NEW LANDOWNERS IN VIRGINIA'S FOREST: A STUDY OF MOTIVATIONS, MANAGEMENT ACTIVITIES, AND PERCEIVED OBSTACLES

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ABSTRACT

Article 1

As forest ownership continues to change, forestry must change to be relevant to its new constituency and client base. Market segmentation can help in this task. There is no such thing as an average forest owner. This study assessed the motivations and forest practices of 661 new owners of forested lands ranging in size between 2 and 50 acres. The study focused on rapidly growing counties in Virginia. Cluster analysis techniques were used to identify six market segments: Absentee Investors, Young Families, Forest Planners, Preservationists, Farmers, And Professionals. Only the smallest market segment (Absentee Investors, n = 26) reflects motivations and forest management interests that somewhat resemble "traditional" forest landowners. The results suggest that "lifestyle" concerns are the major motivations of these new owners and seemingly determine receptivity to professional forestry advice. This analysis helps understand these differently motivated segments and suggests possible marketing strategies professional foresters can use to "sell" forestry and active forest management.

Article 2

Land managers increasingly are seeking to promote management of private forestland that transcends political and ownership boundaries. Descriptive analyses were used to characterize new landowners' intentions to participate in active management, both within individual property boundaries and in cooperation with neighboring landowners. The study also describes obstacles that these new owners perceive constrain their participation in active management. Further analysis explores potential differences in these variables related to amount of land owned, attitudes about private property rights, trust in forestry professionals, and attitudes about clearcutting and harvesting practices. The results suggest that private property rights are not an insurmountable problem to ecosystem management efforts. The forestry profession, however,

seems to suffer from an invisibility problem among the population of new landowners. The very audience that ecosystem management programs target (owners of fewer than 20 acres of forestland) perceives itself to be least relevant to the message of cooperation. In fact, the biggest obstacle identified was that these new landowners have never thought about participating in active management, either within or across property boundaries.

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Fragmentation and Parcelization

As policymakers and land planners call for larger-scale management (i.e., across ecosystems, watersheds, or bioregions), forestland is heading in the opposite direction, becoming increasingly fragmented, parcelized, and contested. The term "fragmentation" typically is used to refer to the physical isolation of forested areas. As competing land uses result in forest conversion (to farmland, mining, residential development, etc.), previously large continuous swaths of forestland disappear, leaving small stands that physically are disconnected from one another. Fragmentation results in problems for species of flora and fauna that rely on interior conditions; it also disturbs watershed purification processes.

"Parcelization" refers to the ownership pattern of forestland. When a large expanse of forestland has a single owner, only one person (or organization) is responsible for making decisions about the management of that land. In light of recent economic conditions, however, forestland has been divided into increasingly smaller parcels, each with a different owner. The growing number and variety of owners now responsible for forest management leads to a higher likelihood of conflicting values and interests—a parcelized landscape often leads to inconsistent, disjointed management with few considerations for ecosystem-wide processes. Although at least one study has documented that increases in development with the attendant land parcelization has led to a *decrease* in forest fragmentation (Erickson, Ryan, and De Young 2001), nationwide the greater concern is that development and parcelization lead to fragmentation through disjointed management across property boundaries.

Forest parcelization has several causes. The first relates to an aging population of landowners. Many owners split their large tracts of land into smaller portions for their heirs. This may happen before death, as with gifts given for estate tax planning purposes, or after death, as specific bequests. Inheriting land can be a mixed blessing for recipients of large properties. If the land is assessed at its highest developed value, as it frequently is, inheritance taxes can be overwhelming. Often, heirs have no financial choice but to divide their parcel and sell sections

(if not all) of it to real estate developers to raise sufficient funds to pay the tax (Moffat and Greene 2002).

In some areas of the country, urban sprawl is contributing to forest parcelization. As businesses abandon downtown locations and move to city margins, those boundaries expand; employees of those businesses often relocate to newly developed bedroom communities nearby to reduce their commute time. The service and retail industries quickly follow, constructing "big box" stores wherever they judge that sufficient demand exists. This process of urban sprawl chips away at the edges of any rural, undeveloped, or forested land that exists near metropolitan areas (Cordell and Macie 2002).

A third cause of parcelization is the increasing number of people who choose to move to the country in search of an enhanced quality of life (Jacob 1997), often unintentionally spurring the conversion of open space (both farm and forestland) into subdivisions for residential developments. As more people seek to "escape" to less developed regions, the need for infrastructure in those areas increases; even after initial expenditures related to infrastructure development, roads and services require maintenance. To fund these projects, communities often raise property taxes. Long-standing rural residents, many of whom are eking out a subsistence from their land as they try to protect their land from similar development, often cannot afford to pay what they deem to be unfair and unreasonable amounts of money to support the changes wrought by the newcomers, so they often are forced to subdivide and sell parcels of their holdings (Moffat and Greene 2002).

Various mechanisms to curb forest parcelization have been suggested. Estate and property taxes based on forest or farm use instead of highest developed use have sought to lower assessments and reduce the burden on those least able to bear it. Zoning ordinances have striven to separate more suburban types of development from productive rural lands, thus curtailing the expected contributions of farmers and others who garner their livelihoods from the land. Other programs have offered financial incentives to landowners who agree to preserve the undeveloped character of their land (Kundell, Myszewski, and DeMeo 2002).

Unfortunately, such "solutions" may be no more successful than building sandcastles on a beach as the tide is rising. Immense economic pressure (i.e., from real estate developers) makes it

unlikely that such solutions will achieve long-term success. Given the seeming inevitability of parcelization in this economically-driven society, it seems prudent to focus limited energies on encouraging management that extends across political and legal boundaries and entails cooperation and coordination among owners of adjacent tracts of land.

Management of Parcelized Forestland

Perhaps the most prominent obstacle to encouraging landowners to voluntarily cooperate and plan across property boundaries is that for them, forest ownership largely is incidental, a by-product of owning a house in the country. Over one fourth (28%) of southern forest owners own their forestland simply because it is part of their residence (Birch 1997). Before wasting energy trying to sell new landowners a message about cross-boundary management, land managers first need to convince these new landowners that the small woodlots they control collectively represent a valuable forest resource.

These owners may not perceive their land to be an important forest resource for several reasons. Some may associate a "forest" with timber harvest and production, and are unwilling to participate in extractive activities. In other cases, small tract sizes may preclude owners from thinking about the ecological significance of their land. Instead, they may construe it as a backyard, a privacy buffer, a personal recreational setting, or, at best, a home for game species and "charismatic megafauna." DeCoster (1998, p. 26) has written that:

> *Because a parcel is small, it's less likely to be viewed by the owner as a significant forest needing expert maintenance. On a small parcel the small scale of natural events—storm damage, fires, bugs and blights, accumulations of valuable wood—reinforces this view. Conversely, a large parcel of forestland is more likely to be viewed by the owner as a forest needing expertise. The larger scale of natural events on such a parcel—the same storm damage, fires, bugs and blights, and accumulations of valuable wood—reinforces this view.*

Very few owners of small forested tracts develop written land management plans for their properties; in fact, over four million southern forest owners have no written forest management plan (Birch 1997). Although efforts to reach owners of small tracts have been largely unsuccessful, connecting with this group remains an important goal for the forestry profession, if

for no other reason than to cultivate a broad-based supportive constituency (Birch 1997, citing Birch and Pywell 1986).

Land management professionals support increased marketing and public relations efforts to reach forest owners with information about forestry and to persuade them to adopt sustainable management practices or participate in cooperative management programs (e.g., Edwards and Bliss 2003). Attempts to communicate with these new landowners, whether to provide them with information or to persuade them to adopt some specific behavior, must derive from a sound understanding of their perceptions and motivations.

Dissertation Format

The general subject of the research reported in this dissertation is new landowners of Virginia forestland. Results are presented in two journal articles. The first article presents results of a market segmentation of the population of new forest owners, based on their motivations for owning forestland. The second article describes factors that influence new landowners' participation in forest management behaviors, with specific emphasis on cross-boundary activities.

Article 1: Market Segmentation

Nonindustrial private forest (NIPF) owners have been separated and described according to gender, race, age, income level, education, and other demographic and socioeconomic variables. Although many surveys of NIPF owners have included items about ownership motivations, objectives, and perceived benefits, these variables generally have taken second place to some demographic variables in reported results and research conclusions. Few important differences are identified between demographic and socioeconomic groups, leading NIPF owners to be treated as one large, homogeneous category. NIPF owners then are compared to other large groups such as the "general public" or "non-forest owners." Market research suggests that additional insights will emerge if we move beyond a focus on socioeconomic groupings to a consideration of variables more relevant to land management, such as size of ownership tracts, perceived benefits deriving from the land, and management objectives.

Many natural resource management agencies have begun to recognize the importance of segmenting their clientele into distinct, relatively homogeneous clusters. Market segmentation is a technique that has been used to identify meaningful groups of anglers (Connelly et al. 1999; Romberg 1999) and wood product consumers (Ozanne and Smith 1996; 1998). One study used market segmentation techniques to characterize the motivations and management intentions of NIPF owners in Arkansas (Kluender and Walkingstick 2000). It is encouraging that researchers recognize the value of market segmentation to understanding NIPF owners; it suggests that we are beginning to construe NIPF owners as consumers of stewardship and ecosystem management messages, rather than simply as producers of timber and forest products. My study focuses even more specifically on the population of new NIPF owners, to develop a useful characterization of the "new people in the woods."

If land managers begin to think like marketing professionals, recognizing forest owners as consumers of their messages, then the large group of NIPF owners no longer can be considered homogeneous. Extension specialists and consulting foresters have long known this—a single argument will not win the hearts of every NIPF owner. As a group, they do not share ownership motivations, objectives, or goals; they have different attitudes about natural resource management, different levels of trust in government and other forestry professionals, and different land tenure histories; and they most definitely do not all participate in the same land management behaviors. To successfully direct marketing efforts at them, then, we need to identify important variables that define distinct markets relevant to land management.

The first article in this dissertation presents the results of market segmentation techniques that separate new forestland owners into meaningful groups based on their motivations, attitudes, and behavioral intentions. These groups then are described in terms of salient sociodemographic characteristics, land ownership variables, and attitudinal factors relevant to forestry.

Article 2: Factors Influencing Management

The second article in this dissertation is a straightforward description of new landowners' willingness to participate in various active management behaviors, including activities that take place within individual property boundaries and those that would require coordination across multiple ownerships. This article also reports information about potential obstacles that could

prevent new owners from participating in active management; it's important to recognize specific obstacles that might be easily overcome (and, alternatively, obstacles that are not likely to be removed by programmatic solutions). To further clarify these results, landowners' attitudes about private property rights, forestry professionals, and clearcutting practices also are compared with both management intentions and perceived obstacles.

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ARTICLE 1
Understanding New Forest Owners: Market Segmentation of Motivations and Behaviors in Virginia's Residential Forest

> *"The decision not to invest in marketing to small sizes is a decision [of forestry] to be less and less relevant to more and more people, and to a significant quantity of land"* (DeCoster 1998, p. 28).

Forests in the 21st century will be dramatically different from forests of the 20th century. The number of owners is increasing, average parcel size is decreasing, and surrounding land uses increasingly are urban. The need for accessible management advice never has been greater: fewer and fewer owners have access to management traditions passed down from previous generations, and forest fragmentation increasingly stresses ecological functions that know no political boundaries. If natural resource professionals are to remain relevant to 21st century forests, they must reach forest owners with information that is appropriate for sustaining healthy forests, with a message that is understood, with an image that is respected, and with a bundle of services that is desired by the landowners.

Literature in marketing and communications suggests that population segmentation is an effective way to tailor products, professional service, marketing efforts, and communications strategies to more homogeneous subgroups within larger populations. Among forestland owners, there is no such thing as an "average" owner. Instead, distinct groups of landowners—such as absentee owners motivated chiefly by financial gain and estate building interests—can be reached and serviced most effectively with marketing strategies specifically tailored to their goals. The purposes of this study are to (1) characterize motivations of new owners of forested lands, (2) segment the population of Virginia's new forestland owners into distinct and meaningful clusters, and (3) suggest how understanding differently motivated segments can improve marketing efforts by professional foresters interested in "selling" participation in land management programs.

Contested Terrain: The Residential Forest

"More than 40% of the current [forest] owners acquired forest land for the first time since 1978" (Birch 1997, p. 4). The number of people owning forestland is increasing faster than the rate of population growth (DeCoster 1998). Concurrently, urban expansion is spreading from suburban developments into the forested "wild" lands. Although this issue is important, little consensus exists about its definition, or even about what to call it. The space between areas of human settlement and areas of predominantly natural conditions has been referred to alternately as the "residential/wild land interface" (Lee 1984), the "urban/forest interface" (Bradley 1984), or the "wildland-urban interface" (Davis 1990). These terms, although quite similar, are subtly distinct. Throughout this paper, I will refer to this contested region as the "residential forest," thereby emphasizing the juxtaposition of human habitat—both urban and rural—with areas of comparatively intact forestland.

Regardless of the label, scholars who have investigated these issues have been referring to the region in which:

> *…significant penetration of people has occurred or is occurring but where there remains significant acreage of forest. It is a zone more than a line…. Here, the individual tree is still important but the forest is more so. The silvicultural problems of stand establishment, stand maintenance and care, and harvest are important but somewhat different from those in urban/suburban areas. In the interface zone, most of the surface of the land is covered by trees, but it is the clearings that give value to the whole area….* (Clawson 1984, p. 199)

Forest fragmentation and parcelization raise several concerns of particular relevance to the forestry profession: (1) concern that the nation's timber supply might dwindle because of decreased harvesting on smaller tracts, (2) concern that large-scale ecosystem processes and ecosystem management efforts might be compromised by an increasingly diverse landowner base, (3) concern about wildfire control in areas with increased human presence, and (4) concern that new landowners might not be willing to accept advice regarding land management decisions from professional foresters.

Owners of small tracts are less likely to consider timber harvesting on their properties because smaller forest parcels often are economically inefficient to harvest (Thompson and Jones 1981). Additionally, consulting foresters and logging contractors are less willing to work these lands because of the complexities of negotiating right-of-ways and sales contracts with multiple parties (Barlow et al. 1998; Wear et al. 1999). As these trends lead to higher stumpage values, timber industries may be motivated to relocate, thus harming local and regional economies where forest industry is well established.

As ecologists learn more about how organisms and their environments function, it has become increasingly evident that land management decisions need to cross legally and politically established property boundaries. Ecosystem management (Cortner 1991; Sample 1994) has been promoted as an appropriate strategy to maintain biodiversity, protect water quality, preserve endangered species' habitats, and sustain other large-scale ecological processes, but, in an increasingly parcelized landscape, such a goal undoubtedly will require trans-boundary cooperation between adjacent landowners.

Of interest to this study is the challenge posed by the increasingly large and diverse population of landowners to the forestry profession's efforts to provide advice about forest management. Currently, only 5% of forest landowners have written plans for managing their lands (Birch 1996). If the forest landowner base continues to increase and diversify, and if technology transfer, stewardship and related volunteer programs, and information, education, and extension efforts are to successfully convey messages about responsible forest management, then the currently low participation rates in such programs (e.g., the Stewardship Incentive Program) among landowners are insufficient. Any attempts to communicate with these new landowners, whether to provide them with information or to persuade them to adopt some specific behavior, must be preceded by sound understanding of their perceptions of forest management and their motivations for ownership.

In addition to these challenges and opportunities, new settlement patterns in this zone pose increased wildfire risks (Butry et al. 2002)—those responsible for forest fire management and control must be concerned about dangers to life and property. Landscape and urban planners are forced to consider not only costs of infrastructure development, but also the quality of life for

interface residents, the preservation of open spaces and aesthetics threatened by sprawl, and even the continuation of traditional (that is, extractive) forest and rural land uses (Amster 1984).

Landowner Motivations: Why Do People Choose to Live in the "Residential Forest"?

According to rural sociologists, nonmetropolitan growth follows several distinct patterns. Burgeoning rural populations may result from tourism, regional appeal to retirees, resource production (i.e., "boomtowns"), growth as trade and professional centers, or attraction to countercultures (Blakely 1984). Jacob (1997) claims that two variables—the amount of time they spend on their land, and the primary source of their income—explain differences among these "back-to-the-landers." Because many of these new rural residents are purchasing forestland, they represent an important focus for forest managers.

Approximately 40% of southern forestland owners bought their land[1] between 1980 and 1994; this group controls 17% of the South's private forestland (Birch 1997, p. 37). In Virginia alone, about 13% of private forest owners[2] purchased their forestland between 1990 and 1994; their purchases represent 6% of all Virginia forest acreage (Birch 1997, p. 191). Clearly, these trends suggest that land tenure is shortening and new owners are becoming dominant.

Mature and highly valued forestland is being cleared to make way for suburban housing development to accommodate new rural landowners. Furthermore, forestland that is not sacrificed to the bulldozer is being divided into increasingly small parcels to fulfill the "American Dream" of land ownership for more and more people. Forest ownership is incidental to these new owners—Birch reported that 28% of southern forestland owners own their forest simply because it is part of their residence (Birch 1997, p. 12)[3].

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1 This figure includes both first-time purchases and additions to existing holdings.

2 This figure includes farmers and individual/joint spousal ownerships, but excludes corporate and timber industry owners.

3 However, Kingsley, Brock, and DeBald (1988) cautioned that such statistics may be misleading. After conducting qualitative interviews with retired West Virginia landowners, they found that the question wording "part of the residence" may reflect the *method* of land acquisition rather than the *reason* for its acquisition. This suggests that a study such as this one, which seeks to illuminate some of the deeper meanings ascribed to forestland, may be useful for future interpretations of quantitative data.

In addition to service industry employees, one of the most rapidly growing groups of new forestland owners in the South is retirees. As of 1994, retirees alone controlled 22% of Virginia's NIPF lands (Birch 1997, p. 189). Zipperer (1993) described retirees as searching for "remote and more peaceful homes in the country," a direct reference to the "lifestyle" factor mentioned by DeCoster (1998). In his book *New Pioneers*, Jacob (1997) has also written about the prevalence of retirees among the larger population of "back-to-the-landers" who move to the country seeking a simpler lifestyle.

In contrast, in their study of western counties containing federally designated Wilderness areas, Rudzitis & Johansen (1989) found that many new migrants were young, educated people; only 10% cited retirement as a reason for their move. When asked why they chose their new location, 42% of the new residents cited the physical amenities of the area (outdoor recreation, scenery, environmental quality, climate); 32% cited social amenities (pace of life, place to raise kids, family access, quality of schools, social services, cost of living, crime rate); and only 27% cited employment.

Regardless of the demographics of the new residents, this category of "lifestyle benefits" clearly must be considered. Forest managers must determine how traditional ideas about forest management relate to lifestyle advantages that new landowners perceive to emanate from their forestlands.

In the past, scholars have proffered numerous explanations about how modern lifestyles affect forest management. Writing for a forestry audience, for example, DeCoster (1998, p. 26) argued that these "modern lifestyles" are problematic:

> *Modern lifestyles favor living in and around the woods and owning pieces of them but earning most income from urban-oriented work unrelated to forests. In these situations, forests tend to be perceived primarily as decorations, a view that diminishes the value of traditional forestry.*

Here, the term "traditional forestry values" seems to be a euphemism for timber production that has become less important on some private lands as the importance of other land ownership

motivations increases. Zipperer (1993, p. 153) provided a similar characterization of new forest owners:

> *Newcomers bring with them a different set of cultural values, lifestyles, attitudes, and demands of the forest landscape. These values and attitudes affect the newcomer's perception of how the forest should be managed and for what purpose…. Most newcomers have spent their entire lives in metropolitan areas, are accustomed to high-quality services, and want these services in their new rural setting. Often they have no grasp of the relationship among trees, wildlife, and water; little understanding of multiple use management; and little comprehension of the relationship between timber operations and forest products.*

Many previous studies of NIPF land ownership motivations share the objective of predicting timber harvest intentions (Greene and Blatner 1986; Young and Reichenbach 1987; Blatner and Greene 1989; Alig et al. 1990; Lawrence et al. 1992). Others have focused on predicting participation in incentive programs such as Forest Stewardship (English et al. 1997; Melfi et al. 1997; Tyson et al. 1998; Brockett and Gebhard 1999). These studies, however, often included only one or two questions to assess the motivations or perceived benefits associated with forest ownership. Moreover, these questions often focused only on perceived benefits of income or resource production (e.g., income from timber, hunting leases, property resale, supply of fire wood). Recent research efforts have begun to show that amenities including privacy, protecting nature, pride, personal identity, and preserving family traditions can be as important as income or resource extraction (Haymond 1988; Bliss and Martin 1989; Hodge 1993; Hodge 1996).

Ownership Motivations Emphasized in This Study

To understand this shift in NIPF land ownership priorities, one must turn to the literature related to exurban migration, where the appeal of the rural lifestyle clearly is depicted. Other authors have elaborated on the motivations underlying the rural migration:

> *Many Americans find the [urban-rural] fringe an attractive place to live because of its combination of open space amenities and access to urban shopping, employment, and cultural activities. Other Americans are fleeing the high crime*

> *rates and high property taxes of central cities. They may also be seeking less racially diverse communities. Still others find the rural-urban fringe an affordable area in which to build a house or buy a home.* (Daniels and Lapping 1996, p. 28)

Campbell and Garkovich (1984, p. 102) explained rural migration similarly: "A large number of individuals moved to rural areas (or did not leave them) due to a belief that rural life represented the 'promised land' of economic security, family security and stability, environmental purity, and moral superiority." The same authors also speculated about the source of these desires:

> *Daily news stories in newspapers, the network television news programs, cover stories in news magazines, a deluge of books, and a spate of topical courses in colleges sustained images of cities as hotbeds of crime, drugs, racial conflicts, traffic congestion, high taxes, impersonality, deteriorating moral standards, and forced busing.... Rural areas and their more natural way of life and exceptional environmental quality offered an attractive counterpoint to the dismal urban condition* (Campbell and Garkovich 1984, p. 99).

Studies of nonmetropolitan migration have shown that "people preferring or wanting to move to smaller places or rural areas were more likely to give quality of life reasons, whereas those moving to larger places were more likely to give income reasons" (Fuguitt and Brown 1990, p. 596). Undesirable conditions such as crime, poverty, and pollution "push" some people away from urban life. For others, the perceived desirable characteristics of country life—simplicity, community togetherness, a more natural lifestyle—"pull" them toward more rural residences (Garkovich 1989). Given the established importance of these "lifestyle" amenities, it seems surprising that there has been limited study of their impact on private forest management.

Specific constructs related to land ownership motivations are described below. These general topics subsequently were used to develop a survey instrument to assess the extent to which they are relevant to the population of new forest owners.

Utilitarian/Commodity/Economic Motivations

Several constructs relate to utilitarian values of natural resource ownership and management. Foremost among these is commodity sale for financial gain. As mentioned above, most NIPF studies, intent on predicting timber and fiber supplies for industrial markets, have included this construct on landowner questionnaires (e.g., Hodge 1993; Birch 1996). Bliss (1989) characterized this type of motivation as an external incentive that may affect the timing and extent of harvesting, but not the initial decision to harvest.

A second construct frequently included in NIPF studies relates to land investment. Nationwide, 14% of NIPF owners consider land investment to be either their primary or secondary reason for owning land (Birch 1996, p. 37). Birch (1997, p. 193) also reported that 20% of Virginia NIPF owners identified land investment as the primary or secondary reason underlying their ownership. Hodge (1993), however, found that over 78% of Virginia NIPF owners who owned at least 20 acres of forest considered investment an important motivation. The difference in these results was likely an artifact of questionnaire design. In the Birch studies, NIPF owners selected a primary and secondary ownership motivation from a list. In the Hodge study, NIPF owners rated each of 12 reasons on an importance scale of 1 to 3. It is difficult to judge which method is more "correct," but probably unnecessary to do so here; it is sufficient to note that land investment was important to both populations.

A third economic construct is conspicuously absent from the NIPF literature. Within the popular media dedicated to the back-to-the-land movement, there is great emphasis placed on the perceived lower cost of living associated with rural life. Migration studies have revealed that this motivation is an important factor for many exurban refugees (Cook 1987; Fuguitt and Brown 1990; Benfield et al. 1999). Migrants seem to expect lower taxes, lower housing prices, lower grocery and utility bills, more affordable child care—in general, a lower cost of living.

In addition to strictly monetary benefits, some people might decide to purchase rural land for the opportunity to personally grow and harvest products for home use. The popular literature related to neo-homesteading (exemplified by the magazine *Mother Earth News*) is awash with instructions on how to provide, through the sweat of one's own labor, for basic living needs. In his discussion of neo-homesteaders' motivations, Jacob (1997) noted that "self-reliance can bring

to its adherents an intoxicating sense of personal freedom" (p. 86–87). Despite its seeming status as a key motivator of back-to-the-landers, this "self-sufficiency" construct largely has been absent from studies conducted in a NIPF framework.

A final utilitarian construct is recreation. The opportunity to enjoy a spectacular viewshed, to glimpse migrating songbirds, to hike, hunt, fish, or ride horses on one's own land can be a powerful impetus for many landowners. An enormous body of popular media recognizes the importance of recreation. Specialized publications exist for many diverse activities; as only one example, the magazine *Birds and Blooms* is directed specifically at rural and suburban residents who want to increase their backyard's beauty and suitability for bird-watching. Long recognized as an important forest-related benefit, and even codified in the Multiple Use-Sustained Yield Act of 1964, recreation often is included in NIPF motivation inquiries (e.g., Bliss and Martin 1989; Birch 1996). Much of the managerial attention to recreation on private lands, however, has concerned public access; like timber supply, public access for recreation is considered to be threatened by the parcelization and fragmentation of forestland (Cordell et al. 1993; Dennis 1993).

Lifestyle Motivations

"Lifestyle" constructs refer to the quality of life supposedly afforded by a relaxed, easy-going, simple, safe, healthful life in the country. Recent research demonstrates that a sense of privacy is paramount among new landowners. Closely related to privacy and solitude are concepts such as independence and freedom from society's demands. Almost all (98%) of Jacob's (1997) "new pioneers" considered a sense of privacy to be very important. Hodge (1993) reported that 44% of Virginia forest owners value their forestland because it provides a buffer from adjacent properties. Likewise, Haymond (1988) reported that about half of forest-owning opinion leaders cited "lifestyle enhancement" values afforded by their land.

In contrast to the quest for solitude, many exurbanites seek a sense of community. A common complaint of urban lifestyles is their anonymity, lack of roots, or sense of home (Benfield et al. 1999). Sense of community relates to developing roots, leaving a reminder of one's life, and fostering close relationships with trusted, friendly neighbors. Jacob (1997) found that 60% of readers of the magazine *Countryside* considered a sense of community to be important.

Another lifestyle construct relates to the unpleasant attributes of city residence that push people away. Exurban refugees seek healthy environments free of crime and pollution. The promise of a safe, healthy environment leads many parents, especially those with young school-aged children, to view rural environments as more enriching and value-enhancing settings than cold, impersonal, drug-filled and violent cities. Rural sociologists have recognized the lure of suburban school districts as a major contributor to exurban sprawl (Benfield et al. 1999).

Beyond the perceived advantages of small towns for parents, popular exurban flight literature (e.g., Urbanska and Levering 1996; Ross and Ross 1997) also suggests that a simpler home life filled with fewer material goods leads to a more stable community structure and improved personal well being. Small towns promise a slower, saner pace and a simpler life that attracts disenchanted urban residents. Books urging people to "trade business suit blues for blue jean dreams" (Ross and Ross 1997) promise to help them escape the "rat race" and "get back to the basics." Such a dream promises the opportunity to get involved with the land, to get one's hands dirty, and to actively participate in natural processes.

Over three fourths (76%) of Virginia forest owners consider "preserving nature" to be another important reason for owning land (Hodge 1993). Studies of landowners in other states report similar findings (e.g., Haymond 1988). Among populations of neo-homesteaders, "…the ideal back-to-the-land microfarm enhances, rather than degrades, the piece of earth on which its human operators hold a stewardship" (Jacob 1997, p. 112). This finding might be interpreted in several ways. In utilitarian terms, a concern for nature might arise from a desire to provide an economically sustained yield of some forest product. Alternatively, nature might be protected for its own sake, a biocentric focus. Finally, the image of themselves as caring, responsible stewards of the land may be an important factor in a landowner's personal or cultural identity (Bliss and Martin 1989). As Kingsley et al. (1988, p. 199) wrote,

> *The comments of…owners, who had either inherited their land or wished to bequeath it to their heirs, were made with pride and indicated a strong sense of stewardship. These owners clearly looked upon their forestland as a valued treasure that they had received from a preceding generation and/or that they want to pass to their heirs.*

A final lifestyle construct stems from evidence that certain people subscribe to a "transcendentalist" philosophy and seek spiritual solace in nature. They consider rural life—where nature is ubiquitous, obvious, and comparatively undefiled—to be a more wholesome, spiritually fulfilling environment. A copious literature documents this construct among wilderness visitors and other recreationists (e.g., Cole 1997; McDonald et al.1985; Driver et al. 1996), but comparatively little has been written about a sense of spirituality among landowners. Ticknor's (1986) study, which identified the primary reason for owning woodland as "rebuilding the spirit," is a notable exception.

Regional Motivations

A third group of constructs is associated with large-scale land management concerns such as preserving regional history and culture, enhancing regional ecological health and systems, and providing products and employment opportunities for the regional economy. These motivations are addressed in both popular homesteading literature (e.g., Scott 1999) and in scholarly publications (e.g., Cantrill 1998; Solecki 1998). I included these items in my questionnaire to gauge whether and to what extent new owners perceive their role in the larger landscape and in forest management initiatives such as ecosystem management.

Market Segmentation

Market segmentation is "the process of partitioning markets into segments of potential customers with similar characteristics who are likely to exhibit similar purchase behavior" (Weinstein 1987, p. 4). Natural resource managers recognize the importance of "the application of research-based marketing concepts—behavior theory, audience segmentation, message design" (Tyson et al. 1998, p. 34) to promote desired behaviors such as forest stewardship. Market segmentation has been used to identify meaningful groups of anglers (Connelly et al. 1999; Romberg 1999) and wood product consumers (Ozanne and Smith 1996; 1998). One study has used market segmentation techniques to characterize the motivations and management intentions of NIPF owners in Arkansas (Kluender and Walkingstick 2000). This is encouraging—it suggests that researchers are beginning to construe NIPF owners as consumers of stewardship and ecosystem management messages, rather than simply as producers of timber and forest products. As

foresters increasingly solicit NIPF owner cooperation in ecosystem and forest management efforts, they also must view NIPF owners as potential consumers of such messages.

As a group, NIPF owners hold varying ownership motivations, objectives, or goals; they have different attitudes about natural resource management, different levels of trust in government and other forestry professionals, and different land tenure histories. Most importantly to forest managers, they display a wide range of land management behaviors. Although many surveys of NIPF owners have included items about ownership motivations, objectives, and perceived benefits, these variables rank lower than demographic variables in reported results and research conclusions. In the past, private forest owners have been separated and described according to gender, race, age, income level, education, and other demographic or socioeconomic variables. However, differentiating among groups using only such variables may mask more important, underlying differences.

Few important behavioral differences among NIPF owners have been found in the market segments developed from socioeconomic characteristics, which has led to NIPF owners being treated as one large, homogeneous group. Several studies have demonstrated that forest owners may not differ from the general public with regard to environmental concerns (e.g., Bliss et al. 1994; Bourke and Luloff 1994). NIPF owners often are compared to other large groups such as the "general public" (Bliss et al. 1994) or "non-forest owners" (Bourke and Luloff 1994)—small wonder that, in comparing one large, diverse group with a larger, even more diverse one, few differences are readily identified.

To successfully segment the market of NIPF owners, it is necessary to identify important variables that define distinct markets relevant to forest management. My study employs market segmentation techniques to separate new owners into groups with similar management objectives, who have similar needs for professional forestry advice, and, hopefully, can be reached with a similar message.

Methods[4]

Research Setting

Virginia is divided into three planning units based on predominant physiographic characteristics—mountain, piedmont plateau, and coastal plain. To identify counties that recently have experienced high growth rates, I prioritized the counties in each of these three regions by population growth and increases in housing, combined with forest loss (Table 1.1). Starting at the top of each prioritized list, I called county Commissioners of the Revenue until I identified two per region with computerized real estate sales records. Six counties were selected as the sample frame for this research (Figure 1.1): Montgomery and Frederick (Mountain region), Spotsylvania and Bedford (Plateau region), and Henrico and Chesterfield (Coastal region). For each county, I requested the following information for all sales between 2 and 50 acres during the 5-year period from 1994–1998: landowner's name and mailing address, total acreage of the property, and date the property was purchased.

Table 1.1. Information about changes in population, housing, and forest area used to select sample counties in Virginia.

	Population			Housing			Forest area			Rank
County	1980	1995	Rank	1980	1990	Rank	1985	1992	Rank	sum*
Bedford	34,927	52,335	13	13,892	19,641	9	287,093	288,607	57	68
Chesterfield	141,372	239,659	5	48,883	77,329	5	193,898	189,813	24	29
Frederick	34,150	51,549	12	12,759	17,864	11	130,947	129,262	34	45.5
Henrico	180,735	232,799	25	70,428	94,539	14	66,929	59,637	5	24.5
Montgomery	63,284	75,756	35	22,386	27,770	28	146,183	145,464	46	77.5
Spotsylvania	31,995	71,981	1	11,850	20,483	1	184,537	175,636	12	13

* Rank sum = [Rank (Population) + Rank (Housing)] / 2 + Rank (Forest area)

[4] Complete details about research methods (sample selection, mailing procedures, instrument development, statistical procedures, etc.) are provided in Appendix A.

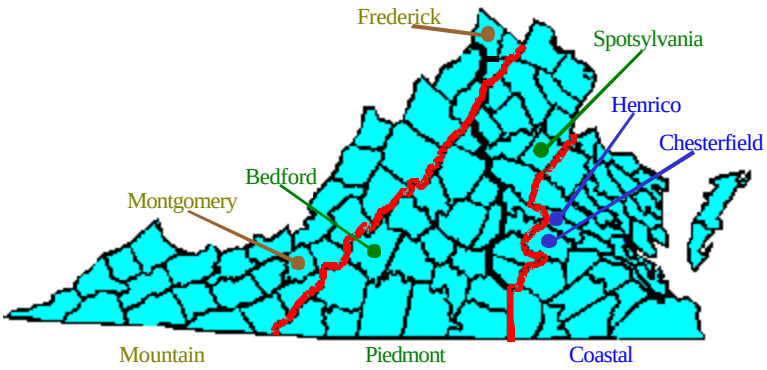

Figure 1.1. Six counties selected as the sample frame for a survey of Virginia's new forest owners.

Respondents/Sample Population

I defined a "new" owner as one who acquired land between 1994 and 1998. "Small" tracts were defined as those between 2 and 50 acres. The 2-acre minimum size was established to identify primarily owners of parcels outside of city limits; the 50-acre upper limit represents a tract size that might be considered too small for traditional management strategies to be effectively implemented. The sample was stratified further by parcel size—those who purchased at least 2 but fewer than 20 acres, and those who purchased at least 20 but fewer than 50 acres. Twenty acres was selected as an appropriate dividing point because it is the minimum acreage required to participate in the Forest Stewardship Program in Virginia.

In April 1999, a mail questionnaire was sent to 1,855 new owners of small tracts of land in the counties listed above. Cover letters were personalized with the name and address of each landowner as well as information from county records about the size and date of the recent purchase. Of the original 1,855 questionnaires mailed first-class, 264 were "noneligible or nonreachable" (Dillman 1978), so I adjusted the sample size to 1,591; 734 were completed and returned for a response rate of 46.1% (734/1,591). Of these respondents, however, 73 purchased their land prior to 1990, hence they were classified as "noneligible" and excluded from further analysis. My final adjusted sample size, then, was 1,518, resulting in a final usable response rate of 43.5% (661/1,518).

Survey Instrument

I designed my questionnaire to elicit information regarding land ownership motivations (or objectives), willingness to participate in various management activities (including cross-boundary management activities), perceived constraints to management, general attitudes about forest management, and socioeconomic characteristics.

Questionnaire items related to motivations and general attitudes about forest management were pretested in a questionnaire administered to 128 students in an introductory natural resources course in February 1999. The goal of the pretest was to identify three to five items for each motivational construct. Factor and reliability analyses revealed redundant items that were discarded, confusing wording that needed correction, and several motivational constructs that lacked reliability because of too few items; ultimately, 67 items were identified for use in the final questionnaire. These items represent several distinct factors within the three general motivation categories discussed above—utilitarian/economic, lifestyle/personal, and regional/ecosystem.

