and private cooperative forestry programs. In: R. T. Dumke, G. V. Burger and J. R. March (Eds.), proceedings of Symposium: Wildlife management on private lands. La Crosse Printing Co., La Crosse, Wisc. p227-234.

Ramsey, C. W., and M. Shult. 1981. Educational approaches to wildlife management on private lands. In: R. T. Dumke, V. Burger and J. R. March (Eds.), Proceedings of symposium: Wildlife management on private lands. La Crosse Printing Co., La Crosse, Wisc. 318-334.

Rogers, E. M. 1983. Diffusion of innovations. 3rd Edition. Free Press. New York, N.Y. 453pp.

-----, and F. F. Shoemaker. 1971. Communication of innovations: a cross-cultural approach. The Free Press, New York, N.Y. 476pp.

Rohs, F. R. 1985. Questionnaire construction: information gathering for needs, assessment, evaluation, and research. USDA CES/Univ. of Ga. Coll. of Agric., Athens, Ga. 24pp.

Rosen, B. N., H. F. Kaiser and M. Baldeck. 1989. Nonindustrial private forest landowners as timber marketers: a field study of search for market information and decision quality. Forest Science 35(3):732-744.

Royer, J. P. 1979. Conclusions from a review of 50 years of small woodland owner studies. In: Proceedings of the 1979 Southern Forest Economists' Workshop. Chapel Hill, N.C. p.1-14

Royer, J. P., T. A. Goss and J. L. Townsend. 1981. Policy research on nonindustrial private forest: Duke's contribution. FOREM 4(3). Duke Univ., Durham, N.C.

Sabido, M. 1981. Towards the social use of soap operas. Institute for Communications Research. Mexico City, Mexico.(not seen).

SAS Procedures Guide. 1988. SAS Institute, Inc., Cary, N.C. 441pp.

Savory, A. 1989. Holistic Resource Management. Island Press, Washington, D.C. 564pp.

Schoenfeld, C. 1981. Communication: a human factor. In: R. T. Dumke, G. V. Burger and J. R. March (Eds.), Proceedings of Symposium: Wildlife management on private lands. La Crosse Printing Co., La Crosse, Wisc. p.130-152.

Shaw, S. P. 1981. Wildlife management on private nonindustrial forest lands. In: R. T. Dumke, G. V. Burger and J. R. March (Eds.), Proceedings of Symposium: Wildlife management on private lands. La Crosse Printing Co., La Crosse, Wisc. p.6-42.

Shelton, R. 1981. Motivating the landowner to manage for wildlife. In:R.T. Dumke, G. V. Burger and J. R. March (Eds.), Proceedings of Symposium: Wildlife management on private lands. La Crosse Printing Co., La Crosse, Wisc. p.301-306.

Snyder, L. B., and S. H. Broderick. 1992. Communicating with woodland owners: lessons from Connecticut. J. For. 90(3):33-37.

Stewart, R. S. 1990. Development of a strategy to increase forest management activities on nonindustrial private forestlands. Unpublished M. S. thesis, Univ. of Vermont, Burlington, Vt. 75pp.

Stone, R. N. 1969. A comparison of woodland owners' intent with woodland practices in Michigan's upper peninsula. Unpublished PhD. Diss., Univ. of Minn., Duluth, Mn. 121 pp.

Super, D. E., and D. D. Nevill. 1986. The values scale. Consulting Psychologist Press. Palo Alto, Ca.

Taylor, D. L., and W. L. Miller. 1978. The adoption process and environmental innovations: a case study of a government project. Rural Sociology 43(4):634:648.

Uhl, K., R. Andrus and L. Poulsen. 1970. How are laggards different? An empirical inquiry. J. Marketing Research :51-54.

United States Cooperative Extension Service. 1990. State extension specialists in fisheries and wildlife. U. S. Gov't. Printing Office, Washington, D.C. 27pp.

USDA Forest Service. 1986. Forest statistics of Virginia. Southeastern Forest Experiment Station, Resource Bulletin SE-87. Asheville, N.C. 67pp.

USDA Forest Service. 1988. An analysis of the timber situation in the U.S.: 1989-2040. USDA Forest Service GTR RM-199. Washington, D.C. 269pp.

