

PERSONAL NETWORKS AND PRIVATE FORESTRY:
EXPLORING EXTENSION'S ROLE IN LANDOWNER EDUCATION

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Dedication

To Minnesota's forest landowners, from whom I have had the pleasure to learn so much.

Abstract

Recognizing the public value of sustainable forest management on private lands, governments have invested in programs to educate and assist landowners. However, landowner awareness of and enrollment in these programs are low. Applying a basic social network analysis approach, I investigated the role of personal networks in the flow of information and adoption of sustainable forest management behavior. Based on the results of a written survey, 90% of 1767 owners of Minnesota forest land have received forestry information from at least one source including 65% from a peer and 53% from a professional forester. Personal forestry information network size ranged from 0 to 14 with a mean of 2.92. Network size was positively associated with ownership size and the number of land management activities implemented. Landowner network results confirm the important role of public sector foresters, but also suggest opportunities for increased use of peer learning techniques to engage landowners as learners.

Extension forestry programs are the primary providers of landowner education nationwide. A second study investigated the ways that these programs leverage landowner personal networks for education. The managers of 39 forestry-related peer learning programs train volunteers and use other peer learning techniques to inform and educate landowners about sustainable forest management. Relative to state-level Extension forestry programs, a higher percentage of peer learning programs target smaller, often underserved, landowner groups. Although program outputs and demands for service are increasing, many

peer learning program managers face reduced budgets and are turning to new technologies and techniques to maintain or grow their programs.

In an environment of rapid changes in both the tools available to support Extension education programs and complex issues demanding a response, the results of these studies present both opportunities and challenges for the future of the nation's Extension forestry programs.

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Introduction

Families and individuals own approximately 35% of the timber land in the United States (Smith et al. 2004). Sustainable private forest management creates important public value in the form of water and wildlife habitat quality, scenic beauty, supply of natural resources to fuel rural economic activity, and even atmospheric carbon reduction. Federal, state, and local governments have invested in interventions to encourage sustainable private forest management for decades. These investments typically include technical assistance, landowner outreach and education, preferential tax treatment for productive land, and, though less common, direct incentive payments (Alig et al. 1990; Kluender et al. 1999; Schaaf and Broussard 2006; Skok and Gregersen 1975; Kilgore and Blinn 2004). A variety of program evaluation studies suggest that these strategies do encourage sustainable forest management (Cubbage et al. 1996; Gaddis et al. 1995; Henly et al. 1988; Moulton and Esseks 2001). Increasingly however, the efficiency and effectiveness of current programs, along with the assumptions supporting them, are being questioned (Kilgore et al. 2007; Kluender et al. 1999).

In the context of an evolution in private forestry research that increasingly recognizes the roles of complex social and identity-related factors on landowner behavior, new approaches are emerging (Fischer et al. 2010; Egan 1997). Several studies have investigated drivers of forest management

behaviors including identity (Bliss and Martin 1988; Potter-Witter 2005; Kendra and Hull 2005; Ross-Davis and Broussard 2007) and values and benefits derived from the land (Salmon et al. 2006). One notable trend is development of landowner typologies that identify relatively uniform segments that share common values, land management motivations, and identities (Kluender and Walkingstick 2000; Majumdar et al. 2008; Finley and Kittredge 2006; Butler et al. 2007). In Egan's (1997) words, these studies reflect an evolution of research from timber to forests and people.

Factors affecting private forest management

Research has informed a variety of public investments designed to maximize the public value of sustainable private forest management. This section briefly summarizes a number of factors known to influence private forest management behavior: ownership size; motivations or reasons for land ownership; participation in cost-sharing, technical assistance, or education programs; forest practice regulations; peer-to-peer outreach; incentive payments; and personal identity.

Ownership size

Ownership size is positively related to the likelihood of timber production on private forest lands (Row 1978; Alig et al. 1990; Straka et al. 1984; Thompson and Jones 1981). There are several reasons for this relationship. The most important is economies of scale: the fixed costs associated with timber harvest planning and operations (e.g. moving timber harvest equipment) vary little with

harvest size. These costs therefore are significantly larger on a per-acre basis on small than large parcels (Row 1978). Although landowners typically do not pay these costs directly, the costs are deducted from timber sale revenues, and therefore have an important impact on the bottom line. In addition to economies of scale, small-scale owners also gain less per unit effort expended in activities such as timber sale planning, searching for professional assistance, and learning about silvicultural options than do larger owners (Row 1978).

Attitudes, motivations, or reasons for ownership

Numerous studies investigate motivations or reasons for owning and managing forest land (Erickson et al. 2002). These studies tend to conclude that landowners are highly diverse with respect to not only preferred uses of the land (e.g. hunting, generating revenue through timber harvest, or maintaining open space) but also attitudes toward timber harvesting, motivations to improve or modify the woodland, production or sale of wood products, and appropriate levels of intervention in natural ecosystem function.

Over the years, these studies have evolved from simple surveys into typology development (Emtage et al. 2007). The more recent typology approach has led to development of numerous ways to segment landowners at scales from several counties (Ross-Davis and Broussard 2007), to states or regions (e.g. Finley et al. 2006; Kluender and Walkingstick 2000; Kendra and Hull 2005) and even nationwide (e.g. Majumdar et al. 2008). These approaches use statistical analysis to inductively identify groups of respondents whose responses to

different survey questions are sufficiently consistent to form a statistical “cluster.” Because of their internal consistency, the resulting clusters can present opportunities for targeted outreach or policy intervention. While typology results are somewhat variable based on the geography, variables used to classify landowners, and the populations studied (Emtage et al. 2007), many include at least one segment focused on active management and production, one focused on privacy and solitude, and one somewhat uninvolved or uninterested.

Cost-sharing

Cost share programs are funded and administered at the federal, state, and local levels. Most of these programs are funded by the United States Department of Agriculture, and many originated from initiatives to maintain or restore water quality or the productivity of the agricultural and forested land base. In 1987, 14 states offered their own cost share programs (Bullard and Straka 1988). These state-level programs included free tree seedlings, fencing, timber stand improvement, reforestation, and other activities.

Financial support for reforestation activities helps to ensure a sustained supply of wood products. Payments to support erosion control devices, wildlife habitat features, and similar items help to maintain clean water and viable wildlife populations. Most studies of the value of technical assistance and cost share programs found them to be efficient and effective (Cubbage et al. 1985; Bullard and Straka 1988; Henly et al. 1988). These and similar studies generally found net positive returns for investments in private forestry assistance, but to

varying degrees. However, others have questioned the value of public funds used to influence what might otherwise be free markets.

Cost sharing increases the impact of technical assistance programs (Esseks and Moulton 2000). Royer (1987) found that reforestation behavior among Southern forest landowners was highly sensitive to price and the availability of cost-share assistance. Where reforestation costs were high and cost-share funds were not available, reforestation occurred less. State and provincial forestry agency directors considered technical assistance and cost share programs to be the most effective policy tools to influence behavior on private forest lands (Kilgore and Blinn 2004). However, other studies suggest that cost sharing may have a limited effect on persuading landowners to implement practices that they would otherwise not have (Bliss and Martin 1990; Kluender et al. 1999).

Technical assistance

Technical assistance programs offer landowners access to the services of professional foresters, soil conservation experts, or other natural resources professionals for reduced, or no, fees. The most common services provided are direct, onsite forest management advice for landowners, education for landowners, and education for loggers, wood processors, and others (Cubbage et al. 1996; Egan et al. 2001). Assistance for landowners is designed to help them make informed decisions about what forest management activities to conduct and how to find resources necessary to implement them. Assistance for loggers

is generally designed to promote the use of best forest management practices (BMPs) during timber harvest.

The availability of technical assistance programs has been shown to increase implementation of BMPs. In West Virginia, forest improvement practices recommended in a Forest Stewardship Plan were more likely to be implemented than practices not recommended (Egan et al. 2001). Egan (1999) also found higher rates of implementation of BMPs on timber sales administered by a professional forester than on those in which a forester was not involved. Landowners also frequently value the value of one-on-one personal contact with a natural resource professional (Bliss and Martin 1990). Although independent, paid consultants are available in most situations, technical assistance programs often reach landowners who would not be willing to spend the necessary money to hire a private consultant. These programs play an important role in familiarizing landowners with the services available from professionals and helping landowners to develop goals and a plan for the future of the land.

Technical assistance programs have been found to be efficient and effective. The Forest Stewardship Program offers private forest owners free or low-cost management plan development services provided by public or private professional foresters. Many states also make professional foresters available to advise landowners as they consider options for timber harvests or other forest practices. Cabbage et al. (1985) found a benefit of \$600 per acre in net present value from working with a service forester in Georgia. The same study found

that working with a forester also increased stumpage prices paid to landowners by 58%. A subsequent study conducted in Minnesota found similar results: the average bid price on aspen sales was \$4.66 per cord on sales assisted by a forester and only \$3.32 on sales not assisted by a forester (Henly et al. 1988). Similar studies in other states have found similar results, if less pronounced than the original study (Cubbage et al. 1996).

The benefits of forest landowner assistance programs have been shown to accrue not only to individual landowners, but to society. Cubbage et al. (1985) found that government investments in the Georgia Rural Forestry Assistance program consistently provided positive returns at the individual and social levels.

Landowner education

Extension forestry programs, which are part of the land grant university system, are the primary means by which landowner education programs are designed and delivered (Baumgartner et al. 2003; Jones et al. 2001). Reed et al. (1997; p. 118) describe Extension forestry as

an informal educational system to meet the needs of identified forestry audiences (learners), carried out by a partnership of the... federal..., state..., and county governments..., profit and nonprofit businesses and the learners themselves using a variety of educational methods suited to the learners.

Many Extension forestry programs leverage the energy and knowledge of trained volunteers to educate and inform their land owning peers through the

Master Volunteer program model (Fletcher and Reed 1996; Broderick et al. 1999). These programs train and support the work of committed volunteers to help other landowners find information and consider options for the future of their land. Examples include New York Master Forest Owners (Allred et al. 2011), Oregon Master Woodland Manager (Fletcher and Reed 1996), and Connecticut's Coverts (Broderick et al. 1999) programs. In addition to Master Volunteer programs, Extension agents and others offer classroom, field, and increasingly online learning opportunities for landowners, loggers, and natural resource professionals (Finley and Jacobson 2001; Harmon et al. 1997; Jones et al. 2001; Reed 2001).

In addition to Extension, woodland owner associations, forest landowner cooperatives, and other organizations offer information and educational opportunities to landowners. Organizations like the American Tree Farm System (ATFS), the National Woodland Owners' Association, and similar organizations at the state and local levels are examples of woodland owner associations.

Peer-to-peer outreach

The primary theoretical lens through which peer-to-peer outreach has been analyzed in a natural resources context is Diffusion of Innovations theory (Rogers 2003; Valente 1994; Wejnert 2002). Diffusion theory has helped to explain how adoption of a variety of land management practices have "diffused" through social systems, beginning with two small Iowa farm communities

(Rogers 2003; Ryan and Gross 1943). Diffusion theory is discussed in more detail in the chapters that follow this introduction. One key purpose of the current study is to probe more deeply into these findings.

Regulations

Regulations are variable in the practices covered (Ellefson et al. 1995). Regulations seem to be an effective way to achieve implementation of specified forest management practices (Henly and Ellefson 1986). However, most program administrators consider mandatory regulations to be one of the least preferred policy options (Kilgore and Blinn 2004) due to their cost and complexity and the difficulty of enforcement.

A related development is the growth in non-state forest practices regulations in the form of forest certification systems. These voluntary systems are rapidly increasing in acreage and importance both in the United States and worldwide. Forest certification systems certify landowner compliance with a specified set of forest management procedures and practices. Although these systems are likely to remain important in wood products markets, growth on private forest lands is expected to trail that of other ownership types (Cashore et al. 2003).

Stumpage prices

Forest landowners tend to be responsive to changing stumpage prices, although the relationship is complex (Alig et al. 1990), particularly over the long term. Because stumpage prices are market-based, there is little opportunity for

intervention to increase market prices, or to influence timber supply directly through price manipulation.

Financial incentives

A variety of different financial incentives are available to forest landowners in the United States. This section will focus on two: preferential property tax treatment for managed forest land and direct incentive payments. Numerous states offer preferential property tax treatment for managed forest land, but only one (Minnesota) currently offers a direct incentive payment for managed land.

Although rather different, these two approaches share a common requirement to obtain and follow a property-specific forest management plan, and are therefore considered together here. Enrollment in Wisconsin's Managed Forest Law, for example, offers a very large reduction in per-acre property taxes in return for a binding commitment to follow the management plan and not to change the land use (e.g. develop the land) until the expiration of a multiyear contract. Similarly, Minnesota's Sustainable Forest Incentive Act offers an annual per-acre incentive payment in return for following a management plan and placing a no-development covenant on the land for several years.

Diffusion of innovations and social network theory

Diffusion of Innovations theory describes system-level mechanisms by which individuals learn about and observe innovative behaviors and decide whether or not to adopt those behaviors. Based on time of adoption individuals

are designated as early adopters, members of the early or late majority, or laggards. Based on reported patterns of communication and influence, some proportion of individuals are identified as opinion leaders, to whom others look for advice relative to the behavior (Rogers 2003).

Social networks influence a wide variety of behaviors (Granovetter 1985; Wasserman and Faust 1994) from adoption of agricultural innovations (Ryan and Gross 1943) to contraceptive use (Kohler et al. 2001; Montgomery and Casterline 1996). Landowners report peers as common or preferred sources of advice and information (West et al. 1988; Baughman et al. 1998; Baughman 2002). Some Extension agents, themselves adopters of Diffusion of Innovations theory (Rogers 2003), commonly target education programs toward a relatively small group of opinion leaders who pass the information on through volunteer outreach activities (Muth and Hendee 1980; Finley and Jacobson 2001; Haymond 1988). Adoption of sustainable forest management practices follows from direct contact with learners as well as through the peer-to-peer outreach and education work of trained volunteers.

In a seminal work on the “embeddedness” of rational economic decisions within social networks, Granovetter (1985) illustrates the importance of network effects on decisions and behaviors considered by classical economic theory as driven by atomistic, purely self-interested actors. Granovetter’s embeddedness argument posits that a variety of social norms and influences constrain behaviors. In fact, he argues, the notion of the atomistic, purely self-

interested actor is overly simplistic and fails to account for the role of social systems in regulating human behavior. The embeddedness argument says little about the details of network effects. Some of these are elaborated in Granovetter's (1973) classic work on the strength of weak ties and subsequent work on the nature of strong and weak ties and high- and low-density networks.

The strength of weak ties argument demonstrates the value of weak ties for transfer of information across large social distances (e.g. across a large number of intermediary social ties). Weak ties are an efficient way to access new ideas or codified information (Wasserman and Faust 1994; Reagans and McEvily 2003) such as job opportunities or consumer product information. (A modern-day example of the latter is consumer product reviews shared via the internet, which allow consumers to access product reviews by individuals they do not directly know.) Weak ties allow easily codified information to travel quickly across social distance, because brief contact is often sufficient for the transfer of such information with relatively few distortions (Granovetter 1973; Friedkin 1982). The value of weak ties is not their efficiency *per se*, but their numbers: each weak tie contributes little information, but in aggregate, a large number of weak ties gives access to a large number of pools of knowledge (Friedkin 1982), and a broader body of information.

Tacit information, on the other hand, is transmitted more efficiently through strong ties than weak ties (Friedkin 1982; Reagans and McEvily 2003). By definition, tacit information requires a more intense, closer interaction, be it

extended observation or direct instruction. Information, or learning, that requires this kind of contact flows relatively inefficiently through weak ties compared with strong ties.

Different kinds of networks thus provide efficient access to different kinds of information. Dense networks, composed of small numbers of strong and interconnected ties, produce more stable knowledge systems. Less dense networks, composed of large number of unconnected weak ties, produce more dynamic, open access to different bodies of information and new ideas (Wasserman and Faust 1994).

Another important question in this domain relates to the processes by which information and influence flow through a landowner community. Watts and Dodds (2007) describe two very different models. Under the two-step flow model, information moves first to opinion leaders, and then from opinion leaders on to the rest of the community (Coleman et al. 1966; Katz 1957; Robinson 1976). This is the model assumed to occur by organizers of Extension Master Volunteer programs. The model is attractive for its parsimony, intuitive appeal, and perhaps also for pragmatic reasons: It reduces the target audience from all landowners to only those thought to be most influential to their peers (Rogers 2003).

Under a different model, described by Watts and Dodds (2007) as an influence network model, information flows more or less equally to all members of the community rather than only to opinion leaders, and that multiple-step

flows of influence are common. With widespread access to information, the role of personal networks is less the transmission of new information and more the synthesis, interpretation, and application of that information. Valente (1994) extends classic diffusion theory by elaborating still other models, focusing on contagion and threshold theories that help explain when different individuals adopt an innovation and why times of adoption are so variable within a population. Under threshold theory (Valente 1994; Granovetter 1978) different individuals have different threshold proportions of their contacts, either from the entire system or a subgroup, who must adopt an innovation before they follow suit.

About this dissertation

This dissertation includes three primary chapters following this introduction. The first describes the results of a 2010 survey of just under 1,800 Minnesota forest landowners, investigating relationships between social networks and sustainable forest management behavior. The second study tests the effect of three different personal network name generators on estimates of Minnesota landowners' forestry information networks. The third reviews trends and innovations in state-level Extension forestry programs, focusing on those programs' implementation of peer learning techniques through Master Volunteer and other peer learning program models. Together, the three studies provide insights that can inform effective educational interventions by Extension foresters and allied organizations as well as those concerned with developing

efficient and effective policies to encourage sustainable private forest management.

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Chapter 2: Personal networks and private forestry in Minnesota, USA

The impact of public investments to promote active sustainable management of the 246 million acres of United States forest land owned by families and individuals has been limited by low landowner enrollment and participation. These investments have generally used landowner education, technical assistance, and financial incentives to promote socially beneficial land conservation actions. Landowner awareness of assistance programs tends to be low. I sought a deeper understanding of the role of personal relationships on the flow of information and adoption of sustainable forest management behavior. The findings provide new insight on forest owners' personal networks, and how those networks affect land management. Among the 1767 owners of 20 or more acres of Minnesota forest land surveyed, 90% have received forestry information from at least one source including 65% from a peer and 53% from a professional forester. Personal network size ranged from 0 to 14 with a mean of 2.92. Among respondents naming at least one source, the mean network size was 3.26. In general, the larger the ownership and the more extensive the land management history, the larger the woodland information networks landowners drew upon. The percentage of respondents naming a peer or a professional as their most helpful source were statistically indistinguishable, but loggers,

Extension agents, realtors, and conservation and environmental groups were all named most helpful sources by significantly fewer respondents, suggesting the need for more effective communications by those groups. Satisfaction with forestry information was positively associated with network size and diversity, suggesting that landowners prefer information from a variety of different sources. While more research is needed to better understand how personal networks influence private forest conservation, the results suggest important implications for the design of educational interventions targeting private forest owners.

Introduction

Families and individuals own approximately 264 million acres of forest land in the United States, 35% of the total forest land area (Butler 2008). These private lands provide public benefits such as clean water, wildlife habitat, scenic beauty, sequestration and storage of atmospheric carbon, and forest products to support rural economic activity. Decades of research and practice have sought policy interventions to private land conservation action that maintains and enhances these public benefits (Alig et al. 1990; Kluender et al. 1999; Schaaf and Broussard 2006; Skok and Gregersen 1975; Kilgore and Blinn 2004; Worrell and Irland 1975). Many of these interventions are designed to promote well informed sustainable forest management activity using natural resource professionals to provide technical assistance, landowner education, or using financial incentives such as cost sharing, preferential property tax treatment, or direct incentive payments (Kilgore and Blinn 2004).

Evaluation studies suggest that technical assistance programs do effectively encourage active management (Cubbage et al. 1996; Gaddis et al. 1995; Henly et al. 1988; Moulton and Esseks 2001). The problem is that only a small percentage of private forest landowners take advantage of these programs. As an example, fewer than 4% of forest landowners nationwide have a written management plan (Butler et al. 2012) despite years of promoting development of property-specific forest management plans through the Forest Stewardship Program. Similar reviews of financial incentive programs designed to promote

sustainable forest management likewise found incentives to have limited influence due in part to a lack of landowner awareness of the programs' existence (Salmon et al. 2006; Petrzela 2012; Kilgore et al. 2007).

Continuing a trend described by Egan (1997) as a shift in focus "from timber to forests and people," recent studies have sought deeper understanding of landowners as embedded in and influenced by a complex social and ecological system rather than motivated primarily by economic self-interest (Fischer et al. 2010). These authors have investigated intrinsic drivers of conservation management including personal values and identity (Bliss and Martin 1988), gender (Redmore and Tynon 2011; Lidestav and Ekstrom 2000), and personal benefits derived from the land (Salmon et al. 2006). One notable trend is the development of typologies to categorize and target landowners with interventions that better align with their personal values, information-seeking practices, or decision models (Kluender and Walkingstick 2000; Majumdar et al. 2008; Kendra and Hull 2005; Ross-Davis and Broussard 2007; Finley et al. 2006; Greene and Blatner 1986; Butler et al. 2007; Hujala et al. 2009). This alignment offers the hope of more efficient investment of public resources to encourage sustainable private forest management.

Relationships: A network approach

Relationships can give landowners access to the right information at the right time. Given the broad variation in ownership size, landowner objectives, access to markets, and ecological characteristics of private forest ownerships,

different landowners may depend on different kinds of relationships to inform their conservation activities (Knoot and Rickenbach 2011; Schraml 2003; Hujala and Tikkanen 2008; West et al. 1988; Kittredge 2005; Baughman 2002; Kueper et al. 2013). Timing is a factor too, because many landowners may go years between times of need for land management information. Surendra et al. (2009) found that rural landowners were more likely to have received information via personal communication from professional foresters, other landowners, or peers than urban landowners. Ma et al. (2012) found a positive relationship between having received advice from a variety of sources and enrolling in a cost-share program. As a result, at least one Extension program has begun to offer open forum-style events designed primarily to foster development of peer relationships to inform private land conservation (Ma, Kittredge, et al. 2012) and others are working to develop collaborative learning networks to further conservation goals (Kueper et al. 2013; Jordan et al. 2003).

Social learning through observation of neighbors' behavior and personal interaction with trusted others can lead to increased knowledge and technical skills, and ultimately adoption of conservation behavior (Muro and Jeffrey 2008; Pahl-Wostl et al. 2007; Kueper et al. 2013; Valente and Rogers 1995). Seeking to leverage peer networks to foster adoption of sustainable land management practices, landowner education programs commonly target a relatively small group of opinion leaders (Rogers 2003). These opinion leaders may serve as bridges between formal (e.g. expert) and informal (e.g. personal) networks

(Isaac et al. 2007) and pass information on either actively or passively to their peers (Muth and Hendee 1980; Finley and Jacobson 2001; Haymond 1988; Allred et al. 2011), leading to adoption of new conservation behaviors. Networks are at the core of Everett Rogers' Diffusion of Innovations theory (Rogers 2003; Valente 1994), which is a cornerstone of landowner conservation education. New landowners tend to be more motivated by lifestyle and amenity values of their forest land and less likely to turn to or trust traditional sources of forest management advice and assistance (Rickenbach et al. 2005; Kendra and Hull 2005). They may be more receptive to conservation information delivered through peers and personal networks (West et al. 1988; Brook et al. 2003; Jacobson 2002; Gootee et al. 2010).

Peer exchange can play an important role in the diffusion of behaviors among landowners, but the relationship between information networks and land management behavior are complex and remain poorly understood. To the extent that intentional creation and support of landowner networks such as through Extension programs can offer a more resource-efficient means to promote private land conservation, this lack of understanding is an important constraint.

Social network analysis

Building relationships between a natural resource professional and landowner figures prominently in the design of technical assistance and cost-sharing programs, and is a prominent component of Cooperative Extension

forestry programs (e.g. Finley and Jacobson 2001; Reed 2001). However, personal networks, including relationships between landowners and their peers as well as natural resource professionals, have received little direct attention in private forestry research. As a consequence, relatively little is known about relationships between the size or composition of private forest owners' personal networks and land management behaviors or how to mobilize networks to better accomplish private land conservation. Greater insight into the role of networks in private forest management would be helpful to inform the design of a variety of investments in interventions to encourage sustainable private forest management.

If networks matter to the flow of information and decision support for private conservation, then social network analysis (SNA) may provide useful insights. SNA is both a set of theories and analytical tools focusing on relationships among social entities and on the patterns and implications of these relationships (Wasserman and Faust 1994). Social networks include both nodes (e.g. individuals or organizations) and relationships, or connections, among them. Personal, or egocentric, networks are defined as a central actor and the others (alters) sharing a defined type of relationship with that individual. For example, a landowner's woodland information network might include a public agency forester, a sibling who also owns forest land, the neighboring landowner, and members of a social group.

Personal networks influence behavior in a wide variety of domains from financial investment decisions (Granovetter 1985) to the workplace (Burt 1980), including even private, personal behaviors (Kohler et al. 2001). This influence can occur via information flow through weak ties, which are infrequent acquaintances that provide technical or other information such as friends of friends (Montgomery and Casterline 1996; Friedkin 1982; Granovetter 1973). However, behavior is also influenced by a desire to conform to group norms, perhaps with pressure exerted by strong ties like close friends or family (Marsden and Friedkin 1993; Kohler et al. 2001). Networks can also influence the perception that certain behaviors have reached popularity thresholds that make their adoption less of a risk (Valente 1994).

Information about forest management options is often difficult for landowners to obtain. Most lack the specialized knowledge, skills, and equipment to plan and implement their own forest management activities. Landowners vary in their awareness of existing sources, preferred information formats, perceived need for assistance at any given time, and perceived alignment between their value orientation and those of local service providers (Davis and Fly 2010; Gootee et al. 2010). One might thus expect the size and composition of forestry information networks to be associated with landowners' ability to advance their conservation goals. This association might be based on access to information; perceived norms, identity, and shared values; validation of ideas through observation or weak ties; or simple awareness of existing

sources of assistance at times of need (e.g. catastrophic disturbance) or perceived opportunity (e.g. receipt of an offer to buy timber) (Kittredge 2004).

Recognition of the value of social networks in private land conservation is growing. Knoot and Rickenbach (2011) found a positive relationship between personal network size and application of best management practices during timber harvest operations. Rickenbach (2009) described personal networks within a small Wisconsin forest owner co-operative, finding that information shared by co-operative staff was often passed by members beyond the co-operative membership network. Baumgart-Getz et al. (2012) found that participation in agency and local networks predicts adoption of agricultural best management practices, suggesting an important public value of relationships between professional service providers and landowners. Korhonen et al. (2012) identified a variety of types of information networks used by Finnish forest landowners during recent timber sales, including differences between “independent timber traders” and “relationship builders.” Allred et al. (2011) reported that landowners who met and received information from a trained New York Master Forest Owner were more likely to engage in a variety of behaviors consistent with sustainable private forest management. Kueper et al. (2013) found that the flow of information through personal relationships and access to both peer and expert perspectives were of particular value to participants in peer learning programs, motivating continued participation. Bodin et al. (2006) drew parallels between social network measures and indicators of a

community's capacity for adaptive management. For instance, higher network density (the number of existing relationships as a proportion of the total possible number of relationships) enables the flow of information more quickly across the network. But a more modular or clustered pattern of relationships, in which subgroups persist within the larger network, preserves distinct knowledge systems within those subgroups at the expense of information flow across the whole network (Bodin et al 2006). Relationships that bridge, or span, distinct subgroups are important in brokering relationships and moving information through the network.

Leveraging social networks in sustainable forestry

To improve the efficiency and effectiveness of landowner assistance and education programs, more information is needed about how landowners are accessing information, the role of peer learning and networks, and how those communication channels can be leveraged. One way to obtain this information is through analysis of personal, or egocentric, networks. Personal networks focus on individual subjects, defining networks as all of the alters that are connected to ego by a defined type of tie (Burt 1980). For example, a landowner's personal network for forestry information might include his logger, the forester hired to inventory the land, two neighbors, and an Extension forester. The landowner might have entirely separate personal networks for financial, spiritual, or other matters. Personal network studies focus on the individual respondent, in this case the landowner, as the unit of analysis.

To better understand how networks influence landowner decisions, I investigated three primary research questions: what are the attributes of Minnesota forest landowners' forestry information networks; how do those attributes vary in relation to ownership size, tenure, land management activities, residence distance from forest land, and other landowner characteristics; and how does satisfaction with the quality of information obtained vary with network attributes?

Methods

A stratified random sample of 1,767 owners of 20 or more acres in property tax classifications that included forested land was drawn from tax records in the heavily forested region of northern Minnesota (Figure 1). The 20-acre minimum ownership size was chosen to match a requirement of many available landowner assistance programs in the region. Property tax data were organized by parcel. I manually consolidated parcels into ownerships based on mailing address and family name. The sample was stratified by total forest ownership size to provide a sufficient number of responses across size classes. Industrial and corporate forest landowners were excluded from the sample.