Respondents also were asked to rate their willingness to participate in 24 management activities (15 activities on their own land, 9 involving cross-boundary management). For each activity, respondents noted whether they already, might, or probably never would participate. They also were asked to note obstacles or constraints to participation for each of the 24 activities. From a list of 37 possible reasons for not participating, respondents checked as many items as they believed applied to them.

As means to help differentiate among market segments, respondents described their attitudes about selected issues relevant to professional forestry[5]. Six questions about property rights were included. Four of these asked whether respondents agreed or disagreed that: "The government should have the right to regulate how people use their land and forest in order to…" 1) "…protect water quality," 2) "…protect threatened and endangered species," 3) "…preserve the beauty of the forest," and 4) "…maintain healthy forests." Factor and reliability analysis of the responses to these and two similar items resulted in the creation of a single "Property Rights"

[5] On the 7-point scale, –3 = strongly disagree, 0 = neutral, +3 = strongly agree.

index from the mean of the responses to all six items. The reliability of this measure (Cronbach's alpha) was 0.87.

Four questions were asked about the image of professional forestry. Participants were asked to indicate whether they trust foresters to provide good information about managing trees, and to focus more on ecological health than on making money or cutting timber. They also were asked how much they knew about foresters (see Table 1.5).

Finally, two items about non-conventional timber harvest practices were included. Respondents were asked whether they would be willing to 1) "… harvest a few trees and saw them up for lumber using a small, portable two-person sawmill," and 2) "… accept less money from a timber sale if the logging actions protected other forest qualities" (Table 1.5).

Statistical Analysis and Results

A combination of factor analysis, cluster analysis, and one-way analysis of variance (ANOVA) was used to reduce the 67 motivation items into a smaller number of factors, to identify discrete segments of new landowners, and to explore the external validity of the identified segments. All statistical computations were done using SPSS for Windows (SPSS 1998; 1999).

Data Reduction Using Principal Components Analysis

Principal components analysis (PCA) was used to reduce the 67 motivation items to a smaller number of homogeneous factors for use in a subsequent clustering procedure. Selecting only factors that explained a greater amount of variance than any single variable explained (i.e., eigenvalues greater than one) resulted in a 12-component solution. Factors resulting from equamax rotation were used to create factor scores/indices. Reliability (as assessed by Cronbach's alpha) was high for all 12 factors, ranging from 0.61 to 0.94 (Table 1.2). In a recent review of Cronbach's alpha as a reliability indicator, Santos (1999) stated that 0.7 is typically considered "an acceptable reliability coefficient but lower thresholds are sometimes used in the literature."

Segmentation Using Cluster Analysis

I followed the 5-step cluster analysis procedure recommended by Punj and Stewart (1983). Respondents were clustered on means of 12 motivational indices derived from the factor analysis rather than on the 67 individual motivational items. Initial analysis identified seven outliers

among the items, to which all respondents gave the same answer; these were eliminated from further analysis. The data then were standardized across respondents (rather than across each variable) by dividing by the range of responses (Milligan and Cooper 1988; Beaman and Vaske 1995). A similarity measure was calculated using a derivative of Pearson's product-moment correlation (Beaman and Vaske 1995).

K-means clustering is more efficient when a non-random starting point is given for the specified number of clusters (Punj and Stewart 1983). To do this, for each cluster solution, the data set randomly was divided in half, a k-means clustering procedure was conducted using only half of the data, and the resulting cluster centers were saved. These values then were used in the final clustering of the entire restored data set. This procedure was repeated for solutions between three and eight clusters.

Different cluster solutions were validated by conducting significance tests on variables not used to create the clusters (Aldenderfer and Blashfield 1984). For this analysis, variables measuring land ownership, socioeconomic, and demographic characteristics, forest management attitudes, and management intentions were compared for solutions of three to eight clusters. Ultimately a solution of six clusters was selected based on differentiation among groups as identified through chi-square tests and ANOVAs (Figure 1.2).

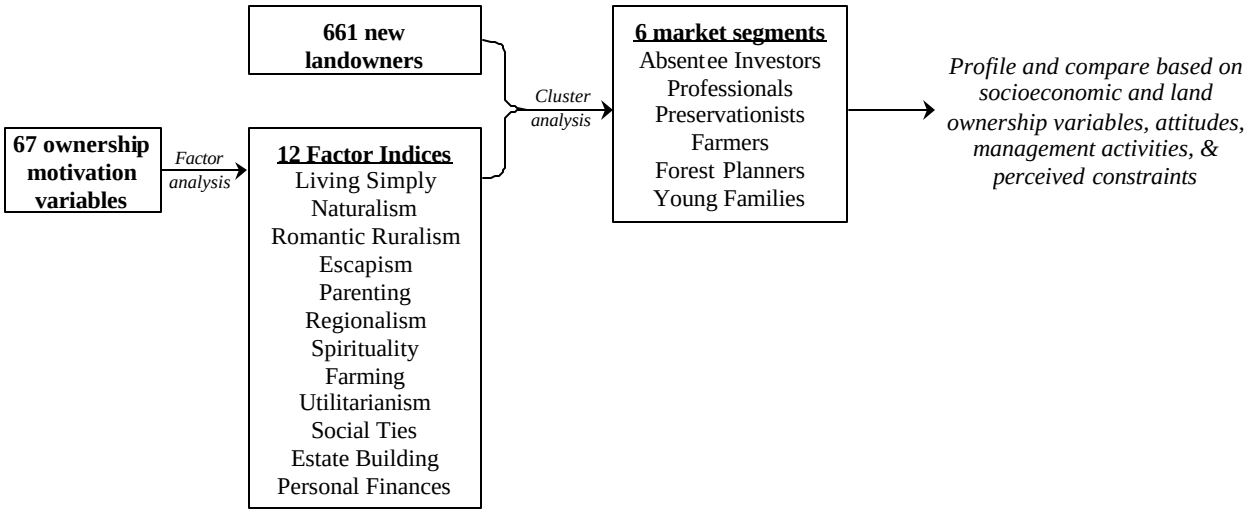

Figure 1.2. Analysis process used to identify and characterize meaningful market segments among the population of Virginia's new forest owners.

Results and Discussion

Sociodemographic Characteristics

Responses were distributed across the three mailing waves and across the six sample counties (Figure 1.3). I excluded 41 questionnaires from the following characterization because respondents did not respond to all motivation items and thus could not be clustered; my sample size is 620. I first will describe characteristics of the whole sample of landowners; I then will discuss differences among market segments (clusters) of new forest landowners.

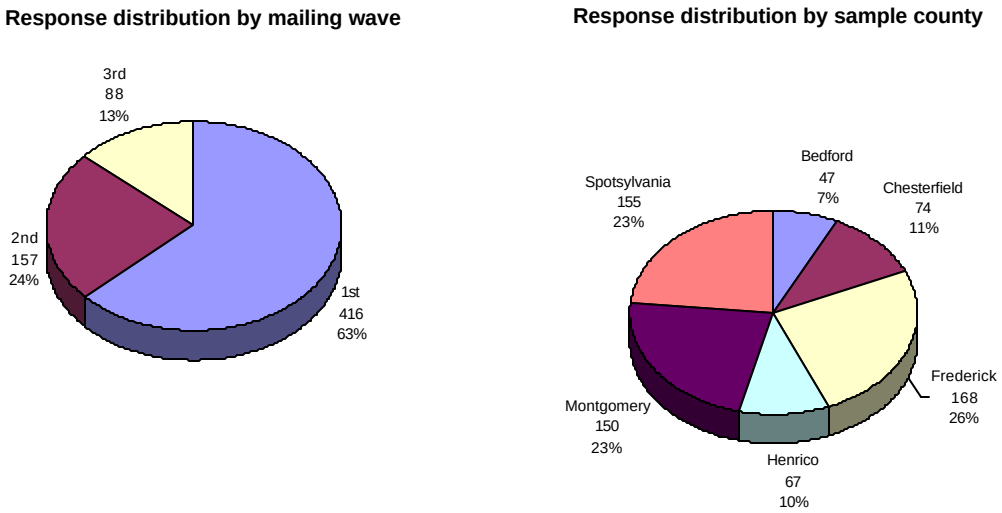

Figure 1.3. Distribution of responses across three mailing waves and six sample counties.

Respondents predominantly were male[6] (68%; see Table 1.3), married (83%), and had children (88%); 50% had children still living at home. Almost half (48%) possessed at least a bachelor's degree, the same amount of college graduates that Hodge (1993) reported among landowners with 20 or more forested acres in Virginia. Our respondents were very well off economically—about half reported an average income above $70,000. Only about 3% of our respondents' income derived primarily from their land.

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[6] In a number of cases, comments such as "We both filled this out!" were written in. This item should perhaps be reworded on future questionnaires—rather than asking who owns the property, researchers should ask who completed the questionnaire and should provide the opportunity for couples to indicate that both of them participated.

Only 59% of respondents currently live on the land they recently purchased (Table 1.4), but an additional 16% plan to make their land their primary residence. Approximately half of those who do not live on their new property live within 10 miles of it; however, the average distance from a non-resident's house to the property was 99 miles (S.D. = 461.3 mi.). Most (85%) purchased their tract fee-simple within the last 5 years. Respondents have previously owned other forest land for approximately 8 years; they own, on average, almost 50 acres. Over half (53%) intend to pass their land on to their children; an additional 29% never have thought about future dispensation of their land. Nearly 18% of the sample intends to sell the land in the near future (in an average of 10 years). Respondents most commonly indicated that increasing regional population (30%), high property taxes (25%), or too much maintenance work (22%) might influence them to sell their land.

Attitudes about Property Rights and Forestry

Respondents were asked their opinion regarding statements about property rights, professional foresters, and alternative forestry techniques. Only one significant difference occurred among the six market segments on these attitudinal items—the groups labeled Planners and Farmers expressed more willingness than Professionals to harvest a few trees and process them with a small two-person sawmill (Table 1.5). Even this difference, although statistically significant, was slight—all six groups' attitudes clustered near the "neutral" scale midpoint. On average, respondents were also neutral ($\bar{x}$ = 0.17) about allowing the government control over their property rights to protect environmental quality. Respondents were only somewhat trusting of foresters ($\bar{x}$ = 0.38). When asked whether they knew "anything about professional foresters," however, they admitted that they knew some, but not much ($\bar{x}$ = 0.40, where –3 = little knowledge, 0 = neutral, +3 = high knowledge). Respondents somewhat favored the possibility of accepting less money for logging to protect other forest qualities on their lands ($\bar{x}$ = 0.60).

Land Management Behaviors

Although some respondents were very active on their lands, most were not. Fully 74% of respondents claim to "regularly inspect the condition of their land"; only 4% probably never will do so (Table 1.6). Only 28% already have tested their soil, but 12% probably never will. Only 9% currently remove exotic species such as kudzu; 54% probably never will. Active

management for commodity production is low for this group of new owners. Only 22% of respondents currently graze livestock, compared to 53% who probably never will. Only 13% already prune trees to improve timber value, compared to 51% who probably never will do so. Overall, factors other than timber value are more likely to lead to active management. Almost half (45%) already do something to improve wildlife habitat, whereas 10% probably will not.

Regarding respondents' willingness to work with neighbors or others to achieve program goals (e.g., ecosystem management) or mitigate ecological impacts of forest fragmentation, 8% already share management plans with their neighbors; 27% said they probably will not do so (Table 1.7). Almost 11% have worked with neighbors to connect wildlife corridors that cross property boundaries; 21% said they probably never will do that. Few (8%) respondents already work with local or state governments to manage their land; 25% said they probably will not do so.

Overall, new landowners have limited management experience. They generally are not willing to manage for commodity production or income, but are willing to consider managing for other purposes. Although they currently do not participate in many activities, they seem willing to do so at some point in the future. Over 40% said they "might" be willing to participate in 7 of the 15 independent management activities (for example, "have my soil tested," 59%; "prune or cut down selected trees to improve forest health," 57%, "plant vegetation to provide privacy from neighbors and roads," 48%; Table 1.6). Of greater interest for those interested in promoting ecosystem management and similar cooperative initiatives, over 50% of new landowners "might" be willing to participate in 7 of the 9 cross-boundary management activities (for example, "work with my neighbors to control insect and disease outbreaks," 79%; "work with an environmental organization to manage land in a way that is healthy for the land," 70%; "work with the federal government to manage my land in a way that is healthy for the land," 56%; Table 1.7).

When asked to identify obstacles that might keep them personally from conducting the land management activities, respondents most commonly reported a belief that their landholding was too small to worry about managing (29%, Table 1.8) or their land is unsuited for those activities (28%). Some (16%) worried that these actions (such as pruning or use of pesticides) might harm the land and fewer (4%) indicated that they do not know where to get advice about managing

their land. Lack of time and money did not appear to be important limitations for these landowners. An important finding was a purposeful decision not to manage; 25% of respondents simply do not want to participate in the independent activities listed, and 14% do not want to participate in the cross-boundary activities.

Motivations

Factors that might characterize a broader "country lifestyle" category are most important to new forest owners (Table 1.2). The most important ($\bar{x}$ = 1.52, on a scale ranging from –3, "Not at all important" to +3, "Very important") factor included items such as "to escape from the rat race of urban civilization" and "to live a simpler life." This Living Simply factor was followed closely by a Naturalism factor. The "country bound" lifestyle also was exemplified in what I labeled Romantic Ruralism, Escapism, and Parenting factors.

Slightly less important, though still rated significantly higher than a neutral rating of zero, were Regionalism and Spirituality factors. The five other factors—in descending order of importance, Farming, Utilitarianism, Social Ties, Estate Building, and Personal Finance—all received scores lower than zero.

Market Segments Identified through Cluster Analysis

The empirical cluster analysis procedures described above suggest that six interpretable clusters exist. I assigned each cluster a name that reflects its dominant characteristic. In this section, I describe and contrast these clusters, emphasizing sociodemographic characteristics, land ownership variables, and attitudinal factors relevant to forestry and to forest management.

Cluster 1 (n = 26): Absentee Investors

Members of the first and smallest cluster did not consider any of the 12 ownership motivations important (i.e., mean scores for each index are below zero; Figure 1.4). Estate Building was most important ($\bar{x}$ = –0.60), followed by Personal Finance ($\bar{x}$ = –1.08). This is the only group that deemed these two the most important motivations—on average, this group derives 14% of their income from their land, a much higher percentage than any other group (Table 1.3). Least important ($\bar{x}$ = –2.14) to Absentee Investors is Social Ties.

Table 1.2. Motivational factors identified through principal components analysis*.

Name of factor	Mean	St. Dev.	Cronbach's alpha	% variance explained	Content Items
Living Simply	1.52	1.32	0.8063	5.545	Escape from rat-race, be free to do what I want, build and fix things with my hands, build my own house/barn, have privacy, live a simpler life
Naturalism	1.29	1.35	0.9441	7.448	Take care of birds and wildlife, keep scenery looking nice, improve ecological health, walk or hike on my land, participate in natural processes, see wildlife, study nature, enjoy scenery, preserve nature, watch things grow, do what is right for environment, help preserve regional history
Romantic Ruralism	0.85	1.42	0.8338	5.795	Have neighbors I can trust, know neighbors, pay less taxes, live in a healthy place, live in a small community
Escapism	0.51	1.39	0.8546	5.697	Get away from other people, be independent, get away from poverty, escape city crime, lower cost of living, get away from pollution, closer to good paying job
Parenting	0.49	1.77	0.8815	5.941	Safe place for kids to play, teach my kids important values, good role model for kids, teach kids important skills, closer to good schools
Regionalism	0.22	1.49	0.8758	5.667	Live more cheaply, drinking water, improve regional water quality, reduce regional erosion, help local economy, develop roots in one place
Spirituality	0.19	1.69	0.8602	5.828	Connect with a higher power, reconnect with my spirituality, feel closer to God, get back to the basics
Farming	0.13 †	1.74	0.7354	5.124	Raise farm animals, ride horses on land, grow some of my own food
Utilitarianism	–0.29	1.42	0.7332	4.474	Hunt on land, drive ORVs on land, practice outdoor skills, provide recreation for others in region, provide firewood and edible plants
Social Ties	–0.42	1.52	0.6112	5.585	Closer to friends, closer to family, live near people like me, provide regional jobs
Estate Building	–0.45	1.60	0.6260	4.761	Buy neighboring lands to have larger landholding, add to existing landholding, leave a lasting reminder of life
Personal Finance	–0.93	1.42	0.8653	5.642	Major source of income, sell products to supplement income, help pay for special expenses (college, medical bills, vacation), pay for retirement, support myself, work for myself, products for local economy

* A table that lists all items in each factor, their loadings, means, and standard deviations appears in Appendix A.

† Mean is *not* significantly different from 0 (t-test, ? ? = 0.05); scale ranged from –3 (Not at all important) to +3 (Very important).

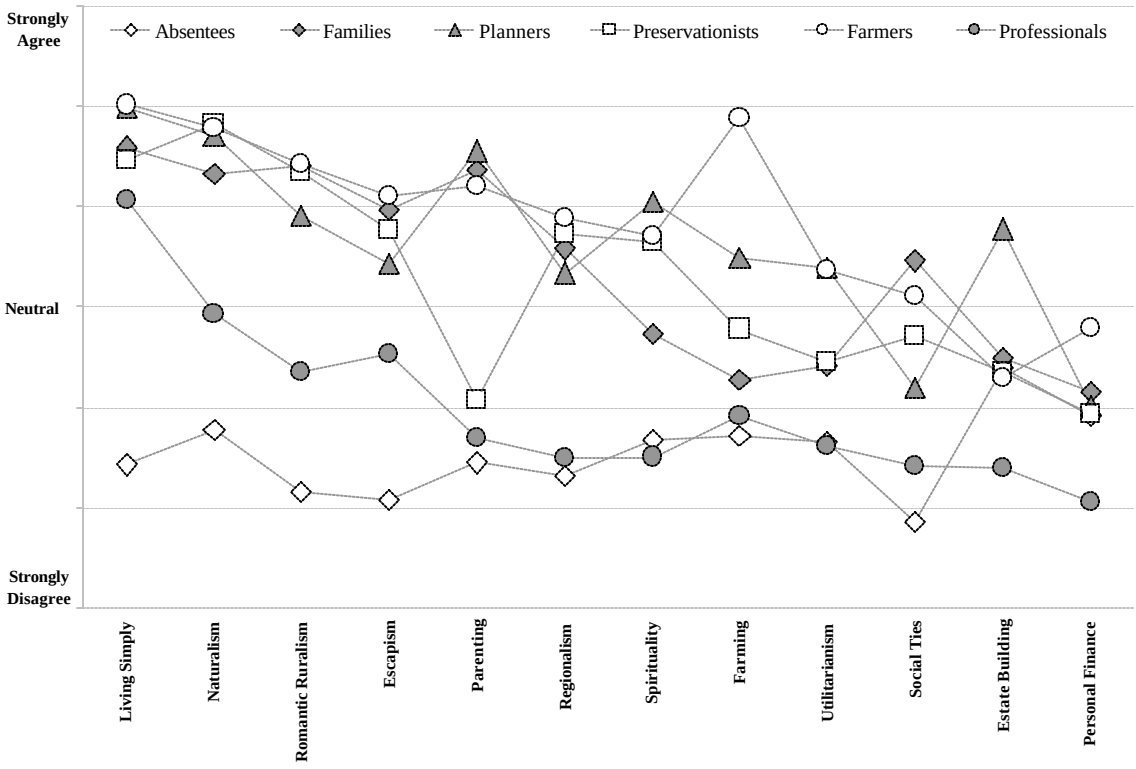

Figure 1.4. Motivational factor scores for six groups of new landowners in Virginia.

On average, Absentee Investors are 53 years old (Table 1.3), the oldest among the six clusters. Absentee Investors have less education than four of the other groups. Over 90% of Absentee Investors reside away from their recently acquired tract (Table 1.4). Almost one fourth (23%) of Absentee Investors inherited their land, rather than purchasing it. Over one third (38%) plans to sell their new tract in fewer than seven years. Absentee Investors own the largest amount of land ($\bar{x}$ = 101.2 ac), although their most recent acquisition averaged only 22 acres.

Absentee Investors are most likely to consider clearcutting acceptable regardless of land type (Table 1.5). They also believe private property rights should supersede public interest. This group was least likely to implement any independent management activity (Table 1.6). An important exception is that this group alone seems relatively likely to prune or cut down selected trees to improve timber values. Interestingly, approximately 8% of Absentee Investors already claim to be working with the federal government to manage their land (Table 1.7), but 50% say they probably never will do so. The most salient obstacle indicated by members of this cluster

was that they simply have not thought about doing these things (Table 1.8). Compared to other groups, they were more likely to think that they don't spend enough time on their land to do some of these things.

Cluster 2 (n = 86): Professionals

This group rated 11 of the 12 motivations as unimportant; Living Simply was the most important motivation for this group ($\bar{x}$ = 1.06; Figure 1.4), whereas Personal Finance was least important ($\bar{x}$ = –1.93). Based on their motivational profile alone (most indices below zero), this group comprises the quintessential professional exurban migrants; their life priorities are on issues not associated with their land.

On average, this group derives less than 1% of their income from the land, and they have the highest annual household income, $78,000 (Table 1.3). Over half have a professional or management career; over 61% have at least a bachelor's degree. About 29% are childless, which is higher than all but one other group.

The parcels purchased by this group were fairly small, about 19 acres on average (Table 1.4). These individuals were not likely to own additional property; the total amount of land they own is only 22 acres. Over one third (36%) never have thought about future dispensation of their land; one fourth plan to sell their land within 7 years. Professionals are similar to Absentee Investors in that they say they probably never will implement any of the management actions included on the questionnaire (Table 1.6, Table 1.7). They did, however, indicate some willingness to do things such as improve wildlife habitat, have soil tested, and cooperate with neighbors or management agencies. Almost half (48%) of the group believes that they don't own enough land to worry about managing, and almost as many (43%) think their land isn't suited for the management practices listed (Table 1.8).

Cluster 3 (n = 107): Preservationists

For this group, Naturalism was the most important reason for owning forestland, followed closely by Living Simply and the Romantic Ruralism. Preservationists were one of four groups that value the "country lifestyle" motivations (i.e., Living Simply, Naturalism, and Romantic Ruralism). Unlike the Young Families, Forest Planners, and Farmers, people in this group were much less concerned about Parenting (Figure 1.4). This makes sense considering that only 15%

have children living at home (compared to 50% of the total sample), and 35% are childless (compared to 18% of the total sample; Table 1.3). This group had the highest proportion (30%) of single respondents and the highest proportion (22%) of retirees; 38% have professional or management careers. The average age of the people in this market segment is 52 years.

Interestingly, almost half (49%) of this group plans to pass their land to their children (Table 1.4), so they seem to care about family, heritage, and tradition. Those who plan to sell their land do not expect to do so for an average of 18 years, and thus Preservationists are by far the most long-term residents of the residential forest. The average size of the most recently purchased tract was 25 acres, intermediate among the other groups; the total amount of land owned by this group is 38 acres.

Preservationists are least likely to consider clearcutting acceptable (Table 1.5). This group indicates that they "probably will not" participate in most active land management behaviors (Table 1.6, Table 1.7). These respondents justify their non-participation in independent management actions by saying that they prefer to let nature take its own course (36%), they never thought about it (34%), and they don't have the equipment (31%; Table 1.8). Regarding cross-boundary management, they don't participate because they don't have the money to do so (31%), they never thought about it (29%), and they worry about losing control over their land (27%; Table 1.8). The combination of these attitudinal and behavioral indicators suggests that this group may be motivated by a romantic preservationist ideal that Nature is best if humans leave it alone, although other more tangible obstacles may also be present.

Cluster 4 (n = 136): Farmers

Farming and Living Simply motivations clearly define this group. Although this group considers the Personal Finance motivation more important than other groups, lifestyle motivations remain more important than income production—people in this segment still place the highest value ($\bar{x}$ = 2.01) on Living Simply than on any other motivation (Figure 1.4). Of the six groups, they have the lowest level of education and the lowest income (Table 1.3), although $62,000 is still considerably higher than the national median of $38,885 (Bureau of the Census 1999).

These people purchased the largest ($\bar{x}$ = 35 ac) tracts, about half of which ($\bar{x}$ = 18 ac) were forested (Table 1.4). Their total ownership is only 46 acres, so this is obviously not large-scale

agribusiness. Over 68% live on their new tracts, the highest of any group; those who don't live on the land reside only 12 miles away, the closest of any group. Over half (54%) plan to pass their land to their children. When asked to choose from a list of factors that might influence them to sell their land, 41% said that they might sell if the area population became too high.

This group seems an important target for stewardship and forestry extension efforts—they indicate that they might be interested in participating in most of the management actions I asked about (Table 1.6, Table 1.7). They were most likely to consider processing wood with a small sawmill on their own land (Table 1.5). Surprisingly, 40% selected "I have never thought about it" as an obstacle to their participation in forest management activities (Table 1.8). Over one third also indicated that they don't have the equipment (36%) or money (35%) needed for active forest management, which suggests that land management professionals need to reach these people with advice and information. About one third (33%) of Farmers worry about losing control over their land. Other important obstacles to their participation in cross-boundary management were that they had never thought about it (29%) and that they don't believe their current management practices harm the regional ecosystem (27%). Connecting with these respondents should be a priority for forestry professionals; given their current land practices, they seem likely to find arguments about the individual and ecological advantages to natural resource management persuasive.

Cluster 5 (n = 140): Forest Planners

Personal Income and Social Ties are the only motivations that this group rated as unimportant. Only this group and Farmers consider Utilitarianism an important motivation for land ownership. Overall, the motivational profile of this group seems remarkably similar to the Farmers—the largest difference is that Forest Planners consider Parenting more important, and Farming (which includes items related to active livestock and food production) less important (Figure 1.4).

Given their motivational similarity to Farmers, the demographic disparity between these groups is striking. With a mean of 42 years of age, Forest Planners are the youngest group (Table 1.3). They also are more highly educated than Farmers—25% of Forest Planners have an advanced degree. Over one third (35%) makes more than $100,000 annually, with an average income of $73,000. This group made the largest recent purchases ($\bar{x}$ = 45 ac), over two thirds ($\bar{x}$ = 32 ac) of which is forested (Table 1.4). Other than Absentee Investors, Forest Planners own the most

total acres, more than 80 acres on average. About two thirds (66%) plan to pass their land to their children. Forest Planners exhibit the highest level of trust in forestry professionals (Table 1.5), although this is not a statistically significant difference from the other clusters.

This group matches the profile that Jacob (1997) described as "Planners," exurbanites who have great plans for their new rural lifestyles, but for one reason or another, have not yet implemented many of these plans. A close look at Table 1.6 and Table 1.7 suggests that the "Forest Planner" label is an appropriate one. This group is most likely to already be participating in almost every management action included in the questionnaire. They are most likely to possess a written land management plan (although only 15% do so). In addition, a relatively large proportion of this group indicates that they "might" be willing to participate in the management actions included on the questionnaire. Although a large percentage (56%) of this group professes a willingness to work with federal, state, or local governments or environmental organizations to manage their land across boundaries (Table 1.7), they also are the most concerned about losing control of their land to outside interests (Table 1.8).

Cluster 6 (n = 125): Young Families

Living Simply, Romantic Ruralism, Parenting, and Naturalism motivate this market segment. Like all other groups except the Absentee Investors, Young Families consider Personal Finance to be the least important reason for owning land of the 12 motivations I assessed (Figure 1.4). This group is motivated by a search for an improved quality of life. The average age of people in this group is 45 (Table 1.3). Over two thirds (68%) of them have children living at home, and their average income is almost $70,000.

Young Families purchased the smallest tracts of land, only 16 acres (Table 1.4). On average 10 acres of their new landholding is forested. Although 57% plan to pass their land to their children, another 29% have never thought about their future plans for the land. When asked what might cause them to sell their land, 24% said that they might sell when they retire and move; 14% (compared to 10% of the total sample average) said they might move for a job, reflecting perhaps their younger age and earlier career stage.

This group was less likely to already be participating in active land management (Table 1.6, Table 1.7), but, like the Farmers and Forest Planners, many members of this group indicate that

they "might" participate in both independent and cross-boundary management. Thus, it is especially important to understand the obstacles preventing their participation. About 38% never have thought about either independent or cross-boundary management. Even more (39%) believe their land isn't suited for active management. Over one third indicated that they don't own enough land to manage (37%) and they prefer to let nature take its course (35%). Over one quarter (28%) of these respondents say they don't (or won't) participate in cross-boundary management because their current management isn't harmful; 25% say they don't trust the government.

Implications and Conclusions

Forest ownership is changing. In general, economic motivations for forest ownership are uncommon among new landowners who instead emphasize lifestyle motivations. The forestry profession should take note that these new owners are well educated and economically privileged, and thus have the potential to be important political friends or foes of forestry. They also have the potential to be important clients for forestry services. As forest owners they certainly are in need of forest management advice.

As forest ownership continues to change, forestry must change to be relevant to its constituency and client base. Market segmentation can help in this task. There is no such thing as an average forest owner. Even the most well crafted message about the benefits and ethics of forest management cannot be expected to be equally successful with all forest owners. As these data show, there exist distinct patterns in ownership motivations and management objectives that undoubtedly influence behavioral patterns and may influence receptivity to forestry communications and forestry practices.

The new owners we sampled are highly motivated by lifestyle issues characteristic of the "back-to-the-land" movement. The Planners, Preservationists, Farmers, and Young Families (and perhaps Professionals) are motivated by lifestyle, naturalism, and transcendental experiences. The literature studying these "new pioneers" notes that they desire to live more lightly on the land and minimize personal environmental impact. For example, many hope to feed their families from crops they grow and to install photovoltaic cells to eliminate dependence on public utilities. The "soft" technologies that comprise their dreams are those that are ecologically sound,

rely on renewable energy, require little specialization, are easily understood, and are labor intensive (Jacob 1997).

These ecologically aware people seem primed to be receptive to messages of forest stewardship and responsibility. There remains, however, the difficult task of reaching these people with a message about forest management that resonates, with getting them to trust the advice and ethics of forestry, and with overcoming the obstacles that prevent active forest management needed to protect forest health and amenity benefits threatened by an increasingly fragmented landscape.

The final paragraphs of this paper present some strategies for encouraging participation in active land management among each of the six market segments identified in this paper. This summary makes clear that the growing group of new forest owners is far from homogeneous; there are important differences between distinct subpopulations. This paper illustrates how studies of this kind can provide insight about these diverse segments of clients and constituents of forestry. Finally, it suggests directions in which the forestry profession needs to be growing.

Absentee Investors

As the name implies, Absentee Investors are not likely to reside on the lands they acquire. Thus, foresters face their first challenge in locating and contacting these landowners; this may require a careful inspection of land purchase and tax records. This segment composes only 4% of the sampled population, which is far less than previous estimates of absentee ownership in Virginia of 16% (Shaffer and Meade 1997). This seeming discrepancy can be explained by research methods; other researchers defined “absentee” solely on the basis of the owner living more than 50 miles from the forested tract. Although other segments in this study also included absentees using that definition, this segment is defined by only those absentees who indicated a distinct motivational profile.

Unfortunately for the forestry profession, the motivational profile evinced by members of this group is one of disinterest—perhaps even more challenging than identifying these people will be motivating them into action. Even within this group, which is the only one for which economic motivations were most important, interest in economic profit is not high, and interest in other forest qualities is surprisingly low. Nevertheless, several factors indicate that these individuals will be receptive to traditional forestry messages that emphasize timber management for

financial gain. First, as a group they do place a relative importance on financial motivations. In addition, they profess a willingness to engage in various management practices intended to increase timber values. Furthermore, there has been some evidence that absentee owners are more likely (than resident owners) to respond to offers of forest management information, or to request contact with a forester (Shaffer and Meade 1997, citing Morgan and Martin 1995).

Messages directed at this group should highlight the potential for improving timber quality without the owner's physical presence on the land. Because members of this group are likely to be concerned about compromising their private property rights, messages should also stress the voluntary nature of participation in management initiatives (including cross-boundary programs), and emphasize that the landowner retains sole possession of both the land and all management rights.

Professionals

Like Absentee Investors, Professionals clearly have interests other than forest ownership. They are motivated to live in forests only to the extent that it affords them a simpler lifestyle, not by any of the other benefits made possible by forest ownership. The next highest rated reason for owning forests was to be surrounded by the scenery and wildlife of nature (Naturalism), but at best Professionals are lukewarm about this quality. Regarding their land as a resource that may require management is probably an alien concept.

One barrier to fostering Professionals' interest in active management is that they don't believe their tracts are large enough to merit management. Land managers could connect with them, however, with appeals to their business sense by pointing out that all of their neighbors are in similar situations and, over time, lack of action could result in significant deterioration of the landscape and compromises to the "simple" lifestyle they value. Considering their education and management experience, Professionals are likely to be accustomed to planning and management efforts in other contexts; they are also likely to be familiar with concepts such as "economies of scale" and the "tragedy of the commons" that are often at the foundation of land management theories.

Another particular challenge to working with people in this segment is that they may be too busy with their career interests to be actively involved in land management. They also might not be

very attached to their land or to the region, and find it easier to relocate to follow careers or seek desired amenities. However, Professionals do have considerable financial resources that they could use to invest in the services of forestry professionals.

Preservationists

Preservationists value their forests as natural settings in which they can live uncomplicated lives. They are also highly motivated by Estate Building and plan to own their land for a long time and/or pass it on to family members. They seem to believe or hope, however, that their simple lifestyle and natural setting will persist without active forest management. Considering their high level of education and environmental awareness, perhaps they will be receptive to a "tragedy of the commons" scenario that shows how, over time, lack of action could result in deterioration of the amenity benefits they desire.

Many people in this market segment believe their acreages are not large enough to merit management, so land managers could point out that all of their neighbors are in similar situations and that collectively individual decisions affect regional quality of life. Preservationists (as the name of this segment suggests) also believe that Nature is best left alone. Perhaps establishing local demonstration projects might be an effective means to disseminate advice to this self-motivated audience. Other landowners willing to discuss their experiences (particularly those whose management did not involve timber harvesting or who were themselves skeptical prior to their participation) could act as intermediaries between reluctant Preservationists and forestry professionals. Members of this group are likely to own their land for a long time, so they should be receptive to management plans that show long-term as well as short-term benefits.

Farmers

The group labeled "Farmers" scored high on most of the motivations. They were most interested in living simply, and actively using their land to generate income, raise vegetables, and otherwise live off the land (collectively labeled the "Farming" motivation). These active landowners indicated a willingness to participate in various forest management behaviors, hence they should be receptive to traditional management advice that builds on an interest in doing what's good for the land.

Farmers are likely more interested in answering questions about "How?" than answering questions about "Why?" to manage their land. Communications with this segment should emphasize how to overcome obstacles to management such as insufficient time, money, advice, and equipment. It may be the prohibitive cost and limited availability of large forest management machinery that renders these actions infeasible (i.e., poor economy of scale), at least for this segment. Thus, increasing regional availability of small-scale, inexpensive, "soft" technologies in parcelized areas might increase forest management participation rates among Farmers.

Forest Planners

Similarly, the prospect for encouraging individuals in the Forest Planners group to engage in active land management seems to be good. Their management experience and the existence of written plans makes Forest Planners closest to the mythical "traditional" forest owners. These young, educated, economically well-off individuals are already participating in many active management behaviors; members of this segment correspond closely to those called "Planners" by Jacob (1997), who are in the process of implementing often elaborate plans for a more sustainable country life.

Not only do Forest Planners express their intent to manage within their individual properties, they also clearly express a willingness to work with governmental or environmental organizations to manage their forested lands cooperatively. There is often, however, a disparity between what people say they are willing to do and their actual behavior; this occurs for several reasons (Ehrlich 1969). For some eager individuals, responding positively to hypothetical questions ("I might do this") might be one outlet for wish fulfillment. Others fail to translate plans into actions because of limited opportunities, information, or sense of efficacy. By focusing on answering questions related to "How?" rather than "Why?" to manage forestland (as with the Farmers segment), forestry professionals can address such limitations, thereby increasing the likelihood that their intentions will be realized.

Young Families

Finally the Young Families identified in this study are also strongly motivated by "country lifestyle" factors as well as an interest in Parenting. This segment rated Social Ties more

importantly than other groups, so they, like Preservationists, might appreciate encountering others in their area who have successfully adopted forest management techniques.