Virginia Dept. of Forestry. 1990. Virginia forest stewardship plan. Charlottesville, Va. 26pp.

Watson, G., and D. Johnson. 1972. Social psychology: issues and insights. J. P. Lippencott Co., New York, N.Y. 99pp.

Weigel, R., and J. Weigel. 1978. Environmental concern; the development of a measure. Environment and Behavior. (1):3-15.

Wellman, J. D. 1987. Foresters' core values and cognitive styles: issues for wildland recreation management and policy. Policy Studies Review 7(2):395-403.

Wildlife Management Institute. 1983. Improving access to private land: a path to wildlife. Wildlife Management Institute, Wash., DC. 15pp.

Wright, B. A. 1988. Virginia landowners wildlife management study. Virginia Department of Game and Inland Fisheries, Richmond, Va. 60pp.

Appendix A: Forms and Questionnaires

DEFINITION AND FORM FOR LISTING EARLY ADOPTERS WHO OWN FORESTLAND

This form was given to local informants--local Forestry Commission foresters, county Extension Agents and selected local citizens--to use for nominating early adopters in the first stage of the selection process.

Social scientists have characterized an early adopter as:

--not the first, but one of the first, to try a new idea.
--having more education than average, but not the most.
--a leader in community organizations, but not usually state or national ones.
--respected by neighbors as a "good manager" of his land.
--owning a moderate area of farm or forestland but not the largest amount.
--getting most of his information about new farm or forestry practices from county agents, extension bulletins, newspapers, and magazines.
--progressive in his thinking but not radically different from most other people.

In your opinion, which forestland owners in your community serve as model farmers or forest managers who may be imitated by others within the community? Some descriptive phrases which might apply are given above. Please name as many as you can think of in your community or county. Do not exclude yourself.

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Date:_____

COVERTS Project Volunteer Application Form

The COVERTS Project is looking for a diverse group of Virginia woodland owners who can help others understand management on their lands. This application is an important step in helping us locate enthusiastic landowners to participate in the COVERTS Project. If you are interested, please complete this form as soon as possible. After completing, please return it to: Gerald Cross, Department of Fisheries and Wildlife Sciences, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061-0321.

1. Mr./Mrs./Miss/Ms. _____
(circle one)

2. Home Address: _____
(R.R., Street, or P. O. Box)

_____
Town State Zip

Home Phone: _____ Work Phone: _____

3. Current Occupation_____

4. How long have you lived in Virginia? _____ Years

5. How long have you lived in your present community? _____ Years

6. Approximately how many acres of woodland do you own or are you responsible for managing in Virginia?

_____ Acres Owned _____ Acres Responsible for

7. Our rural property acreage (farm and forestland) is:

_____ The largest in our community
_____ Larger than most
_____ About the same size as most
_____ Slightly smaller than others
_____ Much smaller than others

8. How many miles do you live from the major portion of your woodland holdings?
_____ Miles

9. What are your primary management objectives for the woodlands? (please list in order of importance) As an example you might list: 1) wildlife habitat improvement for game; 2) income production from timber; 3) recreational enjoyment from "birding."

_____

_____

_____

10. What, if any management activities have you carried out on your wooded property in the past three years? As an example, you might list: timber stand improvement, woods road construction and maintenance, controlled grazing in my woodlands, wildlife plantings, etc.

_____

_____

11. Have you consulted with any of the following professionals concerning management of your woodland? (please circle the appropriate letters)

a. County/Area Forester (Virginia Department of Forestry)
b. Natural Resources Specialist (Virginia Cooperative Extension Service)
c. Wildlife Habitat Biologist (Virginia Dept. of Game and Inland Fisheries)
d. County Agricultural Agent (Virginia Cooperative Extension Service)
e. Private Consulting Forester
f. Soil Conservation Service (SCS)
g. Agriculture Stabilization and Conservation Service (ASCS)
h. Soil Conservation District (SCD)
i. Others (please list) _____

_____

12. Please indicate the level of knowledge concerning woodland management you have gained from the following sources. Circle 0 if you haven't gained any knowledge from the sources; circle 1 if you have gained some amount of information; and 2 if you have gained a lot.