A 19-item questionnaire was administered by mail (Appendices 1 and 2) using a 5-wave process based on Dillman's Tailored Design Method (Dillman et al. 2009). The cover letter indicated that the questionnaire was to be completed by the individual most involved in decisions about forest land care and management. After testing a pilot version of the instrument with a

representative sample of 200 landowners, a revised questionnaire was mailed to 1,767 landowners. A total of 1,002 usable responses were received. After removing undeliverable and ineligible addresses, the adjusted sample size was 1677, for a usable response rate of 59.7%, which is comparable to that achieved in recent studies of this population (e.g. Kilgore, Snyder, Taff, et al. 2008; Kilgore, Snyder, Schertz, et al. 2008; Baughman and Updegraff 2002; Becker et al. in press). Nonresponse bias tests revealed no significant difference between the first 5% and last 5% of respondents in ownership size, ownership tenure, visit frequency, written management plan status, or personal network size.

The questionnaire was designed to elicit basic demographics, ownership size and tenure, perspectives on a variety of land management issues, general sources of forestry information, actual named individuals and groups from whom forestry information had been obtained (e.g. forestry information personal networks), land management history, and satisfaction with forestry information network. To reduce sensitivity associated with revealing personal identities, pseudonyms or partial names were encouraged where identifying personal network relationships.

Two different kinds of forestry information networks were analyzed. Generic networks include source categories (e.g. family members, loggers, or others) from which the respondent indicated having received information without providing any additional information about the identity or number of sources from each category. The type of tie (relational content; Burt 1983) of

interest in the personal network name generator was a communication relation (Knoke and Yang 2008): the respondent's receipt of forestry information from an alter. This tie was defined on the questionnaire as "from whom you've received woodland information" including written or verbal information. Using a combined free recall name generator and interpreter (Marsden 1990), respondents wrote alter names, then checked one or more boxes to indicate categories into which that alter fit, such as family member, public forester, or logger. The alter category checkboxes also functioned as subtle prompts which may have helped with recall (Brewer 2000) without introducing excessive bias favoring one or more categories.

In some cases, respondents included alters that did not fit into any of the given categories. Most commonly, these referred to media sources such as "newspapers" or "internet." If no other information was provided, no category was assigned, but the source was counted among alters. Where specific media sources were identifiable as originating from a member of a given category, the appropriate category was assigned during analysis even if not indicated by the respondent. For example, the uncategorized response "Minnesota Deer Hunters Association magazine" was categorized as "conservation or environmental organization" and "DNR website" was categorized as "public forester." These categorizations were appropriate given the established standard for having received woodland information from the source.

Results

Respondents ranged from 17 to 96 years of age with a mean of 60. The median tenure of Minnesota forest landowners surveyed was 24 years. Only 4% of respondents had acquired their first parcel less than 5 years prior to completing the questionnaire. Over half of respondents lived within 25 miles of their nearest wooded parcel, including 39% living on or beside it and 15% less than 25 miles away. About 38% lived more than 75 miles away and are considered absentee owners in our analysis. Respondents visited their forest land often, with 64% visiting once a month or more, including 40% visiting once a week or more. Fewer than 7% visit their forest land less than once per year. Half (49.6%) of respondents were college graduates, which is similar to the percentages reported by Salmon et al. (2006) but about double the percentage reported in the National Woodland Owner Survey (NWOS; Butler et al. 2012) for owners of 20 or more acres in Minnesota. Some of the difference with the NWOS data may result from graduates of 2-year colleges including themselves in this category, which was not differentiated in our survey.

Respondents rated 12 reasons for owning forest land on a four-point scale from not at all important (1) to extremely important (4). Consistent with other studies (Erickson et al. 2002; Baughman et al. 1998; Bliss and Martin 1989; Kendra and Hull 2005), the five reasons with the highest mean values were all amenity-related: beauty, hunting or fishing, privacy, biodiversity protection, and family legacy. The five reasons with the lowest mean values were more financial

and production-oriented: land investment, part of farm, and production of timber or nontimber products, firewood, or other forest products (Table 1). However, respondents seemed to view timber harvesting as consistent with a wide range of values. The percentage of landowners for whom beauty or protection of biodiversity (or both) was very or extremely important who had also harvested timber was only slightly lower than the percent of landowners for whom timber or firewood were very or extremely important (85% and 97%, respectively).

Management activities

Three in four respondents (77%) did not have a written management plan for their property prepared by a natural resource professional. Of the 23% who did have a written plan, about two-thirds reported that the plan covered all of their forest land. The NWOS estimates 19% of owners of 20 or more forested acres statewide had written management plans (Butler et al. 2012).

Respondents tended to be active land managers, with 89% having implemented one or more management activities at some time on their Minnesota forest land (Table 2), and 75% having implemented four or more. In total, 83% had harvested timber in the past. More had harvested timber for personal use (77%) than for sale (55%). A significantly larger percentage of respondents who had a written management plan had also harvested timber: 93% compared with 82% of respondents who did not have a management plan ($p < 0.001$). Resident owners were, on average, more active land managers than

absentee owners (Table 2). The number of management activities completed was positively correlated (Spearman's rho) with wooded acres owned ($r=0.311$), years since first Minnesota forest land acquired ($r=0.240$), and frequency of visits to the property ($r=0.340$). It was negatively correlated with residence distance from the nearest Minnesota forest land ($r=-0.248$; $p\leq 0.001$ for all). In other words, long-time owners of larger properties who either lived on the land or visited often tended to be more active land managers.

Generic sources of information

Respondents described their sources of forestry information first based upon generic categories such as whether or not information had been obtained from family members or other landowners. Among generic information sources, other landowners, family, and friends or coworkers were the three most common sources of information (Figure 2), followed closely by logging contractors and public agency foresters. These data are similar to those reported for a similar sample of Minnesota forest owners by Baughman et al. (1998).

Family members, other landowners, and friends or coworkers were consolidated into a grouped category called "peers" for further comparison; public and private sector foresters into "foresters"; and Extension, realtors, or conservation or environmental groups into a category called "ERC". The logger group remained unchanged. Among these grouped categories, peers were most commonly reported as a source of forestry information followed by foresters, loggers, and lastly ERC (Figure 2).

The percentage of respondents who received forest-related information from at least one generic source (77%) was 20% higher than percentages reported to have received “forestry information” by Salmon et al. (2006) and “land management advice” by Ferranto et al. (2012), almost double the 40% reported by Measells et al. (2005) and triple the 26% of owners of 20 or more acres of Minnesota forest land reported to have received “advice” in the NWOS (Butler et al. 2012). While Baughman et al. (1998) do not report a corresponding figure, their percentages for each information source suggest a total percentage of information acquisition at least as high as that reported here. Differences among studies may reflect language (“advice” versus “information”), landowner demographics, the time frame for information acquisition, or a combination of factors.

Personal networks

Respondents were also asked to name actual people or sources from whom they had received forest-related information. These sources constitute respondents’ personal networks. Ninety percent of respondents reported receiving information from at least one named alter, with an average network size of just under three (mean of 2.92 SE=0.082, $n=774$; Figure 3). Among the 694 respondents who named at least one alter, the mean network size was 3.26 (SE=0.082). Two hundred twenty eight (23%) declined to respond and 80 (8%) indicated that they had not received information from any named source.

The 2261 alters named were assigned by respondents, to the best of their knowledge, to one or more of the same nine categories used for the generic networks: family member, friend or coworker, other landowner, public forester, private forester, logger, Extension agent, realtor, or conservation or environmental group. No attempt was made to verify alter identity or to measure instances in which multiple respondents named the same specific alter.

Public foresters were the category named by the largest percentage of respondents, at 45% (Figure 4), followed by other landowners (43%), family members (41%), loggers (36%), and friends or coworkers (34%). Almost four times as many respondents report receiving information from a professional forester as have indicated so in the past five years as reported in the NWOS (Butler et al. 2012). The difference likely reflects the broader word choice of “information” vs. “advice” as well as the NWOS’ 5-year time constraint.

As with the generic results, alter category data were grouped for further analysis, in particular to explore the relative popularity of peers (i.e. family members, friends and coworkers, and other landowners) and various types of professional sources. Significantly more respondents had received forest-related information from peers (65%) than from foresters (53%), loggers (36%), or Extension, a realtor, or a conservation or environmental group (22%; Figure 4). Of respondents naming at least one peer as a source, 60% named more than one peer, with an average of 2.24 peers named. By contrast, of those naming at least one forester, only 42% named more than one, with an average of 1.73

named. Seventeen percent of respondents who named at least one logger named more than one, with an average of 1.21 (Table 3). Not only do more landowners receive information from peers than professionals, but they receive information from more of them. These differences may reflect practical matters such as the higher accessibility of peers than professionals, or they may reflect different levels of trust and styles of communication (Gootee et al. 2010). The data are consistent with two different decision models. On the one hand, landowners may consult a larger number of informal relations such as friends, coworkers, and family members while planning management actions, then meet with a professional to execute the plan. Alternatively, they may obtain an operational plan from a professional, then vet that plan with peers before acting. Additional research is needed to resolve this question and understand the implications for the most efficient roles of Extension agents and natural resource professionals in private forest management planning and implementation.

The total number of alters is only one measure of network size. Personal networks can also be described based on their heterogeneity, or diversity, measured as the number of different kinds of alters, in this case alter categories, represented in the network. Diversity is a meaningful measure because prior research suggests that landowners value information from a variety of perspectives because they can then interpret and apply that information to their individual situation (Kueper et al. 2013). Network diversity at the category level varied from 0 to 8 with a mean of 2.48 ($n=774$, $SE=0.062$). At the grouped

category level, diversity varied from 0 to 4 with a mean of 1.76 ($n= 774$, $SE=0.039$). The relatively small difference between network size and diversity suggests that many landowners receive information from a variety of different kinds of sources, not simply from a few of the same kinds of people.

Network variation with management activities

I hypothesized positive correlations between the number of management activities completed and network size. Reasoning that most landowners lack the specialized skills and equipment to conduct most forest management activities, one might expect that landowners who have completed more activities would have drawn on more sources of information and assistance. Indeed, there was a positive correlation between the number of management activities completed (out of 8) and the total network size ($r=0.425$, $p<0.001$) as well as alter category diversity ($r=0.419$, $p<0.001$ Figure 5).

To the extent that management activity depends on assistance from the network, I hypothesized that landowners more satisfied with their information networks would be more active land managers. This relationship was indeed positive ($r=0.240$, $p<0.001$, $n=512$). Further research would be needed to identify which factor drives this relationship: Are landowners who are dissatisfied with their forestry information networks averse to management for that reason or are landowners who manage a lot simply more satisfied with their information sources because they've had more opportunities to find good sources?

Among landowners who have harvested timber for sale, 69% named a peer, 59% named a forester, and 50% named a logger in their networks. These figures are significantly higher ($p < 0.01$) than corresponding figures for non-harvesters: 61%, 46%, and 20%, respectively, suggesting an active information-seeking process when engaging in at least one kind of management activity. As expected, respondents with a written management plan were much more likely to name a professional forester, at 93% compared with only 39% of non-plan holders (Chi-square; $p < 0.001$). By contrast, the percentage naming a peer was nearly identical: 64% of plan holders vs. 65% of non-plan holders ($p > 0.05$).

Network variation with ownership attributes

Network size and diversity at both the category and grouped category levels were higher for larger acreage landowners (Figure 6), landowners who visit their properties more often, and management plan holders ($p < 0.001$ in all cases). The positive relationships between network size and diversity and ownership size, visit frequency, and management plan status may reflect increased engagement with and commitment to active land management. Larger acreage owners receive greater financial returns from land management and tend to be more active managers (Row 1978; Straka et al. 1984), both of which may create incentives for the more active information-seeking behavior that is reflected in their networks. There was no significant relationship between network size or diversity and ownership tenure or landowner age.

Resident and absentee owners had virtually identical personal networks. The only significant difference in network composition was the percent of owners reporting at least one logger in their networks (Table 4). The similarity in personal networks between resident and absentee owners is in contrast with big differences in management activity. Resident landowners were significantly more likely to have implemented five of eight common land management activities including harvesting timber, controlling invasive species, planting trees, and improving wildlife habitat (Table 2). Resident landowners had implemented an average of 3.85 of eight activities, absentee landowners only 2.74 ($p < 0.001$; Table 2).

Most helpful alters

Regardless of total network size, the structure of the survey instrument allowed for up to four “most helpful” alters to be named. Of the 694 respondents listing at least one alter, 77% designated at least one as most helpful. On average, respondents considered 47% of their alters worthy of being indicated as most helpful, but were selective in assigning helpfulness: Even in networks of four or fewer alters, only 48% of alters were indicated as most helpful. This may reflect that many landowners are unimpressed with their sources of forestry information, or they may simply have decided not to respond. The relatively high overall network satisfaction ratings would suggest the latter, although our results can not confirm that.

Public foresters were named most helpful by the largest percentage of respondents, followed by other landowners and family members (Figure 4). At the grouped category level, the percentage of respondents naming a peer or a professional as their single most helpful source were statistically indistinguishable at just under 30% (Figure 4). Loggers and ERC were named most helpful by significantly fewer respondents.

Of all respondents naming at least one public forester in their networks, 48% named a public forester their single most helpful source, followed by other landowners, private foresters, family members, and friends or coworkers (Figure 4). The pattern was similar for the percentage of respondents naming any of their four most helpful alters, when controlling for the category's presence in the network. This finding might support further investments in policies designed to get landowners in touch with foresters, if those contacts generate public value as well as private helpfulness, or if they lead to increased forest management investment. Alters identified as most helpful were no more likely to span multiple categories than other alters.

Network satisfaction

Overall network satisfaction was measured on a four-point scale for each of five components: Ease of accessing information, reliability of information obtained, relevance of information obtained, trust, and timeliness. Because most respondents gave similar ratings for each component, I calculated a single measure of overall network satisfaction as the average of all five components for

each respondent. On average, respondents were satisfied with their networks, the mean value of which was 2.65 on a scale from one (not at all satisfied) to four (extremely satisfied) (SE=0.032, $n=784$).

Network satisfaction was correlated with the number of management activities completed ($r=0.240$, $p<0.01$). Landowners who had completed four or fewer management activities were less satisfied with their information networks (mean 2.57, SE=0.46) than landowners who had completed 5 or more (mean 2.83, SE=0.063; $p<0.001$). It may be that landowners who are more satisfied with their information networks are more likely to engage in new management activities, confident that their networks may lead them to more positive outcomes. Alternatively, active managers may simply have had more opportunity to work with different alters and identify those in whom they have the greatest confidence. The nature of this association requires additional research.

Measures of network diversity reflect the number of categories (e.g. family members, friends or coworkers, and neighbors) and grouped categories (e.g. peers) represented within each respondent's personal network. I hypothesized that network size and diversity, both measures of the number of different perspectives available within the network, would be positively associated with network satisfaction. The relationships between network satisfaction and size and diversity are illustrated in Figure 3. In all cases, network satisfaction increases with increasing network size (or diversity),

particularly at the low end. In other words, the more different perspectives or pools of knowledge to which they have access, the more satisfied landowners are with their information networks. In all three cases, the relationship is strongest for relatively small networks; adding a new alter category to the network was associated with a relatively large increase in satisfaction for small networks, but declining with the number of pools of knowledge already represented in the network. This may have important implications for the design of landowner education and assistance programs, suggesting that bringing people together to exchange ideas from a variety of perspectives may create value for landowners. It also affirms one of the major findings of Kueper et al. (2013) about the value of multiple perspectives within the network.

Discussion

This is among the first studies to provide a detailed picture of the information networks of such a large sample of forest landowners. Results suggest that 90% of Minnesota forest landowners have received forestry information from at least one source, 65% have received information from an average of 2.24 peers, and 53% have received information from at least one professional forester. The larger the ownership and the more extensive the land management history, the larger the information networks that Minnesota forest landowners can draw on. This is important because most landowners lack the specialized knowledge, equipment, and skills to design and implement their own

management activities, leaving them dependent on others for information and assistance to reach their land management goals.

A considerably higher percentage of landowners in this study had received information from a professional forester than reported in the NWOS. This difference is likely attributable at least in part to question wording (e.g. “advice” in the NWOS and “information” our current study). Because “advice” has a more formal connotation, our data may more accurately reflect Minnesota forest landowners’ information acquisition from both professionals and peers, while the NWOS may underestimate it.

Peers and public foresters are the most helpful sources of information for Minnesota forest landowners. Public foresters are named as often as any other generic source of information and more often than any other named source. They’re also named as a most important source as often or more often than peers. Public foresters provide information to at least twice as many Minnesota forest landowners as private sector foresters. As the availability of public sector foresters declines with public agency budgets (Schroeder et al. 2011), two important issues arise. First, cuts to public sector private forest management capacity will reduce landowner access to professional advice. While 45% of Minnesota forest landowners have received information from a public sector forester, only 23% have obtained a written management plan. The gap between recipients of public sector forestry advice and written management plans suggests that at least 22% of Minnesota forest landowners had obtained less

formal advice from a public sector forester. Anecdotal evidence suggests that advice was frequently in the form of either telephone conversations or property visits to discuss possible forest management practice implementation. The loss of this private forest management capacity means that Minnesota landowners will need to find new sources of forestry information and advice. This study provides evidence for the important role that public sector foresters play in assisting landowners. Second, new capacity will need to emerge to fill the gap in public sector forestry assistance. This may create opportunities not only for private sector foresters to fill the service gap, but also for Extension and other landowner educational organizations to engage landowners early in their planning process. Extension programs that bring together a variety of perspectives to discuss private forest conservation issues may help landowners to learn from the practical experiences of their peers and also understand the potential value of working with a local professional.

Peers, already the group consulted by more landowners than any other, and considered a most helpful source at a level comparable to foresters, may increase in prominence as a source of information as public assistance declines. There may be a timely opportunity to leverage peer networks by investing in the design of educational interventions that foster both peer interaction around forestry content and learning and more efficient use of limited professional forester capacity. Minnesota forest landowners also tend to consult a larger number of peers than professionals, with an average of 2.24 peers named

(contingent on naming at least one) compared with only 1.73 professionals and 1.21 loggers.

The self-administered survey data collection technique may have led to underestimation of total network size due to a lack of prompting to combat low recall, a tradeoff necessary to obtain a large sample (Brewer 2000; McCallister and Fischer 1978; Bernard et al. 1984). More specific prompts, such as the names of organizations or individuals or references to specific types of information such as tree planting or timber harvest recommendations, may have led to larger estimates of network size, but the added complexity of such an instrument may have reduced response. In any case, network size is only one part of the picture, and perhaps a less important part than network diversity. Hammer (1984) noted that responses to name generators include only a sample of members of the corresponding real world networks. In a discussion of error in network data collection, Wasserman and Faust (1994, p. 57) suggest interpreting named networks as reflections of “relatively stable patterns of interaction” rather than a comprehensive enumeration of all individual interactions. Campbell and Lee (1991) likewise found that while different name generators did lead to some differences in network data, variation in network composition among name generators was relatively low. Thus estimates of network diversity and the percentage of landowners receiving information from certain alter categories may be more robust than estimates of network size.

In a review of studies of memory recall in social network data, Brewer (2000) concluded that respondents are more likely to forget weak ties than strong. Marin (2004) found that respondents were more likely to name alters with whom they share strong ties and who are more embedded within their networks (e.g. who know a larger proportion of the respondent's total network). Forest owners might thus be more likely to remember, and name, the forester who wrote a customized, property-specific management plan than another landowner with whom they discussed land management options during a field day or over coffee, even if both introduced ideas that led to future action. Hence this method may have led to disproportionate nomination of strong ties such as close personal relations, others from whom the respondent spent a large amount of time or money obtaining information, or particularly helpful sources.

In contrast with other studies with similar populations (Petrzelka 2012; Salmon et al. 2006; Surendra et al. 2009), few differences were evident between personal networks of resident and absentee landowners. Absentee landowners in this study did not appear to be less well connected to local service provider networks than residents. Most notably, absentee Minnesota forest landowners were no less likely to have received information from a public agency forester, to have obtained a written management plan, or to have enrolled in a property tax program than resident landowners. Nor were their networks smaller or compositionally different, with the exception that resident landowners were more likely to include a logger than absentee owners. Higher levels of land

management activity of resident owners seems to be related primarily to factors other than sources of information. Using a Theory of Planned Behavior framework, Bright and Burtz (2006) found that resident owners saw more positive outcomes and fewer barriers to implementing fire protection practices on their rural properties than did absentee owners, noting in particular that full-time residents were less averse to cutting trees than seasonal residents.

Most Minnesota forest landowners have obtained forest-related information from a relatively small number of sources: the median network size was only two. Peers were named as information sources by more respondents than were professional foresters, loggers, or ERC members. Both peers and professionals are common sources of information, and there's no statistical difference between the two groups' likelihood of being considered a "most helpful" source.

Notably, landowners with larger forestry information networks were more satisfied than those with smaller networks. This was true whether network size was measured directly or expressed as network diversity. Landowners appear to prefer receiving information not only from a single authoritative source, but from a variety of other sources as well. They may not be looking for an answer from an expert, but rather a range of perspectives to inform a personal decision about the best course of management for the land. This corroborates the finding by Kueper et al. (2013) that landowners particularly value information from diverse perspectives. It also supports the

thesis of Ma et al. (2012) challenging the expert model of Extension instruction in favor of an approach designed to foster open dialogue both among landowners and between landowners, academics, and land conservation professionals.

These findings highlight a timely issue in the evolution of state-level policies to promote sustainable private forest management. Although only a small percentage of landowners had a written management plan, most who had harvested timber for sale had received information from a professional forester. Over 60% of landowners who had received information from any professional source had received it only from a public sector forester, suggesting that landowners relatively infrequently engage the services of private sector foresters. If state forestry agency budget reductions continue, this major source of professional forestry information will decline with them, leaving more landowners in less contact with a professional.

More efficient leveraging of both peer and professional knowledge through diverse networks, perhaps facilitated by Extension and other outreach organizations, may be necessary to ensure the continued flow of decision support information to private forest owners. Extension education models designed to promote peer-to-peer learning (Allred et al. 2011; Ma, Kittredge, et al. 2012; Kueper et al. 2013) may increase in prominence as a lower-cost yet effective alternative to traditional one-on-one landowner education and assistance. The positive relationships between network satisfaction and both

network range and management history in this study suggests that interventions designed to help landowners exchange information with people with different kinds of conservation knowledge may lead to more, as well as more informed, land management. This idea is consistent with recent studies suggesting that lack of awareness is an important barrier to enrollment in conservation programs (Kilgore et al. 2007). Landowners with access to more different types of alters were more satisfied with their networks. Further research is needed to better understand this relationship. Deeper insight into relationships between landowner audience segments, decision models (Hujala et al. 2009), information networks, and behavior would also aid in the design of the next generation of landowner education and assistance programs.

This study offers the new insight into Minnesota forest owners' information networks. Relationships between information networks and management activity raise new questions about the design of landowner education interventions, suggesting that interventions designed primarily to bring landowners, loggers, and natural resource professionals together may have beneficial outcomes for private forest owners.

Tables

Table 1. Reasons for owning forest land

Table 2. Resident and absentee landowner management activities

Table 3. Multiple nominations from alter categories

Table 4. Resident and absentee landowner category nominations

Table 1: Reasons for owning forest land. Mean importance ratings are based on a four-point scale from 1 = not at all important to 4 = extremely important.

Reason	Mean importance rating	Very or extremely important (%)
To enjoy beauty or scenery	3.30	83.0
Hunting or fishing	3.19	77.7
Privacy	3.15	78.3
To protect nature or biological diversity	2.96	68.9
To pass on to children or other heirs	2.93	66.5
Recreation other than hunting or fishing	2.88	65.8
Part of home or vacation home	2.80	63.1
For land investment	2.47	46.6
To produce firewood or biofuel	1.95	24.1
Part of farm	1.85	27.4
To produce sawlogs, pulpwood, or other timber products	1.82	21.5
To cultivate or collect nontimber forest products	1.57	10.8

Table 2. Percentage of resident (living on or beside their forest land) and absentee (living >75 miles away) landowners completing common forest management activities

	All respondents	Resident	Absentee	Sig
Controlling invasive species	25.0%	34.3%	15.9%	0.000
Planting trees	74.3%	85.1%	63.5%	0.000
Obtaining a written management plan	29.9%	30.5%	29.2%	0.710
Enrolling in a property tax program	17.3%	16.8%	17.7%	0.770
Harvesting timber for sale	55.2%	62.7%	47.9%	0.000
Harvesting timber for personal use	76.7%	89.6%	63.3%	0.000
Improving wildlife habitat	76.0%	81.9%	70.2%	0.000
Obtaining a conservation easement	4.0%	5.2%	2.7%	0.112
Mean number of activities completed	3.29	3.85	2.74	0.000

Table 3: Multiple nominations from the same alter category and grouped category ($n=774$). Grouped categories are defined in the text.

Source category	Mean # sources named from category, if category named [◊]	% naming more than one source from category, if category named [◊]
<i>Individual categories:</i>		
Family member	1.48 ± 0.052 ^a	31.2 ^a
Other landowner	1.92 ± 0.073 ^b	48.6 ^b
Friend or coworker	1.77 ± 0.074 ^c	42.1 ^c
Public forester	1.43 ± 0.046 ^{ad}	28.5 ^a
Private forester	1.30 ± 0.056 ^e	21.7 ^d
Logger	1.21 ± 0.031 ^f	16.5 ^e
Extension	1.22 ± 0.068 ^{efg}	16.9 ^{def}
Realtor	1.13 ± 0.046 ^{fgh}	13.0 ^{def}
Cons. or env. group	1.45 ± 0.082 ^{ade}	29.8 ^{ad}
<i>Grouped categories:</i>		
Any peer	2.24 ± 0.069 ^a	59.5 ^a
Any forester	1.73 ± 0.061 ^b	41.8 ^b
Logger	1.21 ± 0.031 ^c	16.5 ^c
Any E,R,C	1.51 ± 0.074 ^d	32.0 ^d

◊ Different superscripts within a column indicate statistically significant differences at $\alpha \leq 0.05$.

Table 4. Percent of resident (living on or beside their forest land) and absentee (living >75 miles away) landowners naming at least one member of a category in their personal network.