Individuals in the Young Families segment indicated willingness to participate in active forest management. Many of these individuals believe, however, that they don't own enough land or that their land isn't suited for management. Given these individuals' roles as parents, though, it might be an effective strategy for forestry professionals to emphasize the educational value that a healthy forest can provide to demonstrate responsible stewardship practices to children. Calling attention to ways that all members of the family can work together for the good of the forest (on both an individual and a regional scale) could be a valuable strategy for encouraging active management.

Table 1.3. Demographic and socioeconomic characteristics of six groups of new landowners in Virginia.

	p	**Total Sample**	Absentees	Professionals	Preservationists	Farmers	Planners	Families
N		**620**	26	86	107	136	140	125
Age (years)	*.000*	**46.5**	53.2[a]	48.1[c]	51.9[a]	45.6[bc]	42.4[b]	44.7[bc]
Sex	*.262*							
% male		**67.6**	61.5	75.6	62.5	64.1	66.4	73.0
% female		**32.4**	38.5	24.4	37.5	35.9	33.6	27.0
Marital status	*.001*							
% married		**82.9**	88.5	79.1	70.5	82.8	92.0	84.7
% single		**17.1**	11.5	20.9	29.5	17.2	8.0	15.3
Children[*]	*.000*							
% At home		**50.5**	30.8	30.6	15.0	57.8	70.7	68.3
% Not at home		**37.6**	57.7	43.5	52.4	38.5	22.9	32.6
% None		**18.2**	11.5	29.4	34.6	14.1	11.4	9.8
Education	*.000*							
% < Bachelor's		**52.6**	65.4	38.4	41.9	69.9	47.9	55.6
% Bachelor's		**26.4**	23.1	27.9	34.3	17.3	27.1	28.2
% Advanced degree		**21.0**	11.5	33.7	23.8	12.8	25.0	16.2
Career	*.003*							
% Retired		**12.2**	13.0	10.7	22.1	13.7	8.9	6.6
% Prof/mgmt		**41.6**	26.1	56.0	37.5	32.8	43.7	45.5
% Other		**46.2**	60.9	33.3	40.3	53.5	47.4	47.9
Income[†]	*.015*	**69,225**	72,917[ab]	78,291[b]	64,362[ac]	61,977[c]	73,462[ab]	69,554[abc]
% > $100,000		**25.5**	33.3	40.5	21.3	13.2	35.4	19.6
Income from land (%)	*.000*	**3.33**	14.0[a]	0.6[b]	2.6[b]	3.2[b]	2.9[b]	4.3[b]

[*] Numbers do not add up to 100% because some respondents had children at home and living elsewhere.

[†] P-value is for ANOVA using mean estimates based on midpoints of a categorical scale. Because the largest category was unbounded (> $100,000), the midpoint was estimated at $105,000 to preserve equal distance between other categories; however this is most likely an underestimate. The percentage of each cluster that has an income greater than $100,000 is provided for clarification.

[abc] Numbers with different superscripts are significantly different (Duncan post-hoc means comparisons, ? = .05).

Table 1.4. Land ownership characteristics of six groups of new landowners in Virginia.

		Acquisition Method (%)			*Residence Status (%)*				*Tenure (yrs)*	
	N	Fee-simple	LLC $p^{*} = .016$	Inherit	Primary residence	Seasonal residence $p^{*} = .000$	Plan to build	Non-res., no plans	This purchase $p^{\dagger} = .327$	First purchase $p^{\dagger} = .303$
Absentees	26	69.2	3.8	23.1	7.7	0.0	0.0	92.3	4.42	10.2
Professionals	86	90.7	0.0	4.7	61.2	2.4	14.2	22.4	4.09	6.6
Preservationists	107	80.2	0.9	13.2	55.7	0.9	15.1	28.3	3.86	8.6
Farmers	136	83.1	0.0	12.5	68.1	0.0	17.7	14.1	3.89	8.6
Planners	140	91.2	0.7	3.6	56.1	1.4	21.5	20.9	3.71	7.4
Families	125	84.4	0.0	5.7	63.2	0.8	15.2	20.8	4.08	6.9
Total	**620**	**85.2**	**0.5**	**8.6**	**58.8**	**1.0**	**16.4**	**23.9**	**3.93**	**7.8**

		Acreage (ac)			*Future plans for land (%)*			
	N	Total purchase $p^{\dagger} = .002$	Forest purchased $p^{\dagger} = .003$	Total land owned $p^{\dagger} = .001$	No plans	Pass to children $p^{*} = .008$	Sell in X years	Avg. # yrs $p^{\dagger} = .072$
Absentees	26	22.0^{a}	14.1^{a}	101.2^{a}	26.9	34.6	38.5	6.6
Professionals	86	19.3^{a}	12.6^{a}	22.3^{b}	35.7	38.1	25.0	6.8
Preservationists	107	24.7^{ab}	17.6^{ab}	37.6^{b}	33.3	48.6	18.1	17.9
Farmers	136	34.8^{ab}	17.9^{ab}	45.9^{bc}	29.4	53.7	16.9	10.7
Planners	140	45.4^{b}	31.9^{b}	80.5^{ac}	20.3	65.9	13.0	12.0
Families	125	16.2^{a}	10.6^{a}	34.0^{b}	28.7	57.4	13.9	7.9
Total	**620**	**29.0**	**18.7**	**48.8**	**28.6**	**53.4**	**17.7**	**10.6**

		Reasons influencing future plans for land (%)									
	N	Too much work $p^{*} = .319$	Can't afford it $p = .527$	Finance retirement $p = .401$	Live elsewhere $p = .039$	Will retire and move $p = .069$	Will move for a job $p = .026$	No longer interested $p = .034$	Prop. Tax too high $p = .484$	Area too populated $p = .002$	Land not profitable $p = .000$
Absentees	26	9.5	19.0	33.3	0.0	0.0	0.0	14.3	19.0	9.5	33.3
Professionals	86	24.7	14.3	15.6	22.1	13.0	15.6	2.6	16.9	19.5	5.2
Preservationists	107	27.5	23.5	22.5	8.8	14.7	3.9	4.9	29.4	36.3	3.9
Farmers	136	24.6	23.7	21.2	17.8	20.3	11.0	2.5	25.4	41.5	5.1
Planners	140	21.7	17.5	15.8	19.2	19.2	7.5	6.7	24.2	30.8	6.7
Families	125	17.1	18.0	19.8	19.8	24.3	14.4	0.9	27.0	24.3	2.7
Total	**620**	**22.4**	**19.7**	**19.7**	**16.8**	**18.0**	**9.8**	**4.0**	**24.8**	**30.4**	**5.8**

* Chi-square, $p < .05$ indicates significant difference among groups.

† ANOVA, $p < .05$ indicates significant difference among groups.

abc Numbers with different superscripts are significantly different (Duncan post-hoc means comparisons, ? ?= .05).

Table 1.5. Composite scores representing attitudes of six groups of new landowners in Virginia.

	p	**Total Sample**	Absentees	Professionals	Preservationists	Farmers	Planners	Families
N		**620**	26	86	107	136	140	125
Property Rights index[*]	*.536*	**0.17**	–0.19	0.24	0.24	0.06	0.20	0.24
Trust index[†]	*.170*	**0.38**	0.28	0.44	0.17	0.27	0.55	0.45
Knowledge of foresters[‡]	*.085*	**0.40**	0.36	0.53	0.53	0.46	0.01	0.60
Lumber or paper companies[§]	*.254*	**–0.31**	0.19	–0.18	–0.64	–0.14	–0.29	–0.45
The federal government[§]	*.159*	**–0.80**	–0.08	–0.60	–1.14	–0.87	–0.75	–0.79
The state or local government[§]	*.183*	**–0.78**	–0.12	–0.59	–1.13	–0.80	–0.73	–0.80
Individuals[§]	*.259*	**0.02**	0.77	0.11	–0.28	0.12	–0.02	–0.03
Small sawmill[¦]	*.008*	**0.02**	0.04^{ab}	$–0.61^{b}$	$–0.08^{ab}$	0.45^{a}	0.21^{a}	$–0.16^{ab}$
Accept less money for good logging[#]	*.091*	**0.60**	0.44	0.15	0.71	0.67	0.85	0.52

[*] Combination of six items (–3 = public rights…+3 = private rights).

[†] Combination of three items (–3 = low trust in foresters…+3 = high trust in foresters): Professional foresters are… (1) a trusted source of knowledge about how to manage the trees on my land, (2) more interested in making money than in the ecological health of my land [reverse coded], and (3) more interested in cutting timber than in the ecological health of my land [reverse coded].

[‡] "I don't know anything about professional foresters" (–3 = high knowledge…+3 = low knowledge).

[§] "Clearcutting should be allowed on land owned by…" (–3 = strongly disagree…+3 = strongly agree).

[¦] "I would be willing to harvest a few trees and saw them up for lumber using a small, portable two-person sawmill" (–3 = strongly disagree…+3 = strongly agree).

[#] "I would be willing to accept less money from a timber sale if the logging actions protected other forest qualities" (–3 = strongly disagree…+3 = strongly agree).

[abc] Numbers with different subscripts are significantly different (Duncan post-hoc means comparisons, ? = .05).

Table 1.6. Likelihood of adopting independent management activities expressed by six groups of new landowners in Virginia.

	Total Sample (%)	Absentees (%)	Professionals (%)	Preservationists (%)	Farmers (%)	Planners (%)	Families (%)
Prune/cut to improve views (p^* = .064)							
Already	**30.6**	16.0	27.9	28.6	30.6	35.3	31.9
Might	**41.9**	36.0	40.7	34.3	43.5	45.3	44.4
Probably not	**27.5**	48.0	31.4	37.1	25.8	19.4	23.7
Use herbicides or pesticides (p = .010)							
Already	**33.1**	24.0	36.0	25.0	30.6	36.7	37.8
Might	**38.5**	16.0	34.9	40.4	46.0	36.0	39.3
Probably not	**28.4**	60.0	29.1	34.6	23.4	27.3	23.0
Kill vines in trees (p = .002)							
Already	**29.9**	16.0	27.9	27.6	25.2	35.0	34.3
Might	**43.7**	32.0	33.7	41.9	54.5	41.4	46.3
Probably not	**26.4**	52.0	38.4	60.5	20.3	23.6	19.4
Regularly inspect land (p = .001)							
Already	**74.2**	58.3	68.6	68.6	70.5	78.6	83.7
Might	**22.2**	25.0	26.7	24.8	24.6	20.7	16.3
Probably not	**3.6**	16.7	4.7	6.7	4.9	0.7	0.0
Use a prescribed fire (p = .001)							
Already	**8.9**	8.0	6.0	6.7	7.3	11.5	11.2
Might	**36.1**	16.0	25.0	30.8	32.3	43.9	46.3
Probably not	**55.1**	76.0	69.0	62.5	60.5	44.6	42.5
Written management plan (p = .000)							
Already	**7.5**	8.3	2.3	5.7	5.6	15.0	6.0
Might	**47.3**	37.5	31.4	44.8	41.9	55.0	58.2
Probably not	**45.2**	54.2	66.3	49.5	52.4	30.0	35.8
Improve wildlife habitat (p = .000)							
Already	**45.2**	32.0	24.4	52.4	38.2	57.1	49.3
Might	**44.4**	24.0	52.3	41.0	50.4	37.1	47.8
Probably not	**10.4**	44.0	23.3	6.7	11.4	5.7	2.9
Plant valuable trees for timber sale (p = .000)							
Already	**7.9**	12.5	2.4	5.8	4.0	15.7	7.5
Might	**35.6**	25.0	25.0	29.1	31.5	39.3	49.3
Probably not	**56.5**	62.5	72.6	65.0	64.5	45.0	43.3
Plant vegetation for privacy (p = .000)							
Already	**27.1**	12.0	23.3	28.8	27.3	31.2	26.9
Might	**47.5**	20.0	47.7	38.5	52.1	51.4	51.5
Probably not	**25.3**	68.0	29.1	32.7	20.7	17.4	21.6
Grow specialty crops for profit (p = .000)							
Already	**8.3**	8.0	7.0	6.8	5.7	10.1	11.1
Might	**33.7**	20.0	15.1	35.9	22.0	42.4	48.1
Probably not	**57.9**	72.0	77.9	57.3	72.4	47.5	40.7
Graze livestock (p = .000)							
Already	**22.1**	20.0	12.8	12.6	10.6	23.2	44.9
Might	**24.9**	24.0	14.0	23.3	13.0	35.5	33.1
Probably not	**53.0**	56.0	73.3	64.1	76.4	41.3	22.1

	Total Sample (%)	Absentees (%)	Professionals (%)	Preservationists (%)	Farmers (%)	Planners (%)	Families (%)
Remove exotic species (p = .000)							
Already	**8.6**	0.0	2.3	6.8	8.3	10.3	14.4
Might	**37.2**	20.8	23.3	43.7	39.7	40.4	38.6
Probably not	**54.2**	79.2	74.4	49.5	52.1	49.3	47.0
Prune/cut to improve timber (p = .000)							
Already	**13.4**	23.1	9.4	7.7	7.3	21.4	15.6
Might	**35.6**	30.8	21.2	37.5	30.1	41.4	43.0
Probably not	**51.1**	46.2	69.4	54.8	62.6	37.1	41.5
Prune/cut to improve forest health (p = .000)							
Already	**23.8**	15.4	19.8	25.7	17.9	30.2	25.4
Might	**56.8**	34.6	48.8	50.5	64.2	58.3	62.7
Probably not	**19.4**	50.0	31.4	23.8	17.9	11.5	11.9
Have soil tested (p = .000)							
Already	**28.5**	28.0	19.8	32.7	16.3	37.1	33.3
Might	**59.2**	32.0	61.6	52.9	71.5	55.0	60.7
Probably not	**12.2**	40.0	18.6	14.4	12.2	7.9	5.9

* Chi-square tests, $p < .05$ indicates a significant difference among groups.

Table 1.7. Likelihood of adopting cross-boundary management activities expressed by six groups of new landowners in Virginia.

	Total Sample (%)	Absentees (%)	Professionals (%)	Preservationists (%)	Farmers (%)	Planners (%)	Families (%)
Work with federal govt to manage land (p^* = .113)							
Already	**4.2**	7.7	1.2	6.5	4.5	5.8	1.6
Might	**56.4**	42.3	47.1	54.2	58.6	60.9	60.2
Probably not	**39.4**	50.0	51.8	39.3	36.8	33.3	38.2
Share road access with neighbors (p = .042)							
Already	**36.4**	40.0	33.7	31.1	41.7	42.8	29.0
Might	**36.2**	32.0	26.5	37.9	33.3	38.4	42.7
Probably not	**27.4**	28.0	39.8	31.1	25.0	18.8	28.2
Work with neighbors to control outbreaks (p = .025)							
Already	**8.2**	7.7	8.2	8.7	10.6	7.2	6.5
Might	**79.2**	61.5	69.4	82.7	78.8	83.5	82.3
Probably not	**12.6**	30.8	22.4	8.7	10.6	9.4	11.3
Connect wildlife corridors across boundaries (p = .003)							
Already	**10.9**	7.7	6.0	10.7	11.1	15.7	9.6
Might	**68.5**	46.2	64.3	69.9	73.3	71.4	66.4
Probably not	**20.6**	46.2	29.8	19.4	15.6	12.9	24.0
Talk about land with neighbors (p = .001)							
Already	**30.8**	16.0	24.1	26.9	37.4	37.1	27.3
Might	**55.1**	44.0	54.2	59.6	50.4	54.3	60.3
Probably not	**14.1**	40.0	21.7	13.5	12.2	8.6	12.4
Hire same forester as neighbors (p = .000)							
Already	**3.5**	4.0	2.4	1.0	2.3	7.9	2.4
Might	**60.0**	32.0	48.2	65.3	61.8	66.9	59.7
Probably not	**36.5**	64.0	49.4	33.7	35.9	25.2	37.9
Share management plans with neighbors (p = .000)							
Already	**7.7**	8.0	2.4	8.7	10.6	12.1	2.4
Might	**65.2**	48.0	55.3	63.5	68.9	71.4	66.1
Probably not	**27.0**	44.0	42.4	27.9	20.5	16.4	31.5
Work with envt org to manage land (p = .000)							
Already	**1.5**	0.0	0.0	2.8	0.7	3.6	0.0
Might	**69.9**	44.0	50.6	71.7	73.9	77.7	74.0
Probably not	**28.6**	56.0	49.4	25.5	25.4	18.7	26.0
Work with local/state govt to manage land (p = .000)							
Already	**8.1**	11.5	5.9	7.5	7.5	12.9	4.8
Might	**66.5**	38.5	51.8	74.8	70.9	71.2	65.3
Probably not	**25.4**	50.0	42.4	17.8	21.6	15.8	29.8

* Chi-square tests, $p < .05$ indicates a significant difference among groups.

Table 1.8. Factors perceived to constrain participation in independent and cross-boundary management activities by six groups of new landowners in Virginia.

	p^*	**Total Sample (%)**	Absentees (%)	Professionals (%)	Preservationists (%)	Farmers (%)	Planners (%)	Families (%)
Constraints to independent management								
I never thought about it	*.416*	**36.1**	38.5	40.7	33.6	39.7	29.3	38.4
I don't have the equipment to do these things	*.183*	**31.8**	15.4	24.4	30.8	36.0	35.7	32.0
I prefer to let nature take its own course	*.226*	**31.1**	23.1	36.0	35.5	29.4	24.3	35.2
I don't own enough land to worry about managing it	*.000*	**29.2**	34.6	47.7	29.9	28.7	10.0	36.8
I don't have the money to do these things	*.247*	**27.9**	26.9	20.9	29.9	35.3	25.7	25.6
My land isn't suited for these uses	*.000*	**27.6**	34.6	43.0	22.4	22.1	15.7	39.2
I don't have the time to do these things	*.455*	**27.3**	34.6	32.6	20.6	28.7	27.9	25.6
I don't know how to do these things	*.569*	**25.6**	15.4	23.3	27.1	30.1	22.9	26.4
I don't want to do these things	*.005*	**25.5**	15.4	39.5	22.4	17.6	30.0	24.0
I don't know where to get advice about doing these things	*.012*	**17.4**	3.8	9.3	19.6	25.7	17.1	15.2
I worry that these things might harm the health of the land	*.037*	**16.5**	3.8	9.3	16.8	19.1	22.9	13.6
I don't spend enough time on my land to keep up with these things	*.026*	**11.3**	30.8	11.6	13.1	8.1	8.6	12.0
I don't know where I could get the equipment to do these things	*.248*	**8.4**	7.7	5.8	12.1	10.3	9.3	4.0
I worry that these things might decrease my property value	*.821*	**8.2**	7.7	5.8	7.5	11.0	7.9	8.0
I am not physically able to do these things	*.326*	**8.1**	11.5	9.3	12.1	7.4	4.3	8.0
I don't trust the advice I get about doing these things	*.238*	**3.7**	0.0	4.7	6.5	4.4	3.6	0.8
I'm too old to worry about what happens to the land	*.067*	**3.1**	7.7	5.8	5.6	0.7	1.4	2.4
I probably won't live here long enough to worry about what happens to the land	*.185*	**2.9**	0.0	5.8	2.8	0.7	2.1	4.8
Constraints to cross-boundary management								
I never thought about it	*.394*	**32.6**	46.2	34.1	29.0	29.4	30.7	37.6
I worry about losing control over my land	*.017*	**28.3**	19.2	20.0	27.1	33.1	37.1	21.6
My current management practices don't harm the regional ecosystem	*.476*	**27.6**	34.6	35.3	24.3	27.2	24.3	28.0
I don't have the money to do these things	*.133*	**23.9**	19.2	21.2	30.8	29.4	20.0	19.2
I don't trust the government	*.278*	**23.6**	3.8	22.4	23.4	25.0	25.7	24.8
I don't have the equipment to do these things	*.293*	**21.5**	11.5	17.6	23.4	25.0	25.0	16.8
I don't have the time to do these things	*.592*	**20.5**	34.6	20.0	17.8	20.6	20.0	20.8
I don't know how to do these things	*.160*	**20.2**	11.5	12.9	25.2	25.0	19.3	18.4
I prefer to let nature take its own course	*.104*	**18.9**	7.7	15.3	24.3	22.8	13.6	20.8
I don't own enough land for anything I do to matter	*.000*	**17.4**	26.9	29.4	17.8	15.4	5.7	22.4
I don't know what my neighbors do with my land	*.580*	**16.6**	11.5	17.6	17.8	15.4	20.7	12.8
I don't trust environmental organizations	*.516*	**14.7**	11.5	15.3	12.1	19.1	15.7	11.2
I don't want to do these things	*.017*	**14.1**	19.2	24.7	8.4	9.6	15.0	14.4
I don't know my neighbors	*.068*	**13.6**	7.7	22.4	16.8	9.6	13.6	10.4
I don't know where to get advice about doing these things	*.085*	**12.8**	3.8	8.2	16.8	17.6	12.9	8.8
I prefer not to do business with my neighbors	*.571*	**10.7**	11.5	11.8	15.0	10.3	10.0	7.2
I don't believe land fragmentation is a threat to regional ecological health	*.561*	**7.3**	11.5	5.9	4.7	6.6	7.1	10.4
I am not physically able to do these things	*.078*	**6.3**	11.5	3.5	11.2	4.4	3.6	8.0
I don't know where I could get the equipment to do these things	*.360*	**6.1**	3.8	3.5	10.3	7.4	5.0	4.8

I don't trust my neighbors	*.314*	**5.7**	0.0	2.4	7.5	7.4	7.1	4.0
I worry that these things might decrease my property value	*.859*	**4.8**	7.7	4.7	6.5	4.4	5.0	3.2
I probably won't live here long enough to worry about what happens to the land	*.243*	**3.7**	7.7	4.7	6.5	2.2	1.4	4.0
I don't trust the advice I get about doing these things	*.301*	**3.6**	3.8	3.5	6.5	4.4	2.9	0.8
I'm too old to worry about what happens to the land	*.098*	**2.6**	7.7	1.2	5.6	2.2	0.7	2.4

* Chi-square tests, $p < .05$ indicates a significant difference among groups.

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ARTICLE 2
Factors Influencing Virginia's New Forest Owners' Participation in Active Forest Management

Between 1978 and 1994, the amount of privately owned U.S. forestland in tracts smaller than 10 acres increased by 51%, land in tracts 10–49 acres increased by 115%, and land in tracts 50–99 acres increased by 43%. Most of the new smaller forest tracts come from subdividing midsize (100–500 acre) tracts—total acreage within this size category decreased by 11% during the same time period (Birch 1996). Those concerned about forest fragmentation take some solace in observing that only 30% of the total forested acreage is held in parcels smaller than 100 acres and that land in tracts greater than 1,000 acres actually increased by 16% during the same time period (Birch 1996). Nonetheless, the number of new forest owners is increasing faster than population growth and extrapolation of trends suggests that there will be more than 140,000 new forest owners in the U.S. each year; by the year 2010, 95% of private forest ownership could be in parcels smaller than 100 acres. The owners of these small forested lots then will control 38% of all private forest land (DeCoster 1998; Vesterby, Heimlich, and Krupa 1994).

Professional forest managers are worried about parcelization because the increasing number and diversity of owners, many with no formal forest management experience, make difficult the task of effectively distributing professional advice. Additionally, the cumulative effect of individual actions of these many landowners may have negative effects on the supply of fiber, as well as the quality of ecological processes and amenity values. Motivated by these concerns, this paper examines forest management activities of new forest owners in Virginia. In particular, I examine the willingness of new landowners to engage in coordinated trans-boundary activities that might mitigate or minimize some of the negative consequences of forest fragmentation. I also examine obstacles that these new landowners perceive limit their participation in such practices. If cross-boundary management is to work in a fragmented forest, landowners might need to compromise their property rights and work with and accept the advice of forestry professionals. Accordingly, I also examine the trust these new landowners have for professional foresters, as well as the attitudes they hold toward private property rights and certain silvicultural practices.

A key assumption of this study is that fragmented ownership need not produce a fragmented ecosystem, which results from fragmented management. The extent to which fragmented

ownership produces a fragmented ecosystem depends on how individual holdings are managed. The "problems" of fragmentation need not occur if landowners coordinate their management. Examining the feasibility of such coordination provides the motivation for this study.

One means to motivate coordinated management among multiple owners or managers is to implement the top-down approach of government enforced regulation. An alternative method is to encourage a bottom-up, voluntary approach of cooperation. In a review of strategies to implement ecosystem management in the U.S. (Sample 1994; Sample, Enzer, and Moote 1994) concluded that voluntary, cooperative strategies were more likely to succeed in areas where lands are owned by a combination of private individuals, corporations, and public organizations. Several studies have queried U.S. forest landowners about their willingness to engage in practices that implicitly or explicitly involve considering more than one's own land when making management decisions. Generally the response has been favorable to the abstract notion of managing one's land in sympathy with broader scale ecosystem processes. Bliss et al. (1997) found that 69% of mid-south U.S. private forest landowners approved of limiting private property rights to protect environmental quality. Brunson et al. (1996) reported that landowners overwhelmingly expressed their faith in ecosystem management to protect processes and long-term health of forests: 65% of southeastern U.S. respondents considered ecosystem management to be "appropriate" on private lands and 15% already had applied some ecosystem management concepts on their land (although those concepts were not specified). When asked about their willingness to join a collaborative partnership, 59% were interested in first observing a partnership at work; approximately 15% would be more likely to join if most neighboring landowners participated, if federal agencies were not involved, and if protecting commodity uses were a primary partnership objective.

Williams and Ellefson (1997) studied 40 operating partnerships and reported on factors motivating their formation (e.g., improving stewardship, sharing information), barriers inhibiting their membership (e.g., limited time, indifference), conditions threatening their continuation (e.g., lack of financial resources, goal conflicts), and conditions contributing to their success (e.g., recognition of and respect for common goals, willingness to share information). Rickenbach et al. (1998) found that landowners are at least as likely to participate in cooperative cross-boundary management as they are in various independent forest management practices.

Private Property Rights: A Matter of Trust in Forestry?

Because of recent land parcelization trends, ecosystem management—particularly in the East—requires cooperation across political (i.e., ownership) boundaries. The coordination of such a cooperative task is a major undertaking, so such programs often are sponsored by large organizations that have the human and financial resources to assume responsibility of such magnitude. Such groups include non-profit organizations (e.g., The Nature Conservancy) and state or federal government land management agencies.

Many forestry professionals worry that landowners might decline to participate in these cross-boundary partnerships; they assume that an increasing number of landowners perceive tension between their own sovereignty and government-sponsored management programs such as the Forest Stewardship Program or any of the more recent cross-boundary initiatives. In response to perceived encroachment on individual rights—especially high-profile "takings" cases such as the one profiled by Argow (1994)—by environmentalist and government organizations, groups such as the "wise use" movement came into being for the purpose of protecting individual rights. Although strongly worded accusations of Communism and tyranny[7] are made by only the most impassioned individuals, this movement has raised many an eyebrow among land management professionals who are charged with stewardship of natural (and national) resources.

In efforts to better understand the full spectrum of beliefs about individual property rights, many researchers have conducted surveys of private forest owners. Various questionnaire items have focused on reasons that might justify compromises to individual property rights, such as protecting water quality, ecosystem health, and forest beauty. Melfi et al. (1997), for example, reported that some private forest owners choose not to participate in the Forest Stewardship Program because of a variety of concerns about property rights, including fear that receiving government funds could lead to mandated public access and concern that heirs might suffer if the land became "tied up." Brockett and Gebhard (1999) found that support for environmental regulation of private lands was an important factor in determining participation in the Tennessee Greenbelt program, under which landowners are taxed on the land-use value of their property rather than its "highest and best" use value. Participants generally showed less support for

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[7] For examples, see http://www.ewg.org/pub/home/clear/by_clear/Fifty_III.html.

regulations to protect endangered species and the appearance of forests than for regulations to protect streams and wetlands.

Other studies (e.g., Bourke and Luloff 1994) have included more general items that simply ask respondents whether they believe the government or private owners should make decisions about the management of private forestland. Such one-dimensional questionnaire items, while providing some basic attitudinal information, offer minimal insight into the values and beliefs that underlie those attitudes. One factor that seems plausible to explore as a corollary to concerns about property rights is trust in the forestry profession, the group that is conspicuously at the forefront of efforts to establish widespread, cooperative, ecosystem-level programs.

Although various environmental and governmental organizations sponsor cross-boundary management programs with the intent of enhancing credibility, nobody has sought to determine whether and how the level of confidence the public holds in these groups affects participation. For example, some researchers (e.g., Pierce and Lovrich 1983; Soden 1995) have discovered that the public holds very low levels of trust in timber companies, so sponsorship by an individual corporation likely would not be a successful way to elicit enrollment in a cross-boundary management program. Many forestry professionals are employed by government agencies, which have been rated less trustworthy than nongovernmental information sources such as university educators and scientific experts (Soden 1995). If landowners—as the "wise users" do—perceive the government to be a socialist conspiracy against free enterprise and individual rights, and land managers to be agents of that conspiracy, then governmental sponsorship of cross-boundary initiatives might not be the most effective strategy. Indeed, as many as 19% of the respondents in Brunson et al.'s (1996) study reported that they would be more likely to join an ecosystem management partnership if federal agencies were not involved.

It is clear that the forestry profession has long recognized its negative public perception. Among foresters, there are countless anecdotes about landowners who have been "burned" by disreputable timber buyers posing as forestry consultants. In addition to such cautionary tales, public outcry over controversial, high-profile issues such as clearcutting (especially on public lands in the West) have fueled a public relations nightmare for the profession. Even small-scale logging operations, no matter how well planned or carefully conducted, leave obvious and

aesthetically undesirable scars on the viewscape. With such problems showing as the public face of forestry, it should not be surprising if social confidence in the profession has eroded.

Natural resource managers are trained to view themselves as protectors of a public trust; their educational tradition teaches them that they are the stewards of an important public resource, and that the future of the resource lies in their hands. Public challenges to their intentions, therefore, seem like betrayal to these professionals. The initial response to such challenges was to adopt a "they don't know any better" attitude and to initiate efforts to educate people to better understand the professional perspective. Education and extension programs have seen some success, but, to some extent, such efforts have become an exercise in "preaching to the choir."

More recently, many resource professionals have been issuing repeated calls for better and concerted public relations efforts to combat the problem of eroding public trust (e.g., Edwards and Bliss 2003). Some have described the advantages of posting signs at harvest sites (e.g., Lewis 1995); others have considered the possible repercussions of using techniques such as "beauty strips" to disguise the appearance of logging operations (e.g., Hull et al. 2000). Professional codes of ethics for natural resource managers emphasize the importance of integrity among their members. Forest industry corporations pride themselves on the trustworthiness and fairness of their employee representatives. New ecosystem-wide initiatives stress the necessity of improving public perceptions about forestry in addition to protecting the ecological character of the land.

In contrast to those who consider enhanced public relations a panacea, other professionals have suggested that it is not the forestry profession's place to shape public opinion (through either education or public relations), but merely to respond to it. In response to the growing recognition of the importance of the "human dimensions" of resource management, most academic programs now require students to take courses in public speaking, human resources, ethics, and similar topics to learn how to work comfortably in collaboration with diverse groups of people as well as with the resource itself. For any such efforts to succeed, the public must trust the professionals who expect to work with them.

On balance, a broad examination of the ecosystem management literature suggests that many forest landowners are receptive to the idea of coordinating their forest management practices

with neighbors. Most of these studies focus on established forest owners, often those who already have demonstrated high levels of motivation by participating in Tree Farm, Forest Stewardship, or similar programs. The literature does not examine new owners nor does it focus on landowners' willingness to implement specific management practices on their land with or without the cooperation of neighbors. My study focuses on the willingness of new landowners to implement specific management practices, and the constraints they perceive limit their participation. It also reports the relationship between new landowners' management decisions and their attitudes and beliefs about property rights and trust in forestry professionals.

Methods[8]

Research Setting

Virginia is divided into three planning units based on predominant physiographic characteristics—mountain, piedmont plateau, and coastal plain. Data about human population, housing units, and forested area for each Virginia county were obtained from the U.S. Census Bureau[9], and then ranked on each of these attributes. Ranks were summed to identify counties where residential forest issues would be particularly relevant.

Low rank sum values represent high levels of population growth occurring simultaneously with considerable forest loss. County Commissioners of the Revenue were contacted in this ranked order until two per region with computerized real estate sales records available were identified. The six counties ultimately selected as the sample frame for this research (Figure 2.1) were Montgomery and Frederick (Mountain region), Spotsylvania and Bedford (Plateau region), and Henrico and Chesterfield (Coastal region). Each county provided names, mailing addresses, acreage and date of purchase for all real estate transactions made during 1994–1998.

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[8] Complete details about research methods (sample selection, mailing procedures, instrument development, statistical procedures, etc.) are provided in Appendix A.

[9] http://govinfo.library.orst.edu/usaco-stateis.html

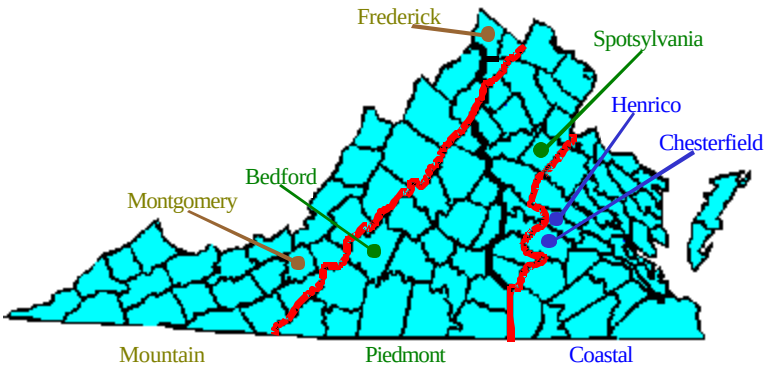

Figure 2.1. Six counties selected as the sample frame for a survey of Virginia's new forest owners.

Respondents/Sample Population

"New" owners were defined as those who acquired their land during the 5-year period between 1994 and 1998. "Small" tracts were defined as those between 2 and 50 acres. The 2-acre minimum size was established to identify primarily owners of parcels outside dense urban areas; the 50-acre upper limit represents the tract size that forestry professionals tend to consider "problematic" for management (e.g., DeCoster 1998). The sample was stratified further by parcel size—those who purchased between 2 and 20 acres, and those who purchased between 20 and 50 acres. Twenty acres was selected as an appropriate dividing point because it is the minimum amount of land required to participate in the Forest Stewardship Program in Virginia.

In April 1999, I sent a mail questionnaire (Appendix B) to 1,855 new owners of small tracts of land in the six counties. Cover letters were personalized with the name and address of each landowner as well as information from county records about the size and date of the recent purchase. Of the original 1,855 questionnaires mailed first-class, 264 initially were determined to be "noneligible or nonreachable" (Dillman 1978), resulting in an adjusted sample size of 1,591. Another 734 were returned completed; the total response rate (734/1,591) was 46.1%. On further examination, 73 respondents actually had purchased their land prior to 1990, and were reclassified as "noneligible" and excluded from my analysis. Thus, the final adjusted sample size was 1,518, and final usable response rate (661/1,518) was 43.5%. These responses were distributed across three mailing waves—416 from the first mailing, 157 after the second, and 88 after the third.

Instrument

The questionnaire (Appendix B) included 15 items about forestry actions conducted independently, or entirely within individual property boundaries. For each item, respondents indicated whether they "already do," "might do," or "will probably never do" that action. They also indicated which of 18 perceived constraints influence their decision not to participate in these independent management actions. A second set of 9 management items and 24 perceived obstacles focused on actions that would require cooperation across property boundaries.

Respondents also described their attitudes about selected issues relevant to professional forestry[10]. Six questions about property rights were included (Table 2.1). Four questions asked about the image of professional forestry. Respondents also indicated whether they trust foresters to provide good information about managing trees, and to focus more on ecological health than on making money or cutting timber; they also were asked how much they felt they knew about foresters (Table 2.2). Finally, the questionnaire included four items about clearcutting and two items about non-conventional timber harvest practices (Table 2.3).

Statistical Analysis

All statistical computations were done using SPSS for Windows (SPSS 1998; 1999). My first task was to conduct basic descriptive analyses of the management participation and constraint items, as well as the variables related to tract size, beliefs about property rights, trust in foresters, and attitudes about timber harvesting. The second level of statistical calculations involved a series of analyses of variance (ANOVAs) to determine whether differences in management activities or the perception of constraints might be related to differences in tract size or attitudes. For each ANOVA, a single management item or perceived constraint was defined as the independent factor (i.e., the ANOVA groups were either "already do," "might do," and "probably will not do" for management activity items and "yes" or "no" for constraint items). The dependent variables were defined as, sequentially, the total amount of land owned, the Property Rights index, the Trust index, the four clearcutting items, and the two alternative harvesting items. This structure allowed me to identify significant attitudinal differences among

[10] On the 7-point scale, –3 = strongly disagree, 0 = neutral, +3 = strongly agree.

groups defined by either participation level or constraint perception. Results of these analysis are discussed below, and presented in their entirety in a series of tables (Appendices D and E).