	none	some	much
Newspaper	0	1	2
Radio	0	1	2
Television	0	1	2
Extension Publications	0	1	2
Workshops/Short Courses	0	1	2
Resource Professionals:			
a. Public	0	1	2
b. Private	0	1	2
Friends and/or neighbors	0	1	2
Private Natural Resource and/or Environmental Organizations such as Fish and Game Club, Sportsman Association, etc.			
a. Personal Contacts	0	1	2
b. Publications	0	1	2

13. Please indicate the statement which most accurately described the level of knowledge you feel you have about forest and wildlife management. (circle the appropriate letter)

A. I have no knowledge of forest or natural resources management.
B. I am aware of some of the options available to me in managing my property for wood, wildlife, and other benefits.
C. I understand some forest and wildlife management concepts and can explain them to others.
D. I have enough knowledge and skill to implement some forest and wildlife management activities on my land.
E. I know as much about forest and wildlife management as most foresters or wildlife biologists.

14. Which of the following most accurately describes your attitudes in general about hunting (not necessarily just on your property)? (circle the appropriate letter)

A. I am strictly opposed to all hunting.
B. I am not opposed to hunting, but do not hunt.
C. I am a hunter.

15. I do _____, do not _____ allow hunting on my property.

16. After hearing of a completely new idea in forestry, farming or other land use, I am usually:

_____ Eager to try it as a scientific investigation.
_____ Willing to try it as soon as I have observed a successful demonstration.
_____ Willing to try it about the same time that most other people do.
_____ Willing to try it only after many other people do.
_____ Very cautious and unlikely to try it.

17. Compared to my friends and neighbors, my level of education is:

_____ Very High
_____ Above Average
_____ Average
_____ Slightly Below Average
_____ Lower Than Most

18. Do you consider your thinking, in general, to be:

_____ Considerably more liberal than most other people
_____ Progressive, but not radically different from most other people
_____ Mainstream, with little or no difference from most other people
_____ Slightly more conservative than most other people
_____ Considerably more conservative than most other people

19. Please indicate the extent to which you agree or disagree with the following statements. (if you disagree strongly, circle 1; disagree somewhat, circle 2; undecided, circle 3; agree somewhat, circle 4; agree strongly, circle 5.)

	Disagree				Agree
A. I find it difficult to express my ideas	1	2	3	4	5
B. It is easy for me to act naturally in a group	1	2	3	4	5
C. I enjoy speaking in public	1	2	3	4	5
D. Others expect me to be a leader in my community	1	2	3	4	5
E. I am more likely than others in my circle of friends or acquaintances to be asked my views on natural resources issues	1	2	3	4	5

20. Which of the following do you feel are your three strongest points as a communicator? (Please circle the appropriate letters)

a. Writing for newspapers, periodicals, etc.
b. Appearing on radio
c. Appearing on television
d. Public speaking
e. Organizing workshops or educational displays
f. Leading groups in the field
g. Conversation with neighbors
h. Other (please list)_____

_____

21. Please list any current or past community, state or national organization involvement. (Include, for example, association memberships or offices, community, state or national boards or committees, other volunteer activities, etc.)

Organization/Activity **Role** **Former or current**

_____

_____

_____

_____

22. What would you most like to see emphasized in the COVERTS workshop program?

23. Briefly, why do you wish to participate in the COVERTS Project?

24. Please circle your first choice of dates and location for attendance at a COVERTS workshop. If you can be flexible and attend either one, please circle your second choice as well.

First Choice: Smith Mountain Lake, October 9-11; Front Royal, November 6-8

Second Choice: Smith Mountain Lake, October 9-11; Front Royal, November 6-8

COVERTS COOPERATOR QUESTIONNAIRE

Name _____

Date _____

. PLEASE RETURN BY ASAP

1. How many forestland owners or managers have you engaged (one-on-one) in discussion about forest and/or wildlife management since your participation in the Smith Mountain Coverts workshop Oct. 9-11, 1991? _____

2. If you have not contacted anyone to date, do you plan to do so in the next 6 months?

   _____Yes How many? _____
   _____No

3. Of those you **have engaged**, how **many** do you know of who have initiated the Stewardship planning process or other management actions for their forestland?