	Total	Resident	Absentee	Sig
<i>Individual categories</i>				
Family	41.2	40.7	41.7	0.808
Friend or coworker	34.1	34.7	33.4	0.750
Other landowner	43.4	44.1	42.7	0.732
Public forester	43.4	44.4	42.4	0.612
Private forester	19.2	20.5	17.9	0.410
Logger	35.7	41.8	29.8	0.002
Extension	8.5	9.4	8.8	0.428
Realtor	7.4	7.4	7.3	0.954
Cons. or env. group	12.5	12.1	12.9	0.770
<i>Grouped categories</i>				
Any peer	64.4	63.0	65.9	0.455
Any forester	51.1	51.5	50.7	0.835
Any ERC	23.4	23.9	22.8	0.760

Figures

Figure 1. Study area

Figure 2. Generic networks

Figure 3. Network satisfaction and three measures of network size

Figure 4. Personal network composition and most helpful status

Figure 5. Management activities and three measures of network size

Figure 6. Ownership size and three measures of network size

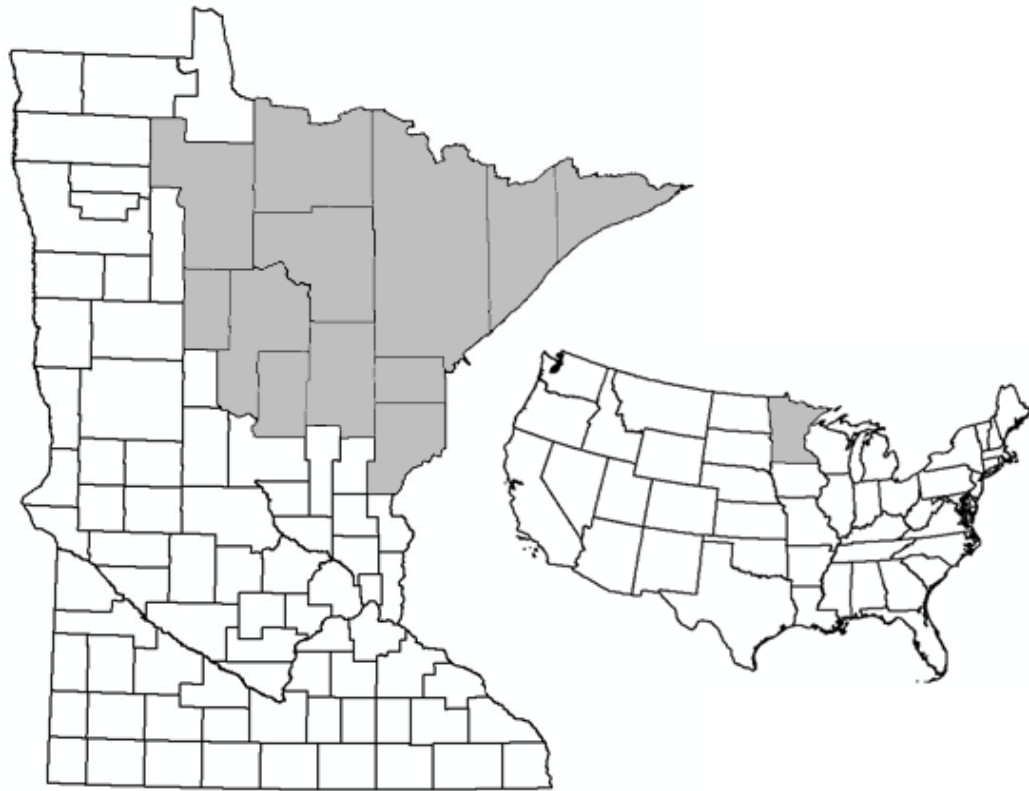
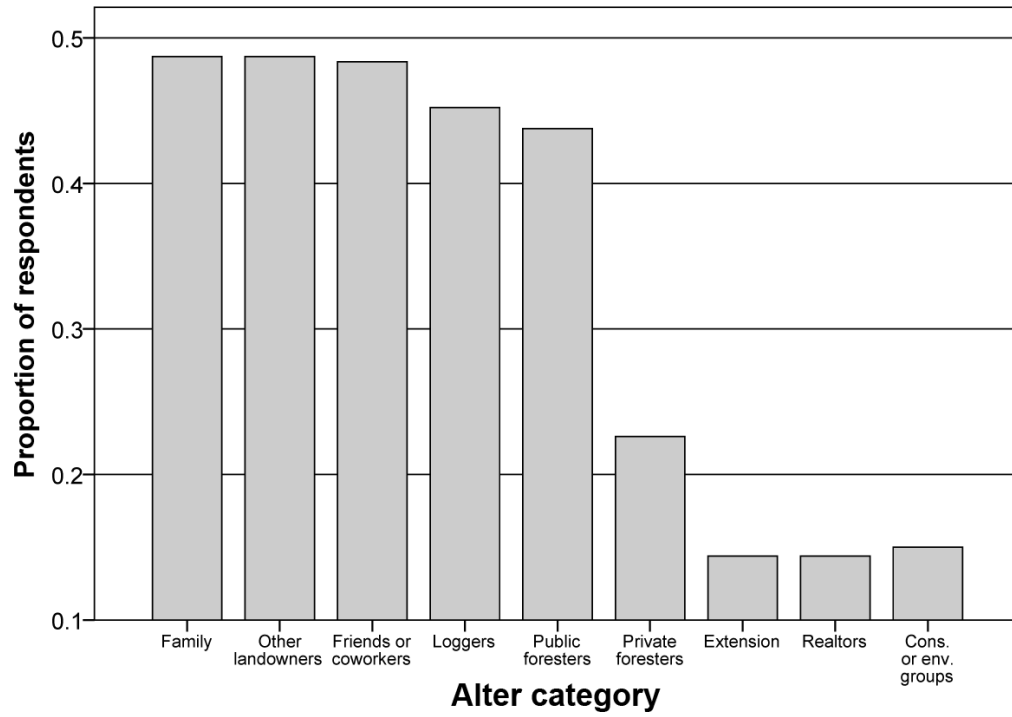
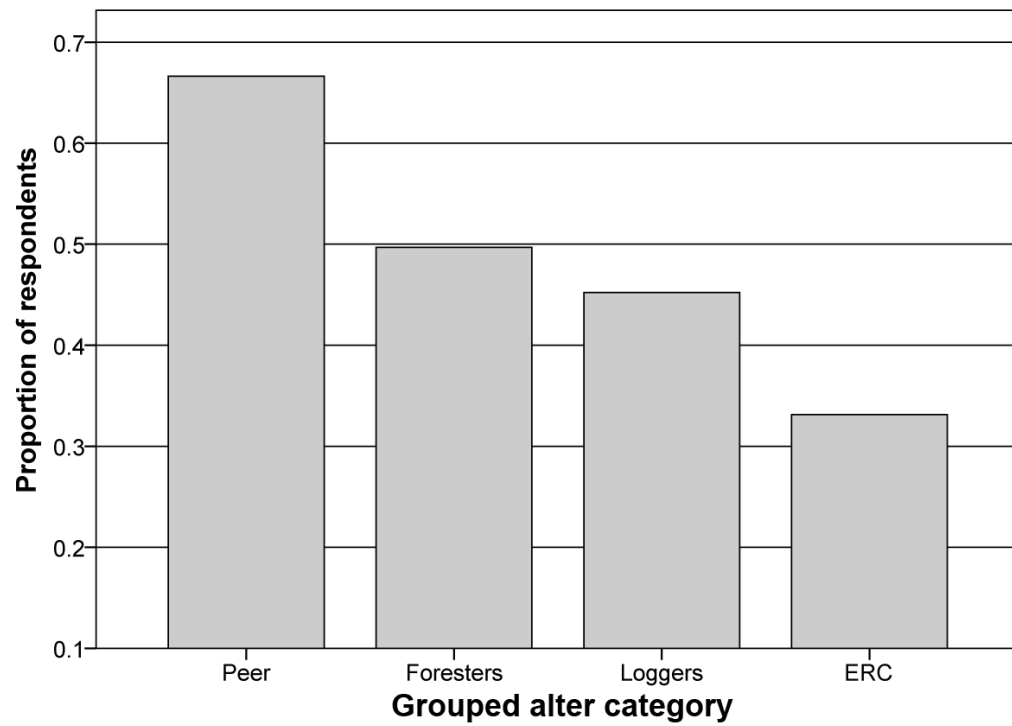


Figure 1: Map of the study area in northern Minnesota, USA. The 12-county study area is indicated by shading in the inset map.

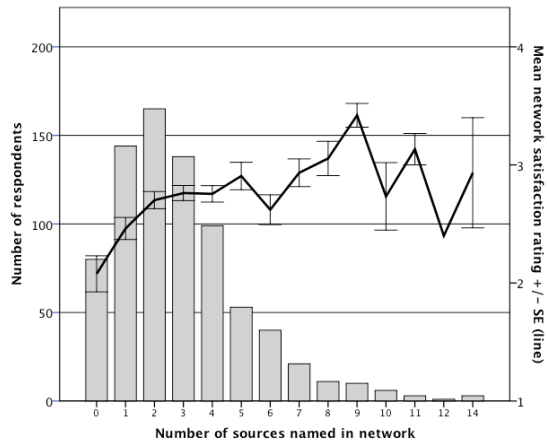


(a)

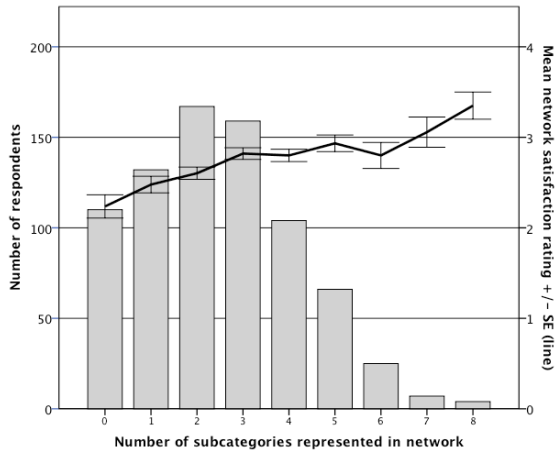


(b)

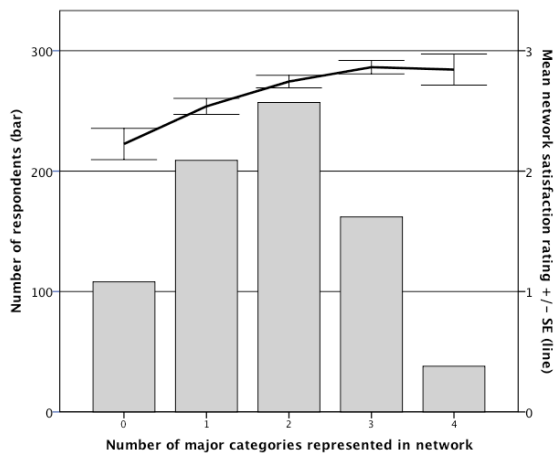
Figure 2. Proportion of respondents naming each (a) alter category and (b) grouped alter category as generic sources of information.



(a)

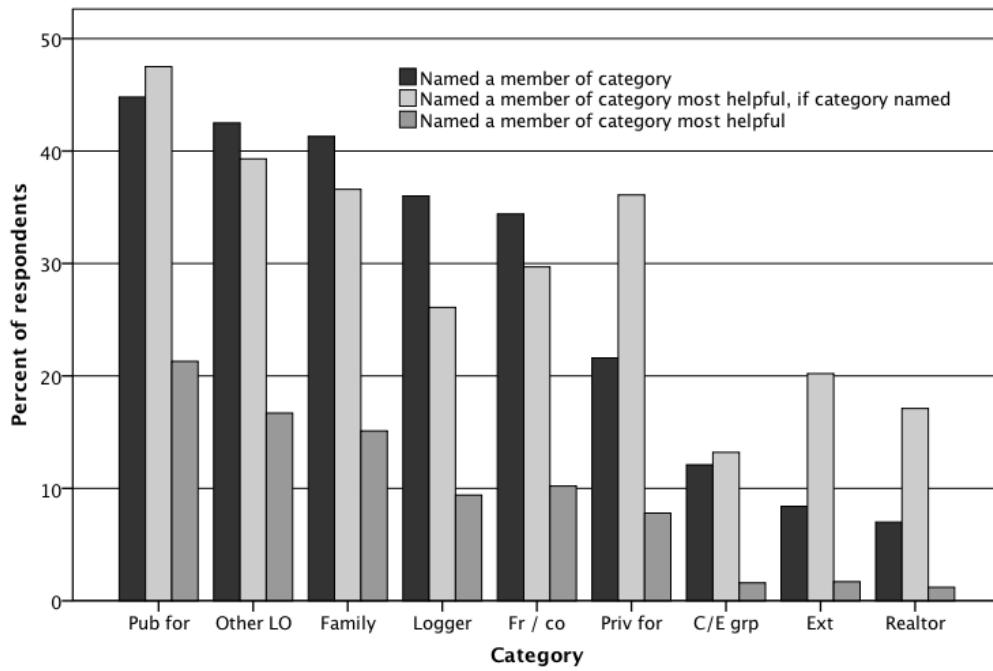


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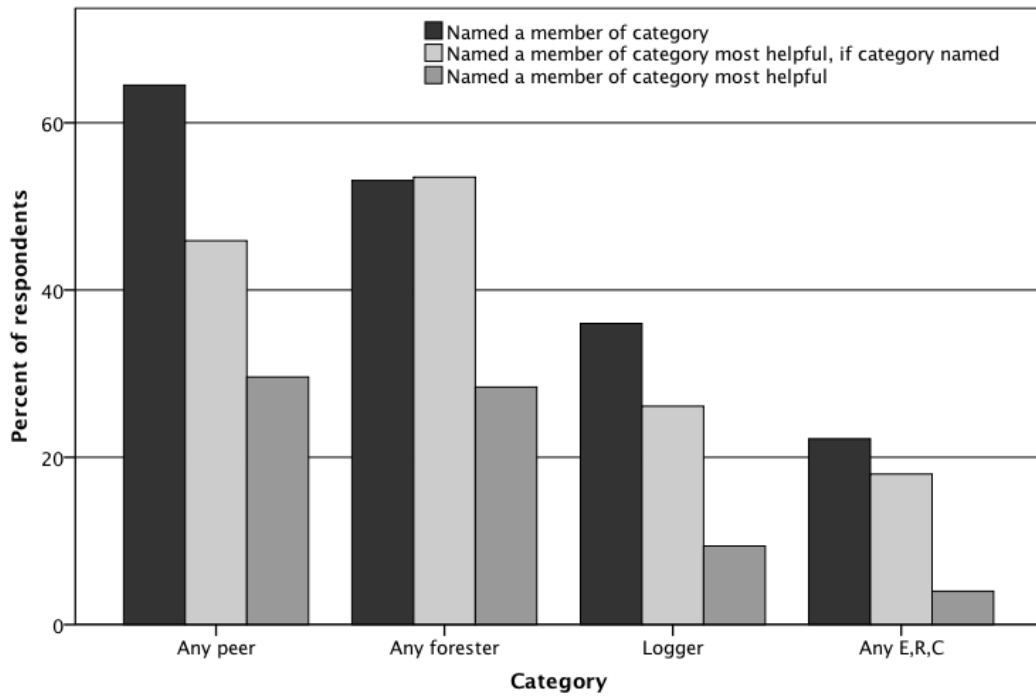


(c)

Figure 3. Relationships between network satisfaction and 3 measures of network size and range.



(a)



(b)

Figure 4. Percent of respondents that named each (a) alter category and (b) grouped alter category and the percent that named each most helpful.

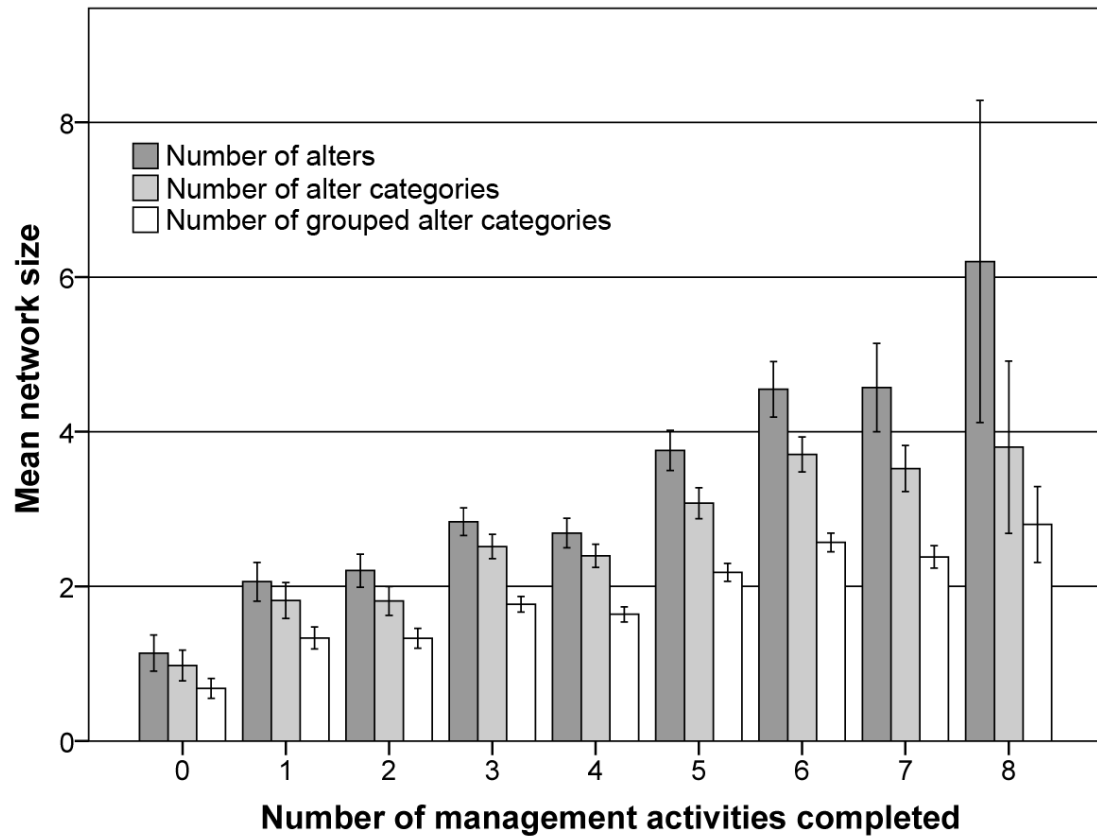


Figure 5: Management history and three measures of forestry information network size and diversity. Error bars indicate ± 1 SE.

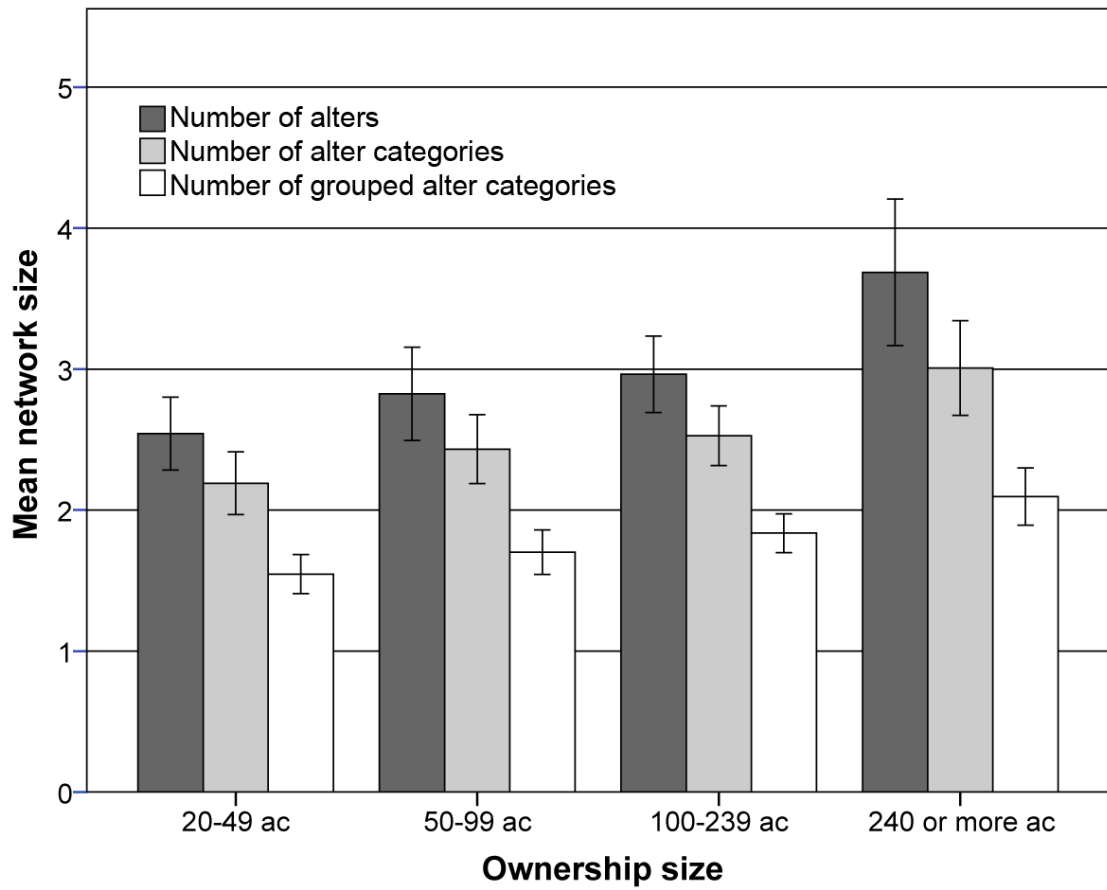


Figure 6: Ownership size and three measures of forestry information network size and diversity. Error bars indicate ± 1 SE.

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Chapter 3: The effect of data collection technique on landowner personal network data

Private forest management research continues to evolve from a focus on timber supply to address more complex drivers of land management behavior such as personal identity and values. Social network analysis, focusing on the role of interpersonal relationships on the flow of information, trust, and service delivery, is increasingly recognized as a valuable approach to understanding landowner behavior. Landowner personal networks are central to Diffusion of Innovations theory and the Theory of Planned Behavior, both of which are commonly invoked in the design of interventions to encourage sustainable private forest management. However, personal network data can be difficult for respondents to accurately recall and for researchers to obtain for a large sample of landowners. This study tests the effect of three different personal network name generators on estimates of Minnesota landowners' forestry information networks. Simple reports of information received from nine generic alter (source) categories provide a relatively accurate baseline. Personal network data from a written survey provides richer data but underestimates network diversity and fails to account for a large number of potentially influential weak ties. A combination of personal network data collected from a written survey and a follow-up telephone survey both doubled estimated average network size

from 2.77 to 5.48 alters and increased network diversity from 2.28 alter categories per respondent to 3.69. Network data from the written survey revealed a bias in favor of strong ties, defined in the study as most helpful alters, that was largely overcome through additional prompting during the telephone survey in order to obtain more complete network data. A combination of written surveys and telephone or in-person interviews may be the best way to balance the need for a large sample with the cost of more intensive, yet more reliable, data collection methods. Future research on landowner personal networks should use a combination of data collection strategies and prompts, preferably including telephone surveys or personal interviews; investigate the relationship between tie strength and influence; and investigate how landowner network vary temporally with respect to the adoption of new land management practices.

Introduction

Over the past several decades, private forest conservation research has evolved from a focus on timber supply to the influence of identity and values on landowner motivation for a broad suite of management objectives (Egan 1997; Fischer et al. 2010; Bliss and Martin 1988). Social network analysis is emerging as an important area of study within this new emphasis, focusing on the role of interpersonal relationships on the flow of information, trust, and service delivery (Knoot and Rickenbach 2011; Korhonen et al. 2012; Kueper et al. 2013). Social network analysis can provide insight into community capacity for adaptive management (Bodin et al. 2006) and recent studies suggest that intentional network development to build social capital can lead to positive conservation outcomes (Floress et al. 2011). Social networks are central to Diffusion of Innovations theory (Rogers 2003; Valente 1994) and the Theory of Planned Behavior (Ajzen 1991). Both theories are frequently invoked to explain land management behavior, suggesting an important role for social networks in influencing land management behaviors.

Understanding the ways that personal networks influence land management behavior requires accurate and reliable data describing both the networks in which landowners operate and relationships between those networks and land management behavior. Network data can be collected by a variety of methods including interviews, surveys, public records, and direct observation. I applied three different network data collection methods to a

population of Minnesota family forest owners to test the effect of the data collection instrument on the estimated size and composition of woodland information networks. The importance of this analysis is to inform the interpretation and application of data about landowner personal networks to inform more efficient public investments to promote active, sustainable forest management on private lands. The size and composition of landowner networks describe the number and types of a given landowner's current and past information sources, each of which may exert a different influence on land management behavior. Network data can thus provide important insights into landowners' patterns of information acquisition and decision processes that may inform future educational and other interventions designed to encourage sustainable land management action.

Literature Review

A landowner's forestry information personal network includes the individuals and organizations from which landowners have received land management information. These sources may be friends or family as well as natural resource professionals, conservation organizations, or others. The attitudes, opinions, and information that lead to action are influenced in part by personal networks (Wasserman and Faust 1994). The composition of landowners' personal networks is thus of growing interest. Landowner networks tend to include a mix of peers and professionals (Knoot and Rickenbach 2011; Korhonen et al. 2012), with peers generally valued as sources

of trusted local information and professionals as sources of more specific land management advice (Kueper et al. 2013). Although a large portion of government funding to promote sustainable management of private forest land has supported development of management plans by professionals (Esseks and Moulton 2000), some research suggests that peers may be as influential as professionals in decisions about their land management decisions (West et al. 1988; Schubert and Mayer 2012). This may reflect the relative ease of obtaining information from peers over professionals, but trust, language, or patterns of communication may also affect each group's influence on what landowners do (Gootee et al. 2010; West et al. 1988; Hujala and Tikkanen 2008; Knoot and Rickenbach 2011).

Social networks describe a group of "actors," in many cases individuals, and the strength and durability of the relationships among them. Among other things, ties between individuals within a network may depict social interactions, family relationships, relative positions within an organization, or information exchange. Data on who belongs to a network and ties among its members are typically collected from the members themselves using name generator and interpreter questions, which identify relevant actors and elicit data about them (Marsden 1990).

There are two basic approaches to social network analysis: whole networks and personal (egocentric) networks. Whole network data describe relationships among all members of a bounded, defined network, such as the

membership of a conservation organization, owners of land within a designated township, or participants in an educational program. A recent example of a whole network study is Rickenbach's (2009) study of the flow of information within and beyond the membership of a Wisconsin forest owner cooperative. Collection and analysis of whole network data requires high response rates from the network members in order to identify relevant ties between and among members of the network. In whole network studies, the unit of analysis is typically the network itself.

Personal networks by contrast, also known as egocentric networks, focus on the individual as the unit of analysis. Personal network data describe the existence and nature of ties between an individual (ego) and others with whom ego shares a specified type of tie (alters). When collecting personal network data, the respondent is asked to name relations of a specified type. For example, common personal network name generators are "With whom do you discuss important matters?"; "With whom do you socialize?"; or in the context of private forest owners, "From whom have you received information about forest practices?" The data enable analysis of the composition of landowner networks with regard to the types of information and assistance accessible from the network, as well as variation in networks among landowners. These data can then be analyzed to identify patterns of associations between network attributes and land management behaviors. For instance, Minnesota landowners who had

larger ownerships and more extensive land management histories also had larger forestry information networks (Sagor In review).

Personal networks are increasingly seen as important influences on private forest conservation. In a study of Wisconsin landowners, Knoot and Rickenbach (2011) found that both peers and experts were important sources of woodland information, but experts were more likely to be named as important sources of timber harvesting information and assistance. Larger information networks were associated with higher application of best management practices, supporting the value of interventions designed to build relationships between landowners and service providers as a means to increase the sustainable management of private forest lands. One way to build relationships is to mobilize knowledgeable, trained landowner volunteers to deliver information to their peers (Fletcher and Reed 1996). This strategy is central to many Extension forestry programs in the United States (Sagor 2013 in prep.). The use of direct volunteer outreach, for example, through the Master Volunteer program model is widespread and valued by both learners and educators (Allred et al. 2011; Finley and Jacobson 2001; Kueper et al. 2013). The purpose of Master Volunteer programs is primarily to build relationships between landowners to provide them with reliable sources of technical information and advice. This is in contrast to dispensing technical land management advice, which is a role generally viewed as best suited to natural resource professionals. Peer learning

approaches are an alternative to models of experts conveying facts and information through more formal educational programming (e.g. Ma et al. 2012).

Data collection and variation in landowner networks

A variety of methodological challenges constrain both whole and personal network studies, including accurate recall, validity, reliability, and other errors (Wasserman and Faust 1994; Brewer 2000). Social network questions are not familiar to most respondents, may seem intrusive, and may require effort to recall and process, all of which may constrain respondents' ability or willingness to respond to research inquiries and provide complete and accurate network data.

These challenges may explain some of the wide variation in where landowners report obtaining information. The percentage of respondents who received forest-related information from at least one source in a recent study of Minnesota landowners, 77% (Sagor In review), was 20% higher than reported to have received "forestry information" by Salmon et al. (2006) and "land management advice" by Ferranto et al. (2012), almost double the 40% reported by Measells et al. (2005) and triple the 26% of owners of 20 or more acres of Minnesota forest land reported to have received "advice" in the National Woodland Owner Survey (NWOS; Butler et al. 2011). While Baughman et al. (1998) do not report a corresponding figure, their percentages for individual sources of information suggest a total at least as high as that reported here. While the differences may reflect variation among regional landowner

populations, survey instrument design including language (“advice” versus “information”), and time frame within which sources were to be named may be factors as well. Data collection method also appears to affect results. Using an interview-based approach, Knoot and Rickenbach (2011) found an average network size of 4.1 alters in a recent study of Wisconsin landowner networks, which was 36% higher than a separate study estimated from a mail survey of a similar population (Rickenbach 2009).

The type and form of the name generator itself can have important effects on the network data (Marsden 1990). The number and type of prompts (e.g. list of names, lists of types of alters, or photos) as well as limits on the number of alters that can be named can affect reported network size (Freeman et al. 1987). Describing a method to elicit personal network data via interviews, McCallister and Fischer (1978, p. 134) concluded that “in the absence of extensive probing they are likely to forget important people.” Bernard et al. (1984), summarizing seven different studies of communication, found that informants’ accuracy in recall of social network or communications contacts was only about 50%. In the Rickenbach (2009) study, it was determined that a high level of trust existed among cooperative staff and landowner members existed, but there were few ties among landowners. He concluded that “[s]uch conversations or events may not be recalled when filling out a questionnaire, but likely do influence decision-making and behavior” (p. 598).

However, while recalled network data may not always reveal complete details, they do seem to reveal stable patterns of interaction (Wasserman and Faust 1994). Respondents across multiple types of studies were capable of accurately recalling representative samples of real-world networks (Hammer 1984). Respondents' attempts to name other participants in specific events, while subject to recall error, corresponded well to long-term patterns of participation in the series of similar events (Freeman et al. 1987). In other words, recall of who participated specific events was relatively weak, but recall of overall patterns of participation was strong. Furthermore, Campbell and Lee (1991) found that while estimates of network size depended heavily on the name generator used, network composition in terms of alter attributes was more stable. In other words, while estimates of network size varied substantially, attributes like the mean age, educational level, and gender distribution of personal networks within similarly sized networks was remarkably stable across studies. This pattern might suggest that while estimated network size varies, the relative composition of those networks in terms of alter category (e.g. public foresters, family members, Extension agents) would be relatively stable across data collection techniques. This has important implications both for the design of future landowner network studies and the interpretation of past research. Network composition may be a more important measure to inform landowner education and decision support interventions because it describes to whom landowners turn for information. While network size is important too, it

may be less important to know how many sources of each category a given landowner consults. If network composition is relatively stable across data collection methods, choice of method could be driven by factors other than data quality concerns.