Results and Discussion

Sociodemographics

Respondents were 67% male[11]; most were married (83%) and had children (81%); 49% had children still living at home. Almost half (46%) possessed at least a bachelor's degree, the same amount of college graduates that Hodge (1993) reported among landowners with 20 or more forested acres in Virginia. Respondents in this study were very well-off economically—about one third (31%) had gross incomes above $90,000. This corresponds to the inflation-adjusted 29% reported by Hodge (1993). Respondents in this study derive only about 3% of their income from their land.

Although they were selected based on the size of a recently purchased parcel, a few respondents claimed to own fewer than 2 acres, and approximately 35% of respondents owned other lands in addition to their recent purchases. Of the 661 respondents who returned a completed questionnaire, 268 (40% of the sample) owned between 2 and 20 acres, 260 (39%) owned 20–49.9 acres; and another 120 (18%) owned more than 50 acres in total. It is this total number of acres owned (rather than the size of only the recently purchased tract) that is explored below as a potential predictor of management attitudes and behaviors.

Only 58% of respondents currently live on the land they recently purchased, but an additional 13% plan to make that forest land their primary residence. Approximately half of those who do not live on their new property live within 10 miles of it; however, the average distance from the non-residents' houses was 99 miles (S.D. = 464.8 mi). Most (87%) purchased their tract fee-simple within the last 5 years, and previously owned other forest land for approximately 8 years. They own, on average, just over 51 acres. Over half (53%) intend to pass their land on to their children; an additional 29% never have thought about future dispensation of their land. Nearly

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[11] In a number of cases, comments such as "We both filled this out!" were written in. This item should perhaps be reworded on future questionnaires—rather than asking who owns the property, it could ask who completed the questionnaire and provide the opportunity for couples to indicate that both of them participated.

18% intend to sell the land in the near future (in an average of 10 years). Respondents most commonly indicated that increasing regional population (27%), high property taxes (22%), or too much maintenance work (19%) might influence them to sell their land.

Attitudes about Property Rights

Six items related to property rights were included on the questionnaire. Two asked whether forest owners have ultimate rights or whether the government should be able to limit private rights to protect the environment; the other four asked whether it was acceptable for the government to limit rights to protect water quality, endangered species, aesthetics, or forest health. Overall, respondents were least willing to cede control to the government to preserve scenic beauty and most willing to do so to protect water quality (Table 2.1). A series of t-tests revealed that five of the means were slightly but significantly above zero (i.e., respondents expressed support for limiting property rights); only the response to the item "private property rights should be limited if necessary to protect the environment" didn't differ significantly from zero.

The mean responses to these items, however, tell only part of the story. Analysis of the frequency distribution of responses shows that very few people (14%–22%, depending on the item) provided "neutral" responses to the items regarding property rights (Table 2.1). A clear majority of respondents indicated that limitations to individual rights were appropriate (i.e., between 57% and 68% responded on the "agree" side of the scale) for four of the items. Many (20%–36%) of the remaining landowners do not agree that governmental interventions should limit individual property rights. That between one fifth and one third of respondents oppose governmental intervention suggests a considerable challenge for land managers who target new landowners for enrollment in any cooperative management programs that have governmental associations.

Factor analysis of the six property rights items revealed that one factor explained 63% of the variance (Cronbach's alpha = 0.87) in the responses to these items. Thus, I created a single "Property Rights" index for each respondent by averaging the scores of these six variables. The index is used below to examine potential relationships between concerns about property rights and participation in various forest management activities and the factors that are perceived to

constrain such participation. There were no significant differences (ANOVA, $p < .05$) in attitudes about property rights among respondents who owned different amounts of land. Despite the distribution of responses to these items, I use the mean index response below to identify possible differences in property rights attitudes among groups defined by their management participation levels and perception of constraints.

Table 2.1. Attitudes about property rights among new Virginia landowners.

	Mean[*]	% Disagree	% Neutral	% Agree
Forest owners [do not][†] have the right to do as they please with their forests, regardless of what it does to the environment.	**1.15**	17.9	13.8	68.3
Private property rights should be limited if necessary to protect the environment.	**0.10**[‡]	35.5	17.8	46.7
The government should have the right to regulate how people use their land and forests in order to…				
…protect water quality	**0.86**	19.7	15.1	65.2
…protect threatened and endangered species	**0.52**	25.7	17.6	56.6
…preserve the beauty of the forest	**0.15**	31.7	21.8	46.6
…maintain healthy forests	**0.51**	25.1	17.8	57.1
Property Rights Index	**0.53**			

[*] Scale ranged from –3 (strong support for protecting individual property rights) to +3 (strong support for limiting individual property rights).

[†] Bracketed wording did not appear in questionnaire; item was reverse coded to preserve scale interpretation.

[‡] One-sample t-test indicated mean did not differ significantly from zero ($p < .05$).

Trust in Foresters

Respondents were asked a single item about their level of familiarity with professional foresters, and three items about the trustworthiness and good intentions of professional foresters. A series of t-tests revealed that three of the means were significantly greater than zero ($p < .05$). Mean responses to these items indicate that these respondents are not sure whether foresters are more interested in cutting timber than ecological health and are only slightly (although significantly) more positive about foresters' intentions of placing forest health above making money (Table 2.2).

As with the responses to the property rights items, closer inspection of the frequency distribution of responses to the trust items reveals that the means tell only part of the story. The response

distribution suggests that these landowners are divided in their trust of foresters. Although 54% consider foresters a trusted source of knowledge, a clear majority (over 70%) are either neutral or outright skeptical about foresters' stewardship ethic. It is alarming that about one fourth of respondents believe that foresters are more interested in money and timber and thus cannot be trusted to protect the land's ecological health. Most new landowners admit that they don't know much about professional foresters, and one could argue that this "rational ignorance" makes their skepticism of foresters' intentions unjustified. Nevertheless, these results should be troubling to forestry professionals. The assumption by new landowners that professional foresters are not overly concerned about protecting environmental quality likely will influence landowner receptivity to professional forestry messages and guide landowners' selections of service professionals, hence limiting professional land managers' access to and influence over this forested landscape.

Factor analysis of the three trust items revealed that one factor explained 68% of the variance (Cronbach's alpha = 0.76) in the responses to these items. I created a "Trust" index for each respondent by averaging the scores of these three variables. The index is used below to examine potential relationships between trust in forest management professionals and participation in various forest management activities and the factors that are perceived to constrain such participation. Knowledge about foresters differed significantly (ANOVA, $p < .05$) among owners of different amounts of land, with those who own more than 50 acres of land claiming to know more about professional foresters ($\bar{x} = -0.5$). Despite the distribution of responses to these items, I use the mean index response below to identify possible differences in trust among groups defined by their management participation levels and perception of constraints.

Table 2.2. Levels of trust in foresters among new Virginia landowners.

	Mean[*]	% Disagree	% Neutral	% Agree
I don't know anything about professional foresters.[†]	**0.38**[§]	24.7	35.8	39.5
Professional foresters are a trusted source of knowledge about how to manage the trees on my land.	**0.85**	8.1	37.9	54.0
Professional foresters are more interested in making money than in the ecological health of my land.[‡]	**0.16**	23.1	45.5	31.4
Professional foresters are more interested in cutting timber than in the ecological health of my land.[‡]	**0.11**[¦]	25.8	45.1	29.1
Trust Index	**0.38**			

[*] Scale ranged from –3 (low trust in foresters) to +3 (high trust in foresters).
[†] Scale ranged from –3 (high knowledge about foresters) to +3 (low knowledge about foresters).
[‡] Item was reverse coded to preserve scale interpretation.
[§] ANOVA indicated significant difference among groups of landowners owning different-sized tracts ($p < .05$).
[¦] One-sample t-test indicated mean did not differ significantly from zero ($p < .05$).

Attitudes about Harvesting

The questionnaire included two items about non-conventional harvest practices and four items about the acceptability of clearcutting. A series of t-tests revealed that the mean responses to three of the clearcutting items and the financial trade-off item were significantly greater than zero ($p < .05$). Mean responses indicated that these new landowners were neutral about operating a small sawmill on their own properties (ostensibly as an alternative to hiring a logging contractor who might use mechanized and capital-intensive equipment), and about clearcutting on land owned by individuals (Table 2.3).

The total amount of land owned had some notable effects on respondents' attitudes toward harvesting. Those who owned larger tracts of land felt that clearcutting was more acceptable on lands owned by private individuals (ANOVA, $p < .05$). They were also more favorable (ANOVA, $p < .0005$) to the possibility of using a small sawmill to process timber harvested from their lands, although even the owners of more than 50 acres displayed a weak response to this item ($\bar{x} = 0.5$). Furthermore, they were significantly more favorable to the idea of accepting less money for a timber harvest that protected other forest qualities (ANOVA, $p < .0005$), possibly reflecting the greater likelihood that they would conduct harvesting of any type.

Again, the frequency distribution of responses to these items provides additional insight into respondents' attitudes about harvesting. Many respondents (47%) believed that clearcutting should not be permitted on governmentally owned lands; 39% disapproved of clearcutting on industrial lands, and 32% on lands owned by individuals (Table 2.3). Especially intriguing is the number of respondents who seemed willing to consider harvesting and processing trees using "small" or "boutique" forestry operations technologies (i.e., portable sawmills)—42% were willing, 25% were neutral, and only 33% were not interested.

Few respondents (16%) said they were not willing to accept less money from a timber sale on their land "if the logging actions protected other forest qualities"; nearly half (49%) said they *would* accept less money from a timber sale that protected other forest qualities (Table 2.3). These findings seem important—they suggest that the timber on these lands is not necessarily lost to the fiber market, and that landowners might actually be willing to absorb some of the greater costs associated with harvesting on a smaller scale than is the norm with traditional forestry practices. It seems like a win-win situation. The difficulty lies in convincing landowners that forestry can be practiced in a manner that enhances amenity values and protects ecological quality.

Table 2.3. Attitudes about timber harvesting among new Virginia landowners.

	Mean[*]	% Disagree	% Neutral	% Agree
I would be willing to harvest a few trees and saw them up for lumber using a small, portable two-person sawmill.	**0.01**[†]	32.8	24.8	42.4
I would be willing to accept less money from a timber sale if the logging actions protected other forest qualities.	**0.60**[†]	16.4	34.4	49.2
Clearcutting trees should be allowed on land owned by…				
…lumber or paper companies.	**–0.30**	38.6	30.1	31.3
…the federal government.	**–0.78**	47.4	32.4	20.2
…the state or local government.	**–0.75**	47.1	32.1	20.8
…individuals.	**0.05**[†]	32.4	30.7	36.9

[*] Scale ranged from –3 (strongly disagree) to +3 (strongly agree).

[†] ANOVA indicated significant difference among groups that own different sized tracts (p???????

Participation in Forest Management Activities

There was a great deal of variance in respondents' willingness to engage in specific management actions on their land. Regarding independent management activities (Table 2.4), few respondents had a written management plan for their land (8%), but most regularly inspected their land (74%). About 58% probably never will grow fruit and vegetable crops for local sale, but only 4% probably never will inspect their land. For the large group that is "on the fence" (i.e., those who selected "I might do this") with regard to active forest management, it is especially important to understand the constraints that prevent them from engaging in such activities. I will explore these perceived obstacles in greater detail below.

Table 2.4. Expressed willingness by new Virginia landowners to engage in independent land management activities on lands they now own.

	Already do (%)	Might do (%)	Probably will not do (%)
Develop a written management plan for my land	7.9	47.0	45.1
Plant high-value trees for future sale as timber	8.3	35.4	56.3
Grow small plots of specialized crops (e.g., fruits or vegetables) that can be sold locally for a profit	8.6	33.7	57.7
Remove exotic (non-native) plant species like kudzu	8.6	36.6	54.8
Use a prescribed fire (controlled burn) to manage the forest	9.2	35.4	55.4
Prune or cut down selected trees to improve timber value	13.5	35.3	51.2
Graze livestock	22.4	24.8	52.8
Prune or cut down selected trees to improve forest health	23.8	56.3	19.9
Plant vegetation to provide privacy from neighbors & roads	27.3	47.4	25.3
Have my soil tested	29.2	58.6	12.2
Kill vines growing in trees	29.8	43.2	27.0
Prune or cut down selected trees to improve scenic views	30.2	42.1	27.7
Use herbicides or pesticides to control weeds and insects	33.2	38.4	28.3
Improve wildlife habitat	46.0	43.5	10.6
Regularly inspect the condition of my land	73.6	22.5	3.9

Although few people currently practice the cross-boundary management actions listed in the questionnaire, a high percentage seemed willing to try them. More than 60% of the respondents either already or might engage in each of these nine activities (Table 2.5). Respondents were unlikely (4%) to work with the federal government to manage their land, but a majority (56%)

claimed that they would be willing to consider doing so. The overall willingness to consider cross-boundary management practices is extremely important to those who are charged with promoting ecosystem-wide management incentives. It is of paramount importance to understand the factors that prevent new landowners from getting involved. I will explore below the obstacles perceived by respondents who said they "might" engage in cross-boundary management.

Table 2.5. Expressed willingness by new Virginia landowners to engage in cross-boundary land management activities on lands they now own.

	Already do (%)	Might do (%)	Probably will not do (%)
Work with an environmental organization such as The Nature Conservancy to manage my land in a way that is healthy for the land	1.6	68.8	29.6
Hire the same forester or natural resource professional as my neighbors	3.4	59.8	36.8
Work with the federal government to manage my land in a way that is healthy for the land	4.1	56.0	39.9
Share management plans with my neighbors	7.7	64.7	27.6
Work with local or state government to manage my land in a way that is healthy for the land	8.3	65.7	26.0
Work with my neighbors to control insect and disease outbreaks	8.3	78.5	13.2
Work with my neighbors to connect wildlife corridors across shared property boundaries	11.1	67.1	21.8
Talk about my land with my neighbors	30.7	54.6	14.7
Share road access with my neighbors	36.1	36.4	27.4

The total acreage owned by a respondent influenced the willingness to participate in 14 of the 15 independent management actions (Appendix D). Not surprisingly, owners of smaller tracts expressed less willingness or expectation to engage in utilitarian activities such as planting trees for timber sale, grazing livestock, or using fire for management. For example, owners of tracts smaller than 20 acres are more likely to plant vegetation for privacy than owners of tracts larger than 50 acres (84% vs. 64%, combining respondents who either "already do" or "might do" this activity), but are less likely (28% vs. 67%) to plant trees for future timber sale. Important to forest managers interested in promoting participation in programs such as stewardship, only 2% of owners of tracts smaller than 20 acres, 7% of owners of tracts between 20 and 50 acres, and 22% of owners of tracts larger than 50 acres currently have a written management plan. Many

owners in each group, however, indicated that they might be willing to develop one (36%, 55%, and 53%, respectively).

Significant differences existed among owners of different tract sizes for 6 of the 9 cross-boundary management actions (Appendix D). For example, owners of tracts larger than 50 acres are more willing than owners of tracts smaller than 20 acres to work with neighbors to connect wildlife corridors across property boundaries (86% vs. 74%, combining respondents who either "already do" or "might do" this activity). Although 40% of all respondents say they probably never will coordinate their management efforts with the federal government, larger tract size seems to moderate this unwillingness. In fact, owners of tracts larger than 50 acres were significantly more likely than owners of tracts between 20 and 50 acres and smaller than 20 acres (9%, 5%, and 2%, respectively) to already be working with the federal government.

Concern over property rights explained significant amounts of variance in only 3 of the 15 independent management actions (Appendix D). Landowners who said that they "probably will not" participate in wildlife habitat improvement expressed significantly more concern about protecting individual property rights (Property Rights index $\bar{x}$ = 0.01; 26% favored protecting individual rights, 47% were neutral, and 27% favored limiting individual rights). Likewise, limitations to individual property rights were more acceptable among respondents who currently prune trees to improve timber value ($\bar{x}$ = 0.20; 19% favored protecting individual rights, 51% were neutral, and 30% favored limiting individual rights) or plant vegetation for privacy ($\bar{x}$ = 0.88; 10% favored protecting individual rights, 39% were neutral, and 51% favored limiting individual rights).

Concern over property rights might impede, but probably does not prevent, these new landowners from participating in forest management activities that cross boundaries. Differences in property rights attitudes also were identified for 6 of the 9 cross-boundary items (Appendix D). What is most interesting about these data is that, for five items, those who "already do" and who "probably will never do" the activity share significantly stronger feelings about protecting individual property rights. It might be the case that those who currently participate in cooperative programs have a proactive goal of protecting their property rights from future threats. Concerns about protecting individual property rights don't seem to be as big a problem among the

"maybe" group (only about 10% of this group had a Property Rights index score that favored protecting individual property rights), which is encouraging for those who are espousing cross-boundary initiatives.

A landowner's trust in foresters seemed to have minimal impact on willingness to participate in management activities. Trust was related significantly to management behaviors for only two independent management actions and two cross-boundary items (Appendix D). Those who said they "might" remove exotic plant species held higher levels of trust (Trust index $\bar{x}$ = 0.52; 8% distrust foresters, 64% were neutral, and 28% trust foresters) than those who already remove exotic species ($\bar{x}$ = 0.14; 14% distrust foresters, 69% were neutral, and 18% trust foresters); likewise, those who said they "might" prune to improve timber value expressed more trust in foresters ($\bar{x}$ = 0.61; 6% distrust foresters, 66% were neutral, and 28% trust foresters) than both of the "already do" group ($\bar{x}$ = 0.23; 12% distrust foresters, 70% were neutral, and 18% trust foresters) and the "will probably never do" group ($\bar{x}$ = 0.24; 9% distrust foresters, 72% were neutral, and 18% trust foresters). Those who said they probably would not share road access with their neighbors expressed lower trust ($\bar{x}$ = 0.14; 8% distrust foresters, 74% were neutral, and 18% trust foresters) than did those who "might" share road access ($\bar{x}$ = 0.56; 4% distrust foresters, 72% were neutral, and 24% trust foresters). More importantly, though, those who already share a forester with neighbors express higher levels of trust ($\bar{x}$ = 1.20; 0% distrust foresters, 55% were neutral, and 45% trust foresters) than both groups that "might" ($\bar{x}$ = 0.49; 7% distrust foresters, 67% were neutral, and 25% trust foresters) and "probably will not" ($\bar{x}$ = 0.08; 11% distrust foresters, 75% were neutral, and 14% trust foresters) do so. In this case, the experience of having interacted with a forestry professional on a personal level may have improved the trust ratings. This conjecture corroborates the concern mentioned above, which associates new landowners' lack of familiarity with foresters with an unfounded skepticism in those foresters' land management intentions. The key finding from these data is that there do not seem to be serious trust-related problems limiting the development of cross-boundary management strategies among this sample. Even respondents who indicated that they would not participate in these activities expressed trust in foresters above the scale midpoint.

Significantly different attitudes about clearcutting were identified for three of the independent management actions and four of the cross-boundary items (Appendix D). Respondents who already plant trees for future timber sale were more likely to consider clearcutting acceptable on government lands (although they displayed a very weak acceptance, $\bar{x}$ = 0.1, frequencies indicated that the group was divided; 26% disapprove of clearcutting, 46% were neutral, and 28% approve). Conversely, those who said they will not plant trees for timber considered clearcutting less acceptable on industrial ($\bar{x}$ = –0.5; 35% disapprove of clearcutting, 51% were neutral, and 14% approve) and privately owned ($\bar{x}$ = –0.2; 29% disapprove of clearcutting, 50% were neutral, and 21% approve) lands. Respondents who said they probably never will prune or cut to improve timber value considered clearcutting on any type of land unacceptable (means ranged from $\bar{x}$ = –0.3 for privately held lands to $\bar{x}$ = –1.0 for governmentally owned lands; between 29%–45% disapprove of clearcutting, 47%–53% were neutral, and only 8%–18% approve). Upon inspection of the cross-boundary items, it becomes clear that attitudes about clearcutting, like the perception of foresters' trustworthiness, also may be affected by the level of familiarity with the professional forestry community. Those individuals who say they currently use the same forester as their neighbors consider clearcutting less intolerable (means ranged from $\bar{x}$ = 0.4 for government lands to $\bar{x}$ = 1.3 for private lands; between 15%–26% disapprove of clearcutting, 25%–32% were neutral, and 42%–60% approve). Furthermore, experience cooperating with environmental or governmental organizations in land management efforts is also associated with higher acceptability of clearcutting on different types of land. Although these results do not indicate causality (in other words, it is impossible to determine from these data whether those individuals who are more accepting of clearcutting are more predisposed to join such programs, or whether participation in such programs affects those people's attitudes), it is encouraging that the level of familiarity with the professional land managers seems to be related so strongly to attitudes about harvesting.

Responses to the items about using a small sawmill and accepting an economic tradeoff for more ecologically responsible harvesting significantly differed for almost every independent and cross-boundary item (Appendix D). In general, the group of respondents who said they probably never will engage in the activities listed were less likely (lower $\bar{x}$) to indicate a desire or

willingness to use "boutique" harvesting technology or to accept less money for preventative logging operations.

Perceived Constraints to Management

Respondents were asked to select reasons that explained why they would not participate in the specific management actions listed. Respondents merely checked which of the possible reasons listed in the questionnaire applied; the percentages of respondents who checked each constraint are reported below (Table 2.6).

The most common reason for not participating in a management action was not having thought about it (cited by 36% and 32% of respondents for independent and cross-boundary management actions, respectively). Other frequently cited reasons reflected respondents' lack of equipment, time, money, knowledge, and advice. All of these reasons (especially those regarding knowledge and advice) might be addressed with landowner outreach programs. A preservationist rationale of letting nature take its course also was mentioned frequently (31% and 19% for independent and cross-boundary management actions, respectively), which suggests that there are respondents who hold philosophical objections to active management.

For those advocating cross-boundary management, it is noteworthy that only 14% of respondents said they just did not want to participate. Only about one quarter (28%) of these respondents were concerned about losing control of their land. About one fourth (23%) of respondents expressed a lack of trust in the government, 15% said they don't trust environmental organizations, and 6% said they don't trust their neighbors.

Some respondents indicated that they don't participate in cross-boundary management practices because such practices were not needed or were irrelevant to the protection of regional environmental quality. For example, 28% said their current management practices don't harm the regional ecosystem; 18% don't believe they own enough land for their management practices to make a difference. Only 7% said they don't believe fragmentation is a threat to ecological health.

Table 2.6. Factors perceived by new Virginia forest owners that constrain their participation in independent and cross-boundary management behaviors.

	% agree	
	Indep.	X-bdry
I never thought about it.	35.8	31.5
I prefer to let nature take its own course.	31.4	19.0
I don't have the equipment I would need to do these things.	31.1	20.9
I don't own enough land for anything I do to matter.	29.3	18.3
I don't have the money to do these things.	28.4	23.9
My land isn't suited for these uses.	27.7	†
I don't have the time to do these things.	26.7	20.6
I don't know how to do these things.	26.1	20.3
I don't want to do these things.	24.2	13.8
I don't know where to get advice about these things.	17.4	12.8
I worry that these things might harm the health of the land.	15.9	†
I don't spend enough time on my land to keep up with these things.	11.4	†
I am not physically able to do these things.	8.8	7.0
I don't know where to get the equipment I would need to do these things.	8.2	6.0
I worry that these things might decrease my property value.	7.9	4.7
I don't trust the advice I get about doing these things.	3.7	4.0
I probably won't live here long enough to worry about what happens to the land.	3.4	4.3
I'm too old to worry about what happens to the land.	3.4	2.9
I worry about losing control over my land.	*	28.0
My current management practices don't harm the regional ecosystem.	*	28.0
I don't trust the government.	*	23.4
I don't know what my neighbors do with their land.	*	16.8
I don't trust environmental organizations.	*	14.7
I don't know my neighbors.	*	13.5
I prefer not to do business with my neighbors.	*	10.9
I don't believe land fragmentation is a threat to regional ecological health.	*	7.2
I don't trust my neighbors.	*	6.0

* Constraint only included on questionnaire in reference to cross-boundary management behaviors.
† Constraint only included on questionnaire in reference to independent management behaviors.

There were significant differences among owners of different-sized tracts for only 3 of the 18 independent constraints (Appendix E). Predictably, owners of smaller tracts were more likely to believe that they don't own enough land or that their land isn't suited to engage in such actions. About one third (32%) of those who own between 2 and 20 acres believe that they don't own enough land to participate in cooperative management. This is an important finding for natural resource managers—the very audience that ecosystem management programs target perceives itself to be least relevant to the message of cooperation.

There also were significant differences among owners of different-sized tracts for 5 of the 24 cross-boundary constraints (Appendix E). Owners of small tracts were more likely to say that they had never thought about these management activities, that they didn't own enough land for their actions to matter, and that they don't know how to do these things. Owners of larger tracts, on the other hand, were more likely to express concern over losing control of their land; this was an important constraint for 31% of respondents who owned tracts between 20 and 50 acres and 36% of those with more than 50 acres. Owners of larger tracts were also more likely to express distrust in environmental organizations, although fewer than one quarter (23%) of those who own 50 or more acres selected this as an important constraint.

There were significant differences in the mean Property Rights index score for two independent and five cross-boundary constraints (Appendix E). The 4% of respondents who indicated that they don't trust the advice they get (for both independent and cross-boundary management) expressed greater concern with protecting individual property rights. The 3% who said they were too old to participate in the independent management practices also expressed greater concern with protecting individual property rights.

Because so few respondents identified those constraints as important, however, there is little practical significance in these findings. Differences in attitudes about property rights were more revealing for the remaining four cross-boundary constraints for which there were statistically significant differences in Property Rights index score. The 7% who don't believe fragmentation is a threat expressed a higher degree of concern about protecting individual property rights, as did the 15% who don't trust environmental organizations, the 23% who don't trust the government, and the 28% who worry about losing control over their land. These data seem intuitive; they confirm the reliability of the questionnaire instrument while illuminating important beliefs held by these respondents.

There were also significant differences in the mean Trust index score for six of the constraints to cross-boundary management (Appendix E). Again, five of these testify to the reliability of the questionnaire instrument. Respondents who worry about losing control over their land, as well as those who don't trust the government, environmental organizations, their neighbors, or any advice they get, expressed lower levels of trust. More encouragingly, however, the 21% who

indicated that they simply didn't have the time to participate in cross-boundary activities expressed *higher* levels of trust in foresters. Those who promote cooperative management need to recognize this limitation and emphasize how little time commitment is required to participate in recommended programs.

There was at least one significantly different attitude about clearcutting for two of the independent and six of the cross-boundary constraints (Appendix E). Respondents who worry about impacts to their property value, for example, are more likely to consider clearcutting acceptable on industrial and governmental lands. Interestingly, there was no significant difference in their attitudes toward clearcutting on privately owned land. Similarly, those who say they don't trust the advice they get about managing their land considered clearcutting more acceptable on government lands, but not on industrial or private lands. Most interesting among the results about clearcutting attitudes is that those respondents who said they don't know where to get advice about cross-boundary management consider clearcutting less acceptable on land of any ownership type. It may be that these individuals recognize that professional foresters are willing to offer advice, but they may be perceived as untrustworthy "timber beasts" who push unacceptable practices such as clearcutting. These respondents might prefer advice to come from sources that specifically are not associated with the traditional professional forestry community.

Finally, there were significant differences in attitudes about alternative harvesting practices associated with seven of the independent and seven of the cross-boundary constraints (Appendix E). The general trend was for lower scores among respondents who identified constraints to their participation. There were a few notable exceptions to this trend, however, among the cross-boundary constraints. Respondents who worry about losing control over their land, who don't consider land fragmentation a threat to ecological health, or who don't know where to get advice actually had *higher* scores on these two items. What is encouraging about this discovery is that the presence of obstacles to participation in cross-boundary management does not necessarily rule out the possibility of *any* management. In fact, it seems likely that these respondents are willing to participate in certain independent management activities. Forestry professionals should recognize that a failure to participate in cross-boundary initiatives doesn't mean an individual would be unwilling to enroll in standard efforts such as Stewardship or Tree Farm programs.

Information Requests

Only 51% (Table 2.7) of respondents took advantage of our offer to provide information (as prepared by Virginia Cooperative Extension) about various topics—46% requested information about three topics, 4% about two topics, and 1% about only one topic. Put another way, 49% did *not* avail themselves of the opportunity to receive free information and advice.

Table 2.7. Requests for information made by respondents who selected "I don't know how" or "I don't know where to get advice" as an obstacle to participating in land management activities.

Obstacle	# of topics requested			
Independent actions	0	1	2	3
I don't know how to do these things (n = 171)	46.2	0.0	2.9	50.9
I don't know where to get advice about doing these things (n = 114)	33.3	0.9	2.6	63.2
Cross-boundary actions				
I don't know how to do these things (n = 133)	43.6	1.5	3.8	51.1
I don't know where to get advice about doing these things (n = 84)	33.3	1.2	2.4	63.1

To get an idea of these respondents' motivation, it is helpful to evaluate the requests made by respondents who indicated that they "didn't know how" or "didn't know where to get advice" as an important obstacle to their participation in either independent and cross-boundary management actions (Table 2.7). Almost half (46% for independent actions, 44% for cross-boundary actions) of those who said they didn't know how to do these things did not request any information. One third (33% for both independent and cross-boundary actions) of those who said they didn't know where to get advice still didn't ask for information when it was provided conveniently and free.

It is possible, of course, that the specific topics that the respondents were invited to request were not relevant to this group of respondents, although the list was developed with the intention of covering a wide range of topics. Not only were there items related to active forest management (e.g., "forest and timber management"), but also items related to residential landscaping (e.g., "lawn care" and "home gardening"), personal economics (e.g., "home business ideas" and "saving money"), and general conservation (e.g., "restoring mine lands" and "recycling/waste management"). With such a variety of options offered, it seems unlikely that the list was insufficient. Rather, it is more likely that obstacles such as "I don't know how" or "I don't know

where to get advice" might have been selected as more socially acceptable constraints than more honest admissions that "I don't want to."

Conclusions

This paper focused on four questions important to enlisting the cooperation of new owners of private forestland in efforts to address parcelization of landscape and ecosystem processes. Preliminary answers to these questions are provided below.

How do concerns about property rights affect willingness to consider fragmentation and ecosystem management issues?

Concerns about property rights don't seem to be an insurmountable problem. Only about one fourth of respondents in this study expressed unwillingness to accept governmental limitations to individual property rights. This corresponds with the percentage of respondents in the Brunson et al. (1996) study who said they would be more likely to engage in ecosystem management if federal agencies weren't involved. It appears that there exists a distinct minority of landowners that considers protecting property rights a central issue. Although these individuals might be adamantly opposed to participating in cross-boundary programs associated with governmental agencies, these data (and Brunson's study) suggest that they might still be willing to enroll in non-governmental programs.

A particularly interesting revelation of this study is that some of these new landowners who already engage in active management are more concerned about protecting individual property rights than those who "might" participate. If additional research confirms this, then it could be an important tool for land managers. Previously, land managers have conceptualized concerns about private property as deterrents to active management; these results suggest that foresters could instead position active management programs as opportunities for landowners to ward off potential threats to property rights, thus addressing landowners' concerns more proactively. It is encouraging that the large group who is "on the fence" with regard to active management does not seem to consider property rights a big problem.

Do new owners trust the professional forestry community, and if not, how might this affect the role of professional forestry in reaching this important audience?

These new landowners' lack of familiarity with the traditional forestry community is alarming, although not entirely surprising. Although over 70% are either neutral or skeptical of foresters' stewardship ethic, fewer than 25% claim to know anything about professional foresters. Only 8% of these new landowners have a written management plan for their land; about 20% do not know where to get information to manage their forests. It seems that, among this group of new landowners, foresters suffer not from an image problem, but from an invisibility problem. The many respondents who said they don't know where to get advice or information about management, combined with their lack of interactions with professional foresters, suggests that the entire profession is largely unknown to these new owners.

It seems, then, that the first challenge in persuading new landowners to get involved in active management is becoming known to them. Birch, Hodge, and Thompson (1998) suggested that foresters could work with real estate agencies in areas with rapid forestland turnover; realtors could be excellent conduits of information from the forestry community to the newest forest owners. Being able to provide information (such as printed materials) about forestry assistance and related topics could be presented as a "value-added" service that realtors can offer their clients.

How does the amount of land owned affect owners' management behaviors?

It is worrisome that about one third of those who own between 2 and 20 acres believe that they don't own enough land to participate in cooperative management efforts. This is an important finding for natural resource managers—the very audience that ecosystem management programs target perceives itself to be least relevant to the message of cooperation. Not only do foresters need to advertise their existence to these new forest owners, they also need to sharpen their persuasive skills to convince owners of very small tracts that their lands are indeed important for—and even central to—the task of preserving ecosystem-wide processes.

What obstacles limit landowner participation in active management?

The biggest obstacle to active management identified in this study is that these new landowners simply haven't given any thought to participating in these behaviors. Again, this seems to be a

crisis more related to the identity of the forestry profession than the image of the forestry profession. In other words, these respondents were more likely to say "I never heard of these things" than "I don't trust the people who want me to do these things." The clear majority of these landowners said they might be willing to engage in cross-boundary management efforts, which should be encouraging to programs attempting to address forest fragmentation. Although such skepticism doesn't seem to be an overwhelming obstacle for new respondents overall, a minority of new landowners is very suspicious about the intentions of the government (and, to a lesser extent, environmental organizations).

When considered in their entirety, these data indicate that these respondents likely are exhibiting what economists refer to as "rational ignorance" (Community and Economic Development Program 1997). The theory of rational ignorance is based on the premise that the benefits to be derived from acquiring information (in this case about forestry) must outweigh the costs of acquiring that information; if the benefits don't outweigh the costs, then it doesn't make sense to expend the energy to get the information—in other words, the rational thing to do is to remain ignorant (Community and Economic Development Program 1997). These new forest owners don't seem to understand that they could realize any benefits from forestry and the services offered by forestry professionals, so it isn't surprising that they aren't actively seeking more information.

This strongly suggests that there are some important issues that need to be addressed before any attempts to enlist these individuals in active management efforts. Foresters face three separate, yet equally important, tasks if they hope to have influence with the population of new forest owners. First, and most fundamentally, they need to make their presence known. Second, they need to encourage new owners to view themselves as forest owners, not simply homeowners. Third, they need to publicize the social, environmental, and financial benefits that can accrue as a result of active forest management. Only after these tasks have been accomplished successfully will it make sense to try to "sell" active management to this important group of landowners.

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SUMMARY

The population of new forest owners is an important one to consider in any analysis of the nonindustrial private forest. If geographers are correct in their predictions that recent trends in urban sprawl will continue, then the number of forest owners will continue to grow and average tract size will continue to decrease. Whether we are interested in sustaining production of timber and fiber products, protecting wildlife habitat and wetlands, or ensuring safe, healthy residential communities, we cannot ignore the people who are gaining control of forestland.

From this research, we have learned several important things, as summarized below.

- There is no "average" forest owner. Market segmentation is a useful tool for carving out more homogeneous segments of the population of forest owners that can be reached separately with unique, tailored messages.

- Within the population of new forest owners, messages about timber harvesting and traditional utilitarian management do not seem to resonate as relevant, despite the large number of people who express some degree of willingness to engage in active management. The forestry community should either emphasize a different set of advantages to management, or adopt an altogether new language, in communications with this population.

- These respondents stated a high degree of willingness to participate in active management within and across property boundaries. It would be a more effective use of resources to concentrate on motivating the large group that is "on the fence" regarding active management than to try to garner the support of the few who expressed outright opposition (for whatever reason).

- The most salient obstacles to these respondents' participation in active management were related to the invisibility of the forestry profession. They have never thought about land management, they do not know where to get advice, and they don't know much about foresters. Clearly there is a need for the profession to engage in some basic "brand identity" marketing efforts. Only after new forest owners recognize the existence of the forestry community will it make sense to have in place cost-sharing and other assistance programs.

There are myriad directions in which future research on the population of new forest owners in high-growth regions could extend. Foremost, it would be interesting to repeat the market segmentation project in other areas of the country, especially the Northeast, where urban sprawl is also problematic. It is possible that there could be a different distribution among market segments, or even unique groups not identified within this sample.