   _____Stewardship Planning Process
   _____Other management actions

4. How many of those landowners you have engaged in conversation do you feel "good about", (that is, you expect that they will initiate some aspect of management in the future)? _____

5. Have you spoken to any **groups** concerning forest/wildlife management since Oct. 11, 1991?

   _____Yes
   _____No
   _____If yes, please give number of groups
   _____Total number of people in the groups

6. Have you conducted any **tours** or **field days** related to forest/wildlife management on your forest property or on anyone else's property since Oct. 11, 1991?

   _____Yes
   _____No
   _____If yes, how many tours/field days?
   _____Total number of people attending?

7. Have you written any **articles/letters-to-the-editor** pertaining to forest/wildlife management that have appeared in a newspaper or magazine since Oct. 11, 1991?

   _____Yes
   _____No
   _____If yes, how many articles?

8. Have **articles** been written about your management of your forestland **by someone else** and subsequently published since Oct. 11, 1991?

   _____Yes
   _____No
   _____If yes, how many articles?

9. Have you spoken on **radio/TV** about forest and/or wildlife management since Oct. 11, 1991?

_____Yes
_____No
_____If yes, how many events?

10. Please estimate the **number of hours** you have spent since Oct. 11, 1991 **preparing for and/or disseminating information on forest/wildlife management.**

_____talking one-on-one with another forestland owner or manager
_____writing an article or letter-to-the-editor
_____preparing for and giving a talk
_____organizing a meeting or field day
_____conducting a meeting or field day

11. Please check-off any **practices you have adopted** since Oct. 11, 1991, **or plan to adopt** during the remainder of this year, as a result of knowledge received at or motivation generated from the Coverts workshop.

___Initiated the process of "Stewardship" certification with VDOF.
___Consulted with public professional forester or biologist.
___Consulted with a private consulting forester or biologist.
___Sent wings of harvested ruffed grouse to VDGIF.
___Participated in VDGIF's Deer Management Assistance Program.
___Started a "life list" of sightings of non-game on your land.
___Planted annuals, biannuals, or perennials in food patches.
___Made patch cuts to favor grapevines and other soft mast.
___Created brush piles.
___Installed nest boxes.
___Transformed hard-edge to soft-edge.
___Made selection cuts to favor the mix of red/white oak, hickory, and beech crop trees for mast production.
___Disked small area to increase weed seed.
___Burned area to foster weed seed and browse production, reduce litter.
___Left snags, den/nest trees, and/or drumming logs during timber harvest.
___Left a 100' riparian corridor of trees.
___Left a forested buffer strip along public roads.
___Planned timber harvest with consideration of wind dynamics.
___Considered habitat juxtapositions with neighboring tracts when planning a clearcut harvest.
___Shaped timber harvest area to maximize or minimize edge.

___Control burned in a pine plantation to stimulate nutrient cycling and growth of crop trees.
___Thinned pines, commercially.
___Thinned pines, precommercially.
___Did timber stand improvement, with income from or personal use of firewood.
___Timed selection or shelterwood cut to minimize damage to residual trees and injury to nests.
___Timed clearcut or seed tree cut to minimize impact on most wildlife.
___Planted hardwoods, using tree shelters.
___Daylighted roads.
___Installed water bars on roads.
___Seeded roads with anything but Kentucky 31 Tall Fescue.
___Control grazed in woodlots.
___Entered tract into an agricultural/forestal district.

___Attempted conflict resolution with polarized resource-using groups.
___Other (specify)
___Other (specify)
___Other (specify)

A COUPLE OF SOCIOLOGICAL QUESTIONS

12. Please indicate the youth groups you were an active member of when you were growing up. Also, please indicate the ones your children were or are now involved with.

You	Your Children
___Boy Scouts	___Boy Scouts
___Cub Scouts	___Cub Scouts
___Girl Scouts	___Girl Scouts
___Brownies	___Brownies
___4-H	___4-H
___YCC	___YCC
___Other (specify)	___Other (specify)
___Other (specify)	___Other (specify)

13. Do you currently have a library card in your possession?

___Yes
___No

Any comments, criticisms pertaining to this questionnaire?

THANKS MUCH FOR YOUR TIME AND EFFORT!

Appendix B: Summary of Selected Questionnaire Responses

Table B1. Frequency, by targeted county, of nominated, opinion-leading private forestland-owners, and frequency and percentage of those applying.