While imperfect recall may nonetheless lead to reliable data, an alternative hypothesis suggests that network data may be biased toward certain kinds of alters. Marin (2004) and Brewer (2000) both found evidence that respondents were more likely to recall, and name, alters with whom they had more frequent contact or stronger ties. If this is true, private forest owners might be more likely to name those sources considered most helpful. For instance, the forester who wrote a customized management plan might more quickly come to mind than a peer landowner with whom they discussed land management options briefly over coffee even though the two exchanges may both have introduced ideas that led to land management action. Name generators that include relatively few prompts may thus lead to disproportionate nomination of strong ties such as close personal relations or particularly helpful sources. This may be problematic because tie strength is not necessarily an indicator of influence. For instance, weak ties can transmit management ideas or practical tips that can enable new actions or lead to seeking out further assistance. But stronger ties may be needed in order to convey information that is more tacit or difficult to codify and convey (Reagans and McEvily 2003). In the private forest land context, management advice is

tacit in the sense that it is property specific and dependent on a multitude of ecological, social, and economic factors. While weak ties could easily convey that timber prices are high, stronger ties, which have more knowledge about the recipient's land and values, might be needed to convey advice about whether or not it's in the landowner's best interest to sell timber. Thus a bias in favor of naming strong ties over weak could skew estimates of actual network composition and underestimate the influence of weak ties. To the extent that knowledge about landowner networks and decision processes inform landowner education programs this could undermine efforts to encourage sustainable private forest management.

The literature on different methods of collecting personal network data were reviewed and the findings from that literature were applied to the private forest owner domain in this study to test the effect of data collection methods on a population of Minnesota forest owners. In doing so, I investigated the following research question: Do respondents report more, fewer, or different kinds of alters in different data collection scenarios?

Methods

Network data generated by three different techniques are compared: two different name generators on a written survey and a follow-up telephone survey. Each technique was used to collect personal network data from owners of at least 20 acres of forested land across a heavily forested 12-county area of

northern Minnesota. Forest landowners were identified from county tax records pertaining only to those classes that commonly include forested land.

Completed written surveys were received from 1,002 respondents between April and July 2010. Accounting for ineligible respondents and bad addresses, the survey had an adjusted response rate of 59.7%. The current study reports network data for a randomly selected subset of 61 written survey respondents who completed follow-up telephone surveys. Forty-one others either could not be reached or declined to complete a telephone survey. The usable response rate for telephone surveys was thus 59.8%.

Brewer (2000) discussed three techniques by which to reduce recall-based omission of egocentric network data: nonspecific prompting, multiple elicitation questions, and re-interviewing. I employed these techniques during the data collection process.

The written survey included two different methods of obtaining woodland network data: Generic and personal. Only one version of the survey was produced, and all respondents were asked to provide data via both methods. For generic network data, respondents were asked to indicate, by checking a box, whether they had received woodland information from any of the following alter categories listed: family members, other landowners, friends and coworkers, public sector foresters, private sector foresters, loggers, realtors, Extension agents, and conservation or environmental organizations. These are referred to as “generic” network data because they did not include actual named

networks; rather, they described only the generic categories from which woodland information was obtained. Where indicated, alter categories were consolidated as follows for analysis: 1) "peers" included family members, other landowners, and friends or coworkers; 2) "foresters" included public or private sector foresters; 3) "ERC" included Extension sources, realtors, or conservation or environmental groups; and 4) loggers.

The second data collection method employed in the same survey was use of an open-ended free recall name generator to gather personal woodland information network data. The name generator elicited the names of alters "from whom you've received woodland information." The survey instrument included a table indicating the same nine alter categories. Respondents could write in named alters, then use checkmarks to indicate which categories applied to each. To reduce sensitivity associated with naming personal relations, respondents were encouraged to use pseudonyms or partial names rather than reveal the actual identity, which was not of interest to the study. In a few cases, respondents included alters that did not correspond to the nine categories. These were generally mass media. Where specific media sources were identifiable as originating from a member of a given category, the appropriate category was assigned during analysis even if not indicated by the respondent. All named alters, regardless if classified, were counted. For example, "Minnesota Deer Hunters Association magazine" was categorized as a "conservation or environmental organization" and "[Department of Natural Resources] website"

was categorized as “public forester.” While rare, these *ex post* categorizations were appropriate given the established standard for having received woodland information from the source.

The third method was use of follow-up telephone surveys with respondents to the written survey. Care was taken to use similar language to that of the written survey to elicit alter names. Nonetheless, the conversational nature of the telephone survey did force the respondent to consider each of the prompts more fully than the written survey. Telephone surveys began with a reminder of alter names the respondent provided during the written survey. This was followed by an invitation to add any additional names to the alter list. New names were recorded along with the corresponding alter categories. This was followed by the interviewer asking, category by category, if the respondent had received woodland information from any additional alters. As alter names were recorded during the interview, those names automatically populated a grid including all named sources from both the written and telephone surveys. The interviewer then asked whether each alter had, to the best of the respondent's knowledge, exchanged forestry information with each of the other named alters. This process was repeated for each alter dyad to obtain network density data. Density is a measure of the number of ties among alters as a proportion of the total number of possible ties. High-density networks have multiple ties among members, while low-density networks have a smaller number of ties (Figure 1). Density is a meaningful measure because it affects the ease with which

information can move throughout a network. Density is also related to the degree to which the network draws on independent pools of knowledge as opposed to simply echoing and reinforcing the knowledge already contained within the network.

To check for bias in network data based on tie strength, respondents were asked to identify their up to four most helpful alters, which were interpreted as strong ties. Relationships between the order named and most helpful status were taken as evidence of tie strength bias in respondent recall. Evidence that the most helpful alters were more likely than other alters to be named early (e.g. prior to additional prompting) would suggest the existence of a bias favoring recall of strong ties.

Results

Descriptive statistics: The 61 telephone survey respondents averaged 63 years of age and ranged from 29 to 96 years and had owned their Minnesota forest land for an average of 28 years. Respondents were about evenly split between resident and absentee owners, with 52% living more than 75 miles away from their nearest Minnesota forest land. All owned at least 20 acres, but 65% owned less than 100 acres. Only one in four had a written management plan.

Generic network data from the written survey: Seventy-six percent of respondents noted at least one generic source of Minnesota forestry information on the written survey. Among the nine alter categories other landowners,

loggers, and family members were the three most common sources of information, followed closely by public sector foresters and friends and coworkers (Figure 2). Private sector foresters, conservation and environmental groups, realtors, and Extension agents were all named less frequently. Among grouped categories, peers (family members, other landowners, and friends or coworkers) were the most commonly reported generic category (by 69% of respondents), followed by foresters (public or private sector; 54%), loggers (49%), and ERC (Extension, realtors, and conservation or environmental groups; 36%). Although generic data give no indication of the number of sources of information within each category, respondents had received woodland information from a mean of 2.78 (SE=0.338) different generic alter categories and 1.98 (SE=0.192) grouped categories.

Personal network data from the written survey: Of the 61 respondents, 77% reported receiving information from at least one named alter. The total number of alters named on the written survey was 166 (Table 1). Each was assigned by the respondent, to the best of their knowledge, to one or more of the nine alter categories. Individual alters could be members of more than one category, for instance both a logger and another landowner.

Total personal network size from the written survey ranged from 0 to 10 with a median of 2 and a mean of 2.77 (SE=0.336; Fig. 4), just below Rickenbach's (2009) estimated average network size of three in a recent study of forest landowners in Wisconsin. Estimates of network diversity measured as the

mean number of categories represented the network were smaller for written personal network data than generic data. On average, written personal networks included alters from 2.28 (SE=0.251) categories and 1.67 (SE=0.168) grouped categories. Family members were named by the largest percentage of respondents, at 41%, followed in descending order by public foresters, other landowners, loggers, and friends or coworkers. For grouped categories, significantly more respondents had received woodland information from peers (61%) than from foresters (46%), loggers (36%), or from ERC (25%; Figure 2).

Of respondents naming at least one peer as a source, 62% percent named more than one peer, with an average of 2.08 peers named. By contrast, of those naming at least one forester, only 32% named more than one (with an average of 1.86 named) and 18% of those naming at least one logger named more than one (with an average of 1.27). Median network size was two alters. With a mean of 2.28 (SE=0.251) categories, personal networks based on written survey data were significantly less diverse ($p<0.01$) than generic networks.

Personal network data from telephone surveys: Average network size increased substantially during the telephone interviews. Despite being reminded of the names provided on the written survey, 49 of 61 telephone respondents named at least one new alter. Average network size doubled, with an average of 2.72 (SE=.330) additional named sources of woodland information, bringing total reported network size (e.g. the total number of named alters, regardless of category) up to 5.48 (SE=0.473; Figure 4). Network

diversity also increased with the addition of telephone personal network data, rising from an average of 2.28 categories on the written survey to 3.69 (SE=0.225) after the telephone surveys (Figure 4). The relatively large increase in network diversity with the addition of telephone personal network data suggests that many respondents added new categories of alters to their networks rather than simply adding new members of categories already named. A total of 168 new alters were identified during telephone interviews. With the exception of other landowners constituting a higher percentage of alters named on the phone, no significant differences in the proportion of alters named by category were discernible from written survey results (Figure 3). In other words, the alters named first on the telephone were distributed similarly to those named on the written survey across the nine alter categories. Alters added on the phone were also distributed relatively evenly across small and large networks, and there was no apparent relationship between the size of the network reported on the written survey and the number of new alters added via telephone. The 17 respondents reporting networks of four or more sources on the written survey added an average of 2.67 new alters on the phone, statistically indistinguishable from the average of 2.74 additional alters reported by respondents with networks of three or fewer sources. In summary, few patterns in alter category or number were evident in the addition of alters after additional prompting on the telephone. Nor was there a clear pattern in helpfulness by alter category. For eight of nine alter categories, between 30 and

44% of alters in the category were named one of the four most helpful alters. Only family members stood out as more or less helpful than the other categories, with 55% of family members named one of the four most helpful alters.

However, because tie strength is not necessarily uniform within an alter category (e.g. not all alters within a category are strong or weak ties), this does not address the relationship between tie strength and the amount of prompting before an alter is named. Based on Marin (2004), I hypothesized that strong ties as indicated by most helpful status would more likely be named early than late because they would come to mind quickly, requiring less cognitive processing or prompting. Weak ties, by contrast, would require more prompting in order to be recalled and named. Hence I expected to find that strong ties (i.e. most helpful alters) would constitute a higher proportion of the alters named early on the written survey and a smaller proportion of the alters named later on the written survey or first during telephone interviews (i.e. only after additional prompting). To test this hypothesis, I divided alters into three groups: those named first or second on the written survey, those named third or later on the written survey, and those named for the first time on the phone. The division between first or second and third or later was chosen both based on the median network size of two alters and because that point divided the alters named on the written survey into two approximately equal groups. Indeed, 62% of alters named first or second were named most helpful compared with 45% of those named third or later and 27% of those named first on the phone. These differences were

significant ($p < 0.001$), suggesting a positive relationship between tie strength and recall.

Comparing data collection methods. While data collection method influenced the number of alters named by category and overall, the proportion of respondents naming a given category remained relatively stable between generic data from the written survey, personal network data from the written survey, and telephone survey data. As illustrated in Figure 2, the proportion of respondents naming at least one member of each alter category increased relatively consistently across categories from personal network (written) to generic network to personal network (written + phone). The one notable exception to this pattern is that other landowners were named by a disproportionately high number of respondents on the phone.

Density measures proved unreliable on a pilot test version of the written survey, and were thus omitted from the written survey instrument. Density was included, however, in the telephone surveys. Network density ranged from 0 to 1 with a mean of .350 (SE=0.042). There was no apparent relationship between network size or heterogeneity and density. The lack of evidence for this relationship in our data suggests a need for future research to determine whether landowner networks are different from other kinds of personal networks with respect to density or if the finding simply reflects the small sample size for which density data are available: the median network size was five alters and only five respondents reported networks larger than ten.

Discussion

Personal network data from the written survey revealed less diverse networks than generic network data obtained on the same survey. This may be primarily a recall problem: It is easier to remember having received information from a certain type of source than to name the source. This recall problem seems to have been resolved by the addition of brief telephone surveys, however. The combined written survey and telephone interview data provide a richer and more complete estimate of landowner personal networks than either of the written survey techniques alone. Considering this finding along with the increase in network size of one-third between Rickenbach (2009 written survey) and Knoot and Rickenbach (2011 telephone interviews) on Wisconsin forest owners, telephone contact seems to increase estimated network size.

Both network size and diversity increased with the addition of data from telephone surveys. Estimated total network size nearly doubled. Network diversity estimates varied by data collection method in a pattern similar to network size, with estimates increasing from written personal network data alone to generic network data to written plus phone network data. The average number of alter categories represented increased, respectively, from 2.28 to 2.78 to 3.69 ($p < 0.05$ for all differences). Several factors could explain the differences including confusion about what was being asked on the written survey that was clarified during the interviews; relative ease of adding data during a telephone interview compared to a written survey; increased recall due to prompting

during the telephone interview; or increased willingness to comply with requests for data during a telephone interview compared with a written survey.

While the percentage of respondents naming members of each alter category increased from written personal network data alone to generic network data to written plus phone network data, the relative composition of networks, expressed as the average proportion of each respondent's network occupied by alters of each category, remained relatively stable across the sample. But there was significant variation in estimates of network diversity across data collection methods. In other words, most landowners did add new kinds of alters on the phone to those named on the survey, but there was little evidence of systematic omission of certain categories of alters by any one data collection method. Some respondents seemed to omit certain alter categories until prompted on the phone, while others seemed to omit other categories.

These data suggest that not only do more landowners receive information from peers than professionals, they also consult a larger number of peers. In comparison with professional sources, peers may be more conveniently accessible and generally are not paid. The data are consistent with the Diffusion of Innovations decision model that landowners consult mass media and weak ties such as friends, coworkers, and family members to develop general management directions, then seek assistance from more specialized sources at the decision and implementation stages (Rogers 2003). A recent study in eastern Finland found variation in landowner networks over time as landowners

prepared to enroll in a land protection program, roughly supporting this hypothesis (Korhonen et al. 2012). Additional research into how landowners' information networks vary as landowners move through these innovation-decision stages would be needed to better understand how landowners seek, obtain, and use information to inform their actions.

The relationship between tie strength and recall reinforces differences among the data collection techniques. Minnesota woodland owners were more likely to name strong ties that they considered most helpful with little prompting, yet only after additional prompting did they name weaker ties. While helpfulness is a valid indicator of tie strength, this finding highlights a weakness of the written survey method. Diffusion of Innovations theory, as well as social network studies (e.g. Granovetter 1973), suggest that weak ties play an important role in building awareness of options that may be chosen after further consideration and in some cases consultation with strong ties. In fact, observation of land management actions by neighbors and other landowners is a common early step in building awareness of available innovations (Rogers 2003). In some cases the landowners whose land is being observed may not be known to the observer, but may nonetheless influence the observer's innovation adoption process. In the current study, with a name generator based on "receiving information from" named alters, these owners would likely not be named at all. Similarly, while the concept of helpfulness was both clear and meaningful as a measure of tie strength, that concept too would largely exclude

weak ties who provided critical information to advance a respondent's adoption of a new land management technique. Evaluating landowner social networks based only on data generated from a written survey may systematically underestimate the presence of these important weak ties (as well as some strong ties) in landowner social networks. Collecting personal network data through a more in-depth interview would enable collection of more data not only on tie strength, but on other attributes of the human relationships related to influence through personal networks.

The existence of tie strength bias in written personal network data raises questions about the interpretation of past personal network studies, suggesting that they may underestimate the size of landowner networks. It also highlights an important challenge in future landowner personal network studies. While data collection methods like personal interviews and telephone surveys may reduce tie strength bias in estimates of network composition, the time and cost per respondent of data collection and analysis can be high enough to preclude collection of large sample sizes. While difficult to quantify, it was common during telephone surveys for respondents to seek clarification of the purpose of the study and the meaning of the questions. It seems likely that without these clarifications respondents would not have named additional alters. Future research should investigate the degree to which tie strength bias can be reduced through either additional prompts in a written survey instrument in order to reduce tie strength bias but preserve the efficiency of the written survey.

Otherwise, the combination of telephone surveys or in-person interviews and written surveys may be needed to overcome tie strength bias and obtain more complete network data from a large enough and representative sample.

One important advantage of the telephone survey approach is that it allows for the measurement of network density. Concerns about misunderstanding of the meaning of ties among alters encountered in the pilot written survey did not arise in the telephone surveys. The telephone conversational format allowed for quick explanations of any confusion on the part of the respondent, which was not possible on the self-administered written survey. Among other things, network density is related to the degree to which the respondent is able to draw on independent sources of information. If all alters are regularly exchanging woodland information, the chance that those sources share common opinions is higher. If those sources do not exchange information with one another, the chance is greater that they would pass along information from independent sources, drawing on a wider variety of perspectives. For example, a landowner who only receives information from tightly interconnected sources might be more influenced by the group's conventional wisdom and less likely to be exposed to different approaches.

These results suggest that data collection technique does affect estimated average network size, but not composition. While the percentage of respondents actually naming an individual source of woodland information on either the written survey or the telephone interview was smaller than the number that

received information from each generic category, combined network data from the written survey and telephone interviews suggest that in fact the generic network data under-report sources of woodland information. This pattern, which holds across every category and grouped category of alters, suggests that more robust name generators, including a combination of written and telephone surveys, leads to more complete reporting of landowner network data. The relevant difference in our results between data from the written survey and data from the combination of survey and telephone interview is that a higher percentage of landowners are receiving information about their land from more sources than might appear from the written survey alone. Landowners are also receiving information from more diverse sources than it might appear from the survey data alone. Landowner engagement strategies based only on written survey data thus may fail to target landowners through information-seeking behaviors that might in fact reach large proportions of the landowner population.

The choice of which data collection method is best suited to a particular study depends of course on the study's objectives. The combination of survey data from a large sample of landowners, supplemented with telephone survey data on a subset of respondents, produces reliable data on landowner information networks more efficiently than an exclusive focus on interviews would. However, even the combination of written and telephone survey left many important questions unanswered about how networks influence

conservation behavior. The kinds of factors that affect the relative influence of one source over another may not be sufficiently easily codified to be reported on a survey. This leads to the following recommendations for future landowner personal network studies:

1. If a large sample is of value, use a written survey with as many prompts as reasonably possible. Additional prompting on the written survey may increase recall, reducing the effect of recall bias on the results.
2. Use personal interviews, or at a minimum oral surveys, to obtain supplemental data. In the current study, the telephone surveys led to nomination of not only a larger number of weak ties, but also of alters from different categories, increasing the diversity of landowner networks. Longer interviews would offer greater opportunities to develop a deeper understanding of the ways in which networks influence landowner decisions.
3. Investigate how landowners define strong ties and how tie strength relates to influence. Ideally, tie strength data should be collected for each alter named, but where that is not possible it can be collected generically by alter category.
4. Investigate changes in landowner network size and composition at different stages of the innovation decision process. Landowners are likely to seek and use different kinds of information at different decision stages. The most efficient interventions should invest in providing

education and information that is most likely to spur action and lead to adoption of sustainable forest management practices. A deeper understanding of the ways that networks change over time and the connections between learning and action, mediated by personal networks, would enable more sophisticated and targeted investments of resources to educate landowners.

Conclusions

Despite the increasing recognition of the importance of personal networks on private forest conservation, social network data collection and analysis techniques remain relatively new to natural resources research. A key purpose of this study was to understand the influence of the survey instrument design on recall and landowner information network data. Family forest owners' sources of information affect their ability to implement sustainable forest management practices on the ground. Much research in the past decade has sought a deeper understanding of landowner values and trust with respect to conservation messages and opportunities for engagement around sustainable forest management issues. There are a number of different ways to collect data on landowner personal networks to inform interventions to engage landowners and ultimately to promote the adoption of sound conservation action on private lands. Our results suggest that written surveys, the least expensive way to obtain network data from a large sample of landowners, provide relatively

accurate picture of landowner personal networks. However, supplementing written surveys with telephone surveys of a subset of respondents allows calibration of the written survey data that may improve the accuracy of network data collected from the larger sample. These findings have important implications beyond simply research on landowner networks. Personal networks are central to Diffusion of Innovations theory and the Theory of Planned Behavior, both of which are often applied in a private land management context. To the extent that studies based on these theories fail to fully account for the influence of personal network members, they may fail to accurately account for the influence of “important others” on landowner behavior. Additional research would help to develop a deeper understanding of tradeoffs between cost and accuracy of personal network data collected from family forest owners. To the extent that these data can inform effective and efficient educational and policy interventions on the ground, this additional research can advance innovation and efficiency of public investments to promote conservation on private forest lands.

Tables

Table 1. Mean number of alters named by category and data collection method for 61 respondents to a self-administered written survey and a follow-up telephone survey.

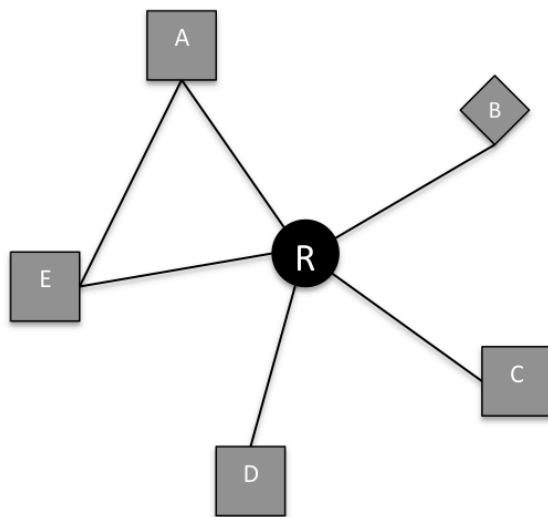
Alter category or grouped category	Written survey	Added during telephone survey	Total
	Mean (SE)	Mean (SE)	Mean (SE)
Family	0.59 (0.100)	0.69 (0.165)	1.28 (0.197)
Friends & coworkers	0.54 (0.137)	0.38 (0.091)	0.92 (0.147)
Other landowners	0.67 (0.144)	0.85 (0.148)	1.52 (0.199)
Public foresters	0.62 (0.133)	0.56 (0.113)	1.18 (0.199)
Private foresters	0.23 (0.075)	0.23 (0.082)	0.46 (0.118)
Loggers	0.46 (0.092)	0.33 (0.101)	0.79 (0.124)
Extension	0.13 (0.059)	0.07 (0.032)	0.20 (0.069)
Realtors	0.05 (0.036)	0.15 (0.061)	0.20 (0.069)
Cons. or env. groups	0.23 (0.068)	0.13 (0.059)	0.36 (0.112)
Peers ¹	1.26 (0.182)	1.39 (0.225)	2.66 (0.264)
Foresters ¹	0.85 (0.184)	0.77 (0.169)	1.62 (0.280)
Loggers	0.46 (0.092)	0.33 (0.101)	0.79 (0.124)
ERC ^{1 2}	0.33 (0.083)	0.33 (0.090)	0.66 (0.136)
Total	2.77 (0.336)	2.72 (0.330)	5.48 (0.473)

¹ Categories do not sum to grouped category or overall totals because categories are non-exclusive (*i.e.* a single alter might be counted as both a family member and another landowner, but only once in the grouped category “peer”).

² Extension, realtors, or conservation or environmental groups.

Figures

(a)



(b)

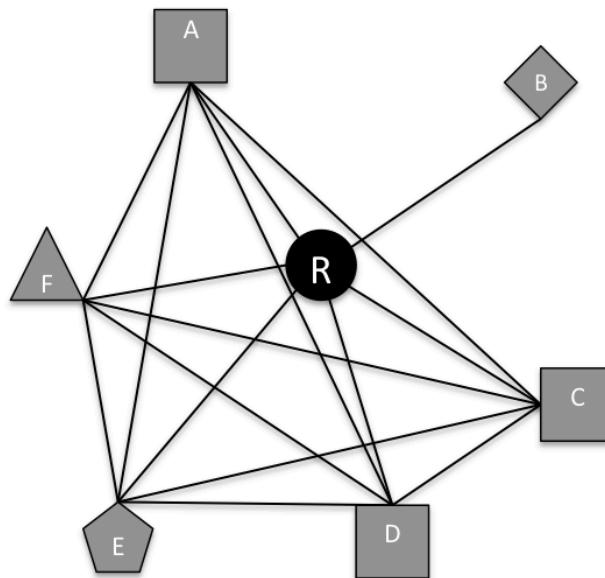


Figure 1. Typical personal network diagrams showing networks with density measures of (a) 0.1 and (b) 0.67. In each case, R is the respondent. Different shapes indicate different alter categories.

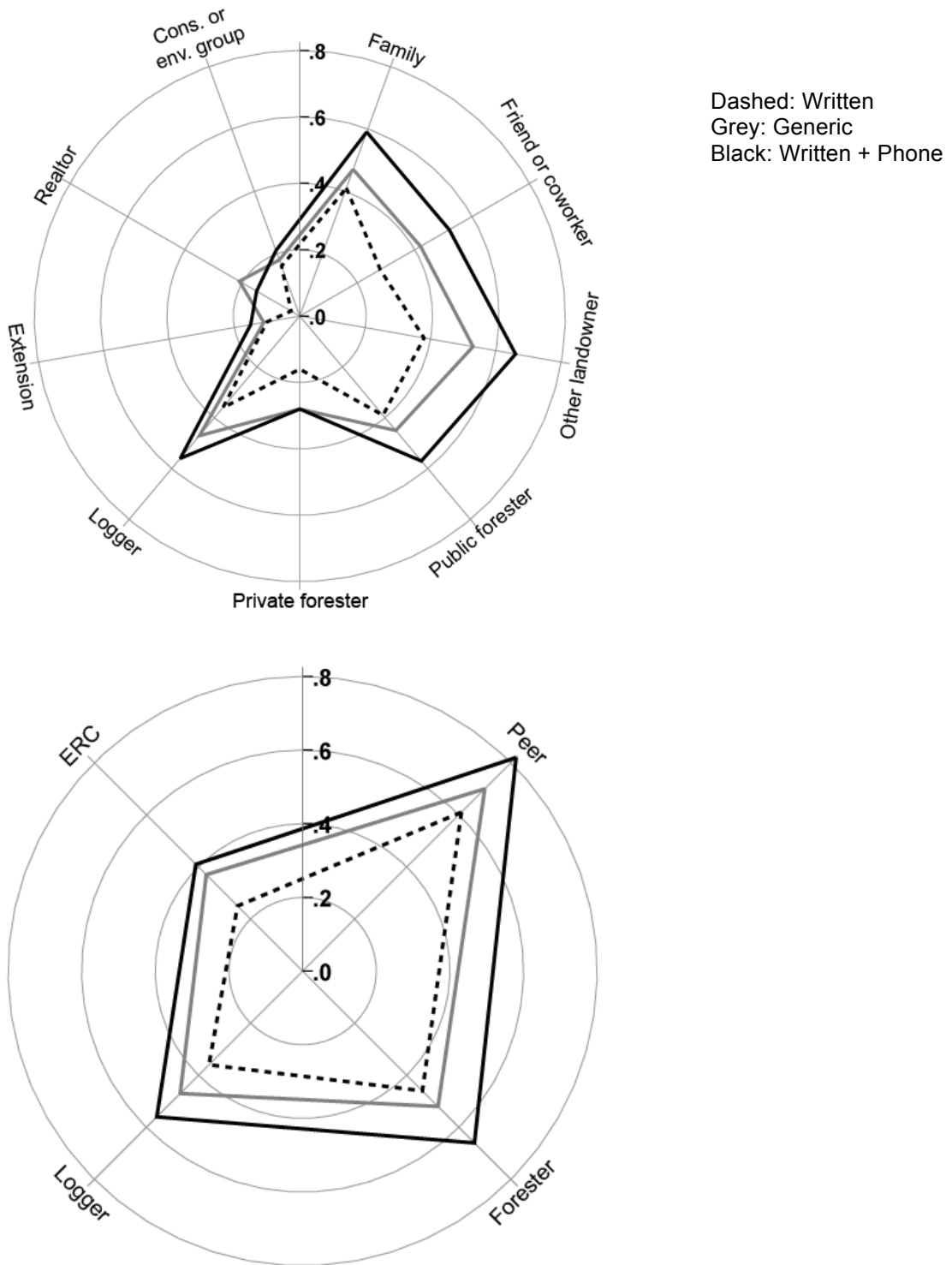


Figure 2. Differences in the proportion of respondents who received information from each alter category by data collection method.