Parallel studies in other regions could overcome several limitations related to the sample selection in this study. For example, in this study one of the factors I used to select sample counties was recent loss of forested acreage. At least one study in Michigan (Erickson, Ryan, and De Young 2001) has demonstrated that forested acreage can increase when agricultural land is parcelized and no longer cleared for crop production. Second, my sample was drawn from only those counties with computerized real estate transaction records, which could have skewed the sample to more technologically advanced or wealthier areas. Truly random sampling would eliminate these potential sources of bias.

To develop a more complete understanding of marketing strategies and messages likely to appeal to the identified segments, it would be helpful to conduct in-depth interviews with a few individuals from each group. Qualitative research efforts such as these can be excellent follow-ups to quantitative approaches. Broad issues identified in the quantitative phase (such as this questionnaire) can suggest the direction for qualitative discussions. Such dialogs with new landowners could reveal or clarify subtle distinctions between different groups; they could also provide insight into the language that these landowners use to talk about their forestland.

For example, it would be particularly interesting to explore the language employed by individuals labeled “Preservationists” in this study. These respondents clearly did not connect with the language typically used by the forestry community, but it is unlikely that they truly do “nothing” on their properties. These people may not think of themselves as forest managers, but they aren’t keeping their “hands off” to the extent that weeds and trees grow up to the foundations of their houses. An afternoon drive through any interface region reveals gardens, playscapes, landscaping—often on quite extraordinary scales. Is there a different language that land managers should be using to connect with these individuals? Perhaps the language of landscaping and outdoor entertaining would be more relevant. It is conceivable, for example, that

a landowner who isn't interested in conducting "a clearing to improve wildlife habitat diversity" might agree to the very same process if it's referred to as the creation of "an open space for outdoor musical performances."

Another informative line of investigation would focus more attention on those individuals who self-identify as being willing to engage in active management (i.e., the "Might" group in this study). The results presented in the second article of this dissertation concerned the attitudes and perceived constraints of all new landowners, but it would be valuable to learn as much as possible about the fence-sitters to improve efforts to communicate with them about forest management. Perhaps we could develop partnerships with contractors, landscapers, or home improvement retailers to identify those who would be willing or likely to participate in active management. Practical constraints prevented me from asking respondents to identify salient constraints for individual management activities—furthermore, a 24 x 27 matrix (in addition to the hundreds of other items already included on the questionnaire) would have added significantly to the burden on the respondents. Collecting such information, however, would be invaluable in developing a more complete understanding of the factors that need to be addressed to engage these individuals in management programs.

Finally, from a more physical perspective, it could be illuminating to map the spatial distribution of the land owned by the various market segments. The obvious tool for such a project is a geographic information system (GIS)—by superimposing a map layer containing market segment classifications over layers of physical land traits (e.g., forest type, wetland presence) and social data (e.g., land tenure, existence of management plans), we could learn more about patterns and relationships between these segments and the existing body of land use characteristics.

The insights provided by juxtaposing information about motivational orientations with land use data could be especially valuable for planning cross-boundary management efforts. For example, it might be constructive to identify spatial clusters of similarly motivated landowners, who could then be contacted with similar "pitches" describing the advantages of cooperative management. Mapping the pattern of market segments on the landscape might also help land managers target

messages specifically to those individuals who live in areas with special management concerns, such as notably sensitive habitats or particularly high wildfire threats.

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APPENDIX A
Research Methods

Research Setting

Virginia is divided into three planning units based on predominant physiographic characteristics—mountain, piedmont plateau, and coastal plain. To identify counties that have recently experienced high growth rates, counties in each of these three regions were prioritized by population growth, increases in housing, and forest loss (Table A.1). A rank sum was calculated by with the following formula:

[Rank (Population change) + Rank (Housing change)] / 2 + Rank (Forest area change)

Low values of this rank sum represented high levels of population growth occurring simultaneously with forest loss. Starting at the top of each prioritized list, Commissioners of the Revenue were contacted until two counties per region with computerized real estate sales records were identified. Six counties were selected as the sample frame for this research (Figure A.1): Montgomery and Frederick (Mountain region), Spotsylvania and Bedford (Plateau region), and Henrico and Chesterfield (Coastal region). For each county, the following information was requested for all sales between 2 and 50 acres during the five-year period from 1994–1998: landowner's name and mailing address, the total acreage of the property, and the date the property was purchased.

Table A.1. Information about changes in population, housing, and forest area used to select sample counties in Virginia.

		Population*				Number of Housing Units*				Forested Acres				
	County	1980	1995	? ? (%)	Rank	1980	1990	? (%)	Rank	1985†	1992‡	? § (%)	Rank	Rank Sum
Coastal Province	Gloucester	20,107	33,421	66.2	7	8,312	12,451	49.8	7	99,488	94,613	4.9	7	14
	Henrico	**180,735**	**232,799**	**28.8**	**25**	**70,428**	**94,539**	**34.2**	**14**	**66,929**	**59,637**	**10.9**	**1**	**21**
	York	35,463	54,108	52.6	11	11,427	15,284	33.8	15	34,510	32,849	4.8	9	22
	Chesterfield	**141,372**	**239,659**	**69.5**	**5**	**48,883**	**77,329**	**58.2**	**5**	**193,898**	**189,813**	**2.1**	**19**	**24**
	Hanover	50,398	74,641	48.1	15	17,278	23,727	37.3	12	184,587	178,376	3.4	11	25
	New Kent	8,781	11,679	33.0	21	3,256	3,968	21.9	31	102,268	98,183	4.0	10	36
	Isle Of Wight	21,603	27,769	28.5	26	7,705	9,753	26.6	25	117,676	114,511	2.7	15	41
	Middlesex	7,719	9,327	20.8	32	4,936	5,486	11.1	52	51,470	49,882	3.1	12	54
	Accomack	31,268	32,266	3.2	64	13,815	15,840	14.7	41	104,715	96,630	7.7	2	55
	King William	9,334	12,244	31.2	24	3,441	4,193	21.9	32	113,537	111,822	1.5	27	55

		Population*				Number of Housing Units*				Forested Acres				
	County	1980	1995	? ? (%)	Rank	1980	1990	? (%)	Rank	1985†	1992‡	? § (%)	Rank	Rank Sum
Mountain Province	King George	10,543	16,463	56.2	10	3,997	5,280	32.1	16	73,029	72,837	0.3	45	58
	James City	22,339	40,489	81.2	4	8,672	14,330	65.2	3	64,104	64,973	-1.4	66	70
	Prince George	25,733	28,383	10.3	49	6,944	8,640	24.4	27	119,262	118,271	0.8	35	73
	Westmoreland	14,041	16,464	17.3	39	7,471	8,378	12.1	46	76,613	75,785	1.1	32	75
	Mathews	7,995	8,947	11.9	48	4,225	4,725	11.8	50	35,237	34,787	1.3	30	79
	Lancaster	10,129	11,161	10.2	50	5,107	5,918	15.9	39	52,896	52,501	0.7	37	82
	Northumberland	9,828	11,122	13.2	46	5,584	6,841	22.5	30	67,888	67,886	0.0	46	84
	Caroline	17,904	21,079	17.7	38	6,527	7,292	11.7	51	262,658	261,702	0.4	43	88
	Richmond	6,952	8,247	18.6	37	3,007	3,179	5.7	74	76,818	76,279	0.7	39	95
	Greenville	10,903	10,967	0.6	70	3,792	3,393	-10.5	94	139,144	135,286	2.8	13	95
	Surry	6,046	6,388	5.7	58	2,724	2,982	9.5	59	124,910	124,151	0.6	40	99
	Charles City	6,692	6,733	0.6	69	2,172	2,314	6.5	71	86,139	85,042	1.3	31	101
	King & Queen	5,968	6,441	7.9	53	2,510	2,698	7.5	65	153,245	152,722	0.3	44	103
	Southampton	18,316	17,313	-5.5	78	6,256	6,560	4.9	77	241,634	240,553	0.4	42	120
	Dinwiddie	22,602	22,944	1.5	66	6,838	8,023	17.3	37	239,824	244,769	-2.1	70	122
	Sussex	10,872	10,078	-7.3	81	3,958	4,252	7.4	67	250,306	250,668	-0.1	48	122
	Brunswick	15,632	16,465	5.3	59	6,195	6,456	4.2	79	287,198	290,950	-1.3	65	134
	Essex	8,864	9,251	4.4	60	4,082	4,073	-0.2	91	95,625	98,013	-2.5	73	149
	Northampton	14,625	13,013	-11.0	87	6,132	6,183	0.8	89	29,932	30,967	-3.5	77	165
	Frederick	**34,150**	**51,549**	**50.9**	**12**	**12,759**	**17,864**	**40.0**	**11**	**130,947**	**129,262**	**1.3**	**29**	**41**
	Warren	21,200	29,264	38.0	18	9,516	11,223	17.9	36	79,845	78,281	2.0	21	48
	Clarke	9,965	12,390	24.3	29	3,961	4,531	14.4	42	40,601	39,987	1.5	26	62
	Montgomery	**63,284**	**75,756**	**19.7**	**35**	**22,386**	**27,770**	**24.1**	**28**	**146,183**	**145,464**	**0.5**	**41**	**73**
	Washington	46,487	48,347	4.0	61	17,884	19,183	7.3	69	194,164	189,483	2.4	18	83
	Rockingham	52,068	61,894	18.9	36	20,862	22,614	8.4	63	308,742	306,177	0.8	36	86
	Dickenson	19,806	17,586	-11.2	88	6,904	7,112	3.0	83	186,145	175,390	5.8	5	91
	Wise	43,863	39,925	-9.0	86	15,666	15,927	1.7	87	190,561	178,535	6.3	4	91
	Augusta	47,578	59,510	25.1	28	19,613	21,202	8.1	64	345,921	346,217	-0.1	47	93
	Bland	6,349	6,783	6.8	56	2,265	2,706	19.5	34	178,055	179,477	-0.8	55	100
	Wythe	25,522	26,350	3.2	63	9,833	10,659	8.4	62	145,345	144,321	0.7	38	101
	Shenandoah	27,559	33,423	21.3	31	12,000	15,160	26.3	26	185,674	191,246	-3.0	75	104
	Page	19,401	22,718	17.1	41	8,329	8,948	7.4	66	120,991	121,531	-0.4	51	105
	Highland	2,937	2,575	-12.3	90	1,463	1,759	20.2	33	195,822	196,294	-0.2	49	111
	Craig	3,948	4,821	22.1	30	1,873	1,993	6.4	72	175,307	179,276	-2.3	72	123
	Botetourt	23,270	27,279	17.2	40	8,710	9,785	12.3	45	245,026	253,975	-3.7	81	124
	Giles	17,810	16,374	-8.1	85	6,733	7,098	5.4	75	176,181	176,775	-0.3	50	130
	Roanoke	72,945	81,717	12.0	47	26,800	31,689	18.2	35	102,107	110,833	-8.5	91	132
	Lee	25,956	24,411	-6.0	79	9,659	10,263	6.3	73	156,526	157,865	-0.9	57	133
	Rockbridge	17,724	19,116	7.9	54	7,125	7,975	11.9	48	243,783	253,650	-4.0	83	134
	Floyd	11,563	12,642	9.3	52	4,915	5,505	12.0	47	134,179	143,873	-7.2	90	140
	Pulaski	35,229	34,426	-2.3	77	13,736	14,740	7.3	68	117,241	118,971	-1.5	68	141
	Smyth	33,345	33,231	-0.3	71	12,313	13,132	6.7	70	172,534	177,224	-2.7	74	145
	Alleghany	14,333	12,604	-12.1	89	5,433	5,481	0.9	88	251,501	254,026	-1.0	59	148
	Bath	5,860	4,870	-16.9	92	2,537	2,596	2.3	84	302,052	306,266	-1.4	67	155
	Grayson	16,579	16,380	-1.2	74	6,790	7,529	10.9	53	161,648	175,828	-8.8	92	156

		Population*				Number of Housing Units*				Forested Acres				
	County	1980	1995	? ? (%)	Rank	1980	1990	? (%)	Rank	1985†	1992‡	? § (%)	Rank	Rank Sum
	Buchanan	37,989	30,430	-19.9	93	12,772	12,222	-4.3	92	287,004	290,585	-1.2	63	156
	Tazewell	50,511	47,146	-6.7	80	18,274	18,901	3.4	82	207,118	213,914	-3.3	76	157
	Scott	25,068	23,197	-7.5	82	9,778	10,003	2.3	85	229,142	237,082	-3.5	78	162
	Carroll	27,270	27,634	1.3	67	11,685	12,209	4.5	78	164,004	184,058	-12.2	93	166
	Russell	31,761	29,261	-7.9	83	11,518	11,558	0.3	90	166,872	174,359	-4.5	86	173
	Spotsylvania	**31,995**	**71,981**	**125.0**	**1**	**11,850**	**20,483**	**72.9**	**1**	**184,537**	**175,636**	**4.8**	**8**	**9**
	Prince William	144,636	245,184	69.5	6	46,490	74,759	60.8	4	121,061	114,923	5.1	6	11
	Fairfax	595,754	887,205	48.9	14	215,739	307,966	42.7	8	99,337	92,614	6.8	3	14
	Fauquier	35,889	51,473	43.4	17	12,565	17,716	41.0	10	180,056	175,188	2.7	14	28
	Stafford	40,470	80,107	97.9	3	13,271	20,529	54.7	6	120,200	118,956	1.0	33	38
	Louisa	17,825	22,887	28.4	27	7,063	9,080	28.6	20	232,229	228,537	1.6	24	48
	Franklin	35,740	42,856	19.9	33	13,512	17,526	29.7	18	286,692	284,099	0.9	34	60
	Bedford	**34,927**	**52,335**	**49.8**	**13**	**13,892**	**19,641**	**41.4**	**9**	**287,093**	**288,607**	**-0.5**	**52**	**63**
	Rappahannock	6,093	7,117	16.8	42	2,704	2,964	9.6	56	105,446	103,499	1.8	22	71
	Campbell	45,424	48,918	7.7	55	16,341	19,008	16.3	38	208,415	205,236	1.5	25	72
	Patrick	17,647	17,762	0.7	68	7,054	8,125	15.2	40	225,130	220,534	2.0	20	74
	Albemarle	55,783	73,203	31.2	23	20,363	25,958	27.5	23	290,860	293,436	-0.9	58	81
	Appomatox	11,971	12,777	6.7	57	4,509	4,913	9.0	60	155,856	153,357	1.6	23	82
	Charlotte	12,266	12,188	-0.6	72	4,561	4,947	8.5	61	214,857	209,194	2.6	16	83
Piedmont Province	Nottoway	14,666	15,160	3.4	62	5,619	5,732	2.0	86	140,994	137,331	2.6	17	91
Piedmont Province	Fluvanna	10,244	16,058	56.8	9	3,828	5,035	31.5	17	132,590	137,348	-3.6	80	93
Piedmont Province	Loudoun	57,427	115,870	101.8	2	19,742	32,932	66.8	2	101,055	118,338	-17.1	94	96
Piedmont Province	Powhatan	13,062	18,905	44.7	16	3,838	4,910	27.9	22	127,998	132,471	-3.5	79	98
Piedmont Province	Greene	7,625	12,660	66.0	8	3,059	4,154	35.8	13	64,253	68,858	-7.2	89	100
Piedmont Province	Amelia	8,405	9,670	15.1	43	3,016	3,439	14.0	43	167,507	169,531	-1.2	62	105
	Goochland	11,761	16,138	37.2	19	4,031	5,203	29.1	19	123,054	130,505	-6.1	87	106
	Buckingham	11,751	13,316	13.3	45	4,542	5,013	10.4	55	299,235	301,661	-0.8	56	106
	Cumberland	7,881	7,737	-1.8	75	3,060	3,170	3.6	81	135,560	133,642	1.4	28	106
	Madison	10,232	12,252	19.7	34	3,997	4,547	13.8	44	118,289	120,511	-1.9	69	108
	Culpeper	22,620	30,528	35.0	20	8,271	10,471	26.6	24	106,997	114,304	-6.8	88	110
	Orange	18,063	23,763	31.6	22	7,358	9,038	22.8	29	120,565	125,848	-4.4	85	111
	Henry	57,654	56,585	-1.9	76	20,968	23,169	10.5	54	178,116	179,127	-0.6	53	118
	Nelson	12,204	13,357	9.4	51	5,500	7,063	28.4	21	223,672	233,316	-4.3	84	120
	Amherst	29,122	29,770	2.2	65	9,672	10,598	9.6	57	221,538	226,454	-2.2	71	132
	Prince Edward	16,456	18,752	14.0	44	5,548	6,075	9.5	58	160,816	166,832	-3.7	82	133
	Lunenburg	12,124	11,155	-8.0	84	4,808	5,065	5.3	76	208,183	209,807	-0.8	54	134
	Mecklenburg	39,444	30,760	-22.0	94	13,036	14,589	11.9	49	262,562	265,852	-1.3	64	136
	Halifax	30,599	30,317	-0.9	73	11,350	11,790	3.9	80	348,892	352,976	-1.2	60	137
	Pittsylvania	66,147	56,101	-15.2	91	24,255	22,861	-5.7	93	400,638	405,446	-1.2	61	153

* http://govinfo.library.orst.edu/usaco-stateis.html, accessed January 1999.

† From Brown (1986).

‡ From Johnson (1992).

§ Negative numbers indicate counties that gained forested acreage; positive numbers indicate forest loss, so low rank numbers correspond to counties with greatest area of forestland lost.

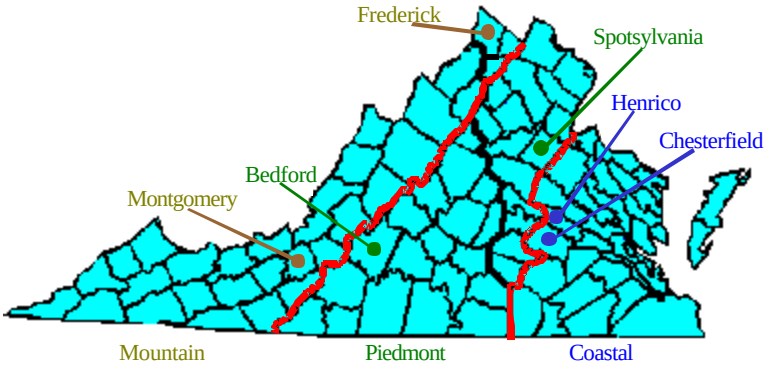

Figure A.1. Six counties selected as the sample frame for a survey of Virginia's new forest owners.

According to Johnson's (1992) report, between 17% and 38% of the land area in the six sample counties is classified as private, individually owned (not corporate or farm-owned) timberland (Table A.2). Although almost half of Virginia's forestland is owned by private individuals in parcels smaller than 50 acres, in these six counties the average parcel size was between 100 and 200 acres as of 1992 (Thompson and Johnson 1996). The sample for this research was drawn from the population of individuals who purchased their land during the period from 1994–1998, subsequent to the collection of these data.

Table A.2. Forest statistics* for six sample counties in Virginia.

County	Total county acreage	Total forestland acreage (% total area)	Private timberland acreage (% total area)	Number sampled in this study who purchased 2–19.9 acres	Number sampled in this study who purchased 20–50 acres
Bedford	482,618	288,607 (60)	113,248 (23)	167	63
Chesterfield	304,448	189,813 (62)	83,493 (27)	167	64
Frederick	271,532	129,262 (48)	64,009 (24)	167	229
Henrico	169,210	59,637 (35)	28,099 (17)	167	39
Montgomery	254,074	145,464 (57)	87,981 (35)	167	220
Spotsylvania	262,471	175,636 (67)	100,542 (38)	167	238
				1,002	**853**

* From Johnson (1992).

Instrument Development

Pretest

Items related to motivations and perceived benefits and general attitudes about forest management were pretested in a questionnaire administered to 128 students in an introductory natural resources course in February 1999. Students were offered 2 extra credit points for completing the questionnaire. Factor and reliability analyses of items designed to assess various land ownership motivations revealed redundant items that were discarded, confusing wording that was corrected, and several motivational constructs that lacked reliability because of too few items. The goal of the pretest was to identify three to five items for each motivational construct.

Final Version

The final questionnaire (Appendix B) was designed to elicit information regarding: land ownership motivations (or objectives), willingness to participate in various management activities (including cross-boundary management), perceived constraints to management, general attitudes about forest management, perceptions about forest health, and socioeconomic characteristics.

Based on results of the pretest, 67 items about ownership motivations ultimately were identified for use in the final questionnaire. The 67 items included in the final list of land ownership objectives represented several distinct factors within three general motivation categories—utilitarian or economic motivations, lifestyle or personal motivations, and regional motivations.

Respondents were asked to rate their willingness to participate in 24 management activities (15 activities on their own land, 9 involving cross-boundary management). For each activity, respondents noted whether they already, might, or probably never would participate. They also were asked to note obstacles or constraints to participation for each of the 24 activities. From a list of 37 possible reasons for not participating, respondents checked as many items as they believed applied to them.

As means to help differentiate among market segments, respondents described their attitudes about selected issues relevant to professional forestry. Using a seven-point Likert scale (–3 indicated “strongly disagree”; 0, “neutral”; and +3, “strongly agree”), six questions asked about

property rights. Four asked whether respondents agreed or disagreed that: "The government should have the right to regulate how people use their land and forest in order to…" 1) "…protect water quality," 2) "…protect threatened and endangered species," 3) "…preserve the beauty of the forest," and 4) "…maintain healthy forests." Factor and reliability analysis of the responses to these and two similar items resulted in the creation of a single "Property Rights" index from the mean of the responses to all six items. The reliability of this measure (Cronbach's alpha) was 0.87.

Four questions were asked about the image of professional forestry. Participants were asked to indicate whether they trust foresters to provide good information about managing trees, and to focus more on ecological health than on making money or cutting timber. They also were asked how much they knew about foresters.

Finally, two items about non-conventional timber harvest practices were included. Respondents were asked whether they would be willing to 1) "… harvest a few trees and saw them up for lumber using a small, portable two-person sawmill," and 2) "… accept less money from a timber sale if the logging actions protected other forest qualities."

Sample Population

In April 1999, the final questionnaire was mailed to 1,855 new owners of small tracts of land in the counties listed above. "New" owners were defined as those who acquired their land during the 5-year period from 1994–1998. "Small" tracts were defined as those between 2 and 50 acres; the 2-acre minimum size was established to identify primarily owners of parcels outside of city limits. In addition to the planning unit and county strata, the sample was stratified by parcel size—those who purchased between 2 and 20 acres, and those who purchased between 20 and 50 acres. Twenty acres was selected as an appropriate dividing point because it is the minimum amount of land required to participate in the Forest Stewardship Program in Virginia.

In determining the number of questionnaires to mail, response rates reported in previous literature were examined. Studies reported various response rates from 12% for a study of large landowners in Tennessee (English et al. 1997) to 97% for a study of South Carolina Stewardship Program participants (Thrift et al. 1997), but typical response rates seemed to be between 30 and

50% for studies of private forest owners. For this population, a response rate of 40% (the midpoint of this range) was predicted.

In addition to considering response rate, it was necessary to account for some respondents not owning forest, but some other land type. The percentage of the total acreage in private forestland in the six sample counties ranged from 17% in Henrico County to 38% in Spotsylvania County (Table A.2). On average, 27.3% (rounded up to 30%) of the area in these counties is private forestland. Thus, to obtain 20 forest owners' responses per stratum with only about 30% forestland and 40% response (i.e., solving for x where 0.30 * 0.40 * x = 20), it was necessary to mail 167 questionnaires per stratum. This sample size satisfies the demands of factor analysis, as described in the Analysis section below, for which meaningful results require a sample of at least 200. The lists were sampled randomly. Because there were far fewer purchases of tracts between 20 and 50 acres, the sample of the larger strata actually became a census (Table A.2).

Cover letters were personalized with the name and address of each landowner as well as information from county records about the size and date of the recent purchase. The initial mailing was on April 14, 1999; two weeks later (April 28, 1999) a reminder postcard was mailed to nonrespondents. Three weeks following that (May 19, 1999), a second cover letter was mailed with a replacement copy of the questionnaire; on June 8, 1999, a final reminder letter was mailed to all remaining nonrespondents asking why they had not yet returned the questionnaire (Appendix B).

Of the original 1,855 questionnaires mailed first-class, 264 were determined to be "noneligible or nonreachable" (Dillman 1978), resulting in an adjusted sample size of 1,591. Another 734 were completed and returned, for a total response rate (734/1,591) of 46.1%. These responses were sorted by year of most recent land purchase. The 73 respondents whose most recent land purchase was prior to 1990 subsequently were classified as "noneligible" and excluded from further analysis, resulting in a final adjusted sample size of 1,518, and a final usable response rate (661/1,518) of 43.5%. Of these, 416 were returned after the first wave of mailings, 157 after the second wave, and 88 after the third wave.

Statistical Analysis[12] and Results

Responses were distributed across the three mailing waves and across the six sample counties (Figure A.2); 41 questionnaires were excluded from the following characterization because respondents did not respond to all motivation items and thus could not be clustered, so adjusted sample size is 620. Description of the characteristics of the whole sample of landowners and differences among market segments (clusters) of new forest landowners are discussed in Article 1 of this dissertation.

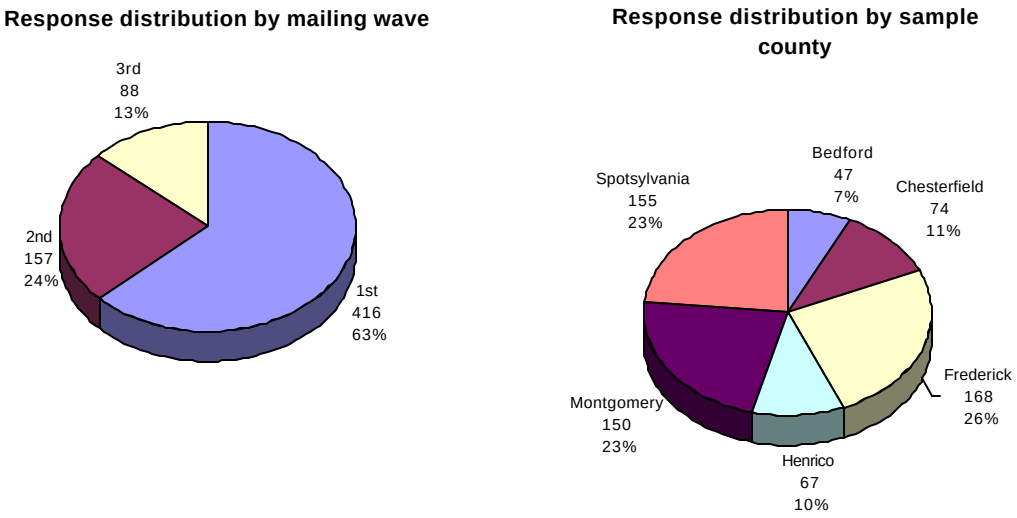

Figure A.2. Distribution of responses to a questionnaire about forest management activities across three mailing waves and six sample counties in Virginia, 1999.

A combination of factor analysis, cluster analysis, and one-way analysis of variance (ANOVA) was used to reduce the motivation data into a smaller number of factors, to identify discrete segments of new landowners, and to explore the external validity of the identified segments (Figure A.3). The following sections outline the multivariate procedures used in this analysis.

[12] All statistical computations were done using SPSS for Windows (SPSS 1998, 1999).

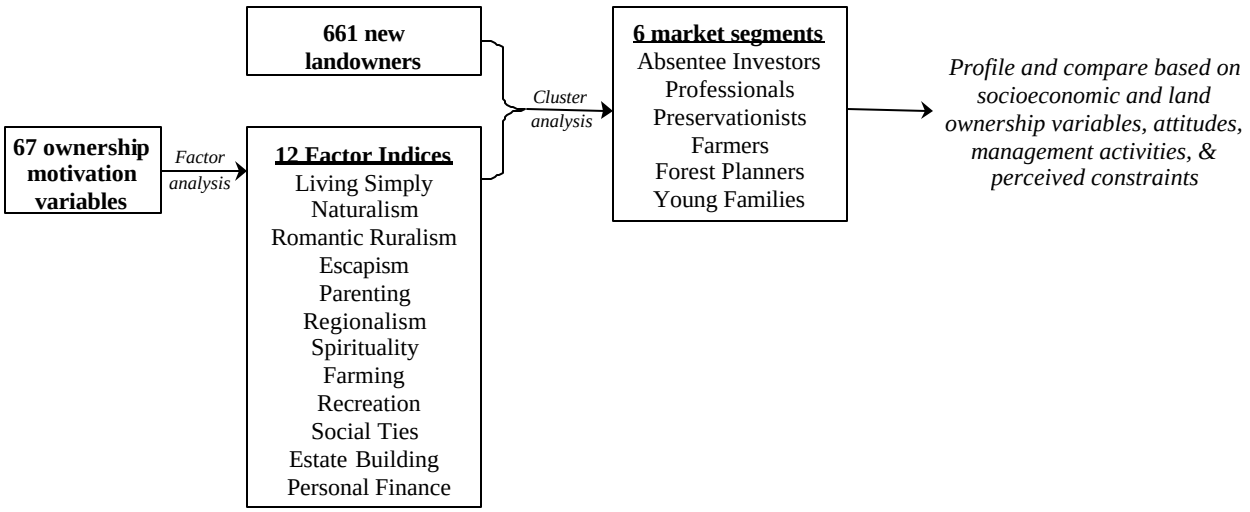

Figure A.3. Analysis process used to identify and characterize meaningful market segments among the population of Virginia's new forest owners.

Data Reduction: Principal Components Analysis

By conducting a linear transformation on a large number of original variables, principal components analysis (PCA) is useful for reducing the dimensionality of a complex data set. This smaller, more easily understood set of variables can then be used in further analyses (Dunteman 1989). For this study, PCA was deemed most appropriate for the simple task of reducing the 67 motivation variables into a smaller number of homogeneous factors for use in a subsequent clustering procedure.

Selecting only components with eigenvalues greater than one (in other words, factors which explained a greater amount of variance in the set of variables than any one variable did) resulted in a 12 component solution. This seemed appropriate in light of previous NIPF motivation literature that often includes 10 to 12 choices for landowners to rate on questionnaires.

Because cluster analysis (the ultimate use for the factors created in this step) requires uncorrelated variables, only orthogonal rotations were considered. Factors created by equamax rotation were intuitively meaningful and seemed appropriate for discriminating among market segments. Thus, the factors resulting from equamax rotation were used to create factor scores (Table A.3). Cronbach's alpha was calculated for each factor to determine its reliability. For each factor, alpha was greater than 0.6, which is considered an acceptable reliability coefficient (Santos 1999). Most items loaded strongly onto only a single factor after equamax rotation. Only

eight items had loadings higher than 0.4 for two factors. I grouped all items into the factors on which they scored most highly; subsequent interpretation confirmed that this approach resulted in factors that made sense intuitively.

Table A.3. Factors resulting from principal component extraction, equamax rotation.

Name of factor	Cronbach's Alpha	% Variance Explained	Loading	Mean	St. Dev.
1—Naturalism	**0.94**	**7.4**		**1.29**	**1.35**
To take care of birds and wildlife			0.65	1.1	1.8
To keep the scenery in the region looking nice			0.51	1.3	1.8
To improve the ecological health of the region			0.54	0.8	1.8
To be able to walk or hike on my land			0.61	1.9	1.6
To participate in natural processes			0.57	1.1	1.8
To see wildlife			0.68	1.9	1.5
To study nature			0.65	1.1	1.8
To enjoy scenery			0.59	2.1	1.4
To preserve nature			0.60	1.2	1.8
To watch things grow			0.51	1.4	1.7
To do what is right for the environment			0.46	1.0	1.8
To help preserve regional history			0.34	0.4	1.9
2—Parenting	**0.88**	**5.9**		**0.49**	**1.77**
It provides a safe place for children to play			0.79	0.8	2.3
To be able to teach my kids important values			0.76	1.0	2.1
To be a good role model for my kids			0.76	1.1	2.1
To teach my kids important skills			0.67	–0.2	2.2
To live closer to good schools			0.56	–0.1	2.0
3—Spirituality	**0.86**	**5.8**		**0.19**	**1.69**
To connect with a higher power			0.79	–0.3	2.1
To reconnect with my spirituality			0.76	0.0*	2.0
To feel closer to God			0.74	0.3	2.0
To get back to the basics			0.43	0.7	1.9
4—Romantic Ruralism	**0.83**	**5.8**		**0.85**	**1.42**
To have neighbors I can trust			0.72	0.8	1.9
To know my neighbors			0.57	0.5	1.9
To pay less taxes			0.53	0.2	2.0
To be able to live in a healthy place			0.45	1.8	1.6
To live in a small community			0.40	1.1	1.7
5—Escapism	**0.85**	**5.7**		**0.51**	**1.39**
To be away from other people			0.65	0.9	1.8
To be independent of others			0.62	0.7	1.9
To get away from poverty			0.60	–0.3	1.9
To escape city crime			0.52	1.2	2.0
To have a lower cost of living			0.51	0.5	2.0
To live away from pollution			0.48	1.4	1.8
To live closer to a good paying job			0.45	–0.8	1.9

Name of factor	Cronbach's Alpha	% Variance Explained	Loading	Mean	St. Dev.
6—Regionalism	**0.88**	**5.7**		**0.22**	**1.49**
To live more cheaply			0.56	0.3	1.9
It provides me drinking water			0.53	0.4	2.1
To improve water quality in the region			0.48	0.1*	1.8
To reduce erosion in the region			0.46	0.2	1.8
To help the local economy			0.41	–0.4	1.8
To develop roots in one place			0.34	0.8	1.9
7—Personal Finance	**0.87**	**5.6**		**–0.93**	**1.42**
It provides a major source of my income			0.82	–1.7	1.8
It produces products I sell to supplement my income			0.74	–1.6	1.9
It may help me pay for special expenses like college education, family medical bills, or family vacations			0.69	–1.2	1.9
To help me pay for my retirement			0.63	–0.3	2.0
To support myself			0.45	–0.2	2.1
To work for myself			0.44	–0.2	2.1
To produce products for the local economy			0.42	–1.0	1.7
8—Social Ties	**0.61**	**5.6**		**–0.42**	**1.52**
To live closer to friends who live in the area			0.72	–0.5	1.9
To live closer to family that live in the area			0.69	–0.3	2.1
To live near people like me			0.61	0.1*	2.0
To help provide jobs in the region			0.50	–1.0	1.7
9—Living Simply	**0.81**	**5.5**		**1.52**	**1.32**
To escape from the rat race of urban civilization			0.63	1.6	1.9
To be free to do whatever I want to do			0.62	1.8	1.8
To have a chance to build and fix things with my hands			0.55	0.8	2.1
To build my own house or barn			0.53	1.3	2.0
To have privacy			0.52	2.3	1.4
To live a simpler life			0.36	1.4	1.8
10—Farming	**0.74**	**5.1**		**0.13***	**1.74**
To raise farm animals			0.75	–0.1*	2.2
To be able to ride horses on my land			0.74	–0.2	2.2
To be able to grow some of my own food			0.41	0.8	2.0
11—Estate Building	**0.63**	**4.8**		**–0.45**	**1.60**
To buy neighboring lands so I have a larger landholding			0.72	–0.4	2.0
To add to my existing land holdings			0.69	–0.4	2.2
To be able to leave a lasting reminder of my life			0.50	–0.4	2.1
12—Utilitarianism	**0.73**	**4.5**		**–0.29**	**1.42**
To be able to hunt on my land			0.75	–0.1*	2.5
To be able to drive off-road vehicles on my land			0.67	–1.6	1.8
To practice my outdoor skills			0.49	0.7	1.9
To provide recreational opportunities for others (outside of my own family) in the region			0.39	–0.9	2.0
It provides firewood, edible plants, and/or other things I use			0.38	0.6	2.0

*Mean is significantly different than 0 (t-test, ? ?= .05).

Factor scores can be created in several ways. By multiplying the raw data matrix by the matrix of rotated beta weights (as provided by statistical software), all available information is retained. However, the computationally simpler technique of creating factor-based indices by combining only the "important" variables for each factor to create a score also can be useful. In this case, indices were created with a two-step process. First, all variables with loadings of at least 0.3, a somewhat arbitrary rule of thumb but one recommended by Aldenderfer and Blashfield (1984), for each of the 12 factors were identified. Raw data scores across each resulting group of variables then were averaged for each respondent. Thus, 12 new variables were created for each respondent in the sample. These indices subsequently were used to cluster respondents into meaningful segments.