County	Number nominated	Number applying	Percentage
Bedford	21	1	4.76
Clark and Frederick	18	2	11.11
Fauquier	16	6	37.50
Floyd	19	3	15.79
Franklin	11	2	18.18
Henry	19	3	15.79
Page	3	0	0.00
Patrick	4	1	25.00
Pittsylvania	18	2	11.11
Rappahannock	21	1	4.76
Roanoke	11	2	18.18
Shenandoah	13	2	15.38
Warren	6	1	16.67
TOTAL	180	27	15.00

Table B2. Management activities carried out on their private forest holdings during the past 3 years by 1991 Virginia Coverts cooperators-participants.

Management Activity	Frequency	Percent
Wildlife Plantings	31	63.3
Woods Road Construction/ Stabilization	29	59.2
Timber stand Improvement	16	32.7
Timber harvesting (clearcut)	14	28.6
Tree planting	11	22.4
Water Resources Development	5	10.2
Controlled Grazing	5	10.2
Placement of nest boxes	4	8.2
Trails	3	6.1
Creating Edge	2	4.1
Creating Brush Piles	2	4.1
Salvage of Storm Damaged Timber	2	4.1
Left Den Trees	1	2.1
Disking	1	2.1
DMAP	1	2.1
Burning	1	2.1
Bushogging	1	2.1
Spraying	1	2.1
Managed for Hard/Soft Mast	1	2.1
Best Management Practices	1	2.1

Table B3. Number of Coverts cooperators participating in local civic or governmental organizations as office-holders, leaders, listed by organization.

Organization	Frequency	Percent
Miscellaneous local government organizations	5	10.20
Miscellaneous civic organizations	5	10.20
Church organizations	5	10.20
Boy Scouts of America	4	8.16
Soil and Water Conservation Districts	4	8.16
Ruritans	4	8.16
Town Council	3	6.12
Chamber of Commerce	3	6.12
Kiwanis	2	4.08
Lions Club	2	4.08
Jaycees	1	2.04
Big Brothers/Big Sisters	1	2.04
Rotary	1	2.04

Table B4. Natural resource organizations within which Coverts Cooperators are members.

Organization	Number of Coverts cooperators as members	Percent of cooperator population as members
Ruffed Grouse Society	9	18.37
National Wildlife Federation	7	14.29
Virginia Forestry Association	5	10.20
Nature Conservancy	5	10.20
Tree Farm System	4	8.16
Local Sportmen's clubs	4	8.16
Local Forestry and Wildlife Associations	4	8.16
Quail Unlimited	4	8.16
Ducks Unlimited	3	6.12
Audobon Society	2	4.08
National Arbor Day Society	2	4.08
National Wild Turkey Federation	2	4.08
Virginia Wildlife Federation	2	4.08
Local environmental organizations	2	4.08
National Christmas Tree Growers	1	2.04
Virginia Poultry Federation	1	2.04
Future Farmers of America	1	2.04
Izaak Walton League	1	2.04

Table B4 - Cont'd

Organization	Number of Coverts cooperators as members	Percent of cooperator population as members
Trout Unlimited	1	2.04
American Chestnut Foundation	1	2.04
American Forestry Association	1	2.04
Waterfowl U.S.A.	1	2.04
Farm Bureau	1	2.04
American Fisheries Society	1	2.04
The Wildlife Society	1	2.04
American Society of Oceanographers and Limnologists	1	2.04
Wildlife Disease Association	1	2.04
American Association of Wildlife Veterinarians	1	2.04
Virginia Nurseryman's Association	1	2.04
Virginia Native Plant Society	1	2.04
Chesapeake Bay Foundation	1	2.04
Soil and Water Conservation Society	1	2.04
American Agronomy Society	1	2.04

Vita

The author was a 1978 recipient of a B.S. degree in Forestry and Wildlife Resources from Virginia Tech. He has been employed as an associate forester with Michael D. Neal and Associates of Colerain, N.C., as an acquisition and management forester with Bear Island Paper Company of Ashland, Va., and as regional director for the Center for Holistic Resource Management of Albuquerque, N.M. Before entering graduate school, he ran his own consulting company, specializing in agronomy and forestry, and raised cattle. Champe enrolled in the M.S. program at the Department of Fisheries and Wildlife Sciences, Virginia Tech, in August, 1990.