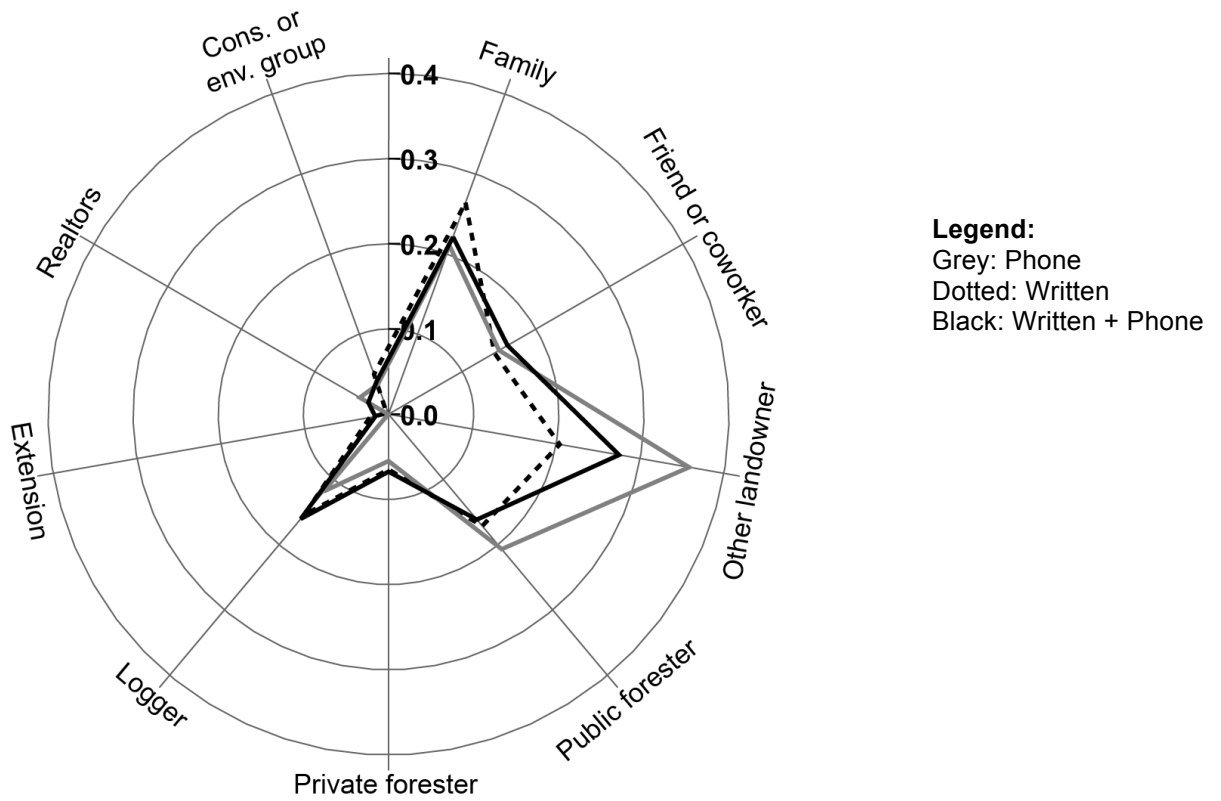


Figure 3. Proportion of all alters named by category and data collection method.

Network size

Diversity: # categories represented

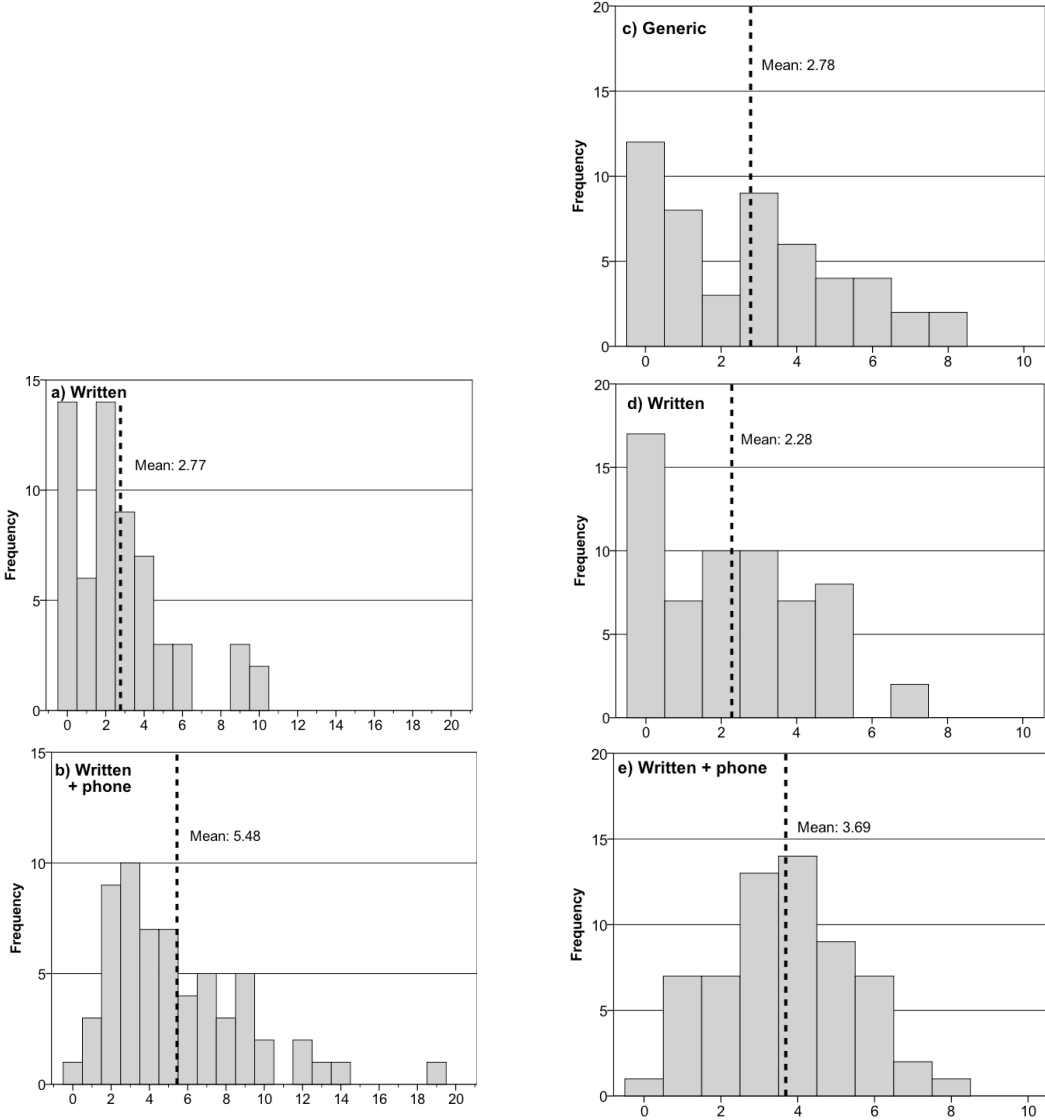


Figure 4. Variation in estimates of network size and diversity by data collection method ($n=61$).

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Chapter 4. Peer learning in Extension forestry: A national review

Landowner education is the foundation of a broad suite of public investments designed to encourage sustainable forest management. Extension forestry programs, which are based in the nation's land grant universities, are the primary providers of this landowner education. I report here the results of surveys of the 50 state-level Extension forestry program leaders and the managers of 39 forestry-related Master Volunteer (MV) and other peer learning (OPL) programs. Nationwide, these programs employ 225 full-time equivalent (FTE) state specialists, educators, and support staff, with the highest FTE capacity per million acres of private forest in the north and the lowest in the Rocky Mountain region. These programs are evolving. Over half of state-level Extension forestry programs report using digital text, remote presentations (e.g. webinars), and other digital communication tools more now than five years ago. Over half of programs report more instruction now than five years ago on forest health and invasive species, intergenerational land transfer, and the effects of climate change on forests, yet relatively few states report teaching any topics less now than five years ago. Drawing on partnerships with state natural resources agencies, landowner associations, trade organizations, conservation groups, and others, the managers of 22 MV and 17 OPL programs use educated

volunteers and other peer learning techniques to encourage sustainable forest management. A higher percentage of MV and OPL programs are targeting smaller, and often underserved, segments of the landowner population than the state-level programs in which they are housed. Although program outputs and demands for service are increasing, many MV and OPL program managers face reduced budgets and are turning to new technologies and techniques to maintain or grow their programs. In an environment of rapid changes in both the tools available to support Extension education programs and complex issues demanding a response, the implications of declining budgets and Extension forestry FTE capacity create both opportunities and challenges for the future of the nation's Extension forestry programs.

Introduction

Many benefits of active private forest management accrue to both the landowner and to broader society. In addition to the supply of forest products to support rural economies, the public values of private forest management include increased forest diversity and resilience, which reduce risk of damage such as insect outbreaks or wildfire that cross property boundaries. Seeking to increase the public value of these benefits, decades of research have sought strategies to encourage sustainable private forest management (Alig et al. 1990; Kluender et al. 1999; Schaaf and Broussard 2006; Skok and Gregersen 1975; Kilgore and Blinn 2004). Public investments aimed at enhancing these benefits have supported a wide variety of interventions, landowner education being the preferred approach in combination with other interventions (Schaaf and Broussard 2006; Bliss and Martin 1990; Kilgore and Blinn 2004). Extension forestry programs, which are part of the land grant university system, are the primary means by which landowner education programs are designed and delivered (Baumgartner et al. 2003; Jones et al. 2001). The purpose of the current study was to describe the trends and innovations in Extension forestry programs, and in particular their use of peer learning strategies to promote sustainable private forest management.

Literature review

Reed et al. (1997; p. 118) describe Extension forestry as "an informal educational system to meet the needs of identified forestry audiences (learners), carried out by a partnership of the [National Institute for Food and Agriculture] (federal), universities (state), and county governments (counties), profit and nonprofit businesses and the learners themselves using a variety of educational methods suited to the learners." The purpose of this system is to make land grant university-based research more accessible to landowners. The belief is that "informed and knowledgeable landowners make better decisions toward both maximizing their own forest satisfaction (financial and amenity benefits) and providing the greatest net economic and environmental benefits to society" (Jones et al. 2001, p. 4). University faculty and staff administer extension programming, providing a perspective informed by emerging research. Drawing on this research, Extension forestry specialists and educators offer classroom, field, and increasingly online education designed to foster adoption of sustainable forest management practices (Harmon et al. 1997; Jones et al. 2001; Reed 2001; Baumgartner et al. 2003).

Peer learning and educational models that leverage personal contacts through landowner networks have received increasing attention as an effective strategy to engage landowners (Allred et al. 2011; Finley and Jacobson 2001; Fletcher and Reed 1996). One popular method to leverage personal networks for landowner education is the Master Volunteer (MV) model. The MV model is

grounded in Rogers' Diffusion of Innovations theory, under which knowledgeable peers influence others' adoption of certain practices (Rogers 2003). Diffusion of Innovations theory has been applied to private forest management in a number of studies (e.g. Doolittle and Straka 1987; Haymond 1988; Korhonen et al. 2012; West et al. 1988) and underpins much Extension forestry programming. As a prominent example, MV programs train committed individuals to disseminate information and educate their peers about land management options and sources of financial or technical assistance. Evaluation studies support this approach. After a visit with a trained Master Forest Owner volunteer in New York, landowners were interested enough in possible new management approaches such as thinning their woods that they pursued further information from a professional (Allred et al. 2011), which is a frequent precursor of land management action. Personal contact was identified as the most valued part of forestry technical assistance programs in Wisconsin (Bliss and Martin 1990) and led to a 55% reduction in wildfire incidence in one particularly fire-prone Louisiana ward (Doolittle and Welch 1974). Personal contact with landowners through Extension programs is of greater value at the decision, implementation, and confirmation stages of the decision-innovation process (Rogers 2003) than the initial knowledge stage (Muth and Hendee 1980; West et al. 1988). While programs that share the cost to implement beneficial land management practices may do little to persuade landowners to implement treatments that they would not have implemented anyway (Kluender et al. 1999;

Kline et al. 2000; Bliss and Martin 1990), the personal contact between a landowner and a forester during these programs is highly valued by landowners.

Seeking to leverage the value of personal contact, many state Extension forestry programs offer MV programs that engage and seek to inform family forest owners through trained volunteers. Prominent examples include New York's Master Forest Owner program (Allred et al. 2011), Coverts programs (e.g. Snyder and Broderick 1992) and the Oregon Master Woodland Manager program (Fletcher and Reed 1996). These programs offer a relatively small number of people, typically 10-30 per year, intensive education and prepare them to share their new knowledge with peers through volunteer activities. The MV model offers a multiplier effect by empowering active volunteers to disseminate information and engage landowner learners in ways that reduce the burden on paid faculty and staff (Allred et al. 2011).

MV programs tend to be relatively inexpensive to administer (Meyer and Hanchek 1997). Peer volunteers tend to be trusted and in many cases more accessible to landowners than natural resource professionals (Snyder and Broderick 1992; West et al. 1988). Some landowners feel that natural resource professionals do not understand them or have agendas inconsistent with landowners' interests, which can make information from peers seem more relevant and better aligned with landowner values (Davis and Fly 2010; Gootee et al. 2010; Hull et al. 2004; Rickenbach et al. 2005).

More Minnesota forest landowners reported receiving forestry information from a peer than from any other type of source (Sagor In review). If landowners are obtaining conservation information from peers and through personal contacts, how are Extension forestry programs making research-based information and education available through those personal networks? Facilitating peer learning opportunities is one of the most common learner-focused practices used by North American Extension foresters (Johnson et al. 2007). Landowners in Connecticut who had been visited by a peer volunteer were more likely to join a conservation organization or seek out forestry information, implement wildlife habitat improvement practices, or obtain a written forest management plan (Snyder and Broderick 1992). Similarly, landowners contacted by a Master Woodland Manager in Oregon felt better equipped to make future land management decisions, and reported having clearer goals and values after the visit (Fletcher and Reed 1996).

While popular, the MV model is only one way to foster information diffusion through landowner networks. A variety of educational program models include peer learning by design. Examples include workshops hosted on landowners' properties, structured activities like small group discussions that foster exchange of local knowledge (Charnley et al. 2007; Jordan et al. 2003), or creation of a learning atmosphere conducive to peer exchange (Kueper et al. 2013). In a case study review of five different landowner learning networks in the United States and Australia, Kueper et al. (2013) found that participants

valued the open and welcoming atmosphere, the relationships they built over time, and access to information from a variety of perspectives including both peers and professionals. These findings support the work of programs like the Women Owning Woodlands network in Oregon, which are established to meet the specific learning preferences of women landowners, a growing audience traditionally underserved by landowner education programs (Redmore and Tynon 2011). Ma et al. (2012) described the Massachusetts Woodland Forums, in which the focus was more on building relationships than imparting information.

The purpose of the current research was to characterize and assess Extension programs nationwide with a focus on the role of peer learning in landowner education. In doing so, I describe the size and capacity of Extension forestry programs nationwide, use of emerging technologies, and the ways that peer learning strategies are deployed. Greater insight into these issues can inform the efficiency and effectiveness of future investments to promote sustainable private forest management.

Methods

The study included two phases of data collection, both using Internet-based surveys as the primary data collection method. Surveys were administered using a protocol consistent with the Tailored Design Method (Dillman et al. 2009) that included mailing a hard-copy letter and consent

statement with follow-up reminders and associated communications via email and telephone to complete the online survey.

First, the Extension Forestry program leader in each of the 50 US states completed a survey addressing program capacity, areas of content focus, trends in use of educational and communication methods, and expected changes to their programs. Program leaders also provided information about any active MV and other peer learning (OPL) programs offered either alone or collaboratively, that targeted family woodland owners, provided education on woodland management, and either required or encouraged participants to conduct volunteer outreach to other family woodland owners after completing the program. Because not all peer learning programs included volunteerism, program leaders were also asked to identify other means by which peer exchange was encouraged among landowners. Usable surveys were received from all 50 state Extension program leaders for a full census.

In the second phase, the managers of identified MV and OPL programs within each state completed Internet-based surveys following a similar protocol. Due to the expected program model consistency among MV programs but the variation among OPL programs, separate surveys were administered to the managers of each group. In both cases, survey questions addressed program purpose, audiences, objectives, curriculum, partnerships, budgets and funding sources, and future plans. In addition, the MV survey included questions about educational methods and curriculum topics. Where common questions were

asked of MV and OP program managers, results are reported together. For many analyses though, that was not possible because of the differences in program design. Extension forestry program leaders nationwide identified 23 MV programs and 19 OPL programs. Usable survey responses were received from the managers of 22 MV programs in 19 states (Oregon, South Carolina, and Wisconsin each reported two different programs; Table 4) and 17 OPL programs from 15 states (Wisconsin reported three programs; Table 5), for a total sample of 39 programs from 25 states and a 93% overall response rate.

Both survey instruments included an open-ended question about the three most important changes planned for the next five years. Quoted text submitted in response to these questions appears throughout the results.

Results

State-level Extension forestry programs

The total capacity of all Extension Forestry programs was 225 full-time equivalents (FTE). This figure includes state specialists, who generally have split research, Extension, and in some cases teaching appointments, as well county or regional educators (agents) and support staff. State-level Extension forestry capacity was highest in the Pacific coast states (averaging 7.7 FTE) and lowest in the Rocky Mountain states (1.3). The northern states had the highest average Extension forestry capacity per million acres of private forest land (Table 1). Nationwide, specialists averaged 53% of total program capacity, educators or

agents 31%, and support staff 16%. This capacity is substantially smaller than reported by Reed et al. (1997). The 1996-1997 national directory of Extension Forestry staff included only Extension specialists and educators, not support staff, which if subtracted from the current figure leaves 189 full-time equivalents, just over half of the 356 reported by Reed et al. While 15 years ago “over 20 states” listed five or fewer Extension forestry personnel, 37 states now reported five or fewer full-time equivalents.

State-level Extension forestry programs targeted a broad diversity of audiences (Table 3). Total program capacity as measured by FTEs was positively correlated with the number of audience segments specifically targeted ($r=0.591, p<0.001$). Among the most commonly targeted audiences were all family forest owners, natural resource professionals, and the general public. As might be expected, finer segments of these audiences were less commonly targeted. For instance few states had programs that specifically targeted large-acreage landowners or owners of land in specific geographic locations.

The content of state-level Extension forestry educational programs is changing. Figure 1 shows the topics that are being taught at the time of the survey compared with five years earlier. The largest percentage of states report increasing their instruction on topics related to forest health, intergenerational land transfer, climate change, and online mapping. Open-ended responses frequently reflected the connections among these topics. A northern program leader mentioned “stronger integration of climate science and attendant issues

including rain/drought cycles and invasive species.” A southern state program leader plans for his program to “spend greater percentage of time on forest impacts, health, and resiliency as pertains to climate and climate variability.” For most programs, these topics have apparently been added rather than substituted in Extension forestry curricula. For only three of 21 total topics did a larger percentage of states report a decrease in instruction over the past five years than reported an increase. The topics taught less often at the time of the survey were harvesting and selling timber, recreational trail design, and seedling establishment and tree planting. Overall, state-level Extension programs are providing educational opportunities on a wider variety of topics now than five years ago.

State program leaders reported a number of changes over the past five years in instructional design and content delivery strategies as well. Most common were increases in the use of digital media to engage their audiences (Figure 2). Extension forestry programs appear to be moving toward more cost-efficient but also less direct and personal means of communication with their audiences: four of the five instructional formats used more by the largest percentage of states at the time of the survey than five years prior involve digital media and the fifth is peer-to-peer information exchange. By contrast, formats that involve in-person interaction, particularly those involving one-on-one and extended contact, seem to be declining in frequency of use among Extension forestry programs. These changes are driven in some states by reduced

capacity, but in others by a desire to reach new learners and enhance educational opportunities. The program leader of a north-central state with less than 2 FTE of Extension forestry capacity mentioned “more Web-based content as university support, state forestry agency support, and legislative support for forestry continues to erode precipitously here in our state.” By contrast, a southern state with almost five times more capacity plans to “improve and increase electronic programmatic delivery, primarily individual and county level webinars, [as well as an email] newsletter and web offerings.” Other open-ended responses by state Extension program leaders emphasized the value of digital communications in creating more flexibility for learners including creating customized learning certification, ensuring convenient access to Extension content, and “seamless use of social media to connect with the demographic that are big users.” One western state plans expansion of “online instruction, in a course format, not just webinars.”

Although not a focus of specific questions on the state-level program leader survey, collaboration and partnerships were mentioned frequently in response to the open-ended question about planned future changes. One Pacific coast program leader plans to “develop a coordinated forestry education program that collaborates with state and federal forest land managers to address issues facing private forest landowners.” A Rocky Mountain program leader mentioned plans to “focus more on landowner education in cooperation

with [neighboring states] to reduce costs.” Likewise, a southern state plans to “look at more regional or multi-state efforts.”

Master volunteer and other peer learning programs

Tables 4 and 5 list the 22 MV and 17 OPL programs for which completed surveys were received. Among states with one or more MV or OPL program, about 10% of total Extension forestry capacity was dedicated to the program(s) (Table 2). The oldest programs, the Oregon Master Woodland Manager and Connecticut and Vermont Coverts programs, were all first offered in 1983. MV programs in those 19 states had been offered for an average of almost 16 years and a median of 17 years. Slightly more than half of the effort of offering MV and OPL programs was dedicated to the initial training, followed by managing and corresponding with volunteers (18%), offering refresher or continuing education trainings (13%), and program evaluation and reporting (12%). While some OPL programs addressed specific topics like intergenerational land transfer (e.g. Ties to the Land) or wildfire awareness, most OPL programs were broad in content. This may reflect a desire to engage specific audiences based more on audience characteristics such as gender or an interest in leadership and volunteerism than a specific content interest or issue focus. States that had at least one MV or OPL program had significantly larger state-level FTE capacity (6.0 vs. 3.2 FTEs; $P < 0.05$), but there was no relationship between state-level

capacity per million acres of private forest land and presence of a MV or OPL program.

In terms of a general content focus, the majority of MV programs addressed forest stewardship and management. Coverts programs, which focus on forest management to benefit wildlife, were also common. Maryland's Woodland Stewards Program and Florida's Community Forest Stewards program focused on small residential woodlots and urban forests, respectively. As illustrated in Figure 1, a larger percentage of MV programs reported recent increases in instruction in topics like intergenerational land transfer, climate change effects on forests, online mapping, and permanent land protection than state Extension forestry programs as a whole. Compared with their state-level Extension forestry programs as a whole, MV programs were less likely to report growth in instruction on topics that might be classified as traditional or technical forest management topics such as forest measurement, financial aspects of forest ownership, agroforestry, tree identification, wildfire protection, and general silviculture. With the exception of leadership and communication, this latter group of topics tended to be more technical in nature.

Volunteer training

Almost all MV programs required completion of an initial training that was 20-40 hrs long, with only one program's initial training under 20 hours and three more than 50 hours. Five of 22 MV programs required annual continuing

education for trained volunteers. Of those five programs, only New Hampshire Coverts, the Oregon Land Stewards Program, and the Pennsylvania Forest Stewards Program required a minimum of 20 hours of annual continuing education. Unlike MV programs, OPL programs were more variable in delivery model. While some, like Wisconsin's Woodland Advocate Program, had a structure similar to MV programs, others included peer exchange in different ways including short courses, mentorship programs, informal learning networks, and landowner associations rather than one-on-one volunteer-led peer exchange.

All MV and OPL programs studied here targeted family forest owners. Many targeted all family forest owners rather than specific subgroups. However, MV and OPL programs were more likely than state-level programs to target specific audience segments (Table 3). Small- and large-acreage owners were the two most common subgroups targeted by MV programs, followed by women and landowners based on the geography of their land or residence. Among OPL programs, women, small-acreage landowners, landowners by residence location, and landowners from certain ethnic groups were the most common target audiences.

Fees for learners to participate in MV programs ranged from \$0 to \$450. Not all MV programs charge fees: four charged no fee to participate. Of the 18 programs charging fees, half charge less than \$100. Among OPL programs, fee structures were more difficult to compare. Some programs charged \$10-125 per

workshop or similar event, others charged a single fee for a series of events, more like the MV model. In general fees appear to be lower for OPL than MV programs, but the offerings are more often of shorter duration as well.

Budgets

Annual operating budgets of MV programs reportedly ranged from \$0 to \$50,000 with an average of \$12,875 and a median of \$10,000. Eight of 22 MV programs reported declining budgets over the previous five years, including four reporting substantial reductions, while only two programs reported budget growth during the same period. With the exception of staff salaries, program budgets were almost entirely funded by grants and external funds (Table 6). While most programs drew on a variety of funding sources, 19 of 22 programs indicated a reliance on a single funding source for more than half of their annual budget, leaving those organizations vulnerable to disruptions in external funding. Two particularly important sources of funding for MVP programs were the Forest Stewardship Program (FSP) and the Renewable Resources and Extension Act (RREA). Fourteen different programs depended on one of these sources for 10% or more of their annual operating budgets, including six dependent on these sources for more than half of their annual budget.

Budgets for OPL programs reportedly ranged from \$0 (two programs) to \$55,000, with an average of \$10,420 (sd=\$13,890) and a median budget of \$6,000. In comparison with MV programs, OPL programs relied more heavily on

registration fees and less on all other sources of funding, including the Forest Stewardship Program, the Renewable Resources and Extension Act, and other grants (Table 6).

Based on responses to open-ended question about the most important changes planned for the next five years, program managers identified the need to increase program revenues, with nine planning to either increase the fees charged to program participants or to seek more diverse and stable funding sources. Two programs plan to seek more efficiency in their volunteer management operations through partnerships with either other existing Extension MV programs or a woodland owner association. One northern state MV program manager plans to merge volunteer management functions with another natural resource MV program in the same state. This change is driven by “significantly reduced capacity for delivering the program and working with volunteers.”

Instruction and delivery formats

Program delivery models used by Extension forestry MV programs were found to be shifting away from in-person gatherings and toward digital communications. Similar to state-level programs, the four delivery formats that have increased the most among MV programs in the last five years were all digital, while four of the six delivery formats that have declined all involve in-person instruction (Figure 2). This was confirmed by open-ended responses

about planned future changes, in which the transition toward digital content was an important theme. Eight MV or OPL program managers plan to increase their digital communications. In most cases they planned to use digital media more to enhance communications with trained volunteers than as an alternative platform for the initial training, although both were mentioned. For example, one northern MV program manager mentioned that “the group of volunteers gets bigger each year but staff time remains the same.” Another plans to initiate the use of online social networks to maintain communications, and a third plans to set up a digital newsletter in part to permit “fewer mailings, but more frequent communication.” One Rocky Mountain program manager plans “a slight increase in online programming as younger and more computer savvy generations acquire land.”

On a related note, two MV program managers intend to offer, as a northern state program leader put it, a “shift toward more cohort model offerings that are directed to specific social issues or problems.” The other, from a Rocky Mountain state, was more specific about an issue focus, mentioning “wildfires, insects, [and] disease.” Two other program managers plan curriculum changes as well, but did not elaborate. While many MV programs address a fairly broad suite of forestry content, this shift appears motivated by a desire to target training and volunteer activities toward a narrower range of issues to more clearly demonstrate program impact.

Trends in instructional formats were not available for OPL programs, but the strategies by which OPL programs foster peer exchange were, in declining order by the number of programs using them: property tours; peers serving as guest speakers, teachers, or discussion leaders; discussion groups during events; emailing among peers; one-on-one property visits or other interactions outside of program events; online discussion forums; and peers writing articles for newsletters or other communications.

Partners

MV and OPL program managers listed 186 different organizations that contributed direct financial support, curriculum development or instruction, volunteer management, or program planning and advice. Universities (most often University Extension programs) and state natural resource agencies were the two most common types of contributing organizations (Table 7). The 22 MV programs reported an average of 4.7 partner organizations, with eight of the 22 programs reported contributions from at least six organizations. MV program managers were most dependent on partner organizations for financial support. Nine of 20 of MV program managers reported exclusive dependence on partner organizations to fund the programs. Partners contributed to MV programs in other ways too. On average, each MV program received financial assistance from three outside partner organizations, at least two partner organizations for

curriculum development and instruction and direct financial support, and at least one organization for volunteer management.

Among the 17 OPL programs, an average of five partner organizations contributed to the program in some way. Eight programs included at least six partner organizations. Dependence on partner organizations in OPL programs largely mirrored that of the MV programs: six of 16 depended exclusively on partner organizations for direct financial support. Of the 10 OPL programs that reported partner contributions to volunteer management, two depended on them exclusively, and three of 17 depended exclusively on partner organizations for program planning. An average of almost four partner organizations contributed to program planning for OPL programs, three to curriculum development and instruction, two to direct financial support, and less than one for volunteer management (some did not have a volunteer component).

Programs for which budgets had declined over the previous five years reported a smaller number of partners than programs whose budgets had increased during that period (4.5 vs. 5.75; $p < 0.05$). The difference appeared to be driven by the number of partners contributing financially: programs with increasing budgets averaged more than three contributing partner organizations, significantly more than the two partners contributing financially to programs with declining budgets ($p < 0.05$). Differences in the number of partners contributing in other ways were not statistically significant. This suggests that MV and OPL programs seeking to grow their annual budgets were

finding more success through new sources of funding than by soliciting increased contributions from existing partners.