Segmentation: Cluster Analysis

Cluster analysis procedures are intended to classify observations into distinct (but sometimes overlapping) groups based on similarity or dissimilarity across a number of specified variables. Its seeming arbitrariness renders it perhaps even more controversial than factor analysis. There are a number of important decisions to be made for each clustering effort, including selecting appropriate variables upon which to construct a similarity or dissimilarity matrix, deciding whether to standardize or transform across variables or across cases (respondents), selecting an appropriate similarity measure, selecting an appropriate clustering method (hierarchical or iterative), determining a "stopping rule" to know how many clusters is enough, and evaluating the replicability and external validity of the resulting clusters. Evaluating the usefulness of a particular cluster solution requires careful reporting of decisions made at each of these steps, and is the focus of this section.

Basic texts advise the researcher to select variables that are theoretically relevant to the problem rather than using a "slapshot" approach and including every variable that potentially contains cluster structure (Aldenderfer and Blashfield 1984; Punj and Stewart 1983). More detailed analyses have revealed that including even one irrelevant variable in a cluster analysis may compromise severely the validity of any solutions, although this problem is attenuated if clustering with an iterative partitioning method (Punj and Stewart 1983). There are two types of variable selection. In the first, all variables are weighted based on their relative importance in defining cluster structure; in the second, only a subset of variables is selected for use in

clustering (Gnanadesikan, Kettenring, and Tsao 1995). The first method of variable weighting is similar to the practice of variable standardization.

The purpose of this research was to determine whether differences in land ownership motivations enable differentiation among market segments of new landowners. Thus, the decision to make about variable selection was whether to cluster on the 67 original motivation variables, or on the 12 factor-based indices as described above. Recent classification research has suggested that attempts to reduce inter-variable correlation by way of principal components actually can mask or distort true existing cluster structures. However, researchers who have recommended against such a "tandem" approach (i.e., first factoring then clustering) have not made specific recommendations for data based on psychographic or attitudinal variables, as used in this study.

Classification researchers repeatedly note that standardization is not necessarily required for a particular data set. In fact, "many researchers fail to recognize that if clusters actually exist in the original variables space, then standardization can distort or hide the clustering present in the data" (Milligan 1996). There appears to be little agreement about the best method for standardization (if it is necessary at all). In a study of particular relevance to this research, Beaman and Vaske (1995) supported Milligan and Cooper's (1988) recommendation of dividing by the range of responses, but across objects (respondents) instead of across each variable. Thus, scalar differences or ipsative bias (the tendency of a respondent to "score high" or "score low" on the given scale) are eliminated from the data. The following equation was used to standardize across each respondent:

$$[X - \text{Min}(X)] / [\text{Max}(X) - \text{Min}(X)]$$

The next decision to be made was the choice of a similarity or dissimilarity measure. As Punj and Stewart (Punj and Stewart 1983, p. 143) noted, "the selection of a similarity measure appears to be less important for determining the outcome of a clustering solution than the selection of a clustering algorithm," as long as the one chosen is appropriate for the type of data used. In a discussion specifically focusing on attitudinal data for which there is no meaningful absolute zero, Beaman & Vaske (1995) suggested using some variant of the Pearson product-moment correlation (r_p) as the distance measure. By first standardizing data across respondents to account for scalar differences, Euclidean distance (the distance measure used in k-means partitioning)

acts as the Cord of Angle Distance, an r_p-based distance (Equation 1 from Beaman and Vaske 1995).

$$D(i,j) - (? (xstd(i,v) - xstd(j,v))^2)^{½} = (2(1-r_p))^{½}$$

More important than selecting a similarity measure is the selection of a clustering method. Punj and Stewart (1983) recommend a five-step process combining hierarchical and iterative methods, which was used here. In a review of clustering studies, Punj and Stewart (1983) noted that Ward's method appears to outperform the average linkage method except in the presence of outliers. The recommended distance measure for Ward's clustering method is the Euclidean distance, which, as described above, acts as the r_p-based cord when used on standardized data. Using the 12 factor-based indices as clustering variables and standardizing across respondents, it was determined that solutions between three and eight clusters should be compared in the subsequent iterative partitioning step.

K-means clustering is more efficient when a non-random starting point is given for the specified number of clusters. To do this (for each cluster solution), the data set was divided randomly in half, a k-means clustering procedure was conducted using only half of the data, and the resulting cluster centers were saved. These values then were used in the final clustering of the entire restored data set. This procedure was repeated for solutions between three and eight clusters.

Different cluster solutions then were analyzed for validity and interpretability of results. Although in many reports of cluster analyses, solutions are validated by conducting multivariate analysis of variance (MANOVA) on the variables used to create the clusters, Aldenderfer and Blashfield (1984) explained that this approach is faulty. The clusters were created specifically with the intent of maximizing the differences among the clustering variables; naturally, then, comparisons of the means will result in highly significant p-values. Calculating cophenetic correlation also is recommended frequently, but is appropriate only for use with clusters created through hierarchical methods. Many mathematicians have proposed statistics that evaluate the quality of a particular clustering solution, but recent reviews have determined that most of these measures are "wanting on a number of dimensions" (Punj and Stewart 1983).

Aldenderfer and Blashfield (1984) recommend validating a cluster solution by conducting significance tests on variables *not* used to create the clusters. For this analysis, variables measuring land ownership, socioeconomic, and demographic characteristics, forest management attitudes, and management intentions were compared for solutions of three to six clusters. Chi-square tests (for discrete variables such as willingness to participate in particular management behaviors) and ANOVAs (for continuous variables such as attitude toward property rights) both were used to compare different cluster solutions. Ultimately a solution of six clusters was selected based on its differentiation among groups (Figure A.4).

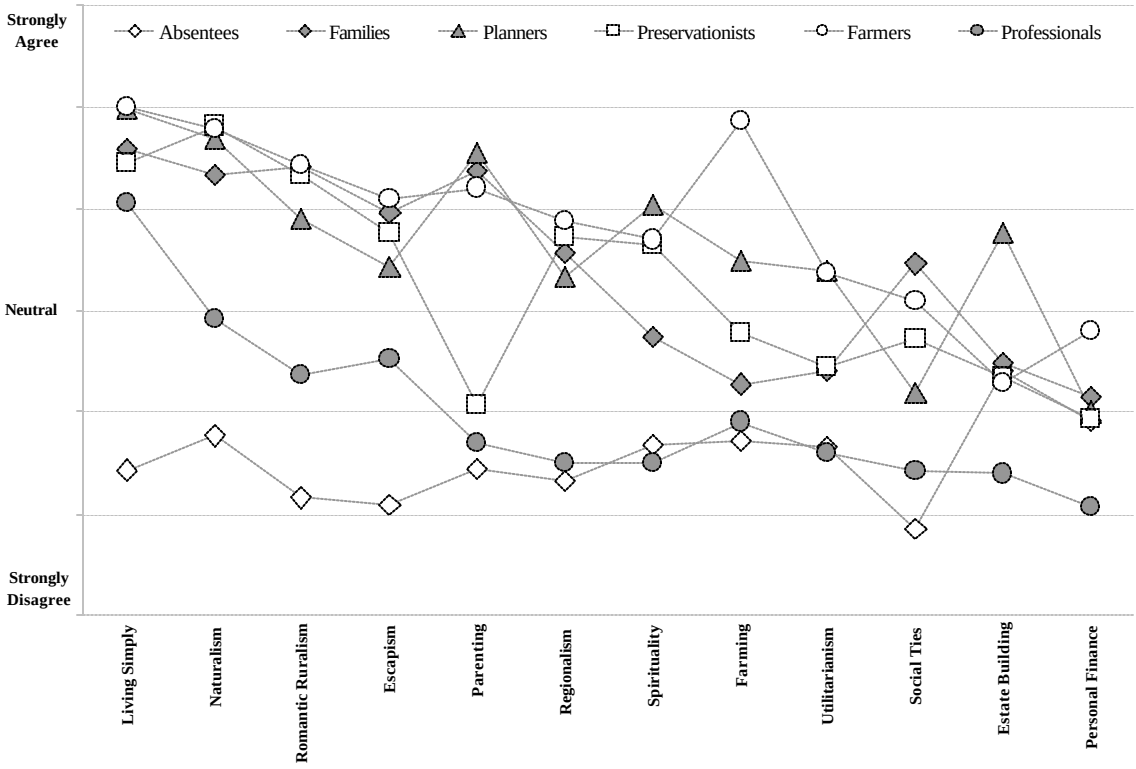

Figure A.4. Motivational factor scores for six groups of new landowners in Virginia.

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APPENDIX B
Cover Letters and Questionnaire Instrument

FIRST WAVE COVER LETTER (April 14, 1999)

<NAME>
<ADDRESS1>
<ADDRESS2>

Dear <NAME>,

Your name was obtained from public tax records in <COUNTY> County as someone who purchased <ACRE> acres of land in <YEAR>. Several thousand people have purchased land in Virginia just in the past few years. We are collecting information to help us better meet the needs of the ever-changing group of private citizens who own land throughout Virginia. We need your help, **whether this was your first land purchase or just a recent addition to your existing land holdings**. Please tell us about you and your land by completing the enclosed survey. We need to hear from everybody to get a complete picture.

All of your answers will remain confidential. The code on the front page of the questionnaire is included so that we can keep track of who has returned the survey. The complete mailing list that associates that code with your name will be kept separate from your answers and destroyed when we finish the project.

Please be patient if it seems that some of the questions are repetitive. We are being careful to include the fullest possible range of reasons people might value owning land. As a result, we are asking many questions and some of the questions are similar to one another. Please answer EVERY question. There are no right or wrong answers. Answer what you believe to be true for you. If you are not sure, pick the answer that comes closest to how you feel. Please feel free to respond to this questionnaire, either generally or about specific items, by making notes in the many blank spaces provided throughout the survey. You are also welcome to contact us directly.

Please complete all 26 questions, then **return your completed questionnaire in the enclosed postage-paid envelope.**

Thank you very much for taking the time to complete this survey.

Sincerely,

Angelina M. Kendra
Graduate Research Assistant
(540) 231-5848
akendra@vt.edu

Dr. R. Bruce Hull
Associate Professor of Forestry
(540) 231-7272
hullrb@vt.edu

REMINDER POSTCARD (April 28, 1999)

Dear Virginia Landowner,

Recently we sent you a survey which asked questions about you and the land you recently purchased in Virginia. Our records show that we have yet to receive a completed survey from you. Many individuals have already returned their survey to us, and we would like to include your information and opinions with theirs when doing our research.

If there is an error in our records, or if you have recently returned your completed survey, please ignore this reminder and accept our thanks for your assistance. However, if you have not completed our survey yet, please do so at your earliest convenience. Once again, thank you for your participation in this important study.

Sincerely,

Angelina Kendra
Graduate Research Assistant, Virginia Tech

SECOND WAVE REMINDER LETTER (May 19, 1999)

Dear New Landowner:

Recently, we sent you a survey which asked about you and the land you recently purchased in Virginia. Our records indicate that we have yet to receive a completed survey from you. Many individuals have already returned their survey to us, and we would like to include your information and opinions with theirs when doing our research.

We realize that in the rush of daily life, you may have misplaced the original copy of the survey that you received a few weeks ago. Enclosed with this letter is another copy of the survey and a stamped return envelope for your convenience. If you have already returned the survey to us, please disregard this letter and accept our thanks for your assistance.

Each year in Virginia, thousands of people purchase forestland. In order to better understand the needs and concerns of these new landowners, and to develop relevant information and programs, we have undertaken this study. Because only a small number of individuals are receiving this survey, your opinions and views are very important. Remember, there are no right or wrong answers. Once again, the information you provide is strictly confidential and your name will not be released to anyone for any reason. The number printed on the front cover of the questionnaire is for tracking purposes only, and we will eliminate our mailing list once this study is complete.

If our records are incorrect and you have not purchased land in Virginia during the last 10 years, or if for any other reason you do not wish to participate in this study, please write the reason on the back of this letter and return it to us in the enclosed postage-paid envelope. We will remove your name from our mailing list so you will not receive any additional copies of the questionnaire.

Thank you once again for your participation in this important study. We hope to hear from you soon.

Sincerely,

Angelina M. Kendra
Graduate Research Assistant
(540) 231-5848
akendra@vt.edu

R. Bruce Hull, IV
Associate Professor of Forestry
(540) 231-7272
hullrb@vt.edu

THIRD WAVE REMINDER LETTER (June 8, 1999)

<CODE>

Dear <NAME>:

In our continuing efforts to understand the views and opinions of new landowners in Virginia, we have discovered that we have not yet received a completed survey from you. If you recently returned a survey to us, we apologize for any inconvenience this letter might cause. However, if not, we would appreciate hearing back from you soon.

If you will not fill out the survey, please tell us why. It is important for our records to determine why we have not heard back from you. Please take a moment to mark one of the following reasons which most closely matches your reason for not responding, and return this letter to us in the postage-paid envelope.

I have not returned my survey for the following reason(s):

✍✍ The person to whom this survey is addressed is deceased.
✍✍ I no longer own this property.
✍✍ Your records are incorrect; I did not purchase ACRE acres in COUNTY county in 19YEAR.
✍✍ I am physically incapable of completing the survey.
✍✍ I do not feel competent or knowledgeable enough about my land to complete the survey.
✍✍ I refuse to complete the survey for personal reasons.
✍✍ I will do it—the survey is (or will soon be) in the mail.
✍✍ I am not a new landowner; I've owned land for many years (YOU CAN STILL HELP…please read on)

Several people have inquired about what to do if the land they recently purchased was a small addition to an existing larger holding—in that case, we ask that you please complete the questionnaire and return it to us as soon as possible. Many individuals have already returned their surveys to us, and we would like to include your information and opinions with theirs when reporting results that represent new landowners. Enclosed with this letter is another copy of the survey that we recently sent to you in the mail. If you have not yet filled one out, or perhaps have misplaced your previous copy, please take the time to fill out the survey and return it to us in the enclosed stamped envelope.

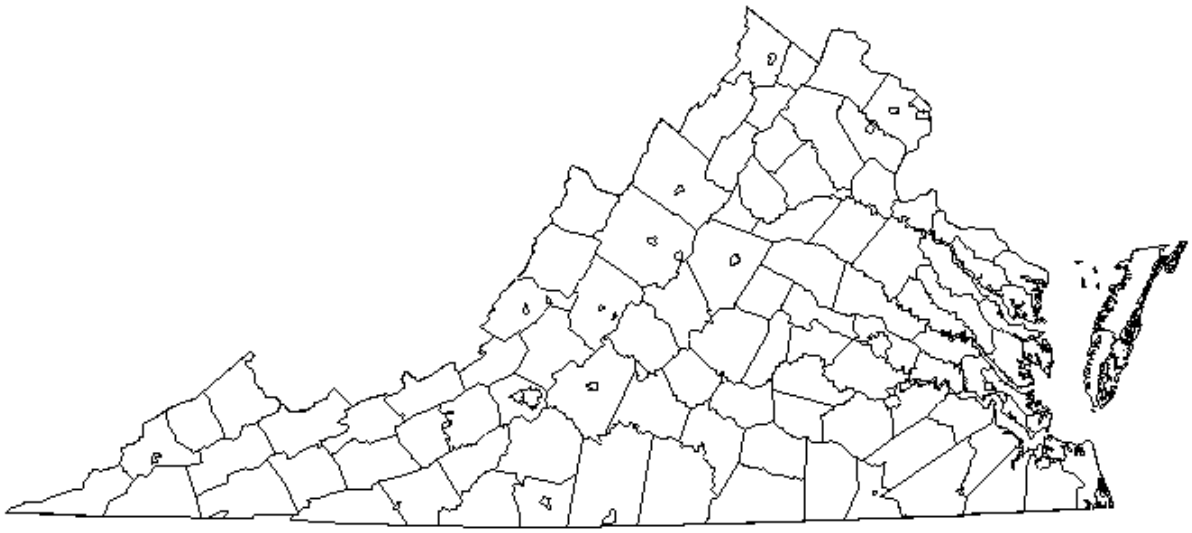
Thank you once again for your participation in this important study. We hope to hear from you soon.

Sincerely,

Angelina Kendra
Graduate Research Assistant
(540) 231-5848
akendra@vt.edu

Bruce Hull
Associate Professor of Forestry
(540) 231-7272
hullrb@vt.edu

QUESTIONNAIRE INSTRUMENT



New Landowners of Virginia

Please tell us a few things about the parcel of land you most recently purchased (the one mentioned in the cover letter included with this questionnaire). Questions 1-2 are included to verify the information we received from your local tax office. If the cover letter was incorrect, please fill in the correct information below.

1. In what year did you acquire your land? _____

2. How many acres did you acquire? _____

3. How many of those acres are forested (i.e., have mostly trees)? _____

4. How did you acquire that land?
   - ✍ Fee-simple purchase (i.e., your name is on the deed)
   - ✍ Purchase as part of a limited liability corporation
   - ✍ Inheritance
   - ✍ Other (please describe) _____

5. Do you currently live on the land described in Questions 1-2?
   - ✍ Yes, I live there all year.
   - ✍ Yes, but only for part of the year (it is a second or seasonal home).
   - ✍ No. I live _____ miles from it.
   - ↴ ✍ …but I plan to build a primary residence there.
   - ✍ …but I plan to build a second or seasonal home there.

6. In addition to the tract described in Questions 1-2, do you currently own **other** tracts of land larger than 2 acres?
   - ✍ No
   - ✍ Yes. I own _____ acres altogether (including acres listed in Question 2).

7. Of the total acreage you own (reported in Question 6), how many acres of your land is devoted to each of the following uses? Please consider that each individual parcel of land may be divided among more than one of these land uses. (Write in the **number of acres** for each category.)

____ Residential or commercial	____ Active cropland or pastureland
____ Forest	____ Open water or wetland
____ Meadow	____ Other (please describe) _____

8. How long do you intend to own your land? (Mark one.)
   - ✍ I have never thought about it.
   - ✍ I will probably sell it in approximately ____ years.
   - ✍ I will probably pass it on to my children.

9. Which (if any) of the following reasons might influence your decision to sell or give away your land? (Mark all that apply.)
   - ✍ It is too much work to keep up with it.
   - ✍ I can't afford to keep it.
   - ✍ I will retire and need the money.
   - ✍ I would rather live elsewhere.
   - ✍ I will retire and move elsewhere.
   - ✍ I will retire and need the money.
   - ✍ A job will probably take me to another place.
   - ✍ I am no longer interested in this land.
   - ✍ The property taxes are too high.
   - ✍ The area is becoming too populated.
   - ✍ I can't make enough money from the land to justify keeping it.
   - ✍ Other (please describe) _____

10. Which category best describes the community in which you live? (Mark one.)
    - ✍ On a farm or ranch
    - ✍ In the country, not on a farm or ranch
    - ✍ Rural or small town (fewer than 2,500 people)
    - ✍ Town or small city (2,500-25,000)
    - ✍ City (25,000-100,000)
    - ✍ A suburb of a large city
    - ✍ A large city (> 100,000)

The following two questions refer to land you may have owned in the past, but **that you no longer own**.

11. Prior to purchasing the land described in Questions 1-2, have you ever owned any other tracts of land larger than 2 acres that you no longer own?
    - ✍ No
    - ✍ Yes. I previously owned _____ acres.

12. In what year did you **first** purchase a tract of land larger than 2 acres **outside of city limits**?
    _____

13. How important to you are **each** of the following reasons for owning **your** land? Please respond to all of the items listed below. (We apologize for the length of this question—we needed to make sure that we covered as many reasons as possible.)

	Not at all important			**Neutral**			**Very important**
To add to my existing land holdings	-3	-2	-1	0	1	2	3
To escape from the rat race of urban civilization	-3	-2	-1	0	1	2	3
To be able to drive off-road vehicles on my land	-3	-2	-1	0	1	2	3
To be able to leave a lasting reminder of my life	-3	-2	-1	0	1	2	3
It may help me pay for special expenses like college education, family medical bills, or family vacations	-3	-2	-1	0	1	2	3
It provides a major source of my income	-3	-2	-1	0	1	2	3
It produces products I sell to supplement my income	-3	-2	-1	0	1	2	3
To teach my kids important skills	-3	-2	-1	0	1	2	3
It provides a safe place for children to play	-3	-2	-1	0	1	2	3
To have a chance to build and fix things with my hands	-3	-2	-1	0	1	2	3
To be free to do whatever I want to do	-3	-2	-1	0	1	2	3
To connect with a higher power	-3	-2	-1	0	1	2	3
To do what is right for the environment	-3	-2	-1	0	1	2	3
To pay less taxes	-3	-2	-1	0	1	2	3
To have neighbors I can trust	-3	-2	-1	0	1	2	3
To feel closer to God	-3	-2	-1	0	1	2	3
To provide recreational opportunities for others (outside of my own family) in the region	-3	-2	-1	0	1	2	3
To take care of birds and wildlife	-3	-2	-1	0	1	2	3
To be able to grow some of my own food	-3	-2	-1	0	1	2	3
To get back to the basics	-3	-2	-1	0	1	2	3
To keep the scenery in the region looking nice	-3	-2	-1	0	1	2	3
To improve the ecological health of the region	-3	-2	-1	0	1	2	3
To be able to walk or hike on my land	-3	-2	-1	0	1	2	3
To participate in natural processes	-3	-2	-1	0	1	2	3
To see wildlife	-3	-2	-1	0	1	2	3
To study nature	-3	-2	-1	0	1	2	3
To live more cheaply	-3	-2	-1	0	1	2	3
To practice my outdoor skills	-3	-2	-1	0	1	2	3
To reduce erosion in the region	-3	-2	-1	0	1	2	3
To develop roots in one place	-3	-2	-1	0	1	2	3
To live closer to good schools	-3	-2	-1	0	1	2	3
To be able to hunt on my land	-3	-2	-1	0	1	2	3

	Not at all important				Neutral		Very important
To build my own house or barn	-3	-2	-1	0	1	2	3
To be able to teach my kids important values	-3	-2	-1	0	1	2	3
It provides me drinking water	-3	-2	-1	0	1	2	3
To help the local economy	-3	-2	-1	0	1	2	3
To live closer to friends who live in the area	-3	-2	-1	0	1	2	3
To work for myself	-3	-2	-1	0	1	2	3
To enjoy scenery	-3	-2	-1	0	1	2	3
To improve water quality in the region	-3	-2	-1	0	1	2	3
To live near people like me	-3	-2	-1	0	1	2	3
To have privacy	-3	-2	-1	0	1	2	3
To live a simpler life	-3	-2	-1	0	1	2	3
To know my neighbors	-3	-2	-1	0	1	2	3
To be able to live in a healthy place	-3	-2	-1	0	1	2	3
To help preserve regional history	-3	-2	-1	0	1	2	3
To be able to ride horses on my land	-3	-2	-1	0	1	2	3
To be a good role model for my kids	-3	-2	-1	0	1	2	3
To reconnect with my spirituality	-3	-2	-1	0	1	2	3
It provides firewood, edible plants and/or other things I use	-3	-2	-1	0	1	2	3
To escape city crime	-3	-2	-1	0	1	2	3
To support myself	-3	-2	-1	0	1	2	3
To raise farm animals	-3	-2	-1	0	1	2	3
To help me pay for my retirement	-3	-2	-1	0	1	2	3
To live away from pollution	-3	-2	-1	0	1	2	3
To be away from other people	-3	-2	-1	0	1	2	3
To preserve nature	-3	-2	-1	0	1	2	3
To live in a small community	-3	-2	-1	0	1	2	3
To help provide jobs in the region	-3	-2	-1	0	1	2	3
To live closer to a good paying job	-3	-2	-1	0	1	2	3
To be independent of others	-3	-2	-1	0	1	2	3
To have a lower cost of living	-3	-2	-1	0	1	2	3
To get away from poverty	-3	-2	-1	0	1	2	3
To live closer to family that live in the area	-3	-2	-1	0	1	2	3
To watch things grow	-3	-2	-1	0	1	2	3
To buy neighboring lands so I have a larger landholding	-3	-2	-1	0	1	2	3
To produce products for the local economy	-3	-2	-1	0	1	2	3
Other _____	-3	-2	-1	0	1	2	3

14. This question contains a list of several things people might do with their land. For each of the following things listed, please tell us whether you already do, or would be willing to do, these things on YOUR land. (Mark one box for each item.)

	I already do this	I might do this	I will probably never do this
Improve wildlife habitat	✍	✍	✍
Plant high-value trees for future sale as timber	✍	✍	✍
Plant vegetation to provide privacy from neighbors & roads	✍	✍	✍
Grow small plots of specialized crops (e.g., fruits or vegetables) that can be sold locally for a profit	✍	✍	✍
Graze livestock	✍	✍	✍
Remove exotic (non-native) plant species like kudzu	✍	✍	✍
Kill vines growing in trees	✍	✍	✍
Use a prescribed fire (controlled burn) to manage the forest	✍	✍	✍
Use herbicides or pesticides to control weeds and insects	✍	✍	✍
Prune or cut down selected trees to improve scenic views	✍	✍	✍
Prune or cut down selected trees to improve timber value	✍	✍	✍
Prune or cut down selected trees to improve forest health	✍	✍	✍
Regularly inspect the condition of my land	✍	✍	✍
Have my soil tested	✍	✍	✍
Develop a written management plan for my land	✍	✍	✍

15. There are many reasons why people might NOT do the things listed in Question 14. Please check those reasons on the list below that apply to you. (Mark all that apply.)

✍ I never thought about it.
✍ I don't want to do these things.
✍ I prefer to let nature take its own course.
✍ I worry that these things might decrease my property value.
✍ I worry that these things might harm the health of the land.

✍ I don't own enough land to worry about managing it.
✍ My land isn't suited for these uses.

✍ I don't have the time to do these things.
✍ I don't have the money to do these things.
✍ I don't have the equipment to do these things.
✍ I don't know where I could get the equipment to do these things.

✍ I don't know how to do these things.
✍ I don't know where to get advice about doing these things.
✍ I don't trust the advice I get about doing these things.

✍ I'm too old to worry about what happens to the land.
✍ I am not physically able to do these things.
✍ I probably won't live here long enough to worry about what happens to the land.
✍ I don't spend enough time on my land to keep up with these things.

Any comments to help us understand your answers?

16. More and more people want to own forested or rural lands. As a result, the land is being fragmented into smaller pieces. Some people think this fragmentation may harm the ecological health of your region. What follows are some land management practices that others have suggested as ways to protect or enhance ecological health in an increasingly fragmented landscape. Please tell us whether you already do, or would be willing to do, these things. (Mark one box for each item.)

	I already do this	**I might do this**	**I will probably never do this**
Work with my neighbors to control insect and disease outbreaks	✍	✍	✍
Hire the same forester or natural resource professional as my neighbors	✍	✍	✍
Talk about my land with my neighbors	✍	✍	✍
Work with my neighbors to connect wildlife corridors across shared property boundaries	✍	✍	✍
Share management plans with my neighbors	✍	✍	✍
Share road access with my neighbors	✍	✍	✍
Work with an environmental organization such as The Nature Conservancy to manage my land in a way that is healthy for the land	✍	✍	✍
Work with local or state government to manage my land in a way that is healthy for the land	✍	✍	✍
Work with the federal government to manage my land in a way that is healthy for the land	✍	✍	✍

17. There are many reasons why people might NOT do the things listed in Question 16. Please tell us which of the following reasons applies to you. (Mark all that apply.)

✍ I never thought about it.
✍ I don't want to do these things.
✍ I don't believe land fragmentation is a threat to regional ecological health.
✍ My current management practices don't harm the regional ecosystem.
✍ I prefer to let nature take its own course.

✍ I don't own enough land for anything I do to matter.
✍ I worry that these things might decrease my property value.
✍ I worry about losing control over my land.

✍ I don't have the time to do these things.
✍ I don't have the money to do these things.
✍ I don't have the equipment I would need to do these things.
✍ I don't know where to get the equipment I would need to do these things.

✍ I don't know how to do these things.
✍ I don't know where to get advice about these things.
✍ I don't trust the advice I get about doing these things.

✍ I don't trust the government.
✍ I don't trust environmental organizations.
✍ I don't trust my neighbors.

✍ I don't know my neighbors.
✍ I don't know what my neighbors do with their land.
✍ I prefer not to do business with my neighbors.

✍ I'm too old to worry about what happens to the land.
✍ I am not physically able to do these things.
✍ I probably won't live here long enough to worry about what happens to the land.

Any comments to help us understand your answers?

18. Please indicate your level of agreement with each of the following statements.

	Strongly Disagree			**Neutral**			**Strongly Agree**
Forest owners have the right to do as they please with their forests, regardless of what it does to the environment.	-3	-2	-1	0	1	2	3
Private property rights should be limited if necessary to protect the environment.	-3	-2	-1	0	1	2	3
The government should have the right to regulate how people use their land and forests in order to …							
…protect water quality	-3	-2	-1	0	1	2	3
…protect threatened and endangered species	-3	-2	-1	0	1	2	3
…preserve the beauty of the forest	-3	-2	-1	0	1	2	3
…maintain healthy forests	-3	-2	-1	0	1	2	3
Professional foresters are a trusted source of knowledge about how to manage the trees on my land.	-3	-2	-1	0	1	2	3
Professional foresters are more interested in making money than in the ecological health of my land.	-3	-2	-1	0	1	2	3
Professional foresters are more interested in cutting timber than in the ecological health of my land.	-3	-2	-1	0	1	2	3
I don't know anything about professional foresters.	-3	-2	-1	0	1	2	3
Clearcutting trees should be allowed on land owned by…							
…lumber or paper companies.	-3	-2	-1	0	1	2	3
…the federal government.	-3	-2	-1	0	1	2	3
…the state or local government.	-3	-2	-1	0	1	2	3
…individuals.	-3	-2	-1	0	1	2	3
I would be willing to harvest a few trees and saw them up for lumber using a small, portable two-person sawmill.	-3	-2	-1	0	1	2	3
I would be willing to accept less money from a timber sale if the logging actions protected other forest qualities.	-3	-2	-1	0	1	2	3

19. In your opinion, what do the following things suggest to you about a forest's health? (Mark one box for each item.)

	It is very healthy	It may be healthy	No impact on health	It may be unhealthy	It is very unhealthy
Many large trees	✍	✍	✍	✍	✍
Trees of many different sizes and ages	✍	✍	✍	✍	✍
Tree leaves that are yellowish	✍	✍	✍	✍	✍
You see many deer	✍	✍	✍	✍	✍
Many different species of trees and animals	✍	✍	✍	✍	✍
Large areas with no visible human management	✍	✍	✍	✍	✍
Cows drinking water from a stream	✍	✍	✍	✍	✍
Clear streams	✍	✍	✍	✍	✍
All pine (evergreen) trees	✍	✍	✍	✍	✍
Lots of insects in the streams	✍	✍	✍	✍	✍
Lots of vines growing in trees	✍	✍	✍	✍	✍
Evidence that trees have been harvested with a clearcut	✍	✍	✍	✍	✍
An area of large trees along the road with evidence of a clearcut timber harvest visible behind the large trees	✍	✍	✍	✍	✍
A small house surrounded by forest	✍	✍	✍	✍	✍
Tire tracks from off-road vehicles in the forest	✍	✍	✍	✍	✍
A small paved road through the forest	✍	✍	✍	✍	✍
A small hiking trail through the forest	✍	✍	✍	✍	✍
An agricultural field of crops planted in the forest	✍	✍	✍	✍	✍
Signs describing who is responsible for the forest	✍	✍	✍	✍	✍
Signs describing when the forest was planted	✍	✍	✍	✍	✍
Bales of hay keeping exposed soil from eroding during a timber harvest	✍	✍	✍	✍	✍
Grass planted after a timber harvest	✍	✍	✍	✍	✍
New, young trees planted after a timber harvest	✍	✍	✍	✍	✍

Finally, please tell us a few things about yourself. This information will only be used for statistical purposes to make general statements about the new landowners of Virginia. Your answers will not be connected with you.

20. What is your age?
    - ✍ 18-25 ✍ 36-45 ✍ 56-65 ✍ 76-85
    - ✍ 25-35 ✍ 46-55 ✍ 66-75 ✍ 86 or older

21. Are you ✍ male or ✍ female?

22. What is your marital status?
    - ✍ Married/living with partner ✍ Single

23. Do you have…
    - ✍ Children living at home ✍ Children living elsewhere ✍ No children

24. Which category best describes your career or employment status? (Mark one.)
    - ✍ home-maker ✍ self-employed
    - ✍ blue collar/skilled trade ✍ professional/management
    - ✍ part-time ✍ student
    - ✍ retired ✍ unemployed

25. What is your highest level of education? (Mark one.)
    - ✍ Some school ✍ Bachelor's degree or equivalent
    - ✍ High school diploma ✍ Master's degree
    - ✍ Some college ✍ Ph.D., M.D., J.D., or equivalent

26. Please mark the answer that comes closest to your total family income (before taxes).
    - ✍ less than $10,000 ✍ $40,000-49,999 ✍ $80,000-89,999
    - ✍ $10,000-19,999 ✍ $50,000-59,999 ✍ $90,000-99,999
    - ✍ $20,000-29,999 ✍ $60,000-69,999 ✍ $100,000 or more
    - ✍ $30,000-39,999 ✍ $70,000-79,999

27. Approximately what percentage of your gross annual income comes from your land? (Place a mark at the closest point on the following line.)

    0------- 10------ 20 ------30------ 40 ------50------ 60------ 70 ------80------ 90 ------100 %

OPTIONAL: We are interested in learning more about some of your answers to the items in this questionnaire. If you would be willing to speak with us briefly later this summer to explain your answers, please write your phone number here: (___)_____. This is <u>not</u> a request for telephone solicitation purposes. Your phone number will not be shared with anyone. As with your written responses, all telephone conversations will be kept strictly confidential.

Thank you for your help!

QUESTIONNAIRE INSERT

The Commonwealth of Virginia has a great deal of information available to help landowners better care for and enjoy their land. If you would like to receive any of this FREE information, please check up to 3 topics from the list below, and return this paper in the postage-paid envelope with your completed questionnaire. To avoid connecting your name with your responses, this request card will be processed separately from the questionnaire. Thank you!

- ✍ Energy efficiency
- ✍ Forest & timber management
- ✍ Growing Christmas trees
- ✍ Growing crops for profit
- ✍ Home business ideas
- ✍ Home gardening
- ✍ Landscaping
- ✍ Lawn care
- ✍ Pesticide use
- ✍ Planting/caring for trees & shrubs
- ✍ Raising livestock
- ✍ Recycling/waste management
- ✍ Restored mine lands
- ✍ Saving money
- ✍ Soil quality/erosion control
- ✍ Water quality
- ✍ Wildlife/game management

APPENDIX C
Raw Item Responses

1. In what year did you acquire your land?

Year	N
1990	8
1991	7
1992	10
1993	17
1994	91
1995	116
1996	99
1997	135
1998	160
1999	18
Total	**661**

2. How many acres did you acquire?

   $\bar{x}$ **= 31.2** **s = 73.4** **N = 661**

3. How many of those acres are forested (i.e., have mostly trees)?

   $\bar{x}$ **= 20.0** **s = 48.4** **N = 640**

4. How did you acquire that land?

	N	%
Fee-simple purchase (i.e., your name is on the deed)	565	86.7
Purchase as part of a limited liability corporation	3	0.5
Inheritance	69	10.6
Other (Most described as "GIFT")	26	4.0
Total	**652**	

5. Do you currently live on the land described in Questions 1-2?

	N	%
Yes, I live there all year.	382	58.1
Yes, but only for part of the year (it is a second or seasonal home).	7	1.1
No. I live _____ miles from it. ($\bar{x}$ **= 99.3, s = 464.8, N = 253**)	162	24.7
…but I plan to build a primary residence there.	88	13.4
…but I plan to build a second or seasonal home there.	18	2.7
Total	**657**	

6. In addition to the tract described in Questions 1-2, do you currently own other tracts of land larger than 2 acres?

	N	%
No	426	64.6
Yes. I own _____ acres altogether. ($\bar{x}$ **= 104.8, s = 204.9, N = 233**)	233	35.4
Total	**659**	

7. Of the total acreage you own (reported in Question 6), how many acres of your land is devoted to each of the following uses? Please consider that each individual parcel of land may be divided among more than one of these land uses. (Write in the number of acres for each category.)

	$\bar{x}$	s	N
Residential or commercial	5.0	24.9	578
Forest	31.6	87.8	583
Meadow	2.7	11.5	599
Active cropland or pastureland	10.5	36.3	596
Open water or wetland	1.2	11.1	602
Other (please describe)	1.8	18.4	598

8. How long do you intend to own your land? (Mark one.)

	N	%
I have never thought about it.	190	29.3
I will probably sell it in approximately ____ years. ($\bar{x}$ **= 10.0, s = 12.3, N = 110**)	114	17.6
I will probably pass it on to my children.	345	53.2
Total	**649**	

9. Which (if any) of the following reasons might influence your decision to sell or give away your land? (Mark all that apply.)