Volunteer Service

Only seven of 22 MV programs required volunteer service after the initial training; volunteer activity was encouraged but not required by the other 15. The most common volunteer activities included leading or hosting educational tours and youth education (19 programs each), serving on boards or other leadership positions (17), and visiting with other landowners (16). Less common volunteer activities included writing articles or news columns, legislative advocacy, serving on municipal boards or in other leadership roles, service projects, assisting with Extension programs, organizing events, or distributing information.

Most programs focused the initial training on providing a deep and focused learning opportunity for a small group of learners each year; only seven programs trained more than 30 new volunteers annually, with three programs (Clemson University's Master Tree Farmer and Master Wildlifer and the University of Missouri's Woodland Steward) training 70 or more annually. However, 13 of 21 MV programs report 100 or more active volunteers, which suggests that volunteers remain active for several years after the initial training. Six programs reported over 200 active volunteers and two programs,

Pennsylvania Forest Stewards and the Wisconsin Coverts Project, reported over 400 active volunteers.

While several program managers identified the challenge of managing and reporting the work of an ever-growing group of volunteers, one northern program manager lamented that the program's biggest failing was

our lack of follow-through with co-operators [volunteers]. We constantly strive to be in closer contact with our network. This is the most important change that we will make.

This same manager plans to

begin regional 'get-togethers' so that co-operators from across the years can meet [each other]. We also hope to introduce co-operators to local conservation professionals (e.g. local land trusts) in the hopes that they can... work together in their region.

Seeking ways to more efficiently connect volunteers with those seeking assistance, other program managers plan to “strengthen connections between volunteers and potential volunteer opportunities” and “to implement a mentoring program that would allow the general public direct contact to volunteers.”

Program evaluation

Budgets and partnerships are inputs to Extension forestry programs. Evaluation data generally focus on outputs, which are one step removed from

the program impacts that create public value. While the survey instruments used in this study did not elicit direct evaluation data, the managers of MV and OPL programs did share the strategies that they use to measure program outputs, outcomes, and impacts (Julian 1997). Among the 22 MV and 17 OPL programs surveyed, the most common metrics that program managers used were participant evaluations of workshop or presentation quality (22 MV programs, 14 OPL programs), number of new participants or graduates annually (21, 10), changes in land management practices reported by participants (19, 11), number and type of volunteer contributions (17, 6), articles written by participants (7, 3), organizational leadership positions filled by participants (12, 3), and number of organizations served by participants (11, 1). Other metrics provided on open-ended questions include self-reported dollars saved or earned, contacts with natural resource professionals, and land management plans completed and implemented. Evaluation data were collected via on-site workshop or other event evaluations by 21 MV programs and 13 OP programs. Other evaluation data collection strategies less commonly used included an annual or multi-year survey, input from an advisory or steering committee, online and mail-in reporting of volunteer contributions, and focus group discussions with participants.

Increased attention to program evaluation was a major theme among the program changes planned for the next five years. Seven different program managers mentioned evaluation among their most important changes, including

“developing stronger descriptions of outcomes for the program,” “putting more emphasis on volunteer output and less on training,” “set[ting] broad concrete goals for volunteer output and work[ing] to inspire action.” At least four others planned to improve and standardize program evaluation procedures, including “improv[ing] assessment and documentation of longer term (>6 months) impacts.” For one program, this means a combination of “more rigorous volunteer hour reporting requirement” and establishing two new methods to streamline and simplify the methods by which volunteers can report their activity.

Trends and changes

MV and OPL programs report widespread increases over the past five years in effort spent marketing and evaluating their programs, as well as increases in a variety of key outputs, including the number of active volunteers and average output per volunteer (Figure 3). Despite these advances, the plurality of MV and OPL programs report declining budgets over the same period. In an open-ended question, MV and OPL program managers listed the three most important changes that they intended to implement within the next five years. As reported throughout this section, managers plan to implement changes primarily to improve communications with program participants, to increase partnerships, to stabilize and diversify program revenues, and perhaps most importantly to improve program evaluation procedures.

Discussion

Extension forestry programs nationwide employ an estimated 225 full time equivalent faculty and staff. Funded by a combination of federal, state, and local dollars, these individuals offer forestry education to the 10.4 million owners of 264 million acres non-industrial private forest land (Butler 2008) as well as natural resource professionals, logging contractors, elected officials, and numerous others. The 20 northern states have the highest Extension forestry capacity, at 0.69 FTE per million acres of private forest land. Capacity was lowest in the 12-state Rocky Mountain region, at 0.4 FTE per million acres. The largest state Extension forestry program, based at Oregon State University, reported a total of 23 FTEs.

Both state-level Extension forestry program leaders and the managers of MV and OPL programs report relatively widespread adoption of digital communication tools and techniques, with four of the five instructional and communication formats with the most widespread growth among both groups being digital (Table 2). Face to face workshops, cohort-based multi-day trainings, and telephone answer lines were used less frequently than five years ago. The fact that an equal percentage of MV program managers report increasing and declining use of cohort-based multi-day events suggests a change in format for these programs that should be further investigated in subsequent research. Traditionally, most MV programs offer their initial volunteer trainings

in this format, raising the question of how volunteers are being trained now compared with five years ago.

The increasing use of digital media may be a consequence of an apparent attempt to engage broad rather than finely targeted audiences: 80% of state-level programs reported offerings targeting all family forest owners (an immense population relative to Extension forestry capacity), but comparatively few reported targeting landowners by the location or size of their land ownership, or by gender or ethnicity. While large percentages of MV and OPL programs included all family forest owners as a target, MV and OPL programs were more likely to target specific audience subgroups than the state-level programs in which they were housed, including those audiences traditionally underserved by Extension forestry programs such as women (Redmore and Tynon 2011). As researchers advance in their ability to more finely segment landowners through the development of landowner typologies, MV and OPL programs may be well positioned to target specific segments in collaboration with trained peer volunteers from those communities. To the extent that Extension forestry programs move to better serve these audience, MV and OPL program models may become a more valuable component of state-level Extension forestry programs in the future.

The two-pronged combination of more widespread use of digital media to disseminate information to large audiences and more personal contact, through the work of peer volunteers, may become a more common educational strategy

as Extension forestry programs evolve. Emerging communication technologies such as social media platforms, email publication and tracking applications, and digital video have made it easier to publish content online, and for landowners to find it, than ever before. Adoption of these tools by Extension forestry faculty and staff has already begun, both as a way to maintain output in spite of declining capacity and as a way to proactively engage new learners. While Extension's primary focus is on education rather than information dissemination, information dissemination and awareness campaigns led by Extension faculty and staff can help to address a major constraint on private landowner assistance programs (Kilgore et al. 2008; Van Fleet et al. 2012). Effective use of these tools has potential to both increase awareness of relevant content and to encourage participation in Extension educational programs designed for behavior change and conservation impact. Future research should investigate the value and roles of digital communications in both information dissemination and Extension forestry educational programs.

Extension forestry programs are changing to address current issues. At both the state and MV and OPL program levels, the majority of these programs are offering more instruction now than they did five years ago on topics like climate change effects on forests, forest health and invasive species, and the use of technologies such as GPS and online mapping tools (Figure 1). Trends in topics addressed are similar between state-level Extension forestry programs and the subset of MV and OPL programs. However, a higher percentage of MV

programs have increased instruction on intergenerational land transfer, climate change, permanent land protection, and online mapping than the state Extension forestry programs in which they are housed (Figure 1). At both the state and MV program levels, the largest recent growth has been in topics like forest health, climate change, water quality protection, and urban forestry. Also at both levels, an average of one-third of programs have increased instruction on each of 21 topics, while only 12% of state-level programs and 7% of MV programs have reduced instruction on the same topics. In other words, state-level Extension forestry programs have found ways to add substantially to their educational portfolios without making proportional reductions or adding capacity. It is unclear how these additions have affected the quality of Extension educational offerings. While not directly addressed by the data, it seems likely that digital communication tools are enabling at least some of the increased instruction.

Increased targeting toward larger acreage landowners and the owners of land in specific high-priority areas both offer opportunities for Extension forestry programs to increase the impact of their work, particularly as program budgets decline. The positive relationship between state-level program capacity in FTEs and the number of audience segments specifically targeted would suggest that larger programs may be meeting the needs of at least some underserved audiences such as women landowners more fully than smaller programs. While state-level Extension forestry budget trend data are not available, annual federal appropriations through the Smith-Lever Act have

declined steadily in real dollars since the early 1990s (APLU 2012). Forty percent of MV and OPL program managers reported declining budgets over the past five years. If, similar to state natural resource agencies (Schroeder et al. 2011), Extension budgets continue to decline in the future, strategies that increase Extension's ability to engage the right target audiences may be a more important key to its long-term success.

While all Extension programs are designed to provide education to learners, forestry MV and OPL programs are designed to create public value both directly through participants' own land management actions and indirectly through the influence of volunteers on their peers. However, this second level of outcomes and impacts can be difficult to measure. One strategy is to estimate impacts is through the volunteer activity reports of program participants, who may not know what actions were ultimately taken by those landowners whom they served. The second is to survey the landowners served, but because volunteers are often self-directed and may not focus on collecting program evaluation data, contact information for those served by volunteers is often not available to evaluators. In many cases, program outcomes and impacts must be estimated from activity reports submitted by volunteers.

Conclusions

Landowner education is critical to promote sustainable management of the nation's 264 million acres of family forest land. Landowner awareness of management opportunities, ability to make informed decisions about land

management practices, engagement with technical assistance providers, and enrollment in or long-term conservation programs are all promoted by programs like those described in this study. State-level Extension forestry programs are adapting to offer increased education to address emerging topics such as the effect of a changing climate on forest resources. Through at least 22 MV and 17 other PTP programs targeting private forest owners, Extension faculty and staff are leveraging diverse partnerships, limited budgets, and a large pool of committed landowner volunteers to engage and inform landowners. While diverse in nature, these programs multiply the value of the public investment in Extension forestry faculty and staff by leveraging small annual budgets to support the work of volunteers, many of whom remain active for years. A lingering concern is a lack of financial support. MV and OPL program managers have traditionally sought external funds to keep their programs operational. Dependence on a small number of funding sources, in particular Forest Stewardship Program and Renewable Resources and Extension Act dollars, poses a challenge to the future stability of these programs, which serve as a foundation for the broad suite of public investments to support the conservation and management of the nation's privately owned forest resources.

Tables

Table 1: State-level Extension Forestry capacity in full-time equivalents (FTE) and forested land area.

State	Total EF capacity (FTE)	Total forest (1000 ac)*	Private forest (1000 ac)*	FTE / MM ac forest	EF FTE / MM ac private forest
<i>North:</i>					
Connecticut	3.50	1,794	1,383	1.95	2.53
Delaware	1.75	383	351	4.57	4.99
Iowa	0.75	2,879	2,552	0.26	0.29
Illinois	1.50	4,525	3,730	0.33	0.40
Indiana	5.30	4,656	3,888	1.14	1.36
Massachusetts	1.45	3,171	2,179	0.46	0.67
Maryland	3.00	2,566	1,957	1.17	1.53
Maine	3.00	17,673	16,575	0.17	0.18
Michigan	2.40	19,545	12,117	0.12	0.20
Minnesota	9.50	16,391	7,114	0.58	1.34
Missouri	1.10	15,078	12,393	0.07	0.09
New Hampshire	16.00	4,850	3,646	3.30	4.39
New Jersey	1.30	2,132	1,322	0.61	0.98
New York	9.15	18,669	14,438	0.49	0.63
Ohio	4.75	7,894	6,973	0.60	0.68
Pennsylvania	7.80	16,577	11,738	0.47	0.66
Rhode Island	0.40	356	303	1.12	1.32
Vermont	1.60	4,618	3,864	0.35	0.41
Wisconsin	11.5	16,275	11,117	0.71	1.03
West Virginia	3.00	12,007	10,418	0.25	0.29
<i>North Total:</i>	<i>88.75</i>	<i>172,039</i>	<i>128,058</i>	<i>0.52</i>	<i>0.69</i>
<i>Pacific Coast:</i>					
Alaska	2.35	126,869	35,875	0.02	0.07
California	8.00	32,817	13,202	0.24	0.61
Hawaii	1.25	1,748	1,155	0.72	1.08
Oregon	23.00	30,169	11,059	0.76	2.08
Washington	4.00	22,279	9,806	0.18	0.41
<i>Pacific Coast Total:</i>	<i>38.60</i>	<i>213,882</i>	<i>71,097</i>	<i>0.18</i>	<i>0.54</i>

Rocky Mountain:

North Dakota	2.75	724	510	3.80	5.39
New Mexico	0.25	16,682	6,331	0.01	0.04
Arizona	0.00	18,671	7,381	0.00	0.00
Colorado	0.00	22,612	5,360	0.00	0.00
Idaho	3.00	21,430	2,553	0.14	1.18
Kansas	1.50	2,106	1,994	0.71	0.75
Montana	4.00	25,014	7,026	0.16	0.57
Nebraska	0.25	1,245	1,092	0.20	0.23
Nevada	0.00	11,089	212	0.00	0.00
South Dakota	0.40	1,682	492	0.24	0.81
Utah	1.70	17,962	3,013	0.09	0.56
Wyoming	1.50	11,445	1,942	0.13	0.77

Rocky Mountain

<i>total:</i>	<i>15.35</i>	<i>150,662</i>	<i>37,906</i>	<i>0.10</i>	<i>0.40</i>
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South:

Alabama		22,693	21,264		
Arkansas	5.20	18,830	15,156	0.28	0.34
Florida	4.55	16,147	11,427	0.28	0.40
Georgia	4.00	24,784	22,440	0.16	0.18
Kentucky	9.00	11,970	10,647	0.75	0.85
Louisiana	5.95	14,222	12,512	0.42	0.48
Mississippi	15.35	19,622	17,320	0.78	0.89
North Carolina	5.00	18,447	15,497	0.27	0.32
Oklahoma	2.00	7,665	7,000	0.26	0.29
South Carolina	8.80	12,746	11,189	0.69	0.79
Tennessee	5.50	14,480	12,310	0.38	0.45
Texas	1.00	17,273	16,204	0.06	0.06
Virginia	16.00	15,766	13,000	1.01	1.23

<i>South total:</i>	<i>82.35</i>	<i>214,645</i>	<i>185,966</i>	<i>0.38</i>	<i>0.44</i>
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<i>US total</i>	<i>225.05</i>	<i>1,287,811</i>	<i>660,088</i>	<i>0.29</i>	<i>0.56</i>
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* Source: Butler (2008)

Table 2. Mean Extension Forestry capacity in full-time equivalents (FTE) in total and dedicated to Master Volunteer (MV) and other peer learning (OPL) programs.

	Mean FTE	Std. Deviation	Median	Range
<i>State-level forestry programs¹:</i>				
Specialists	2.08	2.156	1.0	0-9
Educators	1.88	2.919	0.75	0-13
Support staff	0.63	0.751	0.5	0-4
Total	4.59	4.925	3.0	0-23
<i>Dedicated to MV programs²:</i>				
Specialists	0.31	0.415	0.2	0-1.2
Educators	0.21	0.375	0.0	0-1
Support staff	0.11	0.164	0.0	0-0.5
MV: Total	0.62	0.592	0.35	0-1.9
<i>Dedicated to OPL programs³:</i>				
Specialists	0.50	0.697	0.2	0-2
Educators	0.67	0.985	0.0	0-3
Support staff	0.25	0.399	0.0	0-1
OP: Total	1.13	1.453	1.0	0-5.5

¹ Mean values across 49 states reporting FTE data.

² Mean values of the 19 states with at least one MV program.

³ Mean values of the 15 states with at least one OPL program.

Table 3: Audiences targeted by state-level Extension forestry programs and forestry-related Master Volunteer (MV) and other peer learning (OPL) programs. Audience categories are non-exclusive and several programs target multiple audiences.

Audience	Number of states	Number (%) of MV programs	Number (%) of OPL programs
All family forest owners	40 (80%)	18 (82%)	10 (59%)
Natural resource professionals	40 (80%)	--	--
General public	30 (60%)	--	--
Urban foresters or tree care specialists	23 (46%)	--	--
Youth	23 (46%)	--	--
Logging contractors	22 (44%)	--	--
Public officials	22 (44%)	--	--
Small-acreage landowners	15 (30%)	9 (41%)	4 (24%)
Landowners by residence location	12 (24%)	5 (23%)	4 (24%)
Other audiences	12 (24%) ¹	6 (27%) ²	3 (18%) ³
Large-acreage landowners	10 (20%)	8 (36%)	3 (18%)
Landowners by land location	9 (18%)	6 (27%)	1 (6%)
Women landowners	8 (16%)	6 (27%)	5 (29%)
Landowners in specific ethnic or cultural groups	5 (10%)	3 (14%)	4 (24%)

¹ Tribal communities, educators, 4-H volunteers, and members of the wood products industry.

² Community decision makers and leaders, motivated individuals regardless of land ownership status, and landowners with a management plan.

³ Homeowners.

Table 4. Extension forestry Master Volunteer programs in alphabetical order by state.

Program Name	Host Institution	State	Year first offered	# Trained per year	# Active Volunteers
Master Tree Farmer	University of Arkansas	AR	2000	40-49	
Coverts Project	University of Connecticut	CT	1983	20-29	100-199
Community Forest Stewards	University of Florida	FL	2008	10-19	25-49
Master Woodland Manager	Iowa State University	IA		30-39	100-199
Master Forest Stewards	University of Idaho	ID	2009	10-19	25-49
Keystone	University of Massachusetts Amherst	MA	1988	20-29	200-299
MD Woodland Stewards	University of Maryland	MD	1991	20-29	100-199
Master Woodland Steward	Michigan State University	MI	1992	20-29	< 25
Woodland Advisor	University of Minnesota	MN	1988	< 9	100-199
MO Woodland Steward	University of Missouri	MO	2006	70 +	50-99
Master Forest Steward/Tree Farm	Montana State University	MT	2004	60-69	100-199
NH Coverts	University of New Hampshire	NH	1995	20-29	100-199
NJ Woodland Stewards	Rutgers University	NJ	2010	< 9	< 25
Master Forest Owner	Cornell University	NY	1991	10-19	200-299
Master Woodland Manager	Oregon State University	OR	1982	20-29	200-299
Land Stewards Program	Oregon State University	OR	2009	20-29	50-99
PA Forest Stewards	The Pennsylvania State University	PA	1991	20-29	400-499
COVERTS	University of Rhode Island	RI	2006	20-29	50-99
Master Tree Farmer	Clemson University	SC	1980	70 +	100-199
Master Wildlifer	Clemson University	SC	1995	70 +	50-99
Coverts Project	University of Wisconsin Madison	WI	1994	30-39	400-499
Master Woodland Steward	University of Wisconsin Stevens Point	WI	2002	10-19	200-299

Table 5. Other Extension forestry peer learning programs in alphabetical order by state.

Program Name	Host Institution	State	Year first offered	# Trained per year
Women Woodland Owners	University of Arkansas	AR	2008	< 25
Ties to the Land	University of California	CA	2011	200-299
Mentorship Program	Colorado State University & Cons. Districts	CO	2012	< 25
Forest Stewardship Short Course	University of Connecticut	CT	1998	25-49
Forest Stewardship Program	Florida Forest Service & University of Florida	FL	1992	500 +
Parish Forest Landowner Assocs.	Independent, with Louisiana State University	LA	1985	300-399
Minnesota Women's Woodland Network	University of Minnesota	MN	2009	300-399
Montana Tree Farm	American Forest Foundation.	MT	1941	400-499
Wildfire Awareness Program	University of Nevada	NV	1997	200-299
Women Owning Woodlands Network	Oregon State University	OR	2005	300-399
PA Woodland Owner Assocs.	The Pennsylvania State University	PA	1986	500 +
SC County Landowner Assocs.	Independent, with Clemson University	SC		500 +
VA Forest Landowner Educ. Program	Virginia Polytechnic University	VA	1996	500 +
Ties to the Land	Wisconsin Woodland Owners Association	WI	2010	50-99
WI Woodland Advocates Program	Wisconsin Family Forests, Inc.	WI	2008	25-49
WI Woodland Leadership Institute	University of Wisconsin - Stevens Point	WI	2001	100-199
WV Woodland Stewards	West Virginia University	WV	2002	50-99

Table 6: The number of 39 Master Volunteer and other peer learning programs receiving revenue from five common funding sources.

	Forest Stewardship Program	Renewable Resources & Extension Act	Registration fees	Conservation orgs	Other grants
None	27	27	12	28	14
1-19%	0	3	15	7	4
20-49%	4	7	3	3	7
50% or more	8	2	9	1	14
Mean % budget ¹ (sd)	16.7% (29.3)	11.2% (22.6)	23.3% (32.2)	4.4% (9.9)	34.3% (39.2)

¹Figures do not total 100% because programs are not fully funded by these five sources.

Table 7. Types of partner organizations by contribution type for 22 Master Volunteer and 17 other peer learning programs.

	Any contribution	Curriculum devel. & delivery	Financial support	Program planning	Volunteer mgt.
University	52	48	26	43	26
Landowner association	27	7	11	19	10
Conservation or other NR district	8	8	4	7	3
Federal agency	20	8	7	11	1
State agency	42	28	17	31	6
Trade or industry group	16	8	8	12	3
Conservation or environmental group	15	5	8	9	5
Other	6	2	4	2	1
Total	186	114	85	134	55

Figures

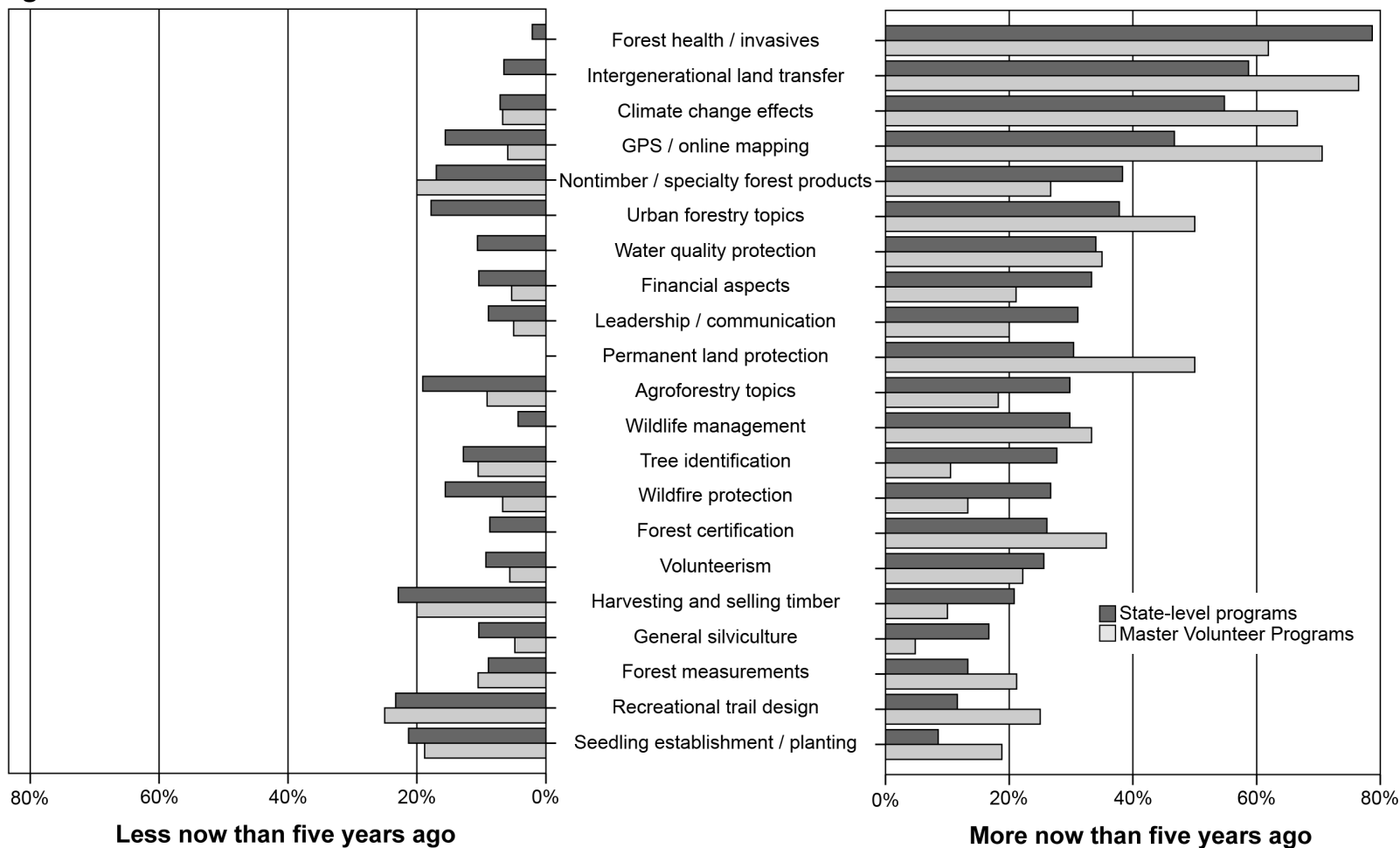


Figure 1. The percentage of state-level Extension forestry programs and individual MV programs teaching specified topics more (right side) or less (left side) frequently now than five years ago

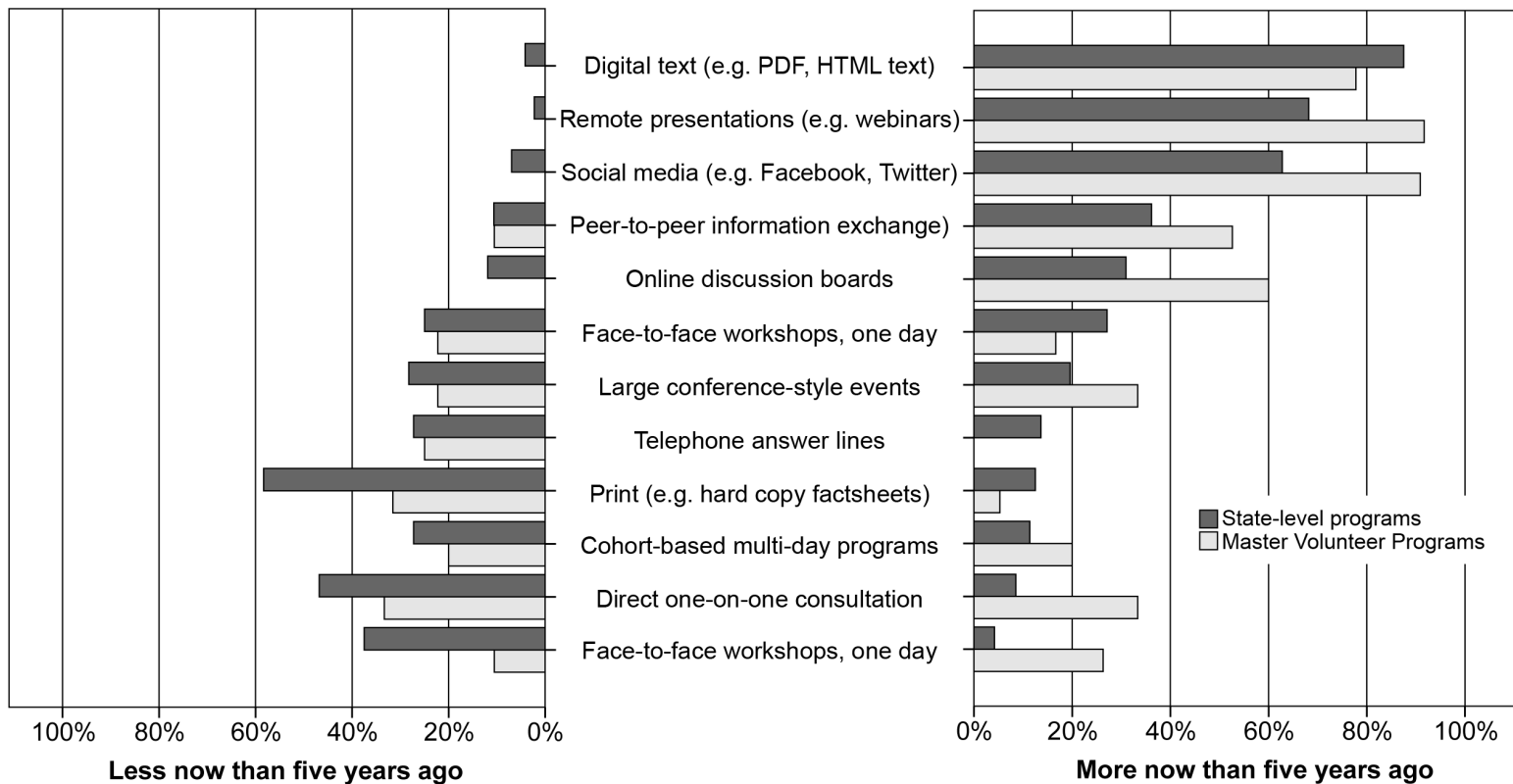


Figure 2. The percentage of state-level Extension forestry programs using specified communication and instructional formats more (right) or less (left) now than five years ago.

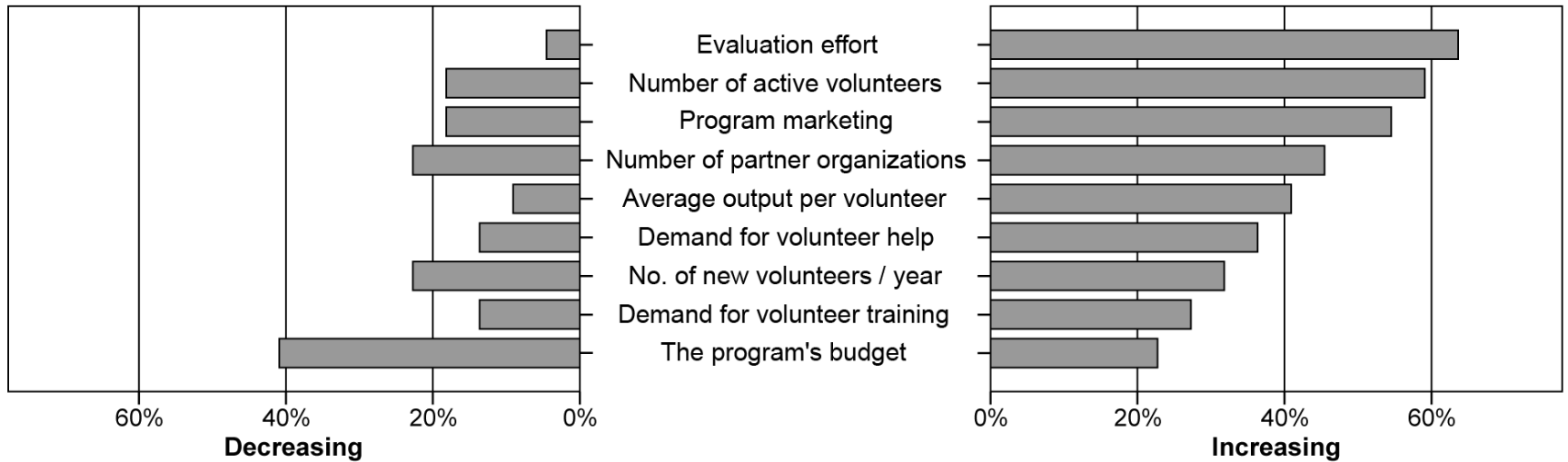


Figure 3. Reported changes to 22 Master Volunteer (MV) and 17 other peer learning (OPL) programs over the past five years. The X-axis indicates the percentage of programs reporting increases (right) or decreases (left) in each program component.

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Chapter 5: Conclusions

This research will be of primary applied value to Extension educators designing and delivering education programs to forest landowners. The results point to a number of opportunities for Extension to serve the educational needs of forest landowners. This closing section of the dissertation addresses potential applications of this research as well as areas in which additional research is needed to advance or apply the primary findings of these studies.

Opportunities for Extension

Intentional network creation: Minnesota landowners with larger forestry information networks were more satisfied with those networks. While somewhat intuitive, this finding suggests a new approach to Extension programming that is more focused on building personal networks than simply imparting information. While in practice many Extension events involve opportunities for interaction among learners, this could be expanded in two key ways: First by ensuring the presence of key points of contact at Extension events. The identities of these individuals will depend on the context and topical focus of the event, but may include local trained volunteers, public or private sector professional foresters, tax assessors, land trust representatives, loggers, or others. Creating opportunities for personal interaction between landowners and these key sources of conservation information increases landowner

awareness of points of contact that can be activated during times of need (Kittredge 2004). It also may help to differentiate the specific services or types of assistance available from each source, reducing errors and frustration associated with incorrect expectations of the various sources.

While not uncommon in Extension forestry programs, this approach underlies recent research into the Conservation Awareness Index concept (Van Fleet et al. 2012) as well as the Massachusetts Woodland Forums (Ma et al. 2012). The Conservation Awareness Index concept provides a readymade evaluation framework for Extension programs that adopt a more intentional approach to network and relationship building.

Sharing the stage: The second way that Extension educators could focus on building relationships is by inviting key landowners to share their experiences as hosts and presenters at Extension events. Landowners' preferences for large, diverse networks was a clear finding both of Sagor (In review) and Kueper (2013). Extension has long featured a mix of professionals and peer landowners during forestry education programs. Related to the idea of intentional network creation is the idea of creating opportunities for landowners to hear not only from natural resources professionals or Extension faculty, but also from landowners like them who have implemented well-informed sustainable forest management practices. Mixing the voices, experiences, and knowledge of landowners with those of researchers and natural resource professionals creates a learning environment that features multiple

perspectives, which is one of the most highly valued elements of peer learning programs (Kueper 2013). This approach also builds self-sustaining knowledge networks to foster local knowledge and share experiences (Charnley et al. 2007).

Bridging the private forest management assistance gap in

Minnesota: The Minnesota Department of Natural Resources, Division of Forestry (DNR) has primary responsibility to provide private forest management (PFM) assistance to the state's approximately 200,000 owners of 5.3 million acres of private forest land (Butler et al. 2012). According to Sagor (In review), while 45% of Minnesota forest landowners have received information from a public sector forester, only 23% have obtained a written management plan. While DNR is not the only public sector source of forestry assistance, it is the largest. DNR was named far more frequently than Soil and Water Conservation District foresters, who also provide public PFM assistance. The gap between recipients of public sector forestry advice and written management plans suggests that at least 22% of Minnesota forest landowners had obtained less formal advice from a public sector forester. Anecdotal evidence suggests that advice was frequently in the form of either telephone conversations or property visits to discuss possible forest management practice implementation.

However, DNR's PFM capacity has been reduced in recent years in response to shortfalls in the state budget. While private consulting foresters have successfully taken over DNR's role in writing property-specific Forest Stewardship Plans, there may be a need to provide an alternative source of

forestry advice. Master Volunteers may be well positioned to do this if a partnership can be established between Extension's Woodland Advisor program and the DNR Division of Forestry to route incoming requests for basic forestry information to a trained local Woodland Advisor.

A common criticism of this approach is that volunteers may supplant the role of a forestry professional by providing land management advice. In practice, most volunteers understand the limitations of their expertise and the value of professional advice. They also understand that their primary role is to connect landowners to professional sources of assistance. To test this belief, Allred et al (2011) surveyed landowners who had been contacted by a New York Master Forest Owner volunteer to learn the outcomes of that visit. Landowners reported that their primary actions since the visit were to develop clearer land management goals and objectives and to seek professional assistance. While no landowner education program is perfect, this approach has potential to fill at least part of the gap in PFM services recently created by the reduction in public forester capacity in Minnesota.

Increased use of digital communication to build and maintain

networks: One of the most common themes among the managers of Extension Master Volunteer programs was the increasing use of digital communications. This occurred in many forms, from simply posting traditional Extension content online to building new social networks and online discussion boards for landowners to connect with Extension faculty as well as their peers. Minnesota

forest landowners are more satisfied not only with larger but also more diverse networks (Sagor In review). Digital communication tools such as mass email, online social networks, and discussion boards can provide relatively low-cost platforms to build and maintain the networks that landowners form while attending Extension events. While adoption of social network technology is relatively low among the demographic groups common among landowners (Butler et al. 2007), adoption is growing consistently among all demographics (Pew Internet and American Life Project 2005).

Social networks that leverage Extension's credibility and trust among landowners, that are clearly focused on topics and communities of interest, and that build on existing personal relationships formed during Extension events may make online networks more attractive to some landowners. At the time of this writing, Cornell University Cooperative Extension and West Virginia University Extension both maintain active forest landowner social networks¹ to answer landowner questions and promote discussion. With approximately 50,000 unique visitors annually, the University of Minnesota Extension's MyMinnesotaWoods website has seen double-digit growth in site traffic every year since its 2007 launch. While all of these numbers are small relative to their states' landowner populations, all are experiencing rapid growth. Their importance as a means to build and maintain landowners' information networks seems likely to continue to grow in the future. These tools can also reinforce

¹ <http://cornellforestconnect.ning.com/> and <http://wvstewards.ning.com/>

learning from Extension education programs and serve as repositories for Extension content, further building their value to landowners.

Areas of additional research:

The studies described here point to new research needs to address a number of unanswered questions. In this closing section, I suggest directions for future research to build on this work and inform the design of future public investments to encourage sustainable private forest management.

How do landowner networks change over time? Given average rotation lengths of 40-90 years for most of Minnesota's common forest types, many landowners will only have the opportunity to sell timber once or a few times. Between periods of active management, their forestry information networks may "run in the background" (Kittredge 2004) for long periods, only being activated when an opportunity or need arises. More research is needed to understand landowners' ability to engage these networks and build new relationships with helpful others when that research is needed. Finnish landowners' networks changed as they moved from Rogers' (2003) decision innovation stages during enrollment in a voluntary land protection program (Korhonen et al. 2012).

Understanding more about the ways that networks change in advance of different kinds of planned management actions, and the patterns with which networks are activated at times of need would be quite useful to Extension

foresters and others concerned with providing efficient education, information, and assistance to private forest owners.

Landowner typologies based on personal networks. Korhonen et al. (2012) developed a typology of landowners based on their personal networks around timber sales. Many other kinds of landowner typologies have been developed in recent years based on landowner attributes, values, and motivations. These typologies can inform landowner awareness and education programs, but if communication patterns or personal networks are considered in the research, it's usually after typology development. Developing new typologies based on both values and motivations and personal networks would more directly inform efforts to encourage sustainable private forest management.

What drives the relationship between network satisfaction and land management history? Landowners who had implemented a large number of management activities were more satisfied with their forestry information networks than less active land managers. But more research is needed to better understand this relationship: Are landowners who are dissatisfied with their forestry information networks averse to management, or have active managers may simply had more opportunity to work with different alters and identify those in whom they have the greatest confidence?

How do different kinds of alters influence landowner behavior?

More research is needed to identify the relative roles of strong and weak ties as

well as different categories of alters. Tie strength based on a helpfulness varied little among alter categories, suggesting that different landowners value different kinds of information or assistance. A deeper understanding of how the different members of a landowner's forestry information network provided information and assistance and how that was used would assist in the design of future landowner education and assistance programs.

How can the problem of tie strength bias be reduced? Mailed surveys are less costly to administer to a large sample than interviews or telephone surveys of similar complexity. Yet the problem of tie strength bias may be harder to overcome on written surveys. Alternative forms of name generators, perhaps including named organizations to prompt recall, might reduce tie strength bias. But overly specific prompts may also predispose certain nominations, replacing one form of bias with another.

How can digital communications supplement core Extension programs? While many Extension foresters report increasing use of digital communication tools, Extension educators would benefit from additional research into the value and roles of digital communications in both information dissemination and Extension forestry educational programs. Different kinds of digital media engage different kinds of internet users and lead to different learning outcomes. While some digital communication tools are particularly effective for information dissemination, they may not be as effective for teaching and learning. Research into the outcomes of potential uses of new digital

communication tools in Extension education programs would help Extension faculty and staff make more informed choices about which technologies to adopt in their work and what outcomes to expect from them.

How do landowners rate the quality of interaction with a trained volunteer compared with a professional forester? As already discussed, there may be an opportunity in Minnesota for trained volunteers to serve in a more formal capacity to assist public sector foresters in meeting landowner demand for assistance given reduced professional capacity. This model has been in place for years in New York, where evaluations suggest that it has worked well (Allred et al. 2011). Additional research is needed to better understand which roles are well suited to trained volunteers and which are not. Clearly landowners can serve well as a first point of contact. Equally clearly, professionals should be the ones to dispense technical land management advice. But in between those two points are a lot of potential roles for volunteers, including helping landowners develop goals and objectives for their properties, recommending general management directions, recommending specific foresters or loggers for subsequent contact, enrolling in cost-share or financial incentive programs, and so on. More detailed evaluations of the outcomes of landowner assistance from trained volunteers would inform both volunteer training curricula and recommended roles to make the most effective use of limited volunteer as well as professional capacity.

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Appendices

Appendix 1. Minnesota personal networks survey protocol.

Appendix 2. Minnesota personal networks survey instrument.

Appendix 3. Guide for follow-up telephone surveys.

Appendix 4. Online survey instrument for state-level Extension forestry program data.

Appendix 5. Online survey instrument for Master Volunteer program data.

Appendix 6. Online survey instrument for other peer learning program data.

Appendix 1. Survey protocol

Data collection protocol: Woodland owner info networks

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Obtaining addresses:

Address list obtained from county tax assessors within the 12-county study area. List includes all owners of 20+ acres of wooded land. This includes parcels in the following property tax classifications:

- 111, 2b timberland
- 2c managed forest land
- 232, 4c(5) seasonal recreational residential
- 121, 2b, Agricultural non productive - Ag homestead
- 129 is Nonproductive - non homestead agricultural
- 123 is Nonproductive - Ag relative homestead

Selecting a sample:

All landowners on the tax assessor spreadsheet were assigned a 17-digit random number by Excel. Random numbers, and the associated records, were then sorted in ascending order. Respondents were contacted starting at the top of the randomized list. The following types of records were excluded:

1. Commercial timber companies, e.g. Potlatch, Boise, etc.
2. Very large public organizations, e.g. Mille Lacs Band of Ojibwe

Trustees were included as normal respondents.

Phase 1: Mailout survey Tailored Design protocol:

1. Day 1: Prenotice letter on Extension letterhead notifying recipient that a survey is on the way.
2. Day 8: Complete survey packet mailed first class. Includes cover letter with consent statement, questionnaire, and stamped return envelope.
3. Day 15: Postcard thanking those who have responded already and encouraging others to respond.
4. Day 29: Replacement complete survey packet mailed first class. Includes a different cover letter with consent statement, this time (following Dillman) more firmly encouraging participation. Packet also includes questionnaire and stamped return envelope.
5. Day 43: Final letter to non-respondents indicating that this is the final opportunity to participate and offering to re-send any materials needed to complete and return the questionnaire.

Phase 2: Telephone follow-up protocol:

Obtain telephone number from online listings. Phone numbers were not included in tax records. I used a two-step search process to identify phone numbers from public listings at <http://find.person.superpages.com/>:

1. Search by first name, last name, city, state. If a two-person name (e.g. John and Mary Smith), search for each name separately. If listings are found, choose the listing with an address matching the sample record.
2. If no listing is found, search by first initial, last name. Be sure to include the surrounding area using the checkbox on the website. If there's still no match, search by last name only and look for an address match.
3. Finally, search for the name and address on Google.com. If a reliable match is found, use it. If not, conclude that no listing is available and move on to the next step.

Phone call content:

If the respondent replies to a mailing and suggests a time to call, call at that time and conduct the survey.

If respondent has given no indication when to call, the purpose of the first call is simply to provide a bit more information about the study and to schedule a convenient time for the survey. If respondent prefers, the survey can be conducted during the first call.

In either case, follow the oral survey guide during the call.

After the call is complete:

Send a thank you letter.

Appendix 2. Minnesota personal networks survey instrument



Minnesota Woodland Owner Questionnaire



Contact: Eli Sagor,
University of Minnesota
(612) 360-4476, esagor@umn.edu



Section 1: Background information

1. How many acres of woodland do you own in Minnesota?
 - Under 20 acres
 - 20-49 acres
 - 50-99 acres
 - 100-239 acres
 - 240 or more acres

2. In what year did you acquire your first parcel of Minnesota woodland?

3. How far from your nearest Minnesota woodland parcel is your permanent residence?
 - On or beside it
 - 0-25 miles away
 - 26-75 miles away
 - More than 75 miles away

4. How often do you spend time in your Minnesota woodlands for any reason? *Please check the box that best describes your experience over the course of an entire year.*
 - Once or more per week
 - Once or twice per month
 - Once or twice every 3 months
 - Once or twice per year
 - Less than once per year

5. Do you have a written management plan for your Minnesota woodland prepared by a natural resource professional?
 - Yes, for all of my woodland
 - Yes, for only some of my woodland
 - No

Section 2: Sources of information

6. Since acquiring your Minnesota woodland, **what type of information** have you obtained from each of the following sources?

People & groups:	General woodland info	Land care & managem't suggestions	Connections to info or people	None or N/A
Family members	1	2	3	9
Other woodland owners	1	2	3	9
Friends or coworkers	1	2	3	9
Logging contractors	1	2	3	9
Public foresters: DNR, SWCD, or other	1	2	3	9
Private foresters	1	2	3	9
Extension agents	1	2	3	9
Realtors	1	2	3	9
Conservation or environmental groups	1	2	3	9
Other: _____	1	2	3	9

Written or educational sources:

Workshops or classes	1	2	3	9
Books, fact sheets, or publications	1	2	3	9
Internet	1	2	3	9
Newspapers	1	2	3	9
Magazines	1	2	3	9
Newsletters	1	2	3	9
Other: _____	1	2	3	9

7. When you need to make decisions about the care and management of your woodland, **how helpful** have you found information from each of the following sources?

People & groups:	Not at all helpful	Slightly helpful	Somewhat helpful	Very helpful	N/A
Family members	1	2	3	4	9
Other woodland owners	1	2	3	4	9
Friends or coworkers	1	2	3	4	9
Logging contractors	1	2	3	4	9
Public foresters: DNR, SWCD, or other	1	2	3	4	9
Private foresters	1	2	3	4	9
Extension agents	1	2	3	4	9
Realtors	1	2	3	4	9
Conservation or environmental groups	1	2	3	4	9
Other: _____	1	2	3	4	9

Written or educational sources:

Workshops or classes	1	2	3	4	9
Books, fact sheets, or publications	1	2	3	4	9
Internet	1	2	3	4	9
Newspapers	1	2	3	4	9
Magazines	1	2	3	4	9
Newsletters	1	2	3	4	9
Other: _____	1	2	3	4	9

8. Think about all of your sources of woodland information together as your woodland information network. **How satisfied are you** with each of the following aspects of your network?

	Not satisfied	Slightly satisfied	Somewhat satisfied	Very satisfied
Ease of accessing woodland information	1	2	3	4
Reliability of info obtained	1	2	3	4
Relevance to your specific situation	1	2	3	4
Trustworthiness of info	1	2	3	4
Timeliness: Getting info when you need it	1	2	3	4

9. How concerned are you about each of the following issues over the next 10-20 years?

	Not at all concerned	Somewhat concerned	Very concerned	Extremely concerned
Estate tax burden of transferring land to next generation	1	2	3	4
Wood product market conditions	1	2	3	4
Climate change impacts on woods	1	2	3	4
Insect & disease problems	1	2	3	4
Rising property taxes	1	2	3	4
Choosing member(s) of the next generation to assume ownership	1	2	3	4
Encroaching development	1	2	3	4
Wildfire	1	2	3	4
Managing invasive species	1	2	3	4
Other (specify): _____	1	2	3	4

10. Please list **actual people or other sources from whom you've received woodland information**. This includes written or verbal information. It can include anything from chatting about wildlife habitat improvement or timber prices; to obtaining a written woodland management plan; to connections to other sources.

Name This source is a... *(check all that apply, to the best of your knowledge)*

	Family member	Woodland owner	Friend or coworker	Logging contractor	Public forester (DNR, SWCD, etc)	Private forester	Extension agent	Realtor	Conservation or environmental group
Sample:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Neighbor Joe</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Question 10, continued:

Conservation or environmental group	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Realtor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Extension agent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Private forester	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Public forester (DNR, SWCD, etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Logging contractor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Friend or coworker	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Woodland owner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Family member	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

11. Next, look back at your list from the previous question. When you need to make a decision about the care and management of your woodland, which of the four sources from that list are most helpful?
Fill in one row for each.

Person or source:	What makes this source particularly helpful to you?
1	
2	
3	
4	

12. **Which of the following activities** have you completed on your woodland since you acquired it?
 Please also indicate which **you plan to complete** in the future.

	Never	Once	More than once	Don't know	Plan to in the future? (Circle one)	
					Yes	No
Controlling invasive species	1	2	3	9	Yes	Don't know
Planting trees	1	2	3	9	Yes	Don't know
Obtaining a written woodland management plan	1	2	3	9	Yes	Don't know
Enrolling in a property tax relief or incentive payment program	1	2	3	9	Yes	Don't know
Harvesting timber, including firewood, for sale	1	2	3	9	Yes	Don't know
Harvesting timber, including firewood, for personal use	1	2	3	9	Yes	Don't know
Improving wildlife habitat	1	2	3	9	Yes	Don't know
Obtaining a conservation easement	1	2	3	9	Yes	Don't know
Other (specify): _____	1	2	3	9	Yes	Don't know

Section 3: A bit more information about you

13. How important is each of the following reasons for owning woodlands to you?

	Not at all important	Somewhat important	Very important	Extremely important
To enjoy beauty or scenery	1	2	3	4
To protect nature and biological diversity	1	2	3	4
For land investment	1	2	3	4
Part of home or vacation home	1	2	3	4
Part of farm	1	2	3	4
Privacy	1	2	3	4
To pass on to children or other heirs	1	2	3	4
To cultivate or collect nontimber forest products	1	2	3	4
To produce firewood or biofuel	1	2	3	4
To produce sawlogs, pulpwood, or other timber products	1	2	3	4
Hunting or fishing	1	2	3	4
For recreation other than hunting or fishing	1	2	3	4
Other (specify): _____	1	2	3	4

14. Indicate your agreement or disagreement with each of the following statements.

Statement	Strongly disagree	Disagree	Agree	Strongly agree	Don't know
Family-owned woodlands should be actively managed to meet society's needs.	1	2	3	4	9
Other landowners like me know best how to manage woodlands.	1	2	3	4	9
I'd like to sell timber but don't know who to call for trusted advice.	1	2	3	4	9
Forestry professionals know best how to manage woodlands.	1	2	3	4	9
I don't need woodland advice because I don't plan to harvest timber.	1	2	3	4	9
I'd like to talk to a professional forester but don't want to pay for their advice.	1	2	3	4	9
If and when I ever need help with my woodlands, I know who to call.	1	2	3	4	9
Family-owned woodlands should be left alone in a natural state.	1	2	3	4	9
Climate change is likely to have major effects on Minnesota woodlands.	1	2	3	4	9

15. Think about other owners of woodland similar to yours. Which of the following do you think best applies? *"Active management" may include controlling invasive species, harvesting timber, planting trees, improving wildlife habitat, or many similar activities.*

Most other woodland owners manage their land...

- far less actively than I do
- a bit less actively than I do
- about as actively as I do
- a bit more actively than I do
- far more actively than I do

16. Have you ever taken classes for credit on woodland management or a related field in school?

- Yes No

17. Have you ever made your living as a logger or natural resources professional?

- Yes, primary source of income
 Yes, but only half or less of my income
 No

18. In what year were you born? _____ (year)

19. What is the highest grade or year of school you have completed?

- 11th Grade or less
 High school graduate or GED
 Some college
 College graduate
 Graduate or professional school

If you have any comments about the contents of this questionnaire, please write them here or enclose a separate sheet:

Thank you very much for your time completing this important questionnaire.

**Please fold your completed questionnaire vertically
and place it in the stamped return envelope.**

Please return your completed questionnaire to:

Minnesota Woodland Owner Questionnaire
University of Minnesota
1530 Cleveland Avenue North
St Paul, MN 55108

Appendix 3. Follow-up telephone survey guide

Follow-up interview guide: Woodland owner info networks

Initial contact via telephone:

[If no answer: Leave no message on the first or second call. On the third consecutive unsuccessful call, leave the following message:]

Hello, this is Eli Sagor calling to follow up on a letter I sent you about a week ago. I'm doing research at the University of Minnesota looking at woodland owners' sources of information. To participate in the study, please call me at (612) 624-6948. Thank you.

Hello. This is Eli Sagor calling. I'm doing research at the University of Minnesota looking at woodland owners' sources of information. I'm calling to follow up on a letter I sent you a week ago. Did you receive that letter?

[If no: Confirm name and address. If correct, go to next item.]

The purpose of the study is to learn more about how woodland owners get information and advice about their land. You completed a mail survey a few weeks ago, and I'm calling with a few more questions to follow-up on the survey. The conversation should take between 10 and 25 minutes. Right now I'm just calling to set up a time that's convenient. Are you willing to participate in the interview?

[If no, to assess nonrespondent bias:] OK. May I just ask you just three quick questions then?

1. How many acres of woodland do you own?
2. How long have you owned woodland in Northern Minnesota?
3. Have you ever harvested or sold timber from land that you own?

Thank you for your time. *[end call]*

[If yes: Confirm name and address. If correct, go to next item.]

When would be a convenient time to call you back?

If respondent prefers to do the interview now, go on to next item. If not, call back at the designated time. After greeting the respondent, repeat consent statement, then go on to next item.

Interview:

[If a separate call from consent statement, repeat consent statement.]

As I mentioned, the purpose of the study is to learn more about how woodland owners get information and advice about their land.

First, I understand you own about ___ acres of woodland in Minnesota. Is that correct?

Why don't you tell me a bit about your woodland?

Prompts: How many parcels? Is it all wooded, or is any open land? What species of trees?

On your questionnaire, you indicated that you had [completed, or not completed, activities X, Y, and Z (e.g. planted trees, controlled invasive species, harvested timber...)]. Do you want to tell me a bit more about those activities?

You also listed a number of different sources of information about your woodland. Specifically, you mentioned receiving information from [name listed sources here]. Do any other sources come to mind that should be on that list?

Would you tell me a bit more about how you're connected to those sources?

Prompts: How did you meet [X]? How often are you in contact? In what ways has [X] helped you gain information or make land care and management decisions?

Next, I'm interested in how your different sources of information are connected to one another. I'll go through a list of the sources you named, one by one, and ask you whether that source knows each other source. For each one, please tell me one of the following things, to the best of your knowledge:

1. As far as I know, they have never met.
2. As far as I know, they know each other, but are not in frequent contact.
3. As far as I know, they know each other well and / or are in frequent contact.

That's all of my questions for you. Do you have any questions for me before I let you go?

Thank you very much for your time! *[end call]*

Appendix 4. Online survey instrument for state-level Extension forestry program data.

About the Study

About the Study

This survey is designed to review the status and trends in Extension Forestry programming across the United States. Your response will make it possible to describe changes in Extension Forestry capacity, teaching methods, and content over the past 5 years. As you are the only person receiving this survey for your state, your individual response is very important! Thank you for taking the time to complete this survey.

Participation in the study is optional. By participating, you indicate your consent for your responses to be compiled with those of other participants and to appear in published reports. Your responses are entirely voluntary. There is no penalty for choosing not to complete the survey.

Section 1: About your state's Extension Forestry Program

Section 1: About your state's Extension Forestry Program

In this section, we ask questions that pertain to your state's Extension Forestry Program as a whole.

1) Which state's Extension Forestry program do you represent?

State

2) Which of the following specific audience segments are the **primary target(s)** for one or more of your Extension Forestry program offerings? "Primary target" means the program is specifically designed to meet the unique needs and preferences of the audience indicated. Check all that apply:

- a. All family woodland owners in your state
- b. Small-acreage family woodland owners
- c. Large-acreage family woodland owners
- d. Women family woodland owners
- e. Family woodland owners from specific ethnic or cultural groups
- f. Family woodland owners that live in a specific geographic area
- g. Family woodland owners that own land in a specific geographic area
- h. Logging contractors
- i. Natural resource professionals
- j. Urban foresters or tree care specialists
- k. General public
- l. State, county, municipal, or other government officials
- m. Youth
- n. Other (please specify)

3) Indicate how frequently each of the following **information dissemination and teaching formats** is used in your Extension Forestry program now relative to 5 years ago.

	Much less frequently used now (than 5 years ago)	Somewhat less frequently used now	About the same	Somewhat more frequently used now	Much more frequently used now (than 5 years ago)
a. Face-to-face workshops lasting one day or less	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Face-to-face workshops lasting more than one day (e.g., short courses)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Cohort-based programs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

meeting over an extended period of time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Direct one-on-one consultation between a professional and a landowner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Large conference-style events	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Peer-to-peer information exchange	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Printed content (e.g., hard-copy factsheets, books)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Digital text (e.g. PDF factsheets, web-based text)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Live satellite or web-based presentations (e.g., webinars)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Online discussion boards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. Facebook, Twitter, or other social media sites	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. Telephone answer lines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m. Other (please specify): <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4) Regardless of teaching format (e.g. classroom, field, online), indicate how frequently each of the following **land management-related topics** is taught in your Extension Forestry program today relative to 5 years ago.