	N	%
It is too much work to keep up with it.	127	19.2
I can't afford to keep it.	112	16.9
I will retire and need the money.	110	16.6
I would rather live elsewhere.	94	14.2
I will retire and move elsewhere.	103	15.6
~~I will retire and need the money.~~		
A job will probably take me to another place.	56	8.5
I am no longer interested in this land.	23	3.5
The property taxes are too high.	144	21.8
The area is becoming too populated.	176	26.6
I can't make enough money from the land to justify keeping it.	36	5.4
Other ("Will never sell" and "Offer I can't refuse"/"Big profit")	130	19.7
No option selected	77	11.6
Total	**661**	

10. Which category best describes the community in which you live? (Mark one.)

	N	%
On a farm or ranch	97	14.9
In the country, not on a farm or ranch	279	42.5
Rural or small town (fewer than 2,500 people)	58	8.9
Town or small city (2,500-25,000)	88	13.4
City (25,000-100,000)	33	4.9
A suburb of a large city	85	12.9
A large city (> 100,000)	16	2.3
Total	**649**	

11. Prior to purchasing the land described in Questions 1-2, have you ever owned any other tracts of land larger than 2 acres that you no longer own?

	N	%
No	456	73.7
Yes. I previously owned _____ acres. ($\bar{x}$ **= 74.5, s = 230.0, N = 160**)	163	26.3
Total	**619**	

12. In what year did you first purchase a tract of land larger than 2 acres outside of city limits?

N = 286, min = 1930, max = 1999

13. How important to you are each of the following reasons for owning your land? Please respond to all of the items listed below. (We apologize for the length of this question—we needed to make sure that we covered as many reasons as possible.)

–3 = Not at all important
0 = Neutral
+3 = Very important

	$\bar{x}$	s	N
To add to my existing land holdings	–0.44	2.26	630
To escape from the rat race of urban civilization	1.59	1.94	638
To be able to drive off-road vehicles on my land	–1.66	1.83	618
To be able to leave a lasting reminder of my life	–0.42	2.15	625
It may help me pay for special expenses like college education, family medical bills, or family vacations	–1.17	1.89	623
It provides a major source of my income	–1.70	1.77	623
It produces products I sell to supplement my income	–1.66	1.88	621
To teach my kids important skills	–0.22	2.24	627
It provides a safe place for children to play	0.81	2.31	630
To have a chance to build and fix things with my hands	0.81	2.09	626
To be free to do whatever I want to do	–1.79	1.75	633
To connect with a higher power	–0.29	2.11	622
To do what is right for the environment	1.06	1.79	627
To pay less taxes	0.17	1.97	617
To have neighbors I can trust	0.82	1.95	626
To feel closer to God	0.35	2.05	628
To provide recreational opportunities for others (outside of my own family) in the region	–0.93	1.97	620
To take care of birds and wildlife	1.09	1.81	630
To be able to grow some of my own food	0.77	2.02	632

	$\bar{x}$	s	N
To get back to the basics	0.73	1.91	631
To keep the scenery in the region looking nice	1.31	1.81	633
To improve the ecological health of the region	0.86	1.79	621
To be able to walk or hike on my land	1.89	1.55	635
To participate in natural processes	1.15	1.81	626
To see wildlife	1.98	1.50	637
To study nature	1.14	1.78	630
To live more cheaply	0.35	1.91	626
To practice my outdoor skills	0.70	1.90	623
To reduce erosion in the region	0.16	1.81	623
To develop roots in one place	0.82	1.93	626
To live closer to good schools	–0.12	2.06	624
To be able to hunt on my land	–0.06	2.47	627
To build my own house or barn	1.35	2.04	632
To be able to teach my kids important values	1.02	2.09	623
It provides me drinking water	0.42	2.09	620
To help the local economy	–0.45	1.85	619
To live closer to friends who live in the area	–0.49	1.94	621
To work for myself	–0.24	2.10	618
To enjoy scenery	2.13	1.35	635
To improve water quality in the region	0.13	1.83	619
To live near people like me	0.14	1.96	620
To have privacy	2.34	1.34	632
To live a simpler life	1.46	1.80	630
To know my neighbors	0.47	1.88	620
To be able to live in a healthy place	1.80	1.57	633
To help preserve regional history	0.42	1.87	620
To be able to ride horses on my land	–0.17	2.24	623
To be a good role model for my kids	1.07	2.07	618
To reconnect with my spirituality	0.05	1.98	622
It provides firewood, edible plants and/or other things I use	0.62	2.03	623
To escape city crime	1.25	1.98	630
To support myself	–0.23	2.08	619
To raise farm animals	–0.13	2.24	624
To help me pay for my retirement	–0.29	2.03	621
To live away from pollution	1.39	1.82	630
To be away from other people	0.97	1.83	626
To preserve nature	1.21	1.77	632
To live in a small community	1.16	1.75	628
To help provide jobs in the region	–1.01	1.70	616
To live closer to a good paying job	–0.80	1.89	617
To be independent of others	0.73	1.93	622
To have a lower cost of living	0.49	1.97	625
To get away from poverty	–0.27	1.91	616
To live closer to family that live in the area	–0.33	2.11	620
To watch things grow	1.43	1.66	638
To buy neighboring lands so I have a larger landholding	–0.36	2.01	616
To produce products for the local economy	–1.01	1.75	614

14. This question contains a list of several things people might do with their land. For each of the following things listed, please tell us whether you already do, or would be willing to do, these things on YOUR land. (Mark one box for each item.)

	I already do this		I might do this		I will probably never do this		Total
	n	%	n	%	n	%	N
Improve wildlife habitat	295	46.0	279	43.5	68	10.6	**642**
Plant high-value trees for future sale as timber	52	8.3	223	35.4	355	56.3	**630**
Plant vegetation to provide privacy from neighbors & roads	174	27.3	302	47.4	161	25.3	**637**
Grow small plots of specialized crops (e.g., fruits or vegetables) that can be sold locally for a profit	55	8.6	215	33.7	368	57.7	**638**
Graze livestock	142	22.4	157	24.8	335	52.8	**634**
Remove exotic (non-native) plant species like kudzu	54	8.6	229	36.6	343	54.8	**626**
Kill vines growing in trees	191	29.8	277	43.2	173	27.0	**641**
Use a prescribed fire (controlled burn) to manage the forest	58	9.2	224	35.4	350	55.4	**632**
Use herbicides or pesticides to control weeds and insects	211	33.2	244	38.4	180	28.3	**635**
Prune or cut down selected trees to improve scenic views	193	30.2	269	42.1	177	27.7	**639**
Prune or cut down selected trees to improve timber value	86	13.5	224	35.3	325	51.2	**635**
Prune or cut down selected trees to improve forest health	152	23.8	630	56.3	127	19.9	**639**
Regularly inspect the condition of my land	472	73.6	144	22.5	25	3.9	**641**
Have my soil tested	186	29.2	374	58.6	78	12.2	**638**
Develop a written management plan for my land	50	7.9	298	47.0	286	45.1	**634**

15. There are many reasons why people might NOT do the things listed in Question 14. Please check those reasons on the list below that apply to you. (Mark all that apply.)

	N	% of Total (/656)	% of Q15* (/596)
I never thought about it.	235	35.8	39.4
I don't want to do these things.	159	24.2	26.7
I prefer to let nature take its own course.	206	31.4	34.6
I worry that these things might decrease my property value.	52	7.9	8.7
I worry that these things might harm the health of the land.	104	15.9	17.4
I don't own enough land to worry about managing it.	192	29.3	32.2
My land isn't suited for these uses.	182	27.7	30.5
I don't have the time to do these things.	175	26.7	29.4
I don't have the money to do these things.	186	28.4	31.2
I don't have the equipment to do these things.	204	31.1	34.2
I don't know where I could get the equipment to do these things.	54	8.2	9.1
I don't know how to do these things.	171	26.1	28.7
I don't know where to get advice about doing these things.	114	17.4	19.1
I don't trust the advice I get about doing these things.	24	3.7	4.0
I'm too old to worry about what happens to the land.	22	3.4	3.7
I am not physically able to do these things.	58	8.8	9.7
I probably won't live here long enough to worry about what happens to the land.	22	3.4	3.7
I don't spend enough time on my land to keep up with these things.	75	11.4	12.6

* Based on the 596 respondents who checked at least one obstacle in Question 15.

16. More and more people want to own forested or rural lands. As a result, the land is being fragmented into smaller pieces. Some people think this fragmentation may harm the ecological health of your region. What follows are some land management practices that others have suggested as ways to protect or enhance ecological health in an increasingly fragmented landscape. Please tell us whether you already do, or would be willing to do, these things. (Mark one box for each item.)

	I already do this		I might do this		I will probably never do this		Total
	n	%	n	%	n	%	N
Work with my neighbors to control insect and disease outbreaks	53	8.3	501	78.5	84	13.2	**638**
Hire the same forester or natural resource professional as my neighbors	21	3.4	372	59.8	229	36.8	**622**
Talk about my land with my neighbors	194	30.7	345	54.6	93	14.7	**632**
Work with my neighbors to connect wildlife corridors across shared property boundaries	71	11.1	428	67.1	139	21.8	**638**
Share management plans with my neighbors	49	7.7	410	64.7	175	27.6	**634**
Share road access with my neighbors	229	36.1	231	36.4	174	27.4	**634**
Work with an environmental organization such as The Nature Conservancy to manage my land in a way that is healthy for the land	10	1.6	442	68.8	190	29.6	**642**
Work with local or state government to manage my land in a way that is healthy for the land	53	8.3	420	65.7	166	26.0	**639**
Work with the federal government to manage my land in a way that is healthy for the land	26	4.1	356	56.0	254	39.9	**636**

17. There are many reasons why people might NOT do the things listed in Question 16. Please tell us which of the following reasons applies to you. (Mark all that apply.)

	N	% of Total (/661)	% of Q17* (/558)
I never thought about it.	206	31.5	36.9
I don't want to do these things.	90	13.8	16.1
I don't believe land fragmentation is a threat to regional ecological health.	47	7.2	8.4
My current management practices don't harm the regional ecosystem.	183	28.0	32.8
I prefer to let nature take its own course.	124	19.0	22.2
I don't own enough land for anything I do to matter.	120	18.3	21.5
I worry that these things might decrease my property value.	31	4.7	5.6
I worry about losing control over my land.	183	27.7	32.8
I don't have the time to do these things.	135	20.6	24.2
I don't have the money to do these things.	156	23.9	28.0
I don't have the equipment I would need to do these things.	137	20.9	24.6
I don't know where to get the equipment I would need to do these things.	39	6.0	7.0
I don't know how to do these things.	133	20.3	23.8
I don't know where to get advice about these things.	84	12.8	15.1
I don't trust the advice I get about doing these things.	26	4.0	4.7
I don't trust the government.	153	23.4	27.4
I don't trust environmental organizations.	96	14.7	17.2
I don't trust my neighbors.	39	6.0	7.0
I don't know my neighbors.	88	13.5	15.8
I don't know what my neighbors do with their land.	110	16.8	19.7
I prefer not to do business with my neighbors.	71	10.9	12.7
I'm too old to worry about what happens to the land.	19	2.9	3.4
I am not physically able to do these things.	46	7.0	8.2
I probably won't live here long enough to worry about what happens to the land.	28	4.3	5.0

* Based on the 558 respondents who checked at least one obstacle in Question 17.

18. Please indicate your level of agreement with each of the following statements.

–3 = Strongly disagree
0 = Neutral
+3 = Strongly agree

	$\bar{x}$	s	N
Forest owners have the right to do as they please with their forests, regardless of what it does to the environment.	1.15	1.80	637
Private property rights should be limited if necessary to protect the environment.	0.10	1.83	629
The government should have the right to regulate how people use their land and forests in order to …			
…protect water quality	0.86	1.86	630
…protect threatened and endangered species	0.52	1.88	618
…preserve the beauty of the forest	0.15	1.90	616
…maintain healthy forests	0.51	1.85	617
Professional foresters are a trusted source of knowledge about how to manage the trees on my land.	0.85	1.37	620
Professional foresters are more interested in making money than in the ecological health of my land.	0.16	1.47	618
Professional foresters are more interested in cutting timber than in the ecological health of my land.	0.11	1.47	616
I don't know anything about professional foresters.	0.38	1.77	600
Clearcutting trees should be allowed on land owned by…			
…lumber or paper companies.	–0.30	1.93	607
…the federal government.	–0.78	1.86	599
…the state or local government.	–0.75	1.85	601
…individuals.	0.05	1.99	615
I would be willing to harvest a few trees and saw them up for lumber using a small, portable two-person sawmill.	0.01	2.08	622
I would be willing to accept less money from a timber sale if the logging actions protected other forest qualities.	0.60	1.74	628

19. In your opinion, what do the following things suggest to you about a forest's health? (Mark one box for each item.)

	It is very healthy		It may be healthy		No impact on health		It may be unhealthy		It is very unhealthy	
	n	%	n	%	n	%	n	%	n	%
Many large trees	161	25.8	319	51.1	55	8.8	88	14.1	1	0.2
Trees of many different sizes and ages	292	46.6	276	44.1	40	6.4	18	2.9	0	0.0
Tree leaves that are yellowish	3	0.5	34	5.5	85	13.9	431	70.3	60	9.8
You see many deer	145	23.3	261	42.0	116	18.7	89	14.3	10	1.6
Many different species of trees and animals	334	52.7	255	40.2	32	5.0	13	2.1	0	0.0
Large areas with no visible human management	88	14.3	310	50.2	133	21.6	74	12.0	12	1.9
Cows drinking water from a stream	80	12.9	223	36.0	121	19.5	169	27.3	27	4.4
Clear streams	256	40.8	301	48.0	44	7.0	24	3.8	2	0.3
All pine (evergreen) trees	42	6.8	239	38.7	205	33.2	120	19.4	11	1.8
Lots of insects in the streams	41	6.7	190	31.1	102	16.7	218	35.7	60	9.8
Lots of vines growing in trees	8	1.3	70	11.4	95	15.5	355	57.9	85	13.9
Evidence that trees have been harvested with a clearcut	14	2.3	92	15.3	150	24.9	248	41.2	98	16.3
An area of large trees along the road with evidence of a clearcut timber harvest visible behind the large trees	16	2.6	107	17.5	169	27.7	247	40.5	71	11.6
A small house surrounded by forest	62	10.1	224	36.4	288	46.8	42	6.8	0	0.0
Tire tracks from off-road vehicles in the forest	6	1.0	73	11.9	179	29.1	296	48.1	61	9.9
A small paved road through the forest	12	1.9	107	17.4	310	50.3	162	26.3	25	4.1
A small hiking trail through the forest	68	10.9	206	33.1	325	52.2	22	3.5	2	0.3
An agricultural field of crops planted in the forest	59	9.7	247	40.5	203	33.3	96	15.7	5	0.8
Signs describing who is responsible for the forest	69	11.2	237	38.3	300	48.5	10	1.6	2	0.3
Signs describing when the forest was planted	56	9.1	241	39.1	308	50.0	8	1.3	3	0.5
Bales of hay keeping exposed soil from eroding during a timber harvest	146	23.7	316	51.2	75	12.2	70	11.3	10	1.6
Grass planted after a timber harvest	157	25.5	318	51.6	89	14.4	45	7.3	7	1.1
New, young trees planted after a timber harvest	301	47.9	274	43.6	43	6.8	9	1.4	2	0.3

20. What is your age?

	N	%
18–25	6	0.9
26–35	114	17.4
36–45	204	31.1
46–55	173	26.4
56–65	105	16.0
66–75	42	6.4
76–85	11	1.7
86 or older	1	0.2
Total	**656**	

21. Are you …

	N	%
Male	430	67.5
Female	207	32.5
Total	**637**	

22. What is your marital status?

	N	%
Married/living with partner	541	83.0
Single	111	17.0
Total	**652**	

23. Do you have…

	N	%
Children living at home	320	48.8
Children living elsewhere	254	38.8
No children	121	
Total	**655***	

* Numbers do not add to 655; respondents could have children both at home and living elsewhere

24. Which category best describes your career or employment status? (Mark one.)

	N	%
Home-maker	35	5.5
Blue collar/Skilled trade	113	17.7
Part-time	17	2.7
Retired	87	13.7
Self-employed	126	19.8
Professional/Management	255	40.0
Student	4	0.6
Unemployed	0	0.0
Total	**637**	

25. What is your highest level of education? (Mark one.)

	N	%
Some school	31	4.8
High school diploma	141	21.6
Some college	180	27.6
Bachelor's degree or equivalent	166	25.5
Master's degree	83	12.7
Ph.D., M.D., J.D., or equivalent	51	7.8
Total	**652**	

26. Please mark the answer that comes closest to your total family income (before taxes).

	N	%
less than $10,000	6	1.0
$10,000-19,999	19	3.1
$20,000-29,999	39	6.4
$30,000-39,999	49	8.1
$40,000-49,999	66	10.9
$50,000-59,999	73	12.1
$60,000-69,999	63	10.4
$70,000-79,999	64	10.6
$80,000-89,999	36	6.0
$90,000-99,999	36	6.0
$100,000 or more	154	25.5
Total	**605**	

27. Approximately what percentage of your gross annual income comes from your land?

$\bar{x}$ = 3.55 **s = 13.14** **N = 657**

(INSERT.) The Commonwealth of Virginia has a great deal of information available to help landowners better care for and enjoy their land. If you would like to receive any of this FREE information, please check up to 3 topics from the list below.

	N	%
Energy efficiency	21	3.2
Forest & timber management	93	14.1
Growing Christmas trees	36	5.4
Growing crops for profit	43	6.5
Home business ideas	58	8.8
Home gardening	102	15.4
Landscaping	134	20.3
Lawn care	71	10.7
Pesticide use	24	3.6
Planting/caring for trees & shrubs	122	18.5
Raising livestock	58	8.8
Recycling/waste management	8	1.2
Restored mine lands	5	0.8
Saving money	35	5.3
Soil quality/erosion control	33	5.0
Water quality	34	5.1
Wildlife/game management	99	15.0

APPENDIX D
Differences in Management Activities

Table D.1. Total number of acres owned by three groups of new Virginia landowners that differ by level of participation in independent and cross-boundary management activities.

Independent activities	*p**	Already do	Might do	Probably will not do
Improve wildlife habitat	*.005*	70.4[a]	40.0[ab]	25.6[b]
Plant high-value trees for future sale as timber	*.000*	172.9[a]	63.5[b]	28.6[c]
Plant vegetation to provide privacy from neighbors & roads	*.269*	44.9	49.4	67.0
Grow small plots of specialized crops (e.g., fruits or vegetables) that can be sold locally for a profit	*.760*	44.9	48.8	56.0
Graze livestock	*.000*	115.1[a]	52.0[b]	25.3[c]
Remove exotic (non-native) plant species like kudzu	*.009*	107.0[a]	49.9[b]	46.8[b]
Kill vines growing in trees	*.671*	45.1	54.7	55.8
Use a prescribed fire (controlled burn) to manage the forest	*.001*	112.9[a]	58.0[b]	40.3[b]
Use herbicides or pesticides to control weeds and insects	*.037*	71.8[a]	44.5[b]	40.8[b]
Prune or cut down selected trees to improve scenic views	*.221*	45.4	63.4	43.7
Prune or cut down selected trees to improve timber value	*.000*	112.5[a]	72.7[b]	23.1[c]
Prune or cut down selected trees to improve forest health	*.025*	68.3[a]	55.9[a]	25.9[b]
Regularly inspect the condition of my land	*.100*	58.7	35.3	23.1
Have my soil tested	*.028*	73.0[a]	47.8[ab]	29.1[b]
Develop a written management plan for my land	*.000*	192.3[a]	53.7[b]	27.3[b]
Cross-boundary activities				
Work with my neighbors to control insect and disease outbreaks	*.127*	83.1	51.8	35.2
Hire the same forester or natural resource professional as my neighbors	*.000*	191.4[a]	60.1[b]	27.4[b]
Talk about my land with my neighbors	*.672*	59.0	51.0	44.9
Work with my neighbors to connect wildlife corridors across shared property boundaries	*.171*	47.5	58.9	34.7
Share management plans with my neighbors	*.056*	60.9	60.0	31.5
Share road access with my neighbors	*.270*	49.1	63.5	42.8
Work with an environmental organization such as The Nature Conservancy to manage my land in a way that is healthy for the land	*.001*	201.6[a]	48.8[b]	51.3[b]
Work with local or state government to manage my land in a way that is healthy for the land	*.000*	141.9[a]	49.2[b]	31.8[b]
Work with the federal government to manage my land in a way that is healthy for the land	*.000*	169.0[a]	50.1[b]	41.3[b]

* ANOVA, $p < .05$ indicates a significant difference among groups.

[a,b,c] Mean number of acres owned was not significantly different for groups with the same superscript (Duncan's post hoc comparisons).

Table D.2. Attitudes about property rights* (based on index score) among three groups of new Virginia landowners that differ by level of participation in independent and cross-boundary management activities.

Independent activities	*p*†	Already do	Might do	Probably will not do
Improve wildlife habitat	*.005*	0.61[a]	0.60[a]	0.01[b]
Plant high-value trees for future sale as timber	*.435*	0.38	0.47	0.59
Plant vegetation to provide privacy from neighbors & roads	*.000*	0.88[a]	0.48[b]	0.25[b]
Grow small plots of specialized crops (e.g., fruits or vegetables) that can be sold locally for a profit	*.662*	0.39	0.58	0.52
Graze livestock	*.214*	0.43	0.43	0.63
Remove exotic (non-native) plant species like kudzu	*.764*	0.49	0.59	0.51
Kill vines growing in trees	*.289*	0.50	0.64	0.44
Use a prescribed fire (controlled burn) to manage the forest	*.813*	0.54	0.47	0.55
Use herbicides or pesticides to control weeds and insects	*.555*	0.45	0.53	0.61
Prune or cut down selected trees to improve scenic views	*.153*	0.43	0.50	0.70
Prune or cut down selected trees to improve timber value	*.041*	0.20[a]	0.52[b]	0.63[b]
Prune or cut down selected trees to improve forest health	*.499*	0.45	0.59	0.47
Regularly inspect the condition of my land	*.323*	0.54	0.62	0.16
Have my soil tested	*.614*	0.52	0.56	0.39
Develop a written management plan for my land	*.588*	0.34	0.55	0.56
Cross-boundary activities				
Work with my neighbors to control insect and disease outbreaks	*.012*	0.06[a]	0.61[b]	0.35[ab]
Hire the same forester or natural resource professional as my neighbors	*.019*	–0.06[a]	0.64[b]	0.40[ab]
Talk about my land with my neighbors	*.030*	0.62[a]	0.59[a]	0.18[b]
Work with my neighbors to connect wildlife corridors across shared property boundaries	*.151*	0.63	0.58	0.32
Share management plans with my neighbors	*.105*	0.50	0.61	0.34
Share road access with my neighbors	*.094*	0.47	0.68	0.40
Work with an environmental organization such as The Nature Conservancy to manage my land in a way that is healthy for the land	*.000*	0.15	0.70‡	0.15
Work with local or state government to manage my land in a way that is healthy for the land	*.001*	0.31[ab]	0.68[a]	0.22[b]
Work with the federal government to manage my land in a way that is healthy for the land	*.000*	0.28[a]	0.79[b]	0.19[a]

* Scale ranged from –3 (strong support for protecting individual property rights) to +3 (strong support for limiting individual property rights).

† ANOVA, $p < .05$ indicates a significant difference among groups.

‡ Unequal group sizes obscured the post hoc test, but it is clear that the "might do" group holds attitudes about property rights different than the other two groups.

[a,b] Mean Property Rights index scores were not significantly different for groups with the same superscript (Duncan's post hoc comparisons).

Table D.3. Levels of trust* in foresters (based on index score) among three groups of new Virginia landowners that differ by level of participation in independent and cross-boundary management activities.

Independent activities	*p*†	Already do	Might do	Probably will not do
Improve wildlife habitat	*.850*	0.40	0.34	0.36
Plant high-value trees for future sale as timber	*.938*	0.38	0.39	0.35
Plant vegetation to provide privacy from neighbors & roads	*.592*	0.44	0.36	0.31
Grow small plots of specialized crops (e.g., fruits or vegetables) that can be sold locally for a profit	*.385*	0.28	0.29	0.43
Graze livestock	*.869*	0.36	0.33	0.39
Remove exotic (non-native) plant species like kudzu	*.030*	0.14[a]	0.52[b]	0.29[ab]
Kill vines growing in trees	*.330*	0.33	0.45	0.29
Use a prescribed fire (controlled burn) to manage the forest	*.651*	0.31	0.43	0.34
Use herbicides or pesticides to control weeds and insects	*.902*	0.36	0.36	0.41
Prune or cut down selected trees to improve scenic views	*.222*	0.34	0.46	0.26
Prune or cut down selected trees to improve timber value	*.001*	0.23[a]	0.61[b]	0.24[a]
Prune or cut down selected trees to improve forest health	*.547*	0.31	0.42	0.31
Regularly inspect the condition of my land	*.828*	0.38	0.39	0.23
Have my soil tested	*.959*	0.39	0.36	0.36
Develop a written management plan for my land	*.579*	0.47	0.40	0.32
Cross-boundary activities				
Work with my neighbors to control insect and disease outbreaks	*.564*	0.44	0.38	0.23
Hire the same forester or natural resource professional as my neighbors	*.000*	1.20[a]	0.49[b]	0.08[b]
Talk about my land with my neighbors	*.182*	0.44	0.39	0.16
Work with my neighbors to connect wildlife corridors across shared property boundaries	*.979*	0.36	0.38	0.35
Share management plans with my neighbors	*.476*	0.44	0.41	0.28
Share road access with my neighbors	*.003*	0.36[ab]	0.56[a]	0.14[b]
Work with an environmental organization such as The Nature Conservancy to manage my land in a way that is healthy for the land	*.132*	0.67	0.43	0.23
Work with local or state government to manage my land in a way that is healthy for the land	*.538*	0.53	0.37	0.32
Work with the federal government to manage my land in a way that is healthy for the land	*.322*	0.69	0.38	0.33

* Scale ranged from –3 (low trust in foresters) to +3 (high trust in foresters).

† ANOVA, $p < .05$ indicates a significant difference among groups.

[a,b] Mean Trust index scores were not significantly different for groups with the same superscript (Duncan's post hoc comparisons).

Table D.4. Attitudes[*] about clearcutting on land owned by lumber or paper companies among three groups of new Virginia landowners that differ by level of participation in independent and cross-boundary management activities.

Independent activities	$p^{\dagger}$	Already do	Might do	Probably will not do
Improve wildlife habitat	*.312*	–0.37	–0.29	0.05
Plant high-value trees for future sale as timber	*.001*	0.32[a]	–0.03[a]	–0.55[b]
Plant vegetation to provide privacy from neighbors & roads	*.030*	–0.64[a]	–0.13[b]	–0.32[ab]
Grow small plots of specialized crops (e.g., fruits or vegetables) that can be sold locally for a profit	*.855*	–0.39	–0.25	–0.32
Graze livestock	*.828*	–0.27	–0.39	–0.28
Remove exotic (non-native) plant species like kudzu	*.753*	–0.47	–0.24	–0.26
Kill vines growing in trees	*.240*	–0.36	–0.41	–0.09
Use a prescribed fire (controlled burn) to manage the forest	*.059*	–0.17	–0.07	–0.47
Use herbicides or pesticides to control weeds and insects	*.467*	–0.26	–0.22	–0.45
Prune or cut down selected trees to improve scenic views	*.258*	–0.16	–0.27	–0.50
Prune or cut down selected trees to improve timber value	*.001*	0.00[a]	0.00[a]	–0.59[b]
Prune or cut down selected trees to improve forest health	*.651*	–0.42	–0.25	–0.36
Regularly inspect the condition of my land	*.722*	–0.32	–0.20	–0.52
Have my soil tested	*.809*	–0.30	–0.31	–0.46
Develop a written management plan for my land	*.287*	0.13	–0.33	–0.34
Cross-boundary activities				
Work with my neighbors to control insect and disease outbreaks	*.393*	–0.51	–0.31	–0.05
Hire the same forester or natural resource professional as my neighbors	*.086*	0.68	–0.32	–0.31
Talk about my land with my neighbors	*.418*	–0.43	–0.20	–0.34
Work with my neighbors to connect wildlife corridors across shared property boundaries	*.801*	–0.42	–0.31	–0.23
Share management plans with my neighbors	*.774*	–0.50	–0.28	–0.31
Share road access with my neighbors	*.878*	–0.28	–0.31	–0.38
Work with an environmental organization such as The Nature Conservancy to manage my land in a way that is healthy for the land	*.001*	0.22[a]	–0.50[b]	0.13[a]
Work with local or state government to manage my land in a way that is healthy for the land	*.000*	0.58[a]	–0.49[b]	–0.09[b]
Work with the federal government to manage my land in a way that is healthy for the land	*.000*	0.83[a]	–0.53[b]	–0.11[b]

[*] Scale ranged from –3 (strong disapproval of clearcutting) to +3 (strong support for clearcutting).

[†] ANOVA, $p < .05$ indicates a significant difference among groups.

[a,b] Mean attitudes about clearcutting were not significantly different for groups with the same superscript (Duncan's post hoc comparisons).

Table D.5. Attitudes[*] about clearcutting on land owned by the federal government among three groups of new Virginia landowners that differ by level of participation in independent and cross-boundary management activities.

Independent activities	$p^{\dagger}$	Already do	Might do	Probably will not do
Improve wildlife habitat	*.123*	–0.90	–0.74	–0.36
Plant high-value trees for future sale as timber	*.000*	0.08[a]	–0.65[b]	–0.98[b]
Plant vegetation to provide privacy from neighbors & roads	*.103*	–1.03	–0.74	–0.59
Grow small plots of specialized crops (e.g., fruits or vegetables) that can be sold locally for a profit	*.808*	–0.92	–0.73	–0.79
Graze livestock	*.420*	–0.76	–0.95	–0.71
Remove exotic (non-native) plant species like kudzu	*.529*	–0.98	–0.80	–0.69
Kill vines growing in trees	*.113*	–0.82	–0.91	–0.52
Use a prescribed fire (controlled burn) to manage the forest	*.189*	–0.61	–0.62	–0.90
Use herbicides or pesticides to control weeds and insects	*.756*	–0.80	–0.70	–0.84
Prune or cut down selected trees to improve scenic views	*.349*	–0.67	–0.75	–0.96
Prune or cut down selected trees to improve timber value	*.007*	–0.47[a]	–0.56[a]	–1.01[b]
Prune or cut down selected trees to improve forest health	*.508*	–0.94	–0.73	–0.78
Regularly inspect the condition of my land	*.141*	–0.87	–0.51	–0.67
Have my soil tested	*.000*	–0.79	–0.80	–0.80
Develop a written management plan for my land	*.413*	–0.45	–0.77	–0.84
Cross-boundary activities				
Work with my neighbors to control insect and disease outbreaks	*.335*	–0.79	–0.81	–0.47
Hire the same forester or natural resource professional as my neighbors	*.015*	0.42[a]	–0.76[b]	–0.88[b]
Talk about my land with my neighbors	*.777*	–0.84	–0.72	–0.76
Work with my neighbors to connect wildlife corridors across shared property boundaries	*.205*	–1.06	–0.80	–0.57
Share management plans with my neighbors	*.782*	–0.96	–0.75	–0.79
Share road access with my neighbors	*.550*	–0.85	–0.67	–0.85
Work with an environmental organization such as The Nature Conservancy to manage my land in a way that is healthy for the land	*.003*	0.22[a]	–0.94[b]	–0.44[ab]
Work with local or state government to manage my land in a way that is healthy for the land	*.012*	–0.11[a]	–0.91[b]	–0.64[b]
Work with the federal government to manage my land in a way that is healthy for the land	*.055*	0.13	–0.83	–0.79

[*] Scale ranged from –3 (strong disapproval of clearcutting) to +3 (strong support for clearcutting).

[†] ANOVA, $p < .05$ indicates a significant difference among groups.

[a,b] Mean attitudes about clearcutting were not significantly different for groups with the same superscript (Duncan's post hoc comparisons).

Table D.6. Attitudes* about clearcutting on land owned by state or local government among three groups of new Virginia landowners that differ by level of participation in independent and cross-boundary management activities.

Independent activities	$p^{\dagger}$	Already do	Might do	Probably will not do
Improve wildlife habitat	*.184*	–0.88	–0.69	–0.43
Plant high-value trees for future sale as timber	*.000*	0.06[a]	–0.59[b]	–0.97[b]
Plant vegetation to provide privacy from neighbors & roads	*.123*	–1.01	–0.68	–0.63
Grow small plots of specialized crops (e.g., fruits or vegetables) that can be sold locally for a profit	*.628*	–0.90	–0.67	–0.80
Graze livestock	*.574*	–0.72	–0.90	–0.71
Remove exotic (non-native) plant species like kudzu	*.733*	–0.92	–0.76	–0.70
Kill vines growing in trees	*.250*	–0.79	–0.86	–0.55
Use a prescribed fire (controlled burn) to manage the forest	*.078*	–0.61	–0.55	–0.91
Use herbicides or pesticides to control weeds and insects	*.765*	–0.74	–0.70	–0.84
Prune or cut down selected trees to improve scenic views	*.277*	–0.64	–0.72	–0.95
Prune or cut down selected trees to improve timber value	*.002*	–0.48[a]	–0.49[a]	–1.02[b]
Prune or cut down selected trees to improve forest health	*.442*	–0.91	–0.68	–0.83
Regularly inspect the condition of my land	*.242*	–0.83	–0.53	–0.71
Have my soil tested	*.958*	–0.75	–0.77	–0.83
Develop a written management plan for my land	*.282*	–0.40	–0.72	–0.86
Cross-boundary activities				
Work with my neighbors to control insect and disease outbreaks	*.378*	–0.77	–0.79	–0.47
Hire the same forester or natural resource professional as my neighbors	*.013*	0.42[a]	–0.74[b]	–0.88[b]
Talk about my land with my neighbors	*.928*	–0.79	–0.73	–0.75
Work with my neighbors to connect wildlife corridors across shared property boundaries	*.376*	–1.00	–0.77	–0.61
Share management plans with my neighbors	*.712*	–0.93	–0.72	–0.80
Share road access with my neighbors	*.543*	–0.83	–0.65	–0.82
Work with an environmental organization such as The Nature Conservancy to manage my land in a way that is healthy for the land	*.005*	0.22[a]	–0.91[b]	–0.43[ab]
Work with local or state government to manage my land in a way that is healthy for the land	*.007*	–0.02[a]	–0.89[b]	–0.64[b]
Work with the federal government to manage my land in a way that is healthy for the land	*.041*	0.17[a]	–0.83[b]	–0.75[b]

* Scale ranged from –3 (strong disapproval of clearcutting) to +3 (strong support for clearcutting).

† ANOVA, $p < .05$ indicates a significant difference among groups.

[a,b] Mean attitudes about clearcutting were not significantly different for groups with the same superscript (Duncan's post hoc comparisons).

Table D.7. Attitudes[*] about clearcutting on privately owned land among three groups of new Virginia landowners that differ by level of participation in independent and cross-boundary management activities.

Independent activities	*p*[†]	Already do	Might do	Probably will not do
Improve wildlife habitat	*.090*	0.00	–0.04	0.56
Plant high-value trees for future sale as timber	*.001*	0.59[a]	0.32[a]	–0.20[b]
Plant vegetation to provide privacy from neighbors & roads	*.007*	–0.37[a]	0.25[b]	0.07[b]
Grow small plots of specialized crops (e.g., fruits or vegetables) that can be sold locally for a profit	*.718*	–0.12	0.11	0.01
Graze livestock	*.741*	0.15	0.02	0.00
Remove exotic (non-native) plant species like kudzu	*.512*	–0.22	0.03	0.12
Kill vines growing in trees	*.134*	–0.06	–0.08	0.29
Use a prescribed fire (controlled burn) to manage the forest	*.629*	0.09	0.13	–0.03
Use herbicides or pesticides to control weeds and insects	*.915*	0.09	0.01	0.03
Prune or cut down selected trees to improve scenic views	*.539*	0.17	0.02	–0.07
Prune or cut down selected trees to improve timber value	*.001*	0.48[a]	0.30[a]	–0.26[b]
Prune or cut down selected trees to improve forest health	*.848*	0.06	–0.01	0.11
Regularly inspect the condition of my land	*.963*	0.04	–0.01	0.04
Have my soil tested	*.403*	0.18	–0.07	0.08
Develop a written management plan for my land	*.575*	0.31	–0.01	0.04
Cross-boundary activities				
Work with my neighbors to control insect and disease outbreaks	*.338*	–0.04	–0.02	0.33
Hire the same forester or natural resource professional as my neighbors	*.018*	1.25[a]	–0.03[b]	0.05[b]
Talk about my land with my neighbors	*.614*	–0.04	0.03	0.21
Work with my neighbors to connect wildlife corridors across shared property boundaries	*.899*	0.04	0.01	0.11
Share management plans with my neighbors	*.870*	–0.11	0.03	0.07
Share road access with my neighbors	*.899*	–0.04	0.03	0.05
Work with an environmental organization such as The Nature Conservancy to manage my land in a way that is healthy for the land	*.001*	0.70[‡]	–0.17	0.46
Work with local or state government to manage my land in a way that is healthy for the land	*.004*	0.70[a]	–0.14[b]	0.29[ab]
Work with the federal government to manage my land in a way that is healthy for the land	*.004*	0.83[a]	–0.18[b]	0.27[ab]

[*] Scale ranged from –3 (strong disapproval of clearcutting) to +3 (strong support for clearcutting).