	Much less frequently taught now (than 5 years ago)	Somewhat less frequently taught now	About the same	Somewhat more frequently taught now	Much more frequently taught now (than 5 years ago)
a. Harvesting and selling timber	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. General silviculture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Seedling establishment / tree planting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Non-timber / specialty forest products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Effects of climate change on forests	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Agroforestry topics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Urban forestry topics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Water quality protection in forest management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Forest health and/ or invasive species	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Wildlife management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. Wildfire protection	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. Tree identification	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m. Other (please specify): <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5) Indicate how frequently each of the following **other topics** is taught in your Extension Forestry program today relative to 5 years ago.

	Much less frequently taught now (than 5 years ago)	Somewhat less frequently taught now	About the same	Somewhat more frequently taught now	Much more frequently taught now (than 5 years ago)
a. Intergenerational land transfer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Financial aspects of land ownership (e.g., property and income taxation)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. GPS and/or online mapping	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Forest measurements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

e. Leadership and/or communication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Volunteerism	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Recreational trail design	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Permanent land protection (e.g., conservation easements)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Forest certification	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Other (please specify):	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6) Please describe any changes that you or others plan to implement in your Extension Forestry program in the next five years. If many exist, please list only the three most important changes.

1)

2)

3)

Section 2: Identifying Master Volunteer and Other Peer Learning Programs

Section 2: Identifying Master Volunteer and Other Peer Learning Programs

In this section, we will ask you to identify master volunteer and other peer learning programs in your state. For each category, please list all Extension Forestry programs that fit the criteria specified below as well as the contact information for the person best suited to answer detailed questions about that particular program. During a second phase of the study where we explore these programs in depth, we plan to contact the individuals that you identify in order to obtain information about their programs.

Part A: Family Woodland Owner Master Volunteer Programs

We would like to learn about family woodland owner "Master volunteer" programs offered within your state. Please list any program or programs currently offered in your state that meet **ALL** of the following criteria:

- The program is **offered by Extension** OR through a collaboration of Extension and other partners (e.g., state agencies, non-governmental organizations, community groups).
- The program **primarily targets family woodland owners** (e.g. families or individuals that own woodlands)
- The program provides **education/training that at least in part focuses on woodland management.**
- The program either requires or encourages participants to conduct **volunteer outreach** to other family woodland owners after they have completed the program.

Please identify any programs in your state that meet all four of these criteria, as well as the appropriate contact person and information for each.

Please enter the first program here. If you have multiple programs, you will be able to enter those next. If your state has no programs that meet these criteria, please enter "none" in the Program Name box.

Program Name:

Name of contact:

Phone:

E-mail:

Address Line 1:

Address Line 2:

City:

State:

Country:

Zip code:

Do you have another Extension Forestry Master volunteer program?

- Yes
- No

Please enter the second Master Volunteer program here. Recall that programs should only be entered if they meet **ALL** of the following criteria:

- The program is **offered by Extension** OR through a collaboration of Extension and other partners (e.g., state agencies, non-governmental organizations, community groups).
- The program **primarily targets family woodland owners** (e.g. families or individuals that own woodlands).
- The program provides **education/training that at least in part focuses on woodland management**.
- The program either requires or encourages participants to conduct **volunteer outreach** to other family woodland owners after they have completed the program.

Program Name:

Name of contact:

Phone:

E-mail:

Address Line 1:

Address Line 2:

City:

State:

Country:

Zip code:

Do you have another Extension Forestry Master volunteer program?

- Yes
- No

Please enter the third Master Volunteer program here. Recall that programs should only be entered if they meet **ALL** of the following criteria:

- The program is **offered by Extension** OR through a collaboration of Extension and other partners (e.g., state agencies, non-governmental organizations, community groups).
- The program **primarily targets family woodland owners** (e.g. families or individuals that own woodlands).
- The program provides **education/training that at least in part focuses on woodland management**.
- The program either requires or encourages participants to conduct **volunteer outreach** to other family woodland owners after they have completed the program.

Program Name:

Name of contact:

Phone:

E-mail:

Address Line 1:

Address Line 2:

City:

State:

Country:

Zip code:

Do you have another Extension Forestry Master volunteer program?

- Yes
- No

Please enter the fourth Master Volunteer program here. Recall that programs should only be entered if they meet **ALL** of the following criteria:

- The program is **offered by Extension OR** through a collaboration of Extension and other partners (e.g., state agencies, non-governmental organizations, community groups).
- The program **primarily targets family woodland owners** (e.g. families or individuals that own woodlands).
- The program provides **education/training that at least in part focuses on woodland management**.
- The program either requires or encourages participants to conduct **volunteer outreach** to other family woodland owners after they have completed the program.

Program Name:

Name of contact:

Phone:

E-mail:

Address Line 1:

Address Line 2:

City:

State:

Country:

Zip code:

Do you have another Extension Forestry Master volunteer program?

- Yes
- No

Please enter the fifth Master Volunteer program here. Recall that programs should only be entered if they meet **ALL** of the following criteria:

- The program is **offered by Extension OR** through a collaboration of Extension and other partners (e.g., state agencies, non-governmental organizations, community groups).
- The program **primarily targets family woodland owners** (e.g. families or individuals that own woodlands).
- The program provides **education/training that at least in part focuses on woodland management**.
- The program either requires or encourages participants to conduct **volunteer outreach** to other family woodland owners after they have completed the program.

Program Name:

Name of contact:

Phone:

E-mail:

Address Line 1:

Address Line 2:

City:

State:

Country:

Zip code:

Do you have another Extension Forestry Master volunteer program?

Yes

No

Please enter the information for any remaining programs here.

Part B: Other Programs Designed to Foster Family Woodland Owner Peer Learning

Next, please list **any other Extension Forestry programs** that are designed to foster peer-to-peer learning among family woodland owners. Listed programs should meet **ALL** of the following criteria. **[Note: Do NOT list programs already listed in Part A.]**

- The program is **offered by Extension** OR through a collaboration of Extension and other partners (e.g., state agencies, non-governmental organizations, community groups).
- The program **primarily targets family woodland owners** (e.g. families or individuals that own woodlands).
- The program is designed to **create opportunities for peer-to-peer learning** among family woodland owners. In other words, the program encourages landowners to teach and learn from one another – formally or informally – through the exchange of knowledge, experiences, and ideas.

Please identify any programs in your state that meet all three of these criteria, as well as the appropriate contact person and information for each.

Please enter the first program here. If you have multiple programs, you will be able to enter those next. If your state has no programs that meet these criteria, please enter "none" in the Program Name box.

Program Name:

Name of contact:

Phone:

E-mail:

Address Line 1:

Address Line 2:

City:

State:

Country:

Zip code:

Do you have another Extension Forestry program for family woodland owners that fosters peer learning?

Yes

No

Please enter the second other peer to peer learning program here. List only programs that meet ALL of the following criteria and have not previously been listed in this survey

- The program is **offered by Extension** OR through a collaboration of Extension and other partners (e.g., state agencies, non-governmental organizations, community groups).
- The program **primarily targets family woodland owners** (e.g. families or individuals that own woodlands).
- The program is designed to **create opportunities for peer-to-peer learning** among family woodland owners. In other words, the program encourages landowners to teach and learn from one another – formally or informally – through the exchange of knowledge, experiences, and ideas.

Program Name:

Name of contact:

Phone:

E-mail:

Address Line 1:

Address Line 2:

City:

State:

Country:

Zip code:

Do you have another Extension Forestry program for family woodland owners that fosters peer learning?

- Yes
- No

Please enter the third other peer to peer learning program here. List only programs that meet ALL of the following criteria and have not previously been listed in this survey

- The program is **offered by Extension** OR through a collaboration of Extension and other partners (e.g., state agencies, non-governmental organizations, community groups).
- The program **primarily targets family woodland owners** (e.g. families or individuals that own woodlands).
- The program is designed to **create opportunities for peer-to-peer learning** among family woodland owners. In other words, the program encourages landowners to teach and learn from one another – formally or informally – through the exchange of knowledge, experiences, and ideas.

Program Name:

Name of contact:

Phone:

E-mail:

Address Line 1:

Address Line 2:

City:

State:

Country:

Zip code:

Do you have another Extension Forestry program for family woodland owners that fosters peer learning?

- Yes
- No

Please enter the fourth other peer to peer learning program here. List only programs that meet ALL of the following criteria and have not previously been listed in this survey

- The program is **offered by Extension OR** through a collaboration of Extension and other partners (e.g., state agencies, non-governmental organizations, community groups).
- The program **primarily targets family woodland owners** (e.g. families or individuals that own woodlands).
- The program is designed to **create opportunities for peer-to-peer learning** among family woodland owners. In other words, the program encourages landowners to teach and learn from one another – formally or informally – through the exchange of knowledge, experiences, and ideas.

Program Name:

Name of contact:

Phone:

E-mail:

Address Line 1:

Address Line 2:

City:

State:

Country:

Zip code:

Do you have another Extension Forestry program for family woodland owners that fosters peer learning?

- Yes
- No

Please enter the fifth other peer to peer learning program here. List only programs that meet ALL of the following criteria and have not previously been listed in this survey

- The program is **offered by Extension OR** through a collaboration of Extension and other partners (e.g., state agencies, non-governmental organizations, community groups).
- The program **primarily targets family woodland owners** (e.g. families or individuals that own woodlands).
- The program is designed to **create opportunities for peer-to-peer learning** among family woodland owners. In other words, the program encourages landowners to teach and learn from one another – formally or informally – through the exchange of knowledge, experiences, and ideas.

Program Name:

Name of contact:

Phone:

E-mail:

Address Line 1:

Address Line 2:

City:

State:

Country:

Zip code:

Do you have another Extension Forestry program for family woodland owners that fosters peer learning?

- Yes
- No

Please enter the information for any remaining programs here.

Part C: Extension Forestry Program Capacity

Please indicate in the table below your total Extension Forestry program capacity (expressed as number of Full Time Equivalents, or FTEs) for each personnel category listed and the amount of Extension Forestry capacity for each category dedicated to the master volunteer and other peer learning programs that you listed above.

	Total FTEs in entire Extension Forestry program	FTEs dedicated to Master volunteer programs listed above	FTEs dedicated to other peer-to-peer programs listed above
State specialists	<input type="text"/>	<input type="text"/>	<input type="text"/>
Extension educators	<input type="text"/>	<input type="text"/>	<input type="text"/>
Support staff	<input type="text"/>	<input type="text"/>	<input type="text"/>

Section 3: About You

Section 3: About You

1) Please provide your contact information. This will allow us to contact you if we have clarification questions about your responses, and for questions 2 and 3 below.

Name:

Phone:

Address:

Address Line 2:

City:

State:

Zip Code:

Country:

Email:

2) Would you like us to send you a summary of the results of this research when the study is complete?

- Yes
- No

3) For the final phase of this study, we will be contacting some survey participants to participate in a follow-up telephone focus group in order to gain richer insight into trends and innovations in Extension Forestry programs. Are you willing to participate in a follow-up telephone focus group?

- Yes
- No

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4) Please use the space below to provide any additional comments about your state's Extension Forestry program or this survey.

Appendix 5. Online survey instrument for Master Volunteer program data.

Confirmation of program eligibility

About the Study

The purpose of this study is to learn about Extension-based "Master volunteer" programs for family woodland owners in the United States. We are surveying all programs that meet all of the following criteria:

- The program is **offered by Extension** OR through a collaboration of Extension and other partners (e.g., state agencies, non-governmental organizations, community groups).
- The program **primarily targets family woodland owners** (e.g. families or individuals that own woodlands)
- The program provides **education/training that at least in part focuses on woodland management**.
- The program either requires or encourages participants to conduct **volunteer outreach** to other family woodland owners after they have completed the program.

For this survey, we will be asking you questions about the **\$(e://Field/Program)**.

This program was suggested to us by the Extension Forestry program leader (or similar) in your state. First, please confirm for us: Does this program meet all of the above criteria?

- Yes
- No

Please explain why not:

Block 1

About this program

1. Please begin by briefly (100 words or less) describing the purpose of the **\$(e://Field/Program)**.

2. In what organization is this program primarily based (e.g. University of X, XYZ landowner association, etc)?

3. In approximately what year was this program first offered?

Year:

4. Is there a fee to receive training in the **\$(e://Field/Program)**?

- Yes
- No

4b. How much is the fee to receive training? Note: If there are other participation fees, please indicate that below.

5. Which of the following specific audience segments are the primary target(s) for the \${e://Field/Program}? That is, the program is specifically designed to meet the unique needs and preferences of the audience indicated. Check all that apply:

- a. All family woodland owners in your state (general audience)
- b. Small-acreage family woodland owners
- c. Large-acreage family woodland owners
- d. Women family woodland owners
- e. Family woodland owners from specific ethnic or cultural groups
- f. Family woodland owners that live in a specific geographic area
- g. Family woodland owners that own land in a specific geographic area
- h. Other (please specify)

Content and curriculum delivery model

6. How many hours of training are required to complete the initial volunteer training?

- a. <20
- b. 20-34
- c. 35-49
- d. 50-64
- e. 65-79
- f. 80 or more
- g. Not applicable

7. How many hours of training are required annually to maintain active status in this program once the initial training is complete? If continuing education requirements are counted every 2 or 3 years (or another schedule), please indicate the average annual training requirement.

- a. None
- b. 1-9 hours per year
- c. 10-19 hours per year
- d. 20 or more hours per year

8. Indicate how frequently each of the following information dissemination and teaching formats is used in the \${e://Field/Program} relative to 5 years ago. If the program is less than five years old, consider changes since the program's inception. Note: Please only mark "Not Applicable" if the format was never used in the last 5 years.

	Much less frequently used today (than 5 years ago)	Somewhat less frequently used today	About the same	Somewhat more frequently used today	Much more frequently used today (than 5 years ago)	Not Applicable (NA)
a. Face-to-face workshops lasting one day or less	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Face-to-face workshops	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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lasting two or more days (e.g., short courses)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Cohort-based multi-day programs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Direct one-on-one consultation between a professional and a landowner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Large conference-style events	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Peer-to-peer information exchange	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Printed content (e.g., hard-copy factsheets, books)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Digital text (e.g. PDF factsheets, web-based text)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Live satellite or web-based presentations (e.g., webinars)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Online discussion boards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. Facebook, Twitter, or other social media sites	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. Telephone answer lines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m. Other (please specify):	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. Regardless of teaching format (e.g. classroom, field, online), indicate how frequently each of the following land management-related topics is taught in the \$(e://Field/Program) today relative to 5 years ago. If the program is less than five years old, consider changes since the program's inception. **Note:** Please only mark "Not Applicable" if the topic was never taught in the last 5 years.

	Much less frequently taught today (than 5 years ago)	Somewhat less frequently taught today	About the same	Somewhat more frequently taught today	Much more frequently taught today (than 5 years ago)	Not Applicable
a. Harvesting and selling timber	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. General silviculture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Seedling establishment/tree planting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Non-timber/specialty forest products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Effects of climate change on forests	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Agroforestry topics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Urban forestry topics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Water quality protection in forest management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Forest health and/or invasive species	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Wildlife management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. Wildfire protection	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. Tree identification	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m. Other (please specify):	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. Regardless of teaching format (e.g. classroom, field, online), indicate how frequently each of the following other topics is taught in this program today relative to 5 years ago. If the program is less than five years old, consider changes since the program's inception. **Note:** Please only mark "Not Applicable" if the topic was never taught in the last 5 years.

	Much less frequently taught today (than 5 years ago)	Somewhat less frequently taught today	About the same	Somewhat more frequently taught today	Much more frequently taught today (than 5 years ago)	Not Applicable
a. Interoperational land						

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a. Intergenerational land transfer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Financial aspects of land ownership (e.g., property and income taxation)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. GPS and / or online mapping	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Forest measurements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Leadership and/or communications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Volunteerism	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Recreational trail design	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Permanent land protection (e.g., conservation easements)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Forest certification	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Other (please specify): <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Which of the following best describes the delivery model for this program?

- a. Cohort-based: We provide a multi-day training program to a group of landowners over a set period of time.
- b. Credit (or course) based: We offer core and elective workshops on an ongoing basis and credits/courses are tracked until all required training is completed.
- c. Both options are offered
- d. Other (please specify)

Volunteer component

12. Which of the following describes the program's volunteer component?

- a. Volunteering is required to remain active in the program.
- b. Volunteering is not required, but is encouraged.

13. What activities do volunteers perform? Check all that apply:

- a. Leading tours and/or hosting events on their own property
- b. Property visits to other landowners
- c. Answering phone calls or emails from other landowners
- d. Giving presentations during courses
- e. Board members of landowner associations
- f. Working booths or tables at fairs or other events
- g. Relevant youth education/outreach
- h. Other 1, please specify
- i. Other 2, please specify
- j. Other 3, please specify (if more than 3 others, please list all remaining activities here)

14. How are the services of trained volunteers promoted to other woodland owners who may be served by those volunteers? Please check all that apply:

- a. Landowners have access to a printed directory of volunteer contacts
- b. Landowners have access to an online directory of volunteer contacts.
- c. Requests by landowners for assistance are routed by program staff to available volunteers
- d. Volunteers proactively offer their services to other landowners through cold calls, in conversations, through word of

- d. volunteers proactively offer their services to other landowners through cold-calls, in conversations, through word-of-mouth, etc.
- e. Other 1 (please specify)
- f. Other 2 (please specify)
- g. Other 3 (please specify; if there are further answers, please list them all here)

Partnerships

15. Please list all of the groups or organizations that contribute support of some kind to the $\{e://Field/Program\}$. In the next question, you will be able to specify the type of support. Please include all contributing groups or organizations; the lead organization that you specified in Question 2 has been filled in for you as a start.

1.
2.
3.
4.
5.
6.

16. Now, for each group or organization that contributes in some way to this program, please indicate the various roles/contributions that apply by marking a "Y" (Yes) in the appropriate boxes below. Under "Other support," please write in any additional roles or contributions.

	Curriculum development or delivery	Direct financial support	Volunteer management	Program planning or advisory role	Other support (please write in)
1. $\{q://QID6/ChoiceTextEntryValue\}$	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
2. $\{q://QID45/ChoiceTextEntryValue/2\}$	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
3. $\{q://QID45/ChoiceTextEntryValue/3\}$	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
4. $\{q://QID45/ChoiceTextEntryValue/4\}$	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
5. $\{q://QID45/ChoiceTextEntryValue/5\}$	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
6. $\{q://QID45/ChoiceTextEntryValue/6\}$	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Program administration

17. Regardless of who does the work, approximately what percentage of the total effort required to manage the program is allocated to each of the following major activities? (Please ensure that the total equals 100 percent.)

- a. Offering initial trainings, including marketing and recruitment
 - b. Offering refresher or continuing education trainings
 - c. Managing and corresponding with volunteers
 - d. Program evaluation and reporting
 - e. Other (please specify):
- Total**

18. What is the program's approximate annual operating budget (excluding salaries)?

Dollars annually:

19. Approximately what percentage of this program's total budget (including salaries) comes from each of the following sources? (The total can be less than 100%, but cannot exceed 100%.)

a. Forest Stewardship Information and Education grants	<input type="text" value="0"/> %
b. Renewable Resources and Extension Act	<input type="text" value="0"/> %
c. Registration fees	<input type="text" value="0"/> %
d. Conservation organizations	<input type="text" value="0"/> %
e. Other grants or contributions	<input type="text" value="0"/> %
Total	<input type="text" value="0"/> %

20. Approximately how many individuals complete the initial training each year?

- <10
 10-19
 20-29
 30-39
 40-49
 50-59
 60-69
 70 or more

21. How many graduates are currently active volunteers (i.e., they have volunteered any amount of time in the last year)?

- <25
 25-49
 50-99
 100-199
 200-299
 300-399
 400-499
 500 or more

22. Compared to five years ago, is the total amount of volunteer output from the program growing, staying the same, or decreasing today? If the program is less than five years old, consider changes since the program's inception.

- Growing
 Staying the same
 Decreasing

Evaluating program outputs and impacts

23. What metrics are used to evaluate this program? Select all that apply.

- a. Number of participants or graduates annually
- b. Percent of participants that graduate
- c. Participant evaluations of presentation quality
- d. Changes in land management practices reported by participants
- e. Number and type of volunteer contributions (e.g. number of landowners assisted, volunteer hours)
- f. Articles written by trained volunteers
- g. Organizational leadership positions filled by trained volunteers
- h. Number of organizations served by trained volunteers
- i. Other 1, please specify
- j. Other 2, please specify
- k. Other 3; please specify (if multiple others, please list them all here)
- l. None of the above, we do not evaluate the program

24. How are evaluation data collected? Select all that apply.

- a. On-site workshop (or other event) evaluations
- b. Annual survey of active participants
- c. Multi-year (e.g., every 2, 3, or more years) survey of active participants
- d. Online, anytime reporting of volunteer contributions
- e. Mail or phone-in, anytime reporting of volunteer contributions
- f. Focus groups (or similar gatherings) of active participants
- g. Input from advisory or steering committee
- h. Other 1, please specify
- i. Other 2, please specify
- j. Other 3; please specify (if multiple others, please list them all here)

Change in the program over time

25. Please select the option that best describes how each of the following aspects of the $\$(e://Field/Program)$ has changed in the last five years. If the program is less than five years old, consider changes since the program's inception.

	Declined substantially (in the last 5 years)	Declined somewhat	Neither declined nor grown	Grown somewhat	Grown substantially (in the last 5 years)	Not applicable
a. Program marketing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Demand for volunteer training	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Demand for assistance from volunteers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Number of new volunteers trained per year	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Number of active volunteers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Average output per volunteer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Time or effort spent on program evaluation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Number of partner organizations contributing to the program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

i. The program's budget



26. Please describe up to three of the most important changes that you or others plan to implement in this program in the next five years:

1)

2)

3)

About You

27. Please provide your job title and contact information, which will allow us to contact you if we have clarification questions about your responses, and for questions 28 and 29 below.

Job Title:

Name:

Phone:

Address:

Email:

28. Would you like us to send you a summary of the results of this research when the study is complete?

Yes

No

29. For the final phase of this study, we will be contacting some survey participants to participate in a follow-up telephone focus group in order to gain richer insight into trends and innovations in Extension Forestry Master volunteer programs. Are you willing to participate in a follow-up telephone focus group?

Yes

No

30. Please use the space below to provide any additional comments that you have for us regarding this program.

Appendix 6. Online survey instrument for other peer learning program data.

Default Question Block**About the Study**

The purpose of this study is to learn about Extension Forestry peer-to-peer opportunities for family woodland owners in the United States. We are surveying all programs that meet all of the following criteria:

- The program is **offered by Extension** OR through a collaboration of Extension and other partners (e.g., state agencies, non-governmental organizations, community groups).
- The program **primarily targets family woodland owners** (e.g. families or individuals that own woodlands).
- The program is designed to **create opportunities for peer-to-peer learning** among family woodland owners. In other words, the program encourages landowners to teach and learn from one another – formally or informally – through the exchange of knowledge, experiences, and ideas.

For this survey, we will be asking you questions about the **\$(e://Field/Program)**.

This program has been suggested to us by the Extension Forestry program leader (or similar) in your state. First, please confirm for us: Does this program meet all of the above criteria?

- Yes
- No

Please explain why not.

About this program

1. Please begin by briefly (100 words or less) describing the purpose of the **\$(e://Field/Program)**.

2. In what organization is this program primarily based (e.g. University of X, XYZ landowner association, etc)?

3. In approximately what year was this program first offered?

Year:

4. Approximately how many family woodland owners are currently actively involved with this program? Consider 'active involvement' to mean any participation at all within the last year.

- <25
- 25-49
- 50-99
- 100-199

- 200-299
- 300-399
- 400-499
- 500 or more

5. Is there a fee to participate in the \${e://Field/Program}?

- Yes
- No

5b. How much is the fee for participation? Note: If there is a charge for only a certain portion of the program, you may indicate that below.

6. Which of the following specific audience segments are the primary target(s) for this program? That is, the program is specifically designed to meet the unique needs and preferences of the audience indicated. Check all that apply:

- a. All family woodland owners in your state (general audience)
- b. Small-acreage family woodland owners
- c. Large-acreage family woodland owners
- d. Women family woodland owners
- e. Family woodland owners from specific ethnic or cultural groups
- f. Family woodland owners that live in a specific geographic area
- g. Family woodland owners that own land in a specific geographic area
- h. Other (please specify)

Program Format

7. Which of the following better describes the kind of peer learning that the program is designed to foster?

- a. Some "peer" participants are placed in "instructor" or "leader" roles, while others are primarily learners.
- b. All participants are equally considered teachers and learners.
- c. Both A and B.
- d. Neither. Please explain.

8. In what ways does the program foster peer-to-peer learning? Check all that apply:

- a. Peer-led and/or -organized property tours
- b. Peers serving as guest speakers, teachers, or discussion leaders
- c. Peer discussion groups or breakout sessions during meetings or other events
- d. Peers writing articles for newsletters or other communications
- e. E-mailing between peers
- f. Online discussion forums for landowners
- g. Property visits or other interactions outside of program events
- h. Other (please specify)

9. Please provide below any further detail necessary to describe how peer-to-peer learning occurs among the

landowners in this program:

Partnerships

10. Please list all of the groups or organizations that contribute in some way to the $\{e://Field/Program\}$. In the next question, you will be able to specify the type of support. Please include all contributing groups or organizations; the lead organization that you specified in Question 2 has been filled in for you as a start.

1.
2.
3.
4.
5.
6.

11. Now, for each group or organization that contributes support of some kind to this program, please indicate the various roles/contributions that apply by marking a "Y" (Yes) in the appropriate boxes below. Under "Other support," please write in any further roles or contributions.

	Curriculum development or delivery	Direct financial support	Volunteer management	Program planning or advisory role	Other support (please write in)
1. $\{q://QID7/ChoiceTextEntryValue\}$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. $\{q://QID37/ChoiceTextEntryValue/2\}$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. $\{q://QID37/ChoiceTextEntryValue/3\}$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. $\{q://QID37/ChoiceTextEntryValue/4\}$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. $\{q://QID37/ChoiceTextEntryValue/5\}$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. $\{q://QID37/ChoiceTextEntryValue/6\}$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Program administration

12. Regardless of who does the work, approximately what percentage of the total effort required to manage the program is allocated to each of the following major activities? (Please ensure that the total equals 100 percent.)

- a. Offering initial trainings, including marketing and recruitment
- b. Offering refresher or continuing education trainings
- c. Managing and corresponding with volunteers
- d. Program evaluation and reporting

e. Other (please specify):

Total

13. What is the program's approximate annual operating budget (excluding salaries)?

Dollars annually:

14. Approximately what percentage of this program's total budget (including salaries) comes from each of the following sources? (The total can be less than 100%, but please ensure that it does not exceed 100 percent.)

a. Forest Stewardship Information and Education grants

b. Renewable Resources and Extension Act (RREA)

c. Registration fees

d. Conservation organizations

e. Other grants or contributions

Total

Evaluations of program outputs and impacts

15. What metrics are used to evaluate this program? Select all that apply.

- a. Number of new participants or graduates annually
- b. Participant evaluations of presentation quality
- c. Changes in land management practices reported by participants
- d. Number and type of volunteer contributions (e.g. number of landowners assisted, volunteer hours)
- e. Articles written by participants
- f. Organizational leadership positions filled by participants
- g. Number of organizations served
- h. Other 1, please specify
- i. Other 2, please specify
- j. Other 3; please specify (if more than three others, please list them all here):
- i. None of the above, we do not evaluate the program

16. How are evaluation data collected? Select all that apply:

- a. On-site workshop (or other event) evaluations
- b. Annual survey of active participants
- c. Multi-year (e.g., every 2, 3, or more years) survey of active participants
- d. Online, anytime reporting of volunteer contributions
- e. Mail or phone-in, anytime reporting of volunteer contributions
- f. Focus groups (or similar gatherings) of active participants
- g. Input from advisory or steering committee
- h. Other (please specify):
- i. Other 2, please specify
- j. Other 3; please specify (if more than three others, please list them all here):

Change in the program over time

17. Please select the option that best describes how each of the following aspects of the program has changed in the last five years. If the program is less than five years old, consider changes since the program's inception.

	Declined substantially (in the last 5 years)	Declined somewhat	Neither declined nor grown	Grown somewhat	Grown substantially (in the last 5 years)	Not applicable
a. Program marketing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Demand for volunteer training	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Demand for assistance from volunteers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Number of new volunteers trained per year	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Number of active volunteers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Average output per volunteer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Time or effort spent on program evaluation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Number of partner organizations contributing to the program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. The program's budget	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

18. Please describe up to three of the most important changes that you or others plan to implement in this program in the next five years:

1)

2)

3)

About You

19. Please provide your job title and contact information, which will allow us to contact you if we have clarification questions about your responses, and for questions 20 and 21 below.

Job Title:

Name:

Phone:

Address:

Email:

20. Would you like us to send you a summary of the results of this research when the study is complete?

Yes

No

21. For the final phase of this study, we will be contacting some survey participants to participate in a follow-up telephone focus group in order to gain richer insight into trends and innovations in Extension Forestry peer-to-peer programs. Are you willing to participate in a follow-up telephone focus group?

Yes

No

22. Please use the space below to provide any additional comments that you have for us regarding this program.