[†] ANOVA, $p < .05$ indicates a significant difference among groups.

[‡] Unequal group sizes obscured the post hoc test, but it appears that the "already do" group is different than the "might do" group.

[a,b] Mean attitudes about clearcutting were not significantly different for groups with the same superscript (Duncan's post hoc comparisons).

Table D.8. Agreement* with the statement, "I would be willing to harvest a few trees and saw them up for lumber using a small, portable two-person sawmill" among three groups of new Virginia landowners that differ by level of participation in independent and cross-boundary management activities.

Independent activities	*p*†	Already do	Might do	Probably will not do
Improve wildlife habitat	*.001*	0.24[a]	0.01[a]	–0.86[b]
Plant high-value trees for future sale as timber	*.000*	0.00[a]	0.71[b]	–0.42[a]
Plant vegetation to provide privacy from neighbors & roads	*.508*	0.04	0.06	–0.17
Grow small plots of specialized crops (e.g., fruits or vegetables) that can be sold locally for a profit	*.000*	0.41[a]	0.61[a]	–0.37[b]
Graze livestock	*.000*	0.39[a]	0.57[a]	–0.39[b]
Remove exotic (non-native) plant species like kudzu	*.000*	1.00[a]	0.35[b]	–0.34[c]
Kill vines growing in trees	*.000*	0.50[a]	–0.05[b]	–0.41[b]
Use a prescribed fire (controlled burn) to manage the forest	*.000*	0.25[a]	0.45[a]	–0.30[b]
Use herbicides or pesticides to control weeds and insects	*.162*	0.18	0.07	–0.22
Prune or cut down selected trees to improve scenic views	*.001*	0.18[a]	0.23[a]	–0.49[b]
Prune or cut down selected trees to improve timber value	*.000*	0.85[a]	0.62[a]	–0.63[b]
Prune or cut down selected trees to improve forest health	*.000*	0.56[a]	0.08[b]	–0.85[c]
Regularly inspect the condition of my land	*.001*	0.21[a]	–0.44[ab]	–0.83[c]
Have my soil tested	*.361*	0.13	0.03	–0.28
Develop a written management plan for my land	*.000*	0.85[a]	0.31[b]	–0.43[c]
Cross-boundary activities				
Work with my neighbors to control insect and disease outbreaks	*.129*	0.19	0.06	–0.43
Hire the same forester or natural resource professional as my neighbors	*.001*	0.48[a]	0.26[ab]	–0.40[b]
Talk about my land with my neighbors	*.000*	0.37[a]	–0.02[a]	–0.68[b]
Work with my neighbors to connect wildlife corridors across shared property boundaries	*.003*	0.24[a]	0.14[a]	–0.55[b]
Share management plans with my neighbors	*.000*	0.81[a]	0.15[b]	–0.55[c]
Share road access with my neighbors	*.000*	0.29[a]	0.17[a]	–0.55[b]
Work with an environmental organization such as The Nature Conservancy to manage my land in a way that is healthy for the land	*.004*	–0.30‡	0.19	–0.42
Work with local or state government to manage my land in a way that is healthy for the land	*.001*	0.56[a]	0.14[a]	–0.48[b]
Work with the federal government to manage my land in a way that is healthy for the land	*.002*	1.23[a]	0.10[b]	–0.22[b]

* Scale ranged from –3 (strongly disagree) to +3 (strongly agree).

† ANOVA, $p < .05$ indicates a significant difference among groups.

‡ Unequal group sizes obscured the post hoc test, but it is clear that the "might do" group is different than the other two groups.

[a,b,c] Mean attitudes were not significantly different for groups with the same superscript (Duncan's post hoc comparisons).

Table D.9. Willingness* to accept less money for a timber harvest conducted to protect other forest qualities among three groups of new Virginia landowners that differ by level of participation in independent and cross-boundary management activities.

Independent activities	$p^{\dagger}$	Already do	Might do	Probably will not do
Improve wildlife habitat	*.001*	0.77[a]	0.63[a]	–0.14[b]
Plant high-value trees for future sale as timber	*.000*	1.12[a]	0.97[a]	0.28[b]
Plant vegetation to provide privacy from neighbors & roads	*.149*	0.80	0.47	0.57
Grow small plots of specialized crops (e.g., fruits or vegetables) that can be sold locally for a profit	*.028*	0.75‡	0.84	0.45
Graze livestock	*.001*	0.72[ab]	0.96[a]	0.37[b]
Remove exotic (non-native) plant species like kudzu	*.000*	1.33[a]	0.96[a]	0.25[b]
Kill vines growing in trees	*.048*	0.85[a]	0.57[ab]	0.40[b]
Use a prescribed fire (controlled burn) to manage the forest	*.100*	0.86	0.76	0.48
Use herbicides or pesticides to control weeds and insects	*.590*	0.70	0.53	0.63
Prune or cut down selected trees to improve scenic views	*.653*	0.54	0.68	0.55
Prune or cut down selected trees to improve timber value	*.000*	1.21[a]	0.87[a]	0.27[b]
Prune or cut down selected trees to improve forest health	*.006*	0.80[a]	0.66[a]	0.15[b]
Regularly inspect the condition of my land	*.141*	0.69	0.42	0.21
Have my soil tested	*.112*	0.69	0.64	0.21
Develop a written management plan for my land	*.000*	1.38[a]	0.83[b]	0.26[c]
Cross-boundary activities				
Work with my neighbors to control insect and disease outbreaks	*.002*	0.69[a]	0.69[a]	–0.04[b]
Hire the same forester or natural resource professional as my neighbors	*.000*	1.19[a]	0.90[a]	0.08[b]
Talk about my land with my neighbors	*.001*	0.81[a]	0.64[a]	0.00[b]
Work with my neighbors to connect wildlife corridors across shared property boundaries	*.002*	0.72[a]	0.73[a]	0.14[b]
Share management plans with my neighbors	*.000*	0.96[a]	0.79[a]	0.11[b]
Share road access with my neighbors	*.009*	0.77[a]	0.72[a]	0.27[b]
Work with an environmental organization such as The Nature Conservancy to manage my land in a way that is healthy for the land	*.000*	1.00‡	0.79	0.11
Work with local or state government to manage my land in a way that is healthy for the land	*.000*	1.44[a]	0.76[b]	–0.04[c]
Work with the federal government to manage my land in a way that is healthy for the land	*.001*	1.64[a]	0.70[b]	0.37[b]

* Scale ranged from –3 (strongly disagree) to +3 (strongly agree).

† ANOVA, $p < .05$ indicates a significant difference among groups.

‡ Unequal group sizes obscured the post hoc test, but it appears that the "probably will not do" group is different than the other two groups.

[a,b] Mean attitudes were not significantly different for groups with the same superscript (Duncan's post hoc comparisons).

APPENDIX E
Differences in Perceived Constraints

Table E.1. Total number of acres owned by new Virginia landowners who identified constraints to independent and cross-boundary management activities.

	Independent			Cross-boundary		
Constraint	p^*	$\bar{x}_{yes}$	$\bar{x}_{no}$	p	$\bar{x}_{yes}$	$\bar{x}_{no}$
I never thought about it.	*.975*	51.6	51.9	*.019*	34.3	60.4
I prefer to let nature take its own course.	*.344*	44.6	55.1	*.366*	42.4	54.4
I don't have the equipment I would need to do these things.	*.022*	34.2	59.8	*.117*	36.4	56.3
I don't own enough land for anything I do to matter.	*.000*	16.8	66.4	*.001*	15.0	60.1
I don't have the money to do these things.	*.484*	46.0	54.1	*.838*	54.0	51.5
My land isn't suited for these uses.	*.002*	26.2	61.7	–	–	–
I don't have the time to do these things.	*.847*	53.4	51.2	*.468*	44.7	54.0
I don't know how to do these things.	*.245*	41.7	55.4	*.055*	32.4	57.1
I don't want to do these things.	*.957*	52.3	51.6	*.635*	45.9	53.1
I don't know where to get advice about these things.	*.730*	47.9	52.6	*.313*	38.3	54.1
I worry that these things might harm the health of the land.	*.207*	66.8	48.9	–	–	–
I don't spend enough time on my land to keep up with these things.	*.142*	30.6	54.5	–	–	–
I am not physically able to do these things.	*.708*	58.0	51.2	*.801*	56.8	51.7
I don't know where to get the equipment I would need to do these things.	*.166*	27.5	53.9	*.215*	26.4	53.7
I worry that these things might decrease my property value.	*.084*	82.1	49.1	*.416*	70.9	51.2
I don't trust the advice I get about doing these things.	*.179*	87.2	50.4	*.167*	87.1	50.6
I probably won't live here long enough to worry about what happens to the land.	*.429*	29.9	52.5	*.419*	32.4	53.0
I'm too old to worry about what happens to the land.	*.786*	44.3	52.0	*.651*	38.6	52.5
I worry about losing control over my land.	–	–	–	*.165*	63.7	47.6
My current management practices don't harm the regional ecosystem.	–	–	–	*.338*	60.1	49.0
I don't trust the government.	–	–	–	*.220*	63.7	48.6
I don't know what my neighbors do with their land.	–	–	–	*.872*	54.0	51.7
I don't trust environmental organizations.	–	–	–	*.037*	78.1	47.6
I don't know my neighbors.	–	–	–	*.563*	44.5	53.3
I prefer not to do business with my neighbors.	–	–	–	*.805*	48.5	52.6
I don't believe land fragmentation is a threat to regional ecological health.	–	–	–	*.886*	54.8	51.9
I don't trust my neighbors.	–	–	–	*.874*	48.9	52.3

* ANOVA, $p < .05$ indicates a significant difference between groups.

Table E.2. Attitudes* about property rights (based on index score) held by new Virginia landowners who identified constraints to independent and cross-boundary management activities.

Constraint	Independent			Cross-boundary		
	$p^{\dagger}$	$\bar{x}_{yes}$	$\bar{x}_{no}$	p	$\bar{x}_{yes}$	$\bar{x}_{no}$
I never thought about it.	*.620*	0.49	0.55	*.216*	0.63	0.48
I prefer to let nature take its own course.	*.942*	0.53	0.53	*.087*	0.34	0.58
I don't have the equipment I would need to do these things.	*.392*	0.60	0.50	*.886*	0.55	0.53
I don't own enough land for anything I do to matter.	*.308*	0.62	0.49	*.559*	0.60	0.52
I don't have the money to do these things.	*.351*	0.45	0.56	*.932*	0.52	0.53
My land isn't suited for these uses.	*.555*	0.58	0.51	–	–	–
I don't have the time to do these things.	*.352*	0.45	0.56	*.890*	0.52	0.54
I don't know how to do these things.	*.193*	0.65	0.49	*.211*	0.67	0.50
I don't want to do these things.	*.239*	0.42	0.57	*.065*	0.28	0.57
I don't know where to get advice about these things.	*.824*	0.50	0.54	*.596*	0.61	0.52
I worry that these things might harm the health of the land.	*.433*	0.63	0.51	–	–	–
I don't spend enough time on my land to keep up with these things.	*.120*	0.77	0.50	–	–	–
I am not physically able to do these things.	*.861*	0.50	0.53	*.865*	0.57	0.53
I don't know where to get the equipment I would need to do these things.	*.460*	0.67	0.52	*.744*	0.60	0.53
I worry that these things might decrease my property value.	*.898*	0.56	0.53	*.568*	0.67	0.52
I don't trust the advice I get about doing these things.	*.027*	–0.09	0.56	*.008*	–0.19	0.56
I probably won't live here long enough to worry about what happens to the land.	*.684*	0.65	0.53	*.241*	0.23	0.54
I'm too old to worry about what happens to the land.	*.013*	–0.20	0.56	*.219*	0.14	0.54
I worry about losing control over my land.	–	–	–	*.000*	0.16	0.68
My current management practices don't harm the regional ecosystem.	–	–	–	*.709*	0.50	0.54
I don't trust the government.	–	–	–	*.000*	0.06	0.68
I don't know what my neighbors do with their land.	–	–	–	*.142*	0.35	0.57
I don't trust environmental organizations.	–	–	–	*.000*	–0.09	0.64
I don't know my neighbors.	–	–	–	*.887*	0.51	0.53
I prefer not to do business with my neighbors.	–	–	–	*.152*	0.31	0.56
I don't believe land fragmentation is a threat to regional ecological health.	–	–	–	*.011*	0.03	0.57
I don't trust my neighbors.	–	–	–	*.995*	0.53	0.53

* Scale ranged from –3 (strong support for protecting individual property rights) to +3 (strong support for limiting individual property rights).

† ANOVA, $p < .05$ indicates significant difference between those who selected constraint and those who didn't.

Table E.3. Levels* of trust in foresters (based on index score) held by new Virginia landowners who identified constraints to independent and cross-boundary management activities.

Constraint	Independent			Cross-boundary		
	$p^{\dagger}$	$\bar{x}_{yes}$	$\bar{x}_{no}$	p	$\bar{x}_{yes}$	$\bar{x}_{no}$
I never thought about it.	*.274*	0.31	0.42	*.927*	0.37	0.38
I prefer to let nature take its own course.	*.612*	0.34	0.39	*.257*	0.26	0.40
I don't have the equipment I would need to do these things.	*.876*	0.37	0.38	*.071*	0.21	0.42
I don't own enough land for anything I do to matter.	*.396*	0.31	0.40	*.673*	0.33	0.39
I don't have the money to do these things.	*.153*	0.27	0.42	*.103*	0.24	0.42
My land isn't suited for these uses.	*.901*	0.37	0.38	–	–	–
I don't have the time to do these things.	*.161*	0.49	0.34	*.022*	0.59	0.32
I don't know how to do these things.	*.523*	0.32	0.39	*.869*	0.36	0.38
I don't want to do these things.	*.842*	0.36	0.38	*.082*	0.17	0.41
I don't know where to get advice about these things.	*.356*	0.28	0.40	*.232*	0.23	0.40
I worry that these things might harm the health of the land.	*.560*	0.31	0.39	–	–	–
I don't spend enough time on my land to keep up with these things.	*.410*	0.49	0.36	–	–	–
I am not physically able to do these things.	*.721*	0.32	0.38	*.989*	0.37	0.38
I don't know where to get the equipment I would need to do these things.	*.520*	0.27	0.39	*.709*	0.31	0.38
I worry that these things might decrease my property value.	*.372*	0.23	0.39	*.105*	0.72	0.36
I don't trust the advice I get about doing these things.	*.201*	0.04	0.39	*.000*	–0.52	0.41
I probably won't live here long enough to worry about what happens to the land.	*.326*	0.13	0.39	*.241*	0.12	0.39
I'm too old to worry about what happens to the land.	*.056*	–0.15	0.39	*.305*	0.07	0.38
I worry about losing control over my land.	–	–	–	*.018*	0.20	0.45
My current management practices don't harm the regional ecosystem.	–	–	–	*.484*	0.32	0.40
I don't trust the government.	–	–	–	*.000*	0.08	0.47
I don't know what my neighbors do with their land.	–	–	–	*.168*	0.23	0.41
I don't trust environmental organizations.	–	–	–	*.002*	0.03	0.44
I don't know my neighbors.	–	–	–	*.277*	0.25	0.40
I prefer not to do business with my neighbors.	–	–	–	*.053*	0.11	0.41
I don't believe land fragmentation is a threat to regional ecological health.	–	–	–	*.856*	0.41	0.37
I don't trust my neighbors.	–	–	–	*.034*	–0.03	0.40

* Scale ranged from –3 (low trust in foresters) to +3 (high trust in foresters).

† ANOVA, $p < .05$ indicates a significant difference between groups.

Table E.4. Attitudes* about clearcutting on land owned by lumber or paper companies held by new Virginia landowners who identified constraints to independent and cross-boundary management activities.

	Independent			Cross-boundary		
Constraint	$p^{\dagger}$	$\bar{x}_{yes}$	$\bar{x}_{no}$	p	$\bar{x}_{yes}$	$\bar{x}_{no}$
I never thought about it.	*.978*	–0.30	–0.30	*.283*	–0.42	–0.24
I prefer to let nature take its own course.	*.777*	–0.27	–0.31	*.462*	–0.18	–0.33
I don't have the equipment I would need to do these things.	*.916*	–0.31	–0.29	*.505*	–0.40	–0.27
I don't own enough land for anything I do to matter.	*.237*	–0.44	–0.24	*.422*	–0.44	–0.27
I don't have the money to do these things.	*.842*	–0.27	–0.31	*.700*	–0.35	–0.28
My land isn't suited for these uses.	*.302*	–0.43	–0.25	–	–	–
I don't have the time to do these things.	*.828*	–0.27	–0.31	*.533*	–0.20	–0.32
I don't know how to do these things.	*.110*	–0.51	–0.23	*.164*	–0.52	–0.25
I don't want to do these things.	*.307*	–0.16	–0.34	*.181*	–0.04	–0.34
I don't know where to get advice about these things.	*.054*	–0.63	–0.23	*.013*	–0.81	–0.22
I worry that these things might harm the health of the land.	*.837*	–0.34	–0.29	–	–	–
I don't spend enough time on my land to keep up with these things.	*.647*	–0.20	–0.31	–	–	–
I am not physically able to do these things.	*.565*	–0.44	–0.29	*.799*	–0.37	–0.29
I don't know where to get the equipment I would need to do these things.	*.392*	–0.52	–0.28	*.107*	–0.79	–0.27
I worry that these things might decrease my property value.	*.009*	0.38	–0.36	*.052*	0.38	–0.33
I don't trust the advice I get about doing these things.	*.237*	0.19	–0.32	*.671*	–0.48	–0.29
I probably won't live here long enough to worry about what happens to the land.	*.589*	–0.52	–0.29	*.983*	–0.31	–0.30
I'm too old to worry about what happens to the land.	*.589*	–0.52	–0.29	*.714*	–0.12	–0.30
I worry about losing control over my land.	–	–	–	*.003*	0.06	–0.45
My current management practices don't harm the regional ecosystem.	–	–	–	*.883*	–0.28	–0.31
I don't trust the government.	–	–	–	*.034*	0.00	–0.39
I don't know what my neighbors do with their land.	–	–	–	*.324*	–0.13	–0.33
I don't trust environmental organizations.	–	–	–	*.002*	0.28	–0.40
I don't know my neighbors.	–	–	–	*.440*	–0.15	–0.32
I prefer not to do business with my neighbors.	–	–	–	*.553*	–0.17	–0.32
I don't believe land fragmentation is a threat to regional ecological health.	–	–	–	*.033*	0.28	–0.35
I don't trust my neighbors.	–	–	–	*.786*	–0.22	–0.31

* Scale ranged from –3 (strong disapproval of clearcutting) to +3 (strong support for clearcutting).

† ANOVA, $p < .05$ indicates a significant difference between groups.

Table E.5. Attitudes* about clearcutting on land owned by the federal government held by new Virginia landowners who identified constraints to independent and cross-boundary management activities.

	Independent			Cross-boundary		
Constraint	$p^{\dagger}$	$\bar{x}_{yes}$	$\bar{x}_{no}$	p	$\bar{x}_{yes}$	$\bar{x}_{no}$
I never thought about it.	*.903*	–0.76	–0.78	*.743*	–0.74	–0.79
I prefer to let nature take its own course.	*.969*	–0.78	–0.77	*.812*	–0.74	–0.79
I don't have the equipment I would need to do these things.	*.973*	–0.77	–0.78	*.660*	–0.84	–0.76
I don't own enough land for anything I do to matter.	*.437*	–0.87	–0.74	*.633*	–0.86	–0.76
I don't have the money to do these things.	*.885*	–0.76	–0.78	*.767*	–0.82	–0.76
My land isn't suited for these uses.	*.210*	–0.93	–0.72	–	–	–
I don't have the time to do these things.	*.571*	–0.70	–0.80	*.410*	–0.65	–0.81
I don't know how to do these things.	*.563*	–0.70	–0.80	*.924*	–0.79	–0.77
I don't want to do these things.	*.699*	–0.72	–0.79	*.469*	–0.64	–0.80
I don't know where to get advice about these things.	*.195*	–0.99	–0.73	*.041*	–1.18	–0.72
I worry that these things might harm the health of the land.	*.518*	–0.89	–0.75	–	–	–
I don't spend enough time on my land to keep up with these things.	*.298*	–0.55	–0.80	–	–	–
I am not physically able to do these things.	*.763*	–0.70	–0.78	*.444*	–0.56	–0.79
I don't know where to get the equipment I would need to do these things.	*.662*	–0.88	–0.77	*.225*	–1.13	–0.75
I worry that these things might decrease my property value.	*.007*	–0.10	–0.84	*.036*	–0.07	–0.81
I don't trust the advice I get about doing these things.	*.009*	0.32	–0.81	*.971*	–0.76	–0.78
I probably won't live here long enough to worry about what happens to the land.	*.427*	–0.45	–0.79	*.900*	–0.73	–0.78
I'm too old to worry about what happens to the land.	*.901*	–0.72	–0.78	*.284*	–0.27	–0.79
I worry about losing control over my land.	–	–	–	*.980*	–0.77	–0.78
My current management practices don't harm the regional ecosystem.	–	–	–	*.224*	–0.92	–0.72
I don't trust the government.	–	–	–	*.987*	–0.78	–0.78
I don't know what my neighbors do with their land.	–	–	–	*.184*	–0.55	–0.82
I don't trust environmental organizations.	–	–	–	*.181*	–0.53	–0.82
I don't know my neighbors.	–	–	–	*.695*	–0.70	–0.79
I prefer not to do business with my neighbors.	–	–	–	*.201*	–0.49	–0.81
I don't believe land fragmentation is a threat to regional ecological health.	–	–	–	*.052*	–0.25	–0.82
I don't trust my neighbors.	–	–	–	*.864*	–0.83	–0.77

* Scale ranged from –3 (strong disapproval of clearcutting) to +3 (strong support for clearcutting).

† ANOVA, $p < .05$ indicates a significant difference between groups.

Table E.6. Attitudes* about clearcutting on land owned by state or local government held by new Virginia landowners who identified constraints to independent and cross-boundary management activities.

	Independent			Cross-boundary		
Constraint	$p^{\dagger}$	$\bar{x}_{yes}$	$\bar{x}_{no}$	p	$\bar{x}_{yes}$	$\bar{x}_{no}$
I never thought about it.	*.988*	–0.75	–0.75	*.980*	–0.76	–0.75
I prefer to let nature take its own course.	*.964*	–0.75	–0.76	*.826*	–0.72	–0.76
I don't have the equipment I would need to do these things.	*.980*	–0.76	–0.75	*.664*	–0.82	–0.74
I don't own enough land for anything I do to matter.	*.576*	–0.82	–0.73	*.813*	–0.79	–0.75
I don't have the money to do these things.	*.774*	–0.72	–0.77	*.748*	–0.80	–0.74
My land isn't suited for these uses.	*.136*	–0.94	–0.68	–	–	–
I don't have the time to do these things.	*.659*	–0.70	–0.77	*.508*	–0.66	–0.78
I don't know how to do these things.	*.657*	–0.70	–0.77	*.843*	–0.78	–0.75
I don't want to do these things.	*.562*	–0.68	–0.78	*.501*	–0.63	–0.77
I don't know where to get advice about these things.	*.167*	–0.98	–0.71	*.041*	–1.15	–0.69
I worry that these things might harm the health of the land.	*.342*	–0.92	–0.72	–	–	–
I don't spend enough time on my land to keep up with these things.	*.357*	–0.55	–0.78	–	–	–
I am not physically able to do these things.	*.847*	–0.71	–0.76	*.509*	–0.57	–0.77
I don't know where to get the equipment I would need to do these things.	*.594*	–0.88	–0.74	*.194*	–1.13	–0.73
I worry that these things might decrease my property value.	*.020*	–0.16	–0.81	*.032*	–0.03	–0.79
I don't trust the advice I get about doing these things.	*.010*	0.32	–0.79	*.921*	–0.71	–0.76
I probably won't live here long enough to worry about what happens to the land.	*.413*	–0.43	–0.77	*.729*	–0.63	–0.76
I'm too old to worry about what happens to the land.	*.968*	–0.74	–0.75	*.335*	–0.31	–0.77
I worry about losing control over my land.	–	–	–	*.936*	–0.74	–0.76
My current management practices don't harm the regional ecosystem.	–	–	–	*.173*	–0.92	–0.69
I don't trust the government.	–	–	–	*.980*	–0.76	–0.75
I don't know what my neighbors do with their land.	–	–	–	*.286*	–0.57	–0.79
I don't trust environmental organizations.	–	–	–	*.146*	–0.49	–0.80
I don't know my neighbors.	–	–	–	*.844*	–0.72	–0.76
I prefer not to do business with my neighbors.	–	–	–	*.277*	–0.52	–0.78
I don't believe land fragmentation is a threat to regional ecological health.	–	–	–	*.060*	–0.26	–0.79
I don't trust my neighbors.	–	–	–	*.806*	–0.83	–0.75

* Scale ranged from –3 (strong disapproval of clearcutting) to +3 (strong support for clearcutting).

† ANOVA, $p < .05$ indicates a significant difference between groups.

Table E.7. Attitudes* about clearcutting on privately owned land held by new Virginia landowners who identified constraints to independent and cross-boundary management activities.

	Independent			Cross-boundary		
Constraint	$p^{\dagger}$	$\bar{x}_{yes}$	$\bar{x}_{no}$	p	$\bar{x}_{yes}$	$\bar{x}_{no}$
I never thought about it.	*.988*	0.04	0.04	*.793*	0.02	0.06
I prefer to let nature take its own course.	*.457*	0.13	0.00	*.401*	0.18	0.01
I don't have the equipment I would need to do these things.	*.789*	0.01	0.06	*.424*	–0.08	0.08
I don't own enough land for anything I do to matter.	*.709*	0.09	0.02	*.317*	0.22	0.01
I don't have the money to do these things.	*.456*	0.14	0.00	*.891*	0.03	0.05
My land isn't suited for these uses.	*.217*	–0.12	0.10	–	–	–
I don't have the time to do these things.	*.332*	0.17	0.00	*.056*	0.35	–0.03
I don't know how to do these things.	*.154*	–0.15	0.11	*.973*	0.04	0.05
I don't want to do these things.	*.878*	0.02	0.05	*.348*	0.24	0.2
I don't know where to get advice about these things.	*.090*	–0.26	0.10	*.013*	–0.47	0.12
I worry that these things might harm the health of the land.	*.432*	–0.10	–0.07	–	–	–
I don't spend enough time on my land to keep up with these things.	*.224*	0.31	0.01	–	–	–
I am not physically able to do these things.	*.320*	0.30	0.02	*.349*	0.32	0.03
I don't know where to get the equipment I would need to do these things.	*.164*	–0.32	0.08	*.188*	–0.36	0.07
I worry that these things might decrease my property value.	*.065*	0.54	0.00	*.320*	0.40	0.03
I don't trust the advice I get about doing these things.	*.056*	0.86	0.01	*.845*	0.13	0.04
I probably won't live here long enough to worry about what happens to the land.	*.925*	0.00	0.04	*.137*	0.65	0.02
I'm too old to worry about what happens to the land.	*.083*	0.80	0.02	*.156*	0.68	0.03
I worry about losing control over my land.	–	–	–	*.072*	0.28	–0.04
My current management practices don't harm the regional ecosystem.	–	–	–	*.957*	0.04	0.05
I don't trust the government.	–	–	–	*.206*	0.23	–0.01
I don't know what my neighbors do with their land.	–	–	–	*.443*	0.18	0.02
I don't trust environmental organizations.	–	–	–	*.015*	0.52	–0.03
I don't know my neighbors.	–	–	–	*.760*	0.11	0.04
I prefer not to do business with my neighbors.	–	–	–	*.070*	0.46	0.00
I don't believe land fragmentation is a threat to regional ecological health.	–	–	–	*.036*	0.64	0.00
I don't trust my neighbors.	–	–	–	*.684*	–0.09	0.06

* Scale ranged from –3 (strong disapproval of clearcutting) to +3 (strong support for clearcutting).

† ANOVA, $p < .05$ indicates a significant difference between groups.

Table E.8. Agreement* with the statement, "I would be willing to harvest a few trees and saw them up for lumber using a small, portable two-person sawmill" by new Virginia landowners who identified constraints to independent and cross-boundary management activities.

	Independent			Cross-boundary		
Constraint	$p^{\dagger}$	$\bar{x}_{yes}$	$\bar{x}_{no}$	p	$\bar{x}_{yes}$	$\bar{x}_{no}$
I never thought about it.	*.286*	–0.11	0.08	*.765*	–0.03	0.03
I prefer to let nature take its own course.	*.144*	–0.17	0.09	*.083*	–0.29	0.08
I don't have the equipment I would need to do these things.	*.861*	–0.01	0.02	*.165*	0.23	–0.05
I don't own enough land for anything I do to matter.	*.000*	–0.69	0.30	*.000*	–0.81	0.19
I don't have the money to do these things.	*.549*	0.09	–0.02	*.514*	0.11	–0.02
My land isn't suited for these uses.	*.009*	–0.34	0.14	–	–	–
I don't have the time to do these things.	*.970*	0.01	0.01	*.653*	–0.06	0.03
I don't know how to do these things.	*.543*	–0.07	0.04	*.686*	–0.06	0.03
I don't want to do these things.	*.041*	–0.29	0.11	*.506*	–0.13	0.03
I don't know where to get advice about these things.	*.420*	0.16	–0.02	*.003*	0.65	–0.09
I worry that these things might harm the health of the land.	*.642*	0.10	–0.01	–	–	–
I don't spend enough time on my land to keep up with these things.	*.006*	–0.65	0.09	–	–	–
I am not physically able to do these things.	*.005*	–0.75	0.08	*.087*	–0.51	0.05
I don't know where to get the equipment I would need to do these things.	*.751*	–0.08	0.02	*.899*	0.05	0.01
I worry that these things might decrease my property value.	*.504*	0.20	–0.01	*.833*	–0.07	0.02
I don't trust the advice I get about doing these things.	*.979*	0.00	0.01	*.115*	0.67	–0.02
I probably won't live here long enough to worry about what happens to the land.	*.013*	–1.10	0.05	*.004*	–1.16	0.06
I'm too old to worry about what happens to the land.	*.020*	–1.05	0.05	*.452*	–0.38	0.02
I worry about losing control over my land.	–	–	–	*.032*	0.30	–0.10
My current management practices don't harm the regional ecosystem.	–	–	–	*.524*	0.09	–0.02
I don't trust the government.	–	–	–	*.916*	0.03	0.01
I don't know what my neighbors do with their land.	–	–	–	*.886*	0.04	0.01
I don't trust environmental organizations.	–	–	–	*.060*	0.38	–0.05
I don't know my neighbors.	–	–	–	*.655*	–0.08	0.03
I prefer not to do business with my neighbors.	–	–	–	*.074*	–0.42	0.06
I don't believe land fragmentation is a threat to regional ecological health.	–	–	–	*.007*	0.80	–0.05
I don't trust my neighbors.	–	–	–	*.973*	0.00	0.01

* Scale ranged from –3 (strongly disagree) to +3 (strongly agree).

† ANOVA, $p < .05$ indicates a significant difference between groups.

Table E.9. Willingness* to accept less money for a timber harvest conducted to protect other forest qualities among new Virginia landowners who identified constraints to independent and cross-boundary management activities.

	Independent			Cross-boundary		
Constraint	p†	$\bar{x}_{yes}$	$\bar{x}_{no}$	p	$\bar{x}_{yes}$	$\bar{x}_{no}$
I never thought about it.	*.072*	0.43	0.69	*.006*	0.32	0.73
I prefer to let nature take its own course.	*.303*	0.49	0.65	*.057*	0.33	0.66
I don't have the equipment I would need to do these things.	*.971*	0.60	0.60	*.778*	0.56	0.61
I don't own enough land for anything I do to matter.	*.000*	0.13	0.79	*.001*	0.10	0.71
I don't have the money to do these things.	*.242*	0.47	0.65	*.362*	0.49	0.64
My land isn't suited for these uses.	*.528*	0.53	0.63	–	–	–
I don't have the time to do these things.	*.807*	0.63	0.59	*.377*	0.48	0.63
I don't know how to do these things.	*.126*	0.78	0.54	*.775*	0.56	0.61
I don't want to do these things.	*.608*	0.54	0.62	*.082*	0.30	0.65
I don't know where to get advice about these things.	*.747*	0.65	0.59	*.218*	0.82	0.57
I worry that these things might harm the health of the land.	*.492*	0.71	0.58	–	–	–
I don't spend enough time on my land to keep up with these things.	*.189*	0.35	0.63	–	–	–
I am not physically able to do these things.	*.208*	0.32	0.63	*.373*	0.38	0.62
I don't know where to get the equipment I would need to do these things.	*.350*	0.39	0.62	*.041*	0.05	0.64
I worry that these things might decrease my property value.	*.203*	0.30	0.63	*.389*	0.33	0.61
I don't trust the advice I get about doing these things.	*.921*	0.57	0.60	*.943*	0.63	0.60
I probably won't live here long enough to worry about what happens to the land.	*.099*	0.00	0.62	*.022*	–0.15	0.63
I'm too old to worry about what happens to the land.	*.001*	–0.62	0.64	*.193*	0.06	0.62
I worry about losing control over my land.	–	–	–	*.054*	0.81	0.52
My current management practices don't harm the regional ecosystem.	–	–	–	*.770*	0.63	0.59
I don't trust the government.	–	–	–	*.925*	0.61	0.60
I don't know what my neighbors do with their land.	–	–	–	*.892*	0.58	0.60
I don't trust environmental organizations.	–	–	–	*.523*	0.71	0.58
I don't know my neighbors.	–	–	–	*.689*	0.67	0.59
I prefer not to do business with my neighbors.	–	–	–	*.258*	0.38	0.63
I don't believe land fragmentation is a threat to regional ecological health.	–	–	–	*.502*	0.43	0.61
I don't trust my neighbors.	–	–	–	*.282*	0.89	0.58

* Scale ranged from –3 (strongly disagree) to +3 (strongly agree).

† ANOVA, $p < .05$ indicates a significant difference between groups.

VITA

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PhD, Forestry 2003
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Instructor	**Introduction to Geography**	2002 – present
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Against The Clock (an Imprint of Prentice-Hall Publishing), Tampa, FL

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Marketing Manager 2000 – 2001
Cardium Health Services, Simsbury, CT

Sales Manager 1999 – 2000
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PUBLICATIONS

Kendra, A. (2003). *Writing Companion for the Digital Artist*. Prentice-Hall. Upper Saddle River, NJ.

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Kendra, A. (1995). White-tailed deer. Educational insert for youth in *Pennsylvania Forests* magazine.

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Fulco, M. and A. Kendra. (August 2001). Employer partnerships for coronary artery disease prevention: An effective health improvement strategy. First National CDC Prevention Conference on Heart Disease and Stroke, Atlanta, GA.

Kendra, A. and R. B. Hull. (June 2000). Segmenting the market of Virginia's new forest owners: Improving efforts to communicate with new residents of a parcelized landscape. 8th International Symposium on Society and Resource Management, Bellingham, WA.

Kendra, A. M. and R. B. Hull. (September 1999). Small landowners' perceptions of the "ideal" forest. Society of American Foresters Convention, Portland, OR.

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Hull, R. B., D. Robertson, and A. Kendra. (April 1999). Perceived indicators of environmental health. National Conference on Environmental Decision Making, Knoxville, TN.

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Hull, R. B. and Kendra, A. (February 1998). Aesthetics, Naturalness or Health: Which Criteria Should the Public Use to Judge Management of Natural Landscapes? 7th International Symposium on Society and Resource Management, Columbia, MO.

